



## **Meeting summary**

April 10, 2019 10:00 a.m. to 3:30 p.m.

Pritchard Building, 415 15th Ave SE, Olympia, WA

## **Meeting attendance and objectives**

The Washington Marine Resources Advisory Council (MRAC) held its 19th meeting on April 10, 2019 in Olympia, Washington. The meeting was facilitated by Martha Kongsgaard, MRAC Chair, and Angie Thomson, EnviroIssues.

Members in attendance: Martha Kongsgaard (Chair), Bill Dewey (Taylor Shellfish Farms), Dale Norton (Washington Department of Ecology- alternate for Maia Bellon), Gus Gates (Surfrider Foundation), Jay Manning (Puget Sound Partnership), Kirsten Feifel (Washington Department of Natural Resources), Marilyn Sheldon (Coastal Shellfish Growers), Mike Rechner (Washington Department of Natural Resources), Melia Paguirigan (Washington Environmental Council - alternate for Mindy Roberts), Rich Childers (Washington Department of Fish and Wildlife – alternate for Kelly Susewind), Ron Shultz (Washington State Conservation Commission)

MRAC members not in attendance: Alan Clark (Northwest Straits Commission), Brian Allison (Puget Sound Commercial Crab Association), Representative Dave Hayes (Washington State House of Representatives), Douglas Steding (Association of Washington Business), Erica McPhee-Shaw (Western Washington University), Garrett Dalan (Washington Coast Marine Advisory Committee), Libby Jewett (National Oceanic and Atmospheric Administration), Lisa Graumlich (University of Washington), Mike Cassinelli (Recreational Fishing Tourism), Norm Dicks (Van Ness Feldman LLP), Terry Williams (Tulalip Tribes of Washington), Tom Davis (Washington Farm Bureau), Tony Floor (Northwest Marine Trade Association)

Other participants: Cristiana Figueroa-Kaminsky (Washington Department of Ecology), Greg Pelletier (Washington Department of Ecology), Kelly Ferron (Washington Department of Ecology), Jan Newton (Washington Ocean Acidification Center), Jennifer Hennessey (Office of the Governor), Jessie Turner (Cascadia Law Group), Jim Kaldy (Environmental Protection Agency), Shallin Busch (National Oceanic and Atmospheric Administration), Terrie Klinger (Washington Ocean Acidification Center), Richard Feely (National Oceanic and Atmospheric Administration)

## Meeting objectives:

- Share updates on recent ocean acidification activities and events
- Hear an update on the 2019-2021 biennium budget
- Hear a presentation on new anthropogenic carbon absorption research
- Identify immediate next steps by ad hoc group

## Materials distributed:

- 2019-2021 biennium budget update
- Ad hoc proposed priorities

## **Welcome and introductions**

Martha Kongsgaard, MRAC Chair, opened the meeting and thanked council members for their participation.

## **Recent OA happenings and research**

Angie Thomson invited participants to share updates on recent happenings related to ocean acidification work.

- Jan Newton, Washington Ocean Acidification Center (WOAC), shared how the OA Alliance has actively participated at international climate events in Japan and New Zealand. The OA Alliance is currently preparing for an East Coast/West Coast conference the same week of the United Nations Climate Week in Fall 2019. Jennifer Hennessey (Office of the Governor) added that the OA Alliance is working to gain new members and focus on the production of OA action plans.
- Members noted several upcoming international events include the Global Ocean Acidification Observing Network (GOA ON)'s 4th International Workshop symposium in China (April 14-17), the UN SDG 14 Communities of Ocean Action in South Korea (May 30), the Our Oceans Conference in Norway (October 23 and 24th) and the COP25 in Chile (December 2-13).
- Jennifer Hennessey noted Chile and Washington state recently signed a Memorandum of Understanding about clean energy and ocean acidification work, and how Washington state will continue work on investments and monitoring priorities with the Pacific Coast Collaborative.
- Terrie Klinger, WOAC, announced that WOAC will be holding a biennial symposium at the University of Washington Center for Urban Horticulture on May 30, 2019.
- Shallin Busch, National Oceanic and Atmospheric Administration (NOAA), shared two updates, including:
  - The U.S. House of Representatives proposed four bills related to ocean acidification work: 1) Coast Research Act 2019, 2) Coast Education Act 2019, 3) OA innovation Act, and 4) NEAR Act focused on vulnerability assessments, innovation, and adaptation.
  - NOAA is working on two updated strategic plans for federal research and monitoring of ocean acidification to be released this fall. The Ocean Acidification Program received an additional \$1M in funding this year. The Interagency Work Group on Ocean Acidification will also release its strategic plan this summer via the Information Exchange.
- Bill Dewey, Taylor Shellfish Farms, noted he was in Washington, D.C. for a House Environment Sub-committee meeting and how ocean acidification was mentioned during the climate change impacts discussion. Bill also shared that Taylor Shellfish and 100 other shellfish growers along the West Coast are part of the Nature Conservancy's Shellfish Grower's Climate Coalition. This group marched in D.C. during the first week

of April and is working to share their experiences, the impact to their businesses, and educate the public on the urgency to adapt to climate change.

- Dale Norton, Washington Department of Ecology (Ecology), commented that the agency is working on a nutrient reduction strategy including the impacts of wastewater treatment plants. Dale added that about 20 percent of Puget Sound is impacted by hypoxic conditions created by the current load of treatment plant discharges; that could be reduced to 10 percent if nutrient reduction strategies are implemented. The next step is to work with stakeholders to brainstorm watershed loading and treatment plant scenarios, including long-term implications and reduction needs that incorporate population growth projections.
- Rich Childers, Washington Department of Fish and Wildlife (WDFW), shared that WDFW adopted a climate change adaptation policy several years ago and is working on implementation throughout the agency. A multidisciplinary Climate Action Team (CAT) is strategizing how to better evaluate risk and resource management in Washington for freshwater, saltwater, wastewater, and watersheds. WDFW's CAT team will soon reach out to key stakeholders in the shellfish industry to participate in a panel discussion on how climate change relates to shellfish growers in Portland, Oregon.
- Martha Kongsgaard shared that she will be working with others to actively recruit legislators to fill the current MRAC membership vacancies, noting the importance of Legislature's perspective and participation on MRAC.

### **Science update**

Richard Feely, NOAA PMEL, presented an overview of results and key takeaways from Global Ocean Acidification Observing Network (GOA-ON) datasets. Highlights include:

- GOA-ON is an international partnership to:
  - 1) Document the status and progress of ocean acidification in open-ocean, coast estuarine, and coral reef environments.
  - 2) Understand the impacts of ocean acidification on diverse marine ecosystems and societies.
  - 3) Support forecasts of ocean acidification conditions.
- Approximately one-third of all anthropogenic carbon resides in the ocean, where the seawater reacts with carbon to lower pH (increase acidity) and makes the water more corrosive for marine organisms to survive.
- There is global variation in anthropogenic carbon uptake, and the subtropics exhibit the greatest uptake. Aragonite saturation also varies globally but is the most dramatic in the subtropics where less upwelling occurs.
- In the Pacific Northwest, the rate of anthropogenic carbon uptake is not as great as in the subtropics, however the combined effects of increasing carbon uptake, upwelling, and runoff from local carbon and nutrient sources creates a state of hypoxia where the most intensive water chemistry changes are seen across the globe.
- Present day aragonite and pH levels have significantly decreased from pre-industrial levels.

- The global trend of increasing anthropogenic carbon uptake reduces the ability of coastal environments to buffer natural extremes in carbon, leading to an increase in extremely low pH.
- Ocean hypercapnia, high carbon dioxide concentrations in seawater, occurs in shallow depths as atmospheric carbon dioxide emissions increase. By 2100, hypercapnia is predicted to occur at the surface as a result of anthropogenic influence. This condition impairs biological processes of all species differently, but such impairments include the ability to find habitat or respond to predators.

Key takeaways include:

- Ocean acidification is changing Washington's local environment faster than the global average.
- Ocean acidification is meaningfully affecting biology, as seen in both laboratory and field studies.
- Local sources of acidification contribute significantly to overall acidification in some parts of the Salish Sea.
- The most severe impacts of ocean acidification can be avoided by reducing carbon emissions now as opposed to later.

The group discussed the following points:

- The role of freshwater is a key factor to understanding water chemistry, however the impacts to our region are not included in the GOA-ON datasets.
- Last year a paper on how sensitive the system is to dissolved oxygen was released including how respiration and dissolved oxygen must be addressed together.
- The chemical signatures from each river in Washington are recorded monthly and unique every time.
- There is not an overall hydrological assessment for our region in Puget Sound to understand the rates of runoff from sources like wildfires, snow melt, etc. Ecology and the UW Climate Impacts Group prepared a proposal but did not receive funding through the legislative process to continue the study.
- Terrestrial and marine scientists can collaborate on funding to pursue these more holistic studies.
- A recent study compared Washington to the coast of Africa and found that Washington waters experience upwelling through the water column to the surface more than anywhere else in the world except the Arctic Ocean.
- Scientific modeling on types of iron fertilization processes are being examined at the international level to better understand what will happen if we do not reduce our carbon emissions.

#### **Washington State Representatives Beth Doglio and Deborah Lekanoff:**

- Representatives Beth Doglio and Deborah Lekanoff visited to share their support for MRAC's efforts and ocean acidification investments in Washington state.

#### **Monitoring and Investigations ad hoc next steps**

Terrie Klinger and Jan Newton led the group in a discussion on monitoring and investigation.

Highlights include:

- Monitoring and investigations key progress over the last two years:
  - Ongoing monitoring of Washington waters for chemistry and biology; ocean acidification indicators are under evaluation.
  - Real-time monitoring and available chemical oceanography experts are supporting shellfish growing practices.
  - Developed numerical models used for activities like source attribution and forecasting.
  - Assessing biological effects from ocean acidification for economically and ecologically important species.
  
- Current monitoring and investigation work focus on modeling and monitoring biological response experiments to yield an enhanced understanding of ocean acidification.
  
- Priority next steps include:
  - Continue to test and use predictive relationships and models to assess ocean acidification conditions over space and time; release results to end users and expand user base to other affected and interested parties.
  - Continue development of new chemical and biological monitoring equipment and methods.
  - Continue development of mathematical models to be applied to ocean acidification assessment, including testing and results verification, and refine source emissions estimates.
  - Identify existing data sets and efforts to monitor ocean acidification to leverage research efforts across Washington.
  - Coordinate development of more research efforts specific to the Washington coast.
  - Sustain and expand ocean acidification monitoring network to address gaps.
  - Investigate the relationship between ocean acidification and harmful algal blooms.

### **Local Land Based Contributions ad hoc next steps**

Melia Paguirigan, Washington Environmental Council, led the group in a discussion on local land based contributions. Highlights include:

Local land-based contributions key progress over the past two years:

- Supported the Ongoing National Pollutant Discharge Elimination System (NPDES) between the EPA, Ecology, and Orca Recovery Task Force Rec's 31, 32, and 33 around nutrient, sediment, and organic carbon reduction programs.
- Reinforced planning efforts and capital improvement plans with agricultural programs like the conservation commissions and conservation districts to address the impacts of excess nutrients, sediment, and organic carbon.
- Used existing and new monitoring methods to continue investigating anthropogenic impacts on water quality relevant to ocean acidification with Ecology, UW, NOAA, WDNR, King County, etc.

- Established new programs to reduce nutrient, sediment, and organic carbon loading from nonpoint sources like the pending Puget Sound Nutrient Forum, the Nutrient Synthesis Report, and the Nitrogen in Puget Sound Story Map.
- Identified and shared key findings from local land-based contributions actions with ocean acidification communicators with tools like the Nitrogen Story Map and WA Sea Grant's Ocean Acidification Action Page.

Currently WEC is working to enhance source attribution modeling with Ecology to identify and quantify source reductions and provide the regulatory framework for requiring reductions. The April 30 Forum focused on scenarios for reducing impacts, the "All Known and Reasonable Technology" petition to cap wastewater loads from municipal and industrial WWTP's is underway, and higher resolution temporal river data is needed to show loadings throughout the watershed to understand attributions within the watershed.

Priority next steps include:

- Ecology is working on a Marine Water Quality Implementation Strategy and Nutrient Synthesis Report; funding will be needed to continue modeling hotspot locations and local impacts of nutrients on Ocean Acidification.
- Connect influences of hydrology (stormwater, CSO's, fresh water, agricultural and landscapes runoff) to hotspots.

### **Adaptation and remediation ad hoc next steps**

Bill Dewey, Taylor Shellfish Farms, led the group in a discussion on adaptation and remediation. Highlights include:

Adaptation and remediation key progress from the past two years:

- Continuous monitoring of the chemistry and biology in Washington waters to better understand the relationship of ocean acidification indicators.
- Shellfish growing practices are being supported by real-time monitoring and available chemical oceanography experts.
- Numerical models have been developed and are being used for activities like source attribution and forecasting.
- Biological effects from ocean acidification are being assessed for economically and ecologically important species.
- Puget Sound Restoration Fund (PSRF) recently completed Year 2 of the Bull kelp field investigation at Hood Head, began propagating bull kelp for enhancement trials in 2019 funded by NOAA and the Port of Seattle, and is working with NOAA, WDNR, and the NW Straits Commission on a Kelp Recovery Plan. PSRF is continuing Olympia oyster restoration work, including a total of 67 acres to date, and has received \$2M for Olympia oyster seed restoration, kelp production, genetic testing, and a Whole Hatchery Health Plan at the Kenneth K. Chew hatchery.
- University of Washington's 'Live Ocean' 3-day forecast model, the Olympic Ocean Acidification Regional Vulnerability Assessment, and Global Ocean's Health Ocean Acidification Report are now available and have contributed to a better understanding of species resiliency.

- WDNR expanded the Acidification Nearshore Monitoring Network to 10 sites, including the first urbanized setting in Elliott Bay and the first on the Olympia Peninsula in Sequim Bay. In 2019, the first overview of data was collected from this network to characterize regional variation in pH and other parameters. As more data emerge, they will be used to identify ‘at risk’ sites with naturally harsh conditions, and ‘resilient’ sites that may be naturally buffered from changing ocean conditions.
- WDNR completed a study evaluating patterns of gene expression as indicators of ocean acidification stress in juvenile geoducks (Spencer et al. 2019) and Pacific oysters (Venkataramen et al. 2019). Neither species appeared to experience acidification stress under current conditions in the field.
- In 2017, WDNR began monitoring pH and other parameters at Joemma State Park to test the effects of eelgrass restoration on local conditions and is continuing efforts to identify optimal restoration techniques. WDNR and Western Washington University are monitoring eelgrass donor stock performance under various stress conditions and are working with the University of Washington (Ruesink and Naish) on a Sea Grant project to identify genetically favorable eelgrass donor stock populations for restoration.

Priority next steps include:

- Follow-up studies from Hood Head kelp investigation by integrating seawater chemistry and biology into kelp production, advance communications strategy and products, utilize the new lab-based kelp/ocean acidification experiment at the NOAA Manchester facility, and continue to assess the benefits and risks of seaweed harvest by developing potential cost structure for marketing biomass to farmers.
- Continue work on the Kelp Recovery Plan and 2019 Bull kelp enhancement trials, as well as alter the legislative language to add “restoration of native kelp, eelgrass beds and restoring native oysters” to the list of fish enhancement activities that qualify for a streamlined HPA process.
- Share lessons learned through Global Ocean Health’s symposium series & podcast to continue developing best ocean acidification management practices for shellfish farmers to mitigate ocean acidification conditions.
- Support new social science research to understand impacts of ocean acidification on human communities.
- Begin microalgae recycling programs for use in upland farms and gardens.
- Look into the effectiveness of urban and man-made systems for restoration of natural ecosystems, such as rain gardens, cleaner transportation, etc.
- Investigate the permitting process to commercially grow seaweed and if this is something we want to encourage in Washington.
- Determine applicability of eelgrass statewide goals similar to California’s.
- Continue developing a vulnerability assessment in Puget Sound.
- Prioritize maintaining existing vegetation and align policies with management.
- Continue research to determine if phytoremediation creates ocean acidification buffering, at what scale, and the need for vegetation removal as part of the restoration process.

#### **Education and Outreach ad hoc next steps:**

Jennifer Hennessey, Office of the Governor, led the group in a discussion of education and outreach. Highlights include:

Education and outreach key progress from the last two years:

- Earned media coverage for the Blue-Ribbon Panel (BRP) refresh and recent scientific publications.
- Continued elevation of the Washington story, new partnerships, and ocean acidification actions through presentations seminars, and panels.
- New interactive exhibit at Point Defiance Aquarium.
- Washington Sea Grant: draft case study/lesson etc.
- The Olympic Coast Ocean Acidification Vulnerability Assessment video, webinar on Ocean Acidification Info Exchange, and kelp project web content are underway.

Current work includes updating findings and messaging from other actions areas, summarizing upcoming science symposium, and producing targeted, compelling communication materials to help tell the story and advance priority recommendations in each of the major action areas. This is being be done by:

- Establishing a concrete outreach plan to guide, coordinate, and track MRAC's education and outreach efforts more strategically.
- Identifying priority recommendations and activities with primary audience(s), and the communication needs for each action area.

Priority next steps:

- Shift our focus from sharing research, key take-aways, and success stories internally to sharing externally to the public, stakeholders, policymakers, and legislators.
  - Raise awareness of Washington's ocean acidification educational tools and resources, such as better linkages through Washington Sea Grant, MRAC website, and the Ocean Acidification Information Exchange.
  - Expand communication to link all relevant topics together and develop materials that are driven by what we want to accomplish in each ad hoc area.
  - Compile a suite of compelling, targeting communication materials in a variety of formats like one-pagers, videos, infographics, storytelling, etc.
  - Connect with the Orca Task Force priorities and momentum on protecting SRKW.
  - Expand the voice of MRAC beyond Puget Sound to include coastal communities.

The group discussed the following points:

- When using emotion to communicate environmental impacts, it is important to be explicit and thoughtful.
- All regions of Washington need to be included in the ocean acidification story, including tribal members and coastal representatives.
- The Puget Sound Partnership is working to include stakeholders from across Washington, but their efforts are under-resourced, and it is difficult to convey a negative ocean acidification message. There is value in having national and international expertise in messaging about the climate and our oceans.
- The Seattle Aquarium is working to build the new Ocean Pavilion as a value statement. Twelve-million people walk past this area every year, making it a prime location to win the hearts and minds of people on ocean issues.

- Partners of the OA Alliance are on an international stage and have found an alignment to increase ambition and urgency around climate action. The Intergovernmental Panel on Climate Change (IPCC) has a report coming out on oceans and the cryosphere, and the next Conference of the Parties (COP) will be held Chile.
- Participants were invited to aid in the development of strong communication tools by the end of the biennium. There is a need for a state agency-housed website to exchange ocean acidification information, raise awareness, and store a library of resources.

**Next steps**

Angie noted that based on the meeting discussion, MRAC may consider widening to topics such as transportation, land use planning, and anthropogenic emissions when developing future budget requests or aligning efforts with partners. Angie mentioned the next MRAC phone call is planned for July 2019 to wrap up budget items, and the next in-person meeting will be in the fall.

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