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Proceedings of the Pacific Scientific Advice Review Committee (PSARC) Groundfish Subcommittee meeting to review pre-COSEWIC assessments of darkblotched and yellowmouth rockfish, advice for sablefish management in 2009-2010 and a recovery potential assessment of canary rockfish

June 16-17, 2008
Nanaimo, BC

Chairperson,
A. Cass

Compte rendu de l'examen pré-COSÉPAC du sébaste tacheté et du sébaste à bouche jaune, de l'avis sur la gestion de la morue charbonnière pour 2009-10 ainsi que de l'évaluation du potentiel de rétablissement du sébaste canari effectué par le sous-comité du poisson de fond du Comité d'examen des évaluations scientifiques du Pacifique (CEESP)

Les 16 et 17 juin 2008
Nanaimo, C.-B.

Président de réunion
A. Cass

Fisheries and Oceans Canada
Pacific Biological Station
3190 Hammond Bay Rd.
Nanaimo, BC V9T 6N7

July 2009 | **Juillet 2009**

Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings include research recommendations, uncertainties, and the rationale for decisions made by the meeting. Proceedings 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.

Avant-propos

Le présent compte rendu a pour but de documenter les principales activités et discussions qui ont eu lieu au cours de la réunion. Il contient des recommandations sur les recherches à effectuer, traite des incertitudes et expose les motifs ayant mené à la prise de décisions pendant la réunion. En outre, il fait état de données, d'analyses ou d'interprétations passées en revue et rejetées pour des raisons scientifiques, en donnant la raison du rejet. Bien que les interprétations et les opinions contenus dans le présent rapport puissent être inexacts ou propres à induire en erreur, ils sont quand même reproduits aussi fidèlement que possible afin de refléter les échanges tenus au cours de la réunion. Ainsi, aucune partie de ce rapport ne doit être considéré en tant que reflet des conclusions de la réunion, à moins d'indication précise en ce sens. De plus, un examen ultérieur de la question pourrait entraîner des changements aux conclusions, notamment si l'information supplémentaire pertinente, non disponible au moment de la réunion, est fournie par la suite. Finalement, dans les rares cas où des opinions divergentes sont exprimées officiellement, celles-ci sont également consignées dans les annexes du compte rendu.

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TABLE OF CONTENTS / TABLE DES MATIÈRES

Summary

DFO and invited external participants met June 16-17, 2008 in Nanaimo BC to peer-review four topics:

- A pre-COSEWIC assessment of darkblotched rockfish
- A pre-COSEWIC assessment of yellowmouth rockfish
- Sablefish advice for management in 2008-2009
- A Recovery Potential Assessment for canary rockfish

Comments, conclusions and advice received on the four science reports are presented in these Proceedings. Taking these comments into account, CSAS Research Documents will follow for the darkblotched rockfish and yellowmouth rockfish and CSAS Science Advisory Reports for the canary rockfish and sablefish.

All working papers were accepted. The working paper authors were advised of revisions required for the darkblotched and yellowmouth rockfish Pre-COSEWIC assessments and the canary rockfish Recovery Potential Assessment. No changes were suggested for the sablefish management strategy evaluation.

Sommaire

Des membres du MPO ainsi que des participants externes se sont réunis les 16 et 17 juin 2008 à Nanaimo, en C.-B., pour procéder à l'examen par des pairs de quatre sujets :

- une évaluation pré-COSEPAC du sébaste tacheté;
- une évaluation pré-COSEPAC du sébaste à bouche jaune;
- un avis sur la morue charbonnière à des fins de gestion en 2008-2009;
- une évaluation du potentiel de rétablissement du sébaste canari.

Les commentaires, les conclusions et les avis reçus sur les quatre rapports scientifiques sont exposés dans le présent compte rendu. Sur la base de ces commentaires, on produira des documents de recherche du SCCS pour le sébaste tacheté et le sébaste à bouche jaune ainsi que des avis scientifiques du SCCS pour le sébaste canari et la morue charbonnière.

Tous les documents de travail ont été acceptés. Les auteurs des documents de travail ont été informés des révisions à apporter aux évaluations pré-COSEPAC sur le sébaste tacheté et le sébaste à bouche jaune ainsi que sur l'évaluation du potentiel de rétablissement du sébaste canari. Aucun changement n'a été proposé pour l'évaluation de la stratégie de gestion de la morue charbonnière.

Introduction

The Department of Fisheries and Oceans routinely conducts peer-reviews of the scientific basis for the provision of advice for managing aquatic resources including their habitats and ecosystems in Canada's Pacific Region. These reviews are conducted under the auspices of the Pacific Scientific Advice Review Committee (PSARC). The PSARC Groundfish Subcommittee met June 16-17, 2008 at the Coast Bastion Hotel in Nanaimo, British Columbia. External participants from industry, academia, and conservation groups attended the meeting. The Subcommittee reviewed four working papers which are summarized in Appendix 1. The meeting agenda appears as Appendix 2. The Terms of Reference for the meeting are included in Appendix 3. A list of meeting participants is included as Appendix 4. Summaries of management issues for darkblotched and yellowmouth rockfish are in Appendix 5 and 6, respectively. These summaries were prepared by regional DFO fisheries managers as a new process to inform COSEWIC report writers about management issues from DFO's perspective. They were not reviewed as part of the science peer-review of the working papers, but participants did agree that they should be appended to these proceedings.

The Chair, A. Cass, opened the meeting by welcoming the participants. During his introductory remarks the objectives of the meeting were reviewed. He explained that, in a departure from normal PSARC practice, peer reviewers for the two Pre-COSEWIC papers presented were not required because future reviews of the same subject matter will take place when the Status Reports are first drafted and then again at the time of their completion.

The working paper authors were advised of revisions required for the darkblotched and yellowmouth rockfish Pre-COSEWIC assessments and the canary rockfish Recovery Potential Assessment. No changes were suggested for the sablefish management strategy evaluation. Recommendations were proposed in reference to a number of issues raised in the discussion of all four working papers.

Detailed Comments from the Review

A pre-COSEWIC review of darkblotched rockfish (*Sebastes crameri*) along the Pacific coast of Canada: biology, distribution and abundance trends
Rowan Haigh and Paul Starr

A summary of the working paper was presented by the authors. A number of key observations emerged from the oral presentation. Partly because of the fact that darkblotched rockfish has never been a targeted species, its relative contribution to the landings having always been low compared to other quota rockfish species, it can be generally characterised as data poor. For example, the only aging data available for this species is a small sample of fish collected in 1967. In many cases biometric statistics that are important to a COSEWIC review have had to be estimated by methods that yield somewhat equivocal results. An example is the estimation of catch for darkblotched rockfish which is based on its present ratio in regard to other rockfish (ORF). Current survey methods are also not all well-adapted to providing information on this species, with survey index CV's greater than 0.3 and often greater than 0.6. The Queen Charlotte Strait (QCS) synoptic trawl survey probably offers the most reliable data over time, while West Coast of Vancouver Island shrimp survey series probably have limited use as an index of stock abundance.

General Discussion

There was discussion on the cause of the spike in the annual index trend from commercial trawl catch per unit effort (CPUE) data in 1997 (working paper Figure 33 and accompanying text). Participants questioned whether this was a result of a true increase in recruitment or an artefact related to the change in management regimes in 1996 and 1997, and hence a change in the fishing and reporting behaviour across the trawl industry. This perturbation in the index coincides with the timing of the change from fishery logbooks to observers in 1996 and the adoptions of Individual Transferable Quotas (ITQs) in 1997. The fact that this peak in commercial CPUE occurs for darkblotched rockfish (a non-quota species) and also for yellowmouth rockfish (a quota species) seems to indicate support for the latter explanation.

The map of mean trawl fishery CPUE (working paper Figure 7) is based on larger spatial cells than COSEWIC guidelines (2 km^2). A request was made to revise the figure accordingly to conform with COSEWIC guidelines. This change may incur violations of Privacy Act considerations with respect to disclosure of fishing locations and catch quantities. Industry provides data reported at a scale that obscures identification of individual vessels. Participants agreed that cooperation with the industry should not be jeopardised by ignoring this rule. Moreover, it was pointed out that a 2 km^2 cell would be invisible on the large scale being covered (essentially the entire coast of BC). Participants agreed that there was little information gain in adopting the COSEWIC guidelines on the size of spatial cells and that revisions to the figure are not required.

Participants acknowledged that the report writer of the COSEWIC Status Report is not a DFO employee and noted that there would be value in ensuring an integrated approach involving close collaboration between the report writers of COSEWIC reports and the DFO pre-COSEWIC status report. The COSEWIC status report writer for darkblotched and yellowmouth rockfish was present at the meeting and agreed that it would be prudent to collaborate where required especially given the tight COSEWIC timelines.

One of the specific requirements of COSEWIC is to attempt to ensure that the information presented in the report is comprehensive and complete. The absence of information from the most recent triennial survey of the US National Marine Fisheries Service (NMFS) was noted at the meeting as a significant data gap. The authors reported that the data were not available at the time the working paper was prepared. The Subcommittee recommended that the triennial survey data be obtained and included in revisions to the report (or supplied to the authors of the COSEWIC stock status report as desired).

DFO staff from the Groundfish Management Unit identified a need to inform the COSEWIC process by providing brief summaries of the management issues associated with each species under consideration for a pre-COSEWIC.peer-review. Examples of these issues for darkblotched and yellowmouth rockfish were distributed to the Subcommittee. A number of technical details in these summaries were noted and required modification by Regional DFO Fisheries and Aquaculture Management. The meeting Chair agreed that the revised summaries would be appended to these Proceedings (see Appendix 5 and 6).

Participants asked whether catches in the Strait of Juan de Fuca and Strait of Georgia reported in the working paper are non-observer data; for example it may include foreign fishery observer data. The authors commented that the source documentation would have to be checked to verify how the data were derived.

The only data set available for age estimates for darkblotch rockfish was collected in 1967. These age readings were based on surface readings, rather than the burnt otolith section method now in use for rockfish. The working paper noted the deficiency in the reliability of using surface otolith ages. It was noted that there are multi-year samples of of darkblotch otoliths in archives and future assessments should consider the utility in processing age readings from those samples.

Figure 6 of the working paper depicted the depth frequency of tows in which darkblotched rockfish were taken. This summary does not provide information on the trawl effort at each depth interval as has been recent practice. The authors agreed that this would be useful information and would revise the working paper accordingly.

COSEWIC requires a sense of the confidence placed in interpretation of data, trend analysis in particular, and the level of scientific uncertainty. Participants acknowledged that yellowmouth and particularly darkblotched rockfish are data limited species with high uncertainty in estimates of key population parameters compared to other exploited species. For example, natural mortality estimates *M* for the Canadian stock are lacking and assumed similar to the US estimate of 0.07. Similarly, the only fall back for determination of fishing mortality is the CPUE data and that is probably not a reliable analogue. The very high CV (.4 to .7) indicates it to be extremely imprecise.

The question of potential critical habitat was raised. Participants from DFO Habitat Management stated that because critical habitat for SARA listed species needs to be geo-referenced, there should be a more complete summary of distribution and habitat requirements. The authors and other participants noted that there are no existing species specific habitat maps for the whole area so it is not possible to precisely isolate where suitable habitat, and more importantly potential critical habitat, for this species exists. The authors agreed to reference the current state of knowledge of habitat types. Participants noted that, like other broadly distributed marine species throughout coastal BC, it is not possible to geo-reference

concentrations of the species to specific habitats. The best available information indicates that habitat impacts are not jeopardizing survival or recovery of the species.

Conclusions and Advice

- The working paper was accepted subject to revisions identified during the review.

- While the text as written currently acknowledges several reasons for the 1997 peak in commercial CPUE. The explanations presented at the meeting should be integrated into the revised working paper. Figure 33 should be modified to indicate where critical changes in the management regime occurred as a possible explanation for the observed trend.

- COSEWIC should be made aware that their standard for scaling on species distribution for widely distributed marine species such as darkblotched rockfish, are not informative and potentially contravene privacy issues related to information provided on specific locations of catch statistics by Industry.

- The discussion accompanying the figures presenting location data on trawls in which darkblotched rockfish were captured should clarify that the maps do not depict the entire range of the species in question, merely the areas where the species is taken in commercial trawl fisheries, in this case as by-catch.

- Participants encouraged the DFO authors to work collaboratively with the COSEWIC Startus Report writer to ensure that the best available data, analyses and interpretation are provided for consideration in the COSEWIC Report.

- The omission of the most recent triennial survey data of the NMFS was noted at the meeting as a significant data gap. The authors should attempt to include these data in the revised working paper, or note why the data were not available.

- Participants agreed that the management summaries provided by Resource Management should be appended to the Proceedings Document. Resource Management staff should complete revisions to the management summary for darkblotched rockfish prior to inclusion in these Proceedings

- The figure showing coastwide distribution of CPUE data was used in the presentation at the meeting but does not presently appear in the working paper. If it is intended to add this figure to the final report, the ambiguity concerning the catch information in the Strait of Juan de Fuca and Georgia Strait mentioned in the discussion above should be resolved.

- Figure 6 in the working paper should be revised to include information on trawl effort at each depth stratum.

A pre-COSEWIC review of yellowmouth rockfish (*Sebastes reedi*) along the Pacific coast of Canada: biology, distribution and abundance trends
Rowan Haigh and Paul Starr

The pre-COSEWIC report for yellowmouth rockfish parallels that produced for darkblotched rockfish. Consequently, some of the same issues and concerns expressed for darkblotched rockfish exist for this species. Where the issues overlapped, the review did not reiterate the material. However, the Conclusions and Advice are repeated or modified at the end of this section as appropriate for yellowmouth rockfish. A summary of the working paper is presented in Appendix 1.

General Discussion

The similarity between the two pre-COSEWIC reports was noted by participants. However, darkblotched rockfish has always been a non-quota species present as a minor component of commercial landings, albeit over a large area. Yellowmouth rockfish is a quota species with much larger historic catches in the thousands of tonnes annually. Thus, there are more data available for this species. Yellowmouth rockfish is widely distributed, but highly concentration off the northwest tip of Vancouver Island. The predominant depth of capture by trawl gear is 130-357m. Where yellowmouth rockfish occurs, Pacific Ocean perch is the dominant species co-existing in the catch.

All the research surveys in which yellowmouth rockfish are intercepted (QCS synoptic survey, GB Reed survey, QCS shrimp survey) show great variability in the derived abundance indices and do not show trends over the period of observation. The west coast Vancouver Island shrimp survey data was deemed to not provide data useful for indexing yellowmouth rockfish due to extremely low catches.

In general, there is evidence of an annual decline of about 2.5% over the 10 years from 1996 to 2006 for fisheries dependent data. Most of this decline occured from 1996-2000; the data show no trend from 2000 onwards. Participants acknowledged that changes in management regimes in the mid-1990s could have influenced the time series. The implied declining trend in abundance seems to be more plausible for this species relative to darkblotched rockfish (e.g., commercial CPUE data may better reflect abundance when derived from a targeted fishery).

Discussion ensued over the causes of the implied decline in abundance. It was suggested that this could merely reflect a low part of the recruitment cycle and not necessarily a result of fishing mortality or changes in fishing activity due to management changes. One participant noted that if recruitment trends in a large number of rockfish species are assessed simultaneously then the confidence in the interpretation could be increased. It may be useful to examine several species at a time to see where one species is traded off for another when management requirements change.

There was concern over the estimates of mortality presented in the paper. The authors noted that the estimates of total mortality, *Z*, based on catch curves does not reflect mortality in any particular year but is smeared over several cohorts. The maximum age of 99 years, used to estimate the natural mortality rate *M*, was challenged. It was explained that this is the maximum observed in the data set. This would be an extreme. It was noted by an author that maximum age is usually quoted as the 99^{th} percentile of the observed age distribution. Participants acknowledged that because this species has a long history of harvested, the maximum age is

not known and can only be estimated from existing data for an exploited population. *M* therefore is likely lower than estimated.

An author pointed out that the discard rate from trawl gear for this species is very low (<10 t/yr). Participants stated that even though the terms catch and landings are essentially synonymous, the distinction should nevertheless be made. Discards in the early years of the trawl fishery are unknown, but they are assumed to be very small due to the value of the species.

A participant questioned whether the authors examined the sablefish catch for by-catch of this species as well. In their response, they noted that this was not done although they did examine by-catch in the hook and line data for halibut. By-catch was not found to be substantial for those fisheries.

Conclusions and Advice

- The working paper was accepted subject to revisions identified during the review.

- Many of the conclusions in the review of darkblotched rockfish are considered relevant to the yellowmouth rockfish as well. They are repeated here with minor revisions as necessary.

- Consideration should be given to separating the results into two time series, one preceding the dramatic management changes that took place in 1996-1997 and one that follows those events. A similar argument could be made for the period before and after the switch from logbooks to observer data.

- While the text as written currently recognises the ambiguity concerning whether changes in catches that peaked in 1997 are attributable to recruitment or new management regimes, the arguments presented at the meeting should be more fully explored in the final text. Figure 35 of the working paper should be modified to indicate where critical changes in management regimes occurred as a possible reference to cause and effect in the trends observed.

- COSEWIC is encouraged to review guidelines on the standard geographic scaling of species distribution for widely distributed marine species such as yellowmouth rockfish, keeping in mind the privacy issues identified during the review of darkblotched rockfish.

- Revision of the paper should clarify that the maps do not depict the entire range of the species in question, merely the areas where the species is taken in commercial trawl fisheries.

- Participants agreed that a collaborative approach between DFO Science staff and the COSEWIC Status Report writer is encouraged to ensure that the best available data, analyses and interpretation are provided for consideration in the COSEWIC Status Report.

- The absence of the most recent triennial survey data of the USNMFS was noted at the meeting as a significant data gap. The authors should attempt once more to obtain this data and analyse it for the purposes of this report or, failing to be able to do so, should note its absence and the potential significance of that absence.

- Figure 13 of the working paper should be revised to include information on the trawl effort at each depth stratum (see rationale under darkblotched rockfish above).

- In this and subsequent pre-COSEWIC reviews, the rationale for the species being considered for status under SARA should be fully elaborated. If this information is not publicly available on the website it should be requested from COSEWIC.

- Additional information on habitat preference and particularly potential critical habitat in the context of SARA should be provided to the degree that this is possible by referencing existing sources.

- Participants agreed that the management summaries provided by Resource Management should be appended to the Proceedings Document. Resource Management staff should complete revisions to the management summary for darkblotched rockfish prior to inclusion in these Proceedings

Evaluation of interim harvest strategies for sablefish (*Anoplopoma fimbria*) in British Columbia, Canada for 2008/09
S. P. Cox and A. R. Kronlund

The Chair remarked that the review of this working paper follows a review of a management strategy evaluation (MSE) methodology for sablefish tabled at PSARC in May 2008. The present paper uses MSE methodology to evaluate candidate management procedures against sablefish fishery objectives. No formal peer-reviews of this paper were requested. A reviewer of the May 2008 sablefish working paper was asked to provide an informal review this report and to advise the Subcommittee on whether the previously approved methodology was appropriately applied.

A summary of the working paper can be found in Appendix 1. The title of the working paper deliberately refers to “interim harvest strategies”, although the May 2008 MSE paper was well received and the methods are supported by PSARC review, fisheries managers, and the Canadian Sablefish Association. The Subcommittee agreed with the author’s view that the evaluation of potentially important structural uncertainties remained for future work. Further it was agreed that the performance of the management system required review in about 3 years given this is the first attempt at MSE in the Pacific Region.

General Discussion

The Subcommittee agreed that the harvest rules used in the candidate management procedures were compliant with DFO policy guidelines for implementing the Precautionary Approach in Canada. Participants also noted that the following four objectives used in the assessment were developed and agreed to in consultation with the industry:

Rebuild B.C. spawning stock biomass to at least 20% of unfished within 1.5 generations (22.5 years assuming M = 0.08 and 50% maturity at age-5) with a minimum of 90% certainty;

Rebuild B.C. spawning stock biomass above the 2007 level within 10 years or less with a minimum of 90% certainty;

Maintain less than 20 % interannual variation in catch;

Maximize the median average annual catch over 1-10 years subject to the constraints imposed by Objectives 1-3.

For the future, more direct economic objectives may emerge that can be used and that are not strictly biomass dependent.

Choice of Operating Models

The Subcommittee and the reviewer agreed that the authors have adhered to the outcome of the methodology review in May 2008. At that meeting, the Subcommittee agreed that of the four operating models scenarios (S1-S4), the low productivity and low depletion scenario (S1) and the low productivity/moderate depletion scenario (S2) should be explicitly used in the provision of advice. The Subcommittee agreed that these two scenarios are representative of low productivity for sablefish despite conflicting explanations for the stable or declining CPUE since the 1970s (i.e., fishing hotspots and maintaining high catch rates, immigration from Alaska, high recruitment).

Stock scenarios S1-S4 were chosen to represent plausible ranges of stock-recruitment steepness (productivity) and hyper-stability in commercial trap fishery catch rates. Sablefish are thought to have undergone a period of relatively low recruitment since the early 1990s, punctuated by an above average recruitment event in 1999/2000. Since the 1999/2000 year classes were observed in Alaska, BC, and the U.S. west coast there has been no data that suggests subsequent above average recruitment. Participants noted that the 1999/2000 year classes occurred along the entire west coast of North America, but are now thought to have fully entered fisheries and is accounting for a progressively smaller proportion of the spawning biomass.

The performance of candidate management procedures should be assessed in the future to determine their degree of robustness to uncertainties in population dynamics, for example unknown steepness. The issue here is whether the reference set is sufficiently broad to encompass plausible states of nature for sablefish. Future data may suggest including new scenarios or dropping existing ones from the reference set based on new information. Participants acknowledged, however, that it is important to follow a procedure consistently and to avoid frequent changes to the input data, assessment model and harvest control rule. The Subcommittee recommended that a management procedure be selected and adopted for a period of at least at least 3-5 years. New elements could be added to procedures or new scenarios to the reference set during this period for evaluation at the end of the interim period.

MSE outcome

As reported in the working paper, 28 data-based management procedures and 15 catch-age procedures were examined for each of the S1 and S2 scenarios. It was determined that 70-80% of these simulations failed to meet the conservation objectives (objectives 1 and 2) and was dropped from further consideration. Those methods that met the conservation criteria indicated stock status would exceed the current spawning biomass in 3-7 years with 90% certainty. However, the trade offs in performance measures that resulted from application of the procedures varied. Of the admissible management procedures, TAC levels for 2008 range from 1,500 to 2,700 tonnes, however, most resulted in a degradation of catch performance between 2009 and 2014 as harvest is progressively reduced to maintain the spawning biomass as a result of the lack of recent strong recruitment.

The best performing data-based management procedures evaluated under scenario S1 resulted in a spawning stock increase over 11-20 years. Other simulations aimed more at maximising catch and not so much at achieving conservation objectives and would take 21-40 years to rebuild the stock. The catch-age modelling approach for S1 that met the objectives gave similar results. Some procedures did well over a 10 year horizon but relatively poorly over the long term since higher catches taken early in the projection period resulted in longer times required to achieve objectives. The desired standard is to see the stock rebuild within 1.5 generations (22 years) above 20% of the unfished level with 90% confidence.

One management procedure within the data-based modelling approach emerged as the best performing model in meeting all 4 original objectives. As noted by the authors, a weakness of the data-based approach is that there is no theoretical basis to target "optimal" harvests since catches are adjusted in response to change in the survey index rather than towards maximum sustainable yield. The data-based procedures are also vulnerable to systematic changes in survey selectivity. However, data-based procedures were clearly capable of achieving the agreed-upon fishery objectives. Industry and the authors supported the use of the data-based approach over the catch-age model-based approach. Stakeholders see it as a more direct and therefore a more intuitive method. Some participants noted that commercial CPUE methods failed to detect the decline in stocks in the 1970s and 80s, yet the database approach is largely dependent on survey CPUE data.

The impact of discards on the analysis and stock recovery was viewed as a research priority by the authors. The analysis was based on landings only. The authors noted in the working paper that this could have a large effect on the performance of candidate management procedures, particularly those based on the data-based harvest control rule, but suggested that the impact would be proportional to the discard rate. Industry participants indicated that in attempting to achieve a quick recovery, license holders will need to take a significant short-term catch reduction. Industry participants commented that one cannot simply ignore discards. They commented that it is important to distinguish between discards and "releases at sea" to arrive at actual mortality as a result of discarding, since there is an unknown but significant percentage of discards that recover. Industry is concerned that with as much as a couple of hundred tonnes of discards a year, there is a need to change fishing behaviour to reduce discard mortality. The authors noted that it is possible to input recent known information on discards into the analyses, but the quality of discard data becomes progressively poorer historically.

Aging errors were not incorporated in the model in the form of a misclassification matrix. The authors noted that this probably is not a significant factor in either the data-based or catch-age modelling approaches. The constant standard survey catchability assumption, as reported by the authors can have a high to medium impact for the data-based and catch-age modelling approaches, respectively. A constant standard survey selectivity assumption, similarly, also has a high to medium impact.

An assumed closed spatial structure in BC with no immigration from US portions of the population to the north or south has a potential medium impact. In the past, the conventional wisdom has been that the BC includes two sablefish stocks: the southern end of a larger stock centered in the Gulf of Alaska and the northern extent of a stock distributed along the U.S. west coast. The question was raised whether any management measures that are not coordinated with the US could possibly make a difference in the biomass or the catch available in BC. The answer offered is that the level of integration of these Canadian and US stocks is such that what we do here may not have a large effect on the Alaska stock but may well have a local impact.

The likely presence of a northern and southern stock prompted a concern that the TAC could be taken all from one or the other stock. This spatial effort concentration could be a problem if the allowable catch is taken predominately from one of the stocks. But, conversely, if the fishery were to be managed on two TACs, one for each component, the combined total catch is likely to be less than a catch based on managing the coast as a single unit.

Incomplete knowledge of life history parameters (no male/female differences, known *M*, known growth parameters) likely has a low to medium impact in both the data-based and catch-at-age modeling approaches.

Other issues

One participant recalled that an earlier commitment had been made by resource management to provide a forum in which a broader range of stakeholder interests, including those of environmental NGOs, could participate in the form of a multi-stakeholder groundfish committee. The participant noted that this Committee has not been formed. However the sablefish industry participants at the meeting noted that in their case there have been opportunities offered to environmental representatives to take part in discussions.

Conclusions and Advice

- The paper was accepted and a Science Advisory Report will be developed based on the outcome of the meeting. No requests for modifications to the working paper were made.

- The development of the operating models should include the incorporation of the discards and the procedures should be evaluated to determine if their performance is vulnerable to discards. If so, then new candidate procedures that address the discarding data should be tested.

Recovery Potential Assessment for canary rockfish (*Sebastes pinniger*).
R. D. Stanley and P. Starr

The working paper abstract is found in Appendix 1.

This Recovery Potential Assessment (RPA) follows from the November 2007 PSARC review of the stock assessment of canary rockfish. Formal reviewers were not solicited prior to this meeting because the assessment report on which it was based was extensively reviewed at the 2007 meeting.

In November 2007 COSEWIC confirmed the status of canary rockfish as “Threatened”. As such, a decision to list the species under SARA will result in the need for a Recovery Strategy (RS). An RPA provides the science input for public consultation on socio-economic impacts of listing, as required under SARA, advice on listing decisions and the science components on the RS. The RPA is based on the revised protocol for conducting recovery potential assessments (http://www.dfo-mpo.gc.ca/csas/Csas/status/2007/SAR-AS2007_039_e.pdf). The revised protocol is divided into Phases (3) and Tasks (17).

Phase I is intended to describe the current and recent species status.

Task 1 examines the abundance, range and number of populations. With respect to extinction risk, canary rockfish has been treated as one coast wide population. The spawning biomass compared to the presumed unfished biomass is about 15-22%.

Task 2 is to describe the present trajectory. The most optimistic model run accepted by PSARC (Run 11) shows the accepted trajectory with a constant decline since WWII, accelerating over the next 20-30 years and then flattening out in the last decade.

Task 3 examines life history parameters. The authors used two stock-recruitment steepness values - 0.55 and 0.70. A lower value is indicative of a less productive stock.

Task 4 looks at habitat requirements and use patterns. The authors assume that habitat is not a limiting factor in quantity or quality.

Task 5 examines population and distribution targets. The authors referred to DFO's Precautionary Approach Harvest Strategy guidelines to guide their analysis. From this they assessed that the Upper Stock Reference (USR) would be $0.8B_{MSY}$ (80% of the biomass at MSY) and the Limit Reference Point (LRP) would be $0.4B_{MSY}$. The fishing mortality that gives maximum sustainable yield (F_{MSY}) should be considered the Removal Reference. The population is considered to be in the Cautious Zone. Runs 5, 11 and 17 were considered by PSARC to be most credible. The harvest levels implied by this Precautionary Approach are 192, 570 and 132 tonnes for Runs 5, 11, 17 respectively. At these harvest levels there is at least a 50% probability of reaching the USR in 5 years.

Task 6 requires estimation of expected population trajectories over the proposed recovery time. As discussed above, the recovery timeframe selected is 5 years, subject to consultation, as is the measure of certainty of that level of recovery.

Task 7 requires an assessment of residence requirements. The issue of residence requirements, as defined under SARA, is not relevant to this species but was not discussed in the working paper.

Phase II examines the scope for management to facilitate stock recovery.

In Task 8 the probability that recovery targets will be achieved in various scenarios are discussed. This is also covered above.

In Task 9 all major sources of mortality are to be examined. In the case of canary rockfish there is assumed to be really only one – the commercial groundfish fishery. But there is some uncertainty concerning the impact now and in the future of recreational and First Nations fisheries. In addition this assumption does not consider potential mortality due to future coastal use (e.g. oil and gas development).

The intent of Task 10 is to quantify the likelihood that current habitat quantity and quality is sufficient to allow population increase and recovery. As before the authors assume that habitat is not a limiting factor for the recovery of this species.

Task 11 assesses, to the extent possible, the magnitude by which current threats to habitats have reduced habitat quantity and quality. Again, the only threat to the population is assumed to be from the fishery removal impacts.

Phase III examines scenarios for mitigation and alternatives to activities.

In Task 12 all feasible measures of mitigating threats are to be itemised. In this case only control measures for the commercial fishery appear to be relevant and this is something that will be subject to consultation with the industry.

Similarly Task 13 asks for an examination of alternatives to activities that are threats to the species and its habitat but as already outlined above, altering harvest strategies is a part of the consultation process with the industry. There are no habitat threats to be mitigated. Some minor gains might be achieved through gear selection or modification or by avoiding certain depth ranges to select only larger fish.

Task 14 provides an inventory of activities that could increase productivity or survivorship. Again, controlling catch appears to be the only meaningful human activity impacting survival or recovery.

Task 15 provides estimates of reduced mortality from the measures taken in Tasks 12-14. The paper presents tables in which a wide range of management scenarios are followed and fishing mortality is estimated.

Task 16 again asks for the expected population trajectory over the target timeframe. Since the target timeframes are subject to consultation, this will depend on the agreements based on public consultations but again the analysis in this paper provides estimates under different scenarios.

Finally Task 17 looks for the parameters to be used for modelling the population trends and they are all given in the working paper.

General Discussion

It is recognized that canary rockfish are not habitat limited and are widely distributed off Canada. However, the authors agreed to provide more clarity on the basic habitat requirements such as the preference for rough, hard bottom habitat. The authors reiterated however that habitat does not seem to be a limiting element for the survival or recovery of the species. A similar comment was raised about the need to provide scientific rationale that specifies the lack of residence requirement as defined under SARA.

One suggestion advocating “closed areas” to protect canary rockfish as part of an overall strategy for recovery was dismissed as being ineffective. The authors pointed out that that canary rockfish are too mobile and widespread to gain protection from specific area closures used as a strategy to protect “inshore” rockfish in the Pacific Region. The authors commented that it is possible to identify hotspot areas with high concentrations of females or areas devoid of target species but the authors reiterated that the concept of Rockfish Conservation Areas would be ineffective for canary rockfish. As a point of clarification the authors explained that there are a number of ways to reduce human impacts through management of the commercial fishery. As discussed it the paper, the commercial groundfish fishery is assumed to be the only significant cause of fishing mortality and the authors stated that science advice to reduce fishing impacts are best directed at that sector. Participants acknowledged, however, that there is uncertainty concerning the impact now and in the future of recreational and First Nations fisheries.

In the assessment, the authors present the status of canary rockfish in the context of DFO's precautionary framework based on the provisional harvest control rule with reference points at 40% and 80% of Bmsy. The analysis indicates that the population is in the "cautious zone". Under the provisional HCR, if followed by managers, harvest could be reduced in order to halt the decline and reverse the trend in abundance after considering the socio-economic tradeoffs. Under COSEWIC, based on their decline criteria, the population is designated as threatened and at risk of extinction. This prompted a suggestion that DFO's precautionary framework is not harmonised with COSEWIC criteria for designating population status. It was pointed out that the reference points applied to canary rockfish are provisional and could change following assessment of other candidate rules. It was recognized that the adoption of the provisional reference points is a relatively new initiative as part of the National Sustainability Framework.

The question arose whether the BC population is distinct from the US northwest component (e.g. Washington-Oregon). The authors confirmed that these populations probably do overlap and may overlap with Alaska population. That being the case, it was suggested that any information on recovery in the US would inform this process. In California-Washington, for example, the abundance is apparently beginning to increase after a 10-year moratorium. It was acknowledged that this may or may not be relevant in the Canadian context.

Conclusions and Advice

- The paper was accepted subject to revisions. The authors should consider including more discussion on the potential merits and pitfalls associated with different recovery options such as time-area fishing closures and/or Marine Protected Area approaches.

- Revisions to the working paper should include discussion of whether the BC stock is a component of a larger stock extending to Alaska in the north and the western US states in the south and, if so, to what extent management measures taken in the US should be harmonised with those in BC.

- Additional discussion on possible mortality in this stock from harvesting by First Nations and the recreational fisheries should be added to the report.

- The report should contain a simple statement in regard to habitat requirements that there is no "residence" habitat for canary rockfish in the context of that term in SARA.

- The authors should attempt to frame a statement based on the predictive capacity of the modelling that indicates that current harvest levels of canary rockfish are such that the population is not in jeopardy at least in the short term between the species listing and the preparation of the Recovery Strategy.

Appendix 1. Working Paper Summaries

1. A review of darkblotched rockfish *Sebastes crameri* along the Pacific coast of Canada: biology, distribution, and abundance trends

We summarize the available information on darkblotched rockfish Sebastes crameri. Specifically, this paper reviews the current data on the biology, distribution, and abundance trends, primarily for citation by COSEWIC stock status reports. This species has a mean weight of 1.318 kg/fish, representing the samples from the observed commercial fishery. Growth relationships show no strong difference between the sexes. Allometric analyses yield curvature parameter estimates β all > 3 for males. Length-age analyses suggest females ultimately reach larger sizes than males (higher values); however, the data are very sparse and only comprise surface-read otoliths (known to underestimate ages). Natural mortality M is assumed to be 0.07, based on US observations. Maturity ogives yield lengths at 50% maturity L50 of 32.1 cm for males and 35.3 cm for females. Using von Bertalanffy growth parameters from US models, ages at 50% maturity k are calculated to be 7.6 y for males and 8.7 y for females. Assuming k = 8 y and M = 0.07, the generation time is 22.3 y. Depth-of-capture frequency in commercial trawl tows suggests that most of the population occurs between 150 m and 435 m. Also based on trawl observations, the area of occupancy covers 31,284 km2. Within its preferred depth range, darkblotched rockfish is caught with numerous other species including Pacific Ocean perch *Sebastes alutus*, arrowtooth flounder *Atheresthes stomias*, yellowmouth rockfish *S. reedi*, and Dove sole *Microstomus pacificus*. Total removal of darkblotched rockfish from BC coastal waters by Canadian and US commercial fleets since 1930 equals at least 4,200 t. Survey indices of abundance are currently not useful for assessing darkblotched rockfish population trends. The GB Reed, WCVI shrimp trawl, and QCS shrimp trawl surveys all generate indices with low precision. The synoptic groundfish surveys offer the best tool for monitoring this species in future. To date, the index trend in Queen Charlotte Sound from 2003 to 2007 appears flat. The commercial trawl CPUE indices coast wide show a decline of 3.9% per year from 1996 to 2006, with a flat trend from 1998 on. It is not known if the trend in CPUE indices represents a change in abundance of this species or in fishing practices associated with the introduction of IVQ management in 1997.

2. A review of yellowmouth rockfish *Sebastes reedi* along the Pacific coast of Canada: biology, distribution, and abundance trends

We summarize the available information on yellowmouth rockfish Sebastes reedi. Specifically, this paper reviews the current data on the biology, distribution, and abundance trends, primarily for citation by COSEWIC stock status reports. This species has a mean weight of 1.467 kg/fish, representing the samples from the observed commercial fishery. Growth relationships show no strong difference between the sexes. Allometric analyses yield curvature parameter estimates β all > 3, suggesting non-isometric growth. Length-age analyses also show little difference between males and females, although the models consistently predict slightly higher values for females. Natural mortality M is estimated to be 0.047, based on an exponential decay model and a maximum observed age of 99. The total mortality Z estimate from catch-curve analysis of the 2003 data is 0.063 (95% confidence interval = 0.044-0.083). Maturity ogives yield ages at 50% maturity k of 10.1 y for males and 10.6 y for females. Assuming k = 10.5 y and M = 0.047, the generation time is 31.8 y. Depth-of-capture frequency in commercial trawl tows suggests that most of the population occurs between 130 m and 357 m. Also based on trawl observations, the area of occupancy covers 33,787 km2. Within its preferred depth range, yellowmouth rockfish is caught with numerous other species including Pacific ocean perch

Sebastes alutus, arrowtooth flounder *Atheresthes stomias*, redstripe rockfish *S. proriger*, silvergray rockfish *S. brevispinis*, and yellowtail rockfish *S. flavidus*. Total removal of yellowmouth rockfish from BC coastal waters by Canadian and US commercial fleets since 1930 equals at least 89,000 t. The long-term surveys are generally not useful for tracking abundance of this species due to low index precision. Two of these surveys (Hecate Strait assemblage and WCVI shrimp) are too shallow and rarely catch yellowmouth rockfish. The current series of synoptic groundfish surveys being conducted on the BC coast may provide indicators of population trends in future, but the available biomass indices are not precise (relative error = 30–50%), which may reduce the capacity of these surveys to track abundance changes for yellowmouth rockfish. The survey imprecision is likely associated with a substantial mid-water presence for this species. The commercial trawl CPUE indices coastwide show a decline of 2.5% per year from 1996 to 2006. It is not known if the trend in CPUE indices represents a change in abundance of this species or in fishing practices associated with the introduction of IVQ management.

3. Evaluation of interim harvest strategies for sablefish (*Anoplopoma fimbria*) in British Columbia, Canada for 2008/09

This paper applies a management strategy evaluation (MSE) approach toward identifying an interim management procedure for setting sablefish (*Anoplopoma fimbria*) quotas in 2008/2009 and beyond. We employ the MSE methodology developed by Cox et al. (2008) to evaluate the likely performance of data-based and model-based management procedures under four simulation scenarios for sablefish stock dynamics. Conservation, catch variability, and catch performance are compared to four management objectives that were developed through consultations with industry stakeholders and managers. Our simulations indicate that 70-80% of the management procedures examined would likely fail to meet specified conservation objectives under some scenarios for sablefish population dynamics. These failures occurred despite the fact that most procedures rebuild the sablefish stock over 40 years. The remaining "admissible" management procedures show the capability to improve stock status within 3-7 years with 90% certainty even under the most pessimistic scenario for stock productivity and current status. TAC levels for 2008 under these admissible procedures range from 1,500 to 2,700 tonnes; however, most will decrease TACs by up to 50% between 2009 and 2014 if the current stock decline continues. The simulated time required to maintain the spawning stock above 2007 levels with 90% certainty ranged from 4 to 7 years when the 2008 TACs were combined with the highest performing data-based management procedure. Advice in this paper is subject to several limitations based on our current representation of sablefish population dynamics in the operating model scenarios. High discard rates in all fisheries are of greatest concern at the moment because (i) our operating model estimates of stock status would be optimistic and (ii) failing to account for discard mortality in future projections means that actual recovery rates will be slower.

4. Recovery Potential Assessment for canary rockfish (*Sebastes pinniger*)

A Recovery Potential Assessment is provided for canary rockfish in BC waters.
It follows the recommended outline from DFO's "Revised Protocol for Conducting Recovery Potential Assessment" and uses the target reference points recommended in DFO's "Harvest Strategy Compliant with a Precautionary Approach". The general intent of this document is to provide the scientific advice required for development of a Recovery Strategy, should this be deemed necessary. The specific intent of the document is to predict the impact of future harvest levels on population trends relative to attaining a specified target stock status, wherein stock status is defined and shown relative to estimates of . Results are summarized based on

population models which explore two assumptions on stock productivity. In addition to summarizing current status, the document provides 5-year forecasts under various fixed harvests scenarios. Commercial fishery harvests are the only “threat” to the population that is examined in the document. Following final selection of recovery targets during consultation, forecasts can be structured to conform to the revised targets.

Appendix 2. PSARC Sub-Committee Meeting Agenda

AGENDA
PSARC Groundfish Subcommittee Meeting
June 16-17, 2008
Coast Bastion Inn, Benson Ballroom

Monday, June 16 – Coast Bastion	
Introduction and procedures	9:00 – 9:15
Pre-COSEWIC review of darkblotched rockfish	9:15 – 12:00
Lunch Break	12:00 – 1:00
Pre-COSEWIC review of yellowmouth rockfish	1:00 – 4:30
Tuesday June 17 – Coast Bastion	
Review of Sablefish advice for management in 2008-09	9:00-12:00
Lunch Break	12:00-1:00
Review of canary rockfish RPA Science Advisory Report	1:00-4:30

Appendix 3. Terms of Reference

Regional Advisory Meeting

Pacific Scientific Advice Review Committee (PSARC)
Groundfish Subcommittee Review

16-17, June 2008
Nanaimo, BC

Chairperson: Al Cass

Background

Pre-COSEWIC and post-COSEWIC PSARC reviews

Fisheries and Oceans Canada (DFO) has agreed that peer-reviews of pertinent science inputs into species status reports developed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) will be conducted by DFO Science. Pre-COSEWIC reviews are deemed necessary when DFO has relevant holdings of information on an aquatic species. Peer-reviews of Recovery Potential Assessments (RPAs) for aquatic species designated by COSEWIC as either threatened or endangered are also required as part of DFO's post-COSEWIC assessment in support of socio-economic analyses and the consultation process, developing recovery plans and listing decisions under SARA. A new framework for developing RPAs can be found at the Canadian Science Advisory Secretariat (CSAS) web site:

www.dfo-mpo.gc.ca/csas/Csas/status/2007/SAR-AS2007_039_e.pdf

The Pacific Scientific Advice Review Committee (PSARC) will undertake a pre-COSEWIC review of working papers for darkblotched and yellowmouth rockfish. Bids for these two species have been let to develop COSEWIC Status Reports this year. PSARC will also review an RPA for Canary rockfish based on a DFO status assessment reviewed by PSARC in 2007.

Sablefish management advice

In May 2007, the PSARC Groundfish Subcommittee reviewed a Management Strategy Evaluation (MSE) methodology for sablefish in British Columbia. The methodology was approved and represents a fishery decision-making framework to guide choices for meeting conservation/sustainability objectives. The framework requires the application of reference points, harvest rules and compliance with the precautionary approach. In June 2007, PSARC will review the application of the MSE framework to assess and advise of the consequences of future fishery impacts including 2008.

Objectives

1. Pre-COSEWIC review of darkblotched rockfish
2. Pre-COSEWIC review of yellowmouth rockfish
3. Canary rockfish RPA Science Advisory Report
4. Sablefish advice for management in 2008-09

Products

- CSAS Proceedings Document summarizing the discussion
- CSAS Research Document (darkblotched rockfish)
- CSAS Research Document (yellowmouth rockfish)
- CSAS Science Advisory Report (Canary rockfish)
- CSAS Science Advisory Report (sablefish)

Location and Date

Nanaimo, BC, 16-17 June 2008

Participants

Participants (approx. 25) will include internal DFO representatives and invites from academia, First Nations, NGO's and industry.

Appendix 4. List of Attendees

Chair: Al Cass
Rapporteur/Editor: Chris Morry

External Participants				
Name	**Affiliation**	**Mon**	**Tues AM**	**Tues PM**
Chris Acheson	Canadian Sablefish Association		x	
Sandy Argue	Ministry of Environment		x	
Dan Edwards	Dogfish Association	x	x	x
Danielle Edwards	ECOTrust Canada	x	x	x
Bob Fraumeni	Canadian Sablefish Association		x	
John Koolman	Hook and Line Groundfish Assoc.	x	x	x
Ron MacDonald	Canadian Sablefish Association		x	
Brian Mose	Deep Sea Trawlers Association	x	x	x
Chris Morry	Consultant (rapporteur)	x	x	x
Andrea Smith	COSEWIC Report Writer	x	x	x
Aaron Springford	Simon Fraser University	x	x	x
Paul Starr	Can. Groundfish Res. & Cons. Soc.	x	x	x
Bruce Turris	Can. Groundfish Res. & Cons. Soc.	x	x	x
Scott Wallace	David Suzuki Foundation	x		
DFO Participants				
Barry Ackerman		x	x	x
Karen Calla				x
Al Cass	Chairman	x	x	x
Courtnay Drule				x
Carole Eros		x		
Trudie Forbes				x
Chris Grondin			x	x
Rowan Haigh		x	x	x
Rob Kronlund		x	x	x
Gary Logan		x	x	x
Jas Sidhu				x
Alan Sinclair		x	x	x
Rick Stanley		x	x	x
Stephen Watkinson		x	x	x
Lynne Yamanaka		x	x	x

Appendix 5. Management Summaries for the pre-COSEWIC darkblotched rockfish assessment.

Overview:

There are seven distinct commercial groundfish sector groups, Groundfish trawl (T), Halibut (L), Sablefish (K), Inside Rockfish (ZNI), Outside Rockfish (ZNO) and the Lingcod and Dogfish fisheries that are licensed under Schedule II, but managed as distinct fisheries. All sectors are currently managed through the Integrated Groundfish Management Pilot, in its third year.

There is no directed darkblotch fishery on the Pacific coast.

The Integrated Groundfish Management Pilot requires individuals to account for all rockfish caught.

There is 100% at-sea and dockside monitoring of all rockfish catch.

Pacific groundfish trawl fleets landed a total of 55t of darkblotch rockfish in the 2007/08 fishing season. The catch had a landed value of approximately $61,000, based on a $0.50/lbs price.

Management measures;

Darkblotch rockfish is currently a non-quota species, without a set TAC. Should a TAC be established in future, it will be allocated 99% to groundfish trawl, and 1% to groundfish hook and line. The groundfish allocation would be managed under an Individual Vessel Quota system.

All rockfish catch in the Integrated Groundfish fleet must be accounted for during the trip. Within the trawl sector, discarded rockfish are assigned a mortality of 100% which is attributed to the species IVQ or trip limit on the vessel. Subject to species, area, time and gear closures, along with vessel caps and trip limits, vessels will be permitted to land non-directed catch. There are per-trip catch limits for non-quota rockfish species in all groundfish fisheries.

There is mandatory 100% monitoring of all commercial groundfish bottom trawl fishing. This is achieved through at-sea observer and or electronic coverage on all bottom trawl trips. The exception is when midwater trawling for Pacific hake on the traditional grounds off the lower west coast of Vancouver Island where 10% at sea monitoring is required.

There is mandatory 100% monitoring of all commercial groundfish hook and line and trap fishing. This is achieved through either at-sea observer coverage on all trips or an onboard electronic monitoring (EM) system during all fishery activity. All rockfish encountered by the hook and line sector must be retained. The EM system records all catch on each trip; however, only 10% of the data is reviewed, as an audit of fishing logbook records. EM recordings are not retained. The feasibility of retaining a small percentage of EM recordings long-term is being investigated.

Vessels that are shown, through auditing, to be releasing rockfish catch at sea, may be required on subsequent fishing trips to carry an onboard observer, or have 100% of their EM video data reviewed, at additional cost to the vessel.

There is 100% dockside monitoring of landed catch.

There has been no stock status report written for darkblotch rockfish.

DFO Pacific Region has created a series of Rockfish Conservation Areas (RCAs) throughout the BC Coast. While the RCAs are designed primarily to protect inshore rockfish species (yelloweye, tiger, china, copper and quillback rockfish), a small number of RCAs, given their proximity to the coastline, do extend protection to offshore species. Further, the RCAs, and DFO's overall rockfish conservation strategy, act to raise awareness of the need to alleviate further rockfish population declines, conferring benefits on all Pacific rockfish species.

Appendix 6. Management Summaries for the pre-COSEWIC yellowmouth rockfish assessment.

Overview:

There are seven distinct commercial groundfish sector groups, Groundfish trawl (T), Halibut (L), Sablefish (K), Inside Rockfish (ZNI), Outside Rockfish (ZNO) and the Lingcod and Dogfish fisheries that are licensed under Schedule II, but managed as distinct fisheries. All sectors are currently managed through the Integrated Groundfish Management Pilot, in its third year.

There is a directed yellowmouth fishery on the Pacific coast, with a coastwide TAC of 2444t for the 2008/09 fishing season. The TAC is primarily allocated to groundfish trawl, with hook and line, halibut, and research accounting for the rest.

The Integrated Groundfish Management Pilot requires individuals to account for all rockfish caught. There is 100% at-sea and dockside monitoring of all rockfish catch.

Pacific groundfish trawl fleets landed a total of 1398t of yellowmouth rockfish in the 2007/08 fishing season, representing 48% of the 2911t TAC. The catch had a landed value of approximately $1.5 million, based on a $0.50/lbs price. In the 2008/2009 fishing season, fleets have so far landed 20.55t, representing less than 1% of the 2848t TAC.

Management measures;

Yellowmouth TAC for the 2008/09 fishing season is allocated 96.77% (2364t) to groundfish trawl, 2.49% (60t) to groundfish hook and line, 0.74% (18t) to halibut, and 3t to research purposes. Within each allocation, the TAC is further divided across Groundfish Management Areas (3C, 3D, 5A/B, 5C/D, and 5E).

The groundfish trawl yellowmouth allocation has been managed under an Individual Vessel Quota (IVQ) system for 13 years. The catch trend during this time has remained stable.

All rockfish catch in the Integrated Groundfish fleet must be retained and landed by the hook and line fleet. In groundfish trawl, discarded rockfish catch is assigned a 100% mortality which must be accounted against the IVQ held by the vessel at the time of fishing. Catch overage must be accounted for through temporary acquisition of individual vessel quota (IVQ). In the groundfish hook and line and halibut fisheries, there are per-trip catch limits for non-directed rockfish catch.

There is mandatory 100% monitoring of all commercial groundfish bottom trawl fishing. This is achieved through at-sea observer coverage and or electronic coverage on all bottom trawl trips. The exception is when midwater trawling for Pacific hake on the traditional grounds off the lower west coast of Vancouver Island where 10% at sea monitoring is required.

There is mandatory 100% monitoring of all commercial groundfish hook and line and trap fishing. This is achieved through either at-sea observer coverage of each trip or an onboard electronic monitoring (EM) system during all fishery activity. All rockfish catch must be retained and accounted for within the quota assigned to the vessel. The EM system records all catch on each trip; however, only 10% of the data is reviewed, as an audit of fishing logbook records. EM recordings are not retained. The feasibility of retaining a small percentage of EM recordings long-term is being investigated.

Vessels that are shown, through auditing, to be releasing rockfish catch at sea, may be required on subsequent fishing trips to carry an onboard observer, or have 100% of their EM video data reviewed, at additional cost to the vessel.

There is 100% dockside monitoring of landed catch.

The last stock status report for yellowmouth rockfish was written in 1999. It noted an expected decline in abundance due to a lack of recent, significant recruitment events.

DFO Pacific Region has created a series of Rockfish Conservation Areas (RCAs) throughout the BC Coast. While the RCAs are designed primarily to protect inshore rockfish species (yelloweye, tiger, china, copper and quillback rockfish), a small number of RCAs extend protection to offshore species due to their proximity to the coastline. Further, the RCAs, and DFO's overall rockfish conservation strategy, act to raise awareness of the need to alleviate further rockfish population declines, conferring benefits on all Pacific rockfish species.