



Meeting summary

Nov. 29, 2017 10:00 a.m. to 3:00 p.m.

Burke Museum, Seattle, WA

Meeting attendance and objectives

The Washington Marine Resources Advisory Council (MRAC) held its 15th meeting on Nov. 29, 2017. The meeting was facilitated by Martha Kongsgaard, MRAC Chair, and Angie Thomson, EnviroIssues.

Members in attendance: Martha Kongsgaard (Chair), Bill Dewey (Taylor Shellfish), Erica McPhee-Shaw (Western Washington University), Garrett Dalan (Washington Coast Marine Advisory Committee), Gus Gates (Surfrider), Kirsten Feifel (Department of Natural Resources), Marilyn Sheldon (Coastal shellfish grower), Mike Rechner (Department of Natural Resources), Mindy Roberts (Washington Environmental Council), Nan McKay (Northwest Straits Commission), Norm Dicks (Van Ness Feldman, LLP)

MRAC members not in attendance: Brian Allison (Puget Sound Commercial Crab Association), Representative Dave Hayes (Washington State House of Representatives), Douglas Steding (Association of Washington Business), Senator Kevin Ranker (Washington State Senate), Libby Jewett (National Oceanic and Atmospheric Administration), Lisa Graumlich (University of Washington), Maia Bellon (Department of Ecology), Mike Cassinelli (City of Ilwaco), Philippa Kohn (Department of Fish and Wildlife), Terry Williams (Tulalip Tribes of Washington), Tom Davis (Washington Farm Bureau), Tony Floor (Northwest Marine Trade Association)

Other participants: Ben Rau (Environmental Protection Agency), Betsy Peabody (Puget Sound Restoration Fund), David Allnut (EPA), Greg Pelletier (Department of Ecology), Jan Newton (Washington Ocean Acidification Center), Jessie Turner (OA Alliance), Julie Horowitz (Governor's Office), Julia Sanders (Global Ocean Health), Meg Chadsey (Washington Sea Grant), Michael Chang (Makah Tribe), Shallin Busch (National Oceanic and Atmospheric Administration), Terrie Klinger (Washington Ocean Acidification Center), Paul Williams (Suquamish Tribe), Rich Childers (Northwest Straits Commission), Richard Feely (National Oceanic and Atmospheric Administration), Samantha Siedlecki (University of Connecticut), Simone Alin (National Oceanic and Atmospheric Association), Stephanie Jaeger (King County)

Meeting objectives:

- Hear an update on the status of the Blue Ribbon Panel Addendum
- Share updates on recent ocean acidification activities and events
- Hear an overview of results and key takeaways from Washington Department of Ecology's Salish Sea model
- Identify key OA policy questions and how science can help answer them
- Learn about the Washington Ocean Acidification Center (WOAC) 2018 Work Plan

Materials distributed:

- WOAC 2018 Work Plan
- OA policy questions

Welcome and introductions

Martha Kongsgaard, MRAC Chair, opened the meeting and thanked council members for their participation. Martha introduced the Burke Museum's Executive Director, Dr. Julie Stein, who welcomed the group.

Martha announced that Dick Feely, National Oceanic and Atmospheric Association (NOAA), was recognized as an American Association for the Advancement of Science Fellow.

Blue Ribbon Panel Refresh Addendum update

Martha shared an update on the Addendum to the Blue Ribbon Panel report, and thanked those who participated in the "refresh" process and provided input on the document. Highlights included:

- The report, titled *2017 Addendum to Ocean Acidification: From Knowledge to Action*, is planned for release on Friday, December 15. Martha and EnviroIssues are working with Resource Media on a strategic plan to roll-out the report to appropriate audiences, including media, policy-makers, legislators, stakeholders and the interested public.
- Angie Thomson announced the report will be available on a new website, www.OAinWA.org. This website will first serve as a landing page for the report, and may evolve into a larger website to store MRAC meeting documents and partner links. The group provided input on the draft website design and content.
- Erica McPhee-Shaw, Western Washington University, noted it would be helpful to have talking points for MRAC members to use when speaking about the report and its purpose. Martha will follow up with Resource Media to discuss materials that can be distributed to the group for this purpose.
- Gus Gates, Surfrider Foundation, suggested a larger communications training to ensure members have the tools to effectively explain the work of MRAC and the need to address ocean acidification. Participants agreed there should be further discussion about a training in the future.

Recent ocean acidification happenings

Martha Kongsgaard invited participants to share updates on recent happenings related to ocean acidification.

- Dick Feely spoke about notable scientific efforts:
 - There is a collaborative effort between NOAA's Pacific Marine Environmental Lab (PMEL) and WOAC to consolidate various data sets from Puget Sound and the Washington coast for archiving to a national data base.
 - New research (Feely et al., 2017) explores why Washington waters are more susceptible to ocean acidification conditions by comparing our region to the warmer Gulf of Mexico. This research explores the connection between ocean acidification,

hypoxia and hypercapnia in fish in warmer versus colder regions. Dick explained that the key differentiating factor is the amount of oxygen in the water column because more oxygen increases the potential for respiration and thus more carbon dioxide in the water. The Gulf of Mexico is a low-oxygen environment with less respiration, so acidifying conditions are less extreme than in Washington waters, which are richer in oxygen. The Gulf of Alaska has similar conditions to Washington waters, however faster and increased variability may be expected. The group agreed to include a call-out box about this research in the Addendum report.

- Julia Sanders, Global Ocean Health, reported that their organization is working with the Alliance for Jobs and Clean Energy, the Nature Conservancy, several tribes and coastal communities on advocacy for draft House Bill 1646, which would create a carbon tax and funds to support clean energy programs and jobs in Washington state.
- Julie Horowitz, Office of the Governor, and Bill Dewey, Taylor Shellfish, noted the International Alliance to Combat Ocean Acidification (OA Alliance) attended the 23rd annual Conference of the Parties (COP23) under the UN Framework Convention on Climate Change in Bonn, Germany and attended the United Nations Ocean Conference. The OA Alliance successfully worked to grow membership and participate in international conversations. OA Alliance membership currently includes 22 government and twenty affiliate members. Washington's action plan is being used in international conversations as an example of how groups can tackle ocean acidification in their regions.
- Shallin Busch, NOAA, mentioned a new taskforce is looking to collect all chemical, biological and physical data along the U.S. west coast (from California to Alaska) online via the OA Information Exchange. This is anticipated to be available in mid-February 2018.
- Betsy Peabody, Puget Sound Restoration Fund, announced that CBS News is producing a segment in November on the potential for kelp to mitigate ocean acidification and Washington's kelp-related efforts.
- Meg Chadsey, Washington Sea Grant, spoke about three notable education and outreach topics:
 - Meg will be hosting a webinar for NOAA about a Paul Allen project called *Carbon Comes Home*. In this webinar, she will speak about the potential for farmers to utilize kelp as fertilizer and serve as an upland carbon sink.
 - At the Pacific Marine Expo, a panel comprised of WOAC staff, a fisherman and a graduate student studying juvenile salmon spoke about the effect of ocean acidification on local fish species. This panel event was well attended by fishermen, suggesting that this is a topic of increasing interest.
 - The Ocean Acidification Vulnerability Assessment will begin soon. This will be an assessment of ocean acidification impacts on indigenous communities on the Washington coast.

- Norm Dicks, Van Ness Feldman LLP, noted that stormwater runoff is having a negative effect on salmon in the region. Participants discussed recent efforts related to storm water management, including:
 - A partnership between Nature Conservancy and Boeing to create porous pavement that can filter stormwater while supporting heavy vehicle traffic.
 - Installing raingardens in many counties around the state, increasing citizen involvement.
 - The Washington Environmental Council and Puget Soundkeeper have developed a Nature's Scorecard to measure how well municipalities have met requirements for green stormwater infrastructure.
- Jan Newton, WOAC, suggested an additional section be added to the Addendum report that underscores WOAC's role in recent international conversations such as COP23.

Update on the Salish Sea Model

Greg Pelletier, Washington Department of Ecology (Ecology), gave an overview of results and key takeaways from the Salish Sea Model of anthropogenic nutrient sources, demonstrating the relative influence of human activities on ocean conditions. The following are key results from initial model predictions:

- The model predicts significant changes in carbonate system variables in response to regional anthropogenic nutrient sources and expected increases in atmospheric carbon dioxide.
- Regional anthropogenic nutrient sources significantly increase dissolved inorganic carbon and decrease pH and aragonite saturation, especially in deep waters.
- Carbonate system variables are sensitive to expected increases in local atmospheric carbon dioxide, especially in the top 20 meters of water.
- Some regions in the Salish Sea increase aragonite saturation with nutrient input, and there is a large degree of spatial and seasonal variability.
- The global trend in atmospheric carbon dioxide appears to have more effect on surface waters, and local nutrient input seems to have more influence on deeper waters.
- Nutrients included in the model predictions are ammonia, nitrate, and organic nitrogen. Next steps for model predictions include investigating each nutrient individually to determine which have the most influence on local pH.

The following points were discussed:

- Bill Dewey pointed out that low levels of aragonite saturation in deep water will have implications for geoduck resources, which live in subtidal waters. Bill noted Taylor Shellfish hatcheries had more success with shellfish survival when they treated the water to increase carbonate ions. Bill explained larvae begin their life in the water column, then settle and burrow into sediment. Varying conditions in layers of the water column and sediment may affect the health of shellfish in different life stages.
- Organic carbon loading from wastewater treatment plants may be significant because when waste decomposes it also releases carbon dioxide.

Ecology and WOAC agreed to have a follow up conversation to discuss scientific implications of this model.

What's next? Upcoming OA policy questions

Julie Horowitz, Governor's Office, and Kirsten Feifel, Department of Natural Resources, described their effort to gather input from resources managers to help inform policy priorities that should guide future OA work. Goals of this effort include improving coordination between state resources managers and other ocean acidification efforts, and helping researchers, agencies and tribes plan for the future with shared resources in mind. Julie and Kirsten shared draft questions for state and tribal natural resource agencies and received feedback from the group. Answers to these questions may help prioritize and inform OA efforts.

Initial draft questions for state and tribal natural resource agencies, in the context of changing ocean conditions, included:

- How familiar is your group or agency with the potential consequences to marine resources or ecosystems posed by changes in climatic and oceanic conditions?
- Do you think changing ocean conditions are currently impacting the natural resources and ecosystems that you monitor or help to manage? Explain your theory and, if available, what evidence do you have to support your theory?
- Is your agency currently doing research on changing ocean conditions or collaborating with other entities doing research on changing ocean conditions? Can you provide a brief description of this work?
- Can you suggest any impacts changing ocean conditions may have in the next 20-50 years to the ecosystem/natural resource you monitor or help to manage? What types of data should we start to gather (or continue to support) now to help address these potential impacts?
- What research questions or monitoring efforts, would be most beneficial to inform and guide management decisions aimed at ameliorating potential negative impacts due to changing ocean conditions?
- What types of actions could your agency (or others) undertake today to better prepare for the impacts of changing ocean conditions?
- Do you or anyone on your team collect biological/physical/ or chemical data (that hasn't been discussed yet) that might inform our understanding of changing ocean conditions?
- Please provide a bibliography of relevant publications that your group/agency has published on this topic.

Julie invited participants to provide input on the draft questions and help identify gaps. The following points were discussed:

- Martha Kongsgaard suggested Julie and Kirsten speak with NGOs and Marine Resource Committees to learn who they work with to broaden their interview audience.
- Bill Dewey suggested speaking with federal partners, NOAA Fisheries Management, Pacific Fisheries Management Council, Fish and Wildlife Endangered Species, and major metropolitan jurisdictions.

- Dick Feely recommended reaching out to leaders of the Task Force on Ocean Acidification.
- Nan McKay, Northwest Straits Commission, suggested including a question that asks how groups are sharing their data and takeaways with others, i.e., what system are they using to save their data and what process do they use to enter data in the system? Dick Feely added that WOAC and NOAA are currently asking that question of groups in their effort to consolidate regional data.
- Terrie Klinger, WOAC, suggested adding a question asking to identify perceived impediments such as harmful algal blooms. Terrie also suggested the Department of Health as an audience for this interview, as food resources are affected by ocean acidification.
- Marilyn Sheldon, Coastal Shellfish Grower, suggested including a question about adaptation or mitigation measures that may be possible in the short term.
- Bill Dewey suggested having a suite of resources ready to provide groups if they indicate they do not know about or contribute to ocean acidification work.

Next steps include beginning interviews with state agencies.

WOAC 2018 Work Plan

Jan Newton and Terrie Klinger, WOAC, presented the 2018 Work Plan and next year's science priorities for monitoring, shellfish, forecasting, communications and coordination. Highlights from the presentation included:

- **Monitoring:** WOAC will sustain implementation of the monitoring of ocean acidification and biological response in Washington waters. WOAC's strategy for the 2017-19 biennium includes:
 - A time-series ocean acidification assessment via monitoring buoys in collaboration with the NOAA Ocean Acidification Program and the King County Department of Natural Resources
 - An assessment of spatial variation via seasonal cruises sampling dissolved inorganic carbon, total alkalinity, and plankton
 - Focus on the use of pteropod shell dissolution as a bioindicator of the effects of ocean acidification on water quality
- **Shellfish:** WOAC will continue support of water chemistry monitoring at several sites in Washington in collaboration with the Pacific Coast Shellfish Growers Association.
 - Data will be publicly available in near-real time over the Northwest Association of Networked Ocean Observing Systems (NANOOS) (<http://www.nanoos.org/>) and IPACOA (<http://www.ipacoa.org/>), a data portal for the Pacific Ocean
- **Forecasting:** WOAC will continue support of the LiveOcean forecasting model (<http://faculty.washington.edu/pmacc/LO/LiveOcean.html>), which provides one to three-day forecasts of corrosive conditions online through NANOOS. Development this biennium will focus on estuarine environments, specifically Willapa Bay and Puget Sound.

- **Communications:** WOAC will communicate new findings through formal and informal means, including public presentations to the MRAC and other audiences, and responses to requests for information from legislative and other sources. WOAC will convene a full-day science symposium in Spring 2019.
- **Coordination:** WOAC will continue to serve as a coordinating body among entities engaged in ocean acidification research and communication. Such entities include, but are not limited to, university researchers; federal, state, and tribal agencies and entities; industry; and non-governmental organizations.
- Other WOAC efforts include:
 - Invest in biological work to study salmon and sablefish response to ocean acidification
 - Partnering with the Olympic Natural Resources Center to begin investigating any potential link between ocean acidification and harmful algal blooms
 - Partnering on externally funded projects on ocean acidification including those with the Schmidt Ocean Institute, the Paul G. Allen Family Foundation, new sensor technologies, and the Regional Vulnerability Assessment

Next steps

Martha Kongsgaard reminded the group that the Salish Sea Conference will be held in Seattle in 2018 and will include a science-policy meeting. This conference will include an ocean acidification breakout group.

Topics for future MRAC meetings or follow-up conversations include:

- Revisit Key Early Actions based on information gained from the Salish Sea Model and results from policy interview questions
- Identify possibilities for a communications workshop to assist in ocean acidification messaging
- Report-out on the outcomes of the Carbon Ad Hoc Committee and discuss messaging of local land-based contribution efforts in light of the Salish Sea Model predictions

Some participants suggested the next MRAC meeting could be held on the Washington coast.

Martha Kongsgaard thanked everyone for their participation and adjourned the meeting.