



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 2021/035

Pacific Region

Proceedings of the Pacific regional peer review on the Pre-COSEWIC Assessment for Canary Rockfish

**November 7, 2017
Nanaimo, British Columbia**

**Chairperson: Maria Cornthwaite
Editors: Lisa Lacko and Jill Campbell**

Fisheries and Oceans Canada
Science Branch
3190 Hammond Bay Road
Nanaimo, BC V9T 6N7

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.

Published by:

Fisheries and Oceans Canada
Canadian Science Advisory Secretariat
200 Kent Street
Ottawa ON K1A 0E6

<http://www.dfo-mpo.gc.ca/csas-sccs/>
csas-sccs@dfo-mpo.gc.ca



© Her Majesty the Queen in Right of Canada, 2021
ISSN 1701-1280

ISBN 978-0-660-40214-7 Cat. No. Fs70-4/2021-035E-PDF

Correct citation for this publication:

DFO. 2021. Proceedings of the Pacific regional peer review on the Pre-COSEWIC Assessment for Canary Rockfish; November 7, 2017. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2021/035.

Aussi disponible en français :

MPO. 2021. *Compte rendu de l'examen par les pairs de la région du Pacifique sur l'examen pré-COSEPAC concernant le sébaste canari; le 7 novembre 2017. Secr. can. de consult. sci. du MPO. Compte rendu. 2021/035.*

TABLE OF CONTENTS

SUMMARY	iv
INTRODUCTION	1
REVIEW	2
PRESENTATION OF WRITTEN REVIEWS	2
REVIEWER: PAUL J. STARR (PJS).....	2
REVIEWER: PAUL GRANT.....	4
GENERAL DISCUSSION	4
DATA.....	5
DEPTH.....	5
BIOLOGY	5
SURVEYS.....	6
THREATS	6
COMMERCIAL CATCH HISTORY AND CPUE.....	6
TOTAL ALLOWABLE CATCH.....	7
CATCH RECONSTRUCTION	7
WORKING PAPER RECOMMENDATIONS	7
DATA SOURCES.....	7
SPATIAL PLOTS AND HABITAT	7
DEPTHS.....	7
BIOLOGY	7
SURVEYS.....	8
THREATS	8
COMMERCIAL CATCH HISTORY AND CPUE.....	8
OTHER SOURCES OF DATA.....	8
TECHNICAL CORRECTIONS IN THE REVIEWS.....	8
SUMMARY AND CLOSING.....	8
ACKNOWLEDGEMENTS.....	9
REFERENCES.....	9
APPENDIX A: TERMS OF REFERENCE.....	10
PRE-COSEWIC ASSESSMENT FOR CANARY ROCKFISH.....	10
APPENDIX B: WORKING PAPER ABSTRACT.....	15
APPENDIX C: AGENDA.....	16
APPENDIX D: PARTICIPANTS.....	17

SUMMARY

These Proceedings summarize the relevant discussions and key conclusions that resulted from a Fisheries and Oceans Canada (DFO), Canadian Science Advisory Secretariat (CSAS) Regional Peer Review (RPR) meeting of November 7, 2017 at the Pacific Biological Station in Nanaimo, B.C. The working paper focusing on the pre-COSEWIC assessment of Canary Rockfish was presented for peer review.

In-person and web-based participation included personnel from Fisheries and Oceans Canada (DFO) Science and Fisheries Management, and external participants from First Nations, the commercial and recreational fishing sectors, environmental non-governmental organizations, academia, and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

After the meeting closed, additional work on the working paper was halted as in the meeting an updated catch reconstruction was requested which was beyond the scope of a pre-COSEWIC report. A full updated stock assessment was recommended.

INTRODUCTION

A Fisheries and Oceans Canada (DFO) Canadian Science Advisory Secretariat (CSAS), Regional Peer Review (RPR) meeting was held on November 7, 2017 at the Pacific Biological Station in Nanaimo to review the pre-COSEWIC assessment for Canary Rockfish.

The Terms of Reference (TOR) for the science review (Appendix A) were developed in response to a request for advice from Science Branch (Species at Risk). Notifications of the science review and conditions for participation were sent to representatives with relevant expertise from COSEWIC, First Nations, commercial and recreational fishing sectors, environmental non-governmental organizations, and academia.

The following working paper (WP) was prepared and made available to meeting participants prior to the meeting (working paper abstract provided in Appendix B):

Keppel, E.A., Rutherford, K.L., Olsen, N., Wyeth, M., and Workman, G.D. 2017. A Review of Canary Rockfish (*Sebastes pinniger*) along the Pacific coast of Canada: biology, distribution and abundance trends. CSAP Working Paper 2015SAR13.

The meeting Chair, Maria Cornthwaite, welcomed participants, reviewed the role of CSAS in the provision of peer-reviewed advice, and gave a general overview of the CSAS process. The Chair discussed the role of participants, the purpose of the various RPR publications (Proceedings and Research Document), and the definition and process around achieving consensus decisions and advice. Everyone was invited to participate fully in the discussion and to contribute knowledge to the process, with the goal of delivering scientifically defensible conclusions and advice. It was confirmed with participants that all had received copies of the Terms of Reference and working paper.

The Chair reviewed the Agenda (Appendix C) and the Terms of Reference for the meeting, highlighting the objectives and identifying the Rapporteur for the review. The Chair then reviewed the ground rules and process for exchange, reminding participants that the meeting was a science review and not consultation. The room was equipped with microphones to allow remote participation by web-based attendees, and in-person attendees were reminded to address comments and questions so they could be heard by those online.

Members were reminded that everyone at the meeting had equal standing as participants and that they were expected to contribute to the review process if they had information or questions relevant to the paper being discussed. In total, 29 people participated in the RPR (Appendix D). Lisa Lacko was identified as the Rapporteur for the meeting.

Participants were informed that Paul Starr and Paul Grant had been asked before the meeting to provide detailed written reviews for the working paper to assist everyone attending the peer-review meeting. Paul Starr and Paul Grant provided written reviews of the working paper. Participants were provided with copies of the written reviews.

The conclusions and advice resulting from this review were to be provided in the form of a research document to COSEWIC to inform a future stock assessment of Canary Rockfish. However, after the meeting closed, the review of the working paper was halted because an updated catch reconstruction was requested, which was beyond the scope of a pre-COSEWIC report. A full updated stock assessment was recommended instead of revising the working paper.

REVIEW

Working Paper: Keppel, E.A., Rutherford, K.L., Olsen, N., Wyeth, M., and Workman, G.D. 2017. A Review of Canary Rockfish (*Sebastes pinniger*) along the Pacific coast of Canada: biology, distribution and abundance trends. CSAP Working Paper 2015SAR13.

Rapporteur: Lisa Lacko

Presenter: Elise Keppel

PRESENTATION OF WRITTEN REVIEWS

REVIEWER: PAUL J. STARR (PJS)

Specific points from the written review are referenced here. Comments from a group discussion following Paul Starr's presentation are included in the relevant points.

General comments

- Question 1 (Is the purpose of the working paper clearly stated?): PJS was concerned that the purpose and scope of the working paper remained unclear.
- Question 2 (Are the data and methods adequate to support the conclusions?): PJS stated that the few conclusions made in this paper are not well supported.
- Question 3 (Are the data and methods explained in sufficient detail to properly evaluate the conclusions?): Yes, there is sufficient detail for a pre-COSEWIC document.
- Question 4 (Does the working paper adequately reflect gaps or uncertainty in the data, analysis or process?): PJS: uncertainty was only superficially addressed.
- Question 5 (Can you suggest additional areas of research that are needed to improve our assessment abilities?): PJS: included in the review.

Specific comments

- Point 3, Section 2.2 Designatable Units (DUs) – How the authors have addressed this is not correct. Figure 3 needs to be reconfigured so that the timeframe extends back to 1996 (before this year, geographical positions are not well reported). The hook and line fishery should be considered separately, i.e, these data sets should not be lumped together in the plot. It is a shame not to use the groundfish version of the Fishery Operations System (FOS), GFFOS, and the commercial Pacific trawl (PacHarvTrawl) data here. The DU chosen indicates that there is one stock, but it is managed in four units. A participant indicated the data and plots should be split by commercial and research data, then by area.
- Point 4, Section 2.4 Depth Preferences – The use of the midwater trawl data to determine the lower depth bound for this species may be misleading because this gear type is not known for its reporting precision. Suggests using the research trawl surveys to provide the depth ranges because the tows are short, conducted along the depth contour, and the species catch is accurately reported. At the shallow end of the range it is known that Canary Rockfish are taken in 20-25 m by longline. Rationale is needed for why the depth range of 51-622 m was used in Figure 7. A participant indicated that the lower bound (51m) appears to come from the 0.025 quantile of research bottom trawl tows. The upper bound (622m) appears to come from 0.975 quantile of commercial midwater trawl tows.

-
- Point 5, Rockfish Conservation Areas (RCAs) and Sponge Reef Closures – More information is needed on this. Suggestion: look at tows in these areas prior to closure to see how important they are. A map of the closures and trawl footprint would be helpful. An author indicated these plots were being worked on.
 - Point 6, Section 3 Biological Information – Suggests that this paper should investigate whether there are spatial differences in the biological data. This was done in Stanley et al (2009), but should be revisited as part of this work. Also, specify how the data were extracted from the Groundfish Biological Samples database (GFBIO). This work requires documentation of the data filters used.
 - Point 7 Section 3.5 Maturity – Maturity estimates from the commercial and research samples differ by one year. This should be explored further. The reviewer indicated the authors should be careful with the port sampling and at-sea sampling data sets as there may be differences because of the sampling location. A participant wanted to know how these data were used. It was indicated that the research surveys provide information on fish density by age and sex. The trawl surveys may also provide information on spatial differences in size distributions. There was concern from a participant that the number of samples from the commercial surveys are much greater than those from the research surveys. Another participant indicated that 500 research/survey samples (Table 1) are fine, but if the variability and/or regression fits are not convincing then the commercial data should be used.
 - Point 10 Reconstruction of Early Catch History – An author indicated they used the catch data from Stanley et al (2009). The reviewer indicated the next assessment will have to state the methods used. The meeting Chair indicated this is beyond the scope of this document and would need to be included in the next stock assessment.
 - Point 12 Section 5.2 Commercial Trawl CPUE – The CPUE trends need to be standardized using a GLM or they should be dropped.
 - Point 13 Section 5.3.1 Synoptic Trawl Survey – Figure 19 plots should not lump survey data from all years into a single figure. Tables 5 and 6 appear to provide contradictory survey results. Table 5 should be removed unless CV calculations are properly documented. The CVs in this table appear to be much lower than the depth-stratified CVs provided in Table 6. Figures in this section should not connect points across years with no surveys. The Figure 22 regressions are misleading because they treat each point as the best representation of the stock in that year, ignoring the wide confidence bounds associated with each estimate. the trend lines should be removed (other participants agreed with this). The 2014 synoptic Haida Gwaii (HG) was not completed and should not be presented in any of the tables or figures. The reviewer asks why the most recent surveys were not reported in this document. The Chair indicated it takes a long time for the 2017 Queen Charlotte Sound (QCS) and Hecate Strait (HS) data to be ready for loading into the GFBio database. The reviewer noted that the Goose Island Gully (GIG) survey data points appear to be different than those used in the 2009 Canary Rockfish stock assessment. The reviewer requested that documentation be provided to show why these estimates have changed. The 1995 surveys should not be included in this series as the design changed considerably relative to the previous surveys and are thus not comparable.
 - Point 15 Section 5.3.3 the National Marine Fisheries Service (NMFS) Triennial Survey – Table 8 in the document differs considerably from what was used in previous assessments (Stanley et al 2005; Stanley et al 2009), with incredibly low CVs. The reviewer suggested that the table in Stanley et al (2009) be provided in the document.

-
- Point 16 Section 5.3.4 Shrimp Trawl Survey – The reviewer noted that although the WCVI and QCS shrimp trawl surveys were included in the 2005 and 2009 assessments, the use of these surveys for *Sebastes* species has since been rejected by the CSAP review process since 2012.
 - Point 17 & 18 Section 5.3.5 and 5.3.6 – the reviewer was concerned that Figures 37 and 41 were misleading and needed correction.
 - Point 19 Section 5.5.1 Canadian Stock Assessments – Wording changes suggested in the written review will be added to the working paper.
 - Point 20 Section 6.1.1 Fishing and Harvesting Aquatic Resources – It is implied that the RCAs are the main management tool, but the harvest quotas are. There should be mention of the freeze of the trawl footprint in 2012 and other deliberate actions used to conserve and protect species.

REVIEWER: PAUL GRANT

Specific points from the written review are referenced here. Comments from a group discussion following Paul Grant's presentation are included in the relevant points.

General comments

Having overlapping stock assessments is a benefit.

The Terms of Reference for these processes need updating.

Specific comments

- Section 2.3 Designatable Units - The section on designatable units needs more information indicating it is one unit but managed as different stocks.
- TOR- COSEWIC Criterion – COSEWIC uses 2x2 km grid, whereas a 5x5 km grid was used in Figure 3.
- Section 2.5 Habitat Protection/Ownership - Rockfish habitat as a percentage of all protected habitat should be provided for the whole coast and should include sponge reef closures.
- Section 3 Biological Information – Additional information on substrate requirements at different life stages and data on dispersal should be considered.
- Section 5 Population Trends – It would be valuable to include information on which data series could not be combined and justification behind those decisions. As well, survey types and data sets with high degrees of uncertainty should be included with pros and cons discussed. It is key to know which surveys are more important to these assessments than others.
- Section 6.1.1 Threats – Add a paragraph about survivorship.

GENERAL DISCUSSION

- After Paul Grant's review and throughout the conversation, there was discussion about the need for a revised stock assessment with reviewers, participants, and COSEWIC representatives agreeing that a stock assessment would be the best way to move forward. COSEWIC is looking at creating a model where both COSEWIC assessments and stock assessments are conducted at similar times to ensure that the most recent information available are presented and used in the stock assessment.

DATA

- There was discussion of how far back in the time series the data should be provided. A participant indicated it was difficult to see if there has been any change over the last three generations because the data were aggregated. Another participant noted that management measures over the last 25 years have changed the quality of the data. Such measures include the 1997 distribution of catch in the fleet by vessel quota, the freezing of the trawl footprint in 2012, avoidance fishing, etc. The highest quality data start in 1996 because data prior to this year have issues with inconsistent reporting of geographical positions and poor species identification (either lumping of minor species or misreporting of major species to avoid trip limits). It was agreed that the commercial data should be inspected annually to observe changes over time; a continual shrinkage of area impacted from 1999-2016 should be evident.
- An SQL query accompanied by a clear-language summary or table will be added.
- 'Extent of occurrence' and 'area of occupancy' need to be differentiated. Extent of occurrence includes all data points and depths represented as a polygon that includes land and overestimates the species' range. Area of occupancy is the biological area of occurrence represented by a 2x2 km grid that shows occupied grid cells and provides a refined estimate of the species' range. Both commercial and research data will be used. It is important to consider temporal changes in distribution. The footprint may be shrinking but that does not mean the fish are moving or disappearing. It was agreed that the authors use all the data (commercial and research surveys) to separate the species' distribution annually. The authors will also add a discussion of the findings along with any indications of changes to the research data collection methods. Also examine the findings based on pre-ITQ (individual transferable quotas), post-ITQ, and time periods before and after the trawl footprint freeze.

DEPTH

- The authors will use the synoptic trawl data to determine best depth distributions. The data from the shallow International Pacific Halibut Commission (IPHC) surveys will be considered. The fishery independent data will be used for the 20-metre depth ranges. The dive and remotely operated vehicle (ROV) surveys from Central Coast Indigenous Resource Alliance will also be used to determine juvenile distributions. These data should also be considered for the area of occupancy maps.

BIOLOGY

- It would be useful to provide a spatial and temporal analysis of the biological data to look for patterns of change along these axes. Some of this may be available from published papers but it would be best to do a new analysis.
- The life history of Canary Rockfish needs to be compared with other rockfish species. Information can be found in Stanley et al (2005), Stanley et al (2009). It would be useful to know if this is a highly productive species, and which indices were used previously to assess life history, longevity, and productivity. Another participant wondered if the size- and age-at-maturity have changed over time. The histogram on age distributions needs to be separated temporally to see if this is true. A participant indicated it would be difficult to assess recruitment without doing a stock assessment. Also, there is limited information on other rockfish species to make comparisons. An author suggested using the information in Milton Love's book (Milton et al 2002). This will be added to the working paper.

-
- There were concerns that the average age and size might be declining. However, a stock assessment would be needed to determine the significance of such an observation.
 - It was noted that population reconstructions by area are needed.

SURVEYS

- The 2014 Haida Gwaii synoptic survey will be dropped.
- The shrimp trawl surveys should be removed because the surveys are very limited in spatial coverage and the depth range is inadequate to properly sample Canary Rockfish.
- There was concern over the GIG survey inclusion. These abundance indices were used in previous Canary Rockfish stock assessments. The working paper added the 1994 Ocean Selector and the 1995 Frosti/Ocean Selector surveys which were not included in Stanley et al. (2009). However, the 1995 survey used a random stratified design unlike the previous fixed station design. Given this substantial change in design, along with the Pacific Ocean Perch orientation of the 1995 survey, it was agreed that these data will be removed from the working paper and the table provided by Paul Starr (in his written review) will be used.
- It should be very clear in the research document which surveys were used in previous stock assessments. There is a table in the Yelloweye Rockfish document that can be adapted for Canary Rockfish. The best indices (synoptic and longline) should be presented first, but they should not be ranked.

THREATS

- A definition of 'threats' is needed in the working paper. For instance, additional threats to the population could include ocean acidification. A more fulsome literature review will be conducted. The Central Coast Indigenous Resource Alliance has some information that they will share with the authors.
- The mitigation efforts from management plans and closed areas need to be included. How the commercial fishery is managed by area to reduce the risk of overfishing needs to be discussed further.
- RCAs were used as a mitigation factor due to the life history of nearshore species. Canary Rockfish has less site fidelity and migrates more than other rockfish. A map will be made showing the historic trawl footprint, RCAs, and sponge reef closures.
- The authors will write these sections and send them to Bruce Turris and Paul Starr for review.

COMMERCIAL CATCH HISTORY AND CPUE

- How these data are presented in the working paper is misleading. The fishery management regulations which require quota for all species captured guarantee that vessels will not catch all the total allowable catch (TAC). In order to reach quotas, vessels often move among various areas to alter the species composition of the catch. This has implications for interpreting CPUE, and generalized linear models (GLMs) must be used to standardize commercial effort to account for shifts in effort. Since the data used here have not been standardized, the graphs using these data should either be removed or updated with GLM standardised indices, and a paragraph should be written outlining the various concerns when using commercial CPUE.

TOTAL ALLOWABLE CATCH

- The use of TACs in the working paper is misleading because the TACs set by management are not the amounts that are harvested by industry. The authors need to clarify this and discuss how quotas are used and how ‘carry-over’ works.

CATCH RECONSTRUCTION

- The data from 1984 – 1994 contain potentially misreported catch. The authors will note how the catch reconstruction is done.

WORKING PAPER RECOMMENDATIONS

DATA SOURCES

- Provide code in the form of structured query language (SQL) and add plain language, describing the general operations performed of the SQL, in the form of a table to the document.

SPATIAL PLOTS AND HABITAT

- Definitions:
 - Extent of occurrence – a concave polygon surrounding all geographic coordinates where a Canary Rockfish was caught by any gear type. The area of this polygon provides an over-estimate of this species habitat.
 - Area of occupancy – using a 2x2 grid coastwide, identify grid cells in which Canary Rockfish occurs (caught by gear). The sum of the occupied grid cells provides a refined estimate of this species habitat.
- Combine the data for the spatial plots as defined above.
- Explore and discuss any changes in spatial distribution using research survey data.
- Provide discussion on changes in commercial spatial distribution with respect to four time periods: pre-ITQ, post-ITQ, before the freezing of the trawl footprint (Apr 1, 2012), and after the application of the trawl footprint.

DEPTHS

- The lower depth range of Canary Rockfish was not captured in the working paper. Explore data from synoptic trawl surveys, IPHC surveys, and visual surveys (dive and ROV) to determine occurrences of juveniles below 20 metre range.

BIOLOGY

- The spatial component of biological parameters has been studied and published by Paul J. Starr, and should be included in the working paper.
- Explore if average age and size have declined as part of a stock assessment.
- Include a reference to Milton Love’s literature on the life history of Canary Rockfish and compare this species’ life history to those of other rockfish.

SURVEYS

- Research CPUE indices: The 2014 WCHG synoptic survey should not be reported because this survey was not completed.
- Goose Island Gully (GIG) surveys: remove current results and include those from Starr's work.
- Organize a list of surveys in tabular format. Profile those with the best credibility (list synoptic and longline surveys first). Include metadata on surveys' used in previous stock assessments.

THREATS

- Do not have to perform threats calculator process.
- Include in the threats section:
 - Review literature on ocean acidification. Alejandro Frid to provide references.
 - Ensure that RCAs are used as spatial management tools to protect inshore rockfish species (primarily Quillback, Copper, China, Tiger, Black, Yelloweye), which exhibit high site fidelity.
 - Threats in the form of fishing pressure have been mitigated by management measures.
- Submit threats section for review by Bruce Turris and Paul Star.

COMMERCIAL CATCH HISTORY AND CPUE

- Do not report CPUE indices as they are not standardized. Keep discussion in working paper.
- TAC reporting needs further discussion on how the quota is used (e.g. carry-overs)
- Catch reconstruction methodology will be addressed in the next stock assessment, thus only need to reference.

OTHER SOURCES OF DATA

- Other sources of data have been discussed in detail under other bullets.

TECHNICAL CORRECTIONS IN THE REVIEWS

- Authors to address technical corrections provided in reviews.

SUMMARY AND CLOSING

The meeting participants agreed that the working paper met the Terms of Reference objectives given the recommended revisions. However, the working paper was halted as during the meeting, an updated catch reconstruction was requested, which the authors deemed beyond the scope of a pre-COSEWIC report. Instead, a full updated stock assessment was recommended.

ACKNOWLEDGEMENTS

We wish to acknowledge Paul J. Starr and Paul Grant for their expertise in their formal review and all the meeting participants for their contributions to discussions. We also thank Maria Cornthwaite as Chair of the meeting and Lisa Lacko as the Rapporteur.

REFERENCES

- Love, M.S., Yoklavich, M., and Thorsteinson, L. 2002. The Rockfishes of the Northeast Pacific. Univ. of Cal. Press. 405 pp.
- Stanley, R.D., Starr, P., Olsen, N., and Rutherford, K. 2005. [Status report on Canary Rockfish *Sebastes pinniger*](#). Can. Sci. Adv. Sec. Res. Doc. 2005/089. 105 pp.
- Stanley, R.D., Starr, P., and Olsen, N. 2009. [Stock assessment for Canary Rockfish \(*Sebastes pinniger*\) in British Columbia waters](#). DFO Can. Sci. Advis. Sec. Res. Doc. 2009/013. xxii + 198 p.

APPENDIX A: TERMS OF REFERENCE

PRE-COSEWIC ASSESSMENT FOR CANARY ROCKFISH

Pacific Region Peer Review Meeting

November 7, 2017

Nanaimo, BC

Chairperson: Maria Cornthwaite

Context

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

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

The Canary Rockfish (*Sebastes pinniger*) was listed on COSEWIC's 2015 Call for Bids to produce a status report, with the following justification:

Canary Rockfish was originally assessed as Threatened in 2007 (COSEWIC 2007) largely because two surveys in the southern part of its Canadian range were considered the most reliable indicators of population trend, and showed abundance index declines of 78% and 96% over 30 years and 17 years respectively. Survey indices from the northern part of the range and commercial catch per unit effort indices showed no consistent trends but were of relatively short duration and are in some cases based on methods which do not adequately sample areas inhabited by the species. There was uncertainty due to high variability in the various index series (characteristic of trawl surveys) and the unknown degree to which abundance trends in the southern part of the Canadian range reflect abundance trends throughout the species' range in Canadian waters (Stanley et al. 2005).

Fishing is the most likely cause of the observed decline.

Canary rockfish are found from the western Gulf of Alaska (Shelikof Strait) to northern Baja California. Populations are most abundant between B.C. and northern California. They are broadly distributed in continental shelf and coastal waters of B.C.

Objective

The overall objective of this meeting is to peer-review existing DFO information relevant to the COSEWIC status assessment for Canary Rockfish in Canadian waters, considering data related to the status and trends of, and threats to this species inside and outside of Canadian waters, and the strengths and limitations of the information. This information will be available to COSEWIC, the authors of the species status report, and the co-chairs of the applicable

COSEWIC Species Specialist Subcommittee. Publications from the peer-review meeting (see below) will be posted on the CSAS website.

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

1. Life history characteristics

- Growth parameters: age and/or length at maturity, maximum age and/or length
- Total and natural mortality rates and recruitment rates (if data are available)
- Fecundity
- Generation time
- Early life history patterns
- Specialised niche or habitat requirements

2. Review of designatable units

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

See COSEWIC [Guidelines for recognizing Designatable Units](#).

- 3. Review the COSEWIC criteria** for the species in Canada as a whole, and for each designatable units identified, if any. See [Wildlife Species Assessment: COSEWIC Assessment Process, Categories and Guidelines](#).

COSEWIC Criterion – Declining Total Population

- a. Summarize overall trends in population size (both number of mature individuals and total numbers in the population) over as long a period as possible and in particular for the past three generations (taken as mean age of parents). Additionally, present data on a scale appropriate to the data to clarify the rate of decline.
- b. Identify threats to abundance— where declines have occurred over the past three generations, summarize the degree to which the causes of the declines are understood, and the evidence that the declines are a result of natural variability, habitat loss, fishing, or other human activity.
- c. Where declines have occurred over the past three generations, summarize the evidence that the declines have ceased, are reversible, and the likely time scales for reversibility.

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

- a. Summarise the current extent of occurrence (in km²) in Canadian waters.
- b. Summarise the current area of occupancy (in km²) in Canadian waters
- c. Summarise changes in extent of occurrence and area of occupancy over as long a time as possible, and in particular, over the past three generations.
- d. Summarise any evidence that there have been changes in the degree of fragmentation of the overall population, or a reduction in the number of meta-population units.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- d. Recommend research or analysis activities that are necessary:

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

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

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

SARA s. 2(1) defines Residence as "a dwelling-place, such as a den, nest or other similar area or place, that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating."

6. Threats

A threat is any activity or process (both natural and anthropogenic) that has caused, is causing, or may cause harm, death, or behavioural changes to a species at risk or the destruction, degradation, and/or impairment of its habitat to the extent that population-level effects occur. See Threats and Limiting Factors section in Instructions for the Preparation of COSEWIC Status Reports.

List and describe threats to the species considering:

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

7. Manipulated Populations

An increasing number of wildlife species have seen their distribution or genetic make-up manipulated by humans, deliberately or accidentally. COSEWIC has developed guidelines to help determine the eligibility of populations for inclusion in wildlife species status assessments. Information available to DFO should be provided to facilitate such determination. See COSEWIC Guidelines on Manipulated Populations.

8. Other

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

Working Paper

Keppel, E. 2017. A Review of Canary Rockfish (*Sebastes pinniger*) along the Pacific coast of Canada: biology, distribution and abundance trends. CSAP Working Paper 2015SAR13.

Expected Publications

- Proceedings
- Research Document

Expected Participation

- DFO: Science, Resource Management and SARA program
- COSEWIC sub-committee chairs
- Industry
- Province of BC

References

COSEWIC. 2007. COSEWIC assessment and status report on the canary rockfish *Sebastes pinniger* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 71 pp.

Stanley, R.D., Starr, P., Olsen, N., Rutherford, K., and Wallace, S.S. 2005. [Status Report on Canary rockfish *Sebastes pinniger*](#). DFO Can. Sci. Advis. Sec. Res. Doc. 2005/089. vi + 105 p.

APPENDIX B: WORKING PAPER ABSTRACT

This review presents data on Canary Rockfish (*Sebastes pinniger*) for use in a COSEWIC status report. Yelloweye Rockfish were listed as Threatened by COSEWIC in 2007. They occur from the western Gulf of Alaska to northern Baja California including all coastal BC waters. Though Canary Rockfish are managed as two separate stocks in BC, the BC population consists of a single designated unit. Canary Rockfish range in depth from 51 to 622 m and are caught over an approximate area of 2,858 km², while the outside population is found at depths of 33-322 m and are caught over an approximate area of 52,325 km². The maximum length of Canary Rockfish caught in BC is 74 cm, and the maximum weight is 4.9 kg. BC Canary rockfish are aged to 84 years, with an estimated age of 11 when 50% of individuals are mature. Natural mortality is estimated at 0.06 for females to age 13, then 0.12 for age 14 and older and 0.12 for all males. Average generation time is 23.9 years. Canary Rockfish are caught in commercial, recreational and first nation's fisheries in BC. Quotas have been reduced from 1193 t in 2007 to a current sector total of 895 t. Commercial catches are influenced heavily by quota reductions and are not informative for population trends. In 2006 100% monitoring was implemented for BC fisheries. Research surveys have increased for groundfish in BC over the last 10 years providing abundance indices for inferring population trends. These time series' are still relatively short and would benefit from continuing surveys.

APPENDIX C: AGENDA

Canadian Science Advisory Secretariat

Centre for Science Advice Pacific

Regional Peer Review Meeting (RPR)

Pre-COSEWIC Assessment for Canary Rockfish

November 7, 2017

Nanaimo, BC

Chair: Maria Cornthwaite

Tuesday November 7, 2017

Time	Subject	Presenter
0900	Introductions Review Agenda & Housekeeping CSAS Overview and Procedures	Chair
0915	COSEWIC Overview and Definitions	Paul Grant
0930	Review Terms of Reference (TOR)	Chair
0945	Presentation of Working Paper	Author
1045	Break	
1100	Overview of written reviews	Chair, Reviewers and Author
1200	Lunch Break	
1300	Identify Key Issues for Group Discussion	Chair, Group
1330	Discussion	RPR Participants
1445	Break	
1500	Discussion	RPR Participants
1645	Next Steps – Chair to review <ul style="list-style-type: none">• Research Document & Proceedings timelines• Other follow-up or commitments (<i>as necessary</i>)	Chair
1700	Adjourn for the Day	

APPENDIX D: PARTICIPANTS

Last Name	First Name	Affiliation
Acheson	Schon	DFO Science, Offshore Assessment
Ashcroft	Chuck	Sport Fishing Advisory Board (SFAB)
Bannar- Martin	Catherine	DFO Science, Quantitative Assessment
Benson	Ashleen	Landmark Fisheries
Bocking	Bob	Maa Nulth Fisheries Committee
Christensen	Lisa	DFO Science, Centre for Science Advice Pacific
Cornthwaite	Maria	DFO Science, Fishery & Assessment Data
Frid	Alejandro	Central Coast Indigenous Resource Alliance
Gardner	Lindsay	DFO Fisheries Management (Groundfish)
Govender	Rhona	DFO Resource Management (Species at Risk)
Grandin	Chris	DFO Science, Offshore Assessment
Grant	Paul	DFO Science, SARA Coordinator
Haggarty	Dana	DFO Science, Offshore Assessment
Haigh	Rowan	DFO Science, Offshore Assessment
Holmes	John	DFO Science, Division Manager
Keppel	Elise	DFO Science, Quantitative Assessment
Lacko	Lisa	DFO Science, Quantitative Assessment
MacDougall	Lesley	DFO Science, Centre for Science Advice Pacific
Neilson	John	COSEWIC Co-Chair: Marine Fishes
Neufeld	Chris	COSEWIC author
Olsen	Norm	DFO Science, Offshore Assessment
Rutherford	Kate	Retired DFO - Groundfish
Sinclair	Alan	COSEWIC Co-Chair: Marine Fishes
Sporer	Chris	Pacific Halibut Management Association
Starr	Paul	Canadian Groundfish Conservation Society
Tadey	Robert	DFO Resource Management (Groundfish)
Turris	Bruce	Canadian Groundfish Conservation Society
Wallace	Scott	David Suzuki Foundation
Whelan	Christie	DFO Science