

Introduction to Rapid Assessment Survey Methodologies for Detecting Non-indigenous Marine Species

by Thomas Therriault



Thanks to a contribution from the Ministry of Agriculture, Forestry and Fisheries (MAFF) of Japan, through the Fisheries Agency of Japan (JFA), funding for a PICES project entitled “*Development of the prevention systems for harmful organisms’ expansion in the Pacific Rim*” has allowed Working Group 21 (http://www.pices.int/members/working_groups/wg21.aspx) to advance its understanding of non-indigenous marine species in the North Pacific. As highlighted in previous PICES Press articles, WG 21 has employed Rapid Assessment Surveys (RAS) to quickly characterize the native, non-native, and cryptogenic species present in coastal areas of different PICES member countries. To date, RAS have been conducted in 2008 in Dalian (People’s Republic of China), in 2009 in Jeju (Republic of Korea), in 2010 in Newport (U.S.A.), and most recently near Vladivostok, Russia, in 2011 (*see related PICES Press article in this issue*). In addition, this funding has allowed for capacity building in non-PICES member countries. In July 2010, a pilot workshop was held at the Marine Station of Kobe University’s Center for Inland Seas (Awaji Island, Japan) to provide participants from developing countries with the tools to conduct RAS in their own waters (PICES Press, 2011, Vol. 19, No. 1, pp. 30–31).

The positive feedback from workshop participants was so overwhelming that Drs. Thomas Therriault (Pacific Biological Station, Fisheries and Oceans Canada) and Hiroshi Kawai (Kobe University, Japan) started planning for a larger RAS demonstration workshop for 2011. Given the global nature of biological invasions, it was critical to engage researchers

working on this important topic outside the six PICES member countries, especially those locations adjacent to the PICES region where the potential transport of non-indigenous species is expected to be high. The Intergovernmental Oceanographic Commission’s Sub-Commission for the Western Pacific (WESTPAC) has been assisting their member countries in studying marine non-indigenous species since 2009, with a focus in Southeast Asia, and the shared interests of the two organizations represented an excellent opportunity to collaborate on marine non-indigenous species issues. Dr. Apple Chavanich offered to host the joint workshop in Thailand, given its logistical benefits.

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 subtidal habitats. In addition, data from each of these surveys have been archived in the WG 21 database, thereby making it more broadly available. Thus, the objectives of the demonstration workshop on “*Rapid Assessment Survey methodologies for detecting non-indigenous marine species*” were to:

- (1) provide hands-on training to researchers from developing Southeast Asian countries concerned about the potential introduction of non-indigenous marine species;
- (2) introduce the PICES WG 21 database on non-indigenous marine species; and
- (3) foster collaboration between PICES and WESTPAC.



Workshop participants explore the intertidal zone near the Phuket Marine Biological Center.



Workshop participants engaged in sample processing and species identifications.

The workshop was held July 19–21, 2011, at the Marine Biological Center, Phuket, Thailand, with more than 25 participants from the People's Republic of China, Hong Kong, Indonesia, Malaysia, the Philippines, Republic of Korea, Singapore, Thailand, and Vietnam. The workshop was supported by PICES, WESTPAC and the Phuket Marine Biological Center, and co-convened by Drs. Apple Chavanich (WESTPAC), Hiroshi Kawai (PICES), and Thomas Therriault (PICES).

The workshop kicked off on Day 1 with a warm welcome from the Director of the Phuket Marine Biological Center, Mr. Wannakiat Thubthimsang. Following an introduction from the co-convenors and with participants providing a bit of background about themselves, information about PICES and WESTPAC initiatives on non-indigenous marine species were discussed. However, with the Marine Biological Center positioned right on the Andaman Sea, it did not take long to get to the hands-on part of the workshop, and participants visited a number of intertidal sites around the Center and the dock where a Thai research vessel was tied up. Thus, participants were exposed to techniques for sampling a variety of different habitats and organisms. Dr. Kawai supplemented algal collections by snorkelling in the warm (but murky) nearshore waters. Loaded down with bags full of live samples, participants returned to the Marine Biological Center where they spent

time identifying the various organisms they had collected. On the second day the workshop shifted towards data collection and data sharing. Dr. Therriault introduced the PICES WG 21 database on non-indigenous marine species developed by Drs. Henry Lee and Debbie Reusser. This hierarchical database, based on marine eco-regions of the world, will allow participants from developing countries to archive their data in a systematic way that is then directly available both to them and to scientists from PICES member countries. The afternoon saw a bit of free time emerge, and most participants visited the nearby Phuket Aquarium before regrouping for a wonderful all-you-can-eat seafood buffet. The last day included a special lecture on how genetic techniques can be used to resolve invasion patterns in marine systems, and workshop attendees each provided an overview of the types of research they are conducting with respect to non-indigenous species.

Overall, this workshop exposed participants to a background about marine non-indigenous species and why vigilance is required, using a series of short lectures, hands-on experience in making field collections in a variety of coastal environments, and laboratory experience using keys and reference material to identify organisms collected. Since this 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.



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 second Canadian Aquatic Invasive Species Network (CAISN II). He is the Principal Investigator for the Taxonomy Initiative of PICES Working Group 21 on Non-indigenous Aquatic Species that includes rapid assessment surveys (RAS) for non-indigenous species. Within PICES, Tom serves as Vice-Chairman of Science Board and Chairman of the FUTURE Advisory Panel on Anthropogenic Influences on Coastal Ecosystems. He is a member of the Marine Environmental Quality Committee and the PICES/ICES Study Group on Developing a Framework for Scientific Cooperation in Northern Hemisphere Marine Science.