

Capacity building: PICES scientists reach out to the next generation of oceanographers in Vladivostok

by Harold (Hal) Batchelder

In a similar vein to the very successful visits by PICES scientists to grammar, middle and high schools during PICES-2015 in Qingdao, China, another set of lectures was given by scientists volunteering their time at two venues: one at the same location as the Annual Meeting – the Far Eastern Federal University (FEFU) on Russkyi Island campus – and one in downtown Vladivostok at the International Linguistics School. Lectures were geared towards two different cohorts.

To minimize speaker conflicts with PICES sessions, it was clear that the best option for public lectures for both events was after lunch on the Thursday of the Annual Meeting.

Once we knew when these lectures were needed, I worked with others at the meeting, especially Dr. Igor Shevchenko (TINRO-Center) to contact scientists who did not have presentation conflicts during Thursday afternoon. It was easy to recruit volunteers for these classroom lectures, as we had done similar outreach for three schools in Qingdao, China during the Annual Meeting in 2015. Interest then was so great that we had to decline a number of volunteers (see [page 11](#) in the 2016 winter issue of PICES Press (Vol. 24, No. 1). For the undergraduate lectures at FEFU, the three speakers were Dr. Steven Bograd (Co-Chair of the PICES Scientific Program on Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems “FUTURE” SSC), Mr. Peter Chandler (Co-Chair of the Working Group on the *Third North Pacific Ecosystem Status Report*), and Dr. Ryan Rykaczewski (FUTURE-SSC member, and Co-Chair (CLIVAR) of the Working Group on *Climate and Ecosystem Predictability*). Presenting at the International Linguistic School were Professor Emanuele Di Lorenzo (Chair of the Physical Oceanography and Climate Committee and Vice-Chair of PICES Science Board), Professor Keith Criddle (Chair of the Human Dimension Committee), and Dr. Thomas Theriault (Acting Co-Chair of the Advisory Panel on *Marine Non-indigenous Species* and Vice-Chair of the Marine Environmental Quality Committee).

The sequence of talks at FEFU began with Dr. Bograd introducing the audience to PICES, and then asking the question that was posed by Professor Warren Wooster (principal founder of PICES) in 1992 at the very first Annual Meeting, “*What is the nature of the subarctic Pacific ecosystem (or ecosystems) and how is it affected over periods of months to centuries by changes in the physical environment, by interactions of components of the ecosystem, and by human activities.*” Steven described the

early years of PICES, and provided details about its first integrative science initiative, the Climate Change and Carrying Capacity (CCCC) program, which lasted 15 years and focused on understanding how climate change and variability impact the structure of ecosystem, and the productivity at many trophic levels.

Steven then described the structure and components of PICES’ second integrative science program, FUTURE, where science investigation occurs in multiple independent working groups that have clear terms of reference and usual durations of 3 years, in contrast to the CCCC structure which had task teams with broad mandates for investigation and greatly extended durations.

Peter Chandler spoke next and presented the rationale and approach that PICES is using to produce a third version of the North Pacific Ecosystem Status Report (NPESR), which is one of the highest priority activities of PICES. He started by reviewing the process that was used to produce two earlier NPESR reports (which focused on conditions in increments of about 5 years, 1997–2002, 2003–2008). He noted that the basic approach of preparing the NPESR3 is similar to that used for the first two, but with an emphasis on collecting Environmental Time Series Observations (ETSOs) through an electronic submission process in advance of compiling the report. Submissions could be data, or graphical representations of data and are submitted with geographical coordinates and linked to one or more of the regional ecosystems defined in the report. As with the two previous versions, the important elements of NPESR3 are to (1) identify critical factors that cause changes in each of the 15 regional ecosystems of the North Pacific, and (2) to identify key questions and critical data gaps that inhibit regional understanding of cause and effect.



Steven Bograd checking slides before presenting to FEFU undergrad students.



(Top) Peter Chandler explaining PICES' third version of the North Pacific Ecosystem Report, (middle) Ryan Rykaczewski listening to feedback during his lecture, (bottom) Igor Shevchenko (TINRO-Center) checking setup for presentations with FEFU students.

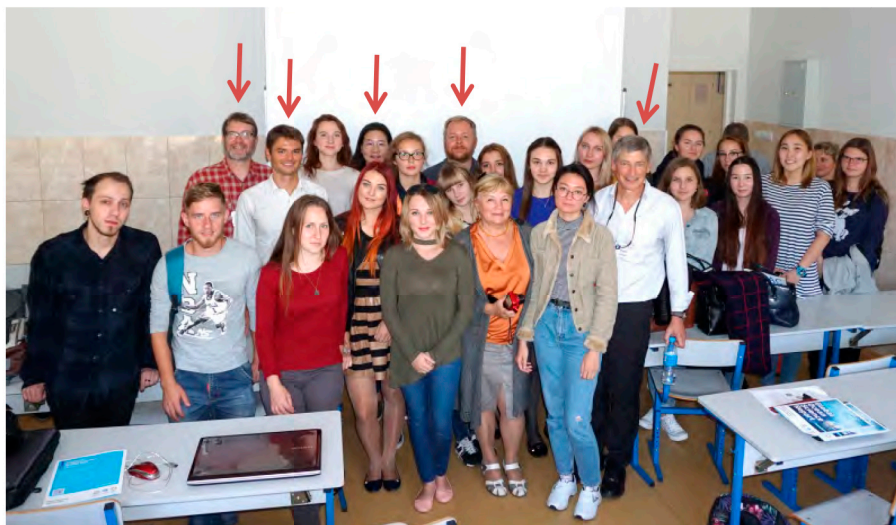
Peter went on to explain that for each regional ecosystem, there will be a lead author working with other contributing authors to summarize the status and, if possible, the changes or trends in individual ecosystem components (e.g., phytoplankton biomass, zooplankton composition and biomass, fish abundance, birds, mammals, pollutants, contaminants, etc.). After the regional reports have been written, reviewed externally, and revised, there will be a

Synthesis Workshop in the summer of 2018 to discuss the strategy for writing the basin-wide assessment of ecosystem status and changes in the North Pacific, from 2009–2014.

One student was interested in knowing how long the process of producing the ecosystem report would take, and when asked what she thought responded “about 5 years”. Appreciating the student’s thoughtful evaluation, Peter went on to explain that the lead authors started working on the Regional Assessments last summer and the plan was to have these reviewed and revised by February 2018, and to hold the Synthesis Workshop at least two months prior to the PICES Annual Meeting in October!

Publication of the regional chapters and synthesis overview are expected to be completed in late spring 2019. If that timeline is met, the time from implementing the new ETSO-based strategy and completing the regional and synthesis reports will be two years, which is not unreasonably long. Considering that many ETSOs spanning 2009 (or earlier) to 2014/15 will have been submitted and archived, subsequent updates of ETSOs might occur more regularly, which will aid in the delivery 5 years later of the NPESR4.

The final PICES speaker was Ryan Rykaczewski who started his talk by speaking in Russian, which delighted his audience but surprised me, as I was unaware that he spoke the language. After a few remarks, he switched to English for the remainder of his talk titled “*Using numerical models and ecological relationships to predict future changes in fisheries*”. This was a hope of both the CCCC program (which was unable to make reliable forecasts of future ecosystem conditions) and of the current FUTURE program, for which the jury is still out on this objective. Ryan is involved in the PICES Working Group on *Climate and Ecosystem Predictability* (WG 40), which reports to FUTURE, and which hopefully will provide some reliable and verifiable short-term to decadal forecasts of ecosystem conditions based on the physical patterns and intensities of the ocean and atmosphere. This expert group includes international partners from other marine science programs or organizations—thus is a truly international effort to predict future marine ecosystems. The overall goal of the Working Group is to identify, diagnose and quantify predictable responses in North Pacific marine ecosystems that arise from regional-scale and large-scale climate processes. Predictions might be on changes in the size or distribution of populations of fish, seabirds and whales. Ryan took a few questions from the audience, some studious, but most of which were about how he learned to speak Russian.



From left, marked by arrows: Drs. Steven Bograd, Ryan Rykaczewski, (backups Sukyung Kang and Elliott Hazen), and Peter Chandler with FEFU undergrad students and their professor (front, centre).

Meanwhile, in the city, the International Linguistics School (ILS) gave a warm welcome to Drs. Criddle, Therriault, and Di Lorenzo. ILS is a pre-university school for students from grades 7 to 12 who are pursuing an International Baccalaureate. With this in mind, Drs. Criddle, Therriault, and Di Lorenzo needed to make some quick adjustments to their presentations. Keith, realizing he would be speaking to 12-year-olds rather than to university students, jettisoned his planned presentation (a modified version of his Science Board Symposium talk – *Durable entitlements and resilience in fishery social ecological systems*) and, instead, delivered a presentation on the common-pool resource dilemma using a case study of Lake Rudragasagar in Tripura, a sub-Himalayan state in northeast India. The 240-ha floodplain lake supports 40,000 households engaged in fisheries, aquaculture, agriculture, brick-making, and tourism services. Keith talked to the students about conflicts between user groups that imperil fish resources – expansion of agriculture through landfill (the lake was over 2,000-ha in 1947), eutrophication driven by nutrients from agricultural runoff and sewage, and overharvest. He used a Socratic learning approach – asking students to suggest ways to prevent an overharvest of fish stocks and preserve economic opportunity for fishery-dependent households. This led to active discussion with students on various management approaches and identifying shortcomings of those approaches. He provided examples from world fisheries where their suggestions had been applied and described the outcomes in those fisheries. Most of the students were attentive but only four or five were comfortable responding to his questions, although many more of their peers gave them ideas to share with him.

Keith found his audience to be a bright and engaging group. In give and take with them, Keith and the students explored the tragedy of open access fisheries, the advantages and disadvantages of limited entry, cooperative management regimes, and individual quotas, the impact of

technological change (increased gear efficiency), competition between common-pool fisheries and aquaculture, the effects of expanding populations, and the challenges of economic development in impoverished regions. Keith had fun in conversing with the students and they were able to gain an appreciation for some of the social and economic dimensions of fisheries and how those dimensions interface with ecological and environmental dimensions.



Keith Criddle in front of an attentive audience. Photo credits: International Linguistics School

Dr. Therriault also recognized that the intended audience was slightly younger than initially expected in the car ride to the school when it was confirmed the class he would be presenting to were 13- to 14-year olds. Luckily, he had a very graphic-laden presentation based on work that he had conducted as part of the PICES [ADRIFT \(Assessing the Debris-Related Impacts From Tsunami\) project](#). Tom first introduced the students to the issue of marine non-indigenous species and why countries are concerned, highlighting the role ships have played in re-distributing species around the world by pointing out examples visible from the classroom in Vladivostok harbour. He then explained the transport of Japanese species to North America and Hawaii *via* the catastrophic tsunami that

occurred in March 2011 following the Great East Japan Earthquake. Since a major goal of the ADRIFT project was to highlight potential risky species, Tom provided a number of examples of these and discussed each with the students. It was amazing how many of the students recognized these marine invaders, including ones that are native to Russian waters and others that are not. Overall, the audience was quite involved and willing to interact even though the subject matter might have been completely new to them. Tom found it quite rewarding and fun to engage with a much younger audience, one that is now familiar with some the threats non-indigenous species pose to North Pacific marine ecosystems and the societies that depend on them.



Tom Therriault during his lecture. Photo credits: International Linguistics School

Dr. Di Lorenzo presented a lecture on the impact of global climate change on the acidification of the oceans to about 100 students between the ages of 10–14. He explained how the carbon dioxide emitted in the atmosphere by human activities dissolves in ocean water lowering the pH of sea water (e.g., making the water more acidic). To further demonstrate this concept, the students participated in a live experiment in class. Manu passed around two vials of sea water, one containing acid (e.g., low pH) and the other regular sea water with a neutral pH. The students then took bivalve shells and inserted them into the vials to observe how the acid solution made the shell dissolve very fast.

This experiment helped to demonstrate how ocean acidification associated with a high level of carbon dioxide in the atmosphere contributes to the dissolution of the shell or skeleton of marine organisms. The students were quite engaged throughout the lecture and asked several questions.

“We are very pleased that the series of lectures was opened by serious scientists whose research makes a real contribution to improving the ocean waters and their inhabitants”, said Dr. Olga Shevchenko, Director of the International Linguistic School. She also remarked that the lectures managed to successfully combine both the acquisition of new knowledge and communication in English.

The students of the Far Eastern Federal University and the International Linguistics School were both very appreciative of PICES enthusiasm in delivering ocean science talks that provided a broader global perspective about activities, issues and concerns in the North Pacific Ocean. In all, a very good day for PICES scientists and the next generation of potential Russian oceanographers.

PICES is appreciative of the enthusiastic support for these lectures and for their arrangements by TINRO-Center and ILS.



Manu Di Lorenzo watching students perform an ocean acidification experiment. Photo credits: International Linguistics School.



Drs. Emanuele Di Lorenzo (holding the bag) and Keith Criddle, and Thomas Therriault (directly behind) with some of the students of the International Linguistics School in Vladivostok. ILS Director, Dr. Olga Shevchenko, is in front far right, and Ms. Ekaterina Kurilova (TINRO-Center; Khabarovsk Branch), assisting with PICES logistics, is to the left of Dr. Di Lorenzo. Photo credits: International Linguistics School.