

REPORT OF THE MARINE ENVIRONMENTAL QUALITY COMMITTEE

The business meeting of the Marine Environmental Quality Committee (MEQ) was held on October 27, 2010 in Portland, Oregon, U.S.A. (14:00 to 18:00 hrs). Chairman, Dr. Steven Rumrill, called the meeting to order and offered a welcome to all participants. MEQ members and observers were asked to introduce themselves and to provide a brief statement about their interests and expertise. The meeting was attended by 10 members and 13 observers (*MEQ Endnote 1*). No MEQ members or observers from China were present. Mr. Graham Gillespie served as the meeting recorder.

AGENDA ITEM 2

Meeting agenda, and review and scope of MEQ activities

The meeting agenda (*MEQ Endnote 2*) was reviewed and the sequence of issues was modified to accommodate departing flights by MEQ members. Dr. Rumrill reviewed the scope of MEQ activities described by the current MEQ Action Plan (2006) to include contaminants in the marine environment, harmful algal blooms, environmental aspects of mariculture, and non-indigenous species. Additional activities such as ecosystem-based management and human dimensions of ecosystem-based fishery management were also included in the scope of MEQ but are not encompassed by the current MEQ Action Plan. The MEQ Action Plan (2006) is out-dated and should be revised.

AGENDA ITEM 3

Implementation of PICES-2009 decisions

MEQ sponsored or co-sponsored the following topic sessions at PICES-2010 in Portland:

- ¾-day Science Board Symposium (S1) on *North Pacific ecosystems today, and challenges in understanding and forecasting change* (October 25)
- 1-day FIS/MEQ Topic Session (S7) on *Economic relation between marine aquaculture and wild capture fisheries* (October 26)
- ½-day MEQ Topic Session (S9) on *Conceptual and numerical models of harmful algal bloom dynamics* (October 27)
- ½-day MEQ/FIS Topic Session (S11) on *Identifying vulnerable marine ecosystems in the North Pacific* (October 29)
- 1-day MEQ/FUTURE Topic Session (S12) on *Anthropogenic forcing in North Pacific coastal ecosystems: Understanding changes in ecosystem structure and function* (October 26)
- ½-day POC/MEQ/FUTURE Topic Session (S14) on *Marine renewable energy development in coastal and estuarine environments around the North Pacific* (October 27)
- 1 day MEQ Workshop (W3) on *New technologies and methods in harmful algal bloom detection. I. HAB species detection* (October 23)

AGENDA ITEM 4

Status reports from MEQ expert groups

Section on Harmful Algal Blooms in the North Pacific (HAB-S)

Dr. Vera Trainer, HAB-S Co-Chair, provided a summary of the activities of the Section, including a summary of past HAB-S activities. HAB-S was formed in 2003 and has conducted a series of annual reviews and workshops that focus on different HAB species. The current focus now places an emphasis on harmonization of datasets, anthropogenic forcing of HAB events, the linked physical-biotic transport of HAB species by onshore and offshore processes, and mitigation for HAB events. HAB-S sponsored a Topic Session (S9) and

workshop (W3) at PICES-2010. Summaries of both can be found in the Session Summaries of the Annual Report. Progress has been made to provide web-based access to the Harmful Algal Event Database (HAE-DAT). The HAB program within the Intergovernmental Oceanographic Commission (IOC) was discussed, and the potential for further HAB-S cooperation with IOC groups and activities was identified. With financial support from the Japanese Ministry of Agriculture, Forestry and Fisheries (MAFF) to set up a program to enhance seafood safety in developing countries, HAB-S held two HAB detection training courses in the Philippines in 2009 and Guatemala in 2010. HAB-S requests assistance from PICES to identify a proper focal point within China for full participation in HAB-S activities.

Working Group on *Aquatic Non-Indigenous Species (WG 21)*

Ms. Darlene Smith, Co-Chair of WG 21, presented a summary of Working Group activities over the past year. The highlights of these accomplishments include a demonstration workshop on the Rapid Assessment Survey methodology held at the Kobe University (Japan; July 13–15, 2010) where the goal was to provide training to Southeast Asian countries on NIS survey techniques that are quick and inexpensive. The demonstration workshop was co-hosted by Professor Hiroshi Kawai (Kobe University), Dr. Hisashi Yokoyama (Fisheries Research Agency, Japan), and Dr. Thomas Therriault (Fisheries and Oceans Canada) and was attended by participants from Malaysia, the Philippines, Indonesia, Singapore, Thailand and Vietnam.

WG 21 also held a Rapid Assessment Survey in Newport (Oregon, U.S.A.; October 18–20, 2010) immediately before the PICES-2010 in Portland. The RAS was hosted by Dr. John Chapman (Oregon State University, Hatfield Marine Science Center), and attended by participants from Japan, Russia, Canada and the U.S.A. Progress was also made on the WG 21 NIS Database Project, and new database features include the mapping of indigenous and non-indigenous species at a global scale using the MEOW ecoregions, and the ability to generate custom NIS atlases.

Working Group on *Environmental Interactions of Marine Aquaculture (WG 24)*

Ms. Ingrid Burgetz, Co-Chair of WG 24, summarized WG 24 activities over the past year. Progress was made toward TOR-1 (Modeling and Assessing Interactions of Marine Aquaculture) by conducting a review of long and short term, near and far-field effects of aquaculture on benthic communities, including chemical and physical changes, and rate of ecosystem recovery. Each member country was asked to review research related to their primary culture approaches (finfish, shellfish and algae culture), and the first drafts of the review are due April 1, 2011. Discussions were held regarding TOR-2 (Risk Assessment Methodologies) and to develop an overview of risk assessment approaches and relative legislative frameworks required for sustainable marine aquaculture. The members of WG 24 decided that once this report is finalized WG-24 will not pursue additional activities under this TOR due to the need to concentrate efforts on TOR-1 and TOR-3 activities (only 1 year remains for WG 24, and WG-24 expertise lies in the TOR-1 and TOR-3 areas). The deadline for submitting country updates for the TOR-2 report is November 30, 2010. Progress has also been made to address TOR-3 (Aquatic Animal Disease of Aquaculture Concern), and the report will identify diseases of concern, regulations/rules, national/regional diagnostic and control programs, detection methods, past and ongoing research activities, and issues around perceived or realized risks associated with transfer of diseases between wild and farmed fish. The deadline for first drafts of the TOR-3 reports is April 1, 2011.

Study Group on *Human Dimensions (SG-HD)*

Dr. Mitsutaku Makino, Chairman of SG-HD, presented an overview of the activities completed by the Study Group. It is widely recognized that human dimensions are an important component of PICES activities, and they are relevant to the PICES FUTURE (particularly SOFE, other groups). The first draft of the HD-SG report and recommendations will be completed by January 2011. The draft report will be circulated to the PICES members for comments in February or March 2011, and the revised version will be submitted at the PICES inter-sessional Science Board meeting in April 2011. Additional edits will be completed during the summer of 2011 and the final report will be presented during PICES-2011 in Khabarovsk, Russia. A proposal has been submitted to the Japanese Trust Fund/MAFF to support a new PICES Working Group on Human Dimensions over the period of 2012–2016.

AGENDA ITEM 5

Relations with other programs and organizations

Dr. Peter Kershaw presented a report on the objectives and activities of the Group of Experts on Scientific Aspects of Marine Pollution (GESAMP) and potential areas of collaboration with PICES (see *MEQ Endnote 5*).

AGENDA ITEM 6

Renewed MEQ focus on contaminants in the North Pacific marine environment

Several members of MEQ expressed interest in establishing an expert group to investigate the collaborative assessment and reporting of contaminants in the marine environment of the North Pacific. They pointed to the popularity of the MEQ/FUTURE Topic Session (S12) on “*Anthropogenic forcing in North Pacific coastal ecosystems: Understanding changes in ecosystem structure and function*” and the large number of presentations that highlighted contaminants as an example of the need for a new group. It is important to note that investigation of the role of contaminants in the marine environment is specifically identified by the MEQ Action Plan as a focus area. As a first step, MEQ agreed to promote the idea of a workshop on the topic at PICES-2011 (see *MEQ Endnote 5*).

AGENDA ITEM 7

Report from FUTURE: Proposed Working Group

AICE-AP Chairman, Dr. Thomas Therriault, briefly discussed the outcome of an inter-sessional FUTURE workshop held August 16–18 in Seoul, Korea. MEQ recommended the establishment of a new BIO/MEQ Working Group on *Marine Ecosystem Responses to Multiple Stressors* (*MEQ Endnote 3*)

AGENDA ITEM 9

Review and revision of MEQ Action Plan

MEQ agreed to review and revise the Action Plan once the PICES Strategic Plan has been revised.

AGENDA ITEM 10

MEQ Best Oral Presentation award for PICES-2010

The MEQ Best Presentation Award Committee (Changkyu Lee, Olga Lukyanova, Darlene Smith, Steve Rumrill) was identified and provided with scoring sheets and standardized criteria for judging the eligible presentations and posters. The MEQ Best Oral Presentation for 2010 was awarded to Jenny Lane (USA): S9-6484 – *The development of toxigenic Pseudo-nitzschia bloom models in Monterey Bay, California, and their application at a single monitoring site within the model domain.*

AGENDA ITEM 11

Suggested theme for PICES-2012

MEQ members voiced their continued support for the PICES tradition of referring to the host country for identification and establishment of the theme for the PICES Annual Meeting. The Committee suggested that a possible theme for PICES-2012 might be “*Critical gaps in understanding the resiliency of North Pacific Marine ecosystems to anthropogenic stressors and climate change.*”

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Items with financial implications for 2011

The MEQ Committee received and endorsed proposals for 2 workshops and 3 topic sessions for PICES-2011 in Khabarovsk, Russia.

Topic Sessions

- ½-day MEQ Topic Session on “*Harmful algal blooms in a changing world*” (*HAB-S Endnote 4*)
- 1-day MEQ/FIS Topic Session on “*Identification and characterization of environmental interactions of marine aquaculture in the North Pacific*” (*WG 24 Endnote 5*)
- 1-day MEQ/FUTURE Topic Session on “*Land-sea interactions and anthropogenic impacts on biological productivity of North Pacific Ocean coastal ecosystems*” (*MEQ Endnote 4*)

Workshops

- 1-day MEQ HAB-S Workshop on “*Incorporation of satellite remote-sensing into monitoring of HABs*” [later renamed as “*Remote sensing techniques for HAB detection and monitoring*”] (*HAB-S Endnote 5*)
- 1-day MEQ Workshop on “*Trends in marine contaminants and their effects in a changing ocean: Refining indicator approaches in support of coastal management*” [later renamed as “*Pollutants in a changing ocean: Refining indicator approaches in support of coastal management*”] (*MEQ Endnote 5*)

MEQ members provided the following ranks on proposed joint theme sessions with ICES at the ICES Annual Science Conference in 2011:

1. Assessment and management of Large Marine Ecosystems,
2. Harmful algal blooms in the Baltic Sea,
3. Ecological response of phytoplankton and microbes to global change processes in ocean basins, shelf seas, and coastal zones,
4. Extracting energy from waves and tides,
5. Integration of multi-disciplinary knowledge in the Baltic Sea to support science-based management,
6. The interface between management and science.

Other items

Section on Harmful Algal Blooms in the North Pacific

- PICES to support a HAB-S member to attend the ICES Annual Science Conference in Gdansk, Poland,
- PICES to co-sponsor the 15th International HAB Conference to be held in Changwon Korea, 2012,
- Training course on satellite remote sensing for early career scientists (*HAB-S Endnote 5*) to be held the week prior to PICES-2011, ideally in Khabarovsk,
- IOC representative (Henrik Enevoldsen, Monica Lion) to attend PICES-2011 to discuss HAE-DAT, country maps and decadal reports,
- request for participation by a manager/scientist(s) from China who has access to HAB monitoring data,
- ½-day HAB-S business meeting at PICES-2011.

Working Group on Non- indigenous Species (WG 21)

PICES or MAFF funding will be used to support:

- 4-day Rapid Assessment Survey of marine non-indigenous species in Vladivostok (MAFF Project Funds; note: requires logistic support from Russian host institutions),
- 4–5 day demonstration RAS workshop in Thailand (Spring, 2011),
- Extend WG 21 mandate to 2014 to permit the conclusion of final RAS in Japan and Canada,
- 2-day WG 21 business meeting at PICES-2011,
- Travel for PICES members to participate in joint meeting between PICES WG 21 and ICES WGs PICES at the 7th International Conference on Marine Bioinvasions (Spain).

Working Group on *Environmental Interactions of Marine Aquaculture*

- 1-day WG 24 business meeting at PICES-2011.

Study Group on *Human Dimensions*

- Extend SG-HD to 2012 in order to overlap with MAFF fund request.

AGENDA ITEM 13

Other business

None

MEQ Endnote 1**MEQ participation list**Members

Ik Kyo Chung (Korea)
 Glen Jamieson (Canada)
 Shigeru Itakura (Japan)
 Kunio Kohata (Japan)
 Changyu Lee (Korea)
 Olga Lukyanova (Russia)
 Mitsutaku Makino (Japan, Co-Chairman)
 Steven Rumrill (U.S.A., Chairman)
 Darlene Smith (Canada)
 John Stein (U.S.A.)
 Thomas Therriault (Canada)

Observers

Katsuyuki Abo (Japan)
 Nick Adams (USA)
 Ingrid Burgetz (Canada)
 Bich-Thuy Eberhardt (USA)
 Graham Gillespie (Canada)
 Yichiro Ichibashi (Japan)
 Peter Kershaw (GESAMP)
 Sangjin Lee (NOWPAP)
 Emily Olesin (USA)
 Peter Ross (Canada)
 William Sydeman (USA)
 Vera Trainer (USA)
 Takafumi Yoshida (NOWPAP, CEARAC)

MEQ Endnote 2**MEQ meeting agenda**

1. Welcome /introduction of MEQ Committee members and observers
2. Approval of MEQ meeting agenda
3. Implementation of PICES-2009 decisions
4. Status reports from MEQ expert groups
 - Section on *Harmful Algal Blooms in the North Pacific* (Dr. Vera Trainer, USA/Dr. Changkyu Lee, Korea)
 - Working Group on *Aquatic Non-Indigenous Species* (Ms. Darlene Smith, Canada/Dr. Vasily Radashevsky, Russia)
 - Working Group on *Environmental Interactions of Marine Aquaculture* (Dr. Ingrid Burgetz, Canada/Dr. Brett Dumbauld, U.S.A./Dr. Katsuyuki Abo, Japan)
 - Study Group on *Human Dimensions* (Dr. Mitsutaku Makino, Japan)
5. Relations with other programs and organizations
 - Group of Experts on Scientific Aspects of Marine Pollution / GESAMP (Dr. Peter Kershaw, UK)

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6. Discussion of contaminants Topic Session and potential new MEQ Study Group on *Contaminants in the Marine Environment* (CME-SG; Dr. Olga Lukyanova, Russia)
7. Report from FUTURE Advisory Panel on *Anthropogenic Influences on Coastal Ecosystems* (AICE-AP) and FUTURE Workshop; proposed Work Group on *Marine Ecosystem Responses to Multiple Stressors* (Dr. Tom Therriault, Canada)
8. Discussion of MEQ contributions and potential realignment of HABS, NIS, and Marine Aquaculture to address FUTURE (Dr. John Stein, U.S.A.)
9. Review and revision of MEQ Action Plan (Dr. Steven Rumrill, U.S.A.)
10. MEQ 2010 Best Presentation and Poster awards
11. Suggestion for the theme for PICES-2012, Hiroshima, Japan
12. Summary of MEQ items with financial implications for 2011
 - a) Proposed inter-sessional meetings
 - b) Proposed topics sessions, workshops, publications, *etc.*
 - c) Travel support requests
 - d) MEQ support for proposed ICES sessions
 - e) Other items
13. Other business

MEQ Endnote 3

Proposal for a FUTURE (AICE)/MEQ/BIO Working Group on *Marine Ecosystem Responses to Multiple Stressors*

Duration: 2011 to 2013

Proposed Chairs: Dr. Motomitsu Takahashi (Japan); Dr. Steve Rumrill (U.S.A.*); Dr. Ian Perry (Canada*)

Proposed Terms of Reference:

1. review and identify critical stressors responsible for ecosystem-level changes, with emphasis on North Pacific ecosystems
2. identify spatial extent/regional differences in anthropogenic and natural stressors among North Pacific ecosystems
3. identify potential sources of data/information available from national/international programs and PICES expert groups on ecosystem responses/anthropogenic stressors
4. identify how PICES countries are currently working to address the cumulative effects from multiple stressors in the marine environment
5. provide metrics of ecosystem change, resiliency and vulnerability for implementation within the PICES FUTURE program as per recommendations from the Intersessional FUTURE Workshop on Ecosystem Indicators
6. convene workshops and sessions to compare ecosystem responses by regions and evaluate results
7. publish a final technical report to summarize results

* denotes tentative service as co-chair with recognition of need for potential replacement or additional co-chair to contribute required expertise and distribute workload.

MEQ Endnote 4

**Proposal for a 1-day MEQ/FUTURE Topic Session on
 “Land-sea Interactions and Anthropogenic Impacts on Biological Productivity of North Pacific Ocean
 Coastal Ecosystems” at PICES-2011**

Co-convenors: Dr. Masahide Kaeriyama (AICE – Japan); Dr. Thomas Therriault (AICE – Canada); Dr. Olga Lukyanova (MEQ – Russia); Dr. Steven Rumrill (MEQ – U.S.A.)

Description: Land-sea interactions are widely recognized as an important component of coastal ecosystem processes throughout the North Pacific Region. Anthropogenic activities in upland and coastal areas can significantly alter the productivity of coastal ecosystems and disturb the communities that depend on them. Human activities such as pollution or overfishing can result in immediate and direct impacts on biological productivity. However, there are an increasing number of indirect impacts such as altering the flow of ecosystem-transboundary materials (ETMs) that are responsible for the enriched productivity of many northern coastal systems. In Asia, the dissolved iron that is transported from the Amur River basin into the Sea of Okhotsk and Oyashio Region is now recognized as a major regulator of the primary productivity in these coastal waters. Similarly, disruptions in the timing and amplitude of riverine discharges from the Columbia River Basin (Pacific Northwest) result in significant alterations of salinity regimes, sediment transport, biological productivity, and fisheries returns throughout the region influenced by the Columbia River plume. Anthropogenic impacts such as changes in land use, artificial river channelization, hydropower structures, and urbanization disrupt and alter the flow of ETMs thereby reducing the productivity in these coastal ecosystems. Furthermore, these alterations can lead to the manifestation of other stressors in coastal ecosystems such as jellyfish blooms, hypoxia events, and harmful algal bloom (HAB) outbreaks.

This session will focus on: 1) how ETMs (e.g., dissolved iron, carbon and other elements) are transported from upland ecosystems into coastal ones, 2) what mechanisms regulate the supply of ETMs and how the downstream transport of these impact the productivity (primary production) of coastal systems, 3) how anthropogenic impacts disrupt the ETM system and resulting changes downstream including increased ecosystem vulnerability, 4) how anthropogenic impacts directly reduce coastal productivity, and 5) exploration of potential adaptive management strategies based on the ecosystem-approach to protect the ETM system to ensure sustainability of coastal ecosystems and stability for the coastal societies depending on them.

PICES request: travel support for 3 invited speakers: Dr. Takayuki Shiraiwa (Hokkaido University, Japan); Dr. Nadezhda Khristophorova (Far Eastern Federal University, Russia); Dr. Barbara Hickey (University of Washington, U.S.A.)

MEQ Endnote 5

**Proposal for a 1-day MEQ Workshop on
 “Trends in marine contaminants and their effects in a changing ocean:
 Refining indicator approaches in support of coastal management” at PICES-2011**

Co-convenors: Dr. Peter Ross (Canada); Dr. Olga Lukyanova (Russia)

Description: Many anthropogenic pollutants impact coastal and marine environment all over the world. Persistent biomagnifying chemicals can accumulate in the marine food web to level that are toxic to organisms, and where they also present health risks to humans especially those who depend strongly on the sea as a source of food. Many other chemicals are less persistent but, nevertheless, cause concern as they can affect, for example, hormone and immune status. Both exposure and susceptibility may be strongly affected by climate variability and change. So-called “microplastics” may concentrate pollutants, be ingestible by the ocean's tiny denizens — from zooplankton to filter feeders like clams and mussels — and move up the food chain up to seabirds and marine mammals. Microplastics persist in the ocean for very long times, and they are likely

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accumulating world-wide. Chemical pollutants undergo long range atmospheric transport, travelling according to their physical-chemical properties and to the characteristics of the environment that they encounter (climate, wind direction and others), reaching remote regions where they have never been produced or used. In the case of long-live top predators that were born before the rise organochlorine chemicals, present body burdens and exposure to biomagnifying chemicals is a product of lifetime contaminant accumulation. Marine mammals can mobilize large quantities of stored fat reserves to get them through the period of stress. Bioaccumulating contaminants are collected by anadromous fish in the ocean and then focused into nursery lakes with, as yet, unknown effects on the lake ecosystems in which they hatch and rear. Capacity of a marine environmental compartment to retain and release chemicals, which depends on several processes, is widely variable both spatially and temporally. The effect of climate changes can significantly influence global pollutant cycling. New approaches to pollution monitoring must take into account factors that may confound the interpretation of temporal and spatial trends, as well as the interpretation of health of species being monitored.

Objectives:

- identify the scope of PICES / FUTURE activities that focus on contaminants in the North Pacific marine environment
- update and revision of MEQ Action Plan elements on marine contaminants
- Identify potential interactions with IOC / ICES / GESAMP / NOAA programs that focus on contaminants in the marine environment, including PICES approach to address plastics and microplastics
- develop recommendations for a PICES Study Group on Marine Contaminants, including terms of reference, membership, deliverables

Travel support for 1 PICES Co-convenor and 1 invited scientist (Dr. Peter Kershaw, GESAMP - Plastics and microplastics)

Request additional travel support from GESAMP, NOWPAP, NOAA