Puget Sound Kelp Research and Monitoring Workgroup
January 12, 2022
Meeting Summary

On Wednesday, January 12, 2022, the Puget Sound Kelp Research and Monitoring Workgroup convened to share programmatic and project updates and to discuss several transboundary research projects underway in the Salish Sea. 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 topics and discussion. 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. A list of attendees is located at the end of the meeting summary.

Brief Updates

- Helen Berry, DNR, provided an overview of the upcoming Floating Kelp Canopy Vital Sign Indicator Workshop on Thursday, January 13, 2022. The purpose of this workshop is to present key concepts and questions from the initial indicator scoping report and spend time discussing ideas relevant to the identified scoping questions. This workshop is open to all interested stakeholders. Additional input can be submitted to the project team directly.

- Ron Thom, Washington State Academy of Sciences, reviewed the background and scope of work for the Net Ecological Gain study the Academy is leading in support of the state Net Ecological Gain Standard for integration into land use, development and environmental regulations. A public meeting is scheduled for January 24th. You can contact the project team at Yasmeen.hussain@washacad.org. Comments included:
    - It seems that expansion of habitat features in a degraded and impacted area is really not a net gain. Improving quality and quantity in areas that are functional seems to be of more value.
    - I'm so glad to hear about the new ecological gain project. I'm hoping that we can also work with policymakers and managers to start tracking the current 'no net loss' standard and eventually, 'net gain'.

- Max Lambert, DFW, provided a brief overview of the literature review he recently conducted on the effects of small overwater structures on Puget Sound habitat and salmon. Max stated that impacts to kelp are significantly understudied and there are no consistent results across studies that do exist. There is, however, evidence that eelgrass and other grasses are impacted. As there are over 6,000 small docks across Puget Sound, this is an area that needs significantly

more research. The full literature review can be found here: https://wdfw.wa.gov/publications/02289. Comments included:

- It's mind-bogging that we know so little about small overwater structures when there are so many. I'm wondering what we can do to focus more collaboration and work on this topic? It would be great to further highlight this gap in understanding as we identify research priorities in the broader Kelp Plan work.
    - Yes that'd be great Helen! One thing we always discuss too is not only negative impacts but possible benefits from adding dappled light back into the nearshore.
- To add - most of these small overwater structure docks being permitted seem to encounter areas with documented understory kelp species and not canopy kelp. So we are really interested in understanding the relationship with these Kelp species in particular (from an HPA perspective)
- For anyone interested in some of our underwater footage related to LARGE docks, compiled here for downtown Seattle: https://www.youtube.com/watch?v=dH7IBRVJ5Ng

- Tyler Cowdrey, DNR, shared findings from a demonstration project conducted with the Northwest Straits Commission on comparing drone and fixed-wing aircraft surveys to map bull kelp forest canopies and fill gaps in Sound-wide data and monitoring efforts. The storymap for this project can be viewed here: https://storymaps.arcgis.com/stories/9daebbe14134440290e87bb77d2feb75
  The final report for this project can be accessed here: https://www.dnr.wa.gov/publications/aqr_nrsh_kelp_canopy_survey_report.pdf
  Comments included:
    - Chiming in on behalf of Luba and Hakai Geospatial - we are working on an AI tool to help automate drone imagery classification for kelp. I think Tyler has seen this, but would be great keep refining it with all the incoming drone mapping from diverse habitats.
        - Yes! Luba shared the AI tool with me and initial tests with it are very promising! I think machine learning certainly could play a big part in kelp canopy classification in the not so distant future. Excited to continue collaborating.
    - It's awesome to see those numbers Tyler. After going through all of that, do you have any strong opinions on bed footprint (perimeter area) vs canopy area (image classification) in terms of which is a better metric for tracking long term trends?
    - We have done some drone flights for eelgrass and kelp. References and Resources for analysis would be very helpful for us at Malahat.
    - What spectral bands for each platform did you use for the classification?
        - Classification of the multispectral imagery was done using blue, red edge, and near-infrared in ArcGIS Pro. We also used the same base imagery to test RGB. I haven't found the ability to use all five bands in that software specifically so I may try others next. Do you know of any that have that capability? Maybe ENVI?
        - ENVI should be able to classify on many-band imagery

- Elizabeth Spaulding, DNR, provided an overview of the Kelp Forest and Eelgrass Meadow Health and Conservation bill that DNR submitted to the legislature. Specifically, this initiative would develop a kelp forest and eelgrass meadow conservation plan to conserve and restore at least 10,000 acres of kelp forests and eelgrass meadows by 2040. DNR proposes accomplishing this by leading a collaborative planning process that will assess and prioritize areas for coordinated conservation and restoration activities throughout Puget Sound and outer coast based on historical and current vegetation distributions and other collaboratively identified criteria. The Fact Sheet for the bill can be found here: https://www.dnr.wa.gov/publications/em_leg_dnr_kelp_eelgrass_2022.pdf
  The link to bill is here:
  https://app.leg.wa.gov/billsummary?BillNumber=1661&Year=2021&Initiative=false

Presentations

Hypothesis: Why kelp is declining in Puget Sound and what we can do to restore it

Bob Kiel, Seattle Aquarium, shared an overview of the research he conducted at Goleta Beach in California on the impacts of tidal action and swells on bull kelp, and outcomes associated with providing holdfasts to support kelp establishment. Bob proposes a similar approach to address bull kelp decline in the Puget Sound. Comments included:

- @Helen- I wonder if any of the geoduck divers could grab cores like that from sites around the sound, I know substrate change is something that's been discussed in relation to sites in SPS.
- @gray - is PSRF still using those big concrete pyramids? Maybe it's time to turn them into apartment complexes.
- @Max - it's a great idea to take cores, both for historical kelp presence and for substrate changes over time. We've discussed these ideas with Eric Grossman, other geomorphologists may also be interested. It's a great opportunity.
- @Helen - this all makes me think again about effects of increased boat wakes in narrow passages in PS on our kelp beds.

Kelp Plan Implementation Phase 1: Scoping for an inventory/database of ongoing efforts and activities

Jeff Whitty, Northwest Straits Commission, shared information about what he will be doing to support implementation of the Kelp Conservation and Recovery Plan as the new Kelp Plan Coordinator. An initial effort will involve developing a kelp project and action inventory. Jeff posed several questions to the workgroup for consideration regarding usefulness, structure, and level of interest in participating in the development of this database. Comments included:

- Who is this data base for? Is this for us as researchers to talk to one another, or is it to talk to managers and the public?
  - It could be a tool useful for everyone, including managers and legislators.
  - I recommend you touch base with local government to understand what tools they need and use to protect kelp. Shoreline Management Act and Growth Management Act are

two existing tools. We should ask local governments to assess how policies are doing to protect kelp and what additional tools they need.

- This is fantastic and ties in very nicely to some of the transboundary initiatives we'll talk about at the end of today's meeting.
- From my perspective, both can be helpful. But you might need to track different information for different audiences.
- A well-designed tool can be used to speak to various audiences. There are lots of templates for how to web-enable inventories like this, with a map, for broad outreach.
- @Jeff and all - NWStraits is doing a Pew-funded study to identify management/implementation needs for kelp. That might be another good place to hone the set of projects/products that would be most effective.
- This seems like an excellent way to identify gaps in knowledge that PhD students such as myself could mine for research ideas.
- As Jeff mentioned, PSRF had started working to catalog current/ongoing subtidal data collection in regions of interest to kelp projects. Eliza Heery, Tom Mumford, and I talked briefly about the idea of expanding this in the last Workgroup meeting. I love Jeff's idea of an inventory to address the whole kelp plan!
- Thank you all for your comments in the chat. I look forward to going through them and will be in contact with you in the near future. If you are interested, please feel free to contact me at whitty@nwstraits.org if you have further ideas or information.

British Columbia Kelp Resilience (BCKelpR) Project

Maycira Costa, University of Victoria, presented research being conducted in Canada on the spatial-temporal changes in canopy forming kelps in response to local and regional environmental and biotic drivers. Data is collected using satellite imaging and is compared against climate indices and local environmental data. Comments included:

- @Maycira - That's fascinating work, and there are strong parallels to projects we're working on in the southern Salish Sea. I'd like to follow up with a more leisurely meeting for this same presentation. If Maycira can find time, and if anyone else wants to join that meeting, let me know and I can set it up.
- Yes, I think doing the analysis considering the cluster will help to understand changes better because there is so much variability along the coast.
- Thanks, Maycira! I'm interested in some of the really high temps that you were finding adjacent to the coastline. Are those surface water temps, and how close to the land were those waters? Intertidal surface temps, or were those values from the surface waters in deeper areas where bull kelp are growing? I'm working on the effects of temperature on bull kelp physiology, and I'm super interested in learning more about the range and maximum temps that you are finding up in BC. Nice work! ☺
- Brooke, the SST data we use is from about 100m from the coast (buffer) to minimize land adjacency. We are validating this method with a large dataset right now. It shows really good accuracy.
    - Those temperatures are really high… wow! >20 degrees is bad news for bull kelp

- There is interest by the Island County MRC's to deploy temp sensors on the bottom at a number of bull kelp beds. They need advice and collaborators
    - @Tom - We talked to Island County MRC last week! Dan/Reef Check is looking into sites in their region

UN Decade of Ocean Science Proposal/Cross-border Working Groups

Rebecca Martone and Margot Hessing-Lewis represented a team from the Tula Foundation and Hakai Institute who are spearheading the UN Decade of Ocean Science, a collaborative effort with the goal of connecting research efforts to management and policy gaps across regions and programs. Specifically, the team is developing the Biodiversity Action Network Proposal, which is a framework intended to augment transboundary partnerships through an overarching synthesis hub. For those who are interested in learning more and potentially participating in kelp-specific work groups, please add your contact information in the following Google Document: https://docs.google.com/spreadsheets/d/1Dg6Laj6VX9kOpSW1HJfOCOuAuOUrw3yu/edit?usp=sharing&ouid=108291179169797735814&rtpof=true&sd=true

Comments included:

- The Salish Sea has a number of special connections, and it would be very beneficial to focus on the issues and connections that are unique to this region.
- One of the biggest challenges that we have is development and local growth, and as planners we need to stay ahead of the curve. We need to give tools to planners so that they connect upland activities to impacts in marine waters.
- I think solutions-based thinking with clear objectives like "net gain" with science as a foundation is critical.
- I think it would be productive to use Maycira's cluster approaches in other areas of the Salish Sea to come up with best predictors of kelp fitness.
- This also emphasizes the need to bring planners/managers into these conversations from the beginning.
- BC has a Coastal Marine Strategy that is being developed now, which is another opportunity.

<u>Participant Updates and Coordination</u>

- Helen Berry: Here's the link to the initial scoping report for the PS floating kelp canopy area indicator, released yesterday. We want to hear your input on the scoping questions summarized in the executive summary, and everything else! https://wadnr.maps.arcgis.com/sharing/rest/content/items/2d4505eccae34769a43250f0ce3d0278/data
- Jordan Hollarsmith: Check out our fresh-off-the-press paper on multiple stressors facing kelp in the Salish Sea! Open access, lots of co-authors on this call: https://onlinelibrary.wiley.com/doi/10.1002/ece3.8510
- Cathy Pfister, Here is a preprint of our approach to studying microbes in association with coastal vegetation :https://www.biorxiv.org/content/10.1101/2022.01.05.475171v1.full.pdf

- Paul McCollum: https://meetings.pices.int/publications/presentations/PICES_14/W4/W4_Rigby.pdf
- Hank Carson: In reference to dive fisheries, I've had several conversations about observed seafloor substrate changes over time (e.g. this area used to be a productive green urchin area with cobble/gravel now it's a mud bowl). We have surface substrate observations on geoduck tracts that could be analyzed for change over time. I'd interested in working with someone on collecting sediment cores.
- Mike McHugh: What data has been suggested that Puget Sound bull and sugar kelp set on the seafloor?
    - @Mike - Folks who grow sugar kelp tend to find mature sorus material in the fall whereas bull kelp starts dropping spores as soon as (sometimes even before) they hit the surface in Late winter / early spring.
    - Mike- I think this is poorly understood, and certainly the location and life-span of the gametophytes is nature is largely a mystery. And each kelp species probably has a different strategy.
    - Time to place settling plates in areas of wanted restoration to answer this question regionally. Would let you know if it did not set.
        - @Mike - PSRF has done some work with bull kelp to understand optimal timing for restoration out planting and may have more insight
        - @mike - I was waiting for Tom to get in there! This is a big unknown for us, and PSRF is very interested in the seasonal overlap between ripe adult sporophytes and settlement of gametophytes, etc. Brian Allen & Dan Tonnes have found experimentally that, for bull kelp in central Puget Sound, outplanting gametophytes/early sporophytes in late winter (Feb) has led to the best success for forming an adult canopy through enhancement
        - @Mike, I did clearing and seeding experiments and saw bull kelp growth in plots without understory, suggesting microscopic stages DO occur on the seafloor
        - Just thinking about an application of season restorative efforts to maintain a core volume of kelp forest in areas we feel are important as an augmentation angle as these metrics continue to undermine year to year natural production.

Participants

- Alejandra Mora, Spectral Lab – University of Victoria
- Brenda Campbell, Pew Charitable Trust
- Brian Timmer, MSc student at University of Victoria
- Brooke Weigel, Postdoc at UW's Friday Harbor Labs
- Casey Palmer-McGee, Samish Indian Nation Natural Resources Department
- Casey Pruitt, DNR
- Cathy Pfister, University of Chicago
- Chris Jones, Port Gamble S'klallam Tribe's Natural Resources
- Dan Abbott, Reef Check
- Danielle Claar, Hakai Institute
- David Troutt, Nisqually Indian Tribe

- Devin Flawd, Lummi Nation
- Elizabeth Ruther, Pew Charitable Trusts
- Franchesca Perez, Stillaguamish Tribe
- Gray McKenna, Puget Sound Restoration Fund
- Hank Carson, WDFW
- Heather Gordon, Immrama Ecology
- Hilary Hayford, Puget Sound Restoration Fund
- James Selleck, NRC/NOAA
- Jeff Whitty, Northwest Straits Commission
- Jennifer Hagen, Quileute Indian Tribe
- Jill Lipoti, Island County Marine Resource Committee
- Jordan Hollarsmith, NOAA Fisheries - Alaska Fisheries Science Center
- Julia Ledbetter, DNR
- Katie Byrnes, Sea Grant Fellow with the Port of Seattle
- Katie Dobkowski, Friday Harbor Labs Researcher
- Katie Sowul, WDFW
- Kathleen Hurley, Port of Seattle
- Kristin Swenddal, DNR
- Kylee Pawluk, Marine Plan Partnership in BC
- Laura Arber, WDFW
- Laura Parfrey, University of British Columbia
- Lianna Gendall, MSc at University of Victoria
- Lindy Hunter, Swinomish Tribe
- Mackenzie Conty, University of Washington Student
- Mark Donohue, DBA Salish Seaweeds
- Margaret Homerding, Nisqually Indian Tribe
- Margot Hessing-Lewis, Hakai Institute
- Maycira Costa, University of Victoria
- Max Calloway, Kelp ecologist
- Max Lambert, WDFW
- Max Lundquist, Tulalip Tribes
- Meg Chadsey, Washington Sea Grant
- Mike McHugh, Tulalip Tribes
- Nam Siu, WDFW
- Nicole Naar, Washington Sea Grant
- Olivia Rhoades, UBC and Hakai postdoc
- Rebecca Martone, Ocean Decade Regional Collaborative Center for the NE Pacific (Alaska - Baja)
- Ron Thom, Washington State Academy of Sciences
- Robert Kiel, Seattle Aquarium
- Robin Fales, UW Bio and Friday Harbor Labs PhD candidate
- Ross Whippo, PhD student at University of Oregon
- Sam Kaiser, Tulalip Tribes Natural Resources
- Sam Starko, University of Victoria Postdoc
- Solenne Walker, DNR Aquatic Land Manager and Jefferson County MRC
- Steve Marx, Pew Charitable Trusts
- Tim McClure
- Tish Conway-Cranos, WDFW
- Tom Mumford, Kelp Plan Implementer
- Tom Ostrom, Suquamish Tribe.
- Tyler Cowdrey, DNR
- Wendel Raymond, UW Friday Harbor Labs
- Zachary Randell, Seattle Aquarium