REPORT OF THE BIOLOGICAL OCEANOGRAPHY COMMITTEE

The meeting of the Biological Oceanography Committee (BIO) took place October 29, 2008. The Chairman of the Committee, Dr. Michael J. Dagg, called the meeting to order and welcomed the participants (*BIO Endnote 1*). The draft agenda was reviewed and approved, but it was noted that several new workshops and topic sessions had been proposed in the last 24 hours and that these would be discussed at the appropriate place in the agenda (*BIO Endnote 2*).

AGENDA ITEM 3
Reports from subsidiary bodies

A report summarizing the status of the Advisory Panel on the *Micronekton Sampling Gear Intercalibration Experiment* (MIE-AP) sample analysis, data analysis, publications and final report preparation was given by Dr. Orio Yamamura (see the MIE-AP report elsewhere in this Annual Report). The Chairman stressed the importance of receiving the final report before PICES-2009, and requested that the MIE-AP Co-Chairmen send him a schedule for completion of the Advisory Panel activities.

A report summarizing the Advisory Panel on *Marine Birds and Mammals* (MBM-AP) meeting of October 26 was given by Dr. Hidehiro Kato (see the MBM-AP report elsewhere in this Annual Report). Concerns on the lack of breadth in membership countries were discussed. A proposal for a ½-day BIO/FIS/FUTURE topic session at PICES-2009, titled "*Krill distribution, abundance and patch dynamics in the North Pacific as revealed by hydroacoustics*" was presented, but later withdrawn. A proposal for a 1-day BIO workshop titled "*Integrating marine mammal populations and rates of prey consumption in models of climate change – Ecosystem change in the North Pacific*" was presented for later discussion. Dr. Kato provided a brief report on his attendance at the IWC annual meeting (*MBM-AP Endnote 4*) and BIO endorsed his attendance as a PICES representative again at this coming year's meeting. Revised MBM-AP Terms of Reference were discussed and approved (*MBM-AP Endnote 2*).

A report summarizing the activity of the Section on *Carbon and Climate* (CC-S) was given by Dr. James R. Christian (see the CC-S report elsewhere in this Annual Report). A data synthesis workshop was proposed for PICES-2009 for later discussion. Two new Japanese members were endorsed by BIO for addition to CC-S. A joint POC/BIO topic session titled "*Anthropogenic perturbations of the carbon cycle and their impacts in the North Pacific*" was proposed for later discussion.

AGENDA ITEM 4
Working Groups

A report was given by Working Group on *Iron Supply and its Impact on Biogeochemistry and Ecosystems in the North Pacific Ocean* (WG 22) Co-Chairman, Dr. Fei Chai (the WG 22 report can be found elsewhere in this Annual Report), A 1-day workshop titled *"Natural supplies of iron to the North Pacific and linkages between iron supply and ecosystem responses"* was proposed for PICES-2009, and later discussed.

Working Group on *Comparative Ecology of Krill in Coastal and Oceanic Waters around the Pacific Rim* (WG 23) Co-Chairman, Dr. William Peterson (the WG 23 report can be found elsewhere in this Annual Report) announced that a 2-day workshop titled "*Krill biology and ecology in the world's ocean"* will be held at the final GLOBEC Open Science Meeting in Victoria in June 2009.

AGENDA ITEM 5
Summaries of topic sessions and workshops held at PICES-2008

The topic sessions and workshops sponsored by BIO at PICES-2008 are listed below. For session or workshop summaries, see the Session Summaries section in this Annual Report:

- BIO Contributed Paper Session. Friday, October 31, 1-day. Co-convenors: Michael J. Dagg (U.S.A.), Michio J. Kishi (Japan).
- S9 (BIO) "*End-to-end foodwebs: Impacts of a changing ocean*". Tuesday, October 28, ½-day and Thursday October 30, 1 day. Co-convenors: Hiroaki Saito (Japan), Sinjae Yoo (Korea) and George Hunt (U.S.A.).
- S2 (MONITOR/TCODE/BIO) "*Linking biology, chemistry and physics in our observational systems – Present status and FUTURE needs*". Thursday October 30, 1 day. Co-convenors: Hernan Garcia (U.S.A.), David Mackas (Canada), S. Allen Macklin (U.S.A.), Jeffrey J. Napp (U.S.A.), Young-Jae Ro (Korea) and Toru Suzuki (Japan).
- W2 (BIO) "*Oceanic ecodynamics comparison in the subarctic Pacific*" (Sunday, October 26, 1 day). Co-convenors Charles B. Miller (U.S.A.) and Atsushi Yamaguchi (Japan).

AGENDA ITEMS 6 AND 7
Symposia and meetings and financial requests

(a) Completed

- ICES Annual Science Conference September 22–26, 2008. Halifax, NS, Canada, was attended by Angelica Peña who co-convened an ICES/PICES theme session titled "*Coupled physical and biological models: Validation, parameterization and application*" (see *BIO Endnote 3* for a report).
- A workshop titled "*The Okhotsk Sea and adjacent areas*" was held at the Tokyo University of Agriculture, Okhotsk Campus in Abashiri, Japan from August 27–29, 2008. Co-convenors were Prof. Makoto Kashiwai and Dr. Gennady Kantakov (see *BIO Endnote 4* for a report).
- PICES International Summer School on "*Ecosystem-based management and ecosystem approach*" Yasunori Sakurai, Masahide Kaeriyama, Shin-ichi Ito, Michio J. Kishi (see *BIO Endnote 5* for a report).
- A report on the session titled "*The effects of ocean acidification on fisheries and ecosystems*" and held at the International Symposium on "*Oceans in a high CO_2 world – II*", Monaco, October 6–8, 2008 (*CC-S Endnote 4*).

(b) Future

Proposed BIO topic sessions for PICES-2009

- A 1-day joint FIS/BIO topic session titled "*Early life stages of marine resources as indicators of climate variability and ecosystem resilience*" (see *FIS Endnote 5*).
- A 1-day joint POC/BIO topic session titled "*Anthropogenic perturbations of the carbon cycle and their impacts in the North Pacific*" (see *POC Endnote 4(3)*) was proposed by CC-S. Travel request for 1 person.
- BIO paper session – Co-convenors Michael Dagg (U.S.A.) and SinjaeYoo (Korea).

A joint POC/BIO topic session titled "*Mesoscale eddies and their roles in North Pacific ecosystems*" (see *POC Endnote 4(4)*).

proposed BIO sponsored workshops for PICES-2009

- A 1-day BIO workshop titled "*Natural supplies of iron to the North Pacific and linkages between iron supply and ecosystem responses*" (see *WG 22 Endnote 4*). Travel request is for 2 invited speakers.
- A ½-day BIO workshop on "*Integrating marine mammal populations and rates of prey consumption in models of climate change-ecosystem change in the North Pacific*" (see *MBM-AP Endnote 5*). Travel request is for 1 scientist.
- A ½-day BIO workshop on "*Standardizing methods for estimating jellyfish concentration, and development of an international monitoring network*" (*BIO Endnote 6*). Travel request is for 1 scientist.

- A 2-day BIO workshop on "*Marine ecosystem model intercomparisons (II)*" (*BIO Endnote 7*) co-sponsored by ESSAS.
- A 2-day carbon data synthesis workshop (*BIO Endnote 8*) proposed by CC-S. (1.5 days for the workshop and a ½ day for the business meeting). Travel support is requested for Dr. Robert Key (U.S.A.).

Other workshops/meetings of interest

- Dr. William Peterson described a Workshop on "*Krill biology and ecology in the world's oceans*", that will be held at the GLOBEC Open Science meeting in Victoria in June 2009 (see the WG 23 report elsewhere in this Annual Report). Chairs: Angus Atkinson (UK), Jaime Gómez-Guitérrez (Mexico), Bettina Meyer (Germany) and William Peterson (U.S.A.). Travel support is requested for 2 PICES participants.
- The 5th International Zooplankton Production Symposium will be held in March or April 2011, at Pucón, Chile, with Dr. Rubén Escribano as local organizer and Dr. Steve Hay (UK) as ICES convenor, together with convenors appointed by PICES and IMBER. BIO recommends that PICES co-sponsor the meeting, and recommends either Dr. David Mackas or Julie Kiester be appointed as the PICES co-convenor. Dr. Kiester (first choice) has not been contacted yet: Dr. Mackas has agreed to do this if she is unavailable.
- A Joint PICES/ICES Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish* (WGFCCIFS) is proposed (see *POC Endnote 3*). Co-Chairs of the proposed WG will meet on June 21, 2009, one day prior to the GLOBEC Open Science meeting in Victoria British Columbia, Canada, to:
  - discuss frameworks and methodologies for forecasting the impacts of climate change on the growth, distribution and abundance of marine life, with particular emphasis on commercial fish and shellfish;
  - review the results of designated case studies to test methods;
  - plan for an inter-sessional meeting in early 2010 where scientists can present, discuss and publish forecasts of climate change impacts on the world's commercial fish and shellfish resources;
  - establish techniques for estimating and communicating uncertainty in forecasts;
  - evaluate strategies for research and management under climate change scenarios, given the limitations of our forecasts.
- WGFCCIFS will report by September 2009 for the attention of the ICES Climate Change Steering Group, ICES Oceanography Committee, and PICES' FIS, BIO and and POC Committees. Members plan to organize an inter-sessional meeting in early 2010 to provide a venue for discussion and publication of results. See *BIO Endnote 9* for supporting information.
- A proposal for an ESSAS Open Science Meeting was put forward by Dr. George Hunt. BIO supports the request for the PICES Secretariat to assist with coordination and organization of the meeting. Travel funds may be requested next year for this meeting, scheduled for spring 2011.

Other meetings of interest include:

- The final GLOBEC Open Science meeting – June 2009 Victoria, Canada
- The Expo 2012 Organizing Committee (Yeosu, Korea) has expressed interest in hosting the 2nd International Symposium on "*Effects of climate changes on the world's oceans*" in the early spring of 2012.

AGENDA ITEM 8
Relationships with other international programs and organizations

No presentations were made.

AGENDA ITEM 9
Publications

- An IFEP-AP special issue on SEEDS II, guest edited by Drs. Atsushi Tsuda, Mark Wells, Mitsuo Uematsu and Hiroaki Saito, will be published in *Deep-Sea Research II*. As of early October 2008, there are 19

manuscripts and the editing for 15 manuscripts has been completed. It is anticipated that editing of all manuscripts will be completed by the end of November and the papers will be sent to the chief editor of DSR II for publication in 2009.

- Selected papers on krill from the 4th International Zooplankton Symposium will be published as a special issue of Deep-Sea Research II, guest edited by Drs. William Peterson and So Kawaguchi: As of late October 2008, 18 papers have been accepted.
- Selected papers from PICES-2008 Workshop on "*Oceanic ecodynamics comparison in the sub-Arctic Pacific*" (W2) is proposed for publication in *Deep-Sea Research II*. This volume will have eleven papers, for publication. Drs. Atsushi Yamaguchi and Charles Miller will be the guest editors. Review and revision processes should be complete by summer of 2009, with manuscripts ready to transfer to the journal for final evaluation.
- A series of 23/24 selected papers from the SCOR Working Group on Zooplankton Time Series will be published in the journal *Progress in Oceanography*. PICES was represented by Dr. William Peterson, and Dr. David Mackas was a WG member supported by SCOR.
- Selected papers based on the topic session on "*Phenology and climate change in the North Pacific*" at PICES XVI in Victoria, Canada are now slated for publication in *Marine Ecology Progress Series* (MEPS). Originally, a special volume was to be published in *Deep-Sea Research II* but only 4 papers were submitted which was insufficient for a special volume in this journal. MEPS is interested in the topic and additional potential contributions have been solicited. Papers are due by mid-December 2008. Additional contributors will be solicited. If fewer than 4 papers are accepted, each paper will be published as a stand-alone article. If more than 4 papers are accepted, there will be a special theme section in MEPS devoted to this topic.

AGENDA ITEM 10
BIO Action Plan update

The current version of our Action Plan will be modified according to what was recommended at the BIO Committee meeting at PICES-2008. This will then be posted on the PICES web page shortly after the Dalian meeting is completed

AGENDA ITEM 11
FUTURE update

Committee members discussed the draft FUTURE Implementation Plan and a list of issues was developed to be presented at the FISP Open Forum held October 30 at PICES-2009. Written comments will also be presented to the FISP Writing Team.

AGENDA ITEM 12
North Pacific Ecosystem Status Report II

Dr. Dagg will co-edit the NPESR II with Dr. Skip McKinnell.

AGENDA ITEM 13
Other items

There was discussion about the proposal to allocate more time to committee meetings and move the meetings to a time earlier in the week. It was agreed that more time will be necessary as FUTURE is implemented and BIO activities will be linked to them. No consensus was achieved about the timing of the meeting.

BIO Endnote 1

BIO participation list

Members	Observers
David L. Mackas (Canada)	Evgeny Barabaushchikov (Russia)
Song Sun (China)	Harold (Hal) Batchelder (U.S.A.)
Michio J. Kishi (Japan)	Fei Chai (U.S.A.)
Atsushi Yamaguchi (Japan)	Seok-Gwam Choi (Korea)
Young-Shil Kang (Korea)	George Hunt (U.S.A.)
Sinjae Yoo (Korea)	Oleg Katugin (Russia)
Alexei Orlov (Russia)	Hidehiro Kato (Japan)
Michael J. Dagg (U.S.A., Chairman)	Tom Okey (Canada)
William Peterson (U.S.A.)	William Sydeman (U.S.A.)
	Harumi Yamada (Japan)
	Orio Yamamura (Japan)

BIO meeting agenda

1. Welcome and Introductions
   - Round of introductions
   - Circulate a sign up sheet
2. Agenda additions and changes – approval of agenda
3. Reports from subsidiary bodies: summarizing activities during past year, summarizing activity at this year's PICES meeting, and summarizing goals for next year. These goals will be put into the BIO Action Plan.
   - MIE-AP - report to be provided orally by (probably) Orio Yamamura because Evgeny Pakhomov will not attend.
   - MBM-AP: Bill Sydeman will be at the meeting and should give a report, also Kato-san on IWC (probably written). MBM ToR approval
   - CC-S
4. Working Groups:
   - WG-22: Iron Supply and its Impact on Biogeochemistry and Ecosystems in the North Pacific Ocean. Shigenobu Takeda (Japan) and Fei Chai (USA).
   - WG-23: Comparative Ecology of Krill in Coastal and Oceanic Waters around the Pacific Rim. William Peterson (USA) and Song Sun (China).
   - Discuss establishment of a group to develop appropriate standards for sampling giant jellyfish - Presentation to be made by Young-Shil Kang.
5. Summaries of topic sessions and workshops held during PICES-2008, Dalian. These will be short written summaries prepared by session conveners and provided to the PICES Secretariat.
   - BIO Contributed Paper Session.
   - S9 (BIO) End-to-end foodwebs: Impacts of a changing ocean.
   - S2 (MONITOR/TCODE/BIO) Linking biology, chemistry and physics in our observational systems – present status and FUTURE needs.
   - W2 (BIO) Oceanic ecodynamics comparison in the subarctic Pacific
6. Symposia and meetings
   (a) completed meetings – reports or comments on:
   - ESSAS-PICES Workshops Sept 15-19, 2008. Halifax, NS Canada;
   - ICES/PICES meeting, Sept 22-26, 2008. Halifax, NS, Canada three theme sessions, one relevant to BIO: "*Coupled physical and biological models: parameterization, validation, and applications*", report from Angelica Peña representing PICES;
   - Okhotsk workshop;
   - PICES/CREAMS summer school;

- "*The effects of ocean acidification on fisheries and ecosystems*" at the International Symposium on "*The Ocean in a High CO_2 World – II*". Monaco, Oct. 6-8. Report from CC-S?
- Others?

(b) future meetings

- final GLOBEC meeting – June 2009 Victoria – BIO role??
- possible BIO theme sessions* for PICES 2009
  - FIS/BIO (1day) for Jeju Is. Korea in 2009. *Early life stages of marine resources as indicators of climate variability and ecosystem resilience* Co-convenors: Suam Kim (Korea), Richard Brodeur (USA), Douglas Hay (Canada) Yoshiro Watanabe (Japan) and ____from BIO?
  - BIO paper session – we should have 1-2 other co - conveners from Asian side of BIO
  - Possible BIO session on "The Effects of Ocean Acidification on Marine Organisms" to be presented by Angelica Peña.
- Possible BIO sponsored workshops for PICES 2009
- Others

8. Relationships with other international programs and organizations
7. Financial requests

   Requests for travel or support of outside workshops must have a clear PICES connection such as participation by a BIO committee member or direct contribution by a PICES BIO committee member, and be linked in some fashion to the BIO Action Plan. Possible travel requests for BIO to consider include:
   - Invited speakers to BIO theme sessions in PICES 2008
   - Travel associated with new BIO Working Groups
   - Travel associated with BIO approved Workshops
   - Travel associated with BIO and non-PICES international programs or organizations
   - Summarize all funding requests and prioritize for presentation to SB
9. Publications for upcoming year
   - status of IFEP special volume on SEEDS II – information provided by Takeda: 12 manuscripts under review, final deadline for submission in mid-October, expecting 18 papers, hope to publish in 2008
   - About 15 papers on krill from the 4th International Zooplankton Symposium will be published in a special volume of *Deep-Sea Research II*, edited by W. Peterson and S. Kawaguchi.
   - Special volume of Plankton and Benthos Research to be published based on papers from the Topic Session titled "*The human dimensions of jellyfish blooms*" held at the Yokohama PICES XV meeting. Edited by Hitoshi Iizumi and Haruto Ishii, with expected publication date in early 2008. (Ric Brodeur may give a short report) OECOS Special Volume 4
   - Other publications to be recommended to Science Board
10. BIO Action Plan update
    - We will discuss and approve the Action Plan for the coming year. Review in the Context of FUTURE.
11. FUTURE update
    - update for information purposes, the status of the Implementation Plan.
12. North Pacific Ecosystem Status Report II.
    - BIO contributions and participants
13. Other items
14. Meeting adjourns

BIO Endnote 3

Report on the ICES/PICES Theme Session, "*Coupled physical and biological models: Validation, parameterization and application*" at ICES ASC in Halifax, Canada

The ICES/PICES Theme Session, "Coupled physical and biological models: Validation, parameterization and application" (1.5 days) was held during the ICES Annual Science Conference, September 22-26, Halifax, N.S., Canada. Co-conveners were Guoqi Han (Canada), Andre Visser (Denmark), Andreas Moll (Germany) and Angelica Peña (PICES, Canada).

This theme session was initiated by ICES Working Groups on *Modeling Physical and Biological Interactions* and co-sponsored by PICES. Its aim was to present recent advances related to development, validation, parameterization and application of both physical–biological models (PBMs) and individual-based models (IBMs), and their coupling, with a particular emphasis on their validation on various temporal and spatial scales. There were 18 oral and 5 poster presentations in this session. The presentations were of high quality, well attended and stimulated interesting questions and discussions.

Contributions covered a wide range of aspects in the context of PBMs, IBMs, and their coupling and applications to ecosystem studies and fisheries management. There was a group of presentations on validation and application of coupled physical–biogeochemical models to understand ecosystem dynamics. These studies demonstrated the time- and space-dependent influences of various processes, such as tidal dynamics, mixing, Ekman pumping, nutrient loading, and climatic variability. Another group of presentations was related to coupling PBMs and IBMs, and applications to feeding success, survival and growth, and recruitment of early life stages. These papers examined the effect of time of spawning, ocean circulation, and food availability on population dynamics. Various other aspects were also considered, including ecosystem models for sea-ice influenced seas, parameterization of biological processes in the benthic layer, and the coupling of such a benthic layer model to a large-scale hydrodynamic model. A few other issues were raised during the session discussion, including the effectiveness of assimilating oceanographic data into coupled physical and biological models and the capability of resolving fronts in these models.

BIO Endnote 4

Report of the 4th PICES Workshop on the Okhotsk Sea and Adjacent Waters

(draft/081009)

Co-Conveners:
Makoto B. KASHIWAI and Gennady A. KANTAKOV

Foreword

These proceedings are outcomes from the workshop on the Okhotsk Sea and Adjacent Waters held in Abashiri in August 2008. The Workshop was proposed by the Biological Oceanography Committee (BIO) to Science Board. At PICES XVI in Victoria, at the recommendation of Science Board based on BIO proposal, Governing Council approved a proposal of holding the 4th PICES Workshop on "The Okhotsk Sea and adjacent waters" from 27-29 August, 2008, at Abashiri Campus of Tokyo University of Agriculture, in Abashiri, Japan.

The papers to be presented at Workshop were called for under topics including followings;

- Basin oceanography and climate of the Sea of Okhotsk;
- Low-trophic response to the variability of the Sea of Okhotsk climate;
- Response of nekton, macro benthos, mammals, sea birds to the Sea of Okhotsk climate variability;
- Impacts of anthropogenic challenges by oil/gas industries, fisheries and other human activities to the Sea of Okhotsk ecosystem, and impacts of violent climate disasters to human activities;
- Potential use of and evidences by new technology, methods and tools for Sea of Okhotsk Research in FUTURE;

The co-conveners and participants of the workshop are hoping these proceedings can contribute and stimulate future research in marine science on the Okhotsk Sea.

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1. Outline of the Workshop

The fourth PICES Workshop on the Okhotsk Sea and Adjacent Waters was held at the Abashiri Campus of Tokyo University of Agriculture in Abashiri, the southernmost city in the rim of Okhotsk Sea on August 27-29, 2008. Co-conveners were Prof. Makoto KASHIWAI (Tokyo University of Agriculture) and Dr. Gennady KANTAKOV (Sakhalin Fisheries and Oceanographic Research Institute). The participants were 64 scientists (Japan 45; Russia 17; Canada 1; PICES 1) and 8 auditing students.

The Workshop was opened by welcome addresses by the Dean of Faculty of Bioindustry, Tokyo University of Agriculture, Prof. Michinari YOKOHAMA, and the Director of Abashiri Construction and Development Department Office, Hokkaido Regional Development Bureau, Ministry of Land, Infrastructure, Transport and Tourism, Mr. Koji KAMADA. The co-conveners made explanation of workshop objectives, structure and outputs.

The goal of the workshop was to develop the Okhotsk Sea component of PICES / FUTURE Program. Under this intention this Workshop was; to bring together a team of international scientists having interest in the Okhotsk Sea and adjacent areas and marine ecosystems embraced by them, under concerns on increasing impacts of climate changes; to review and exchange 'What is known'; and to identify key scientific questions and necessary approaches.

The scientific sessions were held with three plenary sessions in the first day and two parallel sessions in the second day. The structure of sessions was as follows:

1. Plenary Sessions:
   - PS1: Climate / Ocean dynamics
   - PS2: Amur River / Geochemical Cycle
   - PS3: Primary production / Zooplankton / Marine mammals
2. Session A:
   - A1: Current Dynamics
   - A2: Sea-ice, watermass and fresh water processes / Coastal lagoons
   - A3: New technology
3. Session B:
   - B1: Biological processes / Disturbance by oil and gas development
   - B2: Walleye pollock

There were presentations of 46 papers, including presentation by Dr. Skip McKINNELL, Deputy Executive Secretary of PICES, on the status and trends of FUTURE Implementation planning. The session reports including brief summary of presentations and proposed scientific questions and approaches are shown in next section.

The third day was the plenary session for development of session reports and identification of proposals on FUTURE program. After the announcements for the preparation of workshop proceedings, the co-conveners provided closing remarks.

BIO Endnote 5

Report of the PICES International Summer School on
"Ecosystem Based Management and Ecosystem Approach"
by Yasunori Sakurai, Masahide Kaeriyama, Shin-ichi Ito, Michio J. Kishi

The PICES International Summer School on "Ecosystem Based Management and Ecosystem Approach" was held from August 23–26, 2008 at the Faculty of Fisheries Sciences, Hokkaido University, Hakodate, Japan. Fifty people, including participants from all PICES member countries, attended the summer school. On Day 1 four lecturers gave talks on EBM. On Day 2 afternoon, students were divided into six groups and discussions were held following talks on each theme. On Day 3 evening, each group gave a Power Point presentation. The presentation was very fruitful and some of the groups will present posters at PICES-2008I in Dalian, China.

The Advisory Panel for the *CREAMS/PICES Program in East Asian Marginal Seas* (CREAMS-AP) was established in 2005. A goal of CREAMS-AP is to "develop a CREAMS/PICES Capacity Building Program that will provide on-site training through international research at educational laboratories, training camps, inter-calibration centers and to organize summer schools and winter schools for students and young scientists". The first PICES Summer School on "*Ocean circulation and ecosystem modeling*" was held in August 2006, in Busan, Korea.

The PICES summer school in Hakodate focused on "*Ecosystem-based management (Ecosystem approach to management: EAM) and ecosystem approach*". Ecosystem-based management is an integrated approach for the management that considers the entire ecosystem, including humans. The goal of ecosystem-based management is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need.

The 2002 World Summit on Sustainable Development (WSSD) recognized that the management needs for the oceans have changed, needing integration of ocean management activities across sectors and responding to the necessity of conservation objectives for collective ocean use. Among other defined specific temporal targets relevant to oceans management by 2012, the WSSD expects to implement "Ecosystem-based management (EAM)". We believe that ecosystem management and ecosystem science are parallel concepts that require continued interaction to achieve marine resource sustainability.

BIO Endnote 6

½-day BIO *workshop on Standardizing methods for estimating jellyfish concentration, and development of an international monitoring network* **at PICES-2009**

Some jellyfish make massive blooms in the North Pacific coastal and oceanic waters, damaging fisheries and causing large social and economic problems. To date, there have been discussions about bloom mechanisms, distribution, and biological and ecological characteristics of the jellyfish species. However, there are limitations in understanding the dynamics of these massive blooms and providing scientific information to management. One major limitation is standards for sampling and a lack of monitoring. The goals of this workshop are: 1) to understand the problems and develop techniques for estimating concentrations of jellyfishes; 2) to evaluate the status of national/regional monitoring systems for jellyfishes; 3) to emphasize why standard methods and international monitoring are needed; and 4) to develop an implementation plan and schedule for improving abundance and distribution information on jellyfish blooms.

Suggested Co-Convenors: Hideki Akiyama (Japan), Richard D. Brodeur (U.S.A.) and Young-Shil Kang (Korea)

BIO Endnote 7

2-day BIO workshop on "*Marine ecosystem model intercomparisons (II)*" (co-sponsored by ESSAS) at PICES-2009

The objective of the Marine Ecosystem Model Inter-comparison Project (MEMIP) is to compare the performance of various lower trophic level marine ecosystem simulation models at predicting the abundance and distribution of zooplankton functional groups. Models with high performance and broad generality will be priority candidates for examining the state of marine ecosystem's response to future global climate change. This workshop will be technical, "hands-on", and focus on beginning to parameterize, execute and calibrate various 1-D versions of biogeochemical lower trophic level (LTL) marine ecosystem models. Multiple ecosystem models will be configured to three Pacific Ocean "location testbeds". The 1-D physical forcing for each site will be fixed (*e.g.*, to enforce a common physical environment) so that differences observed among simulations at a single site are due only to differences in ecosystem models. The three testbeds will be selected based on the availability of data sets suitable for this exercise-data for multiple years, good seasonal coverage, and breadth of state variables spanning inorganic nutrients, chlorophyll (or preferably phytoplankton carbon or nitrogen), and zooplankton biomass measures are needed. We plan to apply LTL models to Oyashio locations such as stations along Japan's A line, the middle shelf of the eastern Bering Sea (*i.e.*, at mooring M2), and a shelf station on the Newport line to represent the California Current upwelling system. The models will be used to identify mechanisms that are important controls on the level and variability of secondary production and to bound the levels of uncertainty in model predictions by calculating ensemble statistics. Comparisons of identical ecosystem model formulations (*e.g.*, not tuned to each specific location) at multiple locations will provide information on the spatial-temporal robustness of particular model structures and parameterizations.

Suggested Co-Convenors: Harold P. Batchelder (U.S.A.), Shin-ichi Ito (Japan) and Bernard A. Megrey (U.S.A.)

BIO Endnote 8

POC/BIO carbon data synthesis workshop at PICES-2009

This workshop will be a major step forward in the implementation of the North Pacific carbon data synthesis. Investigators who submit data to the synthesis will collectively review the progress of the QA/QC process, and discuss the degree of success of the techniques applied and whether different or additional approaches are necessary. This is a highly «hands-on» activity that will involve data originators who submit data to the synthesis and investigators participating in the synthesis processes, and will lead directly to value-added data products and collective publications.

Co-Convenors: Masao Ishii (Japan) and Robert M. Key (U.S.A.)

BIO Endnote 9

Supporting information on proposed ICES/PICES Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish* (WGFCCIFS)

PRIORITY:	The work of the FCCIFS Workign Group is essential to ensure that ICES and PICES will be able to provide guidance on the potential impacts of climate change on marine ecosystems and the response of commercial fish and shellfish resources to these changes.
SCIENTIFIC JUSTIFICATION AND RELATION TO ACTION PLAN:	The work done within ICES and PICES on Climate Change and fisheries has been diverse and has included: a) guidance on methods for selection of IPCC scenarios for use in projections; b)techniques for downscaling IPCC scenarios to local regions, c) development of coupled ecosystem models for use in evaluating climate induced shifts in environmental conditions, d) literature documenting relationships between climate forcing and marine fish and shellfish distribution and production, and e) stock assessment techniques for evaluating management strategies to mitigate the impacts of change. A challenge facing ICES and PICES is the need to integrate all of this research to provide stakeholders with quantitative estimates of the potential impact of climate change on marine life throughout the world. This challenge calls for the establishment of an interdisciplinary research team composed of experts from around the world who will focus attention on the development of common and standardized frameworks for forecasting climate change impacts on marine life with particular emphasis on commercially important fish and shellfish. ICES and PICES should act now to ensure that our research communities develop the capibilities to provide quantitative contributions to the next IPCC reports and to provide guidance for management under climate change scenarios. Several case studies will be identified by the Steering Group based on their potential for contributing to methodological development and the opportunity for comparison of marine species and community responses to climate forcing in different ecosystems. Members of the working group will be responsible for encouraging the development of regional interdisciplinary teams responsible for the production of forecasts. Members of the working group will provide guidance to the regional teams by providing a framework for the development of the forecasts and communication of new advances in analytical tools. The culmination of the working group's effort will be presentation and discussion of results at an intersessional meeting and publication of results in a peer reviewed journal by 2011. The timing for the publication is critical because the future IPCC AR5 report is slated for release in 2013 and the IPCC only allows references to published papers.
RESOURCE REQUIREMENTS:	No specific resource requirements beyond the need for members to prepare for and participate in the meeting.
PARTICIPANTS:	These would include climatologists, oceanographers, ecologists, stock assessment scientists, ecosystem modellers, fisheries managers and economists. Participation is sought from members of PICES and ICES as well as scientists from the southern hemisphere.
SECRETARIAT FACILITIES:	This group is likely to have high demand on the computing resources of the Secretariat, but no additional software/hardware is anticipated beyond that which is currently available.
FINANCIAL:	ICES invitational travel for 4 invited scientists, PICES invitational travel for 4 scientists.
LINKAGES TO ADVISORY COMMITTEES:	An obvious very close link with the ICES Climate Change steering committee and the PICES FUTURE Scientific Steering Committee.
LINKAGES TO OTHER COMMITTEES OR GROUPS:	Methodological issues are within the mandate of this Group but for the purpose of this meeting this issue is not on the agenda. Fish stock assessment methods for

	forecasting and conducting management strategy evaluations will be discussed, as will various eocsystem modelling approaches. Techniques for selecting and downscaling climate change scenarios for use in forecasts will also be discussed. Knowledge of the mechanisms underlying commercial and other species and community responses to shifts in oceanography will be critical to the formation of forecasts.
LINKAGES TO OTHER ORGANIZATIONS:	ICES and PICES will seek widened participation for this group including contact with relevant academic and intergovernmental organisations including fisheries managers and FAO for this meeting.
SECRETARIAT MARGINAL COST SHARE:	ICES 50%, PICES 50%.