Fisheries and Oceans Canada
Pêches et Océans Canada

Ecosystems and Oceans Science
Sciences des écosystèmes et des océans

Canadian Science Advisory Secretariat (CSAS)

Proceedings Series 2022/017

Ontario and Prairie Region

Proceedings of the Regional Peer Review on the Validation of Metrics Selected to Report on the State of Fish and Fish Habitat in the Ontario and Prairie Region Priority Areas: Part 1

Meeting dates: June 29–30, 2021
Location: Virtual meeting

Chairpersons: Joclyn Paulic and Glenn Benoy
Editors: Chandra Rodgers, Matthew Teillet and Adam Rego

Freshwater Institute
Fisheries and Oceans Canada
501 University Crescent
Winnipeg, Manitoba, R3T 2N6

April 2022

Canada

Foreword

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

TABLE OF CONTENTS

SUMMARY

Fisheries and Oceans Canada (DFO) has committed to producing three (3) spatial or area-based reports on the State of Fish and Fish Habitat (SOFFH) in Canada by March 31, 2023. These will serve as a means of reporting on the progress of implementing a modernized *Fisheries Act*, and demonstrating results of a revitalized Fish and Fish Habitat Protection Program (FFHPP). The FFHPP in the Ontario & Prairie (O&P) Region have selected two (2) priority areas to develop their own SOFFH reports on: the Lower Great Lakes Area in Ontario, and the Eastern Slopes Region of Alberta. Six (6) environmental indicators were selected to represent the SOFFH, and seventeen (17) metrics were proposed to inform those indicator categories. Each priority area will be divided into assessment units (e.g., tertiary watersheds). Data informing each indicator will be consolidated and the 'state' of each metric will be reported based on threshold classifications (e.g., Excellent, Good, Fair, Marginal, Poor) for each assessment unit. The science advice on validation of metrics and ultimately the identification of thresholds will be developed in a two-part CSAS process. This first part, held on a virtual platform on June 29–30, 2021, was a workshop to provide a preliminary review of the proposed metrics with a larger team of experts for the two priority areas and to identify feasibility and accessibility of monitoring data. The second part will be a full CSAS peer-review to identify thresholds for the validated metrics. This second part will occur at a later time.

This Proceedings report summarizes the relevant discussions and recommendations received on the indicators and metrics proposed during this first part of this CSAS process. Additional publications from this process will be posted on the DFO [Canadian Science Advisory Secretariat](#) (CSAS) website as they become available.

INTRODUCTION

On August 28, 2019, a new *Fisheries Act* came into force with modernizations to help safeguard fish and protect the environment. As an indicator of progress towards the goals of the modernized *Fisheries Act* and a revitalized Fish and Fish Habitat Protection Program (FFHPP), Fisheries and Oceans Canada (DFO) has committed to producing three (3) spatial or area-based reports on the State of Fish and Fish Habitat in Canada by March 31, 2023.

Under section 2.1 of the *Fisheries Act*, "The purpose of the Act is to provide a framework for a) the proper management and control of fisheries; and b) the conservation and protection of fish and fish habitat, including by preventing pollution." The fish and fish habitat protection provisions are regulations that enable DFO to make decisions to conserve, protect and restore fish and fish habitat. Many of these regulations directly or indirectly outline pressures on fish and fish habitat, and legislative tools that can be used to protect them. Ontario & Prairie (O&P) Region's 'State of Fish and Fish Habitat' (SOFFH) report will, to the extent possible, report on these pressures as a measure of how the O&P region is managing and protecting its aquatic resources. Due to the nature of the environment and the *Fisheries Act*, these pressures are often broadly described and generally do not have specific goals or targets specified in the *Fisheries Act*. As a result, environmental indicators will be required to describe these pressures.

To guide the development of a regional SOFFH report, O&P Region has set out clear definitions and outlined a step-by-step approach to develop their reports for each priority area. All six (6) DFO regions have expressed a desire to present report(s) on the 'SOFFH', but regions have different priorities, capacities and long-term objectives so not all regions will use the same approach as O&P in the use of indicators/metrics in their reports. However, all regional reports will be organized under a consolidated national report that describes the similarities and differences in the approaches taken.

The O&P Region's SOFFH report will focus on freshwater and support the identification of environmental indicators and associated metrics for each indicator (definitions for these provided in Appendix 1). These metrics will be used to provide a snapshot assessment of the current environmental SOFFH in the reporting area. The FFHPP–O&P Region has selected two (2) reporting areas upon which to report: The Lower Great Lakes area in Ontario, and the Eastern Slopes area of Alberta.

The reporting areas will be divided into assessment units (to be determined; e.g., tertiary watersheds) that will be mapped and information on the 'state' of each metric in each unit will be displayed on those maps. 'State' refers to a classification of the assessment unit and will range from poor to excellent (e.g., excellent, good, fair, poor, unknown). In order to map the state of these metrics, thresholds need to be identified for each metric to classify them into a particular 'state'.

The values for thresholds will become part of this approach and should be considered in the context of allowing the analysis of trends over time for metrics and associated changes in state. This factor is a consideration when selecting environmental indicators and metrics. A SOFFH report may also be used to guide the identification of restoration priorities or areas for protection. The ability to understand trends over the longer-term will be especially useful for understanding the impacts of management actions, as well as natural and anthropogenic habitat alterations, whether positive or negative.

A short list of potential environmental indicators and metrics for each reporting area has been developed (Appendix 2). FFHPP has requested Science to provide advice on the merit of the selected metrics for each priority area that could then be used to further develop defensible

thresholds or benchmarks for reporting on the current (~5 years from 2015–2019) SOFFH in the future.

The science advice on validation of metrics and ultimately the identification of thresholds will be developed in a two-part Canadian Science Advisory Secretariat (CSAS) process. This first part was a workshop to provide a preliminary review of the proposed metrics with a larger team of experts for the two (2) priority areas and to identify feasibility and accessibility of monitoring data. The second part will be a full CSAS peer-review based on an analysis of data that supports the agreed upon metrics to identify thresholds. This second part of this CSAS meeting will take place at a later time after the advice received from this Part 1 meeting has been considered and appropriate data has been compiled.

The objectives of this CSAS peer-review meeting, as described in the Terms of Reference (Appendix 3), were to:

1. Provide an information session on the modernizations of the Fisheries Act and how it pertains to the objectives and timelines for the SOFFH reporting;

2. Provide an overview of the regional approach and definitions;

3. Review the indicators and metrics that were proposed;

4. Review available existing information on metrics and available data for the two (2) priority areas (Lower Great Lakes Area of Ontario and East Slopes of Alberta) to determine appropriate metrics for reporting, and;

5. Identify working paper needs and objectives for the Terms of Reference for Part 2.

A peer-review meeting was held on a virtual platform on June 29–30, 2021 to target these objectives. Meeting participants included DFO, provincial governments for the selected priority areas, environmental non-governmental organizations (ENGO), conservation authorities (CA) and academic experts (Appendix 4). This meeting followed the agenda outlined in Appendix 5. A presentation on the CSAS process was presented by one of the co-chairs. During this presentation it was emphasized that this CSAS peer-review meeting will focus on the scientific data and information and not on socio-economic considerations.

This Proceedings report summarizes the relevant discussions and recommendations received during the meeting. Additional publications from this process will be posted on the DFO [Canadian Science Advisory Secretariat](#) (CSAS) website as they become available.

PRESENTATION

STATE OF FISH AND FISH HABITAT REPORTING

Presenters: Todd Schwartz and Sarah Matchett (DFO)

Rapporteur: Chandra Rodgers

Summary

On August 28, 2019, a new *Fisheries Act* came into force with modernizations to help safeguard fish and protect the environment. As part of showing progress towards implementation of this modernized Act, DFO has committed to developing a minimum of three (3) spatially based reports on the SOFFH by March 31, 2023. While the national approach for meeting this commitment is evolving, and other Regions are also developing approaches for contributing to this commitment, O&P Region has decided to produce regional SOFFH reports that provide information on various environmental indicators and metrics of fish and habitat status (e.g.,

health), as well as indicators describing DFO management actions and efforts. This CSAS peer-review will focus on the environmental indicators that O&P is considering. Management indicators will be developed separately from this process. The O&P Region has decided to produce a data-driven SOFFH report with some similarities to the [WWF State of Canada's Watersheds Reports](#) (WWF-Canada 2020). This includes watershed maps with colour-coded ratings for individual indicators within watersheds that can be incorporated into the report. Ratings can be based on Quantitative Measurement (e.g., Excellent, Good, Fair, Marginal, Poor) or Risk Based (e.g., Negligible, Low, Moderate, Elevated, High) depending on the metric being measured and the information available. The regional approach will aim to focus on freshwater habitats using data collected in recent years (2015+), and with a general focus on environmental indicators that DFO has the legislative ability to influence.

Key terms (e.g., pressure, environmental indicator, metric, threshold, reporting area and assessment unit) were defined and regional work to date (e.g., framework development, indicator and metric selection) was discussed. The presentation gave a further overview of the regional framework, which identifies the two (2) selected priority areas (the Rocky Mountain Eastern Slopes and the Lower Great Lakes Area watersheds), as well as the six (6) selected environmental indicators (Biodiversity, Connectivity, Land Use, Extent, Water Quality, and Water Quantity) and each of the metrics selected as options for reporting on those higher-level indicators.

DISCUSSION

QUESTIONS & CLARIFICATIONS

Rapporteur: Chandra Rodgers

Amalgamation of indicators into an ultimate 'state'

Several participants warranted caution around combining indicators into one final 'SOFFH' ranking map. Concerns primarily focused on how the indicators would be combined (e.g., weighting of different importance depending on the indicator), as well as addressing cumulative effects within the approach to getting the final ranks.

While it was not clarified specifically within this CSAS meeting, the intent of O&P's final product is not to produce one final map outlining an ultimate ranking for the 'SOFFH' per watershed. Rather, the final intent is to produce six (6) broad view maps for each priority area, one map per indicator. Ideally, these separate indicator maps can be used to better inform cumulative effects assessments at a later time.

Cumulative Effects

Caution was advised by several participants when looking at indicators separately. Even though each indicator might be deemed a 'good' or 'moderate' state, the cumulative effects of all of these indicators combined might actually result in poor ecosystem health. Likewise, caution was warned in combining metrics into a single indicator result, since the cumulative effects of each separate metric could be impacting the ecosystem as a whole.

In the Eastern Slopes breakout group session, one participant demonstrated a Shiny application that models cumulative effects and pressures for multiple watersheds in Alberta. The application uses simulations to show how different pressures will be an issue for various trout fish species in the Eastern Slopes. While the application looks at cumulative effects modeling, it was suggested that it may be helpful for the SOFFH report. To the point made above, it was also

mentioned that this application demonstrates how some individual indicators may appear to be in a 'good' state but when combined with others, the cumulative pressures result in poor overall habitat.

Another participant stated that this is not meant to be a cumulative effects assessment but rather a snapshot in time. It was clarified that a cumulative effects assessment must come from a specific planning process. The data used for this SOFFH report may be incorporated into a cumulative effects assessment in the future but that cumulative effects assessment needs to go one step further and consider values from stakeholders and communities as well. One of the co-chairs clarified that the SOFFH report will be the first step in identifying zones to focus on, and then a model (e.g., Joe model; MacPherson et al. 2020) or another cumulative assessment tool could be used later to focus management decisions.

Further reassurance was given by a steering committee member that O&P Region's regulatory review program may use this SOFFH report for information, but it is not the only information they use in their decision-making (e.g., they also consider Fisheries Management Objectives, other data sources, local experts, etc.).

There was still strong desire among participants for a similar SOFFH report that does not look at individual metrics or indicators, but rather looks at an integration and assessment of many different metrics and their interactions, such as cumulative effects assessment. It was mentioned by a steering committee member that there is a cumulative effects working group within DFO and that the desire for this could be passed along to that team.

Protocol for metrics selection

One participant wondered what level of scanning has been done to date on current existing report cards in the two (2) selected O&P priority areas, and how those have been used to finalize the current list of proposed indicators and metrics.

Another participant described that a long list of metrics was compiled based on current communications to the public on the SOFFH. The long list of metrics was then narrowed down to the 17 proposed in this meeting based on two factors: (1) Metrics that DFO generally has the regulatory ability to influence, and (2) Metrics that the client (FFHPP) thought they could practically get data for and report on by the March 2023 deadline. The specific sources for where each of the proposed metrics were found within other organization's report cards and the rationale for including them or excluding them from the final presented list was not provided for this exercise.

Recurrence of reporting

One participant asked whether this would be a one-time report, or a recurring report. While there are currently no further national commitments that O&P is aware of for SOFFH reporting beyond the March 2023, the thought from the regional FFHPP group is that they may continue to produce and/or update regional reports like this in future years.

Lower Great Lakes Boundaries

Some participants requested that a decision be made on geographic boundaries for the Lower Great Lakes priority area. The steering committee met shortly after the first day of this workshop and decided on the following:

- Inshore data is to be included in the report.

- Nearshore data will be considered for the report because nearshore habitat is not included in the current 'State of Great Lakes' reports and thus was considered a reporting gap. It was noted, however, that some bounds would need to be set around the definition of nearshore and how far into offshore habitat the data should span. Specific bounds for nearshore were not identified during this meeting. However, one participant mentioned that nearshore in the Great Lakes has been defined as 30 m depth at low water level. They further specified that in some cases there is a distance measure as well to account for areas where the zone of 30 m is quite extensive (e.g., western basin of Lake Erie). Littoral depth (around 10 m) has also been used. In the coastal or wave zone, 2 m at Low Water Datum has been used. It was identified that an upland boundary also will need to be set for all the zones.

- Offshore data will not be included in the report on the SOFFH. Reporting on offshore ecosystem health is already being done through other means (e.g., Environment and Climate Change Canada [ECCC] and U.S. Environmental Protection Agency [EPA] reporting on State of the Great Lakes). Furthermore, it was advised that reporting on only the Canadian portion of the Great Lakes would be a misrepresentation of what is occurring in the Great Lakes as a whole. In order to minimize duplication of efforts and avoid causing confusion around reporting on similar metrics as other organizations, the steering committee decided to omit offshore data from this reporting. Some of the participants still expressed desire for including the offshore data for the Great Lakes stating that while there is relatively little that DFO manages offshore in the Great Lakes, there is still a lot of public interest in fish and fish habitat in the offshore areas of the Great Lakes.

Scale

It was clarified that resolution of this report would ideally be at a quaternary watershed scale but that the resolution of the data compiled during this meeting would help determine the scale to which DFO can report.

Audience and end-user

Several participants asked for clarification on the end-user of this report. One participant clarified that the O&P Region's report will be used for several purposes:

1. Communication to the public for better transparency and awareness on the SOFFH; and,

2. Communication to DFO senior management to inform them of the effectiveness of management tools, as well as identify areas that could benefit from additional DFO management actions. These actions could include prioritizing areas for restoration (e.g., offsetting, habitat banking, or Grants and Contributions) or for conservation (e.g., Ecologically Significant Area).

Proposed Objectives

Based on the above clarifications and questions, a couple of participants suggested that the following four (4) objectives be considered for the SOFFH Reporting:

1. To report to the public on the State of Fish and Fish Habitat

2. To support decision-making that affects the State of Fish and Fish Habitat

3. To track changes in the State of Fish and Fish Habitat, especially relative to DFO's management responsibilities for fish and fish habitat under the Fisheries Act

4. Identify data gaps to inform and prioritize future assessment and monitoring efforts.

There was agreement among several participants that the gap analysis is one of the most important parts of this SOFFH reporting. Specifically, it will help to spatially identify conservation, protection and restoration priority areas, and in turn, direct public resources to areas where they can have the most impact.

RECOMMENDATIONS

Rapporteur: Chandra Rodgers

Overlap of data with other ENGO and Conservation Authority report cards

There was some concern that the goals for this project are already being met by other organizations (e.g., Watershed Report Cards by Conservation Ontario, and WWF watershed reports). To avoid duplicating the efforts of existing reports, several alternative options were suggested by participants on how to format O&P Region's SOFFH Report.

1. Develop a narrative report outlining a compilation of existing federal, provincial, ENGO, and conservation authority 'state of' report cards (e.g., under the Connectivity indicator, DFO would point to Canadian Wildlife Federation barrier database). For a map, DFO could then re-calibrate the data and thresholds in those existing reports into a consistent, comparable threshold across DFO's priority areas. This kind of 'state of' analysis would also identify data gaps.

2. Point to existing reports for watershed areas where these kinds of 'state of' data and analyses have already been completed by other organizations, but DFO's report could fill in the gaps for the state of areas that currently don't have reports consolidated. DFO's state of reports would need to be aligned with the analyses of other organizations in order to best compare.

If the original proposed plan to consolidate existing datasets and analysis is decided, strong caution was warranted around setting thresholds and reporting potentially different outcomes on overlapping areas that already have public reports.

Reporting on metrics outside of DFO's mandate

Several participants voiced disagreement on both Day 1 and 2 of this meeting with the approach of only reporting on metrics that DFO manages. It was understood by these participants that reporting on DFO mandate-relevant metrics is most useful for DFO management, but it was stressed that that does not represent a true SOFFH if it does not report comprehensively on other metrics of state, such as nutrient levels. Furthermore, it was stated that the public does not often make the distinction between what is within and outside of DFO's mandate. If reporting to the public on SOFFH is truly the primary objective, then the report should encompass all 'state' data, not just data that informs environmental factors over which DFO has mandate. It was thus recommended by several participants to include a more comprehensive and representative list of fish and fish habitat metrics in this report.

An FFHPP client participant mentioned that the process was still open to recommendations to improve the metrics and that those suggestions could be discussed. It was, however, also mentioned that the SOFFH regional team is awaiting further direction from DFO's National Capital Region on what the national consistency will be (which could include direction on whether the metrics should be DFO mandate specific). It was also reiterated that this report is not meant to be a cumulative effects assessment (which would include a more comprehensive list of factors affecting fish and fish habitat), but rather this report should include a smaller selection of indicators and metrics for which the client can reasonably consolidate data, analyze

and develop a report on by the March 2023 deadline. The recommendation to use an alternate, more representative set of metrics was noted as something to be discussed with the regional SOFFH team.

Categorization of metrics

There was substantial discussion around the categorization of the metrics proposed, with many participants commenting that some of the proposed metrics are actually human-induced pressures that drive a change (e.g., barriers to fish passage). Other proposed metrics were agreed to be representative of the SOFFH among participants, but some were thought to be metrics that would inform the state of the fish (e.g., species richness) while others were metrics that would inform the state of the habitat (e.g., water temperature, dissolved oxygen). The steering committee agreed and put category labels beside each proposed metric to reflect its proper grouping (i.e., metric indicating a pressure, state of fish or state of habitat). It was strongly recommended by several participants to organize the SOFFH report by these categories.

The Conservation Standards framework was recommended by some participants as a way of choosing the best indicators and metrics. Conservation Standards is an international process for identifying a suite of biodiversity features, such as fish and fish habitat, that would be representative of the system. In this case, the Biodiversity Features Identification stage would help to identify the most representative features for each of O&P Region's two selected priority areas. The Key Attributes stage would then help identify the most important components of those biodiversity features. Finally, metrics would then be developed in association with the key attributes for each priority area. These metrics would be measurable, quantitative approaches to inform the area's important attributes and thus, their most representative biodiversity features. It was advised that the authors of this proposed SOFFH report go through the Biodiversity Features Identification and Key Ecological Attributes phases in particular to ensure that the metrics being used in the report are truly representative of the areas.

Another suggestion on how to format the SOFFH Report was to report data in layers. For example, 1) Where is it? (location/extent), 2) What is it? (describe the habitat – physical, biological, chemical) and 3) What condition is it in? (water quality/land use/etc. – the pressures).

Weighting of metrics

One participant suggested weighting the metrics according to their relative importance within the indicators (e.g., within the Biodiversity indicator, DFO could weigh the presence of a species at risk (SAR) as a 'more influential' metric than species richness; thus, the presence of SAR may have a weight of 0.35 versus low species richness which may hold a weight of 0.10, so if there is very low species richness, but there is a SAR species present, the sum of the different weights would possibly bump the Biodiversity indicator to 'good' or 'excellent', because SAR presence was deemed to be a more 'influential' metric). It was discussed that thus far, the client has not investigated weighting individual metrics within the indicators, but that valuation of the metrics and how they contribute towards thresholds will be discussed in the SOFFH CSAS Part 2. Regardless, the SOFFH team was aware that there will be immense amounts of data for each priority area and that these data need to be summarized in a way that is both easily understandable to the public and scientifically meaningful.

Definition of State and Baselines

Several participants recommended including a definition for 'State', because it could have several interpretations, in turn, changing what types of metrics are relevant to report. One participant proposed the following definitions:

State of Fish – the diversity, composition, and abundance of fish relative to the naturally occurring community.

State of Fish Habitat – the ability of areas to support the life processes of aquatic organisms relative to the natural function of the area (consistent with the *Fisheries Act* definition of habitat).

Another participant questioned what historical baselines the "state of…" data will ultimately be compared to. Where possible, it was thought that historical baselines should be determined *a priori*, to establish a reference point to which we could compare data. A member of the steering committee, however, thought this may lead to a cumulative effects assessment. While some metrics may require some baseline comparison (e.g., flow deviation from normal), a goal of this report is to provide information on the current state as a snapshot in time, rather than report on trends. There may be a possibility to report on trends in future reports, using these 2023 reports *as* the baseline, but for now the 2023 report will give DFO a starting point so that they can begin looking at what the state is now.

Setting Thresholds

While science advice on thresholds will be sought for Part 2 of this CSAS process, there were some preliminary thoughts brought forth in this Part 1 meeting.

Firstly, there was some discussion around what a 'good' state might be. In some cases, a non-pristine state is still good fish habitat. But what is good in one area may also be bad in another. Furthermore, what is good habitat for some fish species might be bad habitat for others. For example, cloudy and warm waters might be a good habitat for one species, but a bad habitat for another. Likewise, barriers may be bad for migration of some species, but may also preserve a species at risk or inhibit access for aquatic invasive species. These same factors could thus be considered 'good' or 'bad' depending on the context. As such, the factors that deem one metric 'good' or 'bad' may depend on the specific area, watershed or species. Caution was warranted around generalizing thresholds for habitats because those thresholds might differ by area or user of the habitat.

In addition, it was pointed out that functional state and natural state are different, but either could be considered as a baseline within a threshold-setting exercise. Some additional consideration by the SOFFH steering committee was requested with respect to how thresholds would be set at a later date (i.e., comparing current state to a functional state or a pristine state to define a habitat as 'poor', 'moderate', 'good' or 'excellent').

While these topics were agreed to be discussed with the steering committee, it was also mentioned that there is likely to be a narrative portion with this SOFFH report, and as such, caution on some of these pieces can be added to the report.

BREAKOUT SESSIONS

Lower Great Lakes

Rapporteur: Adam Rego; Editor: Chandra Rodgers

General comments and recommendations

The dominant discussion starting off the Lower Great Lakes breakout group focused on boundaries; what areas of the Great Lakes would be included in the SOFFH report. One of the participants included a map of the proposed boundaries. This was later discussed with the steering committee and was addressed in the plenary meeting on Day 2.

Several points that were raised in the plenary session were also reiterated in this breakout session. Namely, that a lot of work has already been done on similar reports and concern was raised that this report would be repeating efforts already put forth by others. Furthermore, concern was raised that additional metrics need to be considered to report more comprehensively and appropriately on the SOFFH. One participant suggested that if certain key metrics are not going to be included in this SOFFH report (e.g., nutrients), then these metrics should at least be noted somewhere in the report as important key components.

A recommendation by one participant was to use one or two representative, sensitive species (such as Brook Trout [*Salmo trutta*]) where there is a lot of data available and might represent the SOFFH.

Participants then reviewed a shared Excel spreadsheet, entering readily available datasets for the Lower Great Lakes that could contribute to watershed-level data for each proposed metric. Each Indicator (in **bold** below) was presented on a separate tab of the Excel file. The proposed metrics for each indicator were identified in their appropriate indicator tab. Participants were asked to fill in the spreadsheet with datasets that they knew existed for that metric, identify the custodian of those datasets, and to comment on whether the proposed metrics were appropriate for that indicator. Results of this exercise will be presented in a supplementary data report (Rodgers et al. in prep.[1]). General comments made within this group on each indicator are outlined below.

Biodiversity

- With the biodiversity indicator appearing to represent the 'State of Fish' section, one participant suggested using the Northern Development, Mines, Natural Resources and Forestry (NDMNRF) broad-scale monitoring data to include important metrics such as abundance and/or biomass. This participant mentioned that some of the inland systems have this kind of data, but if they don't, it is also of high value to see which areas are data-deficient.

- Caution was warranted around using metrics like species richness, because the sensitivity of a metric like this is low. It is unlikely to change in 5 years, unless you happen to have an extirpation, or a human-mediated introduction of a species. There are also cases where habitat conditions can be getting worse but there is a lag time for the species to respond to that change. It was advised to revisit the metrics and think about their sensitivity and likelihood of showing a response or possibly a delayed response in future reports.

- One participant recommended separating fish and mussel metrics. This participant also recommended not only including the number of species that we have in a watershed as originally proposed, but also including the number of extirpated species, number of native species and number of depleted species. Further to this point, another participant noted that COSEWIC species ratings might be important to include in the biodiversity section as well to capture the species that are depleting but would not yet be listed as a species at risk.

- There was some confusion around whether to include non-native species within this report, or if a distinction should be made within the biodiversity section of the report on native species versus non-native species.

---

[1] Rodgers, C. et al. In preparation. Data report on the State of Fish and Fish Habitat (SOFFH) indicators and metrics. Can. Data Rep. Fish. Aquat. Sci.

Water Quality

- One participant explained that in their similar 'state of' reporting, they used water quality indicators and metrics that link directly to aquatic life, such as chloride, nitrates and total phosphorus. They then set thresholds by identifying levels that were toxic or prevented excess plant growth. Data for those reports was taken mostly from the Provincial Water Quality Monitoring Network (PWQMN), so they recommended using that resource for this report. It was also mentioned by another participant that the Gordon Foundation is targeting the launch of their DataStream initiative for the Great Lakes in the fall 2021, so that could be a good resource for water quality data as well.

- There was a question around what scale water quality would be looked at since some sites have ample equipment and automated samplers, whereas other sites might only have occasional monitoring. It was thought that the lowest common denominator would likely need to be chosen for larger watershed consistency, but a steering committee member also mentioned that if there are areas that are data rich, it may be possible to highlight those areas as case studies in the report.

- One participant cautioned that the timing of data collections could alter the conclusion around 'state' of water quality, or other indicators. Nutrients, for example, could be present only for a short period of time or bound by sediment and not captured in a sample. If a single sample was taken it may or may not capture that variability in timing and thus may misinform a conclusion on the state.

- A participant mentioned that DFO tends to group nutrients under contaminants, but there are also new and emerging contaminants, such as estrogen and road salts that are becoming critical to the state of aquatic ecosystems. DFO funds a lot of this kind of research, so it was recommended that those types of contaminants be considered as part of this report as well.

Water Quantity

- One participant noted that, while data is not available everywhere, the Water Survey Canada has great data that could be used for this section of the report. Furthermore, it was also mentioned that the National Water Data Archive: HYDAT also includes a diverse compilation of water quantity and flow data.

- There were a few questions around what kind of data to include in the water quantity section. One participant was interested in seeing information around water abstraction. Another participant was interested in seeing groundwater included and there were additional questions around where to include wetlands.

- There were a few cautions around this indicator as well. Namely, like water quality sampling, it was mentioned that timing of flow data collections needs to be considered. It was also cautioned that high water marks and how fish habitat is defined within those fluctuating water levels will be important considerations within this indicator.

- It was unclear if the metric 'flow deviation from normal' was a pressure or a state of the habitat. One steering committee member said that they view the natural variation in the flow regime as a state of the habitat but that human activity affecting the flow regime would be considered a pressure. It was mentioned that the classification of this metric (i.e., a state of habitat or a pressure) needs to be determined, or different data sets would need to be placed under their appropriate heading. It was noted that it is important to distinguish these differences because pressures are things that management can act on, whereas the state of fish or state of habitat are the results of those actions.

Connectivity

- One participant mentioned that there is currently an exercise being completed by another organization to develop a list of priority low-head barriers for Sea Lamprey control and that this database would be very useful for the SOFFH report.

- It was reinforced by several participants that passability and barriers may be difficult to generalize because they mean different things for different fishes. Specifically, some fish may be able to pass a certain type of barrier, while other fish species cannot. Furthermore, a barrier may be withholding one species from expanding its range, but at the same time, may protect a species at risk. One participant suggested that it may be possible to divide barriers into different categories, such as dams, culverts, sea lamprey barriers, and that may better inform the level of passability.

- One participant mentioned that quantification of passability might be more of a localized metric and difficult to quantify at the watershed level. This participant recommended instead using a metric like 'proportion of habitat that is connected or accessible' and in this case, it could include water accessibility to fish coming in or out of the Lower Great Lakes. Alternatively, if it's in a river network, it was suggested that average or longest fragment length could be used, or possibly utilizing the Dendritic Connectivity Index. Several other participants agreed with this suggestion.

Land Use

- There was some confusion around the purpose of Land Use in the report. One participant mentioned that land use seems like it is indirectly related to fish and fish habitat and didn't see the benefit in having this as a key indicator for this report. Rather, they thought this data might be better woven indirectly into some of the other indicators. While in agreement, another participant noted, that there are some established relationships between land use and water quality (e.g., Chow-Fraser 2006).

Extent

- Like Land Use, one participant echoed that Extent as an indicator on its own does not directly relate to fish and fish habitat. There was also some confusion around what data this indicator was meant to capture.

- A few participants expressed desire for information on the physical habitat (e.g., square kilometers that supports cold water fish and square kilometers that supports warm water fish). It was suggested that this could be one component included in the narrative portion of the report.

- One participant recommended that at the very least, this indicator should include high water extent and low water extent. Biologists and management would use this information to identify areas with intermittently flooded habitat that could be important for different life stages of fish in each watershed.

- It was recommended that if these indicators were to be included, the Land Use and Extent indicators should be renamed 'Land-based' (or 'Physical habitat') and 'In-water' indicators respectively.

Eastern Slopes of Alberta

Rapporteur: Matthew Teillet; Editor: Chandra Rodgers

Participants went through a shared Excel spreadsheet, entering existing datasets for the Eastern Slopes that could contribute to filling in watershed-level data for each proposed metric.

Each Indicator (in **bold** below) was presented on a separate tab of the Excel file. The proposed metrics for each indicator were identified in their appropriate indicator tab. Participants were asked to fill in the spreadsheet with datasets that they knew existed for each metric, identify who the custodian of those datasets are, and were asked to comment on whether the proposed metrics were appropriate for that indicator. Results of this exercise will be presented in a supplementary data report[1]. General comments made within this group on each indicator are outlined below.

General comments and recommendations

Among several of the indicators, it was mentioned that data continuity and comparability are important factors to consider within the datasets being collected because methods have changed over the years and different methods have been used among different sampling sites. This inconsistency in data collection methods will have important implications when beginning to consider thresholds.

There was also some discussion around the natural interplay and correlations between some of the metrics currently being represented under different indicators. For example, it was mentioned that dissolved oxygen (water quality) and ice cover (water quantity) influence each other, but would be represented under different indicators within the presented framework. How these interconnections would be represented in the report was questioned and led to a broader conversation around cumulative effects.

Biodiversity

- One participant explained that the Alberta Fish and Wildlife database (FWMIS) might be a valuable data source for this report because data collected under an Alberta Fish Research License must be entered into FWMIS. Caution was warranted due to differing methodologies and completeness of data but it was agreed by several participants that this would be a valuable source of data.

- A participant mentioned that Ephemeroptera, Plecoptera, and Tricoptera (EPT) presence are scientifically acceptable indicators of good benthic macroinvertebrate richness. As such, the benthic invertebrates metric could be simplified by just assessing EPT.

- A participant warned that generalizing thresholds for species richness for every watershed may be misleading in its conclusions. For example, some headwater streams only have one species but it's supposed to be that way. Comparing those to other streams that contain more species may look problematic when it is actually not. The chair clarified that species richness and indices need to be relative to the norm in their thresholds.

- Similar to the Lower Great Lakes breakout group, there was some discussion around whether to include naturalized species. It was noted that, in some cases, maintaining the population of an introduced species is the desired state.

Water Quality

- One participant pointed out that ideal water quality depends on the species. For example, some fish need warm water with high turbidity whereas some need the opposite, so the metrics under this indicator will be difficult to generalize within thresholds as well. It was mentioned that reporting on a rate of change or deviation from the historical baselines may be more appropriate.

- One participant mentioned that ALCES Online might be a useful dataset for suspended solids and turbidity. This is an online tool available for land use data. It combines provincial datasets and contains data going back 100 years and thus might be helpful in defining

historical baselines. The data can be summarized regionally and exported. Furthermore, the tool can be used to look at specific species and how each variable will affect them. Another participant mentioned that this historic database could help define area-specific thresholds. A participant asked if ALCES is similar to the Road Erosion and Sediment Delivery Impact (READI) model being developed by the Alberta Ministry of Agriculture and Forestry. The participant confirmed that the READI model is similar to ALCES and has similar algorithms.

Water Quantity

- It was discussed that extreme hydrological events, both frequency and duration, could be used as a metric under water quantity. One participant mentioned that Indicators of Hydrologic Alteration for the 400 watersheds of the Eastern Slopes exists and there are updated maps that could be used.

- Several participants agreed that changes in river ice cover area, duration and breakup also have an impact on fish habitat and as such should be considered as a metric as well. Overwinter flow, overwinter habitat, and patchiness could also be included using current models, however, it was agreed that identifying overwintering habitats can be complex.

- Like the Lower Great Lakes breakout group, there were questions about where some other important water quantity/land use metrics would be included, such as groundwater, wetlands and floodplains.

Connectivity

- There was significant discussion on the topic of passability. One participant mentioned that ALCES has a connectivity heat map for the province of Alberta. In the model there are algorithms that predict passability, for example, at hanging culverts, dams and other structures. There are also layers for roads and stream order. The chair confirmed that certain barrier layers could help sort out good barriers that create fish habitat versus bad barriers that limit fish habitat.

- Some discussion led to the agreement among some participants that the Watercourse Crossing Program (WCP) may be a good source for data. It was caveated that the crossings survey may not have the most up-to-date data, but that the data should still be relatively accurate. However, it was also noted that some industry do not share their crossing information and that culvert data does not exist for some watersheds in the Eastern Slopes.

- A few participants challenged if barriers would be considered good or bad. A participant clarified that they have done modeling where barriers are usually a bad thing but at a tactical level, decisions are made for each barrier. A steering committee member confirmed that the final report will have a narrative section that can describe that some barriers may be good (e.g., holding back an aquatic invasive species) and some may be bad (e.g., preventing migration or access to spawning habitats).

- It was stated that there is data to support that culverts are generally in stream orders four (4) or less and that the percentage of impassable culverts generally never goes below 50%. A member of the steering committee questioned if there was a document summarizing this and if it could be used in other jurisdictions like Ontario. The participant confirmed that there is a CSAS document and that it could likely be used for this report.

Land use

- Like the Great Lakes group, clarification was needed on the intent of this indicator. It was clarified that this indicator was included to see how land use impacts the watershed as it relates to fish and fish habitat. A steering committee member further explained the desire to

have a measure within the report describing the intactness of upper watersheds and riparian zones, since these are major factors that can impact fish habitat. A participant suggested that 'Watershed intactness' might be a better indicator name.

- One participant recommended reporting on the pressures causing the change in fish and fish habitat, rather than simply on changes in land use. For example, rather than reporting on development, it was suggested that this report focus on the impacts of development (e.g., increased sediment, storm water runoff) on fish.

- Another participant commented that change in land use is more important than existing land use because you would want to determine how changing land use might affect, for example, the water budgets. Specifically, if there are major changes in land use in headwaters, there will be subsequent changes in the water budget and that will have consequences at a finer scale, for example, in channel morphology, sediment input, and fish habitat. It was noted however, that change in land use is a metric, not an indicator of the SOFFH.

- A participant mentioned that change in the shape of a channel's cross section could also be added as a metric (or replace sinuosity) using Rosgen Stream Classifications. It was noted that remote sensing and drone imagery can be used to determine these shape forms. However, caution was warranted by one participant in the use of sinuosity as a metric because changes may only be detected in topical imagery of highly meandering streams and overlook changes in vertical sinuosity and geomorphology.

- A participant mentioned that sensitivity depends on stream size as well, in that land use may impact a smaller stream more quickly than a large stream. For example, urban development may have an impact on the Bow River in Calgary but it won't have the same impact as development in several headwater streams. It was recommended to differentiate the watershed by stream order or stream size to account for changes in sensitivity.

- Several participants commented on access to maps and their possible utility within this indicator. One participant mentioned that in Google Maps (or Google Earth) you can see remnants of drained streams. Another participant mentioned that some GIS data and maps can be accessed through ESRI Canada. It was also mentioned that Natural Resources Canada (NRCan) has a lot of data for time series analyses and that ALCES would likely be useful too.

Extent

- Some participants agreed that Strahler stream order is the most consistent method used among scientists and would be appropriate to use in this exercise. Stream order was thought to be an important metric to include because it could alter how those watersheds get managed.

- One participant mentioned that watersheds in Alberta have data for "stream hectares by Strahler order" and a metric that says how much of that has been lost due to anthropogenic activities. There is also a dose response curve for each watershed that describes what those results will do to the fish population. These are potential pieces of Extent-related data that could be used for the SOFFH report.

- It was recommended that percent change may be better to report on for some of the metrics in Extent rather than just stating data itself (e.g., percent change in stream length over time versus just stream length). Likewise, it was mentioned that changes in the number of first order streams can also have an impact on fluvial geomorphology, sediments and nutrients, which all relate to habitat. Therefore, loss of, or changes in, first order streams may be important to include. However, a steering committee member reminded participants that this

first report likely will not describe trends over time, but rather will act as the current state. It may be possible to use this report as a baseline for reporting on trends in the future.

NEXT STEPS

Several next steps were identified by the steering committee and task team. Specifically,

1. Finalizing the compilation of knowledge on existing datasets relevant to each proposed metric. Breakout group spreadsheet access was left open to participants for additional dataset entries until July 12, 2021.

2. Making decisions on the structure of the regional SOFFH report based on the recommendations provided here, in conjunction with direction provided by the National Capital Region. Decision points based on the recommendations made in this CSAS meeting were compiled for the regional SOFFH task team and steering committee to discuss. A preliminary version can be reviewed in Appendix 6.

3. Contacting partners and custodians of datasets to determine what data can be utilized in this report.

4. Once data are consolidated for each priority area, FFHPP will seek science advice on the most appropriate methods for setting thresholds in determining the status of 'states' (e.g., Excellent, Good, Fair, Marginal, Poor) in a SOFFH CSAS Part 2.

REFERENCES CITED

Chow-Fraser, P. 2006. Development of the Wetland Water Quality Index (WQI) to assess effects of basin-wide land-use alteration on coastal marshes of the Laurentian Great Lakes. *In* Coastal wetlands of the Laurentian Great Lakes: health, habitat and indicators. Chapter 5. Edited by T.P. Simon and P.M. Stewart. Indiana Biological Survey, Bloomington, IND. pp. 354–366.

MacPherson, L., Sullivan, M., Reilly, J., and Paul, A. 2020. Alberta's Fisheries Sustainability Assessment: A Guide to Assessing Population Status, and Quantifying Cumulative Effects using the Joe Modelling Technique. DFO Can. Sci. Advis. Sec. Res. Doc. 2019/058. vii + 45 p.

WWF-Canada. 2020. 2020 Watershed Reports: A national reassessment of Canada's freshwater. Paquette C. Hemphill L. Merante A. Hendriks E. World Wildlife Fund Canada. Toronto, ON. 24 p.

APPENDIX 1. DEFINITIONS DISCUSSED AT MEETING

Term	Definition
Pressure	Human driven change in any chemical, physical, or biological entity that can cause an adverse effect to fish and fish habitat that is regulated under the *Fisheries Act* (2019), or is considered under the *Fish and Fish Habitat Protection Policy Statement* (2019), or other Acts that DFO is responsible for administering (e.g., SARA).
Environmental Indicators	Measurable factor(s) that contributes to or describes a Pressure. Environmental Indicators should be relevant to the pressure they describe. They should be scientifically sound, broadly accepted, and assessed geographically. They should be cost effective to monitor, measure, and/or model. They should be sensitive enough to show trends and detect changes in systems and provide relevant information to fisheries managers and policy makers to make decisions on trends and changes.
Metrics	Information that is directly measured to quantify an Environmental Indicator. Some Environmental Indicators may have one or multiple Metrics to describe them.
Thresholds	Measurable points for Metrics used to describe the Environmental Indicator where detrimental impacts or changes to the environment are likely, or where environmental management targets have been set. Thresholds can be based on Quantifiable biological parameters (e.g., pH 6 is the threshold below which fish and other aquatic species begin to decline), or an assessment of risk. The level of risk may be based on a target/goal (e.g., set by DFO) or it may be based on some other anthropogenic factor.
Reporting Areas	The geographic area that is reported on in the State of Fish and Fish Habitat. The scope of the Reporting Area can range from large areas including all of Canada to sub-watersheds, but can be selected by identifying areas that are of interest to our stakeholders and the public, have a DFO management story tell, and/or have an adequate amount of available data.
Assessment Unit	The geographic area where an Environmental Indicator is being assessed against thresholds. The scale of the Assessment Units are dependent upon the scope and scale of the Reporting Area and data available. These units can range from individual lake or stream segments to entire watersheds (e.g., Tertiary Watershed level, HUC8, Ontario Watershed Boundaries).

APPENDIX 2. INDICATORS AND METRICS DISCUSSED AT MEETING

Indicator	Metric
Biodiversity	• Fish Species Richness • Fish Biodiversity Index • Number of Aquatic Species at Risk (SAR) • Number of Aquatic Invasive Species (AIS) • Benthic Invertebrates – richness, index
Water Quality	• Total suspended solids, turbidity, water clarity • Temperature, dissolved oxygen
Water Quantity	• Flow deviation from normal (e.g., Indicators of Hydrologic Alteration etc.) • Lake deviation from normal
Connectivity	• Density of watercourse crossings and/or barriers • Quantification of passability if possible
Land Use	• % riparian vegetation along stream length in 5 m and 30 m buffer • Vegetation composition in 5 and 30 m buffer • Urban development vs. agricultural development vs forestry • Sinuosity
Extent	• Stream length (Area of streams, lakes and reservoirs) • Stream order

Validation of Metrics Selected to Report on the State of Fish and Fish Habitat in the Ontario and Prairie Region Priority Areas: Part 1

Regional Peer Review – Ontario and Prairie Region

June 29–30, 2021
Virtual Meeting

Chairpersons: Joclyn Paulic and Glenn Benoy

Context

On August 28, 2019, a new *Fisheries Act* came into force with modernizations to help safeguard fish and protect the environment. To implement the modernized Act, the Fish and Fish Habitat Protection Program (FFHPP) was 'revitalized' with new funding and resources, giving DFO more capacity to work with communities, partners, and stakeholders in freshwater and marine / coastal environments to undertake activities that will improve outcomes for fish and fish habitat through conservation, protection, and restoration. With these additional resources, FFHPP plans to improve how it reports to Canadians on both its own activities related to fish and fish habitat protection, as well as on the overall 'state' or health of species and aquatic habitats.

Under section 2.1 of the *Fisheries Act*, "The purpose of the Act is to provide a framework for a) the proper management and control of fisheries; and b) the conservation and protection of fish and fish habitat, including by preventing pollution." The *Fisheries Act* is divided into a number of sections with regulations that allow managers to manage fishes and the habitat that supports them. Many of these regulations directly or indirectly outline pressures on our fish and fish habitat, and legislative tools that can be used to protect them. The State of Fish and Fish Habitat should, to the extent possible, report on these pressures as a measure of how Canada is managing and protecting its aquatic resources. Due to the nature of the environment and the *Fisheries Act*, these pressures are often broadly described and generally do not have specific goals or targets specified in the *Fisheries Act*. As a result, environmental indicators will be required to describe these pressures.

To guide the development of a Regional State of Fish and Fish Habitat (SOFFH) report, Ontario and Prairie region have set out clear definitions and outlined a step by step approach to develop the report. Efforts are currently underway to adapt this approach nationally so that each DFO Region can produce one or more reports on the State of Fish and Fish Habitat and so that the reports all carry through the same narrative, and similar environmental indicators.

The State of Fish and Fish Habitat is focused on freshwater and supports the identification of environmental indicators and associated metrics for each indicator. The Indicators are intended to provide national consistency while related metrics are selected according to the availability of information in the reporting area. These metrics are used to provide a snapshot assessment of the current environmental State of Fish and Fish Habitat in the reporting area. Integrated Planning Operations – Ontario and Prairie Region has selected two (2) reporting areas upon which to report : The Lower Great Lakes Area in Ontario, and the East Slopes Region of Alberta.

The reporting areas will be divided into assessment units (to be determined, e.g., tertiary watersheds) that will be mapped and information on the 'state' of each metrics in each unit will be displayed on those maps. 'State' refers to a classification of the assessment unit and will range from bad to good (e.g., excellent, good, fair, poor, unknown). In order to map the state of these metrics, thresholds need to be identified for each metric as a cutoff point.

The values for thresholds will become part of this approach, and should be considered in the context of allowing the analysis of trends over time for metrics and associated changes in state. This factor is a consideration when selecting environmental indicators and metrics. A SOFFH report may also be used to guide the identification of restoration priorities or areas for protection. The ability to understand trends over the longer-term will be especially useful for understanding the impacts of both management actions and natural and anthropogenic habitat alterations.

A short list of potential environmental indicators and metrics for each reporting area has been developed. FFHPP has requested Science to provide advice on the merit of the selected metrics for each priority area that could then be used to further develop defensible thresholds or benchmarks for reporting on the current (~5 years from 2015–2019) State of Fish and Fish Habitat in the future.

The science advice on validation of metrics and ultimately the identification of thresholds will be developed in a two-part CSAS process. This first part is a workshop to provide a preliminary review of the proposed metrics with a larger team of experts for the two (2) priority areas and to identify feasibility and accessibility of monitoring data. The second part will be a full CSAS peer-review based on an analysis of data that supports the validated metrics to identify thresholds.

Objectives

The objectives of the peer-review meeting are to:

- Provide an information session on the modernizations of the *Fisheries Act* and how it pertains to the objectives and timelines for the State of Fish and Fish Habitat reporting;

- Provide an overview of the regional approach and definitions;

- Review the indicators and metrics that are proposed;

- Review available existing information on metrics and available data for the two priority areas (Lower Great Lakes of Ontario and East Slopes Region of Alberta) to determine appropriate metrics for reporting, and;

- Identify working paper needs and objectives for the Terms of Reference for Part 2.

Expected Publications

- Proceedings

Expected Participation

- Fisheries and Oceans Canada (DFO) (Science, Aquatic Ecosystems Management sectors)

- Province of Ontario

- Province of Alberta

- Cows and Fish Program

- Parks Canada

- Environment and Climate Change Canada

- Academics

- Other invited experts

APPENDIX 4. LIST OF MEETING PARTICIPANTS

Name	Organization/Affiliation
Adam Rego (Rapporteur)	DFO – Science, Ontario and Prairie Region
Amelia Atkin	DFO – Aquatic Ecosystems, National Capital Region
Andrew Doolittle	DFO – Aquatic Ecosystems, Ontario and Prairie Region
Andrew Drake	DFO – Science, Ontario and Prairie Region
Bev Ross	DFO – Aquatic Ecosystems, Ontario and Prairie Region
Chandra Rodgers (Rapporteur)	DFO – Aquatic Ecosystems, Ontario and Prairie Region
Cindy Chu	DFO – Science, Ontario and Prairie Region
Cody Dey	DFO – Science, National Capital Region
Doug Geiling	DFO – Science, Ontario and Prairie Region
Doug Watkinson	DFO – Science, Ontario and Prairie Region
Eva Enders	DFO – Science, Ontario and Prairie Region
Glenn Benoy (Co-Chair)	DFO – Science, National Capital Region
Haitham Ghamry	DFO – Science, Ontario and Prairie Region
Jacob Brownscombe	DFO – Science, Ontario and Prairie Region
Jason Shpeley	DFO – Aquatic Ecosystems, Ontario and Prairie Region
Jennifer Jung	DFO – Aquatic Ecosystems, Ontario and Prairie Region
Joclyn Paulic (Co-Chair)	DFO – Science, Ontario and Prairie Region
Jon Midwood	DFO – Science, Ontario and Prairie Region
Karen Smokorowski	DFO – Science, Ontario and Prairie Region
Lynn Bouvier	DFO – Science, Ontario and Prairie Region
Marten Koops	DFO – Science, Ontario and Prairie Region
Matt Teillet (Rapporteur)	DFO – Science, Ontario and Prairie Region
Paul Blanchfield	DFO – Science, Ontario and Prairie Region
Richard Kavanagh	DFO – Aquatic Ecosystems, Ontario and Prairie Region
Sarah Matchett	DFO – Aquatic Ecosystems, Ontario and Prairie Region
Sue Doka	DFO – Science, Ontario and Prairie Region
Todd Schwartz	DFO – Aquatic Ecosystems, Ontario and Prairie Region
Warren Currie	DFO – Science, Ontario and Prairie Region
Angela Wallace	Toronto and Region Conservation Authority
Brie Edwards	Ministry of the Environment, Conservation and Parks, Ontario
Colin Lake	Ontario Ministry of Natural Resources and Forestry
Don Jackson	University of Toronto
Fred Wrona	University of Calgary
Georgina Kaltenecker	Ministry of the Environment, Conservation and Parks, Ontario
Helen Ball	Ontario Ministry of Natural Resources and Forestry
Jack Imhof	Trout Unlimited Canada
Jeff Tyson	Great Lakes Fishery Commission
Laura MacPherson	Alberta Environment and Parks
Mark Poesch	University of Alberta

Name	Organization/Affiliation
Mike Sullivan	Alberta Environment and Parks
Nick Lapointe	Canadian Wildlife Federation
Paulette Penton	Ontario Ministry of Natural Resources and Forestry

APPENDIX 5. MEETING AGENDA

Validation of Metrics Selected to Report on the State of Fish and Fish Habitat in the Ontario and Prairie Region Priority Areas: Part 1

Regional Peer-Review

Ontario and Prairie Region

June 29–30, 2021

Virtual Meeting via Microsoft Teams

Chairpersons: Glenn Benoy and Joclyn Paulic

DAY 1 – TUESDAY, JUNE 29, 2021: State of Fish and Fish Habitat 101 (MDT time shown)

10:30 a.m. Welcome (Chairs)

- Participant Introductions
- Review Agenda
- Overview of CSAS peer review process
- Terms of Reference and Meeting Objectives

11:15 a.m. Framework for the State of Fish and Fish Habitat (SOFFH) & Looking Ahead (Presented by: Todd Schwartz and Sarah Matchett)

- Modernization of the *Fisheries Act* & how it pertains to the objectives and timelines for the SOFFH
- Overview of the SOFFH regional approach & definitions
- Focal areas and their selection in relation to the broader approach
- Overview of Regional Work-to-date
- Overview of Indicators & Metrics for each Indicator
- Long-term goals
- Discussion & Q&As

12:00 p.m. BREAK

12:20 p.m. Introduction to the breakout group sessions (Chairs)

12:30 p.m. Breakout Group Session – Part 1 (All)

- **Format**: 1 Great Lakes focal groups; 1 Eastern Slopes focal group. Each group to discuss all indicators (Biodiversity, Connectivity, Land Use, Extent, Water Quality, Water Quantity), and specific metrics for each.

2:20 p.m. Wrap-up and overview of plans for Day 2 of the workshop (Chairs)

2:30 p.m. Day 1 Complete!

DAY 2 – WEDNESDAY, JUNE 30, 2021: Breakout Sessions & Re-group (MDT time shown)

8:00 a.m. Welcome (Chairs)

8:15 a.m. Overview from Day 1 (Todd Schwartz)

- Refresher on the Indicators & metrics

- Overview of metric selection criteria,

- Overview of the State of Fish and Fish Habitat framework

- Addressing questions from Day 1

9:20 a.m. Breakout Group Session – Part 2 (All; *Continued from Day 1*)

- **Format**: 1 Great Lakes focal groups; 1 Eastern Slopes focal group. Each group to discuss all indicators (Biodiversity, Connectivity, Land Use, Extent, Water Quality, Water Quantity), and specific metrics for each.

10:30 a.m. BREAK

10:45 a.m. Re-group (Chairs)

- Review break out group results

- Summarize results

- Round-table wrap-up: issues/challenges, key points to consider

11:40 a.m. Wrap-up and Work Plan (Joclyn Paulic)

- Confirming next steps and progress needed prior to Part 2 of the Regional CSAS Peer Review Meeting

12:00 p.m. Meeting adjourned – THANK YOU!

APPENDIX 6. DECISION POINTS TABLE

Topic	Science recommendation	Decision	Rationale
Using 1–2 representative species	Use 1–2 representative species for fish and fish habitat (e.g., Brook trout) that are (1) sensitive, (2) have a lot of data available and 3) are representative of how other fish are doing	The SOFFH report will aim to include many species.	One goal of this report is its future use by DFO management to make better-informed decisions and recommendations around public allocations of resources. As such, including information on as many species as possible is important for DFO's intended use of the product.
Utilization of other SOFFH-related reports in our map/avoiding duplication of work by other reports	Options suggested were: 1. Develop a narrative report outlining a compilation of existing federal, provincial, conservation authority and ENGO 'state of' report cards (e.g., under the Connectivity indicator, DFO would point to CWF barrier database). For a map, DFO could then re-calibrate the data and thresholds in those existing reports into a consistent, comparable threshold across DFO's priority areas. No new data collection required. This kind of 'state of' analysis would also identify data gaps. 2. Point to existing reports for watershed areas where these kinds of 'state of' data and analyses have already been completed by other organizations, but DFO's report could *also* fill in the gaps for the state of areas that currently don't have reports consolidated. DFO's state of reports would need to be aligned with the analyses of other organizations in order to best compare. 3. (Original plan): Consolidate already collected independent datasets, set thresholds (methodology to be developed in SOFFH CSAS Part 2), mention that other reports exist in the narrative.	To be determined	To be determined

Topic	Science recommendation	Decision	Rationale
Reporting on metrics outside of DFO mandate	Recommended to report on metrics both within and outside of DFO mandate as a more comprehensive representation of a true 'State of Fish and Fish Habitat' rather than reporting only on metrics DFO has mandate over (as originally planned).	To be determined	To be determined
Categorization of metrics	Options suggested: 1. (Original plan) Do 6 maps, 1 per indicator (Biodiversity, Water Quality, Water Quantity, Connectivity, Land Use and Extent). Note that some of these are pressures and not a true indication of state of fish or state of habitat; 2. Do 17 maps, 1 per metric; speak to how metrics connect into indicator categories in the narrative; 3. Do 3 maps, 1 per NEW category; Re-categorize the metrics into Pressures, State of fish and State of Habitat; describe indicators within each category (*Science's recommendation*) OR 4. Use the Conservation Standards approach	#3: There will be 3 State of Fish and Fish Habitat health categories: (1) State of Fish, (2) State of Habitat, and (3) Pressures. Indicators and metrics will fit into these 3 categories.	During the SOFFH CSAS Part 1, it was strongly recommended by science to split the indicators and metrics into 3 categories: (1) State of Fish, (2) State of Habitat, and (3) Pressures. After the CSAS, Cindy Chu presented a proposal to the steering committee on how to re-structure the proposed indicators and metrics to fit more appropriately into those 3 categories. She provided rationale for including certain metrics in each category. The steering committee agreed that this is the approach that the SOFFH team will proceed with.
What are the nearshore bounds? And how will nearshore areas be sectioned on a final map?	Nearshore in the Great Lakes has been defined as 30 m depth at low water level. In some cases there is a distance measure as well to account for areas where the zone of 30m is quite extensive (e.g., western basin of Lake Erie). Littoral depth (around 10 m) has also been used. In the coastal or wave zone, 2 m at Low Water Datum has been used. An upland boundary also has to be set for all the zones above.	Will use ECCC boundaries	These boundaries have already been established by close partners. As such, the client will discuss with ECCC and request to use the nearshore boundaries that they have already established.

Topic	Science recommendation	Decision	Rationale
Are we including offshore in the report?	Some participants recommended NOT including offshore because (1) other already report on offshore and (2) reporting on only the Canadian portion would be a misrepresentation of what's going on in the whole lake. Conversely, others thought that the public still have interest in what's going on in the Great Lakes offshore.	Offshore excluded	(1) Others already reporting on offshore and (2) do not want to misrepresent what's going on in only the Canadian side of the lakes.
Desire for a definition of 'State'/ 'State of Fish' and 'State of Fish Habitat'	Proposed definitions: State of Fish – the diversity, composition, and abundance of fish relative to the naturally occurring community. State of Fish Habitat – the ability of areas to support the life processes of aquatic organisms relative to the natural function of the area (consistent with *Fisheries Act* definition of habitat).	To be determined	To be determined
Do we want to weigh metrics differently, according to their relative importance, into some final indicator 'score'?	Recommendation from science was to weight metrics to better represent an indicator.	**Do not need a decision on this yet. This can be decided in the Thresholds CSAS**	Determining thresholds will be part of the Objectives for the SOFFH CSAS Part 2
Do we want to include pressures in the report?	Advice was to include pressures	Pressures/Threats will be included.	Part of the departmental commitment to report on the State of Fish and Fish Habitat was to include relevant threats. As such, the term 'pressures' will be changed to 'threats' and will be reported on.

Topic	Science recommendation	Decision	Rationale
Reassess metrics to ensure they are sensitive?	Advised to re-assess metrics proposed to ensure they are all sensitive. Will we see a response quickly within future reports (e.g., in 5 years) if the habitat or species is changing OR if management actions something? Also encouraged to think about if there is a lag-time in response. Some metrics were specifically pointed out as ones that are not sensitive and/or will likely have a lag-time in response (e.g., species richness).	To be determined	To be determined