

# REPORT OF BIOLOGICAL OCEANOGRAPHY COMMITTEE

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The meeting of the Biological Oceanography Committee was held from 13:30-17:30 hours on October 23, 2002. The Chairman, Dr. Vladimir I. Radchenko, called the meeting to order and welcomed members (see *BIO Endnote 1* for attendance). The Committee reviewed the agenda and one addition was made for a brief presentation by Dr. George L. Hunt (*BIO Endnote 2*).

## **Business arising from last year's meeting (Agenda Item 3)**

### Status of proposed publications

Dr. David L. Mackas briefly informed the Committee on the publication of a special issue of *Journal of Oceanography* (Vol. 58, No. 5) on *Physics and biology of eddies, meanders and rings* (selected papers from the 2001 POC/BIO/FIS Topic Session) and commented that the journal and Guest Editors (William B. Crawford, Alexander S. Bychkov, Stewart M. McKinnell and Takashige Sugimoto) did an excellent job in processing this issue.

Another special issue of *Progress in Oceanography* (Vol. 55, No. 1-2) on *Variability of Bering Sea ecosystem* was delivered at the meeting. It contains 17 papers presented at last year's CCCC Topic Session. BIO commended Guest Editors (Allen Macklin, Jeffrey M. Napp, Vladimir I. Radchenko, Sei-ichi Saitoh, Phyllis J. Stabeno and Stewart M. McKinnell) for their efforts.

Dr. Paul J. Harrison informed that a special issue of *Deep-Sea Research Part II* (Vol. 49, No. 24-25) on *North Pacific Biogeochemical Processes* (Guest Editors: Toshiro Saino, Alexander S. Bychkov, Chen-Tung A. Chen and Paul J. Harrison) will be published later this year. The new data provided by the Japanese scientists now give more balanced coverage of the east and west sides of the North Pacific.

Dr. Alexander Bychkov reported on the progress with publication of a special issue of *Progress in Oceanography* on *Plankton size classes, functional groups and ecosystem dynamics* (selected papers from the 2001 BIO Topic Session). This issue will contain about 10-12 papers from Canada, Japan, Korea, U.S.A. and Chile. This volume is in the final stages of review, and publication is expected in spring 2003.

### Status of proposed inter-sessional meetings

Dr. R. Ian Perry gave an update on the ICES/PICES/GLOBEC Zooplankton Production Symposium. The associated workshop will focus on comparing changes in zooplankton composition and distribution in North Pacific and North Atlantic, and developing suggestion for future cooperative projects.

Dr. Harrison briefly reported on a 2-day JGOFS/PICES Workshop on *Synthesis of JGOFS North Pacific Process Study* held October 1-2, 2002, in Sapporo, Japan, and co-sponsored by the Japan Oceanographic Society and Hydrospheric Atmospheric Research Centre of Nagoya University. Abstracts have been published and a special issue of *Journal of Oceanography* on *JGOFS North Pacific Synthesis* is planned for publication in early 2004.

## **Progress report of Working Group 14 on Effective Sampling of Micronekton (Agenda Item 4a)**

The Co-Chairman of WG 14, Dr. Richard D. Brodeur, presented a summary of the activities of the Working Group (*BIO Endnote 3*). He gave an overview of the meeting held on October 19, 2002. The Working Group also convened an inter-sessional meeting in conjunction with the AGU/ASLO Ocean Sciences Meeting in Hawaii, in February 2002.

A status report indicated that the WG 14 final report was 70-80% complete. A survey for additional data will be posted on the PICES Home Page and results will be attached to the final report as an appendix. The target date for completion of the report is late 2003. A draft report will be submitted to BIO by September 15, 2003.

There was also discussion of a PICES-supported cruise to compare different micronekton sampling devices. This cruise could be in the area just north of the Hawaiian Islands (Station ALOHA at 22°45'N 158°W - the location of the Hawaii Ocean Time Series), in October 2004, or possibly in the Bering Sea (in conjunction with the BASIS program). Efforts are being made to have ship time provided with no cost to PICES by the United States (NOAA) and by Japan. BIO approved the plan for a sampling comparison experiment by consensus and asked Dr. Brodeur to prepare a draft budget request for this experiment. Preliminary proposal was presented after the Committee meeting (*BIO Endnote 4*).

#### **Report of the Advisory Panel on *Marine Birds and Mammals* (Agenda Item 4b)**

The Panel Co-Chairman, Dr. Hidehiro Kato, distributed a written report to BIO members (*BIO Endnote 5*), and an overview of this handout was presented by Co-Chairman, Dr. Douglas F. Bertram. The joint BIO/FIS/CCCC Topic Session at PICES XI was very successful (summary of the session is included elsewhere in this Annual Report).

The Panel requests a full-day workshop at PICES XII to work on combining data sets on distributions and diets of marine birds and mammals. The workshop should be coordinated with the 2-day workshop on *Examine and critique a North Pacific Ecosystem Status Report* requested by MONITOR. Participation at the Panel meeting was low for China, Korea and Russia. Travel support is requested for 1-2 Russian members for the next meeting.

Dr. Kato commented on the interaction of the Panel with IWP and ICES. This interaction

would be facilitated by appointing a PICES representative to serve as an observer for these organizations.

#### **Progress report of Advisory Panel on Iron Fertilization Experiment (Agenda item 4c)**

Dr. C.S. Wong presented an overview on the completed and planned iron enrichment experiments: SEEDS by the Japanese in the Western North Pacific in 2001 and 2004, and SERIES in the Eastern North Pacific in July 2002. Very significant responses to iron enrichments were observed in both of the completed experiments.

An inter-sessional workshop is planned for December 2003. The workshop cannot be held at the Annual Meeting due to conflicts in the cruise schedule. The Panel requests travel support for 3 scientists (2 from New Zealand and 1 from Mexico) for this meeting to be held at IOS in Sidney, British Columbia, Canada. BIO discussed and approved by consensus the request for an inter-sessional workshop and for travel support.

#### **Review of Topic Sessions supported by BIO at PICES XI (Agenda item 5)**

Dr. John F. Dower reviewed the BIO/POC/FIS Topic Session on *The importance of biophysical coupling in concentrating marine organisms around shallow topographies*. The session was very well attended and papers will be published in a special issue of *Journal of Marine Systems*.

Dr. Elizabeth A. Logerwell reviewed the BIO/FIS/CCCC Topic Session on *Responses of upper trophic level predators to variation in prey availability: An examination of trophic level linkages*. The talks ranged from invited lectures, presentations on prey selection and trophic linkages and ecosystem management issues. This session was also very well attended.

Dr. Harrison was assigned to review the BIO/MEQ Topic Session on *Food web dynamics in marginal seas: Natural processes and the influence of human impacts* scheduled for October 24, 2002.

Summaries of the sessions are included elsewhere in this Annual Report.

### **Proposals for the Topic Sessions at PICES XII (Agenda item 6)**

Several topics were listed as potential themes for Topic Sessions at PICES XII:

- Aquaculture
- Gelatinous zooplankton
- Pelagic-benthic coupling
- Latitudinal variations in productivity
- Physical process impacts on biological productivity and fish populations with variability in fresh water inputs to the ocean
- Theory, biological basis and application of fluctuating carrying capacity of the ocean resulting from human impacts (proposed for Science Board Symposium or BIO Topic Session)

Topics were discussed and the following four requests were forwarded to the Science Board:

1. A full-day Science Board Symposium as outlined in *BIO Endnote 6*;
2. Natural and anthropogenic influences on pelagic-benthic coupling in coastal systems (jointly with MEQ);
3. Physical process impacts on biological productivity and fish populations with variability in fresh water inputs to the ocean (jointly with POC);
4. Latitudinal differences in response of productivity and recruitment of marine organisms to climate variability, from subarctic to subtropical waters, in the eastern and western sides of the Pacific (jointly with CCCC).

It was also reiterated that BIO supports the request by the Advisory Panel on *Marine birds and mammals* to convene a full-day workshop on “Distribution and diets of marine birds and mammals: Patterns produced by biophysical coupling and lower trophic level dynamics”.

### **Themes for PICES XII and PICES XIII (Agenda item 7)**

The proposed theme for PICES XII (2001 *SB Endnote 10*) to be held in October 2003, in

Seoul, Korea, was discussed briefly. It was thought that this theme of “Human dimensions of ecosystem variability” should also include impacts of ecosystem changes on humans, and thus it was recommended that an additional sentence be included into the description. The sentence, “*What are the effects of ecosystem change on human societies?*”, will be put forward to the Science Board. Also, BIO recommended that the Science Board consider changing the wording of the title so that it more clearly reflected the intent and extent of the theme.

The theme suggested for PICES XIII to be held in October 2004, in Honolulu, U.S.A., is “The North Pacific Realm: An ocean far from continental boundaries”.

### **North Pacific Ecosystem Status Report (Agenda item 8)**

Dr. R. Ian Perry gave a brief overview of the draft document and solicited input from all members and committees of PICES. He described the planned process for generating this report by the Science Board and Committee Chairmen. Some existing regional groups should be key players in generating this report. Dr. Mackas commented that MONITOR is proposing a similar activity, but after discussion it was decided that the two activities are parallel and complementary.

### **PICES Review Committee Report (Agenda Item 9)**

Dr. Perry reported that the Review Committee considered that PICES was doing well but two areas should receive more attention: formulating directions for the next five years and improving communication among Standing Committees. The structure of PICES Committees was also reviewed, in particular the concepts of Advisory Panels changing to Sections within a Standing Committee (*BIO Endnote 7*). These subcommittees would be reviewed periodically (*e.g.* every 3 years). A more flexible duration for Working Groups is suggested. It is proposed that the Science Board convene an inter-sessional meeting every spring.

BIO discussed and decided to continue the MBMAP activity in the existing frames of an Advisory Panel until the completion of its 5-year term.

#### **Review of BIO Strategic Plan (Agenda Item 10)**

Dr. Radchenko asked members of BIO to review the draft BIO Strategic Plan (*BIO Endnote 8*) and to submit comments by e-mail before the interim Science Board meeting.

#### **Draft Strategic Plan for TCODE (Agenda item 12)**

Mr. Robin Brown gave a report on the draft TCODE Strategic Plan and solicited suggestions for revising the terms of reference for TCODE.

#### **Discussion of the CCCC Integration Workshop (Agenda item 13)**

Dr. Makoto Kashiwai reported on results of the CCCC Integration Workshop (workshop summary will be published in PICES Press, Vol. 11, No. 1). Dr. Patricia A. Wheeler commented that some of the slots on Task Teams needed to be filled with new members.

#### **Subarctic seas studies – background and outlooks (Agenda item 14)**

Dr. George L. Hunt summarized an NSF-supported workshop on *Ecosystem studies of the subarctic seas* (report is available upon request at glhunt@uci.edu). Plans are underway for an International Symposium to examine the effects of physical forcing and climate on the subarctic ecosystem in 2004. It is anticipated that a new field program would be initiated in 2005-2006.

#### **Relations with other international organizations (Agenda item 15)**

The organizations discussed included BASIS and IWC. BIO will cooperate with these agencies regarding issues of mutual concern.

#### **Requests with financial implications (Agenda Item 16)**

##### Publications

- Final report of WG 14 to be published in the PICES Scientific Report Series in 2004;
- A special issue of *Deep-Sea Research Part II* on results from iron enrichment experiments in the eastern and western North Pacific to be published in 2004.

##### Inter-sessional meetings

- An inter-sessional IFEP Workshop discussing the results from the SERIES and SEEDS experiments to be convened in December 2003, in Sidney, Canada.

##### Requests for travel funding

- Dr. Tsutomu Ikeda, PICES Co-Convenor, to attend the ICES/PICES/GLOBEC Zooplankton Production Symposium in May 2003, in Gijón, Spain;
- Four invited speakers for the BIO-supported Topic Sessions at PICES XII (Seoul, October 2003): POC/BIO Topic Session - 1 person, BIO/MEQ Topic Session - 1 person, and BIO/POC/CCCC Topic Session - 2 persons;
- 1-2 Russian scientists to attend the MBM Workshop to be held in October 2003, in conjunction with PICES XII;
- 3 scientists (2 from New Zealand and 1 from Mexico) to attend the IFEP Workshop in December 2003, in Sidney, Canada.

#### **Best Presentation Award (Agenda Item 16)**

Mr. Kohei Mizobata (Hokkaido University, Japan) was nominated and selected a winner of the BIO Best Presentation Award, for his talk entitled “Impact of the eddy field on phytoplankton distribution along the shelf edge in the southeastern Bering Sea 1998-2000 using SeaWiFS and TOPEX/ Poseidon time series data sets” at the BIO/POC/FIS Topic Session (S3) on *The importance of biophysical coupling in concentrating marine organisms around shallow topographies*.

## BIO Endnote 1

### Participation List

#### Members

Richard D. Brodeur (U.S.A.)  
Michael J. Dagg (U.S.A.)  
Paul J. Harrison (Canada)  
Woong-Seo Kim (Korea)  
David L. Mackas (Canada)  
Vladimir I. Radchenko (Russia, Chairman)  
Takashige Sugimoto (for Michio Kishi)  
Atsushi Tsuda (Japan)  
Patricia A. Wheeler (U.S.A., rapporteur)  
Ming-Yuan Zhu (China)

#### Observers

Douglas F. Bertram (Canada, MBM)  
Robin M. Brown (Canada, TCODE)  
John F. Dower (Canada, WG 14)  
George L. Hunt (U.S.A., MBM)  
Makoto Kashiwai (Japan, CCCC IP)  
Hidehiro Kato (Japan, MBM)  
Elizabeth A. Logerwell (U.S.A.)  
Jun Nishioka (Japan)  
R. Ian Perry (Canada, SB)  
William J. Sydeman (U.S.A., MBM)  
Anatoly F. Volkov (Russia, CPR)  
C.S. Wong (Canada, IFEP)

## BIO Endnote 2

### BIO Meeting Agenda

1. Welcome and introduction of members
2. Approval of agenda
3. Business from last year's meeting:
  - a. Status of proposed publications
  - b. Status of proposed interim meetings
4. Progress reports of existing subsidiary bodies and proposals for new subsidiary bodies:
  - a. Progress report of WG 14
  - b. Progress report of Advisory Panel on Marine Birds and Mammals
  - c. Progress report of Advisory Panel on Iron Fertilization Experiment
  - d. Proposals for new subsidiary bodies
5. Summaries of scientific sessions supported by BIO:
  - a. Food web dynamics in marginal seas: Natural processes and the influence of human impacts (BIO/MEQ);
  - b. The importance of biophysical coupling in concentrating marine organisms around shallow topographies (BIO/POC/FIS);
  - c. Responses of upper trophic level predators in prey availability: An examination of trophic linkages (BIO/FIS/CCCC)
6. Topic session proposals for PICES XII
7. Theme for PICES XIII
8. North Pacific Ecosystem Status Report – general form and content of first draft report; further items to include; sources for Regional summaries and/or data, etc.
9. PICES Review Committee Report
10. Review of BIO Strategic Plan: Discuss a “vision”, for BIO and for PICES, for the next 5 years
11. Capacity building: What should be PICES' strategy and components for the implementation plan
12. Discussion of the draft Strategic Plan for TCODE: How BIO and its subsidiary bodies might interact with TCODE on data issues
13. Discussion on results of the CCCC Integration Workshop: How BIO and its subsidiary bodies might interact with CCCC in the future
14. Subarctic seas studies – background and outlooks (George Hunt)
15. Relations with other international organizations/programs.
16. Summary of items with financial implications
17. 2002 BIO Best Presentation Award
18. Other business
19. Preparation of report to Science Board

### BIO Endnote 3

#### Progress report of WG 14 on *Effective sampling of micronekton*

The meeting of Working Group 14 was convened on October 19, 2002, and was attended by 7 members and 1 observer.

#### Introduction of attendees

Richard D. Brodeur (U.S.A., Co-Chairman)

Kenneth Coyle (U.S.A.)

John F. Dower (Canada)

Naoki Iguchi (Japan)

Vadim F. Savinykh (Russia)

Michael P. Seki (U.S.A.)

Orio Yamamura (Japan, Co-Chairman)

Evgeny Pakhomov (South Africa, observer)

#### Review of terms of reference

- a. Evaluate sampling gear and problems, propose improvements, recommend collaborations among PICES countries for gear inter-comparisons;
- b. Obtain and tabulate data on consumption and biomass of micronekton, stratify by region and taxa, quantify level of confidence to guide future research priorities.

#### Review of past year's activities

- a. Organization of the joint BIO/POC/FIS session on *The importance of biophysical coupling in concentrating marine organisms around shallow topographies* for the forthcoming PICES XI in Qingdao, China, was discussed. This session was proposed by WG 14, and Drs. Brodeur, Dower and Yamamura would be serving as Co-Convenors.
- b. Dr. Brodeur reported on an inter-sessional meeting in conjunction with the AGU/ASLO Ocean Sciences Meeting in Hawaii, in February 2002.
- c. Progress to day on the WG 14 final report was reviewed.

#### Format and composition of WG report

- a. Emphasize dominant species but will include any information available on rare species;
- b. Apply geographic zonation (by adaptation of zones used by WG 11 on *Marine birds and mammals*);

- c. Include reproduction, early life history, and demographic rates;
- d. Discuss prey-predator relationships and rates (diet composition, amount eaten (flux), predators and predation rate);
- e. Consider sampling issues (net towing, other sampling, acoustics, visual);
- f. Compile existing data inventory for the North Pacific;
- g. Provide recommendations for future research.

#### Activities for upcoming year

- a. Send micronekton survey on sampling issues and problems to "experts" inside and outside the PICES community, and make the survey available through the PICES website. Summarize the results of this survey for the WG final report;
- b. Modify assignments of writing tasks for the WG final report;
- c. Complete and send individual assignments to WG Co-Chairmen by July 1, 2003. Submit a draft report to BIO by September 15, 2003. Discuss getting peer review on sections before or after submission to BIO;
- d. Discuss new sampling gear or collection methods (broadband acoustics for species identification, autonomous samplers, vertical tows, simultaneous capture of prey);
- e. Continue discussions of potential for PICES-sponsored multi-national evaluation and inter-calibration cruise to compare different micronekton sampling devices (*BIO Endnote 4*). New NOAA ship at Honolulu Laboratory may be available for such a cruise in 2004, and could be timed to occur before or after PICES XIII in October. Discuss possible locations of sampling (Transition versus Tropical region), gear types to be used, availability of other vessels. Endorsement of this cruise as a PICES-sponsored activity is needed. Also discuss possibility of conducting the inter-calibration cruise in the Bering Sea as a part of BASIS study sponsored by NPAFC. Preliminary discussions were held as to cost and logistics of doing such a cruise.

## **BIO Endnote 4**

### **Proposal for PICES-sponsored micronekton sampling evaluation and inter-calibration cruise**

#### **Background**

In 1999, BIO formally established a Working Group to address a concern that there was insufficient information on the distribution, biomass and ecology of micronektonic organisms in the North Pacific. Included in the terms of reference was a request to examine the efficacy of available micronekton sampling gears and propose new sampling devices if the available ones were not adequate for the task. One of the recommendations that will be included in the forthcoming WG 14 final report is that although a number of gears are presently being used to sample micronekton in the North Pacific and other parts of the world's oceans, there has been little effort expended in comparing the relative sampling efficiency and selectivity of these gears. This has hampered efforts to look at inter-decadal or regional comparisons of micronekton composition and biomass since very often, different gears are used. To this end, WG 14 has proposed that PICES sponsor a multinational cruise in 2004 to compare existing sampling techniques including several nets, visual methods, and acoustics. Although WG 14 is planning to finish its formal activities in the coming year and disband, several members of the Working Group recognize the need for such data, and have agreed to continue beyond the term of the Working Group (to assist in the organization and implementation of this cruise).

#### **Sampling plan**

At this time, many of the logistic details have not been worked out but several key components of the study have been discussed. It was proposed that one, or preferably two, large research vessels be deployed to a location over deep water where mid-water layers can reliably be found. This location would be sampled throughout the dial period and would involve simultaneous sampling by multiple gear types to the extent possible with the configuration of the vessel(s) involved. It is expected that 5-6 micronekton sampling gears currently utilized in

the North Pacific be included in the inter-calibration study. Other new technologies, such as video plankton recorders and acoustics, could also be used to compare biomass estimates obtained by these methods with those of conventional sampling gears such as nets. The species composition and size frequency histograms of different taxa caught by the various gears will then be compared and evaluated.

#### **Choice of study site**

A preferred location would be one that is known to contain high densities of all major micronektonic categories (mid-water fishes, cephalopods and crustaceans), and thus it would have to be an area that has been sampled previously to a great extent. It should also be an area that is relatively uniform over various spatial and temporal scales and exhibits a high degree of repeatability among repeat tows taken at the same station, so that the majority of variability between tows could be ascribed to gear differences. It is desirable that the ocean conditions in the study area be relatively calm to facilitate deployment and recovery of complex gear types. Finally, the station should be in relatively deep water but also close to shore to minimize transit time. Although there are several areas within the PICES region that meet these requirements, the one that is recommended by the Working Group is the area off the Hawaiian Islands, perhaps at the location of the Hawaii Ocean Time Series (HOTS). Other areas were considered, including the Japan/East Sea, Bering Sea and Monterey Bay, and these could be alternate sites but none fit the above criteria as well as the Hawaii site. Thus the plan that follows will discuss the Hawaii region but could be modified for a different region if needed.

#### **Cruise details**

One of the WG 14 members based in Hawaii has indicated that there is a strong possibility that we could get a week to 10 days ship time on a new NOAA fisheries/oceanographic research vessel

based in Honolulu, Hawaii. This vessel, the *Oscar Elton Sette*, is over 70 m long and has the capability to tow large dual-warp trawls requiring doors as well as large and small single-warp midwater trawls. It has several additional oceanographic winches with conducting cable and sufficient deck space to stage several gear types. It also has advanced acoustic and oceanographic sampling capabilities needed for such a study. It is anticipated that ship time will be provided by NOAA at no cost to PICES. It is also possible that another vessel, such as the Japanese Fisheries Agency research vessel *Kaiyo Maru*, will be working in the general area in 2004, and we would pursue the possibility of doing joint sampling with that vessel as well.

We propose that the cruise be conducted during the period just prior to PICES XIII in Honolulu for several reasons. First is that we can take advantage of the possibility that many of the scientists involved would be coming to the PICES meeting anyway, which would save some of the travel costs. We would also hope that some of the scientists would stay around for the PICES meeting to examine the data and perhaps provide a preliminary report during the meeting. This would showcase these results to both the PICES community and others outside the North Pacific region that may be attending the meeting.

### **Financial implications to PICES**

Conducting major oceanographic cruises is generally not a minor expense. However, we believe that we can leverage support from several different agencies/laboratories to help defray much of the cost of the cruise. We anticipate that the US National Marine Fisheries Service will be able to provide ship time at no cost, which will be the major (> 50% of total) cost involved in running the cruise. We hope that a similar contribution can be made by whichever agency or government that provides the second vessel. Moreover, it is expected that most, if not all, the scientists involved will contribute time ( $\approx$  25%) and perhaps funds for minor expenses from their existing budgets. For example, we anticipate that many of the samples could be identified, counted and processed at sea

by the researchers on board, which would substantially decrease post-cruise processing time.

The anticipated costs which we request of PICES are thus minor compared to the costs supplied by the participating agencies or institutions. We have come up with some preliminary costs based on our experiences with other cruises. The major costs to PICES would be shipping of gear and other equipment to and from Hawaii and some travel costs, particularly for those scientists from PICES member countries that may have difficulty finding travel support for such a cruise. Although the proposed research vessel has both electronic and survey technicians that will be able to provide some support, it may be necessary in the case of some specialized scientific gears that a trained specialist be on board to help with these gear types. Finally, funds would be requested for a post-cruise workshop to compare results, and for publication costs to disseminate this information to the scientific community, although these two costs would likely be in the subsequent fiscal year.

### **Benefits to PICES community**

The main benefit of the proposed study is that researchers in the PICES community will finally be able to know what the relative advantages and problems are with the gear types presently in use, both in the North Pacific and elsewhere, so that they may be able to adjust their sampling accordingly. Furthermore, the information provided by the cruise will allow scientists to compare previous micronekton sampling results taken in different regions or in different time periods within the same region when there were multiple gears used. The plankton community has recognized the need for such gear inter-calibration and, in fact, ICES had sponsored a cruise for this purpose. The costs of doing similar comparisons of micronekton gear are so prohibitive that it is unlikely that a single agency or laboratory will undertake such an endeavor. Also, applied but necessary science such as comparison of samplers is often difficult to get funded through peer-review processes, given the present stiff competition for limited resources.



However, although the main purpose of the cruise would be to compare sampling devices, we anticipate that some basic science will result from the data and specimens collected to help us understand more about the distribution, life history, and ecology of this important trophic link in the ocean. The proposed cruise would substantially raise the profile of micronekton in PICES and contribute important data to ecological modeling efforts. Although this cruise is designed to benefit researchers in the PICES study area, we hope to encourage participation from top scientists from other institutes (WHOI, BIO, CSIRO) and organizations (ICES, GLOBEC, SCOR, Tuna commissions, AMLR) with interests in micronekton sampling outside the North Pacific, particularly those with new and promising

technologies (trawl, video, and acoustic) not presently available to the PICES community.

#### **Preliminary cost estimates (US dollars)**

Air travel to and from Honolulu	
<i>\$1.5K per person; for 10 people</i>	<i>\$15K</i>
Shipping costs of gear and samples	
<i>assume \$4K for each gear</i>	<i>\$20K</i>
Pre- and post-cruise accommodations	
<i>3 days @ \$150/day for 10 people</i>	<i>\$4.5K</i>
Post-cruise workshop	
<i>travel and publication</i>	<i>\$8K</i>
<b>Total costs to PICES</b>	<b>\$47.5K</b>

## **BIO Endnote 5**

### **Report of Marine Birds and Mammals Advisory Panel**

#### Opening

The second meeting of the *Marine Birds and Mammals* Advisory Panel (MBMAP) was held from 08:30 – 13:00 hours on October 19, 2002. The meeting focused on reports from Panel members and associates on regional time series data sets following recommendations from the MBMAP meeting in 2001. The Co-Chairman, Dr. Douglas F. Bertram, called the meeting to order and welcomed the participants (*MBMAP Endnote 1*). The Panel reviewed the terms of reference and recommendations from the 2001 meeting (*MBMAP Endnote 2*), and the draft agenda that was adopted (*MBMAP Endnote 3*) with the addition of a presentation from Dr. Alexander Kitaysky on seabirds on Telan Island, Russia. Co-Chairman, Dr. Hidehiro Kato, joined the discussion after the formal session.

#### Old business

The Panel co-sponsored and participated in the BIO/FIS/CCCC Topic Session on *Responses of upper trophic level predators to variation in prey availability: An examination of trophic level linkages* (S4), convened by Drs. Hidehiro Kato (Japan), Elizabeth A. Logerwell (U.S.A.), and Gordon A. McFarlane (Canada).

Panel members attended CCCC Task Teams meeting and workshops (MONITOR and REX). Dr. William J. Sydeman reported at the meeting of the CPR Advisory Panel on the successful integration of a seabird and marine mammals observer on ship involved with the CPR survey.

#### Workshops at future Annual Meeting

The Panel proposed a 1-day workshop at PICES XII (Seoul, Korea) entitled “Distribution and diets of marine birds and mammals: Patterns produced by biophysical coupling and lower trophic level dynamics” (*MBMAP Endnote 4*).

#### Request for travel funding

MBMAP requests support for Panel members from Russia to join the next Annual Meeting.

#### Relation with other organizations/programs

In 2000, Panel members were assigned to the following CCCC Task Teams:

BASS - Hidehiro Kato and Thomas Loughlin  
 MODEL - Peter Ross  
 MONITOR - Douglas F. Bertram and William J. Sydeman  
 REX - Yutaka Watanuki

Dr. Sydeman reported on the CPR meeting.

### Recommendations to BIO

The following recommendations were discussed and agreed upon by the Panel.

1. Recruitment of Panel members from all PICES nations should be given high priority. Names will be sought by participants to be discussed, and selected candidates will be forwarded to the Secretariat.
2. National funding for MBMAP members to attend Annual Meetings should be sought.
3. Member countries should be encouraged to compile up-to-date time series information on selected key species of marine birds and mammals for contribution to the North Pacific Ecosystem Status Report.

4. The Panel recognizes that there are data gaps in the final report of WG 11 on *Consumption of marine resources by marine birds and mammals in the PICES region*, and where feasible, it would be valuable to assemble new information to update the report.
5. The Panel recommends a 1-day workshop entitled "*Distribution and diets of marine birds and mammals: Patterns produced by biophysical coupling and lower trophic level dynamics*" to be held at PICES XII in 2003. The results of the workshop will be published in the primary literature and perhaps also as a PICES Scientific Report.

### **MBMAP Endnote 1**

#### **Participation List**

##### Members

Douglas F. Bertram (Canada, Co-Chairman)  
Hidehiro Kato (Japan, Co-Chairman)  
Susan E. Moore (for Thomas Loughlin, U.S.A.)  
William J. Sydeman (U.S.A.)  
Yutaka Watanuki (Japan)

##### Observers

Norihisa Baba (Japan)  
John F. Dower (Canada)  
George L. Hunt (U.S.A.)  
Alexander Kitaysky (U.S.A.)  
Elizabeth A. Logerwell (U.S.A.)  
Tsutomu Tamura (Japan)  
Andrew W. Trites (Canada)

### **MBMAP Endnote 2**

#### **Terms of Reference**

1. Provide information and scientific expertise to BIO, CCCC Program, and, when necessary, to other Standing Committees with regard to the biology and ecological roles of marine mammals and seabirds;
2. Identify important problems, scientific questions, and knowledge gaps in assessing the roles of marine mammals and seabirds in marine ecosystems;
3. Assemble relevant information on the biology of marine mammals and seabirds and disseminate it to the PICES community through scientific reports and symposia;
4. Develop strategies to improve collaborative, interdisciplinary research with marine mammal and birds researchers and the PICES scientific community.

### **MBMAP Endnote 3**

#### **MBMAP Meeting Agenda**

08:30 Opening remarks (D.F. Bertram)  
08:45 Marine mammals/Japan (Y. Watanuki for H. Kato)

09:15 Marine birds/Japan (Y. Watanuki)  
09:45 Marine mammals/U.S.A. (S.E. Moore for T. Loughlin)

10:30 Marine birds and report on the CPR program/U.S.A. (W.J. Sydeman)  
11:15 Marine birds/Canada (D.F. Bertram)  
11:45 Marine birds/Russia (A. Kitaysky)

12:15 Discussion  
- Recruiting members from PICES nations  
- Plans for 2003

#### **MBMAP Endnote 4**

##### **Proposal for a workshop at PICES XII on *Distribution and diets of marine birds and mammals: Patterns produced by biophysical coupling and lower trophic level dynamics***

Convenors: Hidehiro Kato (Japan) and Douglas F. Bertram (Canada)

This workshop will explore temporal and spatial patterns of ecosystem co-variation, production of lower trophic level prey organisms by biophysical and climate forcing mechanisms, and the response of marine bird and mammal diets to those patterns. We will focus our efforts on two species of bird and mammals that, ideally, have representations on both sides of the North Pacific Ocean and sufficient time series information to facilitate meaningful comparison, either within or between regions. The workshop will build on the previous efforts to examine bird and mammal prey consumption within the PICES region (PICES Scientific Report No. 12, 2001), and will facilitate direct comparisons of data sets which have been examined in isolation in the past. We hope that the comparative approach will facilitate detection of underlying causes for regional differences in ecosystem organization, trophic transfer, and the timing of responses of marine birds and mammals in relation to climate change events. The workshop will provide a forum for directed discussions with physical, biological and fisheries oceanographers, and will serve to launch future collaborations within the PICES community.

Our plan is to select the key species and conduct comparative diet analyses during the next 10 months. Further details will be finalized by correspondence among convenors and MBMAP members. The result of those analyses will be forwarded to a broad range of selected scientists by the end of August 2003, with a list of potential discussion topics.

At the workshop there will be 4 presentations (one for each selected species) each followed by open discussion with invited commentators. Participants will be encouraged to bring information from their discipline that can be used to help explain observed patterns of regional differences in the distribution and diets of the selected marine birds and mammals.

We propose to allocate the regular half-day meeting of the MBMAP to the workshop and request that an additional half-day be granted to allow for a full-day program. If possible the workshop could be merged with activities of the MONITOR Task Team and upcoming discussion for the North Pacific Ecosystem Status Report.

#### **BIO Endnote 6**

##### **Proposed BIO Topic Session or Science Board Symposium in 2003**

##### ***Theory, biological basis and application of fluctuating carrying capacity of the ocean resulting from human impacts***

Example of topics and tentative speakers:

- Total allowable catch and artificial release in fisheries
- Nutrient concentration in relation to change in size/species composition and biodiversity
- Density effect of salmon growth and carrying capacity under climate change (Masahide Kaeriyama, William Pearcy)
- Abundance under the ecosystem regime shift

- Numerical models to evaluate carrying capacity for nutrient load and aquaculture focusing on biological basis (Michio Kishi)
- Biological basis of various methods of restoration (Akira Taniguchi)

Tentative convenors:

Takashige Sugimoto (BIO), Chang-Ik Zhang (FIS), Hideaki Nakata (MEQ), Makoto Kashiwai (CCCC).

## BIO Endnote 7

### Discussion of PICES Review Committee Report

At last year's Annual Meeting, Science Board discussed PICES re-structuring, and agreed "to review the current organizational structure of PICES and to develop a discussion document on that structure and its ability to serve PICES over the next decade" (PICES Annual Report 2001, p. 37). Following this decision, Science Board developed and circulated a discussion document in mid-September 2002. From the document, an excerpt containing the issues related to the BIO activity was prepared (see below) and discussed at the Committee meeting of October 23, 2002.

#### Changing/new requirements for scientific information

##### Ecosystems

- Understanding of the present state of marine ecosystems, the factors causing changes in marine ecosystems, and attempts to manage or mitigate human-caused changes within the context of natural variation;
- Understudied organisms – non-commercial species; hard-to-sample species, etc.

##### Human dimensions

- The human dimensions of global changes, both as causes and consequences, have become recognized and are being incorporated into large international programs.

#### Scientific mandates

- The disciplinary names of the Scientific Committees may suggest their mandates are narrow and restricted to within their

discipline. An alternative may be to rename these committees using more integrating or issue-based terminology (*e.g.* Upper Trophic Levels).

- BIO has an enormous mandate: from microbes to mammals and birds. BIO has dealt with this problem by establishing an Advisory Panel.

#### Issues/problems arising from current practices

- The duration of these Advisory Panels (BIO established an Advisory Panel on *Marine birds and mammals*) can be unclear, as well as agreement on the number of such panels in existence at any time. The required activities and oversight of these specific activities are perhaps too detailed for direct supervision by the parent committee, or that the membership of the parent committee is not the most appropriate for the specific task.
- Many Scientific Committees would like to extend the duration of Working Groups (BIO established a Working Group on *Effective sampling of micronekton*) beyond 3 years. Three years is often too short if a Working Group gets a slow start, or if not all members are able to attend each meeting. Most Working Groups have felt that they were just getting going with the interesting questions when their 3-year term was completed.

## BIO Endnote 8

### Scientific issues and research directions for BIO Committee

#### General issues

##### Holistic approach to ecosystem understanding

To model ecosystem function we must include climate as a forcing mechanism and the role of predation in regulating abundance, which is also controlled to some extent by fisheries (Parsons 2001). Changes in physical forcing mechanisms due to climatic changes will alter the patterns of community structure and energy flows (rates and pathways) between ecosystem components. There are critical (nodal) species that react to change by switching the dominant pathways by which energy goes to the top predators. Thus, it is essential to examine the pelagic and benthic components of the ecosystem to identify those species, or species groups, that play important roles in the transfer of energy. The implication is that some appropriate simplification of ecosystem complexity that would allow predictions of trends in the system, without requiring an exhaustive list of physical variables and species for study (Hunt 2002).

The nature and frequencies of ecosystem changes can be revealed through an investigative approach that requires synchronous data collection, processing and analysis on all species inhabiting a region. The biomass of planktonic and nektonic organisms (especially nodal species), diet rations of high trophic level animals, their metabolic and growth rates, and life history parameters must be estimated from the data. This allows the trophic structure of ecosystems to be described and models of these systems to be constructed. There are key elements of the ecosystem studies (Shuntov, 1999):

- Long-term variability in the ecosystems;
- Quantitative estimation of biological resources, calculations of fish productivity and total biological productivity, and clarification of trends in their dynamics;
- Structure of pelagic and bottom communities, dynamics of bio-diversity parameters;
- Carrying capacities of marginal seas and the Pacific Ocean.

##### How to project small scale studies into large scale studies to give us some understanding of how whole ocean systems can change

Gathering new kinds of data over large areas and long time scales can be important for that aim (Parsons 2001). Are the impacts of changes in forcing factors most pronounced at lower or higher trophic levels? Are the upper trophic level organisms more buffered from change than those at lower trophic levels? Are the effects amplified as they cascade through the ecosystem (the ecosystem as a transistor model)? (Hunt 2002). Higher trophic communities should be monitored with other ecosystem elements and parameters. The regulation of fish and squid stock abundance must be considered within the physical conditions determined by new climatic and oceanographic regimes. It is a way to develop an understanding of the evolution of common species and the whole nekton community in the variable environment. In some cases, more sophisticated models incorporating genetic changes in populations due to fishing or climate change may be necessary (Parsons 2001).

##### Ability of early prediction of a regime shift

This is a critical issue for biological oceanography. Comparative analysis is necessary to clarify the similarities and differences between the 1950-1960s and present climatic and oceanographic epochs in the North Pacific. It is critical to develop studies that compare ecosystem function among the regions. The likelihood and possible duration of the next large-scale change must be predicted. Science must provide mechanisms for sharing both basic science information and the means to incorporate this basic knowledge into the decision making of fisheries management.

#### Methodological issues

- During the last few years, phytoplankton and photosynthesis studies using the new techniques always over-estimated the gross primary production (Shuntov 2001). It is

important to define how much the present understanding reflects the true values.

- Research on the dynamics of plankton species needs to be continued. Optical and satellite (mostly for phytoplankton) estimates of plankton abundance have been developed in the last decade or so. Inter-calibration studies are essential for these developing plankton sampling technologies, both in the ocean surface layer and in the water column. At the present time, marine ecology deals more with the products of calculations than with true plankton abundance values. Verified assessments will be a basis for lower trophic level modeling and connection of these models to the existing higher trophic level models.
- Collection methods must be applied routinely using the least expensive means possible to build a data bank of biological observations in the North Pacific, over time and space.

### **Most important issues**

- The teleconnections between LMEs in the North Pacific and Arctic have to be actively studied in the near future, as well as sea ice influences on the temperature and salinity of the water column, its hydrographic structure, the availability of light for photosynthesis, and the spatial distribution of fish and their predators (Hunt 2002, Schumacher *et al.* 2002).
- An important area for further studies is the nutrient and organic compound cycles in the North Pacific ecosystems; their inter-annual and long-term dynamics. Contaminant cycles have become significant in recent years.
- The recycling of photosynthetic products now appears to be very important in some environments where the whole ecosystem may depend on the recycling. In summer, a significant part of the “new” primary production is created by recycled nutrients in the Far-Eastern Seas (Sapozhnikov *et al.* 1997).
- Factors affecting zooplankton reproduction success are poorly studied. Further research

must include both the monitoring of planktonic community characteristics, and the collection of surrounding physical data series. Only preliminary estimates exist for the contribution of planktonic infusoria, nano- and picoplankton in primary production and organic matter destruction. Further quantification of the bacterial loop is needed.

- The quantity of phytoplankton sinking out of the water column versus that which remains suspended is a point that divides primary production between the pelagic and benthic ecosystems (Parsons 2001).
- Almost nothing is known about the microbenthos and meiobenthos organisms composition, distribution, abundance and dynamics. Their role in the food supply formation for the higher trophic level can be essential and it needs an integrated research project.
- In formulating equations for trophodynamic studies, it is necessary to research the values used for biological coefficients in various relationships. One very important number to study is ecological efficiency (Parsons 2001).
- Mesopelagic macroplankton and micronekton (fish, squids, jellies, etc.) could be critical for the pelagic ecosystem functioning due to their significant biomass and wide distribution.

### **Preliminary conclusion**

We should avoid the promulgation of any ecological theories or models if they are not based on factual relationships which can be tested with subsequently collected data (Parsons 2001).

### **References**

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