

REPORT OF MARINE ENVIRONMENTAL QUALITY COMMITTEE

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The meeting of the Marine Environmental Quality Committee (MEQ) was held from 16:00–19:30 hours on October 18, 2006. The Chairman, Dr. John E. Stein, called the meeting to order and welcomed the participants and observers (*MEQ Endnote 1*). The level of attendance was much greater than last year, which was an encouraging development for MEQ. The Committee reviewed the draft agenda (*MEQ Endnote 2*), and it was adopted. Dr. Glen Jamieson served as rapporteur.

Implementation of PICES XIV decisions (Agenda Item 3)

There were no pressing issues for the Committee pending from last year's meeting in Vladivostok (Russia). The Chairman did not summarize the report of the inter-sessional Science Board/Governing Council meeting (April 2006, Honolulu, U.S.A.) because the main topic of this meeting was the development of a new integrative science program of PICES, which will be discussed in detail later (Agenda Item 6).

Membership and chairmanship of MEQ (Agenda Item 4)

A new Japanese member, Dr. Kunio Kohata, was introduced to the Committee. The Chairman acknowledged Japan's appointment of Dr. Kohata to MEQ.

There continues to be an overall issue of having full participation in MEQ by all PICES member countries. At this meeting, only 7 of the 17 members of MEQ were in attendance. The Committee expressed again its concern that there was no official participation in MEQ from China this year; however, we did have several observers from China. The Committee also noted that there was, for a second year in a row, minimal participation by the United States.

This was the sixth year of Dr. Stein's chairmanship of MEQ, and the Committee must

elect a new Chairman. All efforts to identify a candidate from the western Pacific were not successful. With Dr. Alexander Bychkov (Executive Secretary of PICES) in attendance, the Committee unanimously elected Dr. Glen Jamieson of Canada as the new MEQ Chairman. The Committee thanked Dr. Stein for his leadership of MEQ over the past years.

Dr. Hak Gyoon Kim of Korea was elected as the MEQ Vice-Chairman. The Committee commended Dr. Kim for being willing to accept the nomination and election as Vice-Chairman, since he already co-chairs the HAB Section.

2006 MEQ Best Presentation and Poster Awards (Agenda Item 5)

The MEQ Best Presentation Award was given to Masami Hamaguchi for the paper (co-authored by Naoaki Tezuka) entitled "*Biological impacts caused by the release of the imported manila clam, *Ruditapes philippinarum*, in Japan*" presented at the FIS/MEQ Topic Session on "*Aquaculture and sustainable management of the marine ecosystem*" (S8).

The MEQ Best Poster Award was given to Minkyu Choi for the paper entitled "*Behavior and contamination of estrogenic nonylphenols in Masan Bay, Republic of Korea*" presented at the MEQ Poster Session.

Review of MEQ Action Plan (Agenda Item 6)

Because of the importance of having appropriate time for discussion on the new integrative science program of PICES (FUTURE), the Committee did not review the Action Plan (*MEQ Endnote 3*). Nonetheless, the Committee had spent a considerable time last year on the Action Plan, and thus concluded that it is reasonably complete and reflects the current objectives of MEQ.

New PICES integrative science program (Agenda Item 7)

The Committee had a good discussion of the next integrative science program of PICES and, overall, endorsed the direction as outlined in the current draft of FUTURE. Members also found that the direction of FUTURE is well aligned with the objectives of MEQ. The Committee suggested that:

- climate change, ocean acidification, biological invasions and species expansion are major threats to the marine ecosystem globally, and should be focus areas for FUTURE;
- there is a need to identify the most appropriate ecosystem indicators for forecasting, and that additional effort and focus is needed to determine how we communicate science to managers and the general public in the most effective way;
- attention should be given to the issue of cumulative effects from multiple stressors on ecosystem structure and function.

Progress reports of MEQ subsidiary bodies (Agenda Item 8)

Section on Ecology of harmful algal blooms in the North Pacific

Drs. Vera L. Trainer and Hak Gyoon Kim, HAB Section Co-Chairmen, reported on the results of their workshop on “Review of selected harmful algae in the PICES region: II. Dinophysis and Cochlodinium” and laboratory demonstration on *Heterosigma* cell toxin detection, MEQ Topic Session on “Harmful algal blooms in the PICES region: New trends and potential links with anthropogenic influences”, and the HAB Section (HAB-S) business meeting convened at PICES XV. Summaries of the workshop and session can be found in the *Session Summaries* chapter of this Annual Report.

For PICES XVI, the HAB Section recommends continuing an annual series of workshops to document the existing knowledge on the eco-physiology of harmful algal bloom species that impact all, or most, countries in the North Pacific. This time, discussion will center on

Heterosigma akashiwo and other harmful raphidophytes. Other activities proposed for the Annual Meeting are: a Topic Session focusing on off-shore and in-shore sources to harmful algal bloom development and persistence, and a business meeting with country reports for HAB events in 2005–2006 and discussion of HAE-DAT use (see also Agenda Item 10).

In addition, the MEQ Committee heard a presentation from Dr. Monica Lyon on the IOC/ICES/PICES HAE-DAT (Harmful Algae Event Database). Substantive progress has been made in expanding HAE-DAT to be a truly global database. PICES and HAB-S were commended for their concerted and consistent efforts to work with HAE-DAT to get PICES member countries’ data into the system, and to assist in developing and testing the new web-based data entry interface. All PICES member countries were requested to:

- re-check their country monitoring descriptions to ensure they are correct and as comprehensive as possible;
- participate in a month trial period for suggestions/improvements to HAE-DAT;
- input HAB event data to HAE-DAT for 2003 directly to the on-line database.

The full HAB-S report is included elsewhere in this Annual Report.

WG 18 on Mariculture in the 21st century

Dr. Michael Rust, standing in for both WG 18 Co-Chairmen, reviewed activities of the Working Group and the results of the MEQ/FIS Topic Session on “Aquaculture for sustainable management of marine environment and ecosystem” and their business meeting. The report was also given to FIS. The summary of the session and full WG 18 report are included elsewhere in this Annual Report.

The Committee was very concerned for the second year of very poor attendance at the WG 18 meeting, only 4 of the 14 members were present, and neither of the Co-Chairmen attended. MEQ proposes to close this Working Group as it is not anticipated that they will be able to meet their Terms of Reference.

Nonetheless, the issue of marine aquaculture is of great interest to all PICES member countries. This was clear from the quality of talks in the aquaculture session this year and the good attendance at the session. Because of these findings, the Committee suggests forming a Study Group on *Marine aquaculture and ranching in the PICES region* that would make recommendations on the course that PICES could take in the science of marine aquaculture. These recommendations could be considered by MEQ and FIS for inclusion in their Action Plans (see *MEQ Endnote 4* for the proposed Terms of Reference).

WG 19 on *Ecosystem-based management science and its application to the North Pacific*

Dr. Glen Jamieson, WG 19 Co-Chairman, reported on the activities of the Working Group and the results of their workshop on “*Criteria relevant to the determination of unit eco-regions for ecosystem-based management in the PICES area*”. The summary of the workshop and full WG 19 report are included elsewhere in this Annual Report. Dr. Jamieson noted that to date the Working Group has had no participation from China, so there is no data or input with respect to EBM initiatives occurring in this country. The Working Group proposed a 1-day FIS/MEQ workshop on “*Comparative analysis of frameworks to develop an ecosystem-based approach to management and research needed for implementation*” to be held at PICES XVI (WG 19 Endnote 3). Travel funds are requested for 1 invited speaker to attend the workshop.

WG 21 on *Non-indigenous aquatic species*

Ms. Darlene Smith, WG 21 Chairman, reported on the first meeting of the Working Group. In particular it was noted that a Co-Chairman from the western Pacific needs to be appointed. It was requested that Russia consider nominating Dr. Vasily Radashevsky as a member of WG 21, and that he, if appointed, be named as WG 21 Co-Chairman. For PICES XVI, the Working Group proposed a 1-day MEQ Topic Session on “*Non-indigenous species: Climate change, evolutionary consequences and*

ecological impacts” (WG 21 Endnote 3). Travel funds are requested for 2 invited speakers to attend the session. The Working Group also recommended a 2-day inter-sessional meeting with relevant ICES Working Groups on marine bioinvasions.

The full report of Working Group 21 can be found as a chapter in this Annual Report.

MEQ proposals for new subsidiary bodies (Agenda Item 9)

The Committee suggests that a Study Group on *Marine aquaculture and ranching in the PICES region* be created (MEQ Endnote 4). The Study Group should complete its report by April 2008, for consideration at the inter-sessional Science Board/Governing Council Meeting.

Proposals for Topic Sessions and Workshops at PICES XVI (Agenda Item 10)

The Committee proposes that the following Topic Sessions and workshops to be convened at PICES XVI:

- a 1-day MEQ/FIS Topic Session on “*Coldwater biogenic habitat in the North Pacific*” (MEQ Endnote 5);
- a 1-day MEQ Topic Session on “*Non-indigenous species: Climate change, evolutionary consequences and ecological impacts*” (WG 21 Endnote 3);
- a 1-day 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*” (HAB-S Endnote 4);
- a 1-day MEQ workshop on “*Review of selected harmful algae in the PICES region: III. Heterosigma akashiwo and other harmful raphidophyte*” preceded by a ½-day laboratory demonstration on *Heterosigma* cell and toxin detection (HAB-S Endnote 3);
- a 1-day MEQ workshop on “*Comparative analysis of frameworks to develop an ecosystem-based approach to management and research needed for implementation*” (WG 19 Endnote 3).

Relations with other international programs and organizations (Agenda Item 11)

ICES and PICES are still cooperating on planning for the Fifth International Marine Bioinvasions Conference to be held May 21–24, 2007, in Cambridge, U.S.A. To foster interactions with ICES on marine bioinvasions, the WG 21 Chairman, Ms. Darlene Smith, attended the 2006 annual meetings of the ICES/IOC/IMO Working Group on *Ballast Waters and Other Ship Vectors* and the ICES Working Group on *Introductions and Transfers of Marine Organisms* (March 2006, Oostende, Belgium). To continue these discussions, Dr. Judith Pederson (Chairman of WGITMO) and Dr. Anders Jelmert (Chairman of WGBOSV) attended the WG 21 meeting at PICES XV, and Ms. Smith is going to participate in the 2007 annual meetings of WGITMO and WGBOSV (March 2007, Dubrovnik, Croatia). A 2-day joint meeting of WG 21, WGITMO and WGBOSV is proposed in conjunction with the Marine Bioinvasions Conference. Topics for discussion include:

- ballast water sampling methods;
- NIS databases;
- taxonomic challenges;
- ICES Code of Practice for ship hull fouling;
- rapid response and control options.

Proposed inter-sessional meetings (Agenda Item 12)

MEQ supported a proposal to hold a 2-day joint meeting of WG 21 with ICES WGITMO and ICES/IOC/IMO WGBOSV, in fulfillment of one of its Terms of Reference. The meeting would be convened May 25–26, 2007, immediately following the Fifth International Marine Bioinvasions Conference. Travel funds from PICES are requested to permit 1 Chinese and 1 Russian member to attend the Conference and the joint meeting.

As pointed out in the WG 19 report, this Working Group has had no participation from China, meaning that there are no data or input with respect to EBM initiatives in this country. Suggestions are to: 1) have a preliminary meeting of WG 19 in China, in September 2007,

to facilitate and engage their participation, and to coordinate and compile all work to make sure they are prepared for PICES XVI, or 2) have a 2-day WG 19 meeting in Victoria in late October, in conjunction with PICES XVI for planning the final report, at which time Chinese participation will hopefully occur.

Proposed publications (Agenda Item 13)

The following publications were proposed for 2007–2008:

- 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*”;
- a paper in a primary journal on comparative EBM frameworks based on the results from the proposed PICES XVI workshop on “*Comparative analysis of frameworks to develop an ecosystem-based approach to management and research needed for implementation*”;
- final WG 19 report in the PICES Scientific Report series (2008);
- a WG 19 brochure on ecosystem-based management (2008) in a format similar to the FERRRS Advisory Report.

Travel requests (Agenda Item 14)

Travel support is requested for:

- 1 invited speaker for the MEQ/FIS Topic Session on “*Coldwater biogenic habitat in the North Pacific*” (MEQ Endnote 5);
- 1 invited speaker for 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*” (HAB-S Endnote 4);
- 2 invited speakers for the MEQ Topic Session on “*Non-indigenous species: Climate change, evolutionary consequences and ecological impacts*” (WG 21 Endnote 3);
- 2 invited speakers, 1 from the western Pacific and 1 from the eastern Pacific, for the MEQ workshop on “*Review of selected harmful algae in the PICES region: III.*”

Heterosigma akashiwo and other harmful raphidophyte” (HAB-S Endnote 3);

- 1 invited speaker for the MEQ workshop “Comparative analysis of frameworks to develop an ecosystem-based approach to management and research needed for implementation” (WG 19 Endnote 3);
- 1 Russian delegate to attend the HAB Section meeting at PICES XVI (or request Russia to find a substitute member that can travel to HAB-Section meetings);

- 1 Chinese and 1 Russian member of WG 21 to attend the Fifth International Conference on “Marine bioinvasions” and a joint meeting of WG 21 with ICES WGITMO and ICES/IOC/IMO WGBOSV.

Theme for PICES XVII (Agenda Item 15)

Due to a lack of time this agenda item was not discussed.

MEQ Endnote 1

Participation list

Members

Glen Jamieson (Canada)
Hak-Gyoon Kim (Korea)
Kunio Kohata (Japan)
Olga Lukyanova (Russia)
Darlene Smith (Canada)
John E. Stein (U.S.A., Chairman)
Dong Beom Yang (Korea)

Chuanlin Huo (China)
Ichiro Imai (Japan)
Yoichiro Ishibashi (Japan)
Chang-Gu Kang (Korea)
Takuya Kawanishi (Japan)
Serge Labonte (Canada)
Chang Kyu Lee (Korea)
Sam Geon Lee (Korea)
Monica Lion (IOC)
Bruce Mundy (U.S.A.)
Jeung Sook Park (NOWPAP)
Vasiliy Radashevsky (Russia)
Michael Rust (U.S.A.)
Vera L. Trainer (U.S.A.)
Jinhui Wang (China)
Lijun Wang (China)
Yasunori Watanabe (Japan)

Observers

Alexander Bychkov (PICES)
Andrey Chernyaev (Russia)
Blake Feist (U.S.A.)
Galina Gavrilova (Russia)
Graham Gillespie (Canada)

MEQ Endnote 2

MEQ meeting agenda

1. Welcome and introductions
2. Adoption of agenda
3. Implementation of PICES XIV decisions
4. Membership and chairmanship of MEQ
5. 2006 MEQ Best Presentation and Poster Awards
6. Review of MEQ Action Plan
7. New PICES integrative science program
8. Progress reports of MEQ subsidiary bodies:
 - a. Section on *Ecology of harmful algal blooms in the North Pacific*
 - b. WG 18 (MEQ/FIS) on *Mariculture in the 21st century*
 - c. WG 19 (MEQ/FIS) on *Ecosystem-based*

- d. *management science and its application to the North Pacific*
- d. WG 21 (MEQ) on *Non-indigenous aquatic species*
9. Proposals for new subsidiary bodies
10. Proposals for Topic Sessions and workshops at PICES XVI
11. Relations with other international programs and organizations
12. Proposed inter-sessional meetings
13. Proposed publications
14. Travel support requests
15. Theme for PICES XVII (Dalian, China)
16. Other business

MEQ Endnote 3

MEQ Action Plan (October 2006 – First Draft)

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;

- Scientific criteria for protection of marine ecosystems from contaminants.

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 understanding 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.

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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 2001–2003.

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

Proposed 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 than 10)

- marine aquaculture and/or ocean ranching science needs;
3. 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/FIS Topic Session at PICES XVI on
“Coldwater biogenic habitat in the North Pacific”**

Some of the fauna that are most vulnerable to physical disturbances are the long-lived, slow growing and physically fragile species (corals and sponges) that provide biogenic habitat in deep water. It is increasingly recognized worldwide that deepwater biogenic habitat has not been conserved in the past, with the result that the conservation of such habitat has become a high priority in many jurisdictions. At least in the eastern Pacific, large areas have been established to exclude bottom trawling to protect deep-water corals and sponges. Considerable effort is being expended to identify and determine their distributions and to assess their

ecological role as fishery habitat. This session welcomes presentations that describe: 1) distributions of deepwater biogenic habitat in the PICES regions; 2) threats to biogenic habitat species in the area; 3) the ecological role of biogenic structures as habitat for commercial and other species; and 4) the management measures applied or developed to conserve these species and the habitat they provide.

Recommended convenors: Glen Jamieson (Canada), J. Anthony Koslow (U.S.A.) and Chang-Ik Zhang (Korea).

