REPORT OF MARINE ENVIRONMENTAL QUALITY COMMITTEE

The meeting of the Marine Environmental Quality Committee (MEQ) was held from 13:30-17:30 hours on October 23, 2002. The Chairman, Dr. John E. Stein, called the meeting to order and welcomed the participants (*MEQ Endnote 1*). The Committee reviewed the draft agenda and it was adopted after revision (*MEQ Endnote 2*).

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

The special issue of *Marine Environmental Research* will contain seven technical papers based on the results of the 1999 MEQ Practical Workshop. All papers have been reviewed, and all of the authors have returned revised manuscripts to Dr. Richard F. Addison, who is serving as the Guest Editor for this volume. A set of papers, together with an introductory paper, will be submitted to the journal in the next three months.

New members of MEQ (Agenda Item 4)

Dr. Stein welcomed two new members to MEQ: Dr. Glen Jamison, Fisheries and Oceans Canada, replaces Dr. Richard F. Addison and Dr. Julia K. Parrish, University of Washington, fills a vacancy in the U.S.A. membership on MEQ.

The Committee expressed its concern that there was no participation in MEQ from China this year, nor has there been for the last few years. Russia was also not represented at PICES XI, but there are current representatives who participate in PICES, and except for extenuating circumstances there would have been participation this year. There is an overall issue of recruiting full participation in MEQ by all member countries.

There was a secondary issue of a competing meeting on harmful algal blooms concurrently taking place in St. Petersburg, Florida, U.S.A.; however, arrangements were made for WG 15 members to meet in Florida and timely transmit results of their deliberations to Qingdao.

The Committee resolved to request all member nations to confirm the participation of its MEQ committee members.

Review of MEQ Strategic Plan (Agenda Item 5)

The Science Board requested consideration of the following question: "*What are the problems in the North Pacific in the next 5-10 years, and how can PICES position itself to understand and be prepared to offer advice on these problems*". The following is a summary of the Committee's discussion of this question. Changes are proposed to the MEQ Strategic Plan and these proposed revisions will be considered further inter-sessionally.

MEQ has had a contaminant/chemical focus in the past. However, there are other issues within the realm of marine environmental quality and ecosystem health that could be considered by the Committee.

MEQ is best positioned to examine human development issues in the coastal zone. It is recognized that many of the human impacts are at the coastal scale and not basin scale. The degree of emphasis on regional vs. basin scale needs further discussion within PICES.

The Committee discussed the definition for "marine environmental quality", as a means to explore a broader view of the MEQ mandate. It was generally recognized that MEQ has not been well integrated with the other Scientific Committees, and careful analysis of the MEQ Strategic Plan may allow for identification of how to improve this situation.

Physical/chemical quality as related to toxic contaminants has been the focal point. It was accepted that the Committee's focus should be expanded to: structure, process, and function of the marine system that sustains both ecosystem and human health or well being. 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 vitality and viability.

There are no current international guidelines and standards for ecosystem health, whereas, there are national guidelines and standards for human health. Japan has begun the process of examining environmental health - designing standards and guidelines. Furthermore, each nation has a different situation, each culture and society has a different view of what quality represents. It is important to make sure that the efforts of MEQ, and of PICES, include and are useful to each member country.

Ecological health issues might include:

- Disease, biological pollution, bacteria, HABs;
- Biodiversity and productivity, species introductions, such as ballast water;
- Sustainability of the ecosystem; future use of resources;
- Integrated coastal zone management, ecosystem-based management;
- Predictive models, ecological forecasting;
- Assessment and monitoring – with a clear framework for why the data is being collected and how it will be used to assess the threats to ecosystems of the North Pacific and in particular coastal ecosystems.

Given the above expansion of the Committee's mission, the Committee made the following revisions to the list of issues in the current MEQ Strategic Plan:

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

- 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 (formerly in the Plan as "identification of emerging chemicals");
- Defining indicators or biological markers of marine ecosystem health, with relevance to human health and welfare or perhaps use the human condition in place of human health and welfare;
- Needing further clarification is a topic addressing: anthropogenic impacts on trophic dynamics and biodiversity that impact system sustainability.

Additional review and revision of the Strategic Plan will occur inter-sessionally.

Summaries of MEQ scientific sessions at PICES XI (Agenda Item 6)

Summaries of the scientific sessions held at PICES XI are presented elsewhere in this Annual Report.

Progress report of WG 15 on *Ecology of harmful algal blooms in the North Pacific* (Agenda Item 7)

Because of a conflict with the Tenth International Conference on Harmful Algal Blooms, a portion of WG 15 met in Qingdao, People's Republic of China, on October 18, 2002, while the remainder of the Working Group met in St. Petersburg, Florida, U.S.A., on

October 21, 2002. The report of WG 15 (*MEQ Endnote 3*) is a combined report of these two meetings.

Proposal for a new Working Group (Agenda Item 8)

MEQ does not propose any new Working Groups for the coming year. However, the Committee agreed to propose a Working Group on *Ecosystem-based management* at PICES XII. A draft description and Terms of Reference are provided in *MEQ Endnote 4*. The Committee agreed to first hold a scientific session on "Ecosystem-based management" and re-examine a Working Group. The Committee also is considering proposing a joint Working Group between MEQ and FIS on this topic.

The Committee agreed that WG 15 should be extended for a fourth year. In addition, because the broad regional interest in HABs will likely continue into the foreseeable future, MEQ requests WG 15 to develop a proposal on whether PICES should form a "Section" (under MEQ) on the ecology and oceanography of HABs. WG 15 is also requested to draft terms of reference for this "Section".

Proposed Topic Sessions for PICES XII (Agenda Item 9)

The Committee proposes two sessions for PICES XII:

1. *Ecosystem-based management* (jointly with FIS); recommended MEQ Convenor: Glen Jamieson (Canada). If Science Board does not approve this session, MEQ is prepared to use the MEQ Paper Session as the forum for this topic. The latter would be the Committee's choice for a ½-day session, if the *Ecosystem-based management* Topic Session is not approved as a full-day session.

2. *Aquaculture within the ocean ecosystem: Concepts for the future*. The Committee proposes a full-day session. The tentative conveners are: Ik Kyo Chung (Korea), Julia K. Parrish and John E. Stein (U.S.A.). At the end of the meeting, BIO representative, Dr. Patricia Wheeler, extended an offer from BIO to jointly sponsor this session. MEQ agreed with this suggestion.

The Committee also noted that at PICES XIII a possible timely topic would be "Oil and gas development". This Topic Session will be considered inter-sessionally.

Theme for PICES XIII (Agenda Item 10)

The Committee proposes the following theme: *Tropical-temperate linkages*. In view of the location (Honolulu) of the meeting, Committee members felt that there should be serious effort to consider issues related to the tropical system.

PICES Review Committee Report (Agenda Item 11)

MEQ concluded that the Review Committee Report is evolutionary rather than revolutionary, and that there was merit to many of the proposals. However, most members had not had sufficient time to review the report in detail. Nonetheless, the Committee endorsed serious consideration of the proposal for "Sections" within the Scientific Committee structure. For MEQ, as noted above, a Section on the issue of HABs has merit.

North Pacific Ecosystem Status Report (Agenda Item 12)

MEQ continues its support for the Ecosystem Status Report and resolved to do the following to synthesize information on the MEQ relevant topics and issues:

- Produce a list of MEQ issues relevant to ecosystem status;
- Solicit rank-ordered response (1 = not an issue to 5 = serious issue) from MEQ members in each region;
- Identify knowledge gaps;
- Include final matrix in Status Report.

The Chairman will solicit additional assistance in writing MEQ-relevant sections for the regional reports.

TCODE Strategic Plan (Agenda Item 13)

The Committee had little time available to discuss the Strategic Plan, except to note that WG 15 had engaged on exchanging and collating data on the occurrence of HAB events in the North Pacific. It was evident from this attempt that continued efforts to facilitate the exchange and easy access to data for the PICES region is warranted.

Best Presentation Award

Dr. C. Michael Watson agreed to assess the presentations and recommended that the MEQ Best Presentation Award be given to Sheng Liu (People's Republic of China) for presentation of the paper entitled "Feeding and reproductive responses of marine copepods in South China Sea to toxic and nontoxic phytoplankton", co-authored by W.-X. Wang.

PICES capacity building initiatives (Agenda Item 14)

The Committee was not able to discuss this agenda item, however, agrees that it is an important topic for PICES to address.

MEQ Endnote 1

Participation List

Members

Glen Jamieson (Canada)
Hideaki Nakata (Japan)
Julia K. Parrish (U.S.A.)
Steve C. Samis (Canada)
John E. Stein (U.S.A., Chairman)
C. Michael Watson (U.S.A.)
Dong Beom Yang (Korea)

Observers

Ik Kyo Chung (Korea)
Ludmila S. Dolmatova (Russia)
Yonghwa Lee (Korea)
Sook Yang Kim (Korea)

MEQ Endnote 2

MEQ Meeting Agenda

1. Welcome
2. Approval of agenda
3. Business from last year's meeting: Status of Practical Workshop special issue (*Marine Environmental Research)*
4. Membership changes
5. Review of Strategic Plan. Discuss "Vision", for MEQ and for PICES, for the next 5 years
6. Summaries of scientific sessions supported by MEQ:
   a. Food Web Dynamics in Marginal Seas: Natural Processes and the influence of human impacts (S2, BIO/MEQ)
   b. Eutrophication, Harmful Algal Blooms and Nutrients (S7, MEQ)
   c. MEQ Paper Session
7. Progress report from WG 15
8. Proposals for new Working Groups
9. Topic session proposals for PICES XII
10. Suggestions for the theme of PICES XIII
11. PICES Review Committee report
12. Ecosystem Status report - general form and content of first draft report; further items to include; sources for regional summaries and/or data; etc.
13. Discussion of the draft Strategic Plan for TCODE, and how MEQ might interact with TCODE on data issues
14. PICES capacity building initiatives
15. Preparation of report to Science Board (recommendations, funding requests, topic sessions for PICES XII)

MEQ Endnote 3

Report of Working Group 15 on *Ecology of Harmful Algal Blooms (HABs) in the North Pacific*

Preamble

This year, the WG 15 meeting was held in two parts. The first was held October 18, 2002, in conjunction with PICES XI (Qingdao, People's Republic of China), and immediately followed the MEQ Topic Session on "Eutrophication, harmful algal blooms and nutrients" (S7). This was for members who could not attend the Tenth International Conference on Harmful Algal Blooms, in St. Petersburg, Florida, U.S.A., that overlapped PICES XI and at which the majority of the WG 15 members were present. The results and recommendations of the preliminary meeting in Qingdao were forwarded to Florida, in time for inclusion in the discussion at the WG 15 meeting in Florida on October 21, 2002. This report combines the results and recommendations of both meetings. The summary of the S7 MEQ Topic Session, which was a recommendation of WG 15 in 2001-2002, is included elsewhere in this Annual Report.

At the Qingdao meeting, chaired by Dr. Paul J. Harrison, three WG 15 members and four observers were present. At the Florida meeting, chaired by the WG 15 Co-Chairmen, Dr. Max Taylor and Dr. Tatiana Orlova, there were nine WG-15 members, including Prof. Ming-Jiang Zhou who attended both meetings, and twelve observers.

Accomplishments in 2001 – 2002

1. Accomplishments include a PICES Scientific Report (No. 23) edited by Drs. Max Taylor and Vera Trainer, titled "Harmful algal blooms in the PICES region of the North Pacific" (152 pages), with complete and uniform country reports from China, Japan, Korea, Russia, western U.S.A. and western Canada. Mexico was also invited to contribute their report to this publication. The report contains an introduction/background, country reports (types of HAB events, seasonality, earliest dates recorded, highest toxin levels, general environmental information, comprehensive literature, causative organisms, bloom reports including maps, unanswered questions, and hopes for future work), summary, and appendices (including images, scanning electron micrographs, and maps). This publication appeared in print in October 2002, shortly before the WG meetings began. Items arising from this report were discussed later at the meeting.

2. In accordance with our recommendations of last year, two international collaborations were initiated:

- A project between the United States and Canada, in the Juan de Fuca eddy region, was begun with the invitation of NOAA National Marine Fisheries Service (Northwest Fisheries Science Center, Seattle) to University of British Columbia scientists. This resulted in joint cruises, exchange of research methods, and laboratory visitations. The Juan de Fuca eddy crosses the border to U.S.A. and Canada, which provides a unique opportunity for international collaboration.
- A Russian scientist was invited to work in the Woods Hole, U.S.A., laboratory of Dr. Donald Anderson to learn new methods and establish baseline data for eastern Russia's harmful algal blooms. This included the analysis of sediment samples from the Bering Sea.

3. In addition, the database that was established as part of the WG-15 recommendation now combines shellfish toxicity data from the west coast of North America, including both the United States and Canada. The uses of these data are included in the report and were discussed at the meeting. Portions of the data are available online as a HAB Data Management System (HAB-DMS), which is now accessible through the National Oceanographic Data Center (NODC, U.S.A,) at http://www.nodc.noaa.gov/cgi-bin/hab/hab.pl.
A Pacific Region website has been created and can be found at http://www.nodc.noaa.gov/col/projects/habs/pacindex.html. The FGDC record for the Washington State Department of Health PSP and Domoic Acid 1998-2000 (NODC

#0000559) has been completed. The online linkage can be found at http://www.doh.wa.gov/ehp/sf/.

In collaboration with Michelle Tomlinson, the NWFSC has developed a web-based form to facilitate the acquisition of information regarding Harmful Algal Bloom reports in Pacific Rim countries. These will be linked to the HAB database as another source of HAB data and information. A statement of work is being written to describe additional enhancements to the system, as well as requirements for linking these HAB reports, as well as other sources of coastal data sets which reside within NODC, to the system. Nick Adams from NOAA Northwest Fisheries Science Center, who was instrumental in digitizing harmful algal bloom data, gave a brief overview of the results.

Country reports

The next item was the presentation of brief annual HAB event summaries by each PICES country. HABs occurred in all member countries, including both human health risks (for example, nine PSP illnesses in Alaska in 2002 and domoic acid poisoning) and marine faunal mortalities (fish and shellfish). There were 100 red tide cases in Japan, and 77 occurrences in China (1 billion Chinese yuan lost). The most numerous HAB occurrences in China were in the East China Sea. In Korea, HAB-related fish kills resulted in a 3.4 million dollar loss. In the latter case, clay was used successfully as a mitigating agent. Cultures from cysts isolated from Russian coastal sediments all proved to be toxic. In British Columbia, shellfish poisoning occurrence was high, and an unprecedented fish kill due to *Chattonella* was reported. In the United States, there were widespread shellfish closures due to PSP toxins, but domoic acid caused widespread closures of coastlines to shellfishing in Washington, Oregon, and California. Nine people suffered from PSP symptoms from eating mussels in Alaska. An unusual *Heterosigma* bloom was observed in San Francisco Bay. Mexico updated the information provided in the published PICES Scientific Report No. 23.

Interactions with other Organizations

Strong interest has been expressed in greater interaction between the HAB WG of ICES and PICES. This was a specific line item recommendation in the most recent ICES report. WG 15 strongly endorses this. Typically, the ICES HAB WG meets for one week separately from the main ICES Annual Meeting and often convenes a workshop addressing a specific topic. Dr. Yasuwo Fukuyo also summarized the activities of IOC WESTPAC which, at present, consists mostly of training in the PICES and other areas. Dr. Patricia Glibert (at Qingdao meeting) reported on international GEOHAB studies. PICES Scientific Report No. 23 should assist GEOHAB in establishing a global assessment of HAB events.

General discussion

Matters arising from the published report were discussed. They included a serious concern about the methods used by the member countries for reporting HABs, which make comparisons between countries sometimes difficult. Also, the benefits of international collaboration were emphasized.

Future directions for activities by the Working Group were discussed with a possible change of focus and membership. The following recommendations were made:

Recommendations

1. Continue WG 15 activities for another year (with the current Co-Chairmen), during which time countries are requested to submit ideas for future areas of focus and suggestions for changes in membership. The extension was endorsed by both the Qingdao and the Florida meetings.
2. Convene a workshop (2-3 days) on *Harmonization of HAB data* immediately prior to PICES XII. Specific items of discussion should include:
    a. which data from current monitoring programs and other programs could be included in a digitized HAB database;

b. whether there should be access restrictions to the database;
c. what assistance each country could contribute to database generation and data digitization.

3. Strengthen ties between the PICES and ICES HAB Working Groups (in accordance with recommendations by both groups) by attendance of representatives at one another's WG meetings.

Requests for funding

Travel support for 3-4 scientists to attend a workshop (2 days) on *Harmonization of HAB Data* to be held prior to PICES XII in addition to interested WG members.

MEQ Endnote 4

Proposal for a joint MEQ-FIS Working Group on
Ecosystem-based management science in the North Pacific

Under the overarching objective of conservation of species and habitat, ecosystem-based management (EBM) is the implementation of defined objectives related to maintaining and monitoring biodiversity, productivity and physical and chemical properties of an ecosystem. EBM is now timely and necessary because (i) in many environments, individual ecosystem components are presently being utilized, harvested or impacted with limited attention to the maintenance of the integrity of the overall ecosystem, and (ii) the scale of these impacts is now such that there is a real danger of overall negative ecosystem change to the detriment of human society. This Working Group will develop a synthesis of how PICES countries are currently addressing the issue of EBM, and provide recommendations on how PICES could improve the state of the science that provides the framework for EBM initiatives in PICES countries. Such study is consistent with the actions being currently undertaken by other national and international agencies.

The term marine environmental quality generally refers to an assessment of the state of the marine environment, including conditions resulting from human activities. Both biotic and abiotic environmental impacts thus need to be considered in the context of natural variation in the ecosystem, and where appropriate, management objectives need to be proposed that address defined biological, social and economic EBM objectives. To date within PICES, the Marine Environmental Quality Committee (MEQ) has largely focused on contaminant issues. This proposal would address MEQ's existing mandate more completely, namely to promote and co-ordinate marine environmental quality and interdisciplinary research in the North Pacific. However, since fishing activities are one of the major impacts on marine ecosystems, co-sponsorship of this Working Group by the Fisheries Science Committee (FIS) would be appropriate and desirable.

In 2001, a Working Group was proposed by FIS, titled "Ecosystem considerations in fisheries management" (but not established). This Working Group was to incorporate new information on decadal scale shifts in ocean condition, and re-examine interpretations of fishing effects in light of this information. Developing an understanding of both natural variability and the changes arising from fishing on ecosystem characteristics would be part of the proposed Working Group's task, but the task would be broader. The Working Group would focus on how such variability and impacts could be monitored, and would also consider impacts arising from activities other than fishing. Consideration of how biological community organization is being, and can be, effectively and relevantly measured and monitored is a necessary prerequisite to the meaningful assessment of how organization of a community might be altered by any human activity.

The proposed deliverables are:

1. A summary of initiatives to address EBM that PICES member countries have

underway, including their identified conceptual objectives; what process is being investigated to convert these over-arching goals into operational management objectives; what pilot areas, if any, are such studies being undertaken in; and the progress that has been achieved in these initiatives to date.

2. Consideration of the EBM initiatives being undertaken by PICES member countries in the context of both their research programs, and the initiatives being undertaken elsewhere in the world, and in particular in the North Atlantic and around Australia and the Antarctic.

3. Provision of recommendations on the needed science to enable EBM initiatives to be more fully engaged by PICES member countries. The recommendations might address, for example, the scientific merits of potential sites for pilot studies; opportunities on how adjacent countries might explore common initiatives in trans-boundary areas; and the organization of topic sessions or workshops to broaden discussion around this complex topic.