

REPORT OF BIOLOGICAL OCEANOGRAPHY COMMITTEE

83

80

The meeting of the Biological Oceanography Committee was held from 1330-1730 hours on October 22, 2000, and from 0900-1300 on October 25, 2000. The Chairman, Dr. Tsutomu Ikeda, called the meeting to order and welcomed the participants (*BIO Endnote 1*). The Committee reviewed the draft agenda and it was adopted (*BIO Endnote 2*) as presented.

Business arising from PICES VIII (Agenda Item 3)

Dr. Ikeda circulated reports on:

- a. PICES Science Board/Governing Council responses to 1999 proposals from BIO. All items were approved as proposed except:
 - WG 15 on Ecology of Harmful Algal Blooms was sponsored solely by MEQ (did not need additional sponsorship by BIO, which already currently sponsors WG 14 on Effective Sampling of Micronekton and Advisory Panel on Marine Birds and Mammals);
 - Request for additional members of WG 14 has not yet been fully implemented.
- b. Inter-sessional correspondence and requests:
 - Arctic Climate Impact Assessment wants experts nominated from PICES, but there were no suggestions from BIO;
 - New annual PICES Wooster Award for cumulative achievement. BIO members felt that the award criteria are appropriate and sufficiently broad, but PICES may eventually want to establish additional awards in other areas;
 - Candidates for access to resources raised by the Fund-Raising Committee (see Agenda Item 6);
 - Visibility of poster presentations. Dr. Ikeda reported that this year's meeting

format has time for poster summaries during the oral presentation sessions.

Report of WG 14 on Effective Sampling of Micronekton (Agenda Item 4)

Dr. Richard D. Brodeur noted that this year's WG 14 meeting was first meeting with adequate attendance and therefore should be viewed as the start date for this Working Group. A WG 14 progress report is attached as *BIO Endnote 3*. Some countries and topics remain unrepresented. Dr. Brodeur suggested some nominees for additional members, and especially noted the need for an Asian Co-Chairman.

Micronekton has been operationally defined (on similarity of size, motility and probable sampling method) as including euphausiids, juvenile fish, small midwater fishes, pelagic decapods (shrimps), and small pelagic cephalopods (squids). Large chaetognaths and gelatinous zooplankton were considered but not included, as the main sampling problem is fragility rather than mobility. WG 14 will review past work on micronekton sampling and ecology. For several of the taxa, much of this work is scattered and old with few young scientists are working on these taxa. The Working Group will prepare a final written report for the 2003 Annual Meeting. Dr. Brodeur provided an outline of the probable format and content of the report.

The main topics will be:

- a. Biomass and species composition patterns (by large-scale region, similar to those selected by WG 11 on Consumption of Marine Resources by Marine Birds and Mammals);
- b. Sampling methodologies and difficulties;

Additional topics:

- c. Life history and demographic rates;
- d. Food web connections and rates.

WG 14 requests a full day meeting at the PICES

Tenth Annual Meeting in Victoria, in 2001, and will likely propose a 1-day workshop or topic session for the 2002 or 2003 Annual Meeting.

Review of BIO Strategic Plan (Agenda Item 5)

Dr. Ikeda circulated an outline of goals for BIO Strategic Plan and current activities toward these goals:

- a. Improve cooperation with other PICES components: joint topic sessions with CCCC, POC, MBM Advisory Panel were convened at PICES IX;
- b. Enhance interaction with relevant international organizations: a joint ICES/PICES/GLOBEC Symposium on Comparative Zooplankton Ecology will be held in spring 2003 (see Agenda Item 8 below and *BIO Endnote 4*);
- c. Increase involvement in specific recognized scientific issues: participation in a recent workshop on "Designing the iron fertilization experiment in the Subarctic Pacific", in Tsukuba, Japan;
- d. Improve community attendance and participation in PICES Committees, Task Teams and Working Groups: remains a problem area;
- e. Improve inter-sessional work via email leading to shorter and more efficient annual meetings: more emails not necessarily leading to shorter meeting;
- f. Increase travel support for student participation at Annual Meetings: PICES is providing partial support for some students and young scientists, but BIO unable to document extent or details.

Science Board issues (Agenda Item 6)

The Science Board Chairman introduced a number of new topics to the Committees at the Annual Meeting and requested BIO comments on the following:

- a. North Pacific Ecosystem Status Report. BIO felt that this is a good idea and should

be dual tracked to a referred journal, and to a public-friendly segment within the PICES website, also noting that funds for data manager would be helpful.

- b. PICES-GOOS Regional Analysis Center. While CCCC Monitor Task Team is the contact group, BIO felt that it requires a considerable support for overall objective, but expressed some concern about its timing. Dr. Ikeda reported on a proposed Study Group structure (including one member from BIO).
- c. Ongoing North Pacific monitoring. BIO felt that the CPR pilot project, externally funded for 2000 and 2001, appears to be working well.
- d. Existing CCCC Task Teams. BIO felt that these teams have been running quasi-autonomously within CCCC, but closer links and reporting to permanent committees might be useful.
- e. Workshop or symposium series on "Effect of human and climate interaction on fish production": a possible area of collaboration with NPAFC. No particular comments from BIO.
- f. Changes to the Handbook for Chairmen and Convenors. BIO members agreed to revise the terms of reference of BIO Committee by replacing the final sentence with "...*scientific advice on ecological roles of lower and higher trophic level organisms on fisheries*".
- g. PICES XI theme. Themes BIO member favored amending to *North Pacific links to [regional and] global processes*. BIO agreed that the topic should be of importance to the PICES XI host country (not known yet).

Relations with international organizations (Agenda Item 7)

Dr. Ikeda circulated a list of organizations currently seeking PICES representation at their meetings, and (noted by asterisk) which of these presently are attended. BIO was content with present ranking, and specifically identified ICES (WGZE), GLOBEC and GOOS as the highest

priority program for cooperation.

Joint ICES/PICES/GLOBEC Symposium on Comparative Zooplankton Ecology (Agenda Item 8)

Dr. Ikeda reported that an ICES/PICES Zooplankton Ecology workshop was held April 2000, in Honolulu. BIO was represented by Dr. Ikeda (other PICES participants are Drs. Charles B. Miller and Jeffrey M. Napp), who wrote an extended meeting report that was published in PICES Press 8(2). There is a proposal for a broader Symposium on Comparative Zooplankton Ecology, to take place in 2003, probably in Europe (See *BIO Endnote 4*). PICES would be an equal co-sponsor (with ICES and GLOBEC) and suggested Dr. Ikeda as PICES convenor, and Drs. Ikeda and William T. Peterson as PICES representatives on the Steering Committee. Other responsibilities of PICES (e.g. travel and venue costs, publication, administrative support) will be negotiated over the next 1-2 years. BIO felt that the topic is useful and in line with PICES objectives. There was discussion about the need for expanded global involvement (especially the southern Pacific) but otherwise the symposium was supported as proposed.

Report from Marine Birds and Mammals Advisory Panel (Agenda Item 9)

The Panel Co-Chairman Dr. Hidehiro Kato distributed a written report to BIO members (*BIO Endnote 5*). The main items in this report include a summary of the MBM Technical Workshop (October 20, 2000), planned activities for the next annual meeting including an evening Panel meeting, nominees for MBM participation in PICES/CCCC Task Teams, and the Panel's scientific issues and activities including seeking national funding to attend annual meetings, compiling and cataloguing time series metadata, initiating a seabird observer program in association with the CPR program, an east vs. west diet comparison, filling in data gaps in the WG 11 report. BIO discussed the cost and technology for at-sea monitoring with the CPR

program (and other vessels of opportunity), and strategies for dealing with size mismatch between the small zooplankton caught with CPR and larger prey items of most seabirds.

Sessions at future Annual Meetings (Agenda Item 10)

BIO Topic Sessions at PICES X: BIO recommends convening a full day session on "Plankton size-classes, functional groups and ecosystem dynamics: causes and consequences" (see *BIO Endnote 6*). Prior to the Annual Meeting, Dr. Michael M. Mullin proposed that scientific sessions are more valuable if they are more interactive (more discussions and questioning). BIO discussed ways to overcome the problem under the present situation of time constraint. Suggestions included reserving time at the end of session for group discussion, reserving a portion of the BIO business meeting for open-to-all discussion of one or more topics, or an evening dinner session with discussion.

Joint sessions at PICES X: BIO accepted proposal of convening a full-day session jointly with POC and FIS on "The physics and biology of eddies, meanders and rings in the PICES region" (*POC Endnote 4*), and a ½-day session jointly with MEQ and POC on "Physical, chemical and biological interactions during harmful algae blooms" (*MEQ Endnote 4*). Dr. Patricia A. Wheeler reported that BASS propose an inter-session workshop to examine the feasibility of using ECOPATH/ ECOSIM as a tool to model higher trophic level components of the Subarctic gyre system.

Science Board Symposium at PICES X: BIO recommended the topic on "Ecosystem processes in marginal seas of the North Pacific", with Drs. Timothy R. Parsons (Canada), Vyacheslav P. Shuntov (Russia), Tetsuo Yanagi (Japan) and Yasunori Sakurai (Japan) as potential convenors.

Best Presentation Award (Agenda Item 11)

BIO members met at 1300 on 27 October. Nominations were tabulated for the BIO Best

Presentation Award. Based on these nominations, BIO selected a short list of four candidates and voted for Dr. Christine T. Baier, for her paper (with M. Terazaki) entitled "Effects of chaetognath predation on copepod communities on the southeast Bering Sea shelf".

Other topics (Agenda Item 12)

Report of the Iron Fertilization Experiment Panel

Dr. Paul J. Harrison reported on a 2-day workshop on "Designing the iron fertilization experiment in the Subarctic Pacific" held in Tsukuba, immediately prior to PICES IX, noting a considerable research is planned or proposed

for next few years by Canada, Japan and U.S.A. on field experiments in eastern and western subarctic Pacific.

Requests for travel funding for PICES X

- 2 scientists (1 from U.S.A. and 1 from UK) to attend the BIO Topic Session;
- 2 MBM Advisory Panel members from Russia to attend the meeting.

Publications

Funding request for publication for 2002 – selected papers from the 2001 BIO Topic Session in a special issue of *Progress in Oceanography*.

BIO Endnote 1

Participation List

Canada

David L. Mackas (rapporteur)
Kenneth L. Denman
Paul J. Harrison

Japan

Tsutomu Ikeda (Chairman)
Takashige Sugimoto
Atsushi Tsuda

People's Republic of China

Ya-Qu Chen

Republic of Korea

Woong-Seo Kim

Russian Federation

U.S.A.

Patricia A. Wheeler

Others

Douglas F. Bertram (MBM, Canada)
Hidehiro Kato (MBM, Japan)
William Sydeman (MBM, U.S.A.)
George L. Hunt (MBM, U.S.A.)
Maurisse Levasseur (observer, Canada)
Natalia T. Dolganova (observer, Russia)
Victoria V. Nadtochy (observer, Russia)
Alexander I. Boltnev (observer, Russia)
Vladimir I. Zvalinsky (observer, Russia)
Charles B. Miller (observer, U.S.A.)
Jeffrey M. Napp (observer, U.S.A.)
Wen-Tseng Lo (observer, China Taipei)

BIO Endnote 2

Agenda

22 October 13:30-17:30

1. Welcome and introduction of members.
2. Approval/modification of agenda.
3. Business arising from last year's meeting.
4. WG 14 report.
5. Review of BIO Strategic Plan.

6. Science Board issues.
7. Relations with relevant international organizations.
8. ICES/PICES/GLOBEC Symposium on Comparative Zooplankton Ecology.

25 October 09:00-13:00

9. Advisory Panel on Marine Birds and Mammals report.
10. Proposals for the special topic for PICES Annual Meeting 2001.

11. Voting for 2000 BIO Best Presentation Award.
12. Any other topic.
13. Draft of report to Science Board.

BIO Endnote 3

Progress Report of the Working Group 14 on Effective Sampling of Micronekton

The Working Group meeting on October 22, 2000, was chaired by Dr. Richard D. Brodeur (U.S.A.) and 5 members of WG 14 were in attendance. It was noted that there were no Chinese or Korean members and Russia, Canada, and Japan were represented by only a single WG 14 member. PICES should act to guarantee participation by these nations in subsequent WG 14 meetings.

Introductions

All attendees introduced themselves and their interests in WG 14. (* indicates WG member)

Kenneth Coyle* (U.S.A.) - euphausiids
George L. Hunt (U.S.A.)- represented the Marine Birds and Mammals Advisory Panel
Naoki Iguchi* (Japan) - euphausiids
Tsutomu Ikeda (Japan, observer, BIO Chairman) - represented BIO Committee
Kouichi Kawaguchi (Japan) - mesopelagic fishes
Moriyuki Kotori (Japan) - chaetognaths
David L. Mackas* (Canada) - euphausiids
Vadim F. Savinykh* (Russia) - mesopelagic fishes

History of WG 14

Dr. Brodeur gave a brief overview of the genesis of WG 14. The idea was originally approved by BIO in 1997. The original goal of the Working Group was to examine various collection techniques currently being used to sample micronekton. BIO subsequently expanded this mandate to encompass an overall assessment of our current understanding of micronekton biology and their role in the North Pacific. The Working Group was originally planned to begin in 1999, in Vladivostok, but neither of the

original Co-Chairmen were able to attend. Dr. Brodeur was asked at that time to take over the chairmanship of the group due to the inability of the original Co-Chairmen to continue in that capacity. It was agreed that he would chair this Working Group and that the first official meeting would be held in Hakodate in 2000.

Terms of Reference

Dr. Brodeur reviewed the Terms of Reference for WG 14:

1. to evaluate sampling gear and problems, propose improvements, recommend collaborations among PICES countries for gear inter-comparisons.
2. to obtain and tabulate data on consumption and biomass of micronekton, stratify by region and taxa, quantify level of confidence to guide future research priorities and provide information to the CCCC Task Teams (e.g. MONITOR, MODEL, BASS) for future PICES activities.

Definition of Micronekton

A discussion ensued as to how WG 14 will define micronekton for its purposes. It was pointed out that there are a variety of definitions based variously on size, swimming ability, Reynolds numbers, etc. The basic question revolved around whether to include adult euphausiids and other large zooplankton which border on micronekton since this would significantly increase the scope of WG 14. It was decided that since WG 14 will focus primarily on oceanic rather than shelf communities, micronekton will be defined to

include: mesopelagic fishes, squids, pelagic shrimps and mysids, plus adult euphausiids. Juvenile coastal fishes will not be considered as micronekton, although many of the sampling gears developed for oceanic species will be applicable to them.

Past studies of micronekton and availability of existing data

Dr. Brodeur pointed out that although a substantial micronekton literature exists, it is not widely available and often old. Important starting points might include the 1988 two volume set from the joint NSF-JSPS Honolulu Symposium, edited by Drs. Nemoto and Percy, plus a special volume of *Biological Oceanography* devoted to micronekton, also edited by Dr. Percy. A review paper by Beamish et al. in a 1999 PICES special issue of *Progress in Oceanography* on mesopelagic fishes could also serve as a starting point for these organisms.

Sampling problems

A discussion ensued regarding sampling problems that the group might want to address. As a way of beginning, Dr. Brodeur suggested that the Working Group conduct an e-mail survey of various micronekton researchers both inside and outside the PICES region in order to establish what gears and techniques for sampling micronekton are currently in use around the world. Such a survey should also include the opportunity for respondents to identify collection problems associated with various gear-types. It was also noted that the survey should ask why various agencies collect micronekton, since there was a feeling among WG 14 members that in many cases micronekton are primarily by-catch, and are rarely targeted explicitly.

Other possible sampling techniques show some promise for studying micronekton, including the use of video cameras and ROV's. These techniques may prove particularly useful for understanding the behaviors of micronektonic species, especially those that spend part of the diel cycle very close to the bottom (e.g some

mysids and euphausiid species) where they are unavailable to traditional sampling gear. It was suggested that combinations of nets, acoustics and cameras might be the optimal solution.

Proposal of new members

There will be some need to augment the membership of the WG 14 to account for gaps in expertise and/or national representation. Some suggestions were made for new members and a new Co-Chairman with their areas of expertise and nationality listed below:

Kouichi Kawaguchi (mesopelagic fishes – Japan) – proposed Co-Chairman
Tomohiko Kikuchi (decapoda- Japan)
Yasunori Sakurai or John Bower (squid – Japan)
Vladimir I. Radchenko (mesopelagic fishes – Russia)
Victor V. Lapko (midwater community – Russia)
Nikolay M. Mokrin (squid – Russia)
William G. Percy (all micronekton – U.S.A.)
Michael P. Seki (all micronekton – U.S.A.)

Plan for final Working Group Report

Dr. Brodeur proposed a draft Table of Contents for the WG 14 final report to BIO. A discussion arose as to whether the group wanted to aim for a publication quality product that would serve as a “state of our existing knowledge” document about micronekton in the North Pacific. Dr. Brodeur will raise the issue with BIO. The report is planned to:

- a. emphasize dominant species in each group likely to account for 90% of the biomass and mainly those species which occur in the upper 1000 m;
- b. examine geographic zonation using the biogeographic zones determined by WG 11 (there was some discussion of the number of zones and the boundaries of each);
- c. consider the nature and importance of seasonal variations in size, biomass and distribution;
- d. examine life history and demographic rates;
- e. analyze predator-prey relationships and rates (diet composition, amount eaten, predators

and predation rates, parasites, etc.); trophic budgets may provide an alternate estimator of micronekton biomass pools;

- f. examine sampling considerations (what works, what does not, nets and acoustics); and
- g. provide recommendation for future research.

Cooperation with other programs

There was a discussion of the Acoustgear 2000 Workshop held immediately prior to the PICES Tenth Annual Meeting in Hakodate. Dr. Brodeur was one of the organizers of this workshop, which brought together many researchers to discuss advances in acoustic and net sampling for marine organisms. Several papers were presented on micronekton, which were directly applicable to the goals of WG 14. The Working Group also talked about possibly co-sponsoring a workshop on cross-shore trophic transfer of euphausiids and other micronekton for the PICES Annual Meeting in 2002.

Planned WG 14 activities for the upcoming year:

- carry out an email survey of researchers currently collecting micronekton;
- review literature on micronekton studies and circulate key papers to all WG 14 members (an attempt will be made by Dr. Kenneth Coyle to translate recent Russian review paper);
- assemble biomass/distribution estimates from the literature;
- compile a list of current research/survey activities by PICES member countries.
- convene a full-day meeting at next year's PICES Annual Meeting in Victoria (if the Working Group can not ensure sufficient attendance at that meeting, BIO will be asked for funds for meeting at some more convenient time);
- request travel funds for an inter-sessional meeting between PICES X and PICES XI, including invitation of key researchers outside WG 14 who possess expertise that the Working Group may be missing.

BIO Endnote 4

ICES/PICES/GLOBEC Symposium

Title: The role of zooplankton in global ecosystem dynamics: Comparative studies from World Oceans

Date: Spring 2003

Location: TBA

Co-Convenors: Roger Harris (UK) and Tsutomu Ikeda (Japan).

A Scientific Steering Committee will be established with two members each nominated by ICES (TBA), by PICES (Drs. Tsutomu Ikeda (Japan) and William T. Peterson (U.S.A.)) and by GLOBEC (Drs. Roger Harris (UK) and Serge Poulet (France)) to assist the local organizers in planning the symposium.

There is a need for North Pacific-North Atlantic comparison of various aspects of zooplankton ecology to deepen our understanding of the lives of zooplankton and their roles and functions in the marine ecosystem under the scenario of

global climate change. This 2-3 day symposium will provide an opportunity to examine these aspects of zooplankton. Some specific topics to be covered are:

- Physical variability and zooplankton population dynamics;
- Role of zooplankton in biogeochemical cycles;
- Climate influences – what are the long-term data sets telling us?
- Comparative life histories/life cycles of zooplankton populations within and between North Atlantic and North Pacific;
- Progress in molecular biology of zooplankton;
- The role of microzooplankton in marine resources.

It is expected that the meeting will result in a publication of the best papers in a special issue

of an international journal.

BIO Endnote 5

Progress Report of the Advisory Panel on Marine Birds and Mammals

The first meeting of the Marine Bird and Mammal Advisory Panel was held from 1400-1800 hours on October 22, 2000. The Co-Chairmen, Dr. Hidehiro Kato and Dr. Douglas F. Bertram, called the meeting to order and welcomed the participants. The Panel reviewed the draft agenda and it was adopted as presented.

Agenda

1. Introduction and history of the formation of the MBMAP (Dr. George Hunt).
2. Terms of Reference – review.
3. Membership/representation in CCCC Task Teams by MBMAP members.
4. Possible projects:
 - a. Time series metadata available for MBM in the PICES region;
 - b. Seabird observers on CPR program;
 - c. East – West diet comparison.

Participants

Members:

Douglas F. Bertram (Canada, Co-Chairman)
Hidehiro Kato (Japan, Co-Chairman)
Thomas R. Loughlin (U.S.A.)
William Sydeman (U.S.A., rapporteur)
Yutaka Watanuki (Japan)

Observers:

Alexander I. Boltnev (Russia)
Robert W. Furness (UK)
George L. Hunt (U.S.A.)
Jeffrey L. Laake (U.S.A.)
Larry B. Spear (U.S.A.)

MBM Workshop

A 1-day Workshop on “The basis for estimating the abundance of marine birds and mammals, and the impact of their predation on the other organisms” was held at PICES IX to review the methods and approaches to estimate the consumption of prey by marine birds and

mammals in the North Pacific Ocean. Eleven papers were presented, and up to 35 people attended. Discussion was lively and resulted in enhanced communication and exchange of methods between scientists from several disciplines. We sincerely thank our 4 invited speakers (Drs. Robert Furness, Jeffrey Laake, Larry Spear, and Andrew Trites) for their presentations, and PICES and the Japanese Fisheries Agency for very generous support of participants in this Workshop.

PICES X sessions

MBMAP requests a ½-day meeting during PICES X. This meeting should be scheduled to minimize overlap with CCCC Task Team meetings and workshops.

Request for travel funding

MBMAP requests PICES to provide support for two members from Russia to attend PICES X.

Interaction with CCCC Program

MBMAP recommends that the following members serve on CCCC Task Teams:

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

Recommendations

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

1. The Panel recognizes the need for all members to attend PICES Annual Meetings and participate in MBMAP and CCCC Task Team discussions. National funding for members to attend session should be sought.
2. The Panel proposes to catalogue important time series of marine bird and mammal reproductive and dietary studies in the PICES region (in a METADATA format)

and to disseminate this information within the PICES community to provide evidence for upper trophic-level responses to oceanographic and climate events. Data types potentially available include timing of breeding, growth rates of chicks and reproductive performance (all indicators of prey abundance), and diet composition including types and size of prey consumed.

3. The Panel recommends to develop under the auspices of PICES a program of seabird and cetacean observations to complement the CPR program initiated under the guidance of the MONITOR Task Team.

4. The Panel intends to develop over the next 3 years a comparison of time series of prey use by marine birds and mammals in the eastern and western North Pacific Ocean for the purpose of detecting differences in trophic structure and timing of responses of marine birds and mammals in relation to climate change events.
5. The Panel recognizes that there are data gaps in the Working Group 11 report, and where feasible, it would be valuable to assemble new information to update the report.

BIO Endnote 6

PICES X BIO Topic Session

Plankton size classes, functional groups and ecosystem dynamics: causes and consequences.
Convenors: Angelica Pena (Canada), Toshiro Saino (Japan) and Patricia A. Wheeler (U.S.A.).

The plankton are composed of different functional groups. The phytoplankton, for example, are comprised mostly of small organisms (<~5mm equivalent diameter) that are supported largely by recycled nutrients and contribute little to the biological CO₂ pump. The diatoms (>~5mm) use nitrate, silica and the trace element iron. They are the usual bloom organisms and contribute much of the sinking flux of organic carbon. Other organisms, such as calcifying coccolithophorids, use calcium carbonate rather than silica in their skeletal structures: when they take up carbon as carbonate and sink out of the surface layer, they actually raise the surface pCO₂ thereby retarding

the oceanic uptake of CO₂. These different functional groups in turn support different functional groups of zooplankton - such as microzooplankton and mesozooplankton, through differential grazing. The relative abundance of these functional groups depends strongly on physical and chemical processes - which themselves are modified in a changing climate. We invite talks on the dynamics governing planktonic functional groups, and on the causes and consequences of their changing on various timescales.

Selected papers will be published in a special issue of *Progress in Oceanography*. Authors desiring to be included in the publication should bring manuscripts to the Annual Meeting in Victoria. If review and final revision can be completed by March 1, 2002, publication might be scheduled before PICES XI, in October 2002.