



Puget Sound Kelp Conservation and Recovery Plan

May 2020

Prepared by the Northwest Straits Commission, NOAA's National Marine Fisheries Service, Puget Sound Restoration Fund, Washington State Department of Natural Resources, and Marine Agronomics.



Our shared vision for thriving kelp forests in Puget Sound

Vibrant kelp forests are vital to the health of Puget Sound and Salish Sea. They provide critical refuge, feeding, and nursery grounds for forage fish, rockfish, and salmon, as well as fueling food webs that support healthy bird and marine mammal populations—including Southern Resident killer whales. Mounting evidence points to significant local declines of kelp forests throughout Puget Sound. In response to these widespread concerns, the Puget Sound Kelp Conservation and Recovery Plan provides a research and management framework for a coordinated and collaborative approach to protecting and restoring kelp forests of Puget Sound. We envision revitalized Puget Sound kelp forests stretching from Olympia to Vancouver, B.C. providing economic, recreational, and ecological benefits to all living things that call these shores and waters home.



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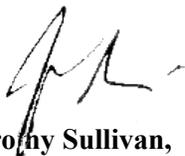
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Puget Sound Kelp Conservation and Recovery Plan



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Want to join us in our shared vision for kelp? Sign on to the vision statement by adding your organization here: <https://nwstraits.org/our-work/kelp/>

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Illustration above used with permission of Claudia Makeyev.

Cover Photo: Bull kelp forest. Image courtesy of Eiko Jones Photography.

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A diverse group of local and regional experts contributed valuable perspectives to this Puget Sound Kelp Conservation and Recovery Plan. We would like to thank the many participants who took part in the kelp workshops in 2016, 2018, and 2019. Appendix C includes a full participant list and notes from the workshops. Workshop participants represented the following organizations:

Clallam Marine Resources Committee	Simon Fraser University
Friends of the San Juan's	Skagit Marine Resources Committee
Island Marine Resources Committee	Snohomish Marine Resources Committee
Jamestown S'Klallam Tribe	Stillaguamish Tribe
Jefferson Marine Resources Committee	Suquamish Tribe
King County Department of Natural Resources	Surfrider Foundation
Marine Agronomics LLC	Swinomish Indian Tribal Community
Natural Resources Consultants	Tulalip Tribes
National Oceanic and Atmospheric Administration	University of British Columbia
Northwest Straits Commission	University of California, Davis
Northwest Straits Foundation	University of Chicago
Padilla Bay National Estuarine Research Reserve	University of Victoria
Paua Marine Research Group	University of Washington
Port Gamble S'Klallam Tribe	University of Wisconsin, Milwaukee
Project Watershed British Columbia	United States Army Corps of Engineers
Puget Sound Partnership	United States Geological Survey
Puget Sound Restoration Fund	Washington Department of Ecology
Puyallup Tribe	Washington Department of Fish and Wildlife
Samish Indian Nation	Washington State Department of Natural Resources
San Juan Marine Resources Committee	Western Washington University
San Juan Salmon Recovery Lead Entity	Whatcom Marine Resources Committee

The discussions in the workshops formed the framework for this Kelp Plan. Without the time and energy contributed by representatives from these organizations, this effort would have failed. We hope this plan provides our community with a framework for continued focus and momentum toward kelp conservation and recovery.

I. Executive Summary

Kelp—some of the largest of all seaweeds—form extensive living structures that provide an array of valuable ecosystem goods and services to deep water and nearshore environments in Puget Sound. These underwater forests act as foundations for diverse and productive nearshore ecosystems, supporting food webs and providing critical habitat for a wide array of marine life.

Anecdotal observations and research suggest that Puget Sound is losing its kelp forests. Extensive losses of bull kelp have been documented in South and Central Puget Sound, and localized declines have been observed throughout Puget Sound. Concerns also exist about potential losses to other kelp species, yet trends are unknown due to data gaps. Although kelp distribution and drivers of declines in Puget Sound are not well understood, data from kelp ecosystems in other temperate coastal regions indicate that widespread loss of kelp habitats would be devastating to the Puget Sound ecosystem. There is a consensus in the scientific community that coordinated action is needed to reverse downward trends in kelp populations by addressing both longstanding and emerging stressors. Cumulative impacts from human stressors threaten kelp. These impacts include degraded water quality from pollution, nutrient loading, increased turbidity, and sediment deposition; introduction of invasive species; and alterations to food-web dynamics from commercial and recreational fishing. Additionally, warming ocean waters and other impacts from climate change pose new and intensifying threats to kelp resilience that often exacerbate the negative effects of other stressors.

This Puget Sound Kelp Conservation and Recovery Plan (Kelp Plan) provides a framework for coordinated research and management actions to protect these fundamental and iconic kelp species from a suite of global and local stressors. Successfully achieving kelp conservation and recovery will require a collaborative effort between our community of Tribes, managing entities, and stakeholders in Puget Sound. Additional collaboration with Canadian federal, provincial, and First Nation entities will support conservation and recovery efforts in the Puget Sound/Georgia Basin region.

Actions identified in this Kelp Plan address six strategic goals:

1. Understand and reduce kelp stressors;
2. Deepen understanding of the value of kelp to Puget Sound ecosystems and integrate into management;
3. Describe kelp distribution and trends;
4. Designate kelp protected areas;
5. Restore kelp forests; and
6. Promote awareness, engagement, and action from user groups, Tribes, the public, and decision-makers.

Puget Sound Kelp Conservation and Recovery Plan

We propose the following research, communication, and conservation actions to achieve these strategic goals.

1. Understand and reduce kelp stressors. Water quality degradation, urbanization/development, invasive species, and warming ocean temperatures are cumulatively affecting kelp and likely driving regional declines in bull kelp populations. These stressors are likely to increase in magnitude with continuing population growth and climate change.

Reduce human impacts on water quality and kelp habitats:

- Inform future management actions through continued research into the impacts of current and historical human activities on kelp forests.
- Identify priority stressors negatively affecting Puget Sound kelp on a sub-regional scale to target management actions.
- Fully implement and enforce available protections for kelp through existing regulations, programs, and policies.
- Increase protection for kelp populations by addressing key gaps in existing regulations and implementation programs.
- Form interagency workgroups to increase collaboration and information sharing across management organizations to improve implementation and to address policy gaps.
- Reduce human-caused nutrient and sediment loading.
- Support sustainable kelp harvest by informing recreational harvesters about regulations and sustainable kelp harvest methods.

Reduce impacts from biological stressors:

- Strive to incorporate kelp and other trophic considerations into fisheries management planning.
- Explore invasive macroalgae (*Sargassum muticum* and *Undaria pinnatifida*) control alternatives, ecological roles, and long-term management considerations with respect to climate change.

Reduce impacts from climate change:

- Investigate climate change impacts to improve management decisions, such as prioritizing locations for kelp protected areas, restoration sites, and mitigation activities.
- Investigate the climate-related benefits of kelp, and develop management opportunities for these benefits.

Puget Sound Kelp Conservation and Recovery Plan

- Investigate the development of temperature-tolerant strains of native kelp species for potential use in restoration and mitigation outplanting in regions where local stressors are reduced.

2. Deepen understanding of the value of kelp to Puget Sound ecosystems and integrate into management. Kelp provides critical habitat as well as food and foraging opportunities for associated nearshore species in Puget Sound. Quantifying services provided by kelp will support management actions, especially for pinto abalone, threatened and endangered species of rockfish, salmon, and Southern Resident killer whales.

Improve understanding of kelp value:

- Quantify functional roles of kelp habitats for associated species and provide guidance to managers on regulatory implementation, such as endangered species habitat conservation.
- Calculate the value of kelp ecosystem services for use in developing mitigation guidance.

3. Describe kelp distribution and trends. Successful implementation of existing regulations relies on accurate information regarding the distribution and trends. Consistent and coordinated multi-year monitoring is essential for establishing accurate inventories and understanding natural variation.

Gain accurate information on kelp distribution and trends:

- Update and expand information on the current extent of canopy-forming and understory kelp.
- Make distribution and trends data available to agencies and the public for use in spatial planning, project planning, and regulatory implementation.
- Coordinate the strategic monitoring of canopy-forming and understory kelp throughout Puget Sound through expanding efforts and building collaborations between organizations.
- Expand the understanding of historical distributions and trends by compiling historical information sources and exploring traditional ecological knowledge.
- Identify the genetic structure of kelp populations, including connectivity, dispersal, and population dynamics.
- Form a research and monitoring workgroup to increase collaboration and information sharing across organizations.

4. Designate kelp protected areas. Puget Sound kelp recovery begins with the conservation and protection of kelp forests.

Protect kelp habitat:

Puget Sound Kelp Conservation and Recovery Plan

- Protect kelp habitat in existing and new reserves, refuges, and protected areas.
- Assess the extent of recreational kelp harvest and its potential impacts. Develop spatial management plans and strategies for kelp harvest activities.

5. Restore kelp forests. Restoring historical kelp forests requires indirect habitat improvement through stressor reduction and direct kelp population enhancement in areas where natural recruitment is limited. In addition to reducing stressors responsible for declines, developing best practices will be critical for successful kelp restoration and mitigation projects.

Restore kelp forests:

- Develop a spatial plan identifying regions and sites for priority restoration actions and mitigation.
- Continue the development of kelp restoration techniques for use in enhancement and mitigation projects.
- Fund and implement restoration activities at priority sites.

6. Promote awareness, engagement, and action from user groups, Tribes, the public, and decision-makers. The success of the Kelp Plan and the conservation and recovery of kelp in Puget Sound depends on increased awareness, engagement, and support of actions to sustain kelp.

Promote awareness, engagement, and support:

- Share information on (1) the value and role of kelp ecosystems as critical nearshore habitat and food web support (for forage fish, rockfish, salmon, and killer whales) in Puget Sound; and (2) the growing concern regarding significant losses to bull kelp canopies.
- Build research capacity through coordinated knowledge sharing of ongoing kelp recovery projects and research gaps.

At the heart of these strategic goals is the need for continued interagency coordination; communication between researchers and managers; and funding to support research, monitoring, education, outreach, implementation, and enforcement. The actions outlined in this Kelp Plan require a unified collaborative effort from federal and state management agencies, Washington State Tribes, Non-governmental organizations (NGOs), and local stakeholders. Raising awareness of the need to support kelp conservation and recovery will help further strengthen budding collaborative partnerships. This Kelp Plan is a call to action. It advocates that kelp be recognized as a necessary element of ecosystem-wide recovery planning, including the prioritization of funding to support the actions outlined in this Kelp Plan.

Puget Sound Kelp Conservation and Recovery Plan



Black rockfish swimming in bull kelp forest near Keystone Jetty.
Photo by Adam Obaza- Paua Marine Research.



Sugar kelp (*Saccharina latissima*), Squaxin Island.
Photo by Helen Berry.