

## REPORT OF WG 21 ON *NON-INDIGENOUS AQUATIC SPECIES*

The Working Group on *Non-Indigenous Aquatic Species* (hereafter WG 21) held its third meeting October 24–25, 2008, under the co-chairmanship of Ms. Darlene L. Smith and Dr. Vasily Radashevsky. A list of participants and meeting agenda can be found in *WG 21 Endnotes 1* and *2*.

### AGENDA ITEM 2

#### **Taxonomy initiative**

In 2007, the Ministry of Agriculture, Forestry and Fisheries (MAFF) of Japan, through the Fisheries Agency of Japan, provided funding to PICES for a project entitled “*Development of the prevention systems for harmful organisms’ expansion in the Pacific Rim*” to develop international systems to collect, exchange and store relevant data. The project is anticipated to run for 5 years (from April 1, 2007 to March 31, 2012).

The project is made up of two components, one on marine non-indigenous species (MNIS) conducted by WG 21 and one on harmful algal blooms conducted by the Section on *Ecology of Harmful Algal Blooms in the North Pacific* (HAB-S). The MNIS sub-project is divided into two initiatives, one on the development of a MNIS database and the other on a taxonomic system to allow identification and documentation of MNIS establishment outside of their native habitat. The latter initiative, which is being led by Dr. Thomas Therriault, consists of four key elements: (1) the identification of taxonomic needs in PICES member countries, (2) the carrying out of rapid assessment surveys, (3) the initiation of standardized collector plate surveys, and (4) the development of taxonomic information system/tools.

The first WG21 Rapid Assessment Survey (RAS) to assess the presence of non-indigenous species was conducted from September 20–23, 2008, in Dalian, China. Dr. Lijun Wang of the National Marine Environmental Monitoring Center, SOA, was the local organizer. In addition to Drs. Therriault and Wang, the RAS team included Dr. Graham Gillespie (Pacific Biological Station, Canada) and Ms. Darlene Smith (National Headquarters, Fisheries and Oceans Canada); Dr. Hiroshi Kawai (University of Kobe, Japan); Dr. Li Zheng and Mr. Zhisong Cui (First Institute of Oceanography, SOA, China); Drs. Vasily Radashevsky, Eduard Titlyanov, Tamara Titlyanova (Institute of Marine Biology, FEB RAS, Russia) and Dr. Liudmila Budnikova (Pacific Research Institute of Fisheries and Oceanography, Russia); Drs. Blake Feist (Northwest Fisheries Science Center, NMFS, U.S.A.) and Judith Pederson (MIT Sea Grant Program, U.S.A.).

Two commercial ports (Dalian on the Yellow Sea and Bayu Quan on the Bohai Sea) were sampled by Dr Wang prior to the RAS. A third site, Ling Shui Qiao Beach, Dalian, was sampled by RAS participants on October 22, 2008. A total of 59 species were identified in Dalian Port, 29 species in Bayu Quan Port, and 60 on Ling Shui Qiao Beach. Dr. Therriault will produce a formal report of the Dalian RAS and will provide a written protocol for the RAS and collector plate surveys at a later date. Canada will provide collectors to countries wishing to deploy collector plates, and all data from the rapid assessment and collector plate surveys will be entered into the nonindigenous species database.

Professor Toshio Furota presented the results of a rapid assessment survey he conducted in Tokyo Bay, Japan. In summary, two sites were sampled; the Port of Tokyo and Piers off Haneda Airport in the inner Tokyo Bay. A total of 67 species and/or taxonomic groups were identified of which 15 are considered non-indigenous. The complete report from the Tokyo Bay rapid assessment survey can be found in *WG 21 Endnote 3*.

### AGENDA ITEM 3

#### **Non-indigenous species database**

The second sub-project funded by MAFF (see Agenda Item 2) was the development of a comprehensive MNIS database led by Dr. Henry Lee II (U.S. Environment and Protection Agency, U.S.A.) and Ms. Deborah

## WG 21-2008

Reusser (USGS-Western Fisheries Research Center at Marine Hatfield Science Center, U.S.A.). This initiative involves the development and population of a database of marine/estuarine species that can be queried for distributional, ecological, and physiological data at different taxonomic levels and spatial distributions. The database includes: species, a hierarchical biogeography at the realm, province and ecoregion level, ecosystem type, salinity, life history and development, habitat, temperature, trophic level and feeding, and invasion vectors.

A working copy version of the database was distributed to all WG 21 members at the meeting and assistance was provided by Ms. Reusser to ensure that it was successfully installed. January 2009 was established as the deadline for entry and submission of existing nonindigenous species by countries to Ms Reusser. The final version database, complete with query and output functions, picture storage, PDF storage and automated import utilities, will be completed by October 2009. Additional data entry and a possible web-based application will be discussed at PICES-2009 in Jeju, Korea.

### AGENDA ITEM 4

#### **WG 21 revised terms of reference**

Given the refocusing of WG 21's work on the two MAFF-funded projects, WG 21 reviewed its current terms of reference and revised them (*WG 21 Endnote 4*) to reflect content and duration of the activities (*WG 21 Endnote 5*) under these projects. They were submitted to the MEQ Committee for approval.

### AGENDA ITEM 5

#### **6<sup>th</sup> International Conference on Marine Bioinvasions**

Dr. Judith Pederson presented information on the 6<sup>th</sup> International Conference on Marine Bioinvasions to be held August 24–29, 2009 in Portland, Oregon, U.S.A. The Conference is entitled “*Marine bioinvaders: Agents of change in a changing world*” and details can be found at <http://www.clr.pdx.edu/mbic>. The themes are:

- Ecological and evolutionary impacts, including potential shifts with global change;
- Predicting the scale and diversity of invasions in the face of global change;
- Measuring and predicting spread on regional and global scales;
- Invasion patterns over time and space: does the past predict the future?
- Advances in detection, identification and tracking-to-origin capabilities;
- Management, rapid response, eradication and restoration.

The conference organizers are seeking financial support from PICES. Dr. Therriault volunteered to serve as a member of the conference's scientific steering committee. Dr. Yoon Lee (Korea) is already a member.

### AGENDA ITEM 6

#### **Possible cooperation between the Northwest Pacific Action Plan (NOWPAP) and PICES**

Dr. Jeung Sook Park, Scientific Affairs Officer of NOWPAP Regional Coordination Unit, presented a statement on possible cooperation between NOWPAP and PICES. WG 21 reviewed it and concluded that while sharing information is desirable, there were insufficient details to make a recommendation to MEQ.

### AGENDA ITEM 7

#### **Recommendations**

The Working Group recommends that the MEQ Committee approve:

- a. The revised terms of reference, with deliverables and milestones;

- b. Extend the lifespan of WG 21 until PICES-2012 (October 2012) to reflect the duration of the MAFF funding;
- c. Support the 6<sup>th</sup> International Conference on Marine Bioinvasions conditional on the organizers' acceptance of significant PICES input;
- d. Support a 2-day meeting of WG 21 at PICES-2009 in Korea.

**WG 21 Endnote 1**

**Participation list**

Members

Evgenyi Barabanshchikov (Russia)  
 Blake Feist (U.S.A.)  
 Toshio Furota (Japan)  
 Graham Gillespie (Canada)  
 Paul Heimowitz (U.S.A.)  
 Masaya Katoh (Japan)  
 Hiroshi Kawai (Japan)  
 Henry Lee II (U.S.A.)  
 Zheng Li (China)  
 Wang Lijun (China)  
 Vasily Radashevsky, (Russia, Co-Chairman)  
 Deborah Reusser (U.S.A.)  
 Darlene Smith (Canada, Co-Chairman)  
 Thomas Therriault (Canada)

Observers

Ingrid Burgetz (Canada)  
 Liudmila Budnikova (Russia)  
 Jinho Chae (China)  
 Zhisong Cui (China)  
 Ted Grosholz (U.S.A.)  
 Glen Jamieson (Canada)  
 Judith Pederson (U.S.A.)  
 Steven Rumrill (U.S.A.)  
 Yasunori Watanabe (Japan)

**WG 21 Endnote 2**

**WG 21 meeting agenda**

1. Opening remarks and introductions
2. Taxonomy initiative
3. Non-indigenous species database
4. WG 21 revised terms of reference
5. 6<sup>th</sup> International Conference on Marine Bioinvasions
6. Statement on possible cooperation between the Northwest Pacific Action Plan (NOWPAP) and PICES
7. WG 21 Recommendations to MEQ Committee:

WG 21 Endnote 3

**Results of Rapid Assessment for marine invasion  
in Tokyo Bay conducted in 2008**

Toshio Furota<sup>1</sup>, Satoko Nakayama<sup>2</sup>, Masanori Taru<sup>1</sup>, Eiji Nishi<sup>3</sup>, Taiji Kurozumi<sup>4</sup>, Tomoyuki Komai<sup>4</sup>,  
Teruaki Nishikawa<sup>5</sup>, and Ko Tomikawa<sup>6</sup>

<sup>1</sup> Toho University,

<sup>2</sup> Japan Wildlife Research Center,

<sup>3</sup> Yokohama National University,

<sup>4</sup> Natural History Museum and Institute, Chiba,

<sup>5</sup> Nagoya University,

<sup>6</sup> Hiroshima University.

*Observation Locations and Methods*

A. Port of Tokyo

1. Suspended artificial panels (32×55 cm black acrylic) from a floating dock at Museum of Maritime Science in Port of Tokyo. Every 1 m deep from 1 m to 4 m near bottom. Established on May 11, 2008, and observed on September 22, 2008.
2. Hand collection in intertidal and subtidal bottoms by SCUBA at Daiba Beach and Museum of Maritime Science in Port of Tokyo. Conducted on September 15, 2008.

B. Piers Off Haneda Airport inner Tokyo Bay

1. Hand collection by SCUBA divers. Surface to bottom (20 m), conducted on July 15, 2008.

*Preservation and identification*

All samples were preserved in 10 % neutralized sea-water formalin.

*Conclusion*

A total of 67 species and/or taxonomic groups were identified. Among them, 17 species were judged to non-indigenous species, which consisted mainly of sessile species, except for 4 free-living ones; An Atlantic clam, *Mericanaria marcenaria*, a mud amphipod, *Monocorophium insidosum*, a small spider crab, *Pyromaia tuberculata*, and a Mediterranean green crab, *Carcinus aestuarii*. This strongly indicates that benthic community in inner Tokyo Bay had been dominated by invasive species. Four major vectors of marine invasion with human activities had been suggested; attaching on ship hauls, sea chests, ballast waters, and intentional or unintentional transplantation with imported fishery species. Action to prevent the marine invasion has not been conducted in Japan. These suggest that there is a possibility of further invasions of marine organisms into the bay, and this will cause change of the benthic community in Tokyo Bay. Monitoring observation for next invasion could be required.

WG 21 Endnote 4

**WG 21 revised terms of reference**

- 1) Assesses the status of Non-Indigenous Aquatic Species in the PICES area by:
  - a) completing an inventory of currently reported estuarine and marine aquatic non-indigenous species in PICES member countries;
  - b) compiling definitions of terms and making recommendations on use of terms; and

- c) summarizing the situation on bioinvasions in the Pacific and compare and contrast to other regions in the Northern hemisphere.
- 2) Assemble an inventory of expertise and programs related Non-Indigenous Aquatic Species in PICES member countries by compiling:
    - a) a list of existing databases of Non-Indigenous Aquatic Species experts in PICES member countries; and
    - b) sources of information on relevant national research and monitoring programs.
  - 3) Prevention and mitigation measures:
    - a) summarize initiatives on prevention and mitigation measures (*e.g.*, ICES Code of Practice for the Introduction and Transfer of Marine Organisms; IMO Ballast Water Management Convention and national policies of PICES member countries); and
    - b) develop recommendations for best practices for prevention and mitigation.
  - 4) Promote collaboration between ICES Working Groups on Non-Indigenous Species by:
    - a) holding joint meetings of the ICES and PICES WG-21 as conveniently possible; and
    - b) developing and recommending an approach for enhances linkages between ICES and PICES on Non-Indigenous Aquatic Species.
  - 5) Develop a Non-Indigenous Aquatic Species Database for the PICES area.
  - 6) Establish a North Pacific Marine Non-Indigenous Aquatic Species taxonomy initiative including:
    - a) Conducting rapid assessment surveys and collector surveys; and
    - b) Developing taxonomic tools.
  - 7) Publish an interim report in 2010 and a final report in 2012 summarizing results and recommendations.

## WG 21 Endnote 5

## Deliverables and milestones to complete WG 21 terms of reference

DELIVERABLE	PROJECT LEAD	MILESTONES
<b>1) Assesses the status of Non-Indigenous Aquatic Species in the PICES area by:</b>		
a) completing an inventory of currently reported estuarine and marine aquatic non-indigenous species in PICES member countries;	Henry Lee	January 15, 2009 – Countries to send data. March 31, 2009 – Inventory completed.
b) compiling definitions of terms and making recommendations on use of terms;	Thomas Therriault	October 2009 – To be completed.
c) summarizing the situation on bioinvasions in the North Pacific;	Henry Lee	October 2009 – Draft manuscript to be completed. October 2010 – Submitted to a peer-reviewed journal.
d) compare and contrast to other regions.	To be determined	October 2011
<b>2) Assemble an inventory of expertise and programs related Non Indigenous Aquatic Species in PICES member countries by:</b>		
a) compiling a list of existing databases of Non-Indigenous Aquatic Species experts;	Blake Feist	October 2009 – To be completed.
b) compiling sources of information on relevant national research and monitoring programs in PICES member countries.	Thomas Therriault	October 2012
<b>3) Prevention and mitigation measures:</b>		
a) summarize initiatives on prevention and mitigation measures (e.g., ICES Code of Practice for the Introduction and Transfer of Marine Organisms; IMO Ballast Water Management Convention and national policies of PICES member countries);	Paul Heimowitz	October 2009 – Henry Lee to summarize IMO; Judith Pederson to summarize ICES Code of Practice; Paul Heimowitz to lead on mitigation.
b) develop recommendations for best practices for prevention and mitigation.	Paul Heimowitz	October 2012 – To be completed.
<b>4) Promote collaboration between ICES and PICES Working Groups on Non-Indigenous Species by:</b>		
a) holding joint meetings of the ICES and PICES WG-21 as conveniently as practical;	Darlene Smith Vasily Radashevsky Judith Pederson	May 2007 – Joint meeting held concurrent with 5 <sup>th</sup> Marine Bioinvasions Conference. August 2009? – Joint meeting to be held concurrent with 6 <sup>th</sup> Marine Bioinvasions Conference.
b) developing and recommending an approach for enhances linkages between ICES and PICES on Non-Indigenous Aquatic Species.	Darlene Smith Vasily Radashevsky Judith Pederson	Annually – Share meeting reports and project status. Ongoing liaison between the ICES and PICES chairs.
<b>5) Develop a comprehensive Non-Indigenous Aquatic Database.</b>		
a) Develop a database prototype;	Henry Lee Deborah Reusser	Completed October 2007.
b) Intercessional workshop to test the revised prototype and establish database	All	Completed March 2008 in Busan, Hosted by NFRDI.

DELIVERABLE	PROJECT LEAD	MILESTONES
structure in Busan, hosted at NFRDI;		
c) Enhanced prototype based on intercessional workshop;	Henry Lee Deborah Reusser	Completed October 2008.
d) Final comments on the database to Henry Lee and Deborah Reusser;	All working group members	Comment period closes December 31, 2008.
e) Transmission of current NIS data to Henry Lee preferably in the database or by spreadsheet (See ToR I);	All WG 21 members	Deadline January 15, 2008.
f) Compiled data	Henry Lee	Deadline March 31, 2008.
g) Final Version 1 of the stand alone database including query functions;	Henry Lee Deborah Reusser	October 2009 – Final working version of the database.
h) Recommendation on Web-based application;	All WG 21 members	October 2009
i) Development of Web-based application, if approved;	TBD	To be completed October 2012.
j) Continued data entry.	All WG 21 members	Annually until October 2012.
<b>6) Establish a North Pacific Marine Non-Indigenous Aquatic Species taxonomy initiative.</b>	Thomas Therriault	
a) Dalian Rapid Assessment Survey;	Thomas Therriault and Wang Lijun	Completed October 2008.
b) Busan Rapid Assessment Survey;	Thomas Therriault and TBD	October 2009
c) A demonstration RAS will be held in Japan for developing countries. Countries to be invited may include Vietnam, Malaysia, Indonesia, Philippines, Thailand and Mauritius;	Thomas Therriault and TBD	Date to be determined between April 2010 and March 2011.
d) Rapid assessment in Russia;	Thomas Therriault and TBD	October 2011
e) Final Report.	Thomas Therriault	October 2012
<b>7) Publish an interim report in 2010 and a final report in 2012 summarizing results and recommendations.</b>	Darlene Smith Vasily Radashevsky	October 2009 – Web brochure outlining the Non-indigenous Aquatic Species issues and WG-21's work on taxonomy and database. October 2010 – Interim report summarizing results and recommendations. October 2012 – Final report summarizing results and recommendations.