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Proceedings of the PSARC Groundfish Subcommittee Meeting / Procès-verbal de la réunion du Sous-comité sur le poisson de fond du CEESP

December 8- 9, 2003 / 8 et 9 décembre 2003

Nanaimo, BC / Nanaimo (C.-B.)

S. Romaine
Groundfish Subcommittee Chair /
Président du sous-comité sur le poisson de fond

Fisheries and Oceans Canada / Pêches et Océans Canada
Pacific Scientific Advice Review Committee / Comité d'examen des evaluations scientifiques du Pacifique
Pacific Biological Station / Station biologique du Pacifique
Nanaimo BC / Nanaimo (C.-B.)
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PACIFIC SCIENTIFIC ADVICE REVIEW COMMITTEE (PSARC)
GROUNDFISH SUBCOMMITTEE MEETING

SUMMARY

The Pacific Scientific Advice Review Committee (PSARC) Groundfish Subcommittee met December 8-9, 2003 at the Pacific Biological Station, Nanaimo, B.C. to review two Working Papers.

Working Paper G2003-05: Bocaccio Update

- The Subcommittee accepted this paper and the two recommendations presented. The first recommendation was to ensure that current levels of monitoring of Bocaccio catches in fisheries should be maintained and in some cases increased based on fisheries management and stock assessment needs. The Subcommittee also recommended catch restrictions to maintain or reduce catches from current levels.
- The Subcommittee noted evidence of a large decline in indices of abundance from the early 1980's to the mid 1990's off the southwest coast of Vancouver Island, however the indices were too imprecise to attach any quantitative estimate of the degree of the decline. Similar patterns have been noted in US waters over the same time period.
- The Subcommittee requested further spatial analysis of the shrimp trawl survey in the revisions of this paper, specifically looking for distribution patterns near the shelf break.

Working Paper G2003-06: Summary of the results of the 2003 Queen Charlotte Sound Bottom Trawl Survey

- The Subcommittee accepted the working paper and recommendations. The Subcommittee endorsed continuing this survey for two more years using the same target of 240 tows. The new biological and environmental data that will come from these surveys is an important improvement in basic data for stock assessment. At the end of this three-year study, the Subcommittee agreed that they would be better able to assess the precision of the survey and recommend the optimal frequency of future groundfish surveys based on interannual variances.
- The Subcommittee recommended that DFO, in collaboration with its research partners, should develop a PSARC document outlining a comprehensive groundfish survey strategy for submission to the 2004 PSARC meeting.

SOMMAIRE

Le Sous-comité sur le poisson de fond du Comité d'examen des évaluations scientifiques du Pacifique (CEESP) s'est réuni les 8 et 9 décembre 2003 à la Station biologique du Pacifique, située à Nanaimo (C.-B.), pour examiner deux documents de travail.

Document de travail G2003-05 : Mise à jour sur le bocaccio

- Le Sous-comité accepte ce document de travail et les deux recommandations formulées. La première recommandation vise à garantir que les niveaux de surveillance actuels des prises de bocaccio sont maintenus ou, dans certains cas, accrus, selon les besoins en matière de gestion des pêches et d'évaluation des stocks. Le Sous-comité recommande des limites de prises afin de maintenir ou de réduire les niveaux de prises actuels.
- Le Sous-comité relève des données montrant une forte baisse des indices d'abondance du début des années 1980 au milieu des années 1990 au large de la côte sud-ouest de l'île de Vancouver. Ces indices sont cependant trop imprécis pour obtenir une estimation quantitative de l'importance de cette baisse. Des conditions semblables ont été observées dans les eaux des États-Unis au cours de la même période.
- Le Sous-comité demande qu'une analyse spatiale plus approfondie du relevé au chalut à crevettes soit effectuée et intégrée dans les révisions de ce document. Cette analyse devrait porter sur la répartition de l'espèce à proximité du rebord de la plate-forme.

Document de travail G2003-06 : Sommaire des résultats du relevé au chalut de fond réalisé dans le bassin de la Reine-Charlotte en 2003

- Le Sous-comité accepte le document de travail et les recommandations. Il appuie la continuation du relevé pour deux autres années, avec le même objectif de 240 traits. Les nouvelles données biologiques et environnementales qui seront obtenues lors de ces relevés constitueront une amélioration considérable des données de base pour l'évaluation des stocks. Le Sous-comité reconnaît qu'à la fin de cette étude de trois ans, il sera plus en mesure de recommander la fréquence optimale pour les relevés du poisson de fond, en fonction des variations interannuelles, et d'évaluer la précision du relevé.

- Le Sous-comité recommande au MPO de préparer, en collaboration avec ses partenaires de recherche, un document du CEESP qui présente une vaste stratégie de relevé du poisson de fond. Ce document sera présenté à la réunion du CEESP de 2004.

INTRODUCTION

The PSARC Groundfish Subcommittee met December 8-9, 2003, at the Pacific Biological Station in Nanaimo, British Columbia. External participants from industry, non-governmental organizations, and First Nations attended the meeting. The Subcommittee Chair, S. Romaine, opened the meeting by welcoming the participants. During introductory remarks the objectives of the meeting were reviewed, the confidential nature of the discussion was highlighted, and the Subcommittee accepted the meeting agenda.

The Subcommittee reviewed two Working Papers. A Summary of the Working Papers is in Appendix 1. The meeting agenda appears as Appendix 2. A list of meeting participants, observers and reviewers is included as Appendix 3.

DETAILED COMMENTS FROM THE REVIEW

Working Paper G2003-05: Bocaccio Update

R.D. Stanley, P. Starr, N. Olsen

Paper accepted subject to revisions

Subcommittee Discussion

The Subcommittee acknowledged that Bocaccio is presently designated by COSEWIC as "threatened" but has yet to be legally listed. One Reviewer noted Bocaccio populations off southern Oregon State are now listed as 'threatened' under the Endangered Species Act (ESA). Populations in northern Oregon, considered to be contiguous with the BC populations, are not listed as of yet but there are measures to reduce fishery impacts in that area. The International Union for the Conservation of Nature (IUCN) has designated Bocaccio as critically endangered and the World Wildlife Fund (WWF) lists it as endangered.

The Reviewers agreed that the Authors had done an outstanding job of summarizing and documenting all the available data and information on Bocaccio. One Reviewer noted the paper did not provide any significant changes from the Stanley *et al.* (2001) paper.

The Subcommittee discussed the three surveys evaluated in the Working Paper and the likely habitat that each was sampling. The United States (US) National Marine Fisheries Service (NMFS) triennial trawl survey off the west coast of Vancouver Island targets groundfish. As a trawl survey, it is limited to low relief, soft bottom habitat which is not optimal Bocaccio habitat. The Department of Fisheries and Oceans (DFO) west coast of Vancouver Island (WCVI) shrimp trawl survey off the west coast of Vancouver Island targets shrimp habitat, which is typically flat, mud bottom. The DFO Hecate Strait trawl

survey is mainly for flatfish assessment, and typically targets flat bottom at depths which are shallower than the typical Bocaccio range. The Authors suggested the three surveys sample sub-optimal Bocaccio habitat and likely can only track large changes in relative abundance. The Subcommittee noted that all three surveys show a similar trend in Bocaccio relative abundance since the 1980s.

One Reviewer noted that irrespective of the uncertainty in the WCVI shrimp survey indices, it is prudent to assume the indices are indicative of trends in Bocaccio abundance in other British Columbia (BC) waters. Some Subcommittee members agreed, noting evidence from the Hecate Strait survey and from the NMFS triennial survey conducted from California up into BC waters, that all showed similar trends. They concluded that inferences from the shrimp trawl survey could be applied coastwide. Other Subcommittee members concluded that the shrimp survey only represents trends in the area surveyed, and therefore any discussion of harvest level reductions should be limited to that area. The Reviewer argued that despite relative abundance being stable since the mid-1990s, the relative abundance has been very low. The Authors reported the United States now acknowledges that the high relative abundance observed in the early 1980s is not reflective of historical average abundance and that episodic recruitment patterns contribute to episodic increases in abundance. The Authors pointed out that recruitment indices are not available for Bocaccio in BC waters to verify whether an increase in year-class strength occurred in 1999 compared to the 1990s. They further noted, however, a positive year-class response in all areas and for several species in BC possibly due to a climate regime shift in 1999. The Subcommittee acknowledged the lack of recruitment information for Bocaccio in BC waters, but could not unanimously accept that decreases in Bocaccio abundance were a result of reduced recruitment success rather than increased impacts due to fishing.

The Subcommittee discussed the information provided by the shrimp trawl survey, particularly the relevance of the estimated low relative abundance of Bocaccio in the late 1970's. The abundance index in the 1970's is comparable to the current low level. The Working Paper did not assess the depth distribution or seaward extent of trawl transects across the shelf in the early 1970's relative to the range of depths or areas sampled in subsequent years. If the survey did not sample similar depths or areas, then the relative abundance estimates would not be comparable. The Subcommittee requested that these spatial analyses be undertaken in revisions to the Working Paper.

Some Subcommittee members concluded that the shrimp survey only represents trends in the area surveyed, and therefore any discussion of harvest level reductions should be limited to that area. Other members noted that evidence from the Hecate Strait survey and from the NMFS triennial survey conducted from California up into BC waters, all showed similar trends. They concluded that inferences from the shrimp trawl survey could be applied coastwide. There was no consensus on this point. The Subcommittee did agree that Bocaccio were distributed throughout BC waters, with no indication of extirpation in any area.

A Subcommittee member noted that the decline in all three surveys since the 1980s has been substantial, yet the commercial catches in BC have remained steady. A Reviewer pointed out that it is unknown if the present commercial catches were hyperstable due to fishery targeting patterns that might be shifting to optimal Bocaccio habitat during a period of decline. The Authors reported, however, that trawlers were not currently targeting Bocaccio. They suggested that this would be more of an issue if industry began to avoid Bocaccio. The Subcommittee questioned whether it was possible for the fishing fleet to actually avoid Bocaccio catches. Industry provided an insightful recount of management measures since 1985 and the history of Bocaccio catches to illustrate that management measures are reflected in the catch rate, and that it is possible to implement reduced catches. Management changes in 1985, specifically the introduction for trip limits for Pacific Ocean perch (POP), canary and silvergrey rockfishes, led to an increase in catches of other rockfish. From 1986 to 1993, trip limits for POP, canary and silvergrey rockfish were reduced, and the Bocaccio catches increased. In 1994, the dockside monitoring program and the first trip limit for "other" rockfish, including Bocaccio, was implemented and the landings dropped dramatically. Bocaccio is presently a non-TAC rockfish, and if the incentive to target Bocaccio was removed, then it would be possible to reduce Bocaccio catches. The Subcommittee supported the Authors' recommendation that the Department work with industry to assess the ability to avoid Bocaccio.

The Working Paper presented two options for harvest level selection by managers: 1) capped harvest at current catch levels and 2) reduce harvest levels to an arbitrary level. A Reviewer suggested the first option did not meet SARA requirements of protection and recovery, and that reduced harvest levels were more appropriate. The Reviewer warned, however, that the second option does not ensure, with some acceptable probability, that fishing will not jeopardize the survival or recovery of the species. Some Subcommittee members agreed that the option to cap harvest levels at current catch rates was basically status quo and did not reflect the precautionary approach. The Authors, however, noted that the spirit behind this option was to invoke an immediate measure that could be improved upon with further discussions and management options. The Authors suggested that the two options did in fact reflect a gradient of management options. There was some discussion regarding the appropriate catch level at which to cap harvest levels, and the Subcommittee concluded that if harvest levels were capped, it would be most appropriate to select some average of the most recent years (for example, the last 5 years) rather than simply selecting the catch level observed in the only the last year.

The Subcommittee asked for information on the approach for determining the status of Bocaccio in the US, specifically what additional information was available in California that allowed the US managers to develop specific fish management plans. The Authors reported there are five surveys or fishery data sets available for Bocaccio off California: the same NMFS bottom trawl triennial survey that extends into BC waters, a larval survey, a juvenile survey and pier fishery and sports fishery CPUE. In addition, there are biological data from California that would allow them to generate a population dynamics

model and provide specific output and quota recommendations. The Authors reported that in California, where the decline in Bocaccio abundance is dramatic, the recent stock assessment has recommended a fishery of 400 tonnes which has been accepted as consistent with recovery strategies. The target level for recovery in California Bocaccio is not historic biomass levels, but a level consistent with MSY.

Discussion ensued regarding the recruitment index that was available for the California Bocaccio population. Recruitment is predicted via a catch-at-age model tuned with the larval and juvenile surveys. The index provides an absolute estimate of recruitment success and it appears as if the 1999 year-class may be better than the year-class failures observed in the 1990s. The 1999 year-class is about one third of the exceptional 1977 year class, and about half of the 1970 and 1973 year classes that appeared to be good. Preliminary data from California suggested that the 2000 year-class is poor. In California, the age of maturity for Bocaccio is approximately 13 years. Bocaccio begin to recruit to the fishery at 3-4 years, but the age at 50% recruitment is likely closer to the age of maturity. One Reviewer's interpretation of the options for harvest in the Working Paper implies that the population is entering a period of good recruitment based on the potential of the 1999 year class. The Authors reiterated that neither option was based on the expectations for a strong year class and that both provided a varying degree of precaution and an attempt to limit further increases in harvest levels.

An External Participant asked why the spatial or temporal distribution in commercial CPUE was not used to identify areas to avoid catching Bocaccio. Industry representatives remarked that the commercial CPUE is dramatically influenced by management changes, so temporal changes in commercial CPUE should not be used to augment information about biomass signals from surveys. The Authors noted the use of commercial CPUE to identify spatial aggregates of Bocaccio would be limited to data since 1996, and the onset of the onboard observer program. Additionally, since there are very few tows in which Bocaccio are caught in substantial numbers, the data would be limited to a few tows per year. Furthermore, Bocaccio catches are often not available on a tow by tow basis. The External Participant also wanted to know if it is possible for the fishery, irrespective of attempts to avoid Bocaccio, would accidentally catch large amounts of Bocaccio in a small number of tows. Industry noted that there may be some areas of high Bocaccio abundance but that they are minimal. They reported that large commercial trawl tows have not been observed by the Industry Representatives in the last few years.

Subcommittee Conclusions

There is evidence of a large decline in the relative abundance of Bocaccio from the early 1980's to the mid-1990's off the southwest coast of Vancouver Island. The Subcommittee acknowledged, however, that biomass indices are too imprecise to attach any quantitative estimates of the degree of the decline. The relative abundance of

Bocaccio has remained low, but steady since the mid-1990. The Subcommittee noted a parallel decline in US waters to the south of BC is well documented.

Overall, the three available surveys showed similar trends in abundance since the early 1980's. The Subcommittee concluded that declines in abundance since the 1980's were likely due to poor recruitment, but declines could be exacerbated by fishing when the population is at low levels of spawning biomass. The estimated increase in abundance in the early 1980's possibly followed strong 1970's year classes. This increase was also measured in the California Bocaccio stock as well as in other groundfish stocks in BC. The Subcommittee noted that there are no measures of year-class strength for Bocaccio in BC waters.

The Subcommittee accepts the paper and requested that the spatial analyses of the shrimp trawl survey be included in revisions.

Subcommittee Recommendations

1. The current levels of monitoring of Bocaccio catches in fisheries where this species is taken should be maintained and, in some cases increased, based on fisheries management and stock assessment needs.

2. Given the current low abundance relative to the early 1980's, the Subcommittee recommended that Managers consider two options for harvest:
    a. cap coastwide harvest levels at current catch levels.
    b. reduce coastwide harvest levels to lower target levels.

The Subcommittee noted that the probability of population increase is higher with Option b.

G2003-06: Summary of the results of the 2003 Queen Charlotte Sound Bottom Trawl Survey

R.D. Stanley, P. Starr, N. Olsen, R. Haigh

Paper accepted subject to revisions

Subcommittee Discussion

Both Reviewers agreed that the purpose of the paper needed to be more clearly stated. One Reviewer stated that the document's purpose was to summarize survey results, to provide analysis of survey cost-effectiveness and to provide abundance indices. The Reviewer noted that most of the paper focused on survey methodology instead and suggested that perhaps the paper's purpose should be modified to reflect the focus on methodology. The other Reviewer suggested the Authors de-emphasize the survey as an initial means to produce an absolute estimate of biomass, but rather as an index of abundances.

A suggestion was also made that the biological sampling component of the survey be increased and that the sampling objectives need to be more clearly stated and included in this paper. A Reviewer also suggested that the Authors add a section on potential benefits and advice to managers that may arise from the continuation of this survey. This Reviewer also noted the Authors stated that the survey should be conducted in 2004 and 2005 and that the paper supports this conclusion and recommendation. Despite this conclusion, the Reviewer also noted there is insufficient data in the paper to support it based on cost-effectiveness.

One Reviewer disagreed with the use of bootstrapping to estimate the confidence intervals from the survey results and suggested that the coefficient of variation (CV) would better characterize the estimate precision. The Authors of the paper disagreed with this recommendation concluding that bootstrapping was a better choice to measure the confidence intervals.

The second Reviewer also suggested that additional data would be beneficial in exploring the potential for other bathymetric stratification schemes. Any post-survey re-stratification study should therefore be used to test the design that was used in this survey. The Reviewer also concluded that market values and other regulatory effects may bias fishery data and recommended less reliance on these data. The Authors disagreed, suggesting that fisheries data was a valuable asset to the paper, if one accepted the potential biases. Some information on commercial catch statistics within the survey area should be added to the paper to identify potential biasing trends in the data source.

Industry sector participants noted that this paper encompasses a large survey area and a great deal of time and effort was put into this work. Industry also noted the results of this survey may not be fully realized for many years or even decades to come.

A suggestion was made to include additional oceanographic parameters, including oxygen levels in future surveys. The Authors were in full agreement, but due to the current design of the survey and the rough conditions experienced by the trawl nets, this was presently impractical unless a dedicated CTD unit was used in addition to the sensors on the trawl net.

Subcommittee Conclusions

- The Subcommittee accepted the working paper and recommendations. The Subcommittee endorsed continuing this survey for two more years. The new biological and environmental data that will come from these surveys are an important improvement in basic data for stock assessment.

- The Subcommittee recommended the survey working group redefine its objectives for these surveys as they relate to the collection of biological data as an initial step in determining the procedure for directing on-board sampling.

Subcommittee Recommendations

1. The Subcommittee recommended the Queen Charlotte Sound survey continue as proposed for 2004 and 2005 and use the same target of 240 tows. At the end of the three years, with the added insight about interannual variance, assessment of the precision of the survey will allow an evaluation of the optimal sampling frequency within the context of an overall groundfish survey strategy (see recommendation 4).

2. The 2003 results should be examined to determine whether a reallocation of the tows among strata will improve precision prior to conducting the 2004 survey.

3. Based on better knowledge of the expected number of sampling opportunities and on-board sampling capability during the charter, the current *ad hoc* method of choosing samples should be made more rigorous to ensure comparability over time.

4. In collaboration with its research partners, DFO should develop a PSARC document outlining a comprehensive groundfish survey strategy for submission to the 2004 PSARC meeting.

APPENDIX 1. Working Paper Summaries

G2003-05: Bocaccio Update
R.D. Stanley, P. Starr, N. Olsen

The present paper updates the available information on the stock status of Bocaccio (*Sebastes paucispinis*) in BC waters. It updates information on catch, CPUE, and survey indices where appropriate, from the previous PSARC document (Stanley *et al*. 2001). In addition, given the importance of the results from the NMFS triennial and West Coast Vancouver Island (WCVI) shrimp surveys with respect to stock status, it provides more comprehensive analyses of these data to communicate more accurately the degree of certainty around the point estimates and the inference of declines in abundance. The document notes the strong evidence of a significant decline in relative abundance from the early 1980's off the southwest coast of BC but also recent stability in the same indices and provides two management directions for consideration. Considering that the only remedial action available for managers is to control catches, Option #1 endorses capping catches at current levels provided existing indices do not decline. Option #1 might also be adopted as an interim measure until a more complex catch reduction strategy can be implemented. Option #2 endorses reducing catch to an arbitrary target level. A significant reduction in catch may be possible through implementation of a voluntary avoidance program, possibly in conjunction with regulatory disincentives to catch Bocaccio. However, the document emphasizes that the available assessment information is not adequate to predict how much a given reduction in catch will affect the population nor able to provide specific advice on the amount of reduction required. The choice between options is dependent on the degree to which the southern BC area reflects all BC waters, and whether the higher relative abundance recorded in the early 1980's is indicative of the long term average abundance or reflects peak levels resulting from periods of good recruitment. This uncertainty in the interpretation of the available abundance indices, along with their low precision, means that it is presently not feasible to reliably estimate stock status for British Columbia Bocaccio.

G2003-06: Summary of the results of the 2003 Queen Charlotte Sound Bottom Trawl survey

R.D. Stanley, P. Starr, N. Olsen, R. Haigh

This document summarizes results from the 2003 groundfish bottom trawl survey in Queen Charlotte Sound and southern Hecate Strait. The survey conducted 239 useable tows in depths of 50-500 m from July 3-August 9 on board the F/V Viking Storm. The survey was jointly conducted and funded by the Canadian Research and Conservation Society and Fisheries and Oceans Canada. The objective of this year's survey was to examine the feasibility for providing long term indices of relative abundance for most fish species affected by bottom trawling, primarily in the survey area.

Results indicate that if the survey were repeated in its current design, it could meet its primary objective and would cost approximately $312,000/y. It will also provide a research platform that will contribute essential biological samples, and oceanographic information. The document recommends that the survey be continued for the planned three years with minor modifications that can be identified with additional analyses of the 2003 results. The additional years will provide insight into the magnitude of the interannual process error and be used to determine the optimal frequency of the survey.

APPENDIX 2: PSARC Groundfish Subcommittee Meeting Agenda December 8-9, 2003

PSARC Groundfish Subcommittee
8-9 December 2003
Pacific Biological Station – Nanaimo, B.C.
Seminar Room

Monday 8 December

1. Opening remarks and introductions	8.30	Steve Romaine
2. Bocaccio	9.00	
Lunch Break	*12.00*	
3. Bocaccio reviews and discussion	13.00	
4. Formulation of Subcommittee Conclusions and Recommendations	14:30	
5. QCS Bottom Trawl Survey	15:30	
Adjournment	*16:30*	

Tuesday 9 December

1. QCS Survey reviews and discussion	9:00	
2. Formulation of Subcommittee Conclusions and Recommendations	10.30	
Adjournment	*11:30*	

APPENDIX 3. List of Attendees

Date: 8 December 2003
Subcommittee Chair: Steve Romaine (RomaineS@pac.dfo-mpo.gc.ca)
PSARC Chair: Al Cass (CassA@pac.dfo-mpo.gc.ca)

Name	Affiliation
Acheson, Schon	Vancouver Groundfish
Ackerman, Barry*	Groundfish Management Unit, RHQ
Bonnet, Terri	DFO Fish Management
Castle, Kris	Prince Rupert Groundfish
Choromanski, Ed	PBS Stock Assessment
Cooke, Karina	PBS Groundfish
Cormier, George	Ottawa Fisheries Management
Eros, Carole*	DFO Fisheries Management
Fargo, Jeff*	PBS Groundfish
Grandin, Chris	PBS Groundfish
Haigh, Rowan*	PBS Groundfish
Johansson, Todd	DFO Resource Management
King, Jackie*	PBS Groundfish
Krishka, Brian	PBS Groundfish
Kronlund, Rob*	PBS Groundfish
Lacko, Lisa	PBS Groundfish
Lochead, Janet	PBS Groundfish
Macdonald, Al*	Groundfish Management Unit, RHQ
Martin, Jonathan	PBS Groundfish
McFarlane, Sandy*	PBS Groundfish
Olsen, Norm	PBS Groundfish
Perry , Ted	PBS Stock Assessment
Rutherford, Kate	PBS Groundfish
Schnute, Jon*	PBS Groundfish
Sinclair, Alan*	PBS Groundfish
Stanley, Rick*	PBS Groundfish
West, Kim	DFO Fish Management
Workman, Greg	PBS Groundfish

Name	Affiliation
Anderson, Kelly	Canadian Groundfish Research and Conservation Society
Dickens, Brian	Fisherman
Koolman, John	
Mosk, Brian	Fisherman
Starr, Paul	Canadian Groundfish Research and Conservation Society
Turris, Bruce	Canadian Groundfish Research and Conservation Society
Wallace, Scott	Sierra Club of BC

Date: 9 December 2003
Subcommittee Chair: Steve Romaine (RomaineS@pac.dfo-mpo.gc.ca)
PSARC Chair: Al Cass (CassA@pac.dfo-mpo.gc.ca)

Name	Affiliation
Acheson, Schon	Vancouver Groundfish
Castle, Kris	Prince Rupert Groundfish
Choromanski, Ed	PBS Stock Assessment
Fargo, Jeff*	PBS Groundfish
Grandin, Chris	PBS Groundfish
Haigh, Rowan*	PBS Groundfish
Johansson, Todd	DFO Resource Management
King, Jackie*	PBS Groundfish
Krishka, Brian	PBS Groundfish
Haggarty, Dana	PBS Groundfish
Lochead, Janet	PBS Groundfish
Macdonald, Al*	Groundfish Management Unit, RHQ
Martin, Jonathan	PBS Groundfish
McFarlane, Sandy*	PBS Groundfish
Rutherford, Dennis	PBS Shellfish
Rutherford, Kate	PBS Groundfish
Schnute, Jon*	PBS Groundfish
Sinclair, Alan*	PBS Groundfish
Stanley, Rick*	PBS Groundfish
Wallace, Scott West, Kim	Sierra Club of BC DFO Fish Management
Workman, Greg	PBS Groundfish

Name	Affiliation
Starr, Paul	Canadian Groundfish Research and Conservation Society
Turris, Bruce	Canadian Groundfish Research and Conservation Society

Reviewers for the PSARC papers presented at this meeting are listed below, in alphabetical order. Their assistance is invaluable in making the PSARC process work. Anonymous Reviewers are not listed.

Brown, Gayle	Fisheries and Oceans Canada
Eros, Carol	Fisheries and Oceans Canada
Rutherford, Dennis	Fisheries and Oceans Canada