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Proceedings of the PSARC Pelagic Subcommittee Meeting February 5, 2003

February 5, 2003
Nanaimo, B.C.

J. King
Pelagic Subcommittee Chair

Fisheries and Oceans Canada
Pacific Scientific Advice Review Committee
Pacific Biological Station
Nanaimo, British Columbia V9T 6N7

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PACIFIC SCIENTIFIC ADVICE REVIEW COMMITTEE (PSARC)
PELAGIC SUBCOMMITTEE MEETING

SUMMARY

The Pacific Scientific Advice Review Committee (PSARC) Pelagic Subcommittee met February 5, 2003 at the Best Western Dorchester Inn, Nanaimo, British Columbia to review scientific information relating to British Columbia pelagic fish biology, distribution and assessment.

Working Paper P2003-01: Indicators and reference points for management of Fraser River eulachon: A comparison and discussion with recommendations

The Subcommittee concluded that the approach of using the indicators is acceptable given the lack of sufficient information of factors affecting eulachon abundance in the Fraser River and the short time series of data. This framework should be considered as a work in progress towards an analytically-based assessment as sampling methodologies develop and time series are extended. The Subcommittee felt that the proposed framework should be tested retrospectively. The decision-making tables presented in the Working Paper are endorsed by the Subcommittee and it is recommended that fishery managers consider this framework when developing fishery management plans for Fraser River eulachons. The framework represents a suite of indicators and criteria for decision-making. It is important to note that these latter points do not represent biological reference points and to some extent are arbitrary limits. The Subcommittee accepted the paper.

Revisions to P2002-03: Analysis of juvenile herring surveys for recruitment prediction in the Strait of Georgia

The Subcommittee considered revisions to the Working Paper submitted in September 2002. The 1999 cohort is the second largest observed since 1952 and an outlier in a predictive relationship between juvenile abundance and subsequent recruitment. The Subcommittee accepted this paper and recommended continuance of the survey, particularly to determine if 1999 represents a change in the predictive capability of the juvenile survey, or is indeed a single outlier.

SOMMAIRE

Le Sous-comité des poissons pélagiques du Comité d'examen des évaluations scientifiques du Pacifique (CEESP) s'est réuni le 5 février 2003 à l'hôtel Best Western Dorchester Inn, à Nanaimo (C.-B.), afin d'examiner l'information scientifique sur la biologie, la distribution et l'évaluation des poissons pélagiques de la Colombie-Britannique.

Document de travail P2003-01 : Indicateurs et points de référence pour la gestion de l'eulakane du fleuve Fraser : comparaison, discussion et recommandations

Le Sous-comité a conclu que la méthode consistant à utiliser les indicateurs est acceptable étant donné le manque de données sur les facteurs qui influent sur l'abondance de l'eulakane dans le fleuve Fraser et la courte série chronologique de données. Au fur et à mesure que les méthodes d'échantillonnage sont améliorées et que les séries chronologiques sont allongées, on devrait considérer ce cadre de travail comme une étape vers l'évaluation analytique. Le Sous-comité a estimé que le cadre de travail proposé devrait être mis à l'essai rétrospectivement. Il a approuvé les tableaux de prise de décisions présentés dans le document de travail. Il est recommandé aux gestionnaires des pêches de tenir compte du cadre de travail lorsqu'ils élaboreront les plans de gestion de la pêche à l'eulakane dans le fleuve Fraser. Le cadre de travail représente une série d'indicateurs et de critères pour faciliter la prise de décisions. Il convient de noter que ces derniers éléments ne constituent pas des points de référence biologiques et qu'il s'agit, dans une certaine mesure, de limites arbitraires. Le Sous-comité a accepté ce document.

Corrections à P2002-03 : Analyses des relevés de harengs juvéniles pour prévoir le recrutement dans le détroit de Georgia

Le Sous-comité a pris en considération les corrections apportées au document de travail présenté en septembre 2002. La cohorte de 1999 est la deuxième plus grande depuis 1952 et constitue une aberration pour la relation permettant de prévoir le recrutement à partir de données sur l'abondance de juvéniles. Le Sous-comité a accepté ce document et recommandé la poursuite du relevé, particulièrement afin de déterminer si 1999 représente un changement du pouvoir de prédiction du relevé des juvéniles ou s'il s'agit bel et bien d'une aberration.

INTRODUCTION

The PSARC Pelagic Subcommittee met February 05, 2003 at the Best Western Dorchester Inn in Nanaimo, British Columbia. External participants from industry attended. The Subcommittee Chair, J. King, 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 Chair presented recommendations and discussion items from the December 5, 2002 meeting of RMEC at which recommendations from the last Pelagic Subcommittee meeting were presented.

The Subcommittee reviewed one Working Paper, and revisions to Working Paper P2002-03 (Hay et al.) that was deferred for a decision and recommendations at the September 2002 Subcommittee meeting. Working Paper summaries are 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 REVIEWS

P2003-01: Indicators and reference points for management of Fraser River eulachon: A comparison and discussion with recommendations

D.E. Hay, K. West, A.D. Anderson, and D.T Rutherford (**Accepted subject to revisions**)

Rapporteur: R. Tanasichuk

Subcommittee Discussion

Subcommittee discussion focussed the proposed decision-making framework and its adequacy for the management of Fraser River eulachon. The authors presented a number of indicators and used them to construct a decision-making protocol. They felt that no indicator had a strong quantitative basis and assumed relationships were based on assumed biological relevance. This was a consequence of little information on eulachon biology and short time series, except for the offshore shrimp trawl biomass index. One of the reviewers felt that, because of the lack of strong quantitative evidence for what he termed the predictors, it was inappropriate to use the framework for decisions about prosecuting a fishery. The authors noted that they use the term “indicators” to reflect what they feel is a qualitative description of stock status rather than “predictors” which would reflect a quantitative description. Another reviewer felt that the analysis was flawed since the shrimp trawl by-catch and Columbia River spawning population biomass were not included. The authors noted that there is a distinction between the 'offshore index' which is derived exclusively from research cruises and 'bycatch', which is a product of the fishery from the entire shrimp fishery on the WCVI. Although the total industry bycatch could exceed catches in commercial fisheries in rivers, in most years the industry bycatch is not so large that it results in a substantial decrease in the offshore index. Rather, the offshore index probably reflects the sum of the biomass of two cohorts of eulachons. Also, the offshore index is assessed in May which is mainly before these cohorts are exposed to capture in the shrimp fishery, which often occurs later in the year (May-October).

The Subcommittee acknowledged that if none of the indicators is correlated to abundance then the decision-making framework could fail. However, the utility of the framework can be tested by looking retrospectively at historical success. In addition, underlying assumptions might be given different relative weighting. The Subcommittee were concerned that the criteria tabulated in the Working Paper would be viewed as biological limit or target reference points, whereas they are determined by other, more arbitrary methods.

Subcommittee Conclusions

The Subcommittee concluded that the approach of using indicators is acceptable given the lack of sufficient information of factors affecting eulachon abundance in the Fraser River. This is to be considered as a work in progress towards an analytically-based assessment as sampling methodologies develop and time series are extended. The Subcommittee felt that terminology other than "reference point" for example should be used so that it is clear that the descriptors of stock status currently used do not have a quantitative stock assessment basis. In addition, the proposed framework should be tested retrospectively. The Subcommittee accepted the paper.

Subcommittee Recommendations

1. The Subcommittee recommended that adequate resources be provided to continue developing a Fraser River eulachon stock assessment methodology through data collection and analyses.

2. The Subcommittee recommended that Fishery Managers consider the decision-making framework outlined in the paper when developing fishery management plans for Fraser River eulachons.

Revisions to P2002-03: Analysis of juvenile herring surveys for recruitment prediction in the Strait of Georgia

D.E. Hay, J.F. Schweigert, M. Thompson, C.W. Haegele, P. Midgley (**Accepted with revisions**)

Subcommittee Discussion

This Working Paper was initially presented at the September 2002 Subcommittee meeting. During preparation of the paper, age-determination data were not available for the 2002 samples, and as such the cohort size estimate for 1999 was not known. By the time of the September meeting, the age-structured model estimated the 1999 cohort to be large. Coupled with analytical techniques suggested by the reviewers, (specifically transformation of data, pooling data and analysis of variance), the Subcommittee recommended deferral of the paper until early 2003 so that additional information and analyses could be included.

It has been confirmed that the 1999 cohort was the second largest observed. The revisions addressed the variability and validity of the 1999 data point. The predictive relationship between juvenile surveys and subsequent recruitment is able to predict 75% of the time the correct poor, average, and good classifications used in the stock assessment approach. This indicates that there is a relationship between the juvenile abundance and recruitment, however 1999 is an outlier. Additional information from 2000 and 2001 surveys, and subsequent 2003 and 2004

recruitment, will be able to address the concern that the predictive capability of the relationship changed in 1999.

The revisions included log-transformations of the data, which improved the statistical significance of the regression analyses. It was noted that the parametric means and regression is not necessarily the most appropriate tool to use for analyses of log-transformed data, particularly if the transformed data is still not normally distributed. The authors reported that regression analyses on medians would likely not provide parameters that were very different. The authors agreed to provide non-parametric analyses the next time the survey data was analyzed.

Subcommittee Conclusions

The Subcommittee accepted the paper. The Subcommittee concluded the survey results should not be directly incorporated into the stock assessment, but could be viewed as auxiliary information when selecting poor/average/good classifications for upcoming recruitment.

Subcommittee Recommendations

The Subcommittee recommended that juvenile surveys be continued and that the next few years should be incorporated into a retrospective analysis of the ability of the survey to predict poor/average/good recruitment.

APPENDIX 1: Working Paper Summary

P2003:01 Indicators and reference points for management of Fraser River eulachon: A comparison and discussion with recommendations

D.E. Hay, K. West, A.D. Anderson, D.T. Rutherford

This report reviews potential indicators and reference points for the management of eulachons (*Thaleichthys pacificus)* in the Fraser River. Concern for the conservation of eulachons in the Fraser River peaked in 1994, following poor returns in First Nations and commercial fisheries. This concern prompted field research to estimate spawning biomass and the introduction of fishing closures and other restrictions. Future management and fisheries require explicit management plans based on objective criteria - or 'indicators' and 'reference points' - about the status of spawning stock biomass and fisheries. The main indicator is the spawning stock biomass (SSB) estimated annually (since 1995) from egg and larval surveys. As a reference point from this indicator, we (the authors) explain why a SSB of less than 150 tonnes, for 2 consecutive years, could be a reference point for conservation. Another indicator is an offshore index of abundance of eulachons estimated during annual shrimp trawl surveys in May. Offshore biomass estimates include two cohorts from the Fraser and Columbia Rivers. An offshore biomass estimate of less than 1000 tonnes in offshore waters could be a reference point for concern about Fraser River eulachon fisheries. Another indicator is catch data from Columbia River fisheries. Columbia River eulachon spawn mainly in January and February, about four months earlier than Fraser River eulachons. In most years, a cumulative annual catch of less than 500 tonnes in the Columbia could be cause for conservation concern for the spawning run in the Fraser River. Test fishery data, collected for seven years since 1995 provides a potential reference point that may be useful for 'in-season' management decisions. The utility of these test fishery data as an indicator, however, remains to be demonstrated. The comparison of test fishery catches with SSB estimates is promising but yet not convincing. Nevertheless, we discuss some potential reference points related to test fishery data. We suggest that there are no firm biological criteria, or sufficient biological information to set a 'biological' quota, but the long term catch history of the Fraser has often seen catches in excess of several hundred tonnes. We do not recommend such catch levels be set at the present time but point out that annual catch levels in the commercial fishery since 1980 have been about 20 tonnes, for a total removal of about 30 tonnes. The combined removals from other sources (First Nations and recreational catches) may have been another 10 tonnes (although this last estimate is very rough). Therefore under normal conditions the Fraser River probably has a spawning biomass of about 500-1000 tonnes so removal of 30 tonnes would constitute an annual catch rate about three to six percent. We suggest that such a removal is sustainable. An unresolved issue, beyond the scope of the present paper, is the potential removal of Fraser River eulachons as bycatch in offshore trawl fisheries. Such fisheries have the potential to catch more eulachons than any Fraser River eulachon fisheries.

P2002-03: Analysis of juvenile surveys for recruitment prediction in the Strait of Georgia

D.E. Hay, J.F. Schweigert, M. Thompson, C.W. Haegele, P. Midgley

We (the authors) estimated annual variation in the relative abundance of juvenile herring from purse seine surveys conducted from 1991 to 1999 in the Strait of Georgia. The objective was to evaluate the predictive capability of the surveys to estimate the relative size of the recruiting year class before it enters the fishery at age 3. In some years, a substantial part of the fished population (20-50%) consists of herring that recruit in the same year. Therefore such predictive capability would be useful as ancillary information for determining total allowable catches for the fishery. Purse seine surveys were made throughout the Strait of Georgia in September and October. Sets were made at ten fixed transects, each with about five fixed sampling stations that varied in depth and distance from shore. Juvenile herring in their first year of life (about 5-6 months of age) were the most common species captured, followed by age-1+ herring. Juvenile herring abundance changed significantly among years, but there also were significant inter-annual differences in abundance among different regions of the Strait of Georgia. For each year of the survey, we compared the numbers and weight of age-0+ juvenile herring catches with the number of age-3 recruits, of the same cohort, estimated independently 3 years later, from age-structured analyses used for the annual assessments. There are several alternate ways to consider these comparisons, each differing in the estimate of the annual juvenile abundance. In general however, all comparisons show a positive but variable relationship, with the juvenile index accounting for less than 50% of the variability in the recruitment index. The most aberrant data point, in an otherwise tidy and convincing regression of seven points, is the exceptionally abundant 1999 cohort, that recruited as age 3 herring in 2002. This was the second largest cohort seen since the 1954 cohort, which was only marginally greater. The troubling aspect of these juvenile surveys, therefore, is that they were unable to anticipate this exceptionally large cohort. At best, we would have anticipated only moderately good recruitment. We anticipate, however, that data from more years will allow further refinement and understanding of the predictive utility of the approach, as well as factors contributing to the variation. With further data collection and analyses we suggest that the results of the survey could become a key indicator of potential recruitment in the Strait of Georgia. Such a prediction could be made nearly two years prior to the recruitment and we comment on the potential of this approach for future use by management. We conclude the paper with a brief discussion of biotic factors that might have contributed to the strong 1999 cohort.

APPENDIX 2: PSARC Pelagic Subcommittee Meeting Agenda February 5, 2003

PSARC PELAGIC SUBCOMMITTEE MEETING
Dorchester Hotel
Wednesday, February 5, 2003
Nanaimo, BC

8:30-8:45	Introductions and Opening Remarks. Chair's report from RMEC.
8:45-9:45	Analyses of juvenile surveys for recruitment predictions in the Strait of Georgia (D. Hay and J. Schweigert) – (Note: updated analyses will be presented for this Working Paper that was initially presented at the September, 2002 meeting. Requires decision and recommendation from Subcommittee, but will not receive new reviews.)
9:45-12:00	Indicators and reference points for management of Fraser River eulachon. (D. Hay et al.)
12:00	*Adjournment*

APPENDIX 3: List of Attendees & Reviewers

Subcommittee Chair: Jackie King
PSARC Chair: Al Cass

DFO Participants	
* Subcommittee Members	
Anderson, Don*	
Chalmers, Dennis*	
Flostrand, Linnea	
Fort, Chuck*	
Hamer, Lorena*	
Hay, Doug*	
Hrabok, Christa	
Kristen, Daniel	
McCarter, Bruce*	
Midgley, Peter*	
Rusch, Bryan*	
Schweigert, Jake*	
Sneddon, Debbie	
Stanley, Rick	
Tanasichuk, Ron*	
Therriault, Tom*	
Thompson, Matthew	
Trager, Diana*	
West, Kim	
External Participants:	**Affiliation**
Bauer, Joe	Commercial eulachon and shrimp trawl fisher
Lewis, Adam	Eulachon Conservation Society
Ware, Dan	Herring Conservation and Research Society
Wilson, Ken	Fraser River Aboriginal Fisheries Resource Conservation Council

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.

Fu, Caihong	Stock Assessment, DFO
Stanley, Rick	Groundfish Stock Assessment, DFO