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Proceedings of the PSARC Groundfish Subcommittee Meeting

Compte rendu de la réunion du sous-comité sur le poisson de fond du CEESP

November 21-22, 2006
Pacific Biological Station
Nanaimo, BC

21 et 22 novembre 2006
Station biologique du pacifique
Nanaimo, C.-B

G. Logan

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Pacific Biological Station
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PACIFIC SCIENTIFIC ADVICE REVIEW COMMITTEE (PSARC)
GROUNDFISH SUBCOMMITTEE MEETING

SUMMARY

The Pacific Scientific Advice Review Committee (PSARC) Groundfish Subcommittee met November 21-22, 2006 at the Pacific Biological Station in Nanaimo, B.C. The Subcommittee reviewed three working papers.

Working Paper G2006-04: Trends in bottom trawl fishing activity in BC

The groundfish Subcommittee accepted the paper with minor editorial revisions. The Subcommittee noted that there has been a decreasing trend in the area occupied by the trawl fishery since 1996 at depths less than 500 m. There was an increasing trend in the area occupied by the trawl fishery at depths deeper than 500 m. coincident with the development of the thornyhead fishery. This trend has now reversed coincidentally with an increase in fuel prices and a drop in market value. Trawl fishing has been identified as one of the major potential human threats to sponge and coral reefs coastwide. Considering the difficulty extrapolating log-book data into a form that could be analyzed, the Subcommittee agreed that this paper does a commendable job analyzing temporal trends in the area fished and depth of fishing activity by the bottom trawl fleet. This information will be invaluable to the Pacific Coral and Sponge Conservation Strategy, a committee tasked with developing a conservation strategy for corals and sponges. However, the paper cannot comment on the urgency of implementing measures to mitigate impacts to benthic habitats such as corals and sponges.

Working Paper G2006-05: Re-evaluation of sponge reef complex occurrences and their protection in Pacific Canada

The groundfish Subcommittee endorsed the paper provided that revisions are made that will strengthen the conclusions of the working paper and clarify un-substantiated statements by the authors. The paper attempted to determine whether existing fishery closures were adequate to protect known bioherms from the groundfish trawl fishery, advise on the size of buffer zones to ensure protection of the sponge and coral reefs and advise whether the existing fishery closures were sufficient to protect the sponge and coral reefs from impacts from other types of ocean use. Buffer zones around bioherms were supported however there was insufficient evidence presented that supported the suggestion that buffer zones beyond the existing boundaries be established. The recommendation that Vessel [Spatial) Monitoring System (VMS) be required on all groundfish trawls was not supported as all trawl vessels currently operate at 100% “at sea” coverage. The Subcommittee recommended that potential sponge closures encompass all benthic fishing gear types that have an impact on sponge and coral reefs. This would include bottom trawl, long-line, trap and hook and line gear. The Subcommittee also suggested that knowledge of bioherms needs to be advanced with reference to the productivity of species utilizing these unique habitats. Lastly, it is recommended that consideration be given to joining

closed area B and C into a single closed area as there was some evidence that coral and sponge bycatch had occurred in the trough between the two closed areas.

Working Paper G2006-06: Decision time for the Queen Charlotte Island Groundfish bottom trawl survey

The purpose of the paper was to review the results and costs of the survey after the first three years (2003-2005). The document specifically addressed the following elements: 1) the precision/accuracy of the survey; 2) the costs of the survey; 3) the expectations of the survey; 4) whether the survey should be continued; and 5) should the survey be modified. Meeting participants strongly supported the multi-species, ecosystem approach put forward in the paper. The paper was viewed as particularly useful in a risk management context that considers trade-offs between factors affecting data quality and survey costs. The survey should be continued in its present design format (every two years) and refined as needed given priorities and available resources.

SOMMAIRE

Le sous-comité sur le poisson de fond du Comité d'examen des évaluations scientifiques du Pacifique (CEESP) s'est réuni les 21 et 22 novembre 2006 à la Station biologique du Pacifique de Nanaimo, en Colombie-Britannique. Le sous-comité a procédé à l'examen de trois documents de travail.

Document de travail G2006-04 : Tendances relatives aux activités de pêche au chalut de fond en Colombie-Britannique

Le sous-comité sur le poisson de fond a accepté le document avec de légères modifications de forme. Le sous-comité a pris note du fait que l'on a observé une tendance à la baisse dans la zone fréquentée par les pêcheurs au chalut depuis 1996, à des profondeurs de moins de 500 m. Dans les zones de profondeurs supérieures à 500 m, la tendance était à la hausse, coïncidant avec l'expansion de la pêche au sébastolobe. Or, cette tendance s'est maintenant inversée avec l'accroissement des prix du carburant et une chute de la valeur sur le marché. On a établi que la pêche au chalut était l'une des grandes menaces anthropique potentielles pour les récifs spongieux et coralliens sur l'ensemble de la côte. Compte tenu de la difficulté que présente l'extrapolation des données des journaux de bord dans une forme adéquate pour l'analyse, le sous-comité a convenu que le document constituait un travail digne de mention pour l'analyse des tendances temporelles dans la zone exploitée et à la profondeur à laquelle est pratiquée l'activité de pêche au chalut de fond. Cette information sera d'une valeur inestimable pour le comité chargé de l'élaboration d'un programme de conservation des coraux et des éponges du Pacifique. Toutefois, le document n'aborde pas la question de l'urgence de la mise en œuvre de mesures visant à atténuer les impacts sur les habitats benthiques comme ceux où l'on trouve les coraux et les éponges.

Document de travail G2006-05 : Réévaluation des occurrences de complexes de récifs spongieux et protection de ceux-ci au Canada pacifique

Le sous-comité sur le poisson de fond a approuvé le document à la condition que des révisions soient faites pour en étoffer les conclusions et pour clarifier certains passages non étayés par les auteurs. Ces derniers tentaient de déterminer si les fermetures de pêches actuelles étaient suffisantes pour protéger les biohermes connus des effets de la pêche au chalut des poissons de fond, de formuler des avis sur la superficie des zones tampons destinées à assurer la protection des récifs spongieux et coralliens et, enfin, de déterminer si les fermetures de pêches étaient suffisantes pour protéger les récifs spongieux et coralliens des impacts associés à d'autres utilisations de l'océan. L'utilité des zones tampons autour des biohermes était reconnue, mais les preuves présentées pour étayer la proposition d'établir de telles zones au-delà des limites actuelles étaient insuffisantes. La recommandation voulant que le Système de surveillance (spatiale) des navires soit requis sur tous les chalutiers exploitant le poisson de

fond n'était pas appuyée, car tous les chalutiers opèrent actuellement selon une une couverture de mer de 100 %. Le sous-comité a recommandé que les fermetures potentielles de la pêche aux éponges s'appliquent à tous les types d'engins de pêche benthiques qui ont un impact sur les récifs spongieux et coralliens. Cela inclut les chaluts de fond, les palangres, les trappes et les les engins de pêche à la ligne. Le sous-comité a également proposé de parfaire les connaissances sur les biohermes en ce qui concerne la productivité des espèces fréquentant ces habitats uniques. Enfin, on recommande d'étudier la possibilité de réunir les zones fermées B et C en une zone fermée unique, car, selon certaines preuves, des prélèvements accidentels de coraux et d'éponges ont eu lieu entre les deux zones fermées.

Document de travail G2006-06 : Décision requise concernant le relevé de la pêche au chalut des poissons de fond dans les îles de la Reine-Charlotte

Le but du document était d'examiner les résultats et les coûts du relevé après les trois premières années (2003-2005). Le document traitait en particulier des éléments suivants : 1) la précision du relevé; 2) les coûts du relevé; 3) les attentes associées au relevé; 4) la pertinence de poursuivre le relevé; 5) la nécessité ou non de modifier le relevé. Les participants à la réunion ont vigoureusement appuyé l'approche plurispécifique et écosystémique mise de l'avant dans le document. Ce document a été considéré comme particulièrement utile dans un contexte de gestion des risques qui implique des compromis entre les facteurs touchant la qualité des données et les coûts du relevé. Le relevé doit être poursuivi dans son format actuel (tous les deux ans) et raffiné au besoin, selon les priorités et les ressources disponibles.

INTRODUCTION

The PSARC Groundfish Subcommittee met November 21-22, 2006 at the Pacific Biological Station in Nanaimo, British Columbia. External participants from industry, academia, and conservation groups attended the meeting. The Subcommittee Chair, G. Logan opened the meeting by welcoming the participants. During the introductory remarks the objectives of the meeting were reviewed, and the Subcommittee accepted the meeting agenda.

The Subcommittee reviewed three Working Papers which are summarized in Appendix 1. The meeting agenda appears as Appendix 2. A list of meeting participants and reviewers is included as Appendix 3

DETAILED COMMENTS FROM THE REVIEW

G2006-04: Trends in groundfish bottom trawl fishing activity in BC

A. Sinclair

Subcommittee Discussion

The working paper focused on the first 3 of 4 objectives in the Request-for-Working-Paper as follows:

1. Identify and analyze temporal trends in the extent and depth of fishing activity by bottom trawl, during the period for which geographic data is recorded for trawl sets.

2. Identify, temporally and spatially, those areas of the continental shelf and slope, and abyssal depths that are being targeted by bottom trawl fisheries.

3. Identify those emerging bottom trawl fisheries that are moving into heretofore un-fished habitats.

4. Comment on what these trends suggest in terms of the urgency of implementing measures to mitigate impacts to benthic habitats such as corals and sponges.

One Reviewer voiced concern over the lack of attention in the paper to Objective 4. The author stated that, in his view, the urgency question was beyond the scope of a science review. He thought the urgency in the development of conservation strategies was a management issue possibly within the mandate of the Coral and Sponge Conservation Strategy Working Group. Reviewers and the Subcommittee concluded that, except for Objective 4, the paper addressed the objectives of the working paper.

Much of the remaining reviewers' comments were focused on technical issues. Two reviewers and the Subcommittee noted the difficulty in describing trawl tows as single points or a line between the start and end points in an attempt to define the area fished. Further, the problem of establishing grid size and the effect on the calculated area fished is difficult to overcome given the reliability of the tow locations. An alternative might be to investigate establishing a tow width; this would provide an opportunity to calculate the area fished per tow. Additionally, the author established a 1 km fishing grid where two or more trawl records or "hits" were interpreted as a cell that was fished. The author explained that a threshold of two trawl hits was used to eliminate anomalous points caused by data errors. The Subcommittee suggested that future work should assess alternative ways of removing the erroneous data as this methodology resulted in about 20% of the blocks being removed from the analysis. One reviewer was concerned that in addressing Objective 3, the two hit rule potentially could screen out valuable information in newly fished areas/habitats.

Two reviewers noted that an additional measure of trawl activity that quantified the intensity of trawl effort could be an insightful indicator. It would appear that there are a small number of tows that are potentially impacting coral and sponge beds. Therefore, it may be useful to examine the fishing frequency or fishing intensity within the grid. Because accurate tow locations may change the distribution of the trawl impacts, the author might consider using the 1994 and 1995 logbook data as well as the logbook data from the Option B fishery in the Gulf of Georgia. An interview with experienced trawl skippers may also help validate the assumptions contained within the analysis.

One Reviewer recommended a change in the terminology that is used to describe the fished area within the 1 km grid. He suggested "area of occupancy" rather than "area fished" would be more appropriate. The author contended that the analysis was intended to describe relative change in trawling and not absolute change, therefore, the choice of terminology is not particularly relevant.

Recognizing that the trawl industry has been very proactive in accommodating "sensitive benthic habitats", training of "At Sea Observers" has been emphasized over the years. The author should be aware that the evolution of this training and changing research priorities provided to the observers may have affected the quality of data collected.

Lastly, it would be useful if the author could include a map showing the current annual closures and a second map showing both the permanent and temporary closures.

Subcommittee Conclusions

The Subcommittee had no major concerns with the paper and accepted it with minor revisions, many noted by the author during the discussion of the merits of the paper. Overall the Subcommittee concluded, with the exception of the urgency question in the RFWP, that the paper addressed the objectives as follows:

- Identified and analyzed the temporal trends in the area and depth of fishing trawl activity;
- Identified, temporally and spatially, those areas of the continental shelf and slope, and abyssal depths that are being targeted by the bottom trawl fisheries;
- Identified those emerging trawl fisheries that are moving into unfished habitats.

The Subcommittee acknowledged that observer training over time could have an impact on data quality.

The paper would benefit from a figure showing all fishing closed areas and areas of untrawlable bottom given current fishing technology.

Subcommittee Recommendations

1. Future researchers should consider the suggestions by reviewers for future work.

2. The revised working paper should be used to inform the Pacific Coral and Sponge Conservation Strategy Working Group and to evaluate the question posed in Objective 4.

G2006-05: Re-evaluation of sponge reef complex occurrences and their protection in Pacific Canada

G. Jamieson, K. Conway and V. Barrie

Subcommittee Discussion

The working paper addressed the need for protection of critical coral and sponge habitats. The paper focused on three questions concerning the potential for groundfish trawl activity impacting these sensitive habitats.

1. Determine whether existing fishery closures are sufficient in area to protect known sponge reef bioherm complexes from the impacts of the groundfish trawl fishery.

2. Advise whether a buffer zone of protection around the reefs is justified to protect the sponge reef bioherm complexes.
3. Advise whether fisheries closures are sufficient to protect the sponge reef bioherm complexes in view of potential impacts from other types of ocean use.

The Subcommittee endorsed the paper but with revisions that will strengthen the objectives of the working paper and clarify unsubstantiated statements by the authors. There was much discussion around the size of the buffer zones and the criteria for establishing them. In addition, many questions arose over the issue of suspended sediment caused by trawl fishing. The sediment suspended by trawl activity is significantly different than the naturally occurring suspension around the sponge reefs. It is unknown whether the trawl sediment has a deleterious impact on the sponge and coral reefs. More important would be the bycatch of sponge in the trawl fishery. It was noted that the bycatch of sponge within close proximity to the existing boundaries appears to be very low.

Both reviewers suggested that little evidence is provided within the paper to substantiate establishing buffer zones suggested; (1 km, 5km or 9 km). The authors were asked to provide a more detailed analysis of the spatial distribution of the sponge bycatch and if possible the spatial extent and the amount of suspension created by the trawl. The authors were also asked to provide clear captions for the text and figures within the document. Lastly, the authors are asked to provide a figure which compared the proposed 2006 sponge closures with sponge catches in 2005.

The Subcommittee recommended the following specific amendments to the document:

- The document should clearly identify whether each of the spatial summaries of catch, effort or non-zero catch, are based on the beginning, end, or mid-point of the tows.
- Sponge reefs for the inside water should receive equal attention in the document.
- It is suggested that the authors add a table which summarizes the chronology of management actions with respect to sponge reef closures.
- The second paragraph on page 7 of the working paper should be rewritten with the assistance of pertinent fishery managers. The closures were implemented after extensive consultation with the trawl fleet and included input from science.
- The authors are asked to remove the comment about dogfish bycatch on page 5, paragraph 3. The information has no relevance to the title and objectives of this document.
- The Subcommittee has asked for clarification about a statement that the trawls caused damage to sponge reefs on the Fraser Ridge.
- The authors stated that Vessel Spatial Monitoring System (VMS) is a requirement of license to ensure compliance, in fact it is not. The

Subcommittee noted that observers were required to report non-compliance of fishing vessels.

- The authors are encouraged to conduct a thorough edit of the paper to ensure that all editorial issues and metrics associated with tables and captions are uniform.

Subcommittee Conclusions

The Subcommittee concluded that a substantial re-write of the paper is required to include specific items identified by the reviewers and Subcommittee. In addition, some members of the Subcommittee questioned the process of defining "adequacy" of the sponge closures within the PSARC forum. Clearly further scientific and policy discussion needs to identify the extent of protection that is required for the coral and sponge reefs. Also further analysis of current fishing behavior and location relative to the known reefs should be entertained. Several participants within the Subcommittee expressed the view that the federal government had made a commitment to protect all coral and sponge reefs; the provincial government, supports marine protected area status for a representative amount of coral and sponge reefs. The Subcommittee concluded that a precautionary approach to protecting the sponges and corals is required until more information is available. This policy question needs to be clarified. Increased effort should be made to locate all coral and sponge reefs so that stakeholders are not being asked to constantly relinquish fishing area. It was suggested that the authors consider using polygons to describe the closures rather than rectangles. Lastly, the trawl fleet should be commended for their quick response in support of sponge reef conservation.

Subcommittee Recommendations

The Subcommittee recommended acceptance of the document subject to revisions discussed and outlined in the discussion and conclusions. The Subcommittee has the following conclusions about the recommendations stated by the authors of the paper;

1. The Subcommittee accepted the principle of a buffer zone around the closures. However there is no scientific evidence provided that would support a decision to establish the suggested one, five or nine kilometer buffer zone.

2. The Subcommittee did not support the suggestion that VMS be incorporated into all components of the trawl fishery. There is currently 100% "at sea" coverage for all trawl activity in outside waters.

3. The Subcommittee recommended that future sponge closures encompass all benthic fishing gear within both the commercial and recreational fishing sectors that have an impact on sponge and coral reefs. This gear would

include bottom trawl, long-line, trap, and hook and line gear. The Subcommittee did not recommend benthic gear closures for all sponge and coral reefs to fishing at this time, i.e. for those in inshore waters, as this decision is contingent upon further development of the conservation strategy for bioherms coastwide.

4. The Subcommittee recommended that the ecological role of bioherms should be advanced with particular reference to their impacts on the productivity of species utilizing this unique habitat. In addition, the Subcommittee suggested that mapping effort to accurately identify sponge and coral reefs be increased subject to other priorities and funding. Further conservation policy needs to be developed that would define the breadth of protection for these habitats.

5. The Subcommittee recommended that the closures identified for the sponge reef complexes B and C in the Queen Charlotte Basin should include the open area between the two closures.

G2006-06: Decision time for the Queen Charlotte Island Groundfish bottom trawl survey

R.D. Stanley, N. Olsen and G. Workman, J. Cleary, and W. de la Mare.

Subcommittee Discussion

The Working Paper presented a methodology and business case for Queen Charlotte Sound multi-species groundfish trawl surveys. The intent of the trawl survey is to provide usable relative abundance indices for as many benthic and near benthic fish species as is reasonable while obtaining the supporting biological samples of size and age composition. The purpose of the paper was to review the results and costs of the survey after the first three years (2003-2005). The document specifically addresses the following elements:

- The precision/accuracy of the survey
- The costs of the survey
- The expectations of the survey
- Whether the survey should be continued
- Should the survey be modified

The analysis makes use of a survey simulator to characterize the effectiveness of the survey, as well as explore potentially more cost-effective designs.

The Subcommittee acknowledged that this was a methodology paper to allow an assessment of trade-offs between data quality (i.e. precision) and survey costs in a risk management context. There was no science advice to inform management decision making and there were no formal reviewers of the paper.

PSARC meeting participants applauded the authors for their thorough assessment of data collected from the three survey years. The authors and Subcommittee acknowledged that a complete evaluation of all factors contributing to an optimal survey design is not possible at this time. The Subcommittee noted that factors affecting parameter estimation (i.e. process error) will be refined over time. Other issues were discussed such as the influence of potentially unavoidable changes to charter vessel skippers and vessels over time. The authors agreed that not all factors affecting species indexing can be controlled in the design but added that control over fishing gear specifications and deployment, for example, will be important for maintaining consistency.

The participants agreed that a revised document should be published in a publicly available format (DFO Technical Report Series or as a CSAS Research Document).

Subcommittee Conclusions

Meeting participants strongly supported the multi-species, ecosystem approach put forward in the paper. The paper was viewed as particularly useful in a risk management context that considers trade-offs between factors affecting data quality and survey costs.

Subcommittee Recommendations

The survey should be continued in its present design format (every two years) and refined as needed given priorities and available resources.

APPENDIX 1. Working Paper Summary

Working Paper G2006-04: Trends in bottom trawl fishing activity in BC

A. Sinclair

Changes in the spatial extent of the BC groundfish bottom trawl fishery was estimated using fishery observer data. The time period 1996-2005 was chosen for detailed analysis since this is the period for which suitable detailed catch and effort data are available from fishery observers. Tow locations were represented by a vector between the start and end points of the tow. Areal estimates were based on a relatively fine spatial grid of 1 km^2. The implications of these choices on the results of the analysis are discussed. There was virtually no groundfish bottom trawl fishing effort reported from depths greater than 500 m prior to 1990. There has been an extension of the fishery into this depth zone since then. The largest expansion in area fished in the 1996-2005 period was in deep water (>500m) and in areas where the longspine thornyhead fishery has developed. There was a considerable increment in cumulative area fished in 2000, the year the longspine thornyhead fishery expanded to northern waters in Triangle (5AB) and Rennell Sound (5E). A second area of expanded fishing is northeast of Middle Bank. This area yielded the majority of reported catches of species associated with corals and sponges. The annual area fished in 0-150 and 150-500 m coastwide either declined or was stable. There was a considerable reduction in the annual area fished in area 5CD in the 0-150 m depth range. There remain considerable areas that have not been trawled since 1996. These are dominated by rough bottoms not suitable for trawling. There are hook and line and trap fisheries in these areas. Little is known about the habitat forming biota in these areas, species compositions, and demographic profiles of the inhabitants.

Working Paper G2006-05: Re-evaluation of sponge reef complex occurrences and their protection in Pacific Canada

G. Jamieson, K. Conway and V. Barrie

Evaluation of sponge bycatches in the vicinity of known sponge bioherms in Queen Charlotte Sound indicates that established groundfish trawl closures have reduced trawl impacts. Recent revision of the closure boundaries to better reflect the known spatial distribution of the bioherms will likely even further reduce direct trawl gear impacts. Impacts from other benthic gears could not be assessed because of the lack of relevant bycatch and fishing location data, but all benthic gear activity in the vicinity of all sponge bioherms should be terminated. Although direct incursions of trawls are now being minimized, there is still concern that fishing activity close to the sponge reefs may be impacting the sponges through increasing suspended solids presence. No direct data on potential consequences exist, but a precautionary management measure would be to establish larger closures around the footprints of the bioherm complexes. New smaller sponge bioherms have recently been found in both Queen Charlotte Strait and the Strait

of Georgia, and it is recommended that effective closures for all benthic fishing gear impacts be established around these sponge bioherm complexes as well.

Working Paper G2006-06: Decision time for the Queen Charlotte Island Groundfish bottom trawl survey

R.D. Stanley, N. Olsen and G. Workman

The intent of the Groundfish Queen Charlotte Sound bottom trawl survey is to provide usable relative abundance indices for as many benthic and near benthic fish species as is reasonable while obtaining the supporting biological samples of size and age composition. The survey, jointly conducted by the Canadian Groundfish Research and Conservation Society and Fisheries and Oceans Canada, covers Queen Charlotte Sound and the southern portion of Hecate Strait. It attempts to cover the populations on the continental shelf region of the central coast while complementing the three other outer coast trawl surveys, as well as another 14 surveys which provide groundfish indexing. The purpose of this document is to review the results and costs of this survey after the first three years (2003-2005). The document specifically addresses the following elements:

- The precision/accuracy of the survey
- The costs of the survey
- The expectations of the survey
- Whether the survey should be continued
- Should the survey be modified

The analysis makes use of a survey simulator to characterize the effectiveness of the survey, as well as explore potentially more cost-effective designs. The document concludes with the recommendation that the survey should be continued in its current configuration with relatively minor operational changes.

APPENDIX 2: PSARC Groundfish Subcommittee Meeting Agenda

AGENDA
PSARC Groundfish Subcommittee Meeting
November 21-22
Seminar Room
Pacific Biological Station

Tuesday, November 21	
Introduction and procedures	**9:00 – 9:15**
Re-evaluation of sponge reef complex occurrences and protection in BC coastal waters	**9:15 – 12:00**
Lunch Break	***12:00 – 1:00***
Trends in Groundfish bottom trawling activity in BC	**1:00 – 4:00**
Adjournment	**4:00**
Wednesday, November 22	
Evaluation of the Queen Charlotte Sound Groundfish bottom trawl survey (2003-2005)	**9:00-12:00**
Adjournment	***12:00***

APPENDIX 3. List of Attendees

Subcommittee Chair: Gary Logan
PSARC Chair: Al Cass

External Participants	
Name	**Affiliation**
Argue, Sandy	Ministry of Agriculture, Food and Fisheries
Barrie, Vaughn	Natural Resources Canada
Buchanan, Scott	Archipelago Marine Research
Chalmers, Dennis	Ministry of Agriculture, Food and Fisheries
Cleary, Jaclyn	Simon Fraser University
Haggarty, Dana	Marine Biological Consulting
Ketchen, Keith	Retired, Fisheries and Oceans Canada
Marliave, Jeff	Vancouver Aquarium
Mose, Brian	Canadian Groundfish and Research Conservation Society
Riccus, Eva	Canadian Parks and Wilderness Society
Starr, Paul	Canadian Groundfish and Research Conservation Society
Turris, Bruce	Canadian Groundfish and Research Conservation Society
Wallace, Scott	David Suzuki Foundation
DFO Participants	
Ackerman, Barry	
Cass, Al	
Conley, Kevin	
Fargo, Jeff	
Haigh, Rowan	
Jamieson, Glen (via video-conf.)	
Farrell, Melody	
Krishka, Brian	
King, Jackie	
Kronlund, Rob	
Logan, Gary (Subcommittee Chair)	
Lucas, Barbara	
McFarlane, Sandy	
Schnute, Jon	
Sinclair, Alan	

Stanley, Rick	
Trager, Diana	
Workman, Greg	
Yamanaka, Lynne	

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.

Haigh, R.	Fisheries and Oceans Canada
Marliave, J.	Vancouver Aquarium
Starr, P.	Canadian Groundfish and Research Conservation Society
Wallace, S.	David Suzuki Foundation