

PICES WG 21: Non-Indigenous Aquatic Species

Intersessional FUTURE Meeting
Seoul, Korea: Aug 16-18, 2010

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Non-Indigenous Aquatic Species

- No country is immune to the ecological and economic impacts of non-indigenous aquatic species (NIS)
- Recognizing that this issue was important for its member countries, PICES developed a Terms of Reference (ToR) for future work on NIS at its 15th annual meeting in 2005 in Vladivostok.
- Working Group 21 (WG-21) was established to fulfill these ToRs and has met annually since 2006 with one inter-sessional meeting in 2008.

WG-21 Terms of Reference

1. Assesses the status of Non-Indigenous Aquatic Species in the PICES area by:
 - completing an inventory of currently reported estuarine and marine aquatic non-indigenous species in PICES member countries;
 - compiling definitions of terms and making recommendations on use of terms;
 - summarizing the situation on bioinvasions in the North Pacific; and
 - comparing and contrasting to other regions.
2. Assemble an inventory of expertise and programs related Non-Indigenous Aquatic Species in PICES member countries by:
 - compiling a list of existing databases of Non-Indigenous Aquatic Species experts; and
 - compiling sources of information on relevant national research and monitoring programs in PICES member countries.
3. Prevention and mitigation measures:
 - summarize initiatives on prevention and mitigation measures and
 - develop recommendations for best practices for prevention and mitigation.

WG-21 Terms of Reference

4. Promote collaboration between ICES and PICES Working Groups on NIS:
 - holding joint meetings of the ICES and PICES WG-21 as conveniently as practical; and
 - developing and recommending an approach for enhances linkages between ICES and PICES on Non-Indigenous Aquatic Species.
5. Develop a comprehensive Non-Indigenous Aquatic Database.
 - MAFF funded project (details to follow)
6. Establish a North Pacific Marine Non-Indigenous Aquatic Species taxonomy initiative.
 - MAFF funded project (details to follow)
7. Publish an interim report in 2010 and a final report in 2012 summarizing results and recommendations.

MAFF Funded Projects

- The Government of Japan through its Ministry of Agriculture, Forestry and Fisheries (MAFF) is providing \$1 million (USD) over five years (2007-2012) to fund PICES projects on NIS and Harmful Algal Blooms
- WG-21 has undertaken two major projects with this funding:
 1. a taxonomy initiative; and
 2. the development of an NIS database for the North Pacific

WG-21 MAFF Funded Projects

- The Taxonomy Initiative
 - PI Thomas Therriault, Canadian DFO
 - Four components:
 1. Identify taxonomic needs in PICES member countries
 2. Develop Rapid Assessment Surveys (RAS)
 3. Develop collector surveys
 4. Develop taxonomic information system/tools
- The Database Development
 - PIs Deborah Reusser, USGS and Henry Lee II, US EPA
 - Objective to Develop and populate a database of marine/estuarine species that can be queried for distributional, ecological, and physiological data at different taxonomic levels and spatial distributions

Rapid Assessment Surveys

- Rapid Assessment Surveys (RAS) conducted annually in the host country for the PICES annual meeting the week prior to the meeting
- RAS would utilize as many taxonomic experts and assistants as possible from the host country with supplemental taxonomic experts as required
- Geo-referenced data on native and non-native species would be entered into the database being developed by WG-21

Rapid Assessment Surveys

- RAS initially will focus on two port locations within each host country
 - globally, ports are among the most invaded habitats
 - commercial shipping (ballast water, hull fouling, sea chests and other niche areas) continues to be responsible for redistributing species
 - a number of other human-mediated activities occur within ports that could make them more susceptible to invasion and/or provide access to other potential vectors
- RAS methodology is transparent, relatively low-cost, and transferrable

Rapid Assessment Surveys

- Currently we are developing connections to other organizations interested/working on non-indigenous aquatic species
 - IOC WESTPAC
 - ICES
 - NOWPAP
- One goal is to transfer RAS methodology to developing countries
- Another is to share distributional data for native/non-indigenous species at the Pacific or global level

RAS Design

- RAS is designed to focus on as many intertidal and subtidal habitats as possible such as:
 - piers/dock pilings
 - intertidal habitats
 - channel markers/buoys
 - deployment of collectors/traps
- Samples can be collected either live or in advance and preserved for taxonomic identification
- Taxonomic experts identify all organisms to the lowest taxonomic level possible, data is entered into the database along with documentation

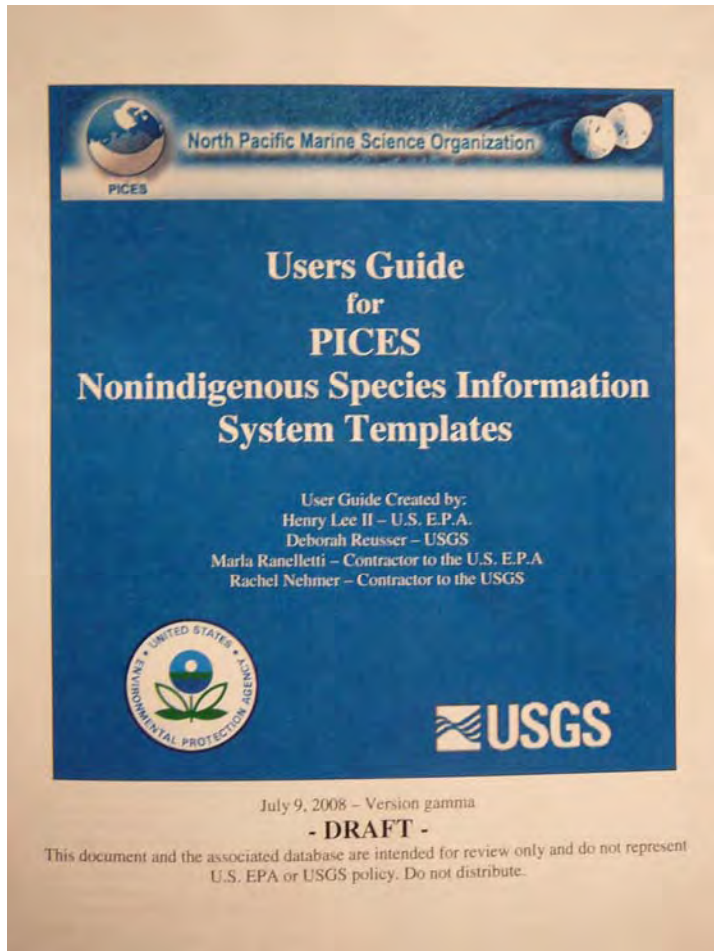


Taxonomy

- Taxonomic experts are a **critical** component of RAS because of their broad understanding of taxa
- Taxonomic generalists are valuable for sample sorting and assisting experts
- WG-21 will use as many taxonomic experts as possible from the host country but will supplement these with additional experts
- Voucher specimens will be retained for future reference by the host country

Non-Indigenous Species Information System

- Objective to:
 - develop a queriable natural history that allows users to extract information on multiple species and locations; and to
 - couple natural history with species' distributions to better predict potential risks



Non-Indigenous Species Information System

- PICES Nonindigenous Species Information System is an ACCESS 2003 Database
- Runs on any Windows platform that has all service packs installed
- Permits each country to list their non-indigenous aquatic species
- To reduce language barriers, a graphical interface is used to the extent possible

Biogeography

- Species distributions are captured hierarchically using the global “Marine Ecosystems of the World” (MEOW)
 - 12 realms, 62 provinces, 232 ecoregions
- A gazetteer of harbours, bays and estuaries is being developed to allow input by water body as well as by biogeographic region.
- Hierarchical natural history typology that allows users to capture information on species’ habitat, physiological and life history characteristics.

Database Contents

- Species
- Hierarchal biogeography at the realm, province and ecoregion level
- Ecosystem type
- Salinity
- Life history & development
- Habitat
- Temperature
- Trophic level & feeding
- Invasion vectors

Species Add/Edit

Add Species Form

Add Species

Edit Species

Kingdom

Animalia

Subkingdom

Eumetazoa

Phylum

Mollusca

Subphylum

Superclass

Class

Bivalvia

Subclass

Heterodonta

Infraclass

Superorder

Euheterodonta

Order

Veneroida

Suborder

Infraorder

Superfamily

Veneroidea

Family

Veneridae

Subfamily

Venerinae

Tribe

Species ID

1553

Species Name

Mercenaria mercenaria

Edit

Author

(Linnaeus, 1758)

ITIS Code

81496

Taxa Code

Bivalve

Data Source

Carlton, 1992

View/Edit References

Add Publication

Safe Edit

Common Names

northern quahog

quahog

cherrystone

little neck

Also Reported as

Mercenaria kennicottii

Synonym

Venus (Mercenaria) mercenaria

Synonym

Venus mercenaria

Synonym

Type Locality

Pensylvania (montibus Sveciae fossilis)

Location of Type

Clear Hierarchy

Update Species Information

View/ Edit Comments

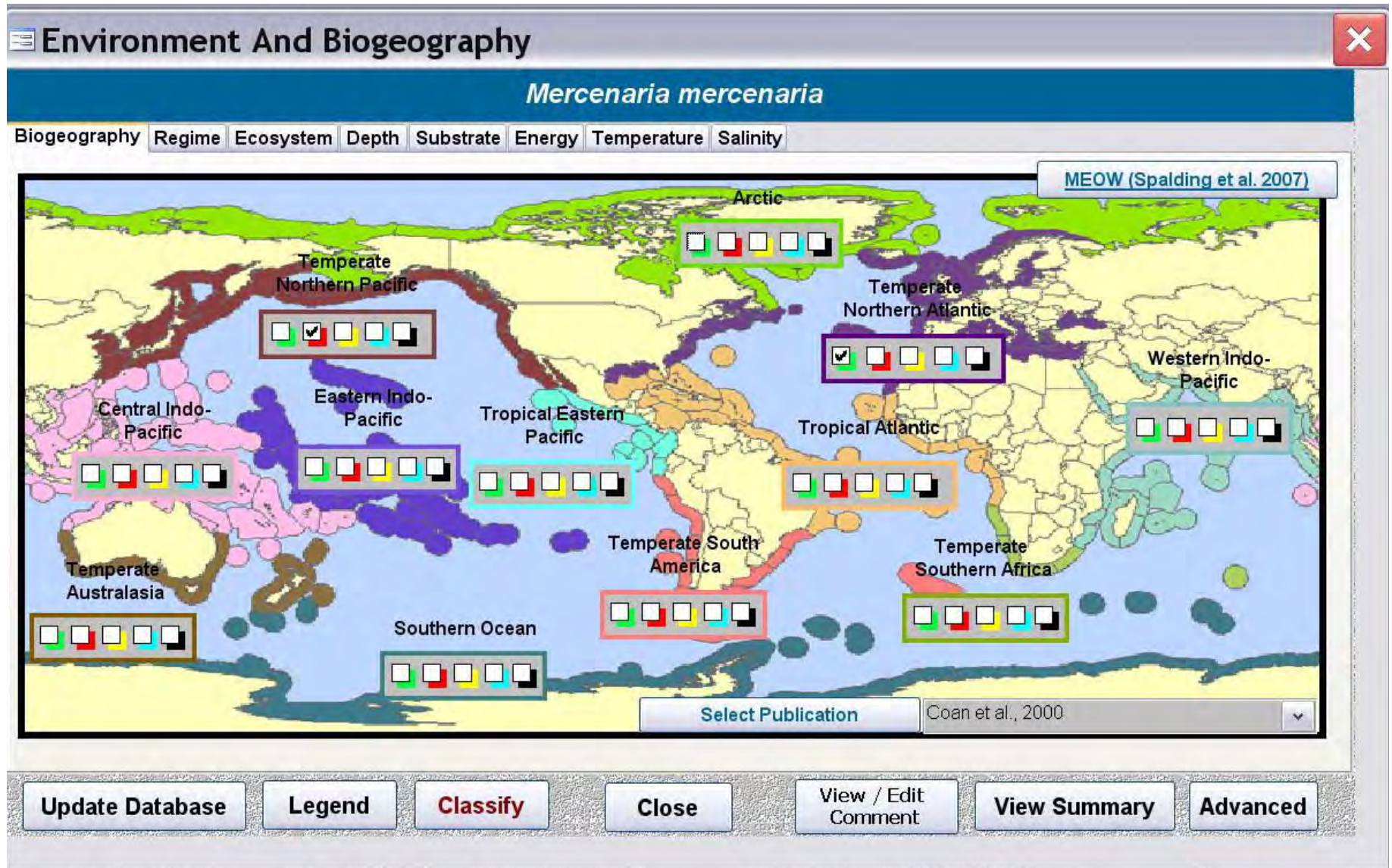
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Environment and Biogeography

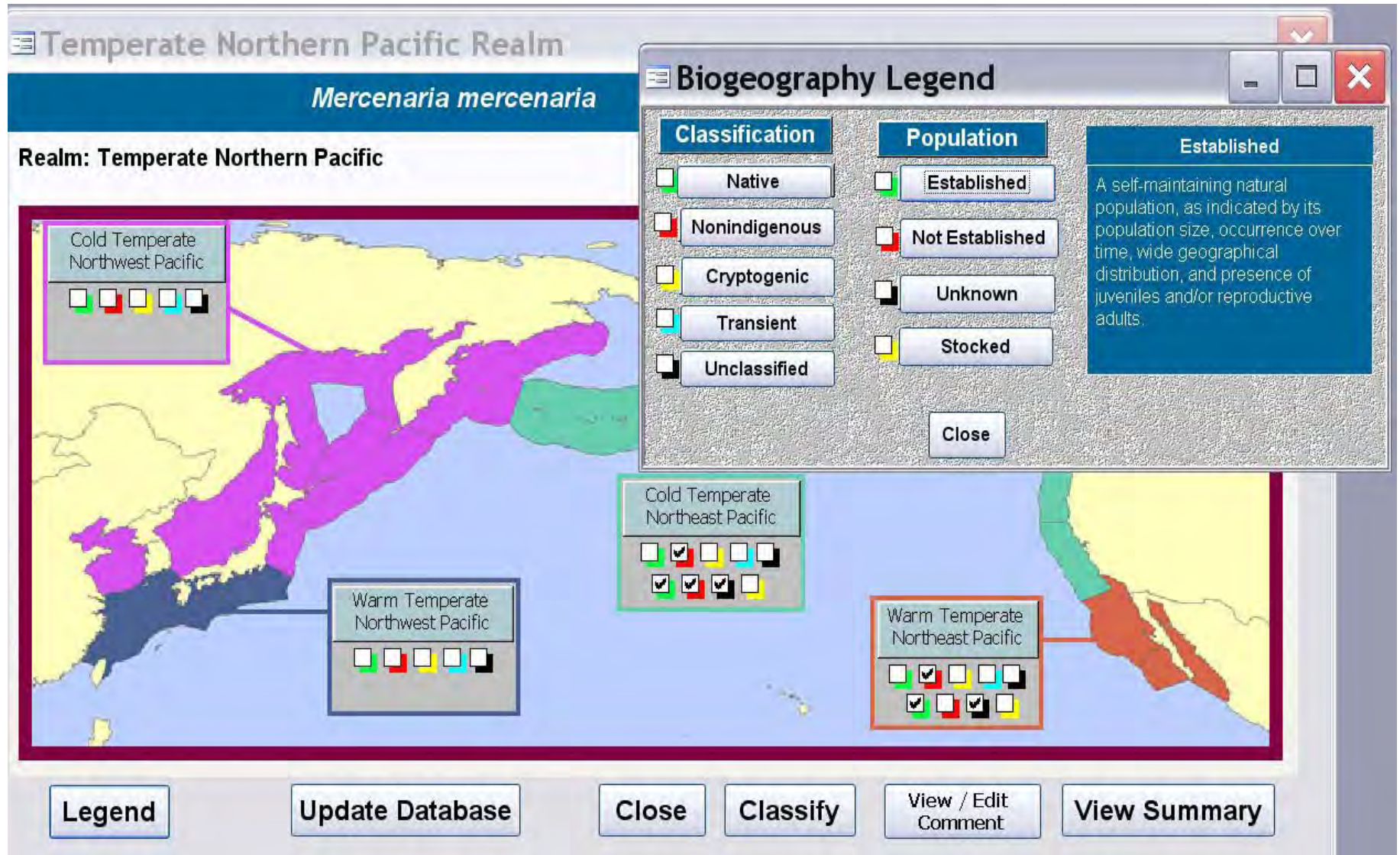
Life History

Invasion

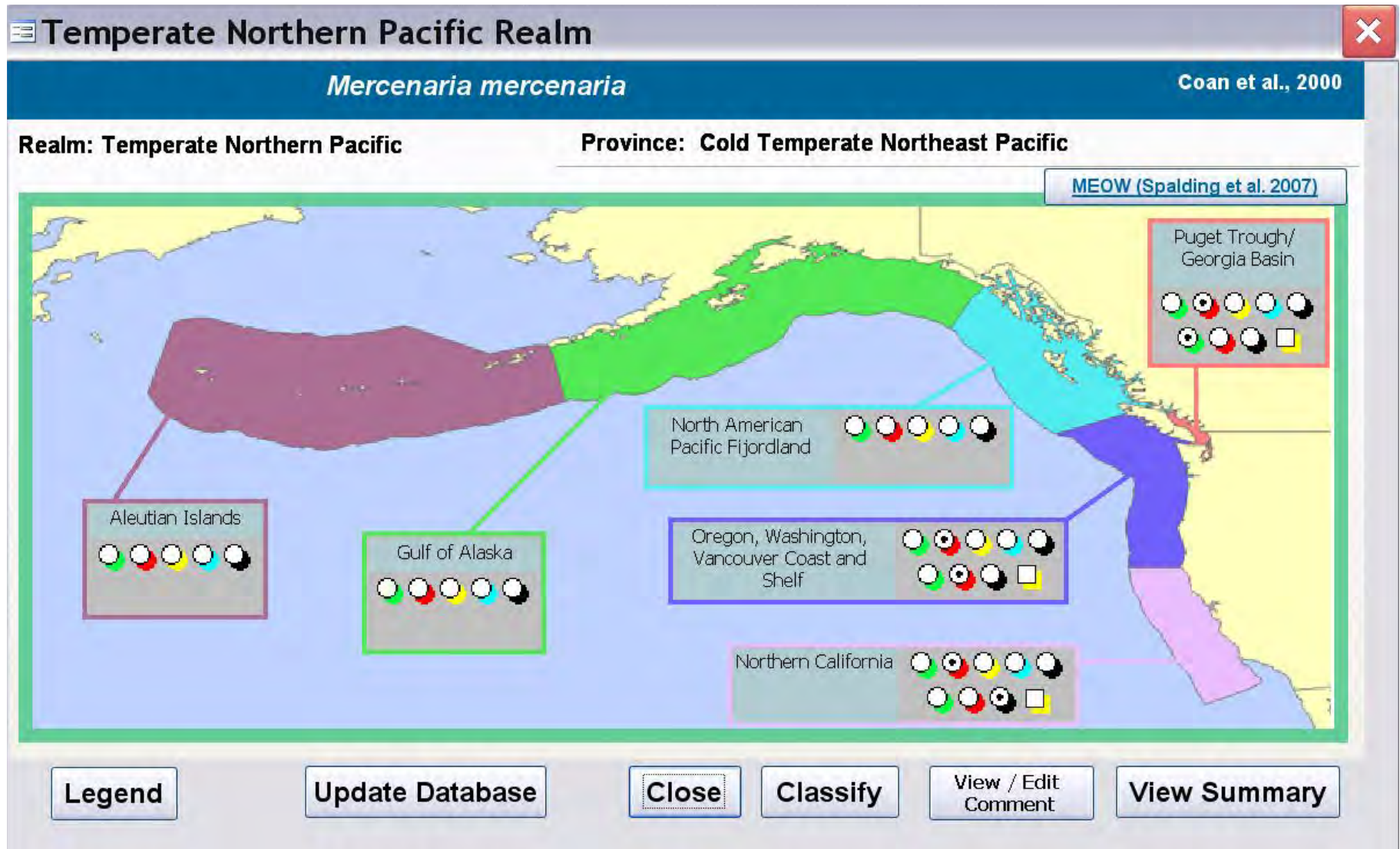
Hierarchical Biogeography - Realms



Hierarchical Biogeography - Provinces



Hierarchical Biogeography - Ecoregions



Key WG-21 Milestones

1. Two Major Initiatives Developed at PICES 2007 in Victoria
 - MAFF funded Database Project (Henry Lee II, USA as lead)
 - MAFF funded Taxonomy Initiative (Thomas Therriault, Canada as lead);
2. Intersessional Database Meeting in Busan, Korea: Winter 2008
3. First Rapid Assessment Survey for Non-indigenous Species in Dalian, China, Oct 2008
4. Full day Session on Invasive Species at PICES 2008 in Dalian
5. Support of 6th International Conference on Marine Bioinvasions, Portland, OR, USA, Aug 2009
6. Second Rapid Assessment Survey for Non-indigenous Species in Jeju, Korea, Oct 2009
7. Demonstration Survey on RAS Techniques for Southeast Asian (Developing) Countries, Awaji Island, Japan, July 2010
8. Third Rapid Assessment Survey for Non-indigenous Species in Newport, OR, USA, Oct 2010

Potential Linkages to FUTURE

- (1) What determines an ecosystem's intrinsic resilience and vulnerability to natural and anthropogenic forcing?

Non-indigenous species can represent a significant stressor in aquatic ecosystems. The rapid assessment surveys (RAS) and country reports are providing baseline data on non-indigenous species across the North Pacific: data that is being entered into WG 21's Database. This data can help identify ecosystems with greater resilience/vulnerability to this forcing.

Additional biological or environmental data could be collected for sites with contrasting diversity/abundance of non-indigenous species.

Potential Linkages to FUTURE

- (2) How do ecosystems respond to natural and anthropogenic forcing, and how might they change in the future?

Non-indigenous species can represent a significant stressor in aquatic ecosystems. Research on the impacts of non-indigenous species in different ecosystems can help identify “priority” species for monitoring/mitigation/control. Further, the distribution and potential impact of non-indigenous species is expected to change in the future owing both to changes in vectors of introduction/spread and changes in the receiving environment possibly allowing new species to establish or existing populations to erupt.

Potential Linkages to FUTURE

- (3) How do human activities affect coastal ecosystems and how are societies affected by changes in these ecosystems?

Non-indigenous species are largely redistributed globally by human-mediated activities (e.g., commercial shipping, aquaculture related activities, recreational boating, live food sales, etc.). For many non-indigenous species the impacts are often difficult to determine and/or measure. However, for “invasive” species, the impacts on society are clear. For example, globally, the impacts of non-indigenous tunicates on shellfish aquaculture are becoming very clear with significant losses in productivity and societal benefits.

Human-mediated introductions will continue. An understanding of introduction vectors, prevention strategies, and monitoring programs will help limit societal losses.