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Proceedings of the Pacific regional peer review on Redstripe Rockfish (*Sebastes proriger*) stock assessment for British Columbia in 2018

June 13-14, 2018
Nanaimo, British Columbia

Chairperson: Greg Workman
Editors: Dana Haggarty and Jill Campbell

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Science Branch
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Canada

Foreword

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

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SUMMARY

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 meeting on June 13-14, 2018 at the Pacific Biological Station in Nanaimo British Columbia. The working paper, focusing on a Redstripe Rockfish (*Sebastes proriger*) stock assessment, was presented for peer review.

In-person and web-based participation included DFO Science and Fisheries Management staff, and external representatives from the Province of British Columbia, commercial fishery sectors, environmental non-governmental organizations, and the United States National Oceanic and Atmospheric Administration.

The conclusions and advice resulting from this review will be provided in the form of the Science Advisory Report (SAR) providing advice to DFO Fisheries Management to inform fisheries management decisions to establish catch levels for the species.

The Science Advisory Report and supporting Research Document will be made publicly available on the CSAS website.

INTRODUCTION

A Fisheries and Oceans Canada (DFO) Canadian Science Advisory Secretariat (CSAS) Regional Peer Review (RPR) meeting was held on June 13-14, 2018 at the Pacific Biological Station in Nanaimo, British Columbia (BC) to review the working paper on a Redstripe Rockfish (*Sebastes proriger*, RSR) stock assessment.

The Terms of Reference (TOR) for the science review (Appendix A) were developed in response to a request for advice from DFO Fisheries Management. Notifications of the science review and conditions for participation were sent to DFO Science and Fisheries Management staff as well as representatives with relevant expertise from First Nations, Province of British Columbia, commercial and recreational fishing sectors, National Oceanic and Atmospheric Administration, and environmental non-governmental organizations.

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

Starr, P.J. and Haigh, R. 2018. Redstripe Rockfish (*Sebastes proriger*) stock assessment for British Columbia in 2018. CSAS Working Paper 2015GRF08.

The meeting Chair, Greg Workman, 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 (Science Advisory Report, 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, working paper, and draft SAR.

The Chair reviewed the Agenda (Appendix C) and the Terms of Reference for the meeting, highlighting the objectives and identifying Dana Haggarty as 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 a consultation. 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, 18 people participated in the RPR (Appendix D).

Participants were informed that Kendra Holt (DFO Science) and Cindy Tribuzio (National Oceanic and Atmospheric Administration) had been asked before the meeting to provide written reviews for the working paper. Vladlena Gertseva (National Oceanic and Atmospheric Administration) provided an unsolicited third review. Participants were provided with copies of the written reviews prior to the meeting.

The conclusions and advice resulting from this peer review process will be provided in the form of a Science Advisory Report to DFO Fisheries Management to inform fisheries management decisions to establish catch levels for the species. The Science Advisory Report and technical Research Document will be made publicly available on the Canadian Science Advisory Secretariat website.

REVIEW

Working Papers:	Starr, P.J. and Haigh, R. 2021. Redstripe Rockfish (*Sebastes proriger*) stock assessment for British Columbia in 2018. CSAS Working Paper 2015GRF08
Rapporteur:	Dana Haggarty
Presenters:	Paul J. Starr and Rowan Haigh

GENERAL DISCUSSION

Following a presentation by the authors, the three reviewers, Kendra Holt (DFO Science), Cindy Tribuzio (National Oceanic and Atmospheric Administration, NOAA), and Valdlena Gertseva (NOAA), shared their comments and questions on the working paper. The authors were given time to respond to the reviewers before the discussion was opened to all participants. This proceedings document summarises the discussions that took place by topic, where points of clarification presented by the authors in their presentations and questions and comments raised by the reviewers and participants are captured within the appropriate topics.

TWO STOCK MODELLING APPROACH

- Historic Pacific Marine Fishery Commission (PMFC) areas were used rather than alternative Pacific Fishery Management Areas (PFMA) or Groundfish Management Areas (GMA), which are based on PFMAs. The PMFC areas were used because they have been used consistently since the 1950s while the GMAs or the PMFAs only date back less than 20 years. Meeting participants suggested a paper documenting this history and the area differences would be useful, but this is not a task for the authors to undertake.
- The authors adopted a two-stock modelling approach as they saw marked and persistent differences in mean weight and the von-Bertalanffy growth models between northern (PMFC 5DE; called 'BCN') and southern (PMFC 3CD 5ABC; called 'BCS') areas, despite similar age compositions between the two areas. Reviewers questioned the delineation of the two stocks based on the following:
    - A reviewer wondered how much variation in mean length there was among the southern PMFC areas compared to variation between the proposed BCN and BCS stock units. The authors responded that the longer lengths (and therefore weights) in the north were consistent across time, and, while there were some differences among the southern PMFC areas, they were not as great as those between the north and south.
    - In response to reviewer comments that differences in mean length between areas may be due to ontogenetic migration (older fish leaving the area), the authors indicated there did not appear to be any indication of age-related migration in that the age composition was similar between the north and south.
    - A reviewer indicated that genetic analysis would be useful for comparisons. The authors will recommend this for future work. The authors noted that genetics may detect fine-scale genetic structure since most of the RSR catch came from five small areas.
    - Reviewers requested to see the von Bertalanffy growth relationship plots by PMFC area as well as weight distributions figures by PMFC area. Plots of the distribution of catch by year, presented by the authors at the meeting, were also requested for inclusion in the paper. The authors agreed to include these figures.
    - A reviewer questioned the high estimated selectivity values, especially for the BCN stock. They suggested that an additional sensitivity run be included to see how a single stock model compared to the base runs. The authors suspected that if they had used a

single stock model, the model output would look very similar to the output for BCS since there are more data from the southern areas than the northern ones. The authors suggested that this two-stock model is a more precautionary approach than a single stock model. They indicated that if there were issues with the health of the Northern stock, that a single stock approach would mask those issues. The meeting participants agreed there was enough justification for using a two-stock approach.

COMMERCIAL FISHERY DATA

- A reviewer asked why there was a marked increase in catch between 1964 and 1965. The authors reported that this was due to the arrival of foreign offshore fleets fishing outside the 12 mile limit (the territorial limit at the time).
- Reviewers, authors, and participants agreed that there should be increased sampling of RSR in the midwater trawl fishery. These data will then allow future authors to explore selectivities between trawl gear types.

SURVEY DATA

- The authors noted that the history of surveys was limited and that the current series of synoptic trawl surveys only began in 2003. Surveys prior to 2003 were not consistent, often varying in design, objectives, and spatial coverage. Since synoptic survey series are biennial, there were only nine survey observations since 2003 for the Queen Charlotte Sound survey.
- The authors indicated that there were two longer running trawl surveys, West Coast Vancouver Island (WCVI) Shrimp and Queen Charlotte Sound (QCS) Shrimp, but they were not included in the analysis due to incomplete depth coverage, limited spatial coverage and poor species resolution in early years. It was noted that these surveys were not used for other slope rockfish (e.g., 5ABC Pacific Ocean Perch in 2017) stock assessments.
- A reviewer noted that data from the US National Marine Fisheries Service (NMFS) Triennial survey were recently updated to remove water hauls (tows where the net did not reach the bottom and no fish were caught). It was noted that these updated data are in the GFBio database (Groundfish biological database). The authors indicated that they did not use this updated dataset. It was decided that the authors would recommend the index from this survey be updated for use in future assessments but no corrective action would be needed for this assessment.
- A reviewer questioned why the Hecate Strait (HS) synoptic survey was included as an index for the BCN stock and not the BCS stock. The authors indicated that the HS survey frame spanned the boundary between the northern and southern stock and that post-stratifying the survey data and generating separate indices was not desirable. The authors included this survey for the BCN stock thinking there would be data from Dixon Entrance but there were none. The authors acknowledged that the HS index should possibly be included with the BCS stock data instead. The authors re-ran the models (BCN without HS and BCS with HS) as mode of the posterior distribution (MPD) runs and found the results were very similar to those from the original runs. The authors will recommend that this survey be used for the BCS stock in future.
- The authors noted that the biological samples from the surveys were not as comprehensive as they could be, due to the multispecies nature of the surveys, and requested that additional samples should be collected in the future, if possible.

- A reviewer suggested incorporating data from the Gulf of Alaska survey for future assessments to supplement data in the northern area. The review meeting agreed that additional survey data were not necessary for this assessment but flagged the possibility of the BCN stock being a transboundary stock as part of a larger Gulf of Alaska stock. This possibility will be identified as an uncertainty in the paper.

AGE FREQUENCY

- The authors noted that the maximum observed age for RSR was 61 years, which came from a single male otolith. The oldest female was aged at 50 years. There were only two observations above age 50. The 99th percentile of the age frequency distribution for males and females combined was 37 years (males=39 y, females=36 y). Reviewers questioned why the maximum age of 61 years was used when other ages may have been more appropriate (the 61-year old reading was an outlier). The authors and a participant indicated that previous stock assessments have used the maximum age observation to estimate *M*. Stock assessments from regions other than Pacific Canada have used the 99th percentile or 90% of maximum age to estimate *M*. Wording will be added to the SAR to indicate that there is uncertainty on how to estimate natural mortality (*M*) from age data. Procedures on estimating *M* going forward should also be reviewed.
- A reviewer wondered if there were any age frequency bins that had no observed age readings and if so, what impact this might have on the model. The authors indicated that this was not a problem because the lognormal distribution was not used to fit the ages.
- At the request of a reviewer, the authors agreed to add text and figures to the paper indicating why ageing error was not included in the model. Since RSR are not as long-lived as some other rockfish species, they are easier to age and therefore reader error is perceived as minimal. The authors will recommend that ageing error be considered for inclusion in future assessments.

ESTIMATION OF NATURAL MORTALITY, *M*

- Reviewers had concerns about the uncertainty surrounding the prior value chosen for *M*, stemming from the high maximum age value used to estimate M. One reviewer suggested future assessments include alternative estimates of *M* in sensitivity runs. Another reviewer provided a different method to estimate *M* that is used by NOAA and which the authors may find helpful in future assessments (Hamel, 2014). Another reviewer suggested a sensitivity run with a higher value of *M* and wider coefficients of variation (CV). The authors conducted this sensitivity run at the end of the first day of the meeting and presented their results the following day.
    - The authors conducted a sensitivity analysis with a prior based on a maximum age of 50 and CVs of 10% and 20% of the prior mean. Their results indicated that the reduced maximum age increased the B_{2018}/B_0 ratio slightly for both the BCN (base case B_{2018}/B_0 ratio: 1.103, 10% CV: 1.180, 20% CV: 1.199) and BCS stocks (base case B_{2018}/B_0 ratio: 0.614, 10% CV: 0.851, 20% CV: 0.769); however, a full model run using an Markov chain Monte Carlo (MCMC) simulation would be needed to confirm these results. The authors said that these results were not likely to impact the advice to management since the results were more optimistic than those for the base case.
    - Meeting participants decided that this sensitivity run was not required in the working paper and that instead wording will be included in the SAR to indicate that there is uncertainty around the prior used for *M*.

- The group recommended that future assessments include a sensitivity run exploring alternative priors to estimate *M*.

GENERAL DISCUSSION COMMENTS

- A reviewer wondered if a data-limited method could be used in the future instead of an age-structured model. The authors indicated that there were 12,000 ages and so RSR was not a data-limited species. A reviewer suggested that a retrospective analysis may help determine if a data-limited approach could be used. The authors responded that a data-limited approach was unlikely to provide more informative results, and commented that if you have data, you should use it.
- A reviewer asked why ages were used in the model instead of lengths. Some life history parameters can be estimated from length, and using length data would also allow the authors to take advantage of the NMFS Triennial Survey data, which do not have age frequency data available. The authors responded that since RSR is a slow-growing species, with both fast- and slow-growing individuals, length data would not provide much information to the model as a single length class would encompass a range of ages.
- A reviewer noted that the fecundity to weight relationship is not necessarily proportional (cubic with respect to length) and that this relationship should be examined prior to the next assessment. The model effectively assumes that the number of eggs increase proportionally with respect to weight. It is possible that this assumption is not correct for old females, but there are few data available from any *Sebastes* species to test this assumption and it is very unlikely that any exist for RSR.
- A reviewer noted that there is currently research being conducted by NOAA at the Northwest Fisheries Science Center (NWFSC) lab on skip-spawning and its implications for maturity and fecundity. The authors agreed that the results of this research should be considered prior to the next assessment.
- A reviewer asked why asymptotic selectivities were used instead of dome-shaped selectivities. The authors responded that they do not use dome-shaped selectivity as it creates “cryptic biomass”, i.e., biomass assumed to exist but not observed by the model. The authors noted that this can be dangerous and non-precautionary and that there was no evidence in the data for reduced selectivity at older ages.
- A reviewer asked how the impact of conservation areas (i.e. Marine Protected Areas) on the population and population indices were accounted for in the model. The authors responded that there was no provision in the model to account for these management actions.
- A reviewer asked the authors to provide justification for their chosen value of 0.6 for σ_R. An author indicated that it was based on previous stock assessments but would provide more discussion on the decision in the revised working paper.
- A participant indicated that the equilibrium exploitation rate for BCN (u_{MSY} =0.6) seemed high. This value was determined by B_{MSY} estimated by the model. The authors concurred, and suggested that the selectivity curve may have been shifted too far to the right, especially for the BCN stock. In the appendix, they provided three other reference points for fishery managers to use when making their decisions.
- Authors, reviewers, and participants expressed concern over the use of B_{MSY}-derived reference points in developing advice to fishery management.

- A participant wondered how recreational catch was considered in the model. The authors indicated that it was treated as incidental and was not included in the model.
- Reviewers and participants indicated that in future assessments, additional sensitivities runs would be helpful, especially surrounding model priors.

REQUESTED REVISIONS TO WORKING PAPER

1. Include additional plots and language discussing growth parameters between stocks to better substantiate the separation of stocks. Include:
   a. add plots from MCMC posteriors of Variational Bayes (VB) parameters;
   b. add distributional plot by year shown in talk;
   c. discuss possible implications of larval entrainment that might influence stock structure from Oceanography;
   d. provide recommendation to do genetic work on stock structure.
2. Explain why the Hecate Strait synoptic survey wasn't included in the BCS stock. Provide recommendation for future use of HS in BCS.
3. Provide recommendation to include the US NMFS Triennial survey with water haul adjustments in BCS.
4. Acknowledge that there is likely to be ageing error. Show precision plot and recommend including ageing error in future models.
5. Provide a recommendation to increase sampling of midwater trawl catch of RSR.
6. Consider additional methods for future work such as:
   a. additional sensitivity runs on important parameters.
7. Include MPD runs using a prior based on maximum age T_{max} of 50 with CV of 10% and 20% for both stocks.
8. Review the possibility that the BCN is part of the SE Alaska stock.
9. Keep track of results that come out of the NWFSC lab on skip-spawning, maturity, and fecundity.
10. Provide justification for using σ_R of 0.6 and add discussion in the revised working paper.

CONCLUSIONS

- There was consensus that the TOR objectives were achieved.
- The Working Paper was accepted subject to the above noted revisions.
- Both the BCN and BCS stocks were in the Healthy zone.

ACKNOWLEDGEMENTS

We appreciate the time contributed to the RPR process by all participants. In particular, we thank the reviewers, Kendra Holt, Cindy Tribuzio, and Vladlena Gertseva for their time and expertise. We also thank Greg Workman as Chair of the meeting and Dana Haggarty as the Rapporteur.

REFERENCES CITED

Hamel, O.S., 2014. A method for calculating a meta-analytical prior for the natural mortality rate using multiple life history correlates. ICES Journal of Marine Science, 72(1): 62-69.

APPENDIX A: TERMS OF REFERENCE

REDSTRIPE ROCKFISH *(SEBASTES PRORIGER)* STOCK ASSESSMENT FOR BRITISH COLUMBIA IN 2018

Regional Peer Review Process – Pacific Region

June 13-14, 2018
Nanaimo, BC

Chairperson: Greg Workman

Context

Redstripe Rockfish (Sebastes proriger) ranges from the southeastern Bering Sea to Baja California and is abundant between southeast Alaska and central Oregon. Prior to 1977, there were few catch restrictions for British Columbia (BC) rockfish. Since then, groundfish management plans have become increasingly complex for targeted rockfish species; introducing quotas for Redstripe Rockfish in 1993. Today, Redstripe Rockfish is a quota species caught primarily by the trawl fishery, with minor amounts caught in the groundfish hook and line fisheries. Redstripe Rockfish is predominately taken by bottom and mid water trawl gear in BC waters. This species is also captured in the mid-water Pacific Hake fishery.

In the 1990's, Fisheries and Oceans Canada (DFO) Science assessed Redstripe Rockfish annually as part of a multi-species slope rockfish complex, where the species showed periods of decline. These assessments did not evaluate stock status in relation to reference points. However, an attempt was made to fully assess this species in 2011, as part of a simultaneous stock assessment of five rockfish species (Taylor et al. 2011, unpublished document[1]).

In the absence of updated science advice, there is uncertainty about the risks posed to the BC stock by current levels of catch. There is also a requirement to estimate stock status relative to reference points that are consistent with the DFO's Fishery Decision-Making Framework Incorporating the Precautionary Approach (DFO 2009). There are no published studies that have examined the genetic population structure of Redstripe Rockfish in northeast Pacific waters, and to date, this species has been treated as one coastwide stock in BC.

DFO Fisheries Management has requested that DFO Science provide advice regarding the assessment of the BC Redstripe Rockfish stock relative to reference points that are consistent with the DFO's Precautionary Approach, including the implications of various harvest strategies on expected stock status. The advice arising from this Canadian Science Advisory Secretariat (CSAS) Regional Peer Review (RPR) will be used to inform fisheries management decisions to establish catch levels for the species. This work may also inform and supplement decisions external to DFO, including Marine Stewardship Council certification of the Pacific Hake fishery.

Objectives

The following working paper will be reviewed and provide the basis for discussion and advice on the specific objectives outlined below:

Redstripe Rockfish (*Sebastes proriger*) stock assessment for British Columbia in 2018. Paul J. Starr and Rowan Haigh. 2018. CSAP Working Paper 2015GRF08

[1] Taylor et al 2011. Simultaneous Stock Assessment of Five Rockfishes in British Columbia Waters: Splitnose, Greenstriped, Redstripe, Harlequin Rockfish, and Sharpchin Rockfish. CSAP Working Paper 2011/P01.

The specific objectives of this review are to:

1. Recommend reference points consistent with the DFO Precautionary Approach, including the biological considerations and rationale used to make such a determination. Evaluate the current status of Redstripe Rockfish relative to the recommended reference points.
2. Assess the current status of Redstripe Rockfish in BC waters, relative to the recommended reference points. If necessary, provide evidence to support the separation of this species into spatially distinct stocks, and if required, provide advice on the status of these stocks.
3. Using probabilistic decision tables, evaluate the consequences of a range of constant catch harvest policies to projected biomass relative to the reference points and additional stock metrics, including projected biomass relative to current biomass. If the data are insufficient to quantitatively evaluate BC Redstripe Rockfish in terms of PA reference points and decision tables, summarise what is known about the status of this species, and the implications for harvest advice.
4. Describe sources of uncertainty related to the model (e.g. model parameter estimates, assumptions regarding catch, productivity, carrying capacity and population status).
5. Recommend an appropriate interval between formal stock assessments, indicators used to characterize stock status in the intervening years, and/or triggers of an earlier than scheduled assessment. Provide a rationale if indicators and triggers cannot be identified.

Expected Publications

- Science Advisory Report
- Proceedings
- Research Document

Expected Participation

- Fisheries and Oceans Canada (DFO) (Science and Fisheries Management)
- Commercial and Recreational Fishing Representatives
- Environmental Non-government Organizations
- First Nations
- Province of BC
- USA Government Agencies (NOAA, Alaska Fish & Game)

References

DFO 2009. A Fishery Decision-Making Framework Incorporating the Precautionary Approach.

APPENDIX B: WORKING PAPER ABSTRACT

Redstripe Rockfish (*Sebastes proriger*, RSR) is a commercially important species of rockfish that inhabits the marine canyons along the coast of British Columbia. The status of RSR in British Columbia is assessed as two stocks harvested in Pacific Marine Fisheries Commission (PMFC) major areas 5DE (BCN) and 3CD+5ABC (BCS). These stocks have supported a domestic trawl fishery for decades and were heavily fished by foreign fleets from the mid-1960s to mid-1970s. The separation of the BC population of RSR into two stocks was based on much higher mean weights in the BCN population, a consistent observation that was confirmed across years, across research surveys and within the commercial fisheries.

We use an annual catch-at-age model tuned to fishery-independent trawl survey series (two in BCN, four in BCS), bottom trawl CPUE series, annual estimates of commercial catch since 1940, and age composition data from survey series (BCN: 5 years of data from 2 surveys; BCS: 14 years from 3 surveys) and the commercial fishery (BCN: 12 years of data; BCS: 24 years).

The model starts from an assumed equilibrium state in 1940, and the survey data cover the period 1967 to 2018 (although not all years are represented). The two-sex models were implemented in a Bayesian framework (using the Markov Chain Monte Carlo procedure) under a scenario that estimates both natural mortality (M) and steepness of the stock-recruit function (h). Sensitivity analyses were performed (four in BCN, five in BCS) to test the effect of alternative model assumptions.

The base model runs for BCN and BCS suggest that low exploitation in the early years, including that by foreign fleets, coupled with several strong recruitment events (in 1982 and 1996 for BCN and 1974 and 2001 for BCS) have sustained the population into the present.

The spawning biomass (mature females only) at the beginning of 2018 for BCN and BCS is estimated to be 0.91 (0.69, 1.13) and 0.62 (0.47, 0.81) of unfished biomass (median and 5th and 95th quantiles of the Bayesian posterior distribution), respectively. For BCN and BCS, this biomass is estimated to be 3.16 (2.02, 4.00) and 2.43 (1.51, 3.77) of the spawning biomass at maximum sustainable yield, B_{MSY}, respectively.

Advice to managers is presented as decision tables that provide probabilities of exceeding limit and upper stock reference points for five-year projections across a range of constant catches. The DFO provisional ‘Precautionary Approach compliant’ reference points were used, which specify a ‘limit reference point’ of $0.4B_{MSY}$ and an ‘upper stock reference point’ of $0.8B_{MSY}$. The estimated spawning biomass at the beginning of 2018 has a probability of 1 of being above the limit reference point, and a probability of 1 of being above the upper stock reference point for both stocks. Five-year projections using a constant catch of 100 t/y in BCN and 700 t/y in BCS indicate that, in 2023, the spawning biomass has probabilities of 1 (BCN) and 1 (BCS) of remaining above the limit reference point, and 1 (BCN) and 1 (BCS) of remaining above the upper stock reference point. The u_{MSY} reference point, however, suggests that catches in excess of 500 t in BCN and 1300 t in BCS will breach the SFF guidelines on fishing mortality, assuming that the manager wishes to be 95% certain that the harvest rate in 2023 will be less than u_{MSY}.

APPENDIX C: AGENDA

Regional Peer Review Meeting (RPR)

Redstripe Rockfish (*Sebastes proriger*) stock assessment for British Columbia in 2018

June 13-14, 2018

Seminar Room, Pacific Biological Station

3190 Hammond Bay Road, Nanaimo BC

Chair: Greg Workman

DAY 1 – Wednesday, June 13

Time	Subject	Presenter
0900	Introductions Review Agenda & Housekeeping CSAS Overview and Procedures	Chair
0915	Review Terms of Reference	Chair
0930	Presentation of Working Paper	Rowan Haigh, Paul Starr
1030	***Break***	
1045	Written Reviews and Authors Response	Chair + Reviewers & Authors
12:00	***Lunch Break***	
1300	Identification of Key Issues for Group Discussion	RPR Participants
1330	Discussion & Resolution of Technical Issues	RPR Participants
1445	***Break***	
1500	Discussion & Resolution of Results & Conclusions	RPR Participants
1630	Develop Consensus on Paper Acceptability & Agreed-upon Revisions (TOR objectives)	RPR Participants
1700	Adjourn for the Day	

DAY 2 - Thursday, June 14

Time	Subject	Presenter
0900	Introductions Review Agenda & Housekeeping Review Status of Day 1 (*As Necessary*)	Chair
0915	Discussion & Resolution of Technical Issues (Continued from Day 1)	RPR Participants
1030	Break	
1045	Discussion and Resolution of Working Paper Conclusions	RPR Participants
11:30	Develop Consensus on Paper Acceptability & Agreed-upon Revisions	RPR Participants
1200	Lunch Break	
13:00	*Science Advisory Report (SAR)* Develop consensus on the following for inclusion: • Sources of Uncertainty • Results & Conclusions • Additional advice to Management (as warranted)	RPR Participants
1445	Break	
1500	Next Steps – Chair to review • SAR review/approval process and timelines • Research Document & Proceedings timelines • Other follow-up or commitments (*as necessary)*	Chair
1545	Other Business arising from the review	Chair & Participants
1600	Adjourn meeting	

APPENDIX D: PARTICIPANT LIST

Last Name	First Name	Affiliation
Anderson	Sean	DFO Science
Christensen	Lisa	DFO Science, Centre for Science Advice Pacific
Cornthwaite	Maria	DFO Science
Ens	Nicholas	DFO Science
Flostrand	Linnea	DFO Science
Gertseva	Valdlena	National Oceanic and Atmospheric Administration
Grandin	Chris	DFO Science
Haggarty	Dana	DFO Science
Haigh	Rowan	DFO Science
Holt	Kendra	DFO Science
Starr	Paul	Canadian Groundfish Research and Conservation Society
Tadey	Rob	DFO Resource Management
Tribuzio	Cindy	National Oceanic and Atmospheric Administration
Turner	Michael	Province of British Columbia
Turris	Bruce	Canadian Groundfish Research and Conservation Society
Wallace	Scott	David Suzuki Foundation
Workman	Greg	DFO Science
Wyeth	Malcolm	DFO Science