



## FUTURE and the FUTURE Open Science Meeting — The future of FUTURE

by Harold (Hal) Batchelder

FUTURE (Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems) is the second integrative science program implemented by PICES. The first science program of PICES, the Climate Change and Carrying Capacity (CCCC) program, had a goal of increasing understanding of climate influences on marine ecosystems, especially as climate might impact the carrying capacity of the North Pacific to support fish resources. The goals of FUTURE go beyond understanding climate effects to understanding how marine ecosystems in the North Pacific respond to climate change *and human activities*, to *forecast ecosystem status* based on a contemporary knowledge of how nature functions, and to *communicate new insights* to its members, governments, stakeholders and the public. This is a much broader mandate than that expected from the CCCC program. It also includes new, and in some cases, unfamiliar or difficult aspects such as developing useful (e.g., skillful, with uncertainty estimates) climate-ecosystem products and engaging with non-scientific stakeholders to determine what products are useful and desired, and how to deliver those to receptive audiences.

The leadership of PICES, while very satisfied with the scientific productivity of the CCCC integrative program, felt there was a disconnect between the program and the six standing committees of PICES, which are oriented along the disciplines or technical needs of the Organization. Thus, there was a desire to better integrate the activities of FUTURE into the committees. This was done by tasking the leadership of FUTURE to the PICES Science Board, which includes as its members the chairman of each committee. Science Board receives advice from three Advisory Panels (AP) that make up FUTURE, whose chairs are also members of Science Board: AP-COVE: *Climate Ocean Variability and Ecosystems*, AP-AICE: *Anthropogenic Influences on Coastal Ecosystems*, and AP-SOFE: *Status, Outlooks, Forecasts and Engagement*.

New expert groups would be proposed, and if approved by Council, established to work on new tasks that require specific expertise or focused effort. Since the start of FUTURE in October 2009, six new working groups, two sections and five study groups have been created to specifically address scientific issues relevant to FUTURE.

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The new working groups established specifically to address components of FUTURE are: [WG 26](#), *Jellyfish Blooms around the North Pacific Rim: Causes and Consequences*; [WG 27](#), *North Pacific Climate Variability and Change*; [WG 28](#), *Development of Ecosystem Indicators to Characterize Responses to Multiple Stressors*; [WG 29](#), *Regional Climate Modeling*; [WG 30](#), *Assessment of Marine Environmental Quality of Radiation around the North Pacific*; and [WG 31](#), *Emerging Topics in Marine Pollution*. These working groups have clearly defined terms of reference, and are expected to complete their tasks usually within three, or exceptionally four, years. The two new Sections on *Climate Change Effects on Marine Ecosystems (S-CCME)* and *Human Dimensions of Marine Systems (S-HD)*, created to advance FUTURE objectives, are expected to continue during the entire program. The Study Groups on *Socio-Ecological-Environmental Systems (SG-SEES)* and *Biodiversity Conservation (SG-BC)* were approved by Governing Council at PICES-2013. A common result from study groups is the recommendation of a longer term group, usually a working group, to pursue the problem over multiple years. SG-SEES will develop an integrated Social-Ecological-Environmental model case study of hypoxia and acidification in a coastal ocean and recommend a suitable focus region. SG-BC will review drivers of biodiversity change in the North Pacific, identify new approaches for advancing biodiversity-based research in the North Pacific, review past biodiversity research and identify potential collaborations and the potential to provide evidence-based advice for informing diversity conservation and management. Both new study groups will meet at PICES-2014 in Yeosu, Korea.

A workshop to develop a FUTURE “roadmap” was held in May 2012 to provide higher level coordination of the various expert groups that are contributing to furthering the FUTURE objectives. A roadmap (basically sufficient information to get from where we were two years ago to where we want to be in 2019, when FUTURE will be 10 years old) was developed. What emerged from this meeting was more a timeline than a map, but it did provide indications of what new expert groups might be needed and what FUTURE activities would occur. Included in the roadmap were:

- Products (new science knowledge, status reports, forecasts and outlooks, outreach and engagement),
- Expert group contributions and future needs, and
- Events (e.g., symposia, workshops).

Roadmaps with these “landmarks” are updated about twice a year and can be viewed at [http://pices.int/members/scientific\\_programs/FUTURE/FUTURE-roadmap.aspx](http://pices.int/members/scientific_programs/FUTURE/FUTURE-roadmap.aspx).

Also at this workshop, PICES expert groups described products that might emerge from the FUTURE activities within the next 2–3 years, which is about at the time that this article is being written. It was recognized at the meeting that products should be driven by demand from stakeholders, which were (a) not represented at the workshop, and (b) have not yet been surveyed or asked to specify their needs. Products available within a few years were judged to be sufficiently close that they were likely to appear during FUTURE but still provide time to identify receptive audiences (outside of the scientific community). PICES took an adaptive approach to focus on products that will be ready for communication soon, and to identify and contact potential users to begin dialog to make products relevant to their needs. Fifteen “potential” FUTURE products were listed in a PICES Press (Vol. 20, No. 2, pp. 5–8) [article](#) about the ISB-2012 meeting and roadmap workshop. While many are actively being worked on, or perhaps are ready, none have, to this writer’s knowledge, actually been delivered to non-scientist stakeholders. Another recommendation that emerged from the roadmap workshop was to hold a FUTURE Open Science Meeting in the spring of 2014. This meeting was to serve many purposes, but I will mention only two here. First, to showcase (and dare I say, celebrate) the breadth and depth of FUTURE-related science that has been accomplished and second, to provide an opportunity for self assessment and external critique of the FUTURE program goals, progress and structure. The convenors of most of the scientific sessions and workshops have written summaries for this newsletter, which I personally thank them for their efforts on organizing, convening and summarizing these sessions/workshops. As to the assessment and critique, I will leave that to the FUTURE Evaluation Team.



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