

2009 PICES Rapid Assessment Survey

by Graham Gillespie and Thomas Therriault

PICES Working Group on *Non-indigenous Aquatic Species* (WG 21) has been working to increase our understanding of marine non-indigenous species (MNIS) in the North Pacific since 2006. The taxonomy initiative is one of two key MNIS research activities within a 5-year (2007–2012) PICES project on “*Development of the prevention systems for harmful organisms’ expansion in the Pacific Rim*” supported by a voluntary contribution from the Ministry of Agriculture, Forestry and Fisheries of Japan, through the Fisheries Agency of Japan. Under the supervision of Dr. Thomas Therriault (Fisheries and Oceans Canada), this initiative has evolved to include both rapid assessment surveys and collector surveys. The first PICES Rapid Assessment Survey (RAS) was carried out in October 2008, in conjunction with the PICES Annual Meeting in Dalian, China. This article discusses the second RAS conducted in October 2009, immediately prior to the PICES Annual Meeting in Jeju, Korea. The 2009 RAS was a tremendous success thanks to excellent logistical support and local knowledge supplied by our hosts, Drs. Kyoung Soon Shin and Jung-Hoon Kang (Korea Ocean Research and Development Institute, Geoje).

A rapid assessment survey provides the opportunity to catalogue native, non-indigenous and cryptogenic species at a given place and time. Repeated surveys over time

generate important baseline information that allows researchers to, among other things, determine when new species arrive. Our surveys target commercial ports in PICES member countries, as ports have a greater probability of containing non-indigenous species. Not only do these locations serve as a recipient environment for organisms transported by commercial shipping (ballast water, ballast sediment, hull fouling), they often have high levels of secondary traffic (recreational or small craft, aquaculture transfers) and tend to be more disturbed than natural environments, a factor that could enhance invasion success. The PICES surveys focus on two major port ecosystem components, namely intertidal and subtidal habitats. Intertidal habitats are sampled using both a timed walk and quadrat/grab sampling methods, and subtidal habitats are sampled using fouling organism collectors, trapping for macrofauna (primarily fish and crabs) and a survey of the fouling communities on floating docks and their associated structures. These surveys are qualitative rather than quantitative and endeavour to capture species composition within each location surveyed, not characterize abundance of any specific species. Classification of species as native, non-native or cryptogenic occurs following species identification based on literature accounts, general rules for classification of status, and discussion by members of the RAS team.



2009 PICES Rapid Assessment Survey team.



Discussion of the 2009 PICES Rapid Assessment Survey results at the WG 21 meeting, October 23, 2009, Jeju, Korea.

In addition to the authors of this article, the 2009 PICES RAS team consisted of Darlene Smith (National Headquarters, Fisheries and Oceans Canada); Masaya Katoh (Seikai National Fisheries Research Institute, Japan), Hisashi Yokoyama (National Research Institute of Aquaculture, Japan); Jin-Woo Choi, Jung-Hoon Kang, Kyoong-Soon Shin, Seungshic Yum (Korea Ocean Research and Development Institute, Korea); Sae-Heung Kim, Jong-Rak Lee and Eun-Young Yim (Jeju Biodiversity Research Institute, Korea); Eduard Titlyanov and Tamara Titlyanova (Institute of Marine Biology of RAS, Russia); Suchana Apple Chavanich (Chulalongkorn University, Thailand); John Chapman (Oregon State University, U.S.A.) and Judith

Pederson (MIT Sea Grant Program, U.S.A.). Laboratory space, equipment, and reference material were graciously provided by the Jeju Biodiversity Research Institute (Jeju Hi-Tech Industry Development Institute, Seogwipo, Jeju, Korea).

During the summer of 2009, three collector plates were deployed at different locations within each of the following four ports: Busan, Masan, Jangmok, and Ulsan. These locations represented different levels of shipping and human-use activity that might suggest different patterns in non-indigenous species occurrence. The collector plates were subsequently processed in Jeju, the week prior to the

PICES Annual Meeting, by the assembled international team of participants. Further, since one of the goals of these surveys is to act as a conduit of knowledge, Korean RAS team members participated in hands-on field sampling in Jeju at Seogwipo Port and Sunrise Peak, Sungsan (UNESCO's World Nature Heritage Site). Seogwipo Port was typical of a multi-use commercial area, with sampling conducted in and around the port using a chartered fishing vessel. In addition, three baited traps were deployed at this location to sample more mobile fauna. The Sungsan location was selected to demonstrate sampling at an intertidal beach where a number of bivalve and algal species were found. Preliminary results of the 2009 RAS include 213 taxa from the following groups: crustaceans (58 taxa), algae (55 taxa), molluscs (54 taxa), polychaetes (37 taxa), ascidians (9 taxa), bryozoans (7 taxa), cnidarians and echinoderms (4 taxa each), porifera (3 taxa) and one taxon each of platyhelminth and fish. Most taxa were identified to the species level, although many are provisional identifications and will require further investigation. Also, some taxa could only be identified to higher taxonomic levels (genus, family or order). Currently, we are able to classify

four species as non-indigenous: the bivalve mollusc *Mytilus galloprovincialis*, the cirriped *Balanus eburnus*, the amphipod *Podocerus cristata* and the polychaete *Hydroides norvegica*. A further 17 species were classified either as cryptogenic or status uncertain so it is possible that other non-indigenous species were encountered, but identifications and classifications are pending.

The 2008 RAS in Dalian, China, identified a total of 119 taxa, three of which (all bivalve molluscs) were classified as non-indigenous (PICES Press Vol. 17, No. 1, pp. 30–32). The larger species list in 2009 may be a reflection of the taxonomic expertise available for the Korean RAS or may be due to higher diversity at examined intertidal sites. Because several identifications remain provisional, both the total number of species and the number of non-indigenous species may increase for both the Chinese and Korean surveys.

As future surveys continue to gather distributional data for a number of taxa among PICES member countries, it will be possible to better understand the extent of non-indigenous marine species in coastal waters of the North Pacific Ocean.



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