



MARINE RESOURCES ADVISORY COUNCIL

Meeting summary

August 5, 2020

1 p.m. to 3:30 p.m.

Virtual meeting

Meeting attendance and objectives

The Washington Marine Resources Advisory Council (MRAC) held its 22nd meeting on August 5, 2020 online and by conference call. The meeting was facilitated by Martha Kongsgaard, MRAC Chair, and Angie Thomson, EnviroIssues.

Members in attendance: Martha Kongsgaard (Chair), Aaron Dufault (Washington Department of Fish and Wildlife), Annette Hoffman (Washington Department of Ecology), Bill Dewey (Taylor Shellfish Farms), Garrett Dalan (Washington Coast Marine Advisory Committee), Jay Manning (Puget Sound Partnership), Senator Jesse Salomon (Washington State Senate), Keith Wagoner (Washington State Senate), Kirsten Feifel (Washington Department of Natural Resources), Libby Jewett (National Oceanic and Atmospheric Administration), Lisa Graumlich (University of Washington), Lucas Hart (Northwest Straits Commission), Marilyn Sheldon (Northern Oyster Company), Mike Cassinelli (Recreational Fishing Tourism)

MRAC members not in attendance: Alan Clark (Northwest Straits Commission), Brian Allison (Puget Sound Commercial Crab Association), Carol Smith (Washington State Conversation Commission), Douglas Steding (Association of Washington Business), Erica McPhee-Shaw (Western Washington University), Gus Gates (Surfrider Foundation), Representative Joe Fitzgibbon (Washington State House of Representatives), Mike Rechner (Washington Department of Natural Resources), Mindy Roberts (Washington Environmental Council), Norm Dicks (Van Ness Feldman LLP), Paul Williams (Suquamish Tribe), Terry Williams (Tulalip Tribes of Washington), Tom Davis (Washington Farm Bureau), Tony Floor (Northwest Marine Trade Association)

Other participants: Angie Thomson (EnviroIssues, MRAC facilitation team), Anji Moraes (Vulcan), Betsy Peabody (Puget Sound Restoration Fund), Carol Reamer (Makah Tribe), Christopher Murray (Washington Ocean Acidification Center), Cory Baranski (EnviroIssues, MRAC facilitation team), James Kaldy (Environmental Protection Agency), Jan Newton (Washington Ocean Acidification Center), Jennifer Hennessey (Office of the Governor), Joe Schumacker (Quinalt Division of Natural Resources), John Elder (Washington State Senate), Julia Sanders (Global Ocean Health), Katie Keil (Washington Ocean Acidification Center), Katie Wrubel (National Oceanic and Atmospheric Administration), Kirk Sato (University of Washington), Lara Whitely-Binder (King County), Larry Carpenter (Washington Department of Fish and Wildlife), Linda Anderson-Carnahan (Environmental Protection Agency), Lynn

Helbrecht (Washington Department of Fish and Wildlife), Meg Chadsey (Washington Sea Grant), Micah Horwith (Washington Department of Ecology), Natalie Coleman (Washington Department of Ecology), Nina Bednarsek (Southern California Coastal Water Research Project), Olivia Smith (EnviroIssues, MRAC facilitation team), Peter Murchie (Environmental Protection Agency), Richard Feeley (National Oceanic and Atmospheric Administration), Shallin Busch (National Oceanic and Atmospheric Administration), Stephen Weisberg (California Task Force on Ocean Acidification), Terrie Klinger (Washington Ocean Acidification Center), Tommy Moore (Northwest Indian Fisheries Commission), Victoria Williams (Oregon State University)

Meeting objectives:

- Share updates on recent ocean acidification happenings
- Learn about results from the recent CA ocean acidification gap analysis
- Hear an overview of results from the follow-up survey to the 2018 “Priorities in the context of changing ocean conditions” survey
- Discuss Monitoring & Investigation opportunities and gaps
- Discuss ideas and opportunities to optimize information exchange
- Hear an update on the 2021-2023 biennium budget

Welcome and introductions

Martha Kongsgaard, MRAC Chair, opened the meeting and thanked everyone for making time to participate on the call.

Science update

Angie Thomson, EnviroIssues, introduced the scientists who would be sharing their recent research related to ocean acidification. Highlights include:

- Jan Newton, Washington Ocean Acidification Center (WOAC), shared an update on recent observations, modeling, and biological response experiments. Monitoring buoys in Puget Sound are actively relaying water chemistry data and helping to inform shellfish growers of water conditions. In July, WOAC had a successful cruise off La Push, Washington to deploy a coastal monitoring buoy, the Cha’ba buoy, with approval from the Quillayute tribe and under safe COVID-19 guidelines. Several burkolators in Puget Sound hatcheries are now refurbished and actively monitor ocean acidification parameters. WOAC data and model outputs are available to the public with the forecasting tool *LiveOcean* through NANOOS.
- Terrie Klinger, WOAC, introduced Chris Murray, WOAC, to share the latest data on developmental plasticity of Pacific herring under combined climate stressors from three preliminary experiments conducted in early 2020. Chris shared the following:
 - *Survival*: treatments did not significantly affect embryo survival to hatch, heatwave conditions decreased peak hatch by ~3 days, and high carbon dioxide levels delayed average hatch time by a day.
 - *Respirometry*: heatwave conditions increased the rate of oxygen consumption, MO_2 , by ~40% after 3 days of increasing temperature levels, in some cases

embryos from high carbon dioxide showed slight but significant reductions to metabolic rates.

- *Development*: Carbon dioxide only slightly reduced body size of larvae, but high levels of carbon dioxide larvae hatched with larger yolk sacs. The heatwave conditions strongly reduced body size at hatch time.
- Nina Bednarsek, Southern California Coastal Water Research Project (SCCWRP), presented on biogeochemical model scenarios from a study, “Chemical Exposure Due to Anthropogenic Ocean Acidification Increases Risks for Estuarine Calcifiers in the Salish Sea: Biogeochemical Model Scenarios.” Nina shared the study is focusing on the magnitude of the aragonite saturation state decline from preindustrial levels to 2008, the sensitivity of marine organisms to ocean acidification, and the relative ocean acidification contributions from anthropogenic carbon and nutrients to ocean acidification. Data collected highlights the timing, locations, and biological impacts where pteropods and Dungeness crabs are experiencing severe larval shell dissolution in Puget Sound due to anthropogenic impacts. In depth analysis can be found in the [Chemical Exposure Due to Anthropogenic Ocean Acidification Increases](#) scientific paper.
- Richard Feely, National Oceanic and Atmospheric Administration (NOAA), presented on model outputs for future trends of ocean acidification in the Salish Sea, Chesapeake Bay, and Prince William Sound in collaboration with Dr. Wei Jun Cai, University of Delaware. Overall, the simulated heatwave had a larger developmental impact, but evidence for metabolic suppression under high carbon dioxide conditions suggests that future acidification does elicit an acclamatory response in herring embryos. Key findings were:
 - Ecologically and economically important calcifiers are already impacted in their natural environment by the anthropogenic stressors that are enhancing ocean acidification.
 - Threshold application can help in characterizing the temporal and spatial extent of habitat compression related to ocean acidification.
 - Biogeochemical modelling in the Salish Sea points to the atmospheric carbon dioxide uptake as a main contributor to negative impacts of ocean acidification.
 1. Salish Sea Model results from 2008 to 2050 project increases in Revelle Factor, DIC, and pCO₂.
 2. Model results project decreases in pH, aragonite, and calcite saturation states.
 3. Regionally, the model indicates most rapid change occurring in the main basin of Puget Sound.

Martha Kongsgaard asked how key scientific findings in Washington can be shared with the Dungeness crabbing community and asked how the scientific community has done this in the past.

- Jan Newton asked if Nina Bednarsek had any interaction with the crabbing community following the publication of her paper about the west coast in *The Seattle Times* and suggested Bill Dewey as a point of contact to reach the Dungeness crabbing communities.

- Nina shared they received a lot of press coverage from both the east and west coasts on the article about this being a serious long-term concern but did not hear from any Dungeness crabbing representatives directly.
- Steve Weisberg, California Task Force on Ocean Acidification, added how C-CAN played a critical role in connecting scientists with those in the shellfish industry and suggested the possibility of hosting a workshop.
- Peter Murchie, Environmental Protection Agency (EPA), asked if recent scientific information can be shared when the public obtains shellfish licenses for recreational crabbing.
 - Aaron Dufault, Washington State Department of Fish & Wildlife (WDFW), replied sharing information has not been done in the permitting process, but shared WDFW is working to identify ways to amplify outreach efforts.
 - Participants noted a need to further engage representatives of the coastal crabbing community in future conversations.

California ocean acidification gaps analysis

Steve Weisberg, California Ocean Acidification and Hypoxia Science Task Force (OAH), presented on the Task Force's process to identify gaps and opportunities in California's ocean acidification monitoring network. Steve shared acidification is a top management priority for the California Ocean Protection Council (OPC), monitoring is a key part of the Action Plan, and the OPC has been investigating ways to bolster California's ocean acidification monitoring capacity. Steve shared the California OAH Task Force members include Francis Chan (Oregon State University), Jim Barry (Monterey Bay Research Institute), Alexandria Boehm (Stanford University), Shallin Busch (NOAA Northwest Fisheries Science Center), Sarah Cooley (Ocean Conservancy), Richard Feely (NOAA Pacific Marine Environmental Laboratory), Lisa Levin (University of California, San Diego), and himself, Steve Weisberg (Southern California Coastal Water Research Project). Below outlines the highlights, the full report is available at the following link: <http://westcoastoah.org/taskforce/products/>

Steve provided insight on the various types of potential ocean acidification monitoring gaps to consider including spatial, temporal, parameter, data quality, and data availability gaps. Prior to conducting California's gap analysis, the following were identified as key actions:

- Prioritize gaps relative to management needs
- Conduct a three-step process
 1. Identify OA Action Plan management decisions most dependent on monitoring data
 2. Assess how well existing data collection systems address those questions
 3. Determine future investments that will most improve the California's ability to manage resources
- Look for opportunities to fill identified gaps by leveraging existing programs

The California gaps analysis resulted in the following recommendations:

1. Better connect chemical and biological monitoring and testing in the lab and in the field by standardizing, advancing, and incorporating biological measurements of

- ocean acidification effects (e.g. shell condition) into regional chemistry monitoring programs and adding ocean acidification chemistry into biological monitoring programs.
- a. Programs to leverage include the CalCOFI (California Cooperative Fisheries Investigations) and CCE LTER (California Current Ecosystem Long-term Ecological Research), SCCWRP Regional Monitoring Program, Applied California Current Ecosystems Studies (ACCESS) Program, and NOAA West Coast Ocean Acidification Regional Survey Cruises.
 2. Continuously improve ocean acidification and hypoxia monitoring models by identifying areas most and least vulnerable to future ocean acidification change, assessing the likely effectiveness of reducing local nutrient and carbon inputs, and determining the best locations to invest in mitigation measures.
 3. Strengthen continuity of long-term chemistry programs by continuing acidification chemistry monitoring, establishing reliable financial support for the future, easing spatial disparity among ocean acidification monitoring across the state, and utilizing independent programs to enhance the availability of data.

Martha Kongsgaard asked how prepared the west coast is to establish long-term chemistry programs.

- Steve responded efforts to establish long-term chemistry programs are just starting and constructing clear messaging for when the tipping point for the west coast will arrive is the first step. Steve shared the research and monitoring investments are not currently reflected in the messaging and how individual species are only beginning to be examined.

Richard Feely asked Steve if he could give a few words on this Task Force report and where he sees the MRAC group going from this meeting today.

- Steve replied the report was well received by the Ocean Protection Council (OPC) who agreed the plan is logical but asked for additional follow up with more specific recommendations. Steve shared the OPC will likely put 75% of the effort in the first recommendation, with the importance and cost effectiveness highlighted in the biological data.

Peter Murchie asked what the MRAC group should be planning for in terms of effectiveness and monitoring.

- Steve replied that monitoring is essential. When starting to look at solutions pertaining to kelp or seagrass beds, it is critical to identify where and when modeling would be most useful. Steve shared the importance of effectively planning monitoring locations and quality of the biological and chemical data that can be collected in conjunction.

“Priorities in the context of changing ocean conditions” survey results & discussion

Kirsten Fiefel, Washington Department of Natural Resources, gave an overview of a 2018 survey that was conducted to help identify concerns and information needs related to changing ocean conditions, inform future priorities based on management and policy implications, and improve coordination among partners. In July 2020, a follow up survey was distributed to refine the 2018 conclusions on biological research and management needs. A selection of survey results includes:

- Gaining an understanding of species' responses to changing ocean conditions is still a priority.
- Dungeness crab is the top research priority among other biology.
- Developing adaptation strategies is the most pressing management or research concern.
- Respondents preferred to receive new science and results in the form of scientific journals, scientific journal review articles, and reports and documents.
- Most survey respondents self-identified as scientists.
- Communication materials ranked as the greatest need for respondents to feel equipped to address changing ocean conditions.
- Respondents prefer to view data in the form of graphics with accompanying narratives interpreting the data.

Kirsten stated the 2020 results affirm and refine the 2018 conclusions on biological needs.

Joe Schumacker, Quinault Tribe, recommended that PDF's of the preliminary literature or a network of articles on the most recent science would be an excellent resource, especially for the tribes.

- Terrie replied all the work out of WOAC is publicly available, but MRAC could host pieces independently. Terrie added California Current Acidification Network (C-CAN) has a [listserv](#) where many items are shared.

Terrie Klinger commented on the short-term funding Steve mentioned in his presentation and expressed how there is currently a lack of long-term funding dedicated to biological studies in Washington and the WOAC.

Joe Schumacker emphasized the importance of linking the biology to the chemistry and shared a desire to establish a long-term ecological research station on the Washington coast, ideally at Westport or La Push. Joe also noted the recent opening of the Olympic Sanctuary and Olympic Coast Sanctuary which are working to designate protected areas offshore and that the tribes and Intergovernmental Policy Council would like to expand those zones in Washington. Joe invited the group to join the steering committee working towards expansion goals.

Peter Murchie asked how funding for ecological monitoring work could be sourced and what the existing requests for Puget Sound priorities, connections, and possibilities look like.

- Jan Newton replied funding for the observations, modeling, and biological responses in the Salish Sea come directly from state legislature to WOAC. Jan shared how Richard, Simone, and others are working to conduct more biological sampling on their cruises. The Olympic Coast Sanctuary has been working to incorporate more biology, and colleagues in the Columbia River basin are working on ocean acidification in the Columbia River estuary. Jan shared with relation to securing funding, Washington has the biennial budget, but we are approaching a budget crisis and will need to be vigilant.

Micah Horwith, Washington State Department of Ecology, mentioned biological monitoring is currently limited, and the Department of Ecology is not doing biological monitoring apart from the sediment monitoring team that collects benthic samples. Micah shared he is working with

that team and there are many complementary working systems in the state with ocean chemical observations supported by General Funds.

Peter Murchie suggested a sub-group meet before the next MRAC meeting to ensure these priority areas with gaps and long-term needs are identified and integrated into the health and recovery priorities in Puget Sound.

Bill Dewey, Taylor Shellfish Company, expressed concern on the lack of input in Washington and California from sectors dependent on marine resources for their livelihoods. Bill emphasized as states face budget cuts, states may be more receptive to provide funding to address gaps in understanding impacts to commercially important marine species and associations.

Senator Keith Wagoner, Washington State Senate, asked Jan Newton if the funding goes directly to WOAC or passes through a state department.

- Jan replied the funds go from the state to the University of Washington, and WOAC is a part of the university's College of the Environment. The University of Washington establishes contracts with specific shellfish institutes and other private institutions as well.

Senator Wagoner added how important it will be to have advocates with strong messaging to take the priorities of MRAC to the right people to make things happen. Senator Wagoner commented how Bill Dewey is a great advocate for the shellfish industry and finding the correct group to get the messaging to during budget renewals will be critical. Senator Wagoner also stressed the importance of distilling down the science to be clearly understood by those in legislature while highlighting how this is a serious challenge with a funding need for solutions.

Jennifer Hennessy, Office of the Governor, asked what would be helpful in communicating the key findings from the data to state agency members who interact with resource managers or those who are resource managers.

- Aaron Dufault replied distilling the most recent information down would be helpful and expressed a willingness to help accomplish this.

Bill Dewey asked if there is a way to receive notifications from LiveOcean to monitor and be updated real time with adverse conditions.

- Jan replied that is a great idea and will share this feedback with the NANOOS team.

Tommy Moore, Northwest Indian Fisheries Commission, shared an ocean acidification bulletin board successfully worked with tribal managers, and wondered if this might be something to consider for information sharing in NOAA science centers. Brief summaries on marine conditions would likely be interesting to managers and could include how to access the research articles.

Budget Update

Jennifer Hennessey, Office of the Governor, gave an overview of upcoming budget constraints and what to anticipate in the 2021-2023 biennium:

- Following the COVID-19 pandemic, state agencies have been asked to identify opportunities for a 15% reduction on all projects for the current and future biennia. Legislators are considering a special session to address budget cuts.
- Conversations are underway to address the approaching revenue gap due to COVID-19's financial impact. Currently, ocean acidification is not a top item to have ongoing funding cut.

Garrett Dalan, Northwest Straits Commission, asked if majority of the funding for this work under MRAC's budget is operational and if any funding comes from capital funding.

- Jennifer replied the funding is operational, never capital, with some general funding via the ALEA fund, but general funding is the hardest due to demands.

Next steps

Martha Kongsgaard shared the next meeting will focus on preparing a budget proposal for the next biennium considering financial cuts and impacts from COVID-19 and selecting advocates to represent MRAC in the next legislative session.

The next MRAC meeting will be another virtual meeting later this year or early 2021.