



Puget Sound Kelp Research and Monitoring Workgroup

October 27, 2021

nearshore@dnr.wa.gov

*Logo concept - Michael Calloway,
Kelp O'Lanterns – Brooke Weigel*



Meeting Summary

On Wednesday, October 27th, 2021, the Puget Sound Kelp Research and Monitoring Workgroup convened to share programmatic and project updates and to learn about several subtidal research projects that are being conducted throughout Puget Sound. The purpose of this workgroup is to share relevant information with the kelp research and monitoring community, as well as provide a forum for connecting around new ideas and needs. The following is a summary of the meeting conversation. Please refer to the meeting agenda and recording located on the Workgroup webpage for more information.

Meeting Summary

Welcome and Introductions

Helen Berry, DNR, welcomed participants to the meeting and reviewed the goals and objectives for the workgroup. Helen asked all participants to introduce themselves in the chat and share any updates they would like to have posted in the meeting summary. A list of attendees is located at the end of the meeting summary.

Brief Updates

- Helen Berry, DNR, provided an overview of the coordination occurring to develop the kelp canopy Vital Sign. A diverse group of partners have been convened to help develop this Vital Sign. All members of the Kelp Research and Monitoring Work Group will be invited to three upcoming workshops to review and provide feedback on the development of the Kelp Canopy Vital Sign. Please hold the following dates for these meetings: January 13, 2022, June 7 2022, January 4 2023 (10 am-12 pm).
- Lucas Hart, Northwest Straits Commission, shared that his organization has received funding to hire a full-time kelp coordinator. Responsibilities of this position will include tracking and synthesizing work related to the Kelp Recovery Plan, keeping partners updated on progress of the plan, and integrating the Kelp Recovery Plan into the Marine Vegetation Implementation Strategy. NWS is also working with Pew Charitable Trust on a policy-related research project to better understand challenges and opportunities for improving linkages between science and policy efforts to improve protections of kelp.
- Brooke Wiegel, University of Washington Postdoc, provided an overview of the research project she is conducting at the Friday Harbor Labs to better understand how environmental stressors impact the growth, physiology, and reproductive success of kelp in the Salish Sea. Brooke began

this project over the summer, but was already able to provide some preliminary results on the impacts of various temperature changes and nitrogen levels to both bull kelp gametophytes and blades. These results indicate that there are impacts to both gametophytes and blades from increased temperatures and nitrogen levels. Comments included:

- I'm finding that Bull kelp may be constructed with lignins (albeit I did just a quick lit search during your talk) - Do you know to what extent kelp here in the PNW may contain lignins - seems relevant to some of the questions of its breakdown with high T and low N - but also some of our biomarkers/organic geochemical tracers in sediments could be used to evaluate their change over time if they indeed produce lignins? Maybe other organic materials could be used too?
 - I'm not sure! I think kelp are made of cellulose and structural polysaccharides like alginates and fucoidan. I haven't characterized the composition of the kelp, but it would be interesting to see if it changes with temp!
- Bart Christiaen, DNR, provided an update on the understory kelp assessment that was conducted utilizing footage from existing eelgrass surveys across Puget Sound. Questions and comments on this update included:
 - It is really important to quantify understory kelps.
 - Would love to see that expand to the western Strait as well.
 - Hope you can expand to North Central Basin, too.
 - I'm curious whether you are planning to look at archived footage to look into temporal trends? (I know it is so much work just get a handle on existing spatial patterns let alone the history!)
 - We changed our survey methods to be able to do this work. Before 2016 we surveyed using simple random transects within the footprint of eelgrass beds, and we surveyed as deep as the maximum edge of eelgrass beds. Now we use stratified random transects over the entire site, slower vessel speeds (for better image quality), and go to -15m MLLW. Our intent is to look at temporal trends going forward. We may be able to look at trends using archival footage at some locations, but not sound wide.

Proposal for ROV and SCUBA monitoring along the western Strait and Outer Coast

Zachary Randell, Seattle Aquarium, provided an overview on the emerging long-term monitoring program he is working to develop to evaluate kelp forest complexity, connectivity, and resilience along the western strait and outer coast utilizing SCUBA and ROV survey methods. Zachary is new to his position at the Seattle Aquarium and is eager to connect with potential partners in the area who are interested in ROV survey opportunities.

Questions and comments included:

- From a location perspective, are you targeting the western strait and northern exposed coast? If yes, what leads to this spatial focus?
 - Yes. For the scope of the pilot study, it would be limited to the Puget Sound and Neah Bay and potentially a quick survey of the outer coast. Once the program is fully up and running we hope to establish sites along the western strait. It will take a while to build up the program that the Seattle Aquarium is hoping to establish.

- How well does your ROV perform in high current environments? A team from the Songhees Nation and UVic did some ROV work in Songhees territory as an alternative to diving, and they faced challenges with current speeds
(<https://www.frontiersin.org/articles/10.3389/fmars.2020.00669/full>)
 - It will be a challenge, and we anticipate that in certain areas we will need to operate during the slack tide. We did purchase a heavy-duty retrofit kit for the ROV with an extra set of thrusters.
- How much extra dive time are you anticipating with the extra battery pack for the ROV lights? Battery time for Blue ROVs can be a limiting factor.
 - Do not yet have a strong sense how much extra time we will get with the extra battery, but hoping to get an extra couple of hours out of the ROV.
- https://werc.ucsc.edu/Publications/2003%20Estes%20et%20al_complex%20trophic%20interactions.pdf
- As background for sea otters, kelp and urchins on the outer coast, Ole Shelton led a major analysis: <https://pubmed.ncbi.nlm.nih.gov/30311056/>
- DNR Nearshore Habitat Program measured a ~50% drop in kelp canopy abundance along the WA strait and coast in the 2014 time frame. Unlike CA, the populations rebounded quickly in 2015. Inside PS, the rebound was delayed by years and in some areas the canopies have not returned to previous abundances. We'll be presenting these findings at SSEC.
- A project/paper led by Sam Starko up here in BC has found widespread declines in canopy kelp on the outer coast (in Barkley Sound) mediated by the combined effects of a local 3 degree SST gradient and urchins/substrate. We should have a preprint on this out soon to be able to share these results more fully.
- This work ^ involved ~50 ROV transects that were very helpful to speedy widespread surveys. Zach, would love to chat more about ROVs. We're planning to scale up ROV surveys elsewhere on BC coast.
- We have supplemented ROV transects with drop quadrats to fill in coverage in places where entanglement is an issue.
- I think we neglected to make clear to grant reviewers the efficiency of ROVs in terms of preventing the drop of burritos during unscheduled diver naps. Think of the savings!
- I see the important applications of ROVs for spatial questions, I wonder also how important it might be to add stationary observatories to your portfolio? We have had luck with month-long deployments of instrumentation with cameras and sensors that seemingly could be analyzed (with AI) for fish/wildlife, water properties, hydrodynamics, sediment, timeseries info to characterize conditions, etc.
- Currents on the outer coast are not often "slack" no matter the tide status. Great ideas and yes on the outer coast.
- The dispersal capacity of bull kelp might make it challenging to study the metapopulation scale with diving and ROV alone.
- We have been using our ROV to film perimeter of beds in the San Juan Islands. Would love to talk with you more about this. We moved from a mini ROV to the DeepTrekker Revolution and seems to hold in the current very well. Our battery with video and lights typically last around 4 hours per charge. We have two sets of batteries as well.

Reef Check Washington

Dan Abbott, Reef Check Foundation, provided an overview of the new Reef Check Washington program that is being developed to provide opportunities for citizen science surveys of kelp forests within the Puget Sound. The Washington program will be modeled after Reef Check's California Kelp Forest Program and is scheduled to launch in 2022.

Questions and comments included:

- How do I volunteer?
 - You need to participate in a Reef Check class. There may soon be one at Friday Harbor Labs. Those with a scientific diving background will have an easy transition to adopt Reef Check protocols.
- This is wonderful! I would love to do this training to improve my subtidal IDs 😊 When will the online course be available for WA?
- How do you select your sites?
 - DNR and PSRF have worked with Dan by providing a list of sites they would like data from. If others have site needs, please let Dan know. Ideally, sites are identified by need.
- How are sites marked or relocated? Especially those separated transects seems they would be difficult to re-occupy?
 - We go to a site and conduct transects in that area. We do not go back to the exact same rocks are markers. Transects spaced out five meters or more.

Coordinated Network of Subtidal Index Sites

Gray McKenna and Hilary Hayford, Puget Sound Restoration Fund, provided an overview of the work they are conducting to develop a coordinated network of subtidal kelp monitoring index sites. This work is meant to support the increased detection and interpretation of changes in kelp populations and connect regional kelp interests. The team reviewed the sites that have been established and invited interested partners to reach out with ideas for additional sites and partnership opportunities.

Questions and comments included:

- Are you making vouchers for kelp specimens? Are you feeling good about species ID?
 - We take vouchers for anything we're not sure about, but generally have an easy time with kelp ID. We do group *Saccharina* and *Hedophyllum* as a "complex" on our datasheets, based on our conversations with you and other researchers about the possible hybridization happening and the range of morphologies we see in the field.
- How were the index sites selected?
 - We balance our interests with the interests of others, try to capture a broad spatial gradient.
- How do you relocate transects?
 - We have high accuracy GPS points for transect starts, ends, and have headings, so we can return to ~close~ to the same transects at each site each year. Once instrumentation monuments are installed, we may use them as permanent transect markers.
- Can't wait to see more sensors in the water, Hilary!

- How long do you envision sensors will remain in the water between turn-arounds?
 - That will vary by site. Hoping people can shepherd their sites as much as possible. Capacity of sensors and divers will be limited, would like feedback from group on how to address this.
- How, when and with what priorities will other core monitoring sites be chosen?
- What would be the process to add an index site?
 - We will utilize groups like this, add sites at the level of having biological surveys done first. Working with Reef Check to develop a list of where we can bio surveys. We can add instrumentation in partnership with other organizations that may have their own dive teams or funding streams who want to take this on. Creativity is going to be the only way to get this done.
- Did you say there may be instrumentation from PSRF to lend or dedicate to a team or project?
 - With this funding, we will purchase sensors and working on legal process for permitting of sensor installation. Actual partnership who implements and uses the instruments will be developed with partners. If you are interested, let's discuss what that exchange might look like.
- It would be good to have a really good inventory of existing subtidal efforts and good info about what, how often, etc.
 - I bet we have lots of this down already. Is this something that the new hire at NWS can also develop and steward?
- There are important existing partnerships near the Camano area - Snohomish County and MRC/NWSC kelp monitoring, Tulalip Tribe, DNR towed imagery monitoring. An umbrella - Snohomish watershed/nearshore is a multi-agency priority area.
- Building these ENVR monitoring moorings now; anyone who want to talk or has experience about smaller surface buoy style/type - please get in touch (brian@restorationfund.org)
- What's the best way forward for building this "inventory" Tom suggests in a formal way? Hilary has done such an amazing job of networking - how can we all step in to make an "inventory"? New google doc? Does someone already have one started?
 - This might be something that the incoming NWS kelp coordinator can support.
 - Eliza may have been volun-told to support the development of a new Google doc.
- Many organizations and communities have unique local interests that I think we all want to honor. So, hopefully we can pick sites through partnership with tribes and local groups. I know that PSRF is considering this dimension of site selection.
- We've deployed HOBO temp sensors for up to one year with no problems, but things like the Odysseys obviously have a limited timeframe over which they can collect reliable data.
- There is a network of subtidal sites not focused primarily on bull kelp. Would be nice to be inclusive. They may have the temp info you would want. Happy to help with my hidden hobo on East Whidbey.
- Is there a need to monitor potential future kelp farming activities and their interactions with natural beds?

Discussion

Helen Berry opened the floor for any remaining updates or discussion questions members would like to bring up with the full group. Adrienne Akmajian, Marine Ecologist with the Makay Tribe in Neah Bay,

shared that her program is interested in utilizing drop cams to do subtidal monitoring in areas along Neah Bay. Adrienne requested that any partners with experience or interest in utilizing drop cams to reach out to her.

Comments included:

- Allie at NSC will share resources regarding their use of drop cams.
- The MRCs have used drop cams.
- I have plans for a very simple drop cam set up with a GoPro. Works great. Contact me at tmumford@uw.edu.
- WDFW used drop cameras over 15 years ago, but switched to ROV.

No other discussion topics were identified.

Action Items

- The next Puget Sound Kelp Research and Monitoring Workgroup meeting is scheduled for January 12, from 10:00 a.m. to 12:00 p.m.
 - Maycira Costa, UVic, will provide an overview of the BC Kelp project.
 - Robert Kiel, Seattle Aquarium, will provide an overview on what contributes to Bull Kelp decline
 - Please send Helen Berry ideas for agenda items.

Attendees

- Helen Berry, WA DNR
- Elizabeth Spaulding, WA DNR
- Tom Mumford, Retired
- Megan Dethier, Friday Harbor Labs
- Brian Allen, Puget Sound Restoration Fund
- Solenne Walker, WA DNR
- Laura Parfrey, UBC
- Max Lambert, WDFW
- Hilary Hayford, Puget Sound Restoration Fund
- Devin Robinson, Tulalip Tribes
- Morgan Arrington, University of Washington
- Jamey Selleck, NRC
- Brooke Weigel, Friday Harbor Labs
- Dan Abbott, Reef Check
- Gray McKenna, Puget Sound Restoration Fund
- Eliza Heery - Smithsonian/Friday Harbor Labs
- Jess Newley, Friends of the San Juans
- Emily Buckner, Puget Sound Restoration Fund
- Adrienne Akmajian, Makah Tribe
- Dayv Lowry, NOAA Fisheries
- Ken Collins, Island County MRC
- Sherryl Bisgrove, Simon Fraser University
- Allie Simpson, NW Straits Commission
- Jodie Toft, Puget Sound Restoration Fund
- Nathalie Hamel, Puget Sound Partnership
- Zachary Randell, Seattle Aquarium
- Gwen Lentes, WDFW
- Robin Fales, UW & Friday Harbor Labs
- Leah Robison, Northwest Straits Commission
- Kalloway Page, Pacific Shellfish Institute
- Laura Arber, WDFW
- Filipe Alberto, UW-Milwaukee
- Allison Cook, WDFW
- Paul McCollum, Port Gamble S'Klallam Tribe
- Tyler Cowdrey, WA DNR
- Steve Rubin, USGS
- David Troutt, Nisqually Indian Tribe
- Tish Conway-Cranos, WDFW
- Will Jasper, Makah Fisheries Management
- Neil Harrington, Jamestown S'Klallam Tribe
- Melissa Sanchez, WA DNR
- Eric Grossman, USGS
- Kirk Larsen, Vulcan & Paul G. Allen Family Foundation
- Hank Carson, WDFW
- Scott Steltzner, Squaxin Island Tribe
- Lauren Johnson, WA DNR
- Jeff Gaeckle, WA DNR
- Kelly Andrews, NOAA Northwest Fisheries Science Center
- Christopher Krembs, WA Dept of Ecology
- Casey Palmer-McGee, Samish Dept of Natural Resources
- Silven Read, Pacific Salmon Foundation
- Kathryn Meyer, WDFW
- David Winfrey, Puyallup Tribe
- Lamai Cox, Candidate MA Geography at WWU
- Julia Ledbetter, WA DNR
- Ron Thom, Puget Sound Partnership
- Paul Chittaro, NOAA Northwest Fisheries Science Center
- Staci McMahon, Master's student at UW
- Katie Sowul, WDFW

- Betsy Peabody, Puget Sound Restoration Fund
- Cindy Spiry, Snoqualmie Tribe
- Kathleen Hurley, Port of Seattle
- Christopher Neufeld, Bamfield Marine Sciences Centre