

PICES Workshop on “An Introduction to Rapid Assessment Survey Methodologies for Application in Developing Countries”

by Thomas Therriault

Since its inception in 2006, PICES Working Group 21 (http://www.pices.int/members/working_groups/wg21.aspx) has been advancing our understanding of marine non-indigenous species in the northern Pacific Ocean. Rapid Assessment Surveys (RAS) are one approach to quickly characterize the native, non-native, and cryptogenic species present in different locations. These qualitative surveys allow rapid depiction of the species composition within each location surveyed, not the abundance of any specific species. Quantitative surveys to estimate population sizes could be done subsequently, if needed, but are too time consuming for rapid assessments. Although specific methods vary slightly based on habitats being sampled or taxonomic groups being characterized, WG 21 has developed methodologies that have been used within PICES member countries to identify non-indigenous species in both intertidal and sub-tidal habitats. To date, RAS have been conducted in Dalian (China) in 2008, Jeju (Korea) in 2009, and most recently near Newport (Oregon, U.S.A.) in 2010 (see related PICES Press article in this issue). Data from each of these surveys have been archived in the PICES WG 21 database of marine and estuarine species. However, given the global nature of biological invasions, it is critical to engage researchers working on this important topic outside of PICES' six member countries, especially in locations adjacent to the PICES region where the potential transport of non-indigenous species is expected to be high. PICES WG 21 is working with other international organizations to share information on global invaders, but there remain fundamental gaps within developing countries. Thus, a demonstration workshop on “An introduction to rapid assessment survey methodologies for application in developing countries” was held to provide participants from developing countries with the tools to conduct their own surveys. In addition, the workshop provided a clear context to why this type of activity is essential both locally and globally, and how information on non-native species can be shared between developing and PICES member countries to benefit all. PICES co-sponsored this workshop with the Fisheries Research Agency (FRA) of Japan and Kobe University's Research Center for Inland Seas. The workshop was co-convened by Drs. Hiroshi Kawai (Kobe University, Japan), Hisashi Yokoyama (National Research Institute of Aquaculture, FRA) and Dr. Thomas Therriault (Fisheries and Oceans Canada), and focused on hands-on training of researchers from mostly developing Southeast Asian countries concerned about the potential introduction of non-indigenous marine species. From July 13–15, 2010, participants from Malaysia, Thailand, Singapore, Indonesia, Vietnam, the Philippines and Japan were invited

to the Marine Station of Kobe University's Center for Inland Seas (Awaji Island, Hyogo Prefecture, Japan) to learn about PICES activities on non-indigenous marine species and to receive training in Rapid Assessment Survey techniques.



RAS workshop participants at the sampling site in the inner part of Osaka Bay, Japan: Front row (l-r): Dr. Tan Koh Siang (Singapore), Dr. Roike Montolalu (Indonesia), Dr. Hisashi Yokoyama (Japan), Takashi Nozawa (Japan) and Dr. Takeaki Hanyuda (Japan); middle row (l-r): Dr. Thomas Therriault (Canada), Dr. Teodora Bagarinao (Philippines) and Dr. Lim Phaik-Eem (Malaysia); back row (l-r): Dr. Akira Kurihara (Japan), Dr. Hiroshi Kawai (Japan), Dr. Takeo Kurihara (Japan), Dr. Paul Geraldina (Philippines), and Dr. Michio Otani (Japan); missing from the photograph: Dr. Suchana (Apple) Chavanich (Thailand).



RAS workshop participants getting ready to visit collection sites: Front row (l-r): Dr. Michio Otani (Japan), Dr. Lim Phaik-Eem (Malaysia), Dr. Tan Koh Siang (Singapore), Dr. Takeaki Hanyuda (Japan) and Dr. Takeo Kurihara (Japan); back row (l-r): Dr. Hisashi Yokoyama (Japan), Takashi Nozawa (Japan), Dr. Zhongmin Sun (China), Dr. Paul Geraldina (Philippines), Dr. Roike Montolalu (Indonesia), Dr. Thomas Therriault (Canada), Dr. Hiroshi Kawai (Japan), Dr. Teodora Bagarinao (Philippines); missing from the photograph: Dr. Suchana (Apple) Chavanich (Thailand) and Dr. Akira Kurihara (Japan).



RAS workshop participants at the Kobe University Marine Station sorting and identifying material collected from surveys on Awaji Island, Japan.

The workshop exposed participants to (1) a background about marine non-indigenous species and why vigilance is required, using a series of short lectures, (2) hands-on experience in making field collections in a variety of coastal environments, and (3) laboratory experience using keys and reference material to identify the organisms collected. Since the workshop focused on background and techniques, actual taxonomic experts were not utilized in this demonstration, but would play a critical role in actual RAS. Taxonomic experts have a broad knowledge of their taxonomic group amassed over time spent studying thousands of individuals from different geographical areas to resolve identifications – skills taxonomic generalists must develop to confidently resolve identifications (and potential invasion status). Further, given that taxonomy for some species will be controversial and that reference collections are important to document the occurrence of non-indigenous species, it is imperative that voucher specimens be maintained for future reference.

Workshop participants visited a number of sites around Osaka Bay where they were shown techniques to sample a

variety of different habitats. On the first day, we visited a site on Awaji Island where participants made timed walk collections in two different inter-tidal habitats, one exposed directly to Osaka Bay with no development, and the other a small enclosed basin with shoreline development and small boat anchorages. These inter-tidal collections were supplemented with snorkelling collections made in the shallow sub-tidal environment directly adjacent to the shore, providing excellent specimens of crabs, bivalves, and tunicates. Loaded with bags of samples, participants returned to the Marine Station where they spent the afternoon identifying the treasures they had collected. On the second day, we focused on the application of collector plates to monitor for the introduction (and/or spread) of fouling organisms like algae, tunicates, and bryozoans that have received much attention in the invasion literature lately. Dr. Kawai and his colleagues have utilized these collectors to monitor changes in algae and invertebrate species in different parts of Osaka Bay over the past few years. Participants were able to observe first-hand differences in fouling communities between a study site in the inner part of Osaka Bay (highly developed) and another near the Marine Station on the outer part of the Bay (relatively pristine). Again, samples were collected and returned to the laboratory for further processing. As thunderstorms pounded the Marine Station on the third day, participants were introduced to the PICES WG 21 database on marine and estuarine species developed by Dr. Henry Lee II and Ms. Debbie Reusser. This hierarchical database, built on marine eco-regions of the world, can allow researchers from developing countries to archive their data in a systematic way that is then directly available both to them and to PICES member countries.

The positive feedback from workshop participants was overwhelming, with many participants eager to initiate aspects of RAS within their home countries. In fact, the feedback on this type of outreach and training activity was so encouraging that Drs. Therriault and Kawai are working with Dr. Apple Chavanich to host a larger demonstration workshop in 2011 in Bangkok, Thailand.

Dr. Thomas Therriault (Thomas.Therriault@dfo-mpo.gc.ca) is a Research Scientist with Fisheries and Oceans Canada (DFO) at the Pacific Biological Station in Nanaimo, British Columbia. Tom is working on a number of aquatic invasive species research questions both within DFO and through the Canadian Aquatic Invasive Species Network (CAISN). He is the Principal Investigator for the Taxonomy Initiative of PICES WG 21 on Non-indigenous Aquatic Species (under the project on “Development of the prevention systems for harmful organisms’ expansion in the Pacific Rim” supported by the Ministry of Agriculture, Forestry and Fisheries (MAFF) of Japan) that includes rapid assessment surveys (RAS) for non-indigenous species. Within PICES, Tom serves as Vice-Chairman of Science Board and leads the FUTURE Advisory Panel on Anthropogenic Influences on Coastal Ecosystems (AICE). He is a member of the Marine Environmental Quality (MEQ) Committee and the PICES Study Group on Developing a Framework for Scientific Cooperation in Northern Hemisphere Marine Science.