REPORT OF MARINE ENVIRONMENTAL QUALITY COMMITTEE

The meeting of the Marine Environmental Quality Committee (hereafter MEQ) was held from 16:00–19:00 hours on October 31, 2007. The Chairman, Dr. Glen S. Jamieson, called the meeting to order and welcomed the participants and observers *(MEQ Endnote 1*). New Japanese members, Drs. Shigeru Itakura and Yasunori Watanabe, have recently joined the Committee, although only Dr. Watababe was able to attend PICES XVI. There continues to be an overall issue of having full participation in MEQ by all PICES member countries. At this meeting, only 9 of the 17 members of MEQ attended from 5 countries. The Committee again expressed its concern that there was no official participation by China this year; although 2 observers from this country were present.

The draft agenda was reviewed and adopted *(MEQ Endnote 2)*. Ms. Darlene Smith served as the rapporteur.

Issues arising from PICES XV decisions (Agenda Item 3)

There were no pressing issues for the Committee pending from last year's meeting in Yokohama (Japan). The Chairman briefly summarized the report of the inter-sessional Science Board/ Governing Council meeting (April 2007, Yokohama, Japan.). The agenda was modified at this stage to include a report from WG 21 on *Non-indigenous Aquatic Species*, and Agenda Items 4 and 5 were combined.

Progress reports of MEQ subsidiary bodies (Agenda Items 4-5)

Section on *Ecology of harmful algal blooms in the North Pacific* (HAB-S)

Dr. Hak-Gyoon Kim, HAB-S Co-Chairman, reported on the results of their workshop (W4) on "*Review of selected harmful algae in the PICES region: III*. Heterosigma akashiwo *and other harmful radiophytes*" and laboratory demonstrations on rapid detection of Rhapidophytes in natural samples using DNA probe based assay, and microscopic observations and detailed analysis of Rhaphidophyte taxonomy; MEQ Topic Session (S6) on "*The relative contributions of offshore and inshore sources to harmful algal bloom development and persistence in the PICES region*", and the HAB Section (HAB-S) business meeting convened at PICES XVI. Summaries of the workshop and Topic Session can be found in the *Session Summaries* chapter of this Annual Report.

For PICES XVII, HAB-S recommends continuing an annual series of workshops to document the existing knowledge on the eco-physiology of HAB species that impact all, or most, countries in the North Pacific. The proposed topic is "*Review of selected harmful algae in the PICES region: IV*. Karenia *and* Prorocentrum", with a 1-day workshop and a ½-day laboratory demo (*HAB-S Endnote 3*).

Other activities proposed for PICES XVII are: a ½-day Topic Session on "*Environmental regulation of species succession: The use of long-term data sets to understand HAB species dominance*" (tentative title*; HAB-S Endnote 4*), and a business meeting with national reports of HAB events in 2007–2008.

Due to changes in key people responsible for HAB data in some PICES member countries, several new people were suggested as primary contacts for HAE-DAT entry for their countries. These new contacts are: Hao Guo (China), Yang Soon Kang (Korea) and Tatiana Morozova (Russia). It was requested that the respective member countries consider appointing these scientists to become HAB Section members (or at least adding them to the HAB-S e-mail list).

It was also indicated that the invited speakers of past and future workshops on "*Review of selected harmful algae in the PICES region*" will be contacted to determine their interest in

writing 3- to 5-page summaries and extensive bibliographies based on their presentations. The goal is to combine these summaries into a review to be published as a PICES Scientific Report by 2010. The full HAB-S report is included elsewhere in this Annual Report.

WG 19 on *Ecosystem-based Management Science and its Application to the North Pacific*

Dr. Jamieson, WG 19 Co-Chairman, reported on the activities of the Working Group and the results of their successful and well-attended workshop (W3) at PICES XVI on "*Comparative analysis of frameworks to develop an ecosystem-based approach to management and research needed for implementation*". The summary of the workshop and the full report of WG 19 are included elsewhere in this Annual Report. It was noted that, to date, the Working Group again has had no participation from China, so there is no data or input with respect to EBM initiatives occurring in this country.

WG 19 members are expected to submit material for the final report by January 1, 2008, whereupon the lead authors and Co-Chairmen will begin merging the data and information. As the lack of Chinese data is a major gap, and input by Chinese scientists is hoped for, options for completing the report are:

1. Achieve Chinese participation in an inter-sessional meeting in February 2009 (in Seattle, U.S.A. or China);
2. Extend the Working Group for one more year and meet with the Chinese scientists at the next PICES Annual Meeting in Dalian, China;
3. Finalize the report without Chinese input (least desirable option).

WG 19 hopes to have a draft of the final report by late January 2008, to send to Chinese scientists prior to a meeting with them, so they can see what contribution is desired.

Following the WG 19 meeting, it was realized that a brochure on EBM was to be published in 2008. However, this topic was not discussed at this year's meeting. The Working Group still plans to produce a brochure (the concept was approved by Science Board last year), but only when the final report is complete. Information in the brochure will be a subset of information from the full WG 19 report (ocean management activities, eco-region definitions, indicators). Discussion of brochure content will occur via e-mail, or at an inter-sessional meeting or at next year's Annual Meeting.

WG 19 also considered the possible structure and content of the North Pacific Ecosystem Status Report (NPESR), and suggested enhancing the next report with information on pollution and socio-economics. Discussion focused on the need to identify key pressures in each region, and on how indicators on status and trends describing human well-being should be determined. Further discussion on these topics will be required.

WG 21 on *Non-Indigenous Aquatic Species*

Ms. Darlene Smith, WG 21 Co-Chairman, presented a brief report on the activities of the Working Group and their second meeting at PICES XVI. Dr. Vasily Radashevsky (Russia) was appointed as another WG 21 Co-Chairman. A 1-day MEQ Topic Session on "*Consequences of non-indigenous species introductions*" was proposed for PICES XVII (*WG 21 Endnote 4*). Travel funds are requested for one invited speaker to attend this session.

Other activities proposed in conjunction with PICES XVII are: the first rapid assessment survey to be conducted in two locations to be confirmed, and a 2-day WG 21 business meeting, with emphasis on a MNIS (marine non-indigenous species) component of a PICES project entitled "*Development of the prevention systems for harmful organisms' expansion in the Pacific Rim*" supported by a voluntary contribution from the Ministry of Agriculture, Forestry and Fisheries of Japan.

The Working Group also requested to hold an inter-sessional meeting to evaluate the protocols and reach final agreement on standards, data elements and data entry templates for the WG 21 MNIS database.

The full report of Working Group 21 can be found elsewhere in this Annual Report.

Study Group on *Marine Aquaculture and Ranching in the PICES Region* (SG-MAR)

Dr. Toyomatsu Horii presented a draft of the SG-MAR final report (see *MEQ Endnote 4* for SG-MAR terms of reference). The report was also given to FIS. The full SG-MAR report is included elsewhere in this Annual Report.

While it is difficult to say why PICES WG 18 on *Mariculture in the 21st Century – The Intersection between Ecology, Socio-economics and Production* was not fully successful, several possibilities were pointed out by its members. These include: (1) the development of the terms of reference; (2) the expertise of the members; (3) the lack of pre-existing personnel relationships among the group; and (4) the isolated position of aquaculture within the larger framework of PICES.

SG-MAR assessed the highest priority marine aquaculture and/or ocean ranching science needs for the next 5–10 years in each PICES member country. From this assessment, two issues had highest priority:

- development of aquaculture technology and systems;
- management of stocking and supplemented fisheries; and
- estimation of the carrying capacity of commercial aquaculture activities.

To address identified priority areas, SG-MAR recommended formation of two new PICES Working Groups on: (1) *Environmental Risk Assessment and Interactions of Marine Aquaculture* (WG-ERAIMA; under MEQ/FIS or MEQ) and (2) *Technology and Management for Aquaculture* (WG-TMA; under FIS/MEQ or FIS).

If established, WG-ERAIMA would:

- hold a joint ICES/PICES meeting in April 2008 on "*Environmental interactions of mariculture*";
- convene a Topic Session on "*Estimation of environmental carrying capacity for commercial aquaculture*" at PICES XVIII (2009, Korea);
- develop a white paper on recommendations on how to improve highest risk aspects of aquaculture.

If established, WG-TMA would:

- hold a 1-day Topic Session on "*Mariculture technology and husbandry for alternate and developing culture species*" at PICES XVII (2008, China; *FIS Endnote 5*);
- conduct a 1-day laboratory demonstration, tour or workshop on a topic that is special to Dalian, China;
- convene a Topic Session on "*Evaluation of stocking technologies to rebuild, and sustain capture fisheries*" at PICES XVIII.

The Committee has some concerns about what was being proposed. Firstly, that it may be difficult to establish two new Working Groups at this time because of existing on-going MEQ expert groups (HAB-S, WG 19 and WG 21). Dr. Horii indicated if only one group could be established the priority group for MEQ would be the one on environmental risk assessment (ERAIMA). Secondly, the Committee discussed whether it might be more appropriate to have a Working Group on risk assessment approaches in general, *i.e.*, to consider issues broader than mariculture alone, as risk assessments are already being done by many, if not all, member countries on a variety of topics. For example, Canada is conducting peer-reviewed risk assessments on salmon cage culture–environment interactions and shellfish–aquaculture environment interactions, and the United States evaluates human health risks as a result of toxin levels in fish feeds, *etc*. As risk assessments occur in many fields besides mariculture, a more comprehensive analysis of appropriate methodologies and issues may be relevant to PICES. A possible Working Group could be, for example, on "*Ecological and Human Risk Assessment Issues*".

The issue of marine aquaculture continues to be of great interest to all PICES member countries, so how best to proceed remains an important topic. These recommendations should therefore

also be considered by MEQ and FIS for inclusion in their Action Plans.

Proposals for new subsidiary bodies (Agenda Item 7)

Socio-economic issues seem to be integral to the activities of so many PICES expert groups, and thus WG 19 recommended to establish a Study Group on *Indicators of Human Well-being: Benefits, Health* under Science Board (see WG 19 report for terms of reference). This proposal was supported by MEQ. If the Study Group is approved, suggested criteria for nomination of membership are to be qualified social scientists, primarily those with strong economics background, with an understanding of natural science, particularly marine science, who are working on questions relating to marine ecosystem approaches and management issues.

Discussion on two new Working Groups proposed by SG-MAR can be found under Agenda Item 4 (see SG-MAR report for mission, strategy and goals of these Working Groups).

New PICES integrative scientific program, FUTURE (Agenda Item 8)

The Committee again had a good discussion and, overall, endorsed the direction outlined in the current draft Science Plan (version 4.2) for a new PICES scientific program, FUTURE (**F**orecasting and **U**nderstanding **T**rends, **U**ncertainty and **R**esponses of North Pacific **E**cosystems). Members also found that these directions are well aligned with the objectives of MEQ.

Review and discussion of MEQ Action Plan (Agenda Item 9)

Because of the on-going development of the next integrative scientific program of PICES, the Committee did not review the MEQ Action Plan (*MEQ Endnote 3*) as it will likely evolve once FUTURE is finalized. Nonetheless, the Committee had spent a considerable amount of time on the Action Plan in 2005, and thus concluded that it is reasonably complete and reflects existing objectives of MEQ.

MEQ Best Presentation and Poster Awards (Agenda Item 10)

The MEQ Best Presentation Award was given to Xuelei Zhang (First Institute of Oceanography, China) for his paper (co-authored by Z.J. Xu and M.Y. Zhu) on "*Impact of atmospheric dust on phytoplankton growth in the Yellow Sea and western Pacific"* presented at the MEQ Topic Session on "*The relative contributions of off-shore and in-shore sources to harmful algal bloom development and persistence in the PICES region*".

Chunjiang Guan (National Marine Environmental Monitoring Center, China) won the MEQ Best Poster Award for his paper (co-authored by Hao Guo and Wen Zhao) on "*Accumulation and elimination of* Alexandrium tamarense *toxins by the scallop,* Argopectens irradias".

Planning for PICES XVII (Agenda Item 11)

The Committee proposed that the following Topic Sessions and workshops to be convened at PICES XVII:

- a ½-day MEQ Topic Session on "*Environmental regulation of species succession: The use of long-term data sets to understand HAB species dominance*" (tentative title*; HAB Endnote 4*);
- a 1-day MEQ Topic Session on "*Human dimension sciences relevance for PICES*" (tentative title; *MEQ Endnote 5*);
- a 1-day MEQ Topic Session on *"Consequences of non-indigenous species Introductions"* (*WG 21 Endnote 4*);
- a 1-day MEQ/FIS Topic Session on "*Mariculture technology and husbandry for alternate and developing culture species"* (*FIS Endnote 5*);
- a 1-day MEQ workshop on "*Review of selected harmful algae in the PICES region: IV.* Karenia *and* Prorocentrum" preceded by a ½-day laboratory demonstration *(HAB-S Endnote 3)*.

Theme for PICES XVIII (Agenda Item 12)

No suggestions were provided.

PICES web site (Agenda Item 13)

No time was spent on this issue at the meeting.

Relations with other international programs and organizations (Agenda Item 14)

In anticipation that a PICES Working Group on mariculture issues will be established, likely one dealing in some capacity with risk assessment, collaboration with the ICES Working Group on *Environmental Interactions of Mariculture* (WGEIM) is recommended. Some SG-MAR members thought that a risk assessment approach may be too difficult and costly to apply in the PICES region. Nevertheless, the Study Group recommended that PICES accept the opportunity for a joint workshop with WGEIM to be held in April 2008, in Victoria, Canada, and use this opportunity to train PICES scientists in risk assessment.

The Committee reviewed activities scheduled for the 2008 ICES Annual Science Conference (September 23–26, 2008, Halifax, Canada). MEQ recommended that PICES co-convene one or both of the following Theme Sessions: "*Marine spatial planning in support of integrated management – tools, methods, and approaches* [ICES convenors: Stuart Rogers (UK), Robert O'Boyle (Canada)]" and "*How much habitat is enough? Evaluating habitats in terms of their ecosystem function, goods and services*" [ICES convenors: Stephen K. Brown (NOAA, USA), David Conover (JNCC, UK; tentative), Jake Rice (DFO, Canada; tentative)]".

At the WG 21 meeting, Dr. Gil Rilov invited PICES to co-sponsor, with the U.S. National Sea Grant Office and ICES, the 6th International Conference on "*Marine bioinvasions*" to be held in late August or early September 2009, in Portland, Oregon, U.S.A. WG 21 recommended that PICES support the conference and requested that one of its Scientific Steering Committee (SSC) members be from WG 21. Dr. Yoon Lee (Korea) volunteered to serve on the SSC. MEQ endorsed this proposal and suggested that support be at the level previously provided to the 5th International Conference on "*Marine bioinvasions*" convened in May 2007, in Cambridge, MA, U.S.A. This is considerably less than the amount requested by the organizers (see WG 21 report).

Finally, there was discussion by both HAB-S and WG 21 about their activities under a project on "*Development of the prevention systems for harmful organisms' expansion in the Pacific Rim*" supported by the very welcome and significant Japanese voluntary contribution (~CDN$ 1 million) provided to PICES for Pacific harmful algal bloom and invasive species studies during the next 5 years.

Items with financial implications (Agenda Item 15)

Proposed inter-sessional meetings

The following inter-sessional meetings were endorsed:

- A 2-day inter-sessional meeting of WG 19 on *Ecosystem-based Management Science and its application to the North Pacific* to discuss progress towards the preparation of the WG 19 final report and obtain Chinese input to the report (February 2008, Seattle, U.S.A.);
- A 3-day inter-sessional WG 21 meeting to evaluate the protocols and reach final agreement on standards, data elements and data entry templates for the WG 21 Marine/Estuarine Invasive Species Database (January 30–31, 2008, in Seattle, U.S.A.); [Update: Dates and location were changed to March 3–5, 2008 in Busan, Korea;]
- A 2-day ICES/PICES workshop on "*Environmental interactions of mariculture*" (April 14–15, 2008, Victoria, Canada).

Proposed publications

The following publications, mentioned at last year's Annual Meeting are now expected to occur in 2008–2009:

- a paper in a primary journal on national eco-region approaches based on the results of the PICES XV workshop on "*Criteria relevant to the determination of unit eco-regions for ecosystem-based management in the PICES area*" (2008)*;*

- a final report of WG19 on *Ecosystem-based Management Science and its Application to the North Pacific* (early 2009);
- a WG19 brochure on ecosystem-based management in a format similar to the FERRRS Advisory Report (2009).

Travel requests

Travel support is requested for:

- 2 invited speakers for the MEQ workshop on "*Review of selected harmful algae in the PICES region: IV*. Karenia *and* Prorocentrum" (*HAB Endnote 3*)*;*
- 1 invited speaker for the MEQ Topic Session on "*Environmental regulation of species succession: The use of long-term data sets to understand HAB species dominance*" (*HAB Endnote 4*)*;*
- 2 invited speakers for the MEQ Topic Session on "*Consequences of non-indigenous species introductions*" (*WG 21 Endnote 4*)*;*
- 2 invited speakers, 1 from the western Pacific and 1 from the eastern Pacific, for the MEQ Topic Session on "*Human dimension sciences relevance for PICES*" (*MEQ Endnote 5*).
- 2 invited speakers for the MEQ/FIS Topic Session on "*Mariculture technology and husbandry for alternate and developing culture species*" (*FIS Endnote 5*);
- A PICES convenor for the ICES/PICES Theme Session on "*Marine spatial planning in support of integrated management – tools, methods, and approaches* and/or on "*How much habitat is enough? Evaluating habitats in terms of their ecosystem function, goods and services*".

MEQ Endnote 1

Participation list

Members

Tatyana Belan (Russia)
Glen S. Jamieson (Canada, Chairman)
Hak-Gyoon Kim (Korea)
Kunio Kohata (Japan)
Olga Lukyanova (Russia)
Steve Rumrill (U.S.A.)
Darlene Smith (Canada)
Yasunori Watanabe (Japan)
Michael Watson (U.S.A.)

Observers

Alexander Bychkov (PICES)
Vasily Radashevsky (Russia)
Thomas Therriault (Canada)
Anastasia Chernove (Russia)
Ichiro Imai (Japan)
Toyomatsu Horii (Japan)
Jie Kong (China)
Yoichiro Ishibashi (Japan)
Chang-Gu Kang (Korea)
Jinhui Wang (China)
David Fluharty (U.S.A.)
Waldo Wakefield (U.S.A.)
Luzviminda Dimaano (Philippines)

MEQ Endnote 2

MEQ meeting agenda

1. Welcome and introductions
2. Approval of agenda
3. Business from last year's Annual Meeting
4. Progress report of MEQ-related subsidiary bodies:
   - Section on *Ecology of Harmful Algal Blooms in the North Pacific*
   - MEQ/FIS WG 19 on *Ecosystem-based Management Science and its Application to the North Pacific*

- MEQ WG 21 on *Non-Indigenous Aquatic Species*
- Study Group on *Marine Aquaculture and Ranching in the PICES Region*

5. Report on "*Development of the prevention system for harmful organism's expansion in the Pacific Rim*"; a project supported by a voluntary contribution by the Government of Japan:
6. Reports on inter-sessional meetings
7. Proposals for new subsidiary bodies (require terms of reference and list of potential members)
8. Discussion on the next major PICES scientific program, FUTURE: Roles for MEQ and respective member countries
9. Review/discussion of the MEQ Action Plan
10. MEQ Best Presentation and Poster Award
11. Planning for PICES XVII (Dalian, China)
12. Theme for PICES XVIII (Busan, Korea)
13. PICES web site – MEQ content
14. Relations with other international programs and organizations
15. Items with financial implications
16. Other business
17. Preparation of MEQ report and recommendations to Science Board

MEQ Endnote 3

MEQ Action Plan

Mission of the MEQ Committee

The MEQ Committee will expand its science from physical/chemical quality as related to toxic contaminants to include: structure, process, and function of the marine system that sustains both ecosystem and human health. Ecosystem health will ultimately affect human health. Rather than focusing on physical drivers of ecosystem change, MEQ is concentrating on anthropogenic drivers of marine ecosystem health. The Committee notes that each nation has a different approach and management structure for insuring marine environmental quality, which in turn, influences the direction and relative priority for research and science advice. In other words, each culture and society has a different view of what quality represents. It is important to make sure that the efforts of MEQ include, and are useful to, each PICES member country.

Ecological health issues can include:

- Disease, biological pollution, bacteria, HABs;
- Biodiversity, species introductions and unintentional introductions of exotic species;
- Sustainability of the ecosystem, future use of resources;
- Integrated coastal zone management, ecosystem-based management;
- Predictive models, ecological forecasting.

Given the above view of MEQ's mission, the Committee made the following revisions to the list of issues in the current MEQ Action Plan.

Issues that were deleted because the focus is too narrow or they are the purview of another PICES Scientific Committee are:

- Impacts of climate change on coastal ecosystems;
- Biogeochemical processes regulating contaminant dynamics in sediments;
- Harmonization of existing methods used in PICES countries;

Issues remaining unchanged, altered to broaden focus, or included *de novo* are as follows:

- Mariculture;
- Biological and physical transport of anthropogenic substances in the marine environment;
- Anthropogenic impacts on benthic habitat (formerly in the Plan as "trawling effects on benthic habitat");
- Identification and assessment of emerging chemical and biological pollutants (including exotic species), and their impacts on marine ecosystems;
- Definition of indicators or biological markers of marine ecosystem health, with relevance to human health and welfare;
- Needing further clarification is a topic addressing anthropogenic impacts on trophic

dynamics and biodiversity that impact system sustainability.

Strategy of the MEQ Committee

The PICES mission has five central themes:
A. Advancing scientific knowledge;
B. Applying scientific knowledge;
C. Fostering partnerships;
D. Ensuring a modern organization in support of PICES activities; and
E. Distributing PICES scientific information.

Specific goals are identified within each of these themes. The Actions of MEQ will seek to meet goals under each of the themes.

Theme A Advancing scientific knowledge

Goal 1 Understand the physical, chemical, and biological functioning of marine ecosystems

Action 1.1 Address the substantial need for improved data and information on the occurrence and mechanisms of harmful species in the North Pacific:
Task 1.1.1 Conduct a workshop on HAB species (*Dinophysis* and *Cochlodinium*) in 2006;
Task 1.1.2 Hold a scientific session on HAB research in the western Pacific (2006);
Task 1.1.3 Initiate discussion of the role of cnidarians and ctenophores in the marine environment.

Action 1.2 Develop a process for conducting holistic assessments of the impact of human activities, and identify a suite of indicators or variables that will facilitate the monitoring of ecosystem status:
Task 1.2.1 Produce an assessment of the spatial and temporal patterns of contaminants for inclusion in the NPESR;
Task 1.2.2 In conjunction with 1.2.1, initiate assessment of relationship between contaminant levels and their effects on marine ecosystems.

Goal 2 Understand and quantify the impacts of human activities and climate on marine ecosystems

Action 2.1 Evaluate and increase knowledge in PICES of the potential impacts of aquaculture on ecosystems of the North Pacific:
Task 2.1.1 Hold a scientific session on "*Aquaculture and the sustainable management of the marine environment*";
Task 2.1.2 Hold a workshop to train PICES scientists in methods to conduct risk assessments on aquaculture activities (note the ICES Code of Practice for Introductions and Transfer of Marine Organisms).

Action 2.2 Evaluate and increase knowledge on the potential impacts of intentional and accidental introductions of non-native species and their vectors of introductions, and collaborate with ICES on introductions and transfers of non-indigenous organisms, including genetically modified organisms:
Task 2.2.1 Propose a PICES WG on introduced species (2006);
Task 2.2.2 Participate in the International Marine Bioinvasions Conference (2007);
Task 2.2.3 Conduct a joint PICES/ICES workshop on introduced species (2007/8).

Action 2.3 Evaluate and increase under-standing of how human health issues are inextricably linked to ocean conditions, primarily in coastal areas:
Task 2.3.1 Conduct a workshop/session on "*Oceans and human health*" issues in the North Pacific.

Action 2.4 Develop the scientific basis for an ecosystem approach to management, including assessments and the provision of scientific advice:
Task 2.4.1 Identify and evaluate the use of indicators for assessing the

achievement of ecosystem-based management;

Task 2.4.2 Continue and expand the development of ecosystem models that facilitate the assessment of monitoring and scientific knowledge of ecosystem functions in a holistic manner;

Task 2.4.3 Hold a scientific session on approaches to designating eco-regions and areas that are ecologically and biologically significant (2006);

Task 2.4.4 Develop country reports on approaches to ecosystem-based management (2006);

Task 2.4.5 Hold a symposium on the science of ecosystem-based management.

Goal 3 Provide advice on methods and tools to guide scientific activities

Action 3.1 Examine and assess methods for measuring HAB species and toxins for use by scientists and agencies of PICES member countries:

Task 3.1.1 Conduct a workshop at PICES XIV to review methods *Pseudo-nitzschia* and *Alexandrium*;

Task 3.1.2 Work to develop capacity for Russian scientists to assess and monitor HAB species and toxin levels;

Task 3.1.3 Conduct a series of laboratory demonstrations of DSP detection.

Theme B Applying scientific knowledge

Goal 4 Provide scientific advice towards wise use of the North Pacific Ocean

Action 4.1 None

Theme C Fostering partnerships

Goal 5 Promote collaboration with organizations, scientific programs, and stakeholders that are relevant to the PICES goals

Action 5.1 Develop an approach for formal linkages with ICES/IOC/IMO WGBOSV (WG on *Ballast and Other Ship Vectors*) and/or the ICES WGITMO (WG on *Introductions and Transfers of Marine Organisms*) over the long term.

Goal 6 Promote collaboration among scientists within PICES

Action 6.1 Develop and maintain joint activities of PICES scientists with IOC in development of an international HAB database (HAE-DAT):

Task 6.1.1 Prepare event reports for 2001–03.

Action 6.2 Provide input to the implementation of activities of GEOHAB and IOC Intergovernmental Panel on Harmful Algal Blooms in the PICES area, such as the HAB database (see 6.1).

Theme D Ensuring a modern organization in support of PICES activities

Goal 7 Provide an effective infrastructure to support PICES programs

Action 7.1 None

Theme E Distributing PICES scientific information

Goal 8 Make the scientific products of PICES accessible

Action 8.1 Publish Working Group reports:

Task 8.1.1 Publish country reports on status of mariculture in PICES member countries in the PICES Scientific Report series;

Task 8.1.2 Publish inventories on non-indigenous organisms for PICES member countries in the PICES Scientific Report series;

Task 8.1.3 Publish a brochure on ecosystem based management.

MEQ Endnote 4

Terms of Reference for a Study Group on
Marine Aquaculture and Ranching in the PICES Region

1. Review and assess the reasons why PICES WG 18 had limited success in achieving their Terms of Reference;
2. Develop a list, by PICES member country, of the highest priority (but no more then 10)
3. Marine aquaculture and/or ocean ranching science needs;
4. Develop recommendations of goals and action items for the next 5–10 years that could be included in Action Plans of MEQ or FIS.

MEQ Endnote 5

Proposal for a 1-day MEQ Topic Session at PICES XVII on
"Human dimension sciences relevance for PICES"

[later renamed to "*Connecting the human and natural dimensions of marine ecosystems and marine management in the PICES context*"]

A complete definition of marine ecosystems includes the human components. Consideration of ecosystem-based management, at least within the natural sciences, usually leaves out the human dimensions, or includes it only as fishing effort. For ecosystem-based management to succeed, however, humans need to be included. This session builds on the Science Board Symposium of 2003 titled "*Human dimensions of ecosystem variability*". Human relationships and how humans interact with the ocean have been changing in nature and strength over time. Natural variability in marine systems can be large, but so are socio-economic pressures and considerations relating to marine environments. Determining appropriate socio-economic indicators to complement indicators of natural climate variability, *e.g.*, for ecosystem-based management, is an ongoing challenge. This session will address these interactions between natural and socio-economic issues in the context of ecosystem-based management. Specifically, it will consider: (1) What are the criteria to determine relevant socio-economic indicators of human well-being related to marine issues for PICES member countries? (2) What are appropriate indicators to monitor changes in management objectives and human well-being relevant to changing ecosystem structure and production? (3) How might decisions that are made to enhance human well-being likely to impact (positively or negatively) the nature and functions of marine ecosystems? This session theme will continue to explore the many ways that humans interact with marine ecosystems and the scientific efforts to quantify and predict human impacts on the dynamics of such systems.

Recommended convenors: David Fluharty (U.S.A.), Mitsutaku Makino (Japan), Ian Perry (Canada) and Chang-Ik Zhang (Korea)

Request: travel expenses for 2 invited speakers (1 from each of the eastern and western Pacific).