

REPORT OF WORKING GROUP ON NON-INDIGENOUS AQUATIC SPECIES

The Working Group on *Non-indigenous Aquatic Species* (hereafter WG 21) held its fifth meeting October 23–24, 2010 under the co-chairmanship of Ms. Darlene Smith and Dr. Vasily Radashevsky who presented opening remarks and welcomed participants. All PICES member countries were present except China (*WG 21 Endnote 1*). On the first day, the agenda dealt with items 1 to 5, with the remainder being discussed on the second day. The agenda for the meeting can be found in *WG 21 Endnote 2*.

October 23, 2010

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Reports on WG 21 activities in 2010

Demonstration Rapid Assessment Survey (RAS) workshop in Japan

A demonstration RAS workshop on “*An introduction to rapid assessment survey methodologies for application in developing countries*” was held July 13–15, 2010 at the Marine Station of the Center for Inland Seas on Awaji Island, Japan. The workshop was hosted by Professor Hiroshi Kawai of Kobe University (see PICES Press Vol. 19, No. 1, pp. 30–31). The goal of the workshop was to provide outreach to participants from developing Southeast Asian countries through training in survey techniques that are quick and inexpensive and can be used where monitoring for non-indigenous species (NIS) is limited and not conducted in a systematic manner. The RAS is a tool for small-scale surveys and is not a replacement for large-scale monitoring programs. Participants came from Malaysia, the Philippines, Indonesia, Singapore, and Thailand. They visited a number of sites around Osaka Bay where they were shown techniques to sample a variety of habitats. Specimens from the highly developed inner part of Osaka Bay and from the relatively pristine area outside of the Bay were collected and identified for comparisons. Based on the positive feedback received from the workshop in Japan, Dr. Thomas Therriault and Prof. Kawai are considering conducting a larger demonstration workshop next year.

RAS 2010 in Newport, Oregon, U.S.A.

The third WG 21 RAS was held at the Hatfield Marine Science Centre in Newport, Oregon, October 18–20, 2010. Twenty participants from Canada, Japan, Russia and the United States sampled intertidal and shallow subtidal habitats in Coos Bay and Yaquina Bay. Results of the Oregon RAS included identification of 191 taxa, most identified to the species level. Twenty-five species of polychaete represent the first records of these species in one or more of the sampled Oregon estuaries, and 8 species of polychaete represent new records in Oregon.

A significant advantage of these surveys is the opportunity for taxonomists to examine material from different areas and exchange ideas directly with other taxonomists of the same taxa and with other invasion ecologists. The participation of ascidian taxonomists in this survey allowed the identification of the second Pacific record of the introduced North Atlantic sea grape *Molgula citrina*, which was also the first Pacific record south of Alaska.

Two of the RAS participants, Graham Gillespie and Sylvia Behrens Yamada, contrasted Canadian and U.S. methods to trap European green crab *Carcinus maenas*, allowing a unique opportunity to inter-calibrate methods used among PICES member countries. Sylvia Behrens Yamada and colleagues have conducted trap surveys in Washington and Oregon estuaries for over a decade while Graham Gillespie and colleagues have conducted trap surveys in British Columbia for the last 5 years.

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Gear types are standardized but the survey methodologies have subtle differences. In Washington and Oregon surveys are completely intertidal with traps set from shore during low tides, while in British Columbia surveys include inter- and sub-tidal habitat with traps set by boat. Catch rates (proxy for abundance) vary widely: generally less than 1 crab/trap-day in Washington and Oregon, while some sites in British Columbia have yielded over 30 crabs per trap-day. Therefore, it was desirable to trap a common area using both methods for inter-calibration.

Direct comparisons provisionally indicate that the two methods are comparable. Shore-based trapping is the most efficient means in large coastal estuaries as green crab populations are limited to the upper intertidal. The sample sizes were low and comparisons over a range of abundance would further increase confidence in these results.

Collector plates were deployed during 2010 in Canada in the ports of Vancouver and Victoria, Canada, in an effort to compare with the Ruiz group in San Francisco, U.S.A. Collector plates were also deployed in Osaka Bay, Japan, and the ports of Pusan, Pohang and Daesan in Korea. In the United States collectors were deployed in Oregon for the WG 21 RAS and in Seattle.

Non-indigenous species database project

Dr. Deborah Reusser installed the new version of the PICES NIS database on the laptop computers of participants at the meeting, and was able to resolve incompatibility issues resulting from different versions of Windows operating systems. The database contains a new feature which permits mapping of indigenous and non-indigenous species at a global scale using MEOW ecoregions. Another feature of the database is the ability to generate custom atlas reports.

Non-indigenous species in the North Pacific atlas

The draft atlas was presented to participants. The atlas now contains 631 non-native species and will be placed on a password protected site for review by WG 21 members and taxonomists who have participated in the RAS.

The long-term future of the database and atlas was also discussed. Funding from the Japanese Ministry of Agriculture, Fisheries and Forestry (MAFF) used to develop the database ends March 12, 2012. The United States Atlas Program has offered to host the database. Given PICES' limited resources for data management, this offer will be investigated as a long-term solution for the NIS database and atlas.

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Country reports

Canada

Dr. Therriault reported that the Canadian Government has renewed funding for NIS. Fisheries and Oceans Canada is reviewing its marine and freshwater monitoring programs. The current Canadian Aquatic Invasive Species Research Network (CAISN) 5-year program will end March 31, 2011. A new 5-year network focusing on early detection, rapid response, climate change and management advice will succeed it. The new name is the NSERC Network on Aquatic Invasive Species and it will include an Arctic component, given the expectation that the Northwest Passage will be open to shipping in the relatively near future. Information on CAISN can be found at www.caisn.ca. The first record of the periwinkle *Litorina litorea* was reported in British Columbia.

China

No Chinese member was in attendance to provide a report.

Japan

Dr. Takeo Kurihara informed the meeting that Japan has begun a National Survey on the Natural Environment program. Under this program, organisms will be monitored for 100 years. The monitoring is focused on natural and well-preserved sites and will identify all organisms including NIS. Additional information on this survey can be found at:

- <http://japan.wetlands.org/WetlandsInternationalJapanWIJ/tabid/1902/language/en-US/Default.aspx>
- http://www2.restec.or.jp/geoss_web/pdf/0415/wg3/biodiversity/03.pdf

Korea

Dr. Jung-Hoon Kang gave a presentation on Port Environmental Risk Assessment Technology. Korea is conducting biological and environmental monitoring in 11 shipping ports. The biological monitoring includes NIS. The NIS monitoring includes deployment of the WG 21 collector plates. NIS will be classified based on risk. DNA probes are being developed to detect high-risk species. Korea is considering adding the NIS data from their port surveys to the PICES NIS database.

Russia

Dr. Radashevsky reported that Dr. Alexander Zvyagintsev of the Institute of Marine Biology, Vladivostok, has created a group working on NIS which has studied organisms in ballast water from two ships, one from Japan and one from China. A list of species found in the ballast water has been published. Many of the species were NIS. The publication is in Russian but has a list of the Latin names of species. Surveys are being conducted around Vladivostok Harbour to detect NIS.

United States of America

Dr. Mark Sytsma reported on a West Coast governors' agreement on ocean health. It is an ocean policy for the region with 7 elements, including one on NIS. There are two tasks related to NIS: standardizing ballast water regulations (Pacific ballast water group) and eradication of four species of invasive *Spartina*. The objective of the *Spartina* management plan is to eliminate it by 2018. The three West Coast states and British Columbia are involved in implementing the management plan.

Dr. Blake Feist reported that NOAA deployed collector plates at two stations around Seattle. The plates were modified to be attached to fixed structures. The plates have been collected and preserved, but not analysed. Additionally Dr. Andrew Cohen of NOAA has produced a paper on pathogens in ballast which can be accessed at the following URL:

http://bioinvasions.academia.edu/AndrewCohen/Papers/432605/Cohen_A.N._2010._Non-native_Bacterial_and_Viral_Pathogens_in_Ballast_Water_Potential_for_Impacts_to_ESA-listed_Species_under_NOAAs_Jurisdiction._A_report_prepared_for_the_National_Oceanic_and_Atmospheric_Administration_National_Marine_Fisheries_Service_Endangered_Species_Division_Silver_Spring_MD._Center_for_Research_on_Aquatic_Bioinvasions_CRAB_Richmond_CA

Dr. Henry Lee II reported that the Environmental Protection Agency is developing national ballast water standards and that Gregory Ruiz (Smithsonian Environmental Research Center) and Dr. Ian Davidson (Portland State University) are continuing extensive monitoring of hull fouling on ships at ports on the west coast of North America.

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Other updates*RAS workshop in Thailand for the WESTPAC region*

Dr. Apple Chavanich of Chulalongkorn University organized a Rapid Assessment Survey with WESTPAC funding. Dr. Therriault will share information and a proposal for a WG 21 event next year in Thailand.

Activities with ICES

Ms. Smith reported on the discussions by two ICES working groups (Working Group on Introduction and Transfer of Marine Organisms and the Working Group on Ballast and Other Ship Vectors) on possible collaboration between ICES and PICES. The two ICES working groups discussed the PICES NIS database but consider it too complex for immediate use. However, they still wish to continue to explore opportunities for collaboration with WG 21. A joint meeting between WG 21 and the ICES working groups is proposed concurrent with the 7th Marine Bioinvasions Conference in Barcelona, Spain, in August 2011.

Establishment of more formal linkages with NOWPAP

Dr. Sangjin Lee (NOWPAP) provided an update on NOWPAP NIS activities and indicated an interest in establishing linkages with PICES WG 21. NOWPAP is one of the UNEP Regional Seas Programs. NOWPAP has 4 member states, China, Japan, Korea, and Russia. One of Regional Activity Centres, DINRAC (Data and Information Network Regional Activity Centre), has established a database related to marine environment conservation on their website. DINRAC has compiled national reports prepared by national experts from member states on NIS and combined into a regional report. It includes current status, legislation, prevention, detection and management of MIS (marine invasive species), which is being implemented by each member state. More information on NOWPAP can be found at the following website: <http://www.nowpap.org> and <http://dinrac.nowpap.org>.

Scientific papers

Presentations on the following topics were given by the lead authors:

- Is it or isn't it? Taxonomic proficiency of North Pacific NIS polychaete assessments in the Northeast Pacific. Leslie H. Harris.
Polychaete Section, Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, California, USA, 90007.
- Per capita invasion probabilities: A linear model to predict rates of invasion via ballast water. Deborah A. Reusser¹, Henry Lee II² and Melanie R. Frazier²
¹ US Geological Survey, Western Fisheries Research Center and Oregon State University, 2111 NE Marine Science Dr., Newport, OR, 97365, USA. E-mail: dreusser@usgs.gov
² US EPA, ORD, NHEERL, Western Ecology Division, 2111 NE Marine Science Dr., Newport, OR, 97365, USA
- Density matters: Comparison of approaches to developing ballast water discharge targets. Henry Lee II¹, Deborah A. Reusser² and Melanie R. Frazier³
¹ U.S. EPA, Western Ecology Division, Pacific Coastal Ecology Branch, Newport, OR, 97365, USA. E-mail: lee.henry@epa.gov
² USGS, Western Fisheries Research Center, Newport, OR, 97365, USA ³ U.S. EPA, Western Ecology Division, Pacific Coastal Ecology Branch, Newport, OR, 97365, USA
- Implications of the species area rule to human welfare
John W. Chapman, Dept. Fisheries and Wildlife, Hatfield Marine Science Center, Newport Oregon, OR 97365, John.Chapman@OregonState.Edu

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Long-term NIS activities in PICES

WG 21 is scheduled to complete its term at the PICES-2012 in Japan. A discussion was held among the 5 member countries present to assess interest in continuing work on NIS within PICES. Representatives from Canada and the U.S. agreed that NIS will continue to be a priority for them. Korean participants believe that NIS will continue to be a priority but that the focus of work should change and include climate change elements. Japanese participants indicated that NIS will continue to be an important issue, but that the focus should change to include indigenous and non-indigenous species in the context of climate change. The Russian participant concurred that it was important to continue the NIS work.

Discussions amongst WG 21 members during the meeting and at the PICES Opening Reception about this topic resulted in the following topics to be considered for continued PICES work on NIS:

- Climate change is expected to alter both indigenous and NIS species. Indigenous species may well change their ranges, especially in ecosystem boundary areas. Climate change may result in new vectors or change in the relative importance of existing vectors that introduce NIS. Climate change may also alter the severity of the impacts of NIS species and may result in indigenous species becoming problem species, as is the case with some species of jellyfish.
- Future PICES work could include study of the impacts of climate change on indigenous and NIS. The foundation work of WG 21, including the database and RAS/taxonomy initiatives, could be used to support this new focus. There could also be an opportunity to incorporate the work of the Section on *Harmful Algal Blooms* (HAB-S), as harmful algae will be affected by climate change just the same as the macro-organisms that WG 21 has focused on.

WG 21 members also discussed how current and future work must be relevant to the FUTURE program and its Advisory Panel on *Anthropogenic Influences on Coastal Ecosystems* (AP-AICE). Members believe that a new focus on climate change would be consistent with FUTURE.

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WG 21 MAFF projects – Plans for 2011–12

Database and atlas

Discussion focused on the final entry of data. Dr. Lee II offered to enter data if it is sent him in an ordered format. WG 21 members and taxonomists who have worked on the RAS can submit data. Korea will consider entering the data from their port survey project. Deadline for comments on the database to Dr. Lee is due December 31, 2010. Dr. Reusser noted increasing difficulties being encountered with different versions of Windows and operating languages, and is working to resolve this issue.

Taxonomy project

Plans for a WG 21 RAS prior to PICES-2011 in Khabarovsk, Russia, were discussed. Khabarovsk is situated on the Amur River, some 700 km north of the Port of Vladivostok. Vladivostok, with its Institute of Marine Biology, was selected as the best location for the WG 21 RAS.

Continuation of collector plate surveys

Dr. Therriault sent collectors out this year and offered to ship collector plates to WG 21 members for the 2011 sampling year.

Demonstration workshop for countries in economic transition

The first RAS demonstration workshop was a successful start but a larger workshop is needed to reach more countries. Dr. Therriault and Prof. Kawai will work with Dr. Chavanich to develop a proposal to hold a second demonstration workshop in Phuket, Thailand, during the summer of 2011, with support from WESTPAC. Target participants will be researchers and managers working on NIS.

Report to Japanese Fisheries Agency

A report of WG 21 and HAB activities conducted with the funding from MAFF will be presented to the Japanese Fisheries Agency. The WG 21 portion will include a summary of the RAS and the database and atlas development. The deadline for the report is October 31, 2010. The report is for bureaucrats and should highlight the successes and important results of the projects, for example, the confirmation that *Ulva pertusa*,

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which has been washing up in abundance in Oregon, is native to Asia and the documentation of *Mogula citrina*, a solitary tunicate from the North Atlantic.

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Terms of reference

WG 21 reviewed its terms of reference and confirmed that it is on track for completion in October 2012.

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Other business

Request for financial support

The organizers of the 7th International Conference on *Marine Bioinvasions* have requested financial support of \$5000 from PICES. PICES has previously provided financial support at this level to fund travel for participants from PICES member countries. WG 21 members are supportive of this request.

Potential linkages between WG 21 and FUTURE

Dr. Therriault led the discussion on potential linkages between WG 21 and the FUTURE program, focusing on AP-AICE. WG 21 activities are consistent with FUTURE but are scheduled to terminate October 2012, leaving a short time period to develop links. A decision will be required to continue PICES work on NIS if longer-term links to FUTURE are to be established.

Suggestions for linking NIS with HAB-S or rolling WG-21 over into a section were made. A number of WG 21 members indicated that their countries (Canada, Japan, Korea, U.S.) were interested in continuing with NIS. Climate change was proposed as a future focus of NIS activities.

WG 21 Endnote 1

WG 21 participation list

Members

Blake Feist (U.S.A.)
Graham Gillespie (Canada)
Jung-Hoon Kang (Korea)
Takeo Kurihara (Japan)
Henry Lee II (U.S.A.)
Yoon Lee (Korea)
Vasily Radashevsky (Russia, Co-Chairman)
Deborah Reusser (U.S.A.)
Darlene Smith (Canada, Co-Chair)
Mark Sytsma (U.S.A.)
Thomas Therriault (Canada)

Observers

Sangjin Lee (NOWPAP of UNEP)
John Chapman (U.S.A.)
Leslie Harris (U.S.A.)
Wang Qixiang (China)

WG 21 Endnote 2

WG 21 meeting agenda

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1. Opening remarks and introductions (Smith and Radashevsky)
2. Reports on WG 21 activities in 2010
 - Demonstration Rapid Assessment Survey (RAS) Workshop in Japan (Therriault)
 - Newport Rapid Assessment Survey 2010 (Therriault and Chapman)
 - PICES NIS Database Project (Lee and Reusser)
 - Non-indigenous species in the North Pacific Atlas (Lee/Reusser)
 - Collector plate deployment in 2010 (Therriault and others)
3. National reports (All)
4. Other updates
 - RAS workshop in Thailand for the WESTPAC region (Smith)
 - Activities with ICES (Smith)
 - Establishment of more formal linkages with NOWPAP (Sangjin Lee)
5. Long term NIS activities in PICES

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6. WG 21 MAFF Projects – Plans for 2011-12
 - Database and atlas (Reusser and Lee)
 - Taxonomy (Therriault)
 - Report to Japanese Fisheries Agency (Kurihara)
7. WG 21 terms of reference (All)
8. Other business (All)