DEPARTMENT OF
NATURAL RESOURCES

OFFICE OF THE
COMMISSIONER OF PUBLIC LANDS
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December 1st, 2023

The Honorable Bernard Dean
Chief Clerk of the House
338B Legislative Building
Olympia, WA 98504

The Honorable Sarah Bannister
Secretary of the Senate
312 Legislative Building
Olympia, WA 98504

Dear Chief Clerk Dean and Secretary Bannister:

Please find the attached the **Prioritization Plan** and **Monitoring Plan** for the Kelp and Eelgrass Health and Conservation legislative report, submitted by the Department of Natural Resources (DNR), as required under RCW 79.135.440 and due the Legislature by December 1, 2023. The statute directs DNR to create a statewide Kelp Forest and Eelgrass Meadow Health and Conservation Plan that endeavors to conserve and recover at least 10,000 acres of native kelp forests and eelgrass meadows by the year 2040. The statue also requires DNR to submit a monitoring plan based on the success measures identified within the Health and Conservation Plan.

For 2023, DNR is required to report on the finalized Native Kelp Forest and Eelgrass Meadow Health and Conservation Plan. The Health and Conservation Plan (Prioritization Plan) includes a map of priority areas based on collaborative development criteria, list of potential tools and actions for conservation and restoration, and a monitoring plan based on identified success measures. The Monitoring Plan includes guidance for approaches to tracking implementation of the Prioritization Plan.

For 2024 and going forward, DNR is required to provide ongoing biennial reports that include updates on adaptive management of the plan, monitoring of priority areas and findings, updated maps, distribution and trends, success measures, community engagement, and tribal consultation.

Should you have any questions, please contact me at 360-486-3469 or Brian.Considine@dnr.wa.gov.

Sincerely,

Brian Considine
Legislative Director
Office of the Commissioner of Public Lands

Enclosure: Legislative Report – Native Kelp Forest and Eelgrass Meadow Health and Conservation Prioritization Plan

cc: Members of the Senate Agriculture, Water, Natural Resources, and Parks Committee
Members of the House Agriculture and Natural Resources Committee
Members of the Senate Ways and Means Committee
Members of the House Appropriations Committee
Office of Financial Management

Statewide Kelp Forest and Eelgrass Meadow Health and Conservation Prioritization Plan

RCW 79.135.440

Prepared by
Washington State Department of Natural Resources
Office of the Commissioner of Public Lands, Hilary Franz
December 1, 2023

WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES

Table of Contents

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GLOSSARY

Eelgrass Meadows/Eelgrass: Used within this report to refer to all native seagrass species in Washington.

Kelp Forests/Kelp: All native kelp species in Washington, including canopy-forming kelp and understory kelp.

High Value Area: Areas that have been preliminarily identified as areas with strong shared values across ecological, economic, and social-cultural values. The areas are grid cells in ArcGIS areas that exceed a defined threshold for ecological, economic, and social-cultural value scores. Areas were identified using existing data and an ArcGIS analysis (see Appendix D: Methods to Identify High Value Areas). Each region has unique thresholds for these scores that are scaled to the availability of data.

Opportunities: Factors that might allow one area to benefit long-term from conservation or recovery more likely than others. An example would be areas that are more likely feasible to conserve or recover for a variety of reasons, including but not limited to political will or resilient habitat. Opportunities will be identified during site selection and will be integrated into the prioritization framework.

Pilot Sub-basin: Sub-basins that were selected to be the pilot for additional investigation and site selection based on opportunities they present to align with ongoing or planned state and federal actions or investments, for data landscapes allowing for well-informed decision-making, or other factors as described in "Pilot Sub-Basins" on page 29. Boundaries of the sub-basins were based upon the Floating Kelp Indicator Sub-basins (Berry et al., 2023), with one adjustment to create two sub-basins, Grays Harbor and Willapa (**Figure 9**).

Prioritization framework: A two-step process used to identify kelp and eelgrass priority areas of high ecological, economic, and social-cultural value for conservation and recovery activity. The two steps begin with statewide evaluation of habitat with strong shared values, then iteration of sub-basin scale priority area identification and implementation.

Priority area: Specific areas to be identified during the site-selection process within sub-basins. Priority areas will be identified with Tribal consultation, local partner engagement, and community input. These acres will contribute toward the 10,000-acre goal in RCW 79.135.440.

Regions: Broad areas of the state consisting of groupings of sub-basins, based on the Floating Kelp Indicator Sub-basins (Berry et al., 2023). Three defined regions are in this report: Coastal, Western Strait of Juan de Fuca and North Puget Sound, and South-Central Puget Sound (see "Map of Regions Used," page 64). The Coastal Region consists of Willapa, Grays Harbor, North Olympic Coast, and Eastern Strait of Juan de Fuca sub-basins. Western Strait of Juan de Fuca and North Puget Sound consists of Western Strait of Juan de Fuca, San Juan Islands, North Puget Sound, and Saratoga/Whidbey sub-basins. The South-Central Puget Sound Region consists of Admiralty Inlet, Central Puget Sound, Hood Canal, and South Puget Sound.

Risks: Considerations that might cause one area to be more vulnerable to stressors and less likely to benefit from conservation and recovery efforts than other areas. An example could be areas where water temperature is higher, due to climate change or other factors (see "Step

2: Sub-basin Scale Engagement and Localized Data Integration" on page 17). Additional kelp and eelgrass stressors are described in **Appendix B**.

Values: The ecological functions and services of kelp and eelgrass or the economic uses and social dependencies they support.

EXECUTIVE SUMMARY

Kelp forests and eelgrass meadows are vital nearshore habitats that hold significant ecological, economic, and social-cultural value for the people and ecosystems of Washington State. Recognizing the importance of conserving and restoring these habitats, the Washington Legislature took action by passing Senate Bill 5619 in 2022. This landmark legislation tasked the Washington Department of Natural Resources (WA DNR) with developing the Kelp Forest and Eelgrass Meadow Health and Conservation Prioritization Plan (herein referred to as 'Prioritization Plan'). The Prioritization Plan's primary objective is to collaboratively develop a framework for prioritizing at least 10,000 acres of kelp and eelgrass habitat for conservation and recovery by 2040, submitting this prioritization framework to the Legislature by December 1st, 2023. The Prioritization Plan submitted here fulfills this requirement of RCW 79.135.440.

Within this document, WA DNR has developed a plan to provide guidance for sub-basin scale engagement and selection of sites contributing to the goal of 10,000 acres of kelp and eelgrass habitat conserved and restored. The purpose of this Prioritization Plan is not to select final recommendations for locations of specific priority areas or recovery actions per site, but to provide a roadmap for future conversations. The Prioritization Plan outputs reported in this document will support additional conversations with Tribes, stakeholders, and community members, and will be refined and updated by integrating new and existing data in future iterations.

Application of the initial prioritization framework resulted in the identification of preliminary High Value Areas, each of which holds significant ecological, economic, and social-cultural values. To identify these values, WA DNR offered consultation with Tribes, held public workshops, and solicited an expert Working Group to guide the Prioritization Plan development process.

In this Prioritization Plan, WA DNR has laid out a process to identify at least 10,000 acres of additional kelp and eelgrass habitat for conservation and recovery. As described below, WA DNR will embark on site-specific consultation with Tribes and reach out to local communities and governments to develop tailored plans for each priority area, using the High Value Areas identified within this plan as a scaffold for conversations. These site-specific plans will ensure the most effective strategies are implemented using a range of tools, including conservation efforts, stressor reduction measures, restoration projects, research initiatives, and public engagement programs, and will be considered within the context of climate change and building resilience.

Following submission of the Prioritization Plan, WA DNR will transition into the next phase of the Prioritization Plan: sub-basin outreach in coordination with Tribes and local partners leading to selection of 10,000 acres of habitat.

The framework described within this Prioritization Plan is summarized as:

1. **STATEWIDE** (this report):
    a. Identify preliminary High Value Areas for kelp and eelgrass habitat.
2. **IN EACH SUB-BASIN** (beginning in 2024 with Pilot Sub-basins):
    a. Gather local knowledge and context for High Value Areas;
    b. Identify shared actions to support kelp and eelgrass conservation and recovery; and
    c. Identify habitat contributing to 10,000-acre goal in conversation with Tribes and partners.

Through continued efforts and engagement, WA DNR is committed to protecting and enhancing these precious coastal ecosystems, promoting biodiversity, supporting fisheries, and providing recreational opportunities for present and future generations. By preserving the health and resilience of kelp forests and eelgrass meadows, the state is ensuring the sustainability of its marine environment and securing the well-being of both natural and human communities for years to come.

INTRODUCTION

Kelp forests and eelgrass meadows are diverse and productive nearshore ecosystems, providing important habitat for a wide array of marine life, including threatened and endangered species such as listed salmon species, rockfish, and abalone. These complex marine forests and meadows provide habitat for important fisheries in Washington, especially Dungeness crab, shellfish, and salmon. They also play an important role in climate mitigation and adaptation by sequestering carbon and locally reducing ocean acidification impacts. In addition to these ecological and economic benefits, kelp and eelgrass have important cultural value to Indigenous people of the Northwest, playing a prominent role in traditional fishing, hunting, and food preparation and storage.

In response to dramatic losses of kelp and eelgrass in many regions of the State (Calloway, 2020; WA DNR, 2015), the Washington Legislature passed Senate Bill 5619 (2022), which was signed into law in March of 2022. The law (Revised Code of Washington (RCW) 79.135.440), also known as the Native Kelp Forest and Eelgrass Meadow Health and Conservation Prioritization Plan--Reports, tasks the Washington Department of Natural Resources (WA DNR) with collaboratively developing a plan which identifies at least 10,000 acres of priority kelp and eelgrass habitat for conservation and restoration by 2040.

As a milestone within development of the Statewide Kelp Forest and Eelgrass Meadow Health and Conservation Plan, WA DNR is required to submit a report to the legislature by December 1st, 2023, alongside a Monitoring Plan. The document presented here, the Statewide Kelp Forest and Eelgrass Meadow Health and Conservation Prioritization Plan (the "Prioritization Plan"), and concurrently submitted Monitoring Plan represent fulfilment of that requirement. Beyond this date, WA DNR will engage in feasibility analyses and community outreach to collaboratively select at least 10,000 acres for implementation of conservation and restoration actions.

The Prioritization Plan is built upon and implements several of the high-priority strategies described in the *Puget Sound Eelgrass (Zostera marina) Recovery Strategy* and the *Puget Sound Kelp Conservation and Recovery Plan* (WA DNR, 2015; Calloway et al., 2020), and is informed by previous habitat prioritization strategies (see **Appendix C**). It also implements key commitments outlined in WA DNR's Plan for Climate Resilience and the 3-Year Update (WA DNR, 2020; 2023), not only in the conservation and recovery of 10,000+ acres of kelp and eelgrass habitat, but also in how climate change will be integrated into each stage of the Prioritization Plan.

The purpose of the Prioritization Plan is to provide guidance for the sub-basin scale engagement and site selection process by laying out the process for engagement and beginning to aggregate information. It is not meant to select final recommendations for locations of specific priority areas or recovery actions per site. The Prioritization Plan outputs are meant to support additional conversations with stakeholders, Tribes, and community members, and will be refined and updated by integrating new and existing data in future iterations.

WA DNR collaboratively built this Prioritization Plan for kelp and eelgrass health and conservation to reflect the most up-to-date scientific knowledge as well as priorities of the communities who interact with kelp and eelgrass in their life, work, or recreation and the Tribal Nations for whom kelp and eelgrass have cultural and economic significance.

This Prioritization Plan represents the initial step towards fulfilling the 2040 goal outlined in RCW 79.135.440, and another step towards achieving collective conservation and recovery goals for kelp forests and eelgrass meadows in Washington. In this document, we highlight the High Value Areas that were identified through a collaborative process and describe the social-cultural, ecological, and economic values to those sites. Following submission of the Prioritization Plan to the legislature, DNR will work within the 2024 Pilot Sub-basins to pursue site-specific Tribal and community engagement, site selection, and implementation of conservation and recovery actions.

Recognizing the intrinsic and scientific value of Indigenous knowledge regarding kelp and eelgrass use and distribution, WA DNR aims to foster a respectful and inclusive relationship with Tribal communities, acknowledging Tribal ownership of invaluable traditional knowledge. WA DNR recognizes Tribes' shared stewardship of Washington's lands and waters, their shared geography with Washington State as sovereign nations, and their vital role as knowledge holders who are critical partners in achieving the goals and objectives of the Prioritization Plan.

Timeline

YEAR	DURATION	ACTION
2022	Updated as needed	Engagement Plan
2023	January - March	Statewide public engagement
	April - September	Development of prioritization framework and identification of High Value Areas
	December 1st	Prioritization Plan submitted to legislature
2024	On-going	Sub-basin engagement within Pilot Sub-basins to identify priority areas that will contribute to the 10,000+ acre goal
	December 1st	Report to the Legislature on progress, and biennially until 2040
2025 - 2040	On-going	Continued sub-basin engagement and identification of 10,000+ acres of priority habitat Implementation and adaptive management
2040		10,000+ Acres of habitat conserved or recovered
Ongoing	Upon request	Tribal consultation

Vision of Success

WA DNR's vision for this plan is to inspire collaborative stewardship and collective action to conserve and recover Washington's kelp forests and eelgrass meadows for the benefit of current and future generations.

To achieve this vision, WA DNR's has identified the following goals for implementation of this Prioritization Plan and future discussions:

1. Support ongoing efforts by DNR and partners, particularly in High Value Areas,
2. Identify ways to support new efforts in High Value Areas,
3. Identify at least 10,000 acres of DNR managed lands for DNR-lead conservation and recovery actions; and
4. Proactively identify and leverage opportunities for conservation and recovery as they arise.

Kelp and Eelgrass are Vital Habitats

Floating and submerged kelp forests and eelgrass meadows create a mosaic of submerged vegetation that supports diverse communities of fish, birds, and mammals by increasing food web complexity and providing critical habitat.

The structure of a kelp forest is like an upland forest, with both tall, canopy-forming kelp and understory kelp forming a matrix of habitat from the rocky substrate through the water column. In this Plan, "kelp forests" refer to all native kelp in Washington, both understory and floating kelp species.

Eelgrass meadows are found in shallower more protected areas with soft sediments, connecting the landscape of submerged aquatic vegetation. In this Plan, "eelgrass meadows" refers to all native seagrasses in Washington. The ecosystem services provided by kelp forests and eelgrass meadows are summarized in **Table 1**.

In addition to the ecosystem services described in **Table 1**, kelp forests and eelgrass meadows are valued hunting grounds and ceremonial foods for Pacific Northwest Tribes (see Wyllie-Echeverria and Ackerman, 2003; Naar, 2022) and support commercial and Tribal-commercial fisheries.

While kelp forests and eelgrass meadows have different biology and respond to stressors differently, many of the stressors identifiable at a state-scale affect both kelp and eelgrass (see **Appendix B**). The Prioritization Plan encompasses both kelp and eelgrass habitat to account for the coarse scale of state-wide prioritization. Beginning in 2024, WA DNR will engage in a more local prioritization process that will use site-specific conditions and identify site-specific goals to identify areas for collective conservation and recovery actions.

A variety of factors influence distribution of kelp and eelgrass, including water depth, temperature, salinity, and substrate type. Along the rugged coastline of the Pacific Ocean, floating giant kelp (*Macrocystis pyrifera)* thrives in nutrient-rich waters, forming extensive underwater forests. In contrast, native eelgrass and seagrasses (*Zostera marina* and *Phyllospadix spp.*) are abundant in shallow bays and estuaries, where submerged meadows provide crucial habitat for numerous marine species. Bull kelp (*Nereocystis luetkeana*) forests are prevalent in the San Juan Islands, Strait of Juan de Fuca, and Olympic Peninsula, while eelgrass beds are widespread throughout the Puget Sound and the coastal estuaries of Grays Habor and Willapa Bay. A variety of understory kelp species are broadly distributed along Washington's coast and within Puget Sound.

A population of non-native eelgrass is also abundant in Washington state. The dominant non-native eelgrass found in Washington state was recently classified as *Nanozostera japonica* (Sullivan, 2023); it was previously referred to as *Zostera japonica*. RCW 79.135.440 directs the Prioritization Plan to focus on opportunities to conserve and recover native eelgrass, and therefore it will not be considered in this report; however, WA DNR will map *N. japonica* to evaluate management opportunities in the future.

The distribution of kelp and eelgrass in Washington State reflects the intricate interplay between environmental conditions and the unique characteristics of these seagrass communities, fostering a thriving marine ecosystem that supports a wealth of marine biodiversity. More detailed information about kelp and eelgrass extent and trends is available in **Appendix A**.

Summary of Ecosystem Services and Functions of Kelp and Eelgrass

Ecosystem function	*Ecosystem service*
Trophic functions	
Primary production	Source of carbon sequestering
Fuels secondary production: grazers (crustaceans, gastropods, echinoderms)	Production of culturally and recreationally important species, like waterfowl and abalone, minor harvest for recreational and commercial consumption by humans
Fuels secondary production: detritivores (crustaceans, gastropods, echinoderms)	Production of commercially fished species (abalone, sea urchins), harvested for commercial mariculture of abalone
Fuels tertiary production: invertivores	Production of commercially fished species (crabs, fishes), migratory birds
Structural Function	
Biogenic 3-dimensional habitat	Provides structural framework for nearshore ecosystems
Source of habitat for epiphytes	Increased local species diversity
Source of recruitment and nursery habitat for juvenile invertebrates and fishes	Production of recreationally and commercially fished species (rockfishes, Dungeness crab, salmon)
Physical structure dampens inshore swell and turbulence	Reduces swell and coastal erosion
Nutrient cycling	Improves water quality by trapping and storing particles and nutrients, as well as uptake of nutrients from the water column.
Water quality improvement	Improve water clarity by reducing resuspension of soft sediments and have the potential to mitigate some effects of ocean acidification
Nutrient cycling	Limit algae blooms and removes harmful bacteria from the water column
Ecosystem connectivity	
Export of primary production to coastal marine ecosystems (sandy beaches, rocky intertidal, offshore soft-bottom and submarine canyons)	Fuels secondary production of detritivores in other coastal ecosystems

Table 1. Ecosystem services and functions provided by kelp forests and eelgrass meadows (adapted from Springer et al. 2010 and WA DNR 2015)

Kelp and Eelgrass and Tribal Nations

WA DNR seeks to implement comprehensive conservation and recovery measures that not only protect vital marine habitats but also preserve the cultural significance they hold for Tribal Nations. Past conservation efforts without incorporating Tribal perspectives have often fallen short of achieving meaningful and sustainable results.

WA DNR has sought to collaborate closely with Tribes within development of the Prioritization Plan and will continue to seek Tribes as co-stewardship partners in implementation of the Plan.

Tribal engagement has informed statewide ecological, economic, and social-cultural categories of values presented below. In addition to offering consultation at any moment in the Prioritization Plan, WA DNR has five Tribal representatives on the Kelp and Eelgrass Plan Working Group, hosted two informational webinars for Tribes, presented Plan development process at the WA DNR Tribal Summit in July 2023, presented a map of draft High Value Areas for feedback and held a Tribal review period prior to public review. WA DNR has met individually with several interested Tribes who shared specifically and broadly kelp and eelgrass habitats that are of importance, and we have incorporated that information into the prioritization framework.

WA DNR recognizes that data presented in this Prioritization framework may not accurately capture the values and knowledge of Tribal Nations as they wish to be included. In future conversations, WA DNR will seek Tribal input to improve representation of Indigenous values, knowledge, and priorities where desired by Tribes.

Throughout identification of priority areas for conservation and recovery and associate actions, WA DNR strives to fully achieve meaningful consultation with Tribal Nations and inclusion of Tribal values and priorities possible. In sub-basin scale conversations, WA DNR will seek to partner with Tribes where interested to co-develop strategies for conservation and recovery where appropriate, in addition to soliciting public engagement for community-scale stewardship of habitat.

WA DNR will actively work with Tribes to select priority areas for conservation and recovery, seeking input to ensure Tribal values and needs are reflected in the site selection process. WA DNR will seek to defer to Tribes to ensure alignment with Tribal values as much as possible. WA DNR will not identify a final priority area for implementation without prior consultation. By collaborating closely with the Tribes, WA DNR aims to develop a conservation plan that not only safeguards the ecological importance of kelp and eelgrass habitats but also upholds the cultural significance and well-being of the Indigenous communities tied to these vital ecosystems.

Environmental Justice and Equity

Environmental justice and equity are key components of WA DNR's approach to engagement for the Statewide Kelp and Eelgrass Plan. WA DNR's mission to sustain and protect Washington's natural resources, including kelp and eelgrass, requires equitable and just prioritization and involvement of overburdened communities and vulnerable populations in the development of management plans. The Healthy Environment for All (HEAL) Act, passed by the state legislature in 2021, aims to reduce environmental health disparities and improve the health of all Washington state residents by providing recommendations developed by the state Environmental Justice Task Force for prioritizing environmental justice in state government.

As described within the Kelp and Eelgrass Engagement Plan, WA DNR is committed to ensuring equitable access to and impacts resulting from Plan development and implementation. WA DNR will continue to engage communities as described in the 2022 Engagement Plan.

A commitment to environmental justice and equity is continuous work. WA DNR strives to ensure that environmental justice and equity, in relation to kelp and eelgrass, is not an action which is achieved upon submission of the Prioritization Plan, but rather an ongoing process which frames work from establishment of the 10,000 acres through 2040 and beyond. In addition, effects of both action and inaction may create overburdened groups who are not apparent today. To that end, DNR will seek ongoing engagement with Tribes, communities, the public, and stakeholders to ensure that the Prioritization Plan and its implementation continue to accurately reflect the values and needs of the diverse groups relevant to this Plan.

Climate Change and Building Resilience

Kelp and eelgrass habitats are vulnerable to climate change effects and play a role in mitigating the climate crisis. Warming ocean temperatures have been linked to kelp forest and eelgrass meadow declines worldwide, and elevated temperatures can act synergistically with other local stressors to exacerbate kelp loss (Weigel et al., 2023; Thom et al., 2011). Temperature stress makes kelp forests and eelgrass meadows less tolerant and more vulnerable to other stressors. Other aspects of climate change related stressors on these habitats include increased storm surge, sea level rise, and changes in the timing of freshwater inputs, impacting salinity and turbidity (see **Appendix B**).

Through its Plan for Climate Resilience, WA DNR has outlined how climate change will be integrated into the agency's approach to natural resource management, especially when identifying areas of high vulnerability and developing strategies (WA DNR, 2020). WA DNR recommitted to these efforts in the recently published 3-Year Update on the Plan, which explicitly highlights kelp and eelgrass conservation and recovery as a key metric of climate resilience (WA DNR, 2023). However, integrating climate change is not just a commitment in a strategic plan, it is crucial for future success and building resiliency of these habitats. Throughout this process, a strong emphasis will be placed on increasing resilience in the face of climate change through the identification and management of priority habitats.

KELP AND EELGRASS HABITAT PRIORITIZATION FRAMEWORK

Prioritization Framework Overview

As described within the Introduction, WA DNR was tasked to provide a framework for collaboratively prioritizing habitat for conservation and recovery of kelp and eelgrass.

Presented below, WA DNR has developed a prioritization framework that represents an iterative, multi-step process with multiple opportunities for Tribal and public input to ensure the outcomes accurately reflect the values of the people of Washington state. This framework will be implemented and adapted through 2040 to identify priority areas and select specific parcels of kelp and eelgrass habitat for conservation and recovery (**Figure 1**).

Previous efforts to prioritize habitat have informed development of this process, notably WA DNR's "*Priority Marine Sites for Conservation in the Puget Sound*" which developed an ecological framework to evaluate candidate aquatic reserve sites (Palazzi & Bloch, 2006). Other efforts and processes that were influential in this process include but are not limited to WA DNR's Ecological Integrity Assessments and the *Sonoma-Mendocino Bull Kelp Recovery*

Plan (Weber et al., 2022; Hohman et al., 2019). Additional context for integration of select prioritization frameworks are described in **Appendix C.**

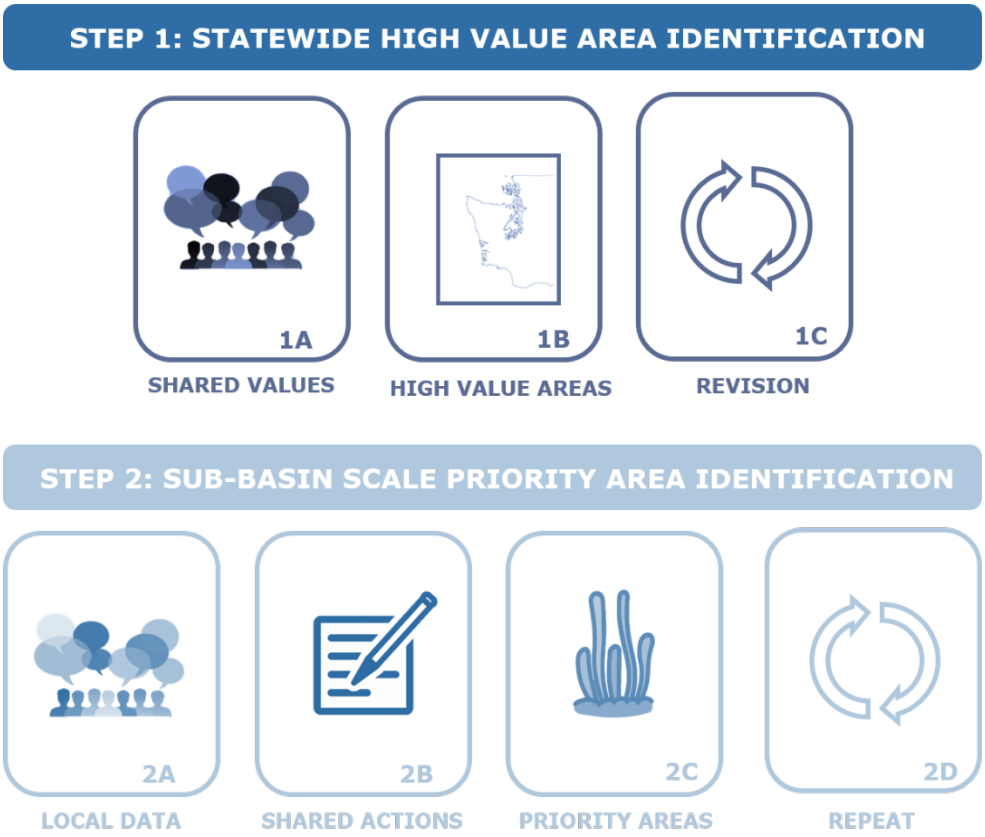

Figure 1: The prioritization framework represents an iterative, multi-step process with multiple opportunities for Tribal and public input to ensure the outcomes accurately reflect the values the people of Washington state. This framework will be implemented and adapted through 2040 to identify priority areas and select specific parcels of kelp and eelgrass habitat for conservation and recovery.

Framework Foundation

The language of the RCW tasks WA DNR to build a framework that identifies "areas of highest risk of permanent loss, or contribute significant environmental, economic, and cultural benefits to Tribal nations and local communities" (RCW 79.135.440). WA DNR used the language of this RCW to guide development the collaborative framework around three central questions. These questions represent the stepwise process WA DNR will use to identify priority areas through 2040 (**Table 2**).

CENTRAL QUESTIONS	FRAMEWORK DEVELOPMENT ACTION
1. **Why** protect kelp and eelgrass?	Identify the **shared values** that underlie Tribes', agencies', and stakeholders' desires for conservation and recovery to identify broad areas that maximize these values.
2. **What** habitat can best be conserved and recovered?	Identify what current and future **opportunities and risks** are present that could influence the long-term success and benefit of conservation and recovery actions.
3. **How** can these habitats be conserved and recovered?	Identify and refine list of **tools and actions** of conservation and recovery of habitats that are applicable to the habitats identified in questions 1 and 2 or other high value habitats.

Table 2: This table represents the questions WA DNR used to guide development of the prioritization framework (left column) with associated actions used to gather primary information for the framework (right column)

WA DNR gathered information from primary and secondary sources to answer the central questions outlined in **Table 2** as a means of developing the framework. In addition to extensive review of scientific articles, WA DNR sought primary sources of information and input that ensure reflection of the diverse values and needs of Washington's people and environments. These sources include expert solicitation from a representative Working Group, gathered public input in a series of virtual and in-person workshops, and offered Tribal Consultation. This process follows the strategy set forth in the Kelp and Eelgrass Engagement Plan submitted to the legislature in 2022.

Two-step Framework Outline:

WA DNR used these guiding questions to develop a two-part framework that outlines a high level, statewide identification of high value habitat, followed by sub-basin scale engagement for local identification of priority areas. This two-step process attempts to address the guiding questions in each step of the process, first using more coarse, high-level data at the state scale in Step 1 to answer question 1, followed by high-context, region-specific knowledge and data at the sub-basin scale in Step 2 to answer questions 2 and 3. This process is outlined below in **Figure 2** and described in the following text.

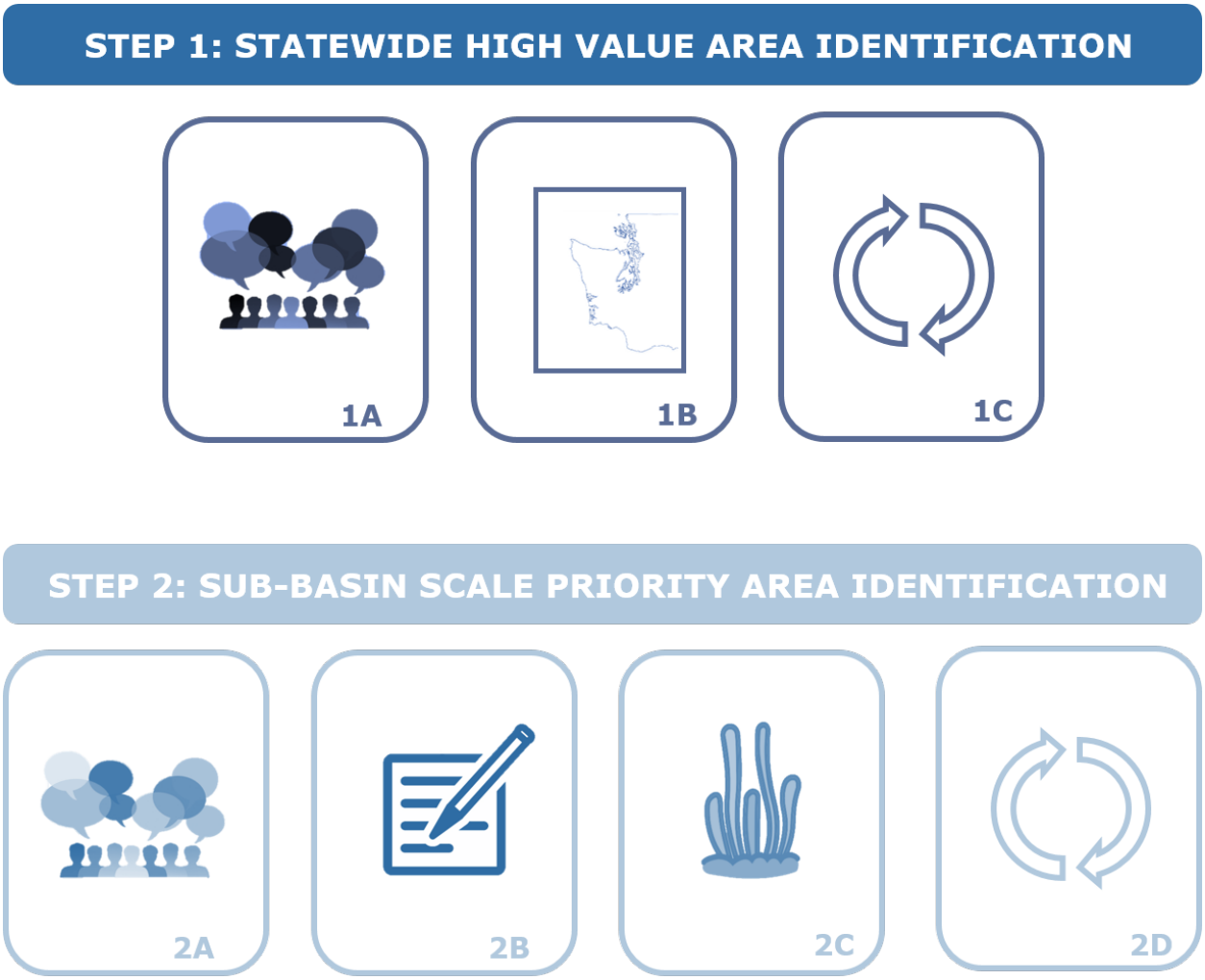

Figure 2: The Two-Step Framework provides opportunities for both broad and fine-scale identification of valuable kelp and eelgrass habitat with multiple points of iteration and input. In Step 1, Statewide High Value Area Identification, public engagement, and Tribal consultation contribute to identification of shared values (1A), which are translated to spatial data sets and mapped into High Value Areas (step 1B). These High Value Areas and shared values will be refined as new data become available and will be used to see conversations in Step 2 (1C).

In Step 2, Sub-basin Scale Priority Area Identification, public engagement, and Tribal consultation at the sub-basin scale add local knowledge and context (2A), contributing to development of shared goals and actions toward conservation and recovery in the basin (2B). This engagement will also help identify priority areas for DNR-led conservation and recovery contributing to the 10,000-acre goal (2C). This process will be repeated for each sub-basin (2D).

Step 1: Statewide High Value Area Identification

The first step in the prioritization framework was to identify broadly what habitat provides ecological, social/cultural, and economic values. We have defined "values of kelp and eelgrass" as the values that Washingtonians identify for kelp and eelgrass habitats. These values underpin almost every aspect of human well-being, including food and water quality, health, and economy.

The three categories for values of kelp and eelgrass are: ecological, economic, and social-cultural values. Areas where there are strong shared values across the three categories of values are identified as our High Value Areas. See "Identifying Shared Values" and "Kelp and Eelgrass High Value Areas."

Data representing shared values identified in (step 1a) are applied at the state scale produce a map of High Value Areas (step 1b) to seed discussion at the sub-basin scale in Step 2. The outputs of this initial stage of the framework are intentionally broad in recognition that the answers to the three central questions outlined in **Table 2** are complex and require additional engagement with Tribes, stakeholders, and communities.

Framework Steps for Statewide High Value Area Identification:

a. Identify shared values through consultation and engagement.
b. Map High Value Areas for kelp and eelgrass habitat.
c. Repeat and revise High Value Areas as new data becomes available.

Step 2: Sub-basin Scale Engagement and Localized Data Integration

Once preliminary High Value Areas are identified, the next stage will be informed by additional targeted Tribal, partner, and community engagement and identifying localized data of the High Value Areas within a selected sub-basin. The engagement and data integration on the sub-basin scale will inform what opportunities and risks are present that could influence the long-term success and benefit of conservation and recovery actions, as well as what tools and actions of conservation and recovery of habitats that are applicable or feasible. This will result in site selection of priority areas and development of priority area implementation plans.

For each sub-basin, DNR will engage in conversations to understand additional contact about kelp and eelgrass habitat value, opportunities and risks (stressors), and feasibility (tools and actions) at the local level (step 2a). DNR will lead these conversations beginning in 2024 with the identified pilot sub-basins and continue through each sub-basin. This local information will inform sub-basin scale plans of shared actions for kelp and eelgrass recovery (step 2b) and, as appropriate, identify Priority Habitat for DNR-lead recovery and conservation contributing to the 10,000-acre goal (step 2c).

Framework Steps for Sub-basin Scale Priority Area Identification

a. Gather local knowledge and context through consultation and engagement.
b. Identify shared actions to support kelp and eelgrass conservation and recovery.
c. Identify habitat contributing to 10,000-acre goal in conversation with Tribes and partners.
d. Repeat for each sub-basin.

Opportunities and Risk
The sub-basin engagement and data integration stage will inform what habitats can best be protected and recovered by identifying which habitats are most likely to benefit from conservation and recovery actions. Our goal will be to identify with Tribes, local partners, stakeholders, and communities what risks to long-term conservation and recovery and opportunities we can leverage in sub-basin.

> **Opportunities** are factors that might make one area more likely to benefit long-term from conservation or recovery than others. An example would be areas that are more feasible to conserve or recover for a variety of reasons, including but not limited to political will or resilient habitat.

Risks are factors that might make one area more vulnerable to stressors and less likely to benefit from conservation and recovery efforts. An example could be areas where water temperature is higher, due to climate change or other factors.

Opportunities and risks will be identified during the sub-basin scale engagement and site-selection and will be integrated into the prioritization framework. This includes integrating climate change modes and identifying strategies to increase resilience of these habitats to climate change effects.

Tools and Actions

Tools and actions will also be developed with Tribes, local partners, stakeholders and community members during the sub-basin scale engagement and site-selection process. Both the Puget Sound Kelp Conservation and Recovery Plan and the Eelgrass Recovery Plan have identified a broad suite of potential tools to protect and recover kelp and eelgrass habitats that we may use as a starting point for identifying site specific actions (Calloway et al., 2020; WA DNR, 2015). These include:

- Conservation
- Stressor Reduction
- Restoration
- Research Opportunities
- Public Engagement
- Deepen understanding of values and integrate into management

Engagement and Partnerships

Throughout the process, WA DNR seeks to collaboratively implement the prioritization Framework to identify priority areas for kelp and eelgrass health and conservation, and to integrate the most up-to-date scientific knowledge as well as priorities of the communities who interact with kelp and eelgrass in the life, work, or recreation and the Tribal Nations for whom kelp and eelgrass have cultural significance.

Our conservation and recovery goals can only be achieved through collaboration and collective action. As the sub-basin scale engagement and localized data integration phase is implemented, WA DNR will seek work and collaborate with Tribal, governmental, and local partners to identify priority areas and develop implementation plans.

As previously described, the work presented in this Prioritization Plan represents just one element of a large kelp and eelgrass conservation and recovery community. WA DNR will seek to ensure the process and outcome of this plan dovetail with existing efforts for maximum efficiency in ensuring the continuing health of these vital habitats.

Options for Iteration and Implementation

The results of the first step of the prioritization framework presented within this document are intended to provide guidance for the sub-basin scale engagement and site selection process, not to select final recommendations for locations of specific priority areas, or recovery actions per site. The High Value Area outputs are meant to support additional conversations with stakeholders, Tribes, and community members, and will be refined and updated by integrating new and existing data in future iterations.

As highlighted in **Figure 2**, this prioritization framework is meant to be adapted as new opportunities arise, integrate new information, and be flexible to changing environmental conditions. As WA DNR moves towards the 2040 conservation and recovery goals, statewide

changes in trends and distributions and our understanding of these habitats may change, and we must be flexible and adaptive to tackle emerging issues.

Criteria for Conservation and Recovery

WA DNR will monitor statewide progress towards the 10,000-acre conservation and recovery goal. High-level success criteria will include the total number of new kelp and eelgrass habitat acres that are under WA DNR management for conservation or recovery, monitored by WA DNR and summarized via a report submitted to the legislature on a biennium basis.

Additional site-specific criteria for conservation and recovery goals will be developed for each priority area as part of the site selection and implementation phase. WA DNR, with Tribal and other partners, will develop success measures and criteria for conservation and recovery that aligns with the Statewide Kelp and Eelgrass Monitoring Plan (publication pending). In addition, site-specific management plans will identify management actions for climate change considerations.

Preliminary Prioritization Framework Results

Identifying Shared Values

The first stage in Step 1 of the prioritization framework was to identify broadly what habitat provides ecological, social/cultural, and economic values (**Figure 3**). We have defined "values of kelp and eelgrass" as the values that Washingtonians identify for kelp and eelgrass habitats. These values underpin almost every aspect of human well-being, including food and water quality, health, and economy.

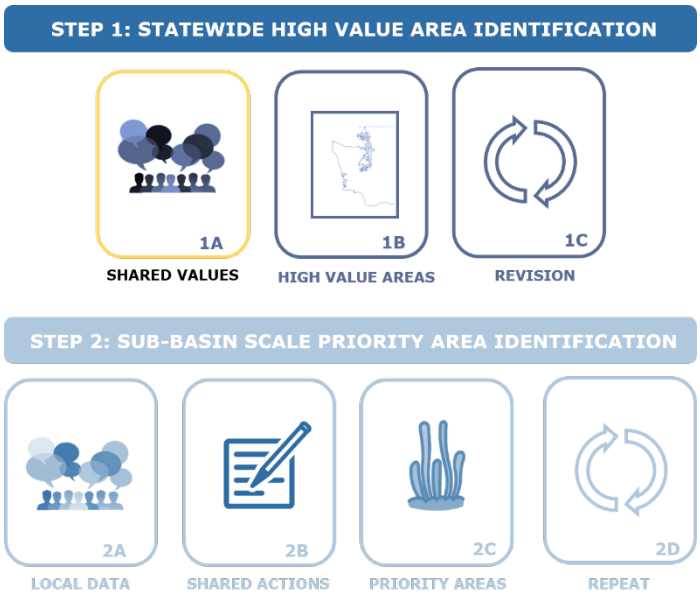

Figure 3: Identifying shared values represents the first part of Step 1 toward identification of high value areas.

During the workshops held January to March of 2023, WA DNR heard from many participants about what they valued about kelp and eelgrass habitats, identify where these values occur

on the landscape, and what risks or stressors these areas might be experiencing. Based on discussions and feedback during the workshops, we identified a suite of shared values for inclusion in the values criteria. See **Appendix C**: Prioritization Framework Development for more information on the outreach and workshops.

Value	Description	Value Category		
		Ecological	Economic	Social-Cultural
Artistic value and spiritual connections	Identified by public workshop participants, kelp and eelgrass possess intrinsic spiritual and artistic values.			X
Blue carbon potential	Kelp and eelgrass contribute to carbon sequestration by taking up organic carbon and storing it. In the future, there might be opportunities to integrate blue carbon into future climate market mechanisms (Ullman et al., 2013).	X	X	
Commercial fishing and shellfish aquaculture	Kelp and eelgrass provide habitat for commercially important species of fish and shellfish at various life stages.		X	
Habitat for ESA fish species	Kelp and eelgrass provide habitat for ESA species at various life stages, including listed salmon and rockfish species.	X	X	X
Important salmon habitat	Kelp and eelgrass provide habitat for salmonid species at various life stages, regardless of ESA listing.	X	X	X
Food web connectivity	Kelp and eelgrass provide habitat for forage fish species. Forage fish species are critical in other nearshore food webs.	X		
Food web support	Kelp and eelgrass fuel nearshore food webs as a primary producer and important food source for many species.	X	X	X
Important invert habitat	Kelp and eelgrass are key habitats for native invertebrate species, including some that are threatened and endangered.	X		
Important migratory bird habitat	Kelp and eelgrass are important habitats for birds as they migrate, not only as a food source but as resting areas.	X		
Functional Estuaries	Eelgrass can be found in these major estuaries on the coast and Puget Sound, which provide important habitat for many different species of fish, birds, and other wildlife.	X	X	X
Existing Marine Managed Areas	These areas were identified and prioritized by their respective agencies and have unique ecological and social value in Washington.	X		X
Nutrient cycling	Kelp and eelgrass take up excess nutrients in the water column.	X	X	
Ocean Acidification Buffering	Eelgrass can buffer against ocean acidification. More research is needed to better understand kelp's ability to buffer against ocean acidification.	X	X	

Value	Description	Value Category		
		Ecological	Economic	Social-Cultural
Recreation and subsistence fishing	Kelp and eelgrass provide habitat for subsistence and recreational fisheries at various life stages.			X
Recreational diving	Kelp and eelgrass habitats support rich marine life that is of high value to divers.		X	X
Recreational kelp harvest	Kelp is a traditional food of many people who reside in Washington.	X		X
Sediment and shoreline stabilization	Eelgrass can provide stabilization to sediments and shoreline habitats during high energy events. However, sedimentation is also a stressor to kelp and eelgrass. We need to identify where eelgrass is beneficial but also identify where there are anthropogenic causes for increased sedimentation for stressor reduction.	X	X	X
Supports iconic NW species	Not only an iconic species in the NW, but Orca are also known to frequent kelp beds and these habitats support their prey/food webs.	X	X	X
Supports NW tourism	People come to the NW to enjoy the scenic vistas and the flora/fauna that exist in those vistas. Parks, refuges, and preserves are areas of high use for Washingtonians and visitors to enjoy.		X	X
Tribal Treaty Rights and Indigenous uses	A multi-faceted value that intersects with many of the values listed in this table, Tribes and Indigenous people residing in Washington have many uses and values around kelp and eelgrass.	X	X	X
Unique Ecological Areas	Previous prioritization processes have identified unique ecological areas on state-owned aquatic lands, particularly the process to identify new WA DNR Aquatic Reserves. The outcome and effort of that process should be leveraged for future prioritization efforts.	X		
Water quality improvement	Kelp and eelgrass can improve water quality by absorption of carbon dioxide and sequestration of nutrients and known pollutants. This can greatly benefit both local human populations and the ecosystems. However, extremely poor water quality is also a known stressor and should be identified in potential actions.	X	X	X

Table 3: Description of values around kelp and eelgrass and how they relate to ecological, economic, and social-cultural benefits.

As highlighted above, some of the values listed in **Table 3** are challenging to quantity or suffer from missing data. Values that would benefit from additional investigation are highlighted in the Gaps and Needs section of this Prioritization Plan (page 36). These gaps represent an opportunity for future investment to improve the ability to manage kelp and eelgrass and their dependent uses.

Data limitations at the statewide scale further necessitate coarse-scale identification of areas of high value. The framework has identified the best available data that visualized the values at the time of developing the Prioritization Plan (see **Appendix D**), and will continue to refine and adapt the framework, integrating more site-specific data and updating with new information as available.

Values criteria developed during the collaborative process and linked to relevant data sets were aggregated using ArcGIS into a map. Thresholds were applied to determine which areas on the map have the highest number of overlapping values, such that high value habitats are defined as sharing high ecological, economic, and social-cultural value scores.

How this framework was developed is outlined below in subsection *Framework Development* with additional details included in **Appendix C.**

Kelp and Eelgrass High Value Areas

By applying the prioritization framework (see **Appendix D**: Methods to Identify High Value Areas), we have preliminarily identified where there are areas of kelp and eelgrass that support the three categories of criteria: economic, ecologic, and social-cultural (**Figure 4**). The areas identified as High Value Areas are not meant to be final recommendations for locations of specific priority areas. The prioritization framework outputs are meant to support additional conversations with stakeholders, Tribes, and community members, and will be refined and updated by integrating new and existing data in future iterations.

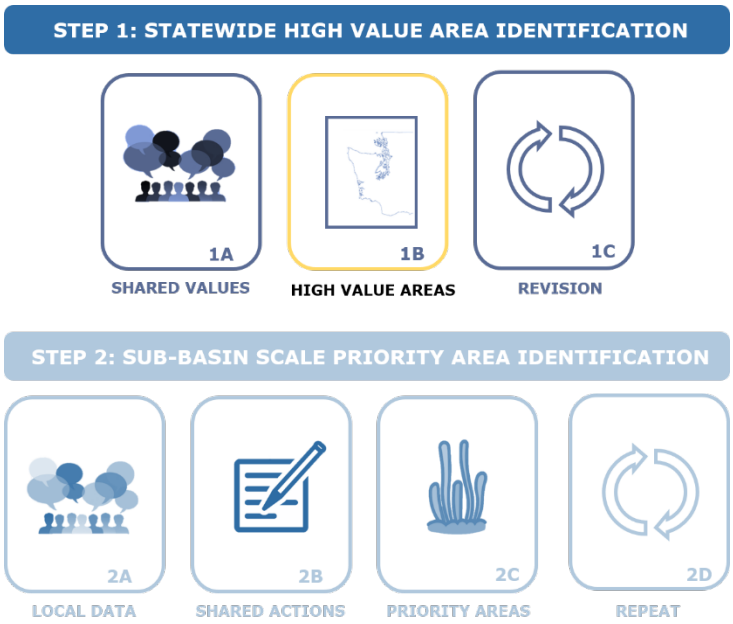

Figure 4: The second element of Step 1 is to produce maps of the High Value Areas. These maps will seed discussion in Step 2 and represent the progress-to-date presented within this report.

Ecological Values

Kelp and eelgrass play a crucial role in the diverse ecosystem of Washington's waters. Using our ecological values and corresponding indicators, we have identified areas of broad ecological value (see **Figure 5**).

Economic Values
Kelp and eelgrass contribute to the economy of Washington in many ways. Using our economic values and corresponding indicators, we have identified broad areas of kelp and eelgrass habitat of high economic value (see **Figure 6**).

Social-Cultural Values
Kelp and eelgrass habitats and the vegetation itself are deeply important to many people residing in Washington. The datasets identified are the best approximation to visualize and map the values identified during the public engagement process (see **Figure 7**); however, we hope to continue to add to these datasets, especially regarding Tribal interests, as part of the adaptive management. Mapping social-cultural values will also be a focus for site specific research and community engagement to provide further refinement and detail to the current data.

Limitations
The indicators selected to spatially represent each of the kelp and eelgrass values were not always a perfect proxy for the value. We have identified the best available data that visualized the value at the time of developing the prioritization framework (**Appendix D**). Because of the need for additional Tribal consultation and community engagement and limitations to our data sources, the High Value Areas are intentionally broad.

The next phase of the process to gather more site-specific information through targeted Tribal consultation and community engagement will provide additional specificity on sites for implementation and action. As new data sources are available, they will be incorporated, and the prioritization framework may be updated.

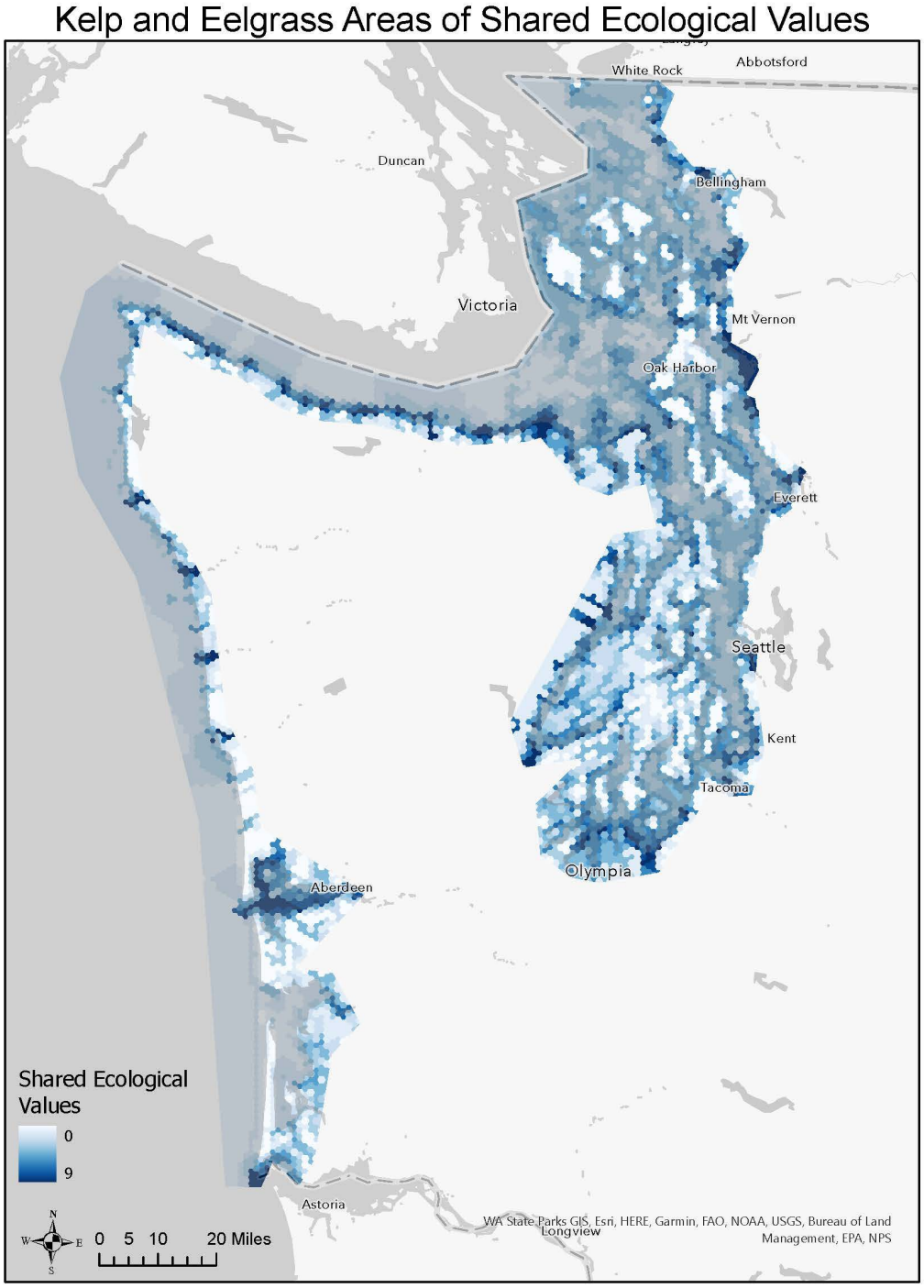

Figure 5: Mapped areas of overlapping ecological values. The darker areas represent areas with multiple ecological values.

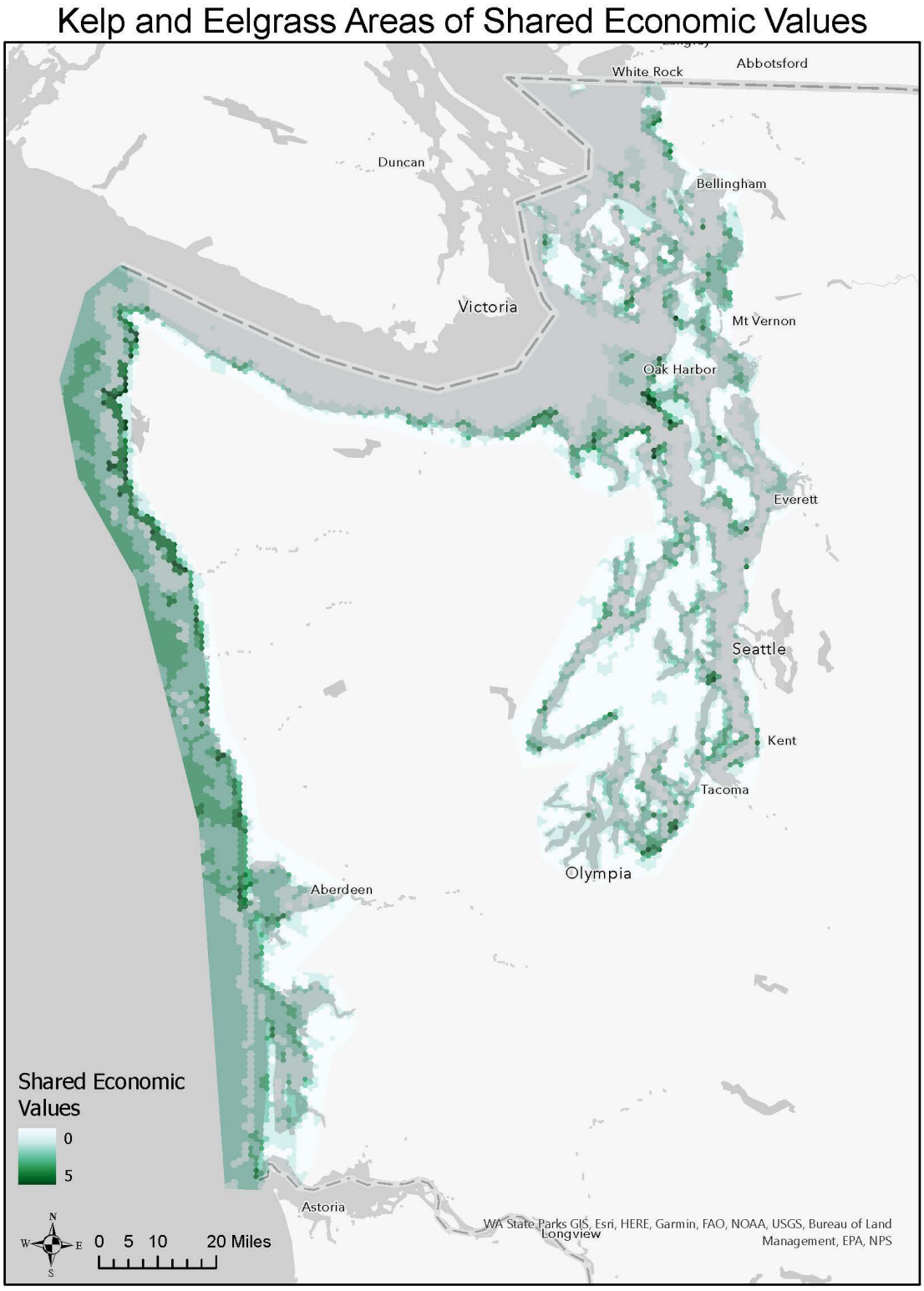

Figure 6: Mapped areas of overlapping economic values. The darker areas represent areas with multiple economic values.

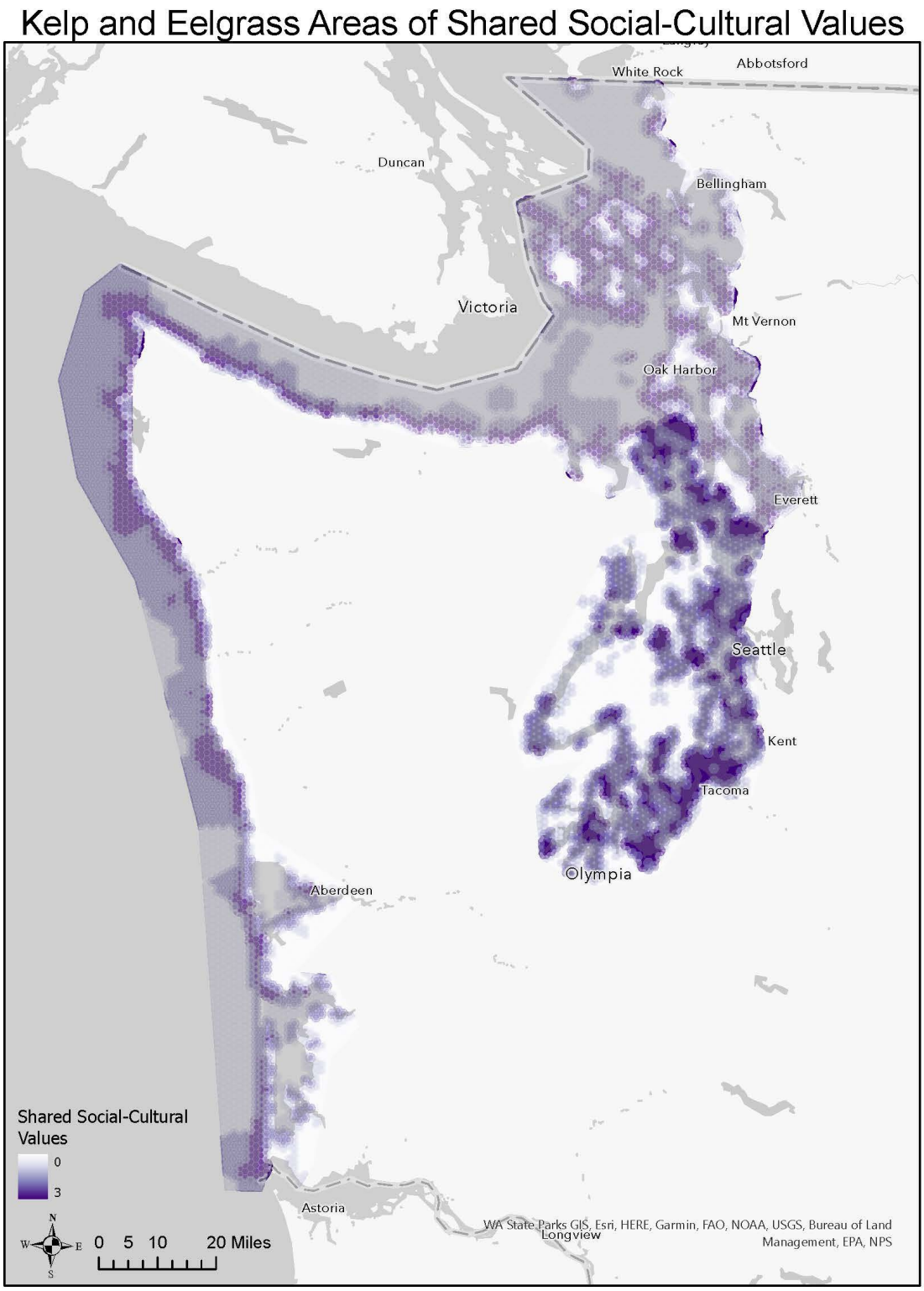

Figure 7: Mapped areas of overlapping social-cultural values. The darker areas represent areas with multiple social-cultural values.

Tribal and Public Engagement Informs this Process

Along with input from the expert Working Group and literature review of ecosystem services and values of kelp and eelgrass habitats, WA DNR held a series of workshops that informed the values that were used to identify High Value Areas.

Tribal engagement, as described in "Kelp and Eelgrass and Tribal Nations" (page 12), also informed statewide ecological, economic, and social-cultural categories of values. WA DNR also incorporated into this initial prioritization framework information shared from several Tribes specifically and broadly about kelp and eelgrass habitats that are of importance to them.

Future Tribal consultation and collaboration will be incorporated into the prioritization framework, as well as into the identification of priority areas and development of implementation plans. WA DNR will seek to defer to Tribes to ensure alignment with Tribal values as much as possible. WA DNR will not identify a final priority area for implementation without prior consultation.

Additional details about how this framework was developed are outlined in **Appendix C.**

Pilot Sub-basins

To understand the local context and knowledge vital to proper selection of priority areas, DNR will engage in consultation with Tribes and engagement with stakeholders at the sub-basin scale (**Figure 8**). Sub-basin conversations will present an opportunity for continuing input into selection of areas contributing to the 10,000-acre conservation and recovery goal of the agency and provide a forum for development of shared understanding and action. It is the intent of DNR to host conversations and continue engagement within each sub-basin, beginning with three Pilot Sub-basins. The outcome of these conversations will be the identification of priority areas contributing to the 10,000-acre goal, as well as implementation plans for conservation and recovery actions.

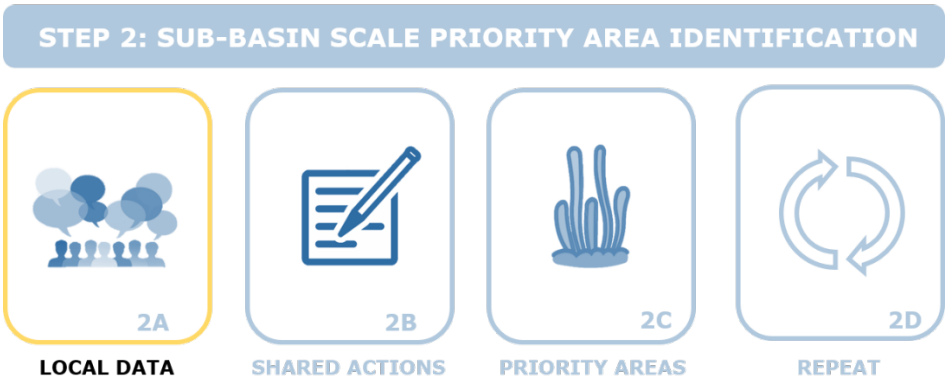

Figure 8: Beginning in 2024, DNR will initiate Step 2 of the Framework in the pilot basins identified below beginning with engagement and consultation to understand local data and knowledge (2A). DNR will then repeat Step 2 in each sub-basin, using lessons learned from implementation in the pilot sub-basins.

Below, WA DNR has identified the three Pilot Sub-basins (**Figure 9**) for implementation of sub-basin scale investigation. These sub-basins have been chosen as pilots for the opportunities they present to align with ongoing or planned state and federal actions or investments, for data landscapes allowing for well-informed decision-making, or other factors as described below.

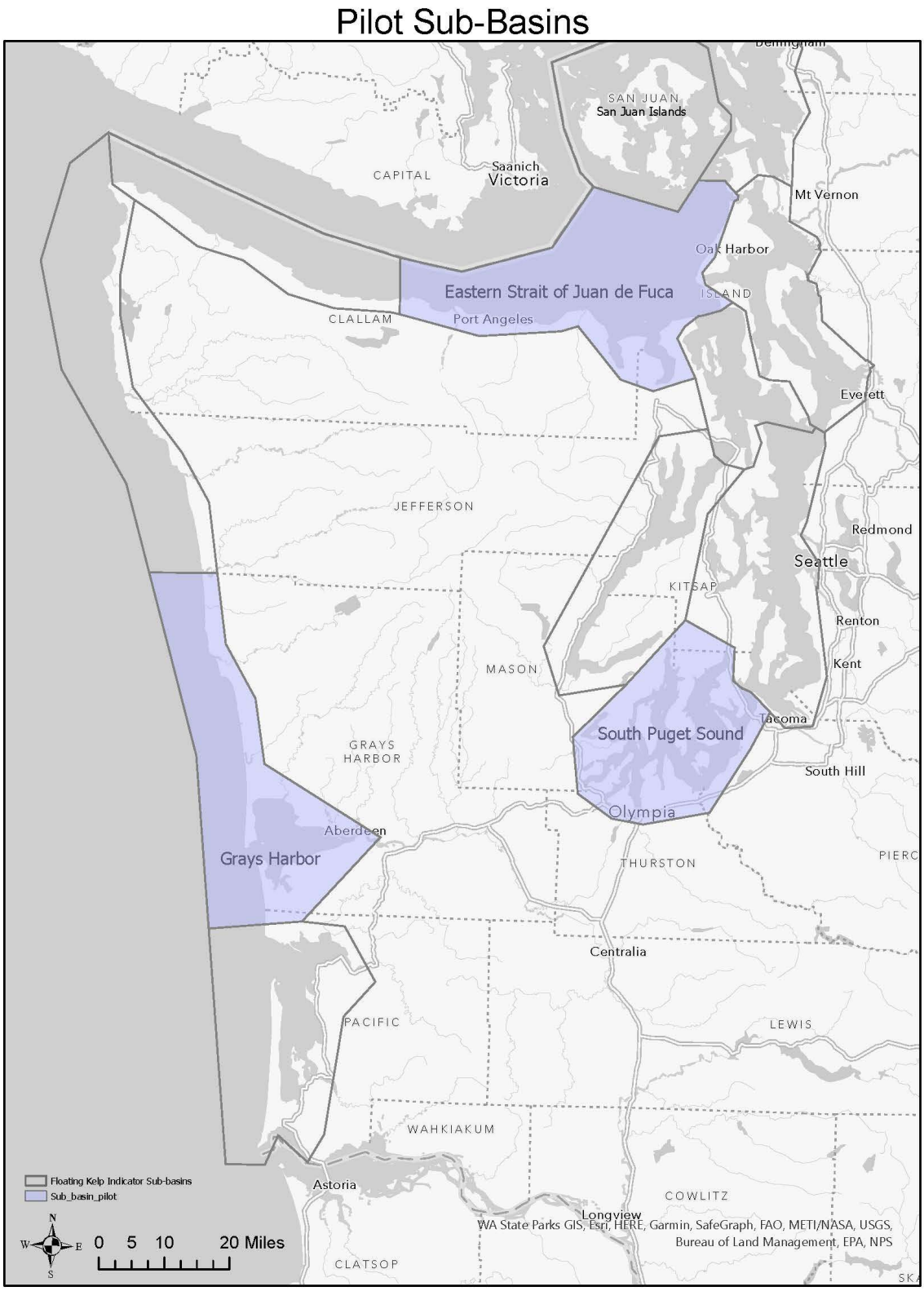

Figure 9: Pilot Sub-basins that will be the initial focus for additional engagement and data integration.

The High Value Areas presented in this report (**Figure 10**) represent a starting point for future conversations within these sub-basins, but not a definitive list of areas to be considered for conservation or recovery. Beginning in 2024, WA DNR will initiate local conversations in each of the Pilot Sub-basins to solicit input on siting of areas contributing to the 10,000-acre conservation and recovery goal, develop partnerships to support implementation of conservation and recovery actions, and work towards a shared stewardship plan for kelp and eelgrass habitat in the area.

While WA DNR intends to focus immediate conversations on conservation and recovery actions leading to fulfillment of the 10,000-acre goal within the pilot sub-basins, it is a priority of the agency to be open to unique conservation and recovery opportunities as they arise. As described within this report, the agency will continue to pursue additional opportunities for kelp and eelgrass conservation and recovery as feasible, and promote conservation and recovery actions by partners, especially within High Value Areas.

In future reports as required by the legislature, WA DNR will continue to refine the map of High Value Areas and iterate through sub-basins to ensure each geography is represented in conversation by the legislative target date of 2040.

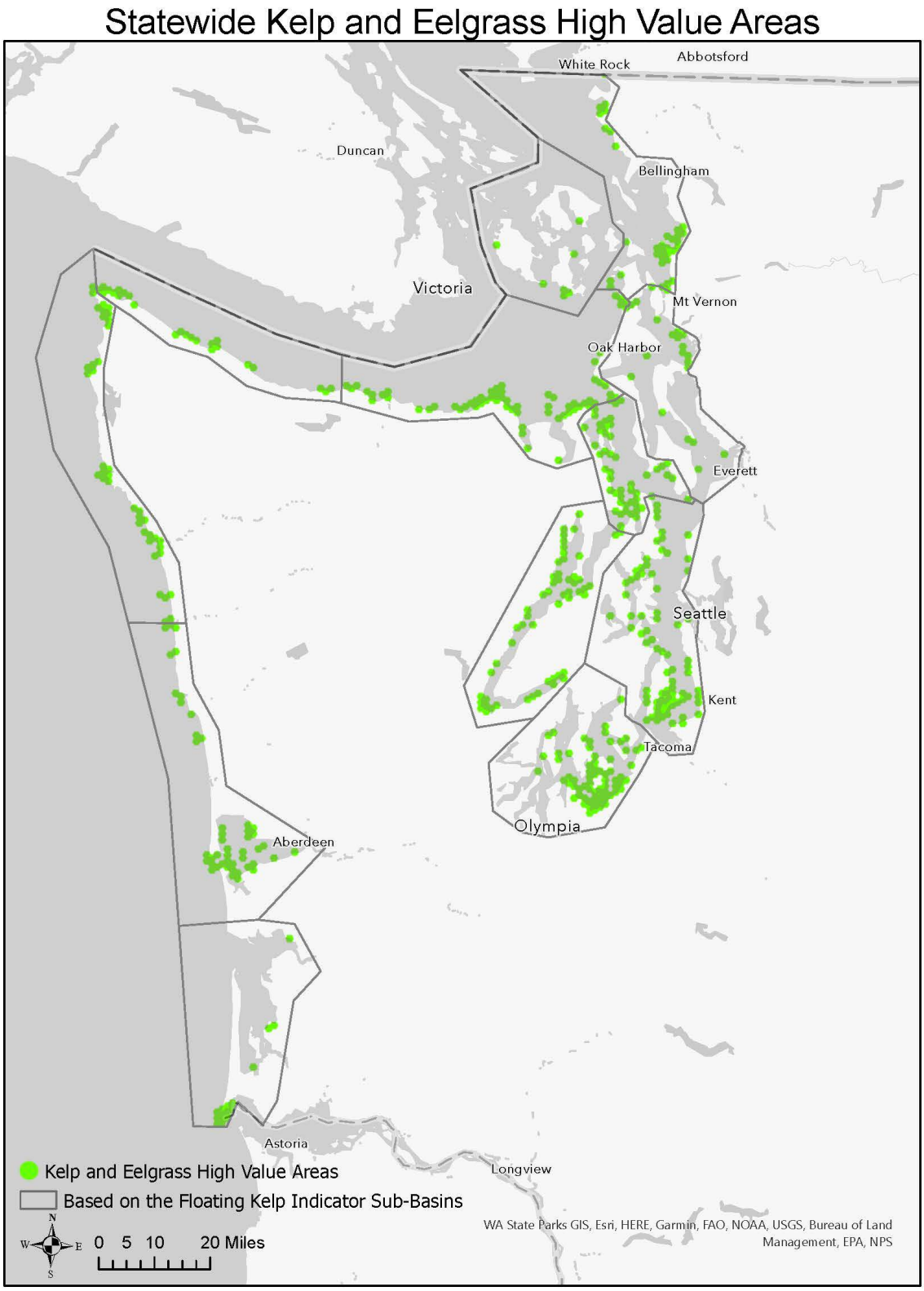

Figure 10: Preliminary High Value Areas identified through the prioritization framework. These do not represent final recommendations for locations of specific priority areas, but to provide a shared understanding for future conversations.

South Puget Sound Sub-basin

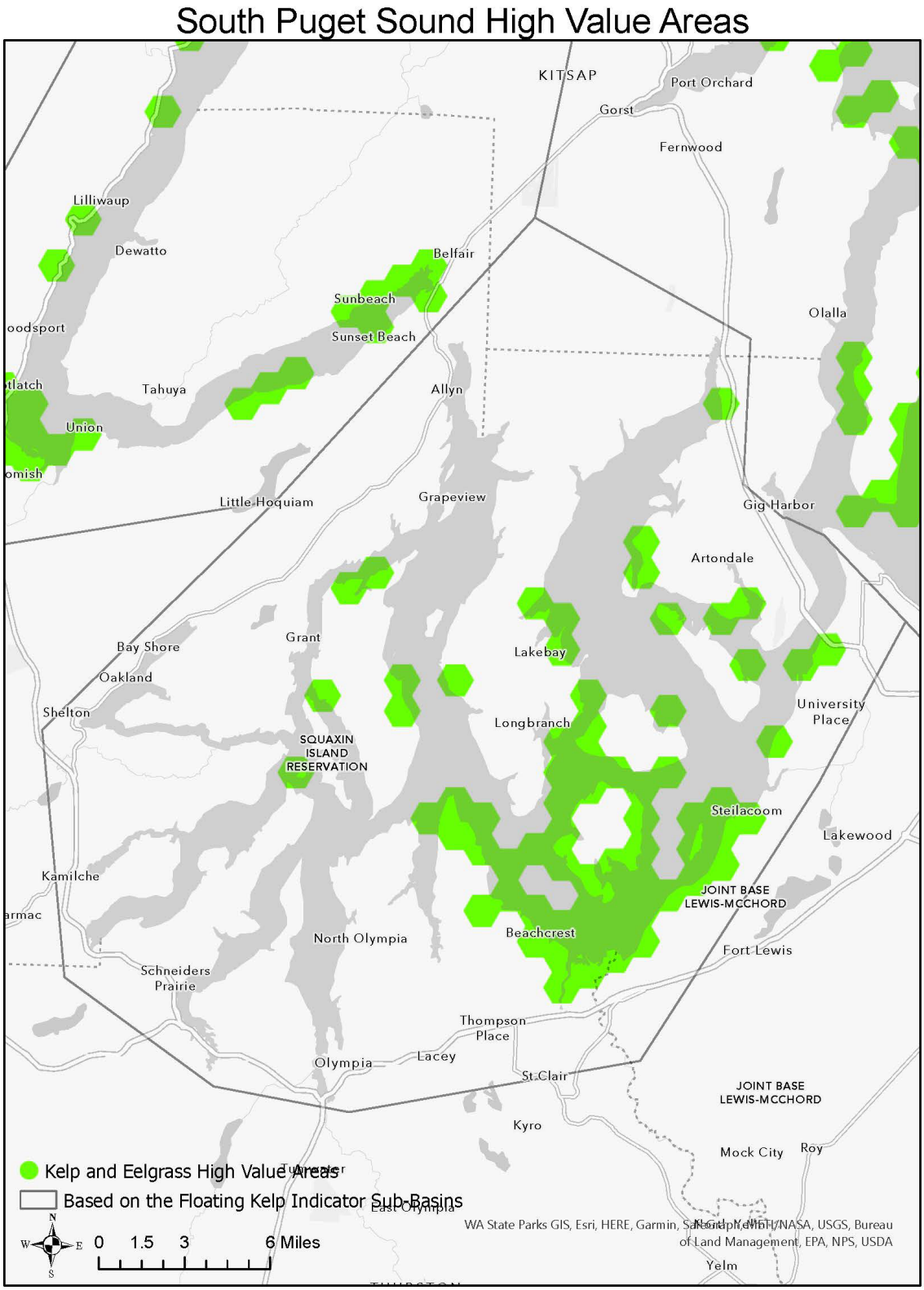

Figure 11: Preliminary High Value Areas for the South Puget Sound Sub-basin. These areas are meant to be a non-binding starting point for the next set of locally focused conversations.

The South Puget Sound Sub-basin represents the waters of south Puget Sound approximately bounded to the north at Point Defiance, and not including Hood Canal (**Figure 11**). Nine finger inlets contribute to over 450 miles of shoreline, including four large islands. Notable in this sub-basin is the Nisqually River delta, a major restoration site that the supports a large eelgrass meadow where juvenile chinook and chum salmon, as well as migrating seabirds, make extensive use of nearshore and estuarine environments (Christiaen et al 2022). The Nisqually River delta is protected by the Billy Frank Jr. Nisqually National Wildlife Refuge and the Nisqually Reach Aquatic Reserve. The Nisqually Indian Tribe and the Nisqually Land Trust also manage adjacent lands for conservation and protection. Together, these protected areas cover more than 17,920 acres.

The floating kelp forests of South Puget Sound have disappeared from most of the sub-basin (Berry et al 2023). There are two forests of bull kelp (*Nereocystis luetkeana*) near the Tacoma Narrows and at Squaxin Island that persist. Participants in Public Workshops highlighted that the South Sound encompasses important values such as connection to place, protection for species and biodiversity, traditional food access, history, and sense of place.

WA DNR has selected South Puget Sound as a pilot sub-basin for the next stage of the Statewide Kelp and Eelgrass Plan. A rich data landscape will allow for informed conversations leading to priority area selection. Ongoing and planned agency activities in the sub-basin will provide opportunities for improved conservation and recovery of kelp and eelgrass.

Eastern Strait of Juan de Fuca Sub-basin

The Eastern Strait of Juan de Fuca Sub-basin represents the Strait east of Whiskey Creek, bounded by a line from Port Townsend to Fort Casey and continuing north to Deception Pass and Telegraph Bight on Fidalgo Island. The area includes Smith and Minor Islands (**Figure 12**). The sub-basin has floating kelp forests of predominantly Bull kelp (*Nereocystis luetkeana*), with some small beds on the western side of the sub-basin with giant kelp (*Macrocystis pyrifera*). While most of the floating kelp forest in this region is considered stable, persistent losses of kelp have been detected along the shorelines of the Miller Peninsula, Protection Island, and Cape George (Berry et al 2023). In narrow bands of the nearshore, there are eelgrass meadows Freshwater Bay to Ediz Hook, but the larger meadows are around Green Hook to the mouth of Sequim Bay. Some of the eelgrass is considered stable, while other areas, like in the nearshore of Jamestown, have been declining (Christiaen et al 2022). Protection Island Aquatic Reserve surrounding the Protection Island National Wildlife Refuge and the Zella M. Schultz/Protection Island Seabird Sanctuary protects 23,778 acres of state-owned aquatic lands. Protection Island is recognized as the single most important nesting area for seabirds in the Salish Sea. The Protection Island Aquatic Reserve protects mixed kelp forests, eelgrass meadows, sandy spits, and is adjacent to feeder bluffs.

The Eastern Strait of Juan de Fuca Sub-basin was selected as a pilot sub-basin for the next stage of implementation of the Kelp and Eelgrass Plan for its rich data landscape, including current and historical data of floating kelp and eelgrass distribution and extent. In addition to WA DNR's suite of standard monitoring efforts, the sub-basin also represents a unique opportunity to leverage WA DNR and other data coverage related to the ongoing effects of the Elwha Dam Removal.

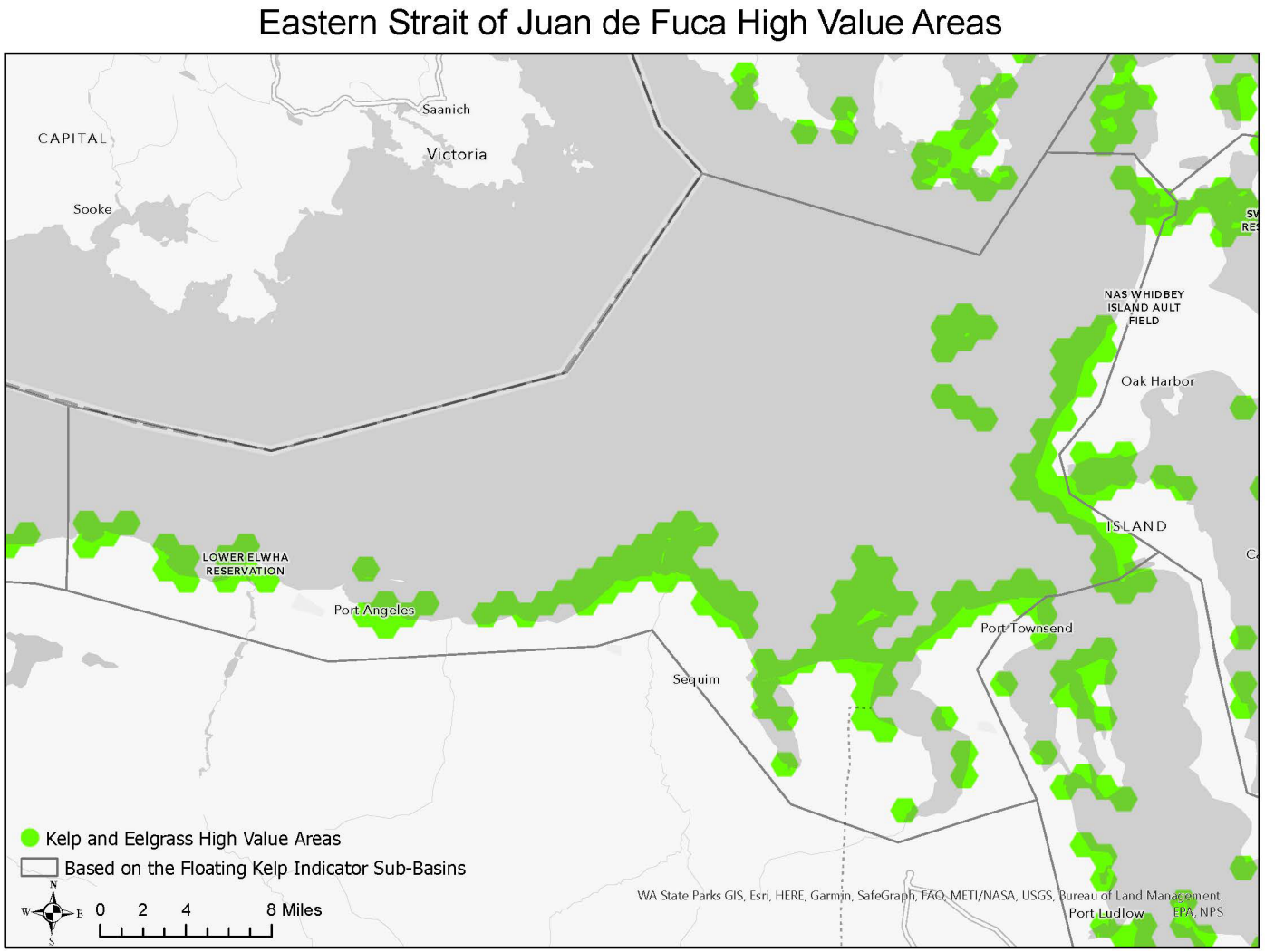

Figure 12: Preliminary High Value Areas for the Eastern Strait of Juan de Fuca Sub-basin. These areas are meant to be a non-binding starting point for the next set of locally focused conversations.

Grays Harbor Sub-basin

The Grays Harbor Sub-basin stretches along the Pacific Coast from Grayland Beach State Park north to the mouth of the Queets River, including Grays Harbor (**Figure 13**). This area provides important sandy and estuarine habitats to a wide range of species. The coastline has largely been monitored via aerial photography since 1989, while the submerged vegetation in Grays Harbor has most recently been surveyed in 2016 by WA DNR. Grays Harbor is not known to provide significant floating kelp forest habitat (Berry et al 2023); however, there are documented eelgrass meadows in the harbor that provide nursery habitat to salmon and Dungeness crab. Participants in public workshops identified the area as important for tourism and a connection to nature, including observation of migratory birds. Within the Harbor, the Grays Harbor National Wildlife Refuge protects roughly 1,500 acres of intertidal flats, salt marsh, and open water habitat for wildlife. North of the Harbor, the coast has experienced loss of floating kelp beds when compared to historical data, but rich understory kelp communities persist locally. WA DNR has selected the Grays Harbor Sub-basin as a pilot sub-basin for its rich ecological, social-cultural, and economic value and opportunities to align to ongoing state and federal investments in the area.

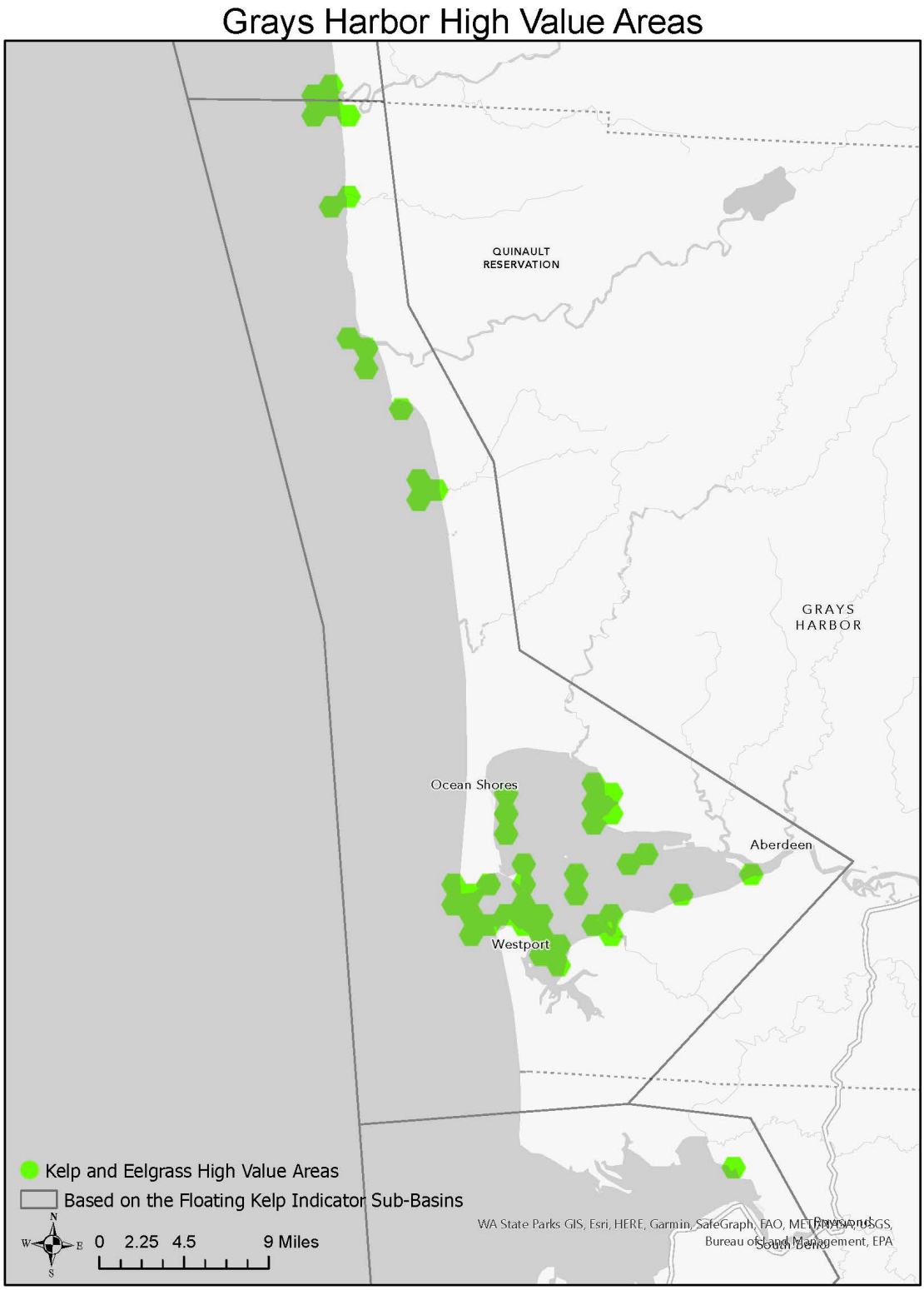

Figure 13: Preliminary High Value Areas for the Grays Harbor Sub-basin. These areas are meant to be a non-binding starting point for the next set of locally focused conversations.

Site Selection and Next Steps

The results of the first step of the prioritization framework presented in the previous section are intended to provide guidance for the sub-basin scale engagement and site selection process, not to select final recommendations for locations of specific priority areas, or recovery actions per site. The prioritization framework outputs are meant to support additional conversations with stakeholders, Tribes, and community members, and will be refined and updated by integrating new and existing data in future iterations.

This section outlines the next steps that will be necessary to select specific sites for conservation and recovery actions, including examples of how opportunities and risks could be applied to the site selection process and potential tools and actions for implementation.

We plan to start targeted outreach in the Pilot Sub-basins in 2024, which will consist of community outreach, develop with local partners a site-specific recovery and/or conservation implementation plan, and identifying success measures and monitoring.

Sub-basin Scale Engagement and Localized Data Integration

The next step in the prioritization framework will be to identify what habitats can best be protected and recovered by identifying which habitats are most likely to benefit from conservation and recovery actions (**Figure 14**). Our goal is to identify risks to long-term conservation and recovery, opportunities we can leverage, and management actions that increase resilience in the face of a changing climate.

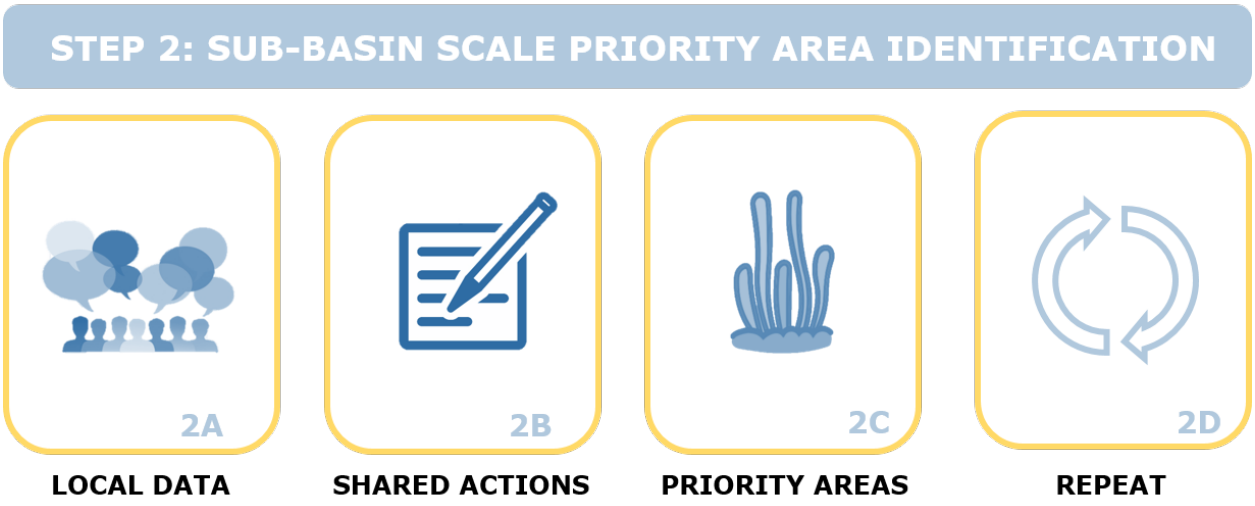

Figure 14: Step 2, identification of priority areas within sub-basins, will begin in 2024 in the pilot sub-basins identified above.

An initial list of broad opportunities and risks were developed through input from the public workshops, the Working Group, and internally at WA DNR. By asking what habitats we can best protect and recover, WA DNR gathered information on stressors and opportunities that could be considered during the sub-basin scale engagement and site selection process.

Additional Tribal, partner, stakeholder and community engagement and data integration at a site-specific level is required to identify the full breadth of stressors, opportunities, and risks

for conservation and recovery of kelp and eelgrass habitats. Tools and actions are likewise dependent on site-specific conditions and co-developed goals with Tribes, partners, stakeholders, and communities. The opportunities, risks, and tools described in this section summarize the input we have received and is meant to be a starting point for site-specific conversations.

Opportunities
Opportunities are the considerations integrated into the prioritization framework that might make one area more likely to benefit long-term from conservation or recovery than others. Opportunities that were discussed during the workshops and with the work group include:

- Habitat Connectivity - Identifying areas that have the potential to be additive with current management and leverages existing work, for example upstream salmon recovery projects or shoreline restoration projects;
- Feasibility – the ability of management conservation/recovery actions to address stressors;
- Significant areas as identified by Tribes;
- Areas with current or historic monitoring;
- Resilient habitat - areas that are more resilient to current and future stressors will be more likely to benefit from conservation actions;
- Environmental justice and access;
- Leverage opportunities for scientific, educational and workforce; and
- Other recovery or restoration actions upstream and in the nearshore.

Risks
Risks are considerations that might make one area more vulnerable to stressors and less likely to benefit from conservation and recovery efforts. Risks that we heard throughout the 2023 process that may be integrated into the sub-basin scale process include, but are not limited to:

- Areas of high nutrient loading;
- Areas more susceptible to turbidity and sedimentation;
- Areas where water temperature is higher, due to climate change or other factors; and
- Areas with high development risk, such as shoreline armoring, overwater structures, etc.

Tools and Actions

Tools and actions will be developed with Tribes, partners, stakeholders and community members during the sub-basin scale engagement and site-selection process. Both the Puget Sound Kelp Conservation and Recovery Plan and the Eelgrass Recovery Plan have identified a broad suite of potential tools to protect and recover kelp and eelgrass habitats that we may use as a starting point for identifying site specific actions (Calloway et al., 2020; WA DNR, 2015). These include:

- Conservation
- Stressor Reduction
- Restoration
- Research Opportunities
- Public Engagement
- Deepen understanding of values and integrate into management

As an agency, WA DNR also has statewide tools that support site-specific conservation and recovery actions. WA DNR has committed in its Plan for Climate Resilience to "identify areas

of high vulnerability to lessee activities and establish strategies for resilience" (WA DNR, 2020). Other potential tools WA DNR could implement, with Tribal and community support, includes creating a new protection zone, like the Snohomish Kelp and Eelgrass Exclusion Zone, or a new Aquatic Reserve, both of which would require WA DNR to engage in additional public input and Tribal consultation.

Development of Priority Area Conservation and Recovery Plans

Once tools and actions are identified for a priority area, the next step represents the implementation phase of the Kelp and Eelgrass Health and Conservation Plan but is included in the prioritization framework as an opportunity for iterative selection and refinement. A site-specific working group including WA DNR, Tribes, local communities, and state and local governments will be assembled to develop joint actions for long-term stewardship of the priority area.

In addition to these potential tools and actions, long-term monitoring is an important tool for conservation and recovery. WA DNR has developed the "Kelp and Eelgrass Health and Conservation Plan – Monitoring Plan," which outlines the monitoring needs to achieve the goals of this plan and will be updated throughout the life of this project (publication pending). Each priority area will require a site-specific plan to conserve and recover kelp and/or eelgrass habitat. We will undertake the development of these plans as part of the site selection process.

GAPS AND NEEDS

As mentioned above, several gaps became apparent during the process of linking data sets to support values identified in the collaborative framework development process. Below, we have identified two broad categories for future research investment to support best management of kelp and eelgrass.

Ecological Data Needs

Fundamentals of Understory Kelp: The current state of knowledge about understory kelp is greatly limited compared to eelgrass and canopy forming kelp, largely due to challenges in sampling and monitoring these species. Expanding our knowledge of understory kelp, like distribution, is needed to appropriately manage this work. Improved technology for monitoring underwater species may be necessary to gain important data on understory kelp.

Climate Change Impacts: Understanding the effects of climate change on kelp and eelgrass ecosystems is critical. Rising sea temperatures, ocean acidification, and changing ocean currents can disrupt these habitats and affect their distribution, growth rates, and overall health. Research is needed to assess the vulnerability of kelp and eelgrass to these changes and develop strategies to adapt to or mitigate their impacts.

Population Dynamics and Connectivity: Gaps exist in our understanding of the population dynamics of kelp and eelgrass species, including their genetic diversity, reproductive biology, and connectivity among different populations. Understanding connectivity is essential for developing effective management strategies, as it helps maintain genetic diversity and allows for recolonization in disturbed areas.

Invasive Species and Diseases: Invasive species and diseases can threaten kelp and eelgrass habitats. Research is needed to deepen our understanding of current and potential invasive species and their impacts on native populations. Developing effective

methods for prevention, early detection, and control is crucial for conserving these ecosystems, as well as understanding threats from invasive species expansion already underway, like sargassum and European green crab.

Anthropogenic Disturbances and Watershed-scale Impacts: Human activities, such as coastal development, pollution, and overfishing, can negatively impact kelp and eelgrass ecosystems. Likewise, activities higher in the watershed and spatially distant from kelp and eelgrass habitat can affect marine health downriver. Understanding the cumulative effects of these disturbances and developing strategies to minimize their impacts is essential for the long-term conservation of these habitats.

Baseline Data and Monitoring: Continuing comprehensive baseline data is necessary to monitor changes in kelp and eelgrass habitats over time accurately. Regular monitoring is crucial to assess the effectiveness of management efforts, detect early signs of degradation, and inform adaptive management practices. WA DNR and partners are currently engaged in regular monitoring of canopy kelp and eelgrass extent and health; additional monitoring of understory kelp would strengthen the ability to manage this resource.

Restoration Techniques and Effectiveness: Restoration of kelp and eelgrass is a primary tool to grow the areal extent of submerged marine vegetation, however much about the practice and long-term efficacy of these practices remains unknown. Identifying suitable restoration sites, optimizing planting and seeding methods, and evaluating the success of restoration projects are essential for increasing the chances of successful recovery. Additional investment in identifying best practices, global case studies, and long-term benefit of restoration would benefit implementation of the Plan.

Social-Cultural and Economic Data Needs

Indigenous Ecological, Historical, and Cultural Knowledge: Indigenous communities have a deep understanding of kelp and eelgrass ecosystems. However, much of this knowledge cannot be easily incorporated into the developed framework for candidate site selection. Future work collaborating with Tribes to document Indigenous Knowledge of kelp and eelgrass where appropriate and consented to could strengthen the reflection of Tribal values in the priority areas.

Uses and Harvesting Practices: Both Indigenous and non-Indigenous peoples use kelp and eelgrass for various purposes, such as food, medicine, crafts, and ceremonial practices. However, there is limited data on the extent, sustainability, and impact of harvesting practices. Gathering data on historical uses and harvest practices is essential for future prioritization and management, as well as supporting the infrastructure to record and integrate contemporary data.

Economic Contributions: Kelp and eelgrass ecosystems can have substantial economic value, providing ecosystem services such as coastal protection, carbon sequestration, and support for fisheries. Understanding the economic contributions of these ecosystems, both in terms of direct uses and indirect benefits, is essential for making informed decisions about their conservation and management. A recently released strategy from the White House Office of Science and Technology to develop statistics for environmental-economic decisions underscores the timeliness of such work. NOAA is also developing a habitat valuation calculator that will be of use once released.

Social and Economic Vulnerability: Changes or declines in kelp and eelgrass ecosystems can have significant social and economic impacts on coastal communities,

particularly those that depend on these resources for their livelihoods. Assessing the vulnerability of these communities to ecosystem changes and identifying ways to enhance resilience is critical for sustainable management.

Social Perceptions and Attitudes: Public perceptions and attitudes towards kelp and eelgrass conservation can influence policy decisions and management actions. Understanding public awareness, attitudes, and knowledge gaps related to these ecosystems can help design effective education and outreach programs.

Situational Analysis of Research Needs to Understand Benefits of Aquaculture: Additional research is needed to fully understand how Washington's growing seaweed aquaculture industry may impact ecosystems, economics, and communities. Both ecological and economic/social-cultural research needs are included in **Appendix F**.

MONITORING AND ADAPTIVE MANAGEMENT

Statewide Goals and Success Measures

The vision of this plan is to inspire collaborative stewardship and collective action to conserve and recover Washington's kelp forests and eelgrass meadows for the benefit of current and future generations. It is around this vision that statewide goals and objectives have been developed, which will be tracked over time and reported on a biennial basis (**Table 4**).

Goal	How we achieve goal
Fulfill the requirements of the legislation	• Track the number of conservation and recovery acres managed and monitored by WA DNR. • Example site specific metrics to be developed in DNR Monitoring Plan
Inspire Collaborative Stewardship Inspire broad public support for and stewardship of kelp and eelgrass habitats.	• Increase public awareness and support for marine vegetation conservation and recovery. • Engage with local community members and decision-makers through outreach to build support. • Engage with statewide and local non-profit organizations and stakeholder groups. • Engage with Tribal, Black, Indigenous, People of Color, and immigrant communities in planning and implementation of conservation efforts.
Inspire Collaborative Stewardship Foster collaborative management of kelp and eelgrass habitats.	• Secure sustained statewide long-term funding to support stewardship from partners and/or land managers. • Co-develop management/stewardship plans with local stakeholders and Tribes and fostering co-stewardship with Tribes. • Dedicated DNR support for the network of stewardship partners within each priority area, including sustaining existing partnerships and developing new partnerships.
Inspire collective action	• Increase ability to swiftly react as a collective of practitioners and stewards to opportunities and crises. • Sustained, secured long-term funding for kelp and eelgrass monitoring and community science. • Support a statewide group to manage overall vision for kelp and eelgrass conservation and recovery.

Table 4: Goals and associated actions will help successfully achieve the vision of the plan.

Statewide Kelp and Eelgrass Monitoring Plan

The Statewide Kelp Forest and Eelgrass Meadow Health and Conservation Plan – Monitoring Plan has been developed to monitor the progress towards the goals of this prioritization process. WA DNR will continue to monitor the distribution and trends of native kelp forests and eelgrass meadows to inform adaptive management of the Prioritization Plan and coordinated partner actions. Every biennium, WA DNR will submit a report to the legislature that describes the native kelp forest and eelgrass meadow conservation priority areas and monitoring approaches and findings.

Each priority area will also have site specific goals, success measures, and monitoring that will inform both site specific management and integrate with statewide monitoring.

Adaptive Management Plan

Adaptive management – the process of continuous improvement based on new data, analysis, and learning – forms the basis for planning, implementing, and improving kelp and eelgrass conservation and recovery.

Evaluating the Framework

As part of biennial reporting to the Washington State Legislature, WA DNR will report on distribution and trends of kelp and eelgrass to inform adaptive management of the Prioritization Plan and coordinated partner actions. WA DNR will also be evaluating on a biennial basis plan implementation, including identifying barriers to plan implementation and legislative or administrative recommendations to address those barriers.

Learning from Monitoring and Research

There are many facets of kelp and eelgrass conservation and recovery challenges, and new issues will emerge or be understood as we make progress over time. As the recovery and conservation strategies are implemented, it is important to test any underlying assumptions that may affect the approaches. WA DNR anticipates working with partners and existing forums to ensure the work leverages multiple opportunities for knowledge exchange.

Updating the Framework and Strategies

As the Prioritization Plan is implemented, evaluated, and new information is available on kelp and eelgrass health and recovery, WA DNR can update the framework and priority areas through 2040. A specific update timeline has not yet been developed but may be included in a future biennial report.

CONCLUSIONS

This plan is the initial step towards achieving collective conservation and recovery goals for kelp forests and eelgrass meadows in Washington. These habitats are diverse and productive nearshore ecosystems, providing critical habitat for a wide array of marine life, including threatened and endangered species such as salmon, rockfish, and abalone. They also play an important role in climate mitigation and adaptation by sequestering carbon, relieving ocean acidification, and increasing resilience of coastal communities in the face of climate change.

The Kelp and Eelgrass Habitat Prioritization Plan was developed to identify High Value Areas and set up the next steps to identify priority areas for the conservation and recovery actions. Shared values were identified as the foundation of the framework, encompassing ecological, social-cultural, and economic benefits. Through workshops and discussions, a range of shared values were defined and integrated into the criteria for identifying high value habitats. The process focuses on collaboration, information gathering, and iterative refinement to achieve effective conservation and recovery of kelp and eelgrass habitats.

Kelp forests and eelgrass meadows also have a deep cultural value to Northwest Tribal Nations, playing a prominent role in traditional fishing, hunting, and food preparation and storage. WA DNR recognizes Tribes shared stewardship of Washington's lands and waters, their shared geography with Washington State as sovereign nations, and their vital role as knowledge holders who are critical partners in achieving the goals and objectives of the Prioritization Plan. Recognizing the intrinsic value of Indigenous knowledge regarding kelp and eelgrass use and distribution, in the implementation of this Plan WADNR aims to foster a respectful and inclusive relationship with Tribal communities.

There is additional information and local input that is necessary to select specific sites. Several gaps became apparent during the process of linking data sets to support values identified in the collaborative framework development process. These gaps included ecological data needs, such as better understanding of understory kelp, social-cultural and economic knowledge gaps, and integrating Indigenous ecological knowledge.

Place-based knowledge, Tribal values, climate considerations and local input are all areas that will inform the next stages of the process to identify priority area sites that will contribute to the 10,000-acre goal. Following submission of the Prioritization Plan to the legislature, WA DNR will focus outreach efforts in the 2024 Priority Sub-basins, consisting of site-specific Tribal and community engagement and data integration, site selection, and implementation, while being open to opportunities as they arise.

The results of the first step of the Prioritization Plan are intended to provide guidance for the sub-basin scale engagement and site selection process, not to select final recommendations for locations of specific priority areas, or recovery actions per site. The Prioritization Plan outputs are meant to support additional conversations with stakeholders, Tribes, and community members, and will be refined and updated by integrating new and existing data in future iterations.

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APPENDIX A – KELP AND EELGRASS CURRENT EXTENT AND TRENDS

Kelp Extent and Trends

Most available information on kelp in Washington pertains to floating kelp species - kelp that grows tall enough from its rocky holdfast to form a canopy that is visible on the surface. Floating kelp species are found along the northern coast of the Olympic Peninsula and throughout all the sub-basins of Puget Sound. While floating kelp canopies are the most conspicuous, they are only present along 11 percent of Washington shorelines compared to understory kelp presence at 31 percent of shorelines (ShoreZone, 2001).

Along the northern outer coast and Strait of Juan de Fuca, floating kelp populations are considered stable in the long-term. The eastern Strait of Juan de Fuca near Protection Island has seen some substantial losses along some shorelines. (Berry et al., 2023)

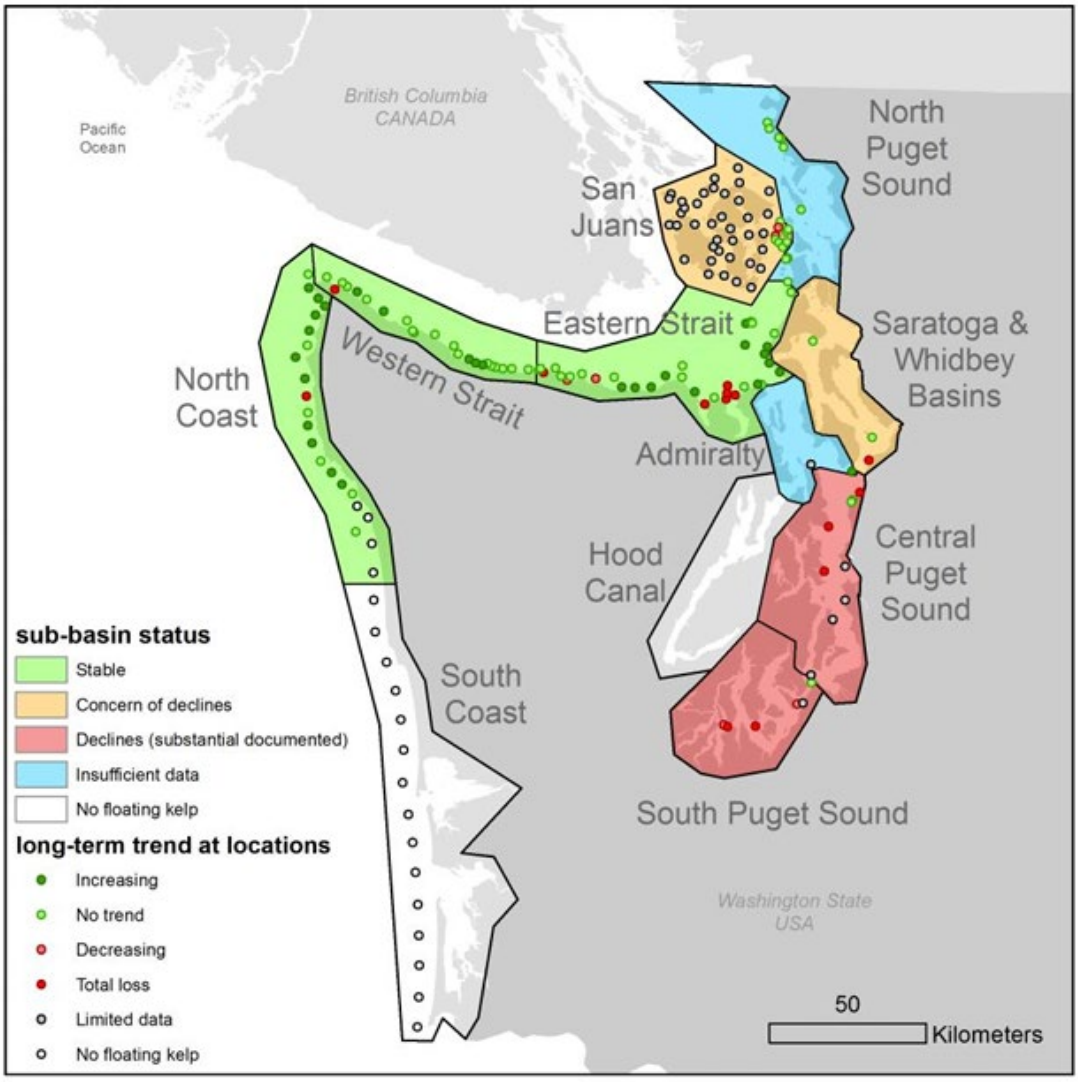

Figure A1: The Kelp Forest Monitoring Alliance, lead the development of the floating kelp indicator for the Puget Sound Partnership and the broader community. Their first report, published in May 2023, presented the first statewide assessment of floating kelp, synthesized from existing monitoring data, Indigenous scientific knowledge, and other information sources. (Berry et al., 2023)

In central and south Puget Sound, declines and even some total losses were documented. There is concern that floating kelp has declined in the San Juan Islands, Saratoga and Whidbey areas, and in Admiralty Inlet and North Puget Sound based on Indigenous scientific knowledge and other reports. However, data limitations and a short temporal record limit our understanding. (Berry et al., 2023)

Additional details on the current understanding of kelp extent and trends can be found in the "Floating Kelp Monitoring in Washington Statewide Summary Report" (Berry et al., 2023).

Understory kelp was mapped statewide as part of the ShoreZone Inventory, which includes all saltwater shorelines statewide based on low-tide aerial video collected between 1994 and 2000 using aerial videography collected at low tide. Understory kelp occurs in all appropriate nearshore habitat in Washington but is most common in counties with relatively high-energy rocky shorelines, such as San Juan and Clallam Counties (WADNR, 2000).

Eelgrass Extent and Trends

Eelgrass is common in the intertidal and subtidal zones along the shorelines of greater Puget Sound and the coastal estuaries.

Puget Sound eelgrass on a regional scale is stable; however, there is significant variability in smaller spatial scales (Christiaen et al., 2022). Across Puget Sound, there is a regional pattern in the number of sites with increases and declines. More sites have declined around the San Juan Islands and Strait of Juan de Fuca over the long-term and in recent years. However, in Northern Puget Sound and the Saratoga Whidbey Basin and Central Puget Sound and Hood Canal, there were no significant difference between sites with increases and declines. Both regions are assumed to be in stable condition. Overall, eelgrass beds at the ends of inlets and enclosed embayments seem particularly vulnerable to declines.

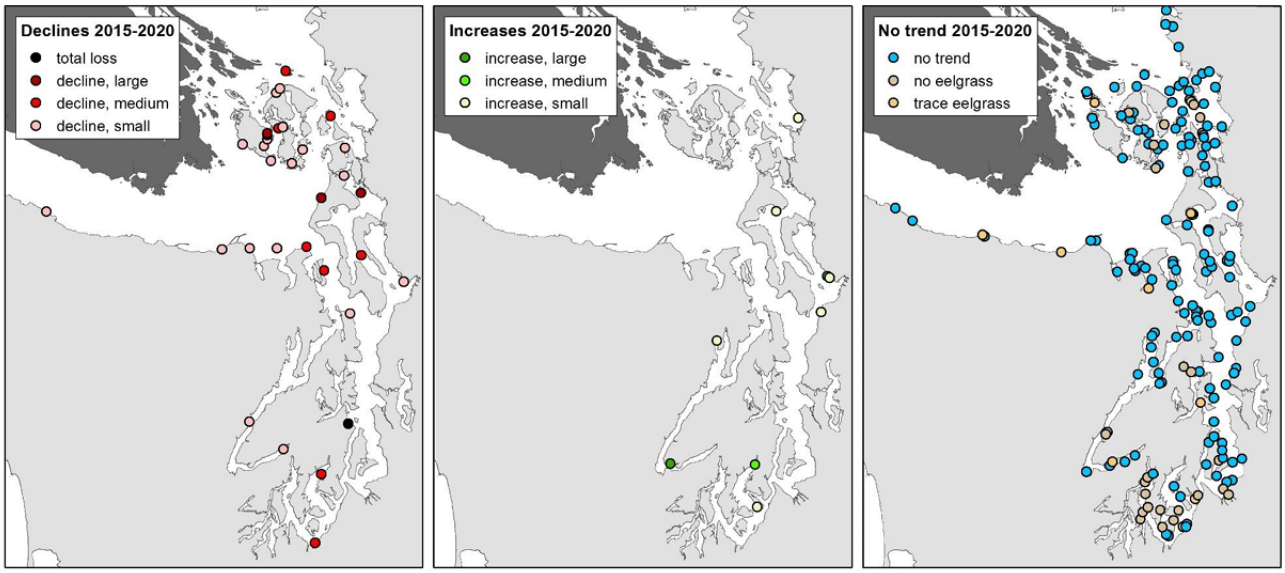

Figure A2: Recent trends at WA DNR sampling sites between 2015 and 2020. Declines are indicated in different shades of red, increases in different shades of green, and sites with no trends are blue. (Christiaen et al, 2022)

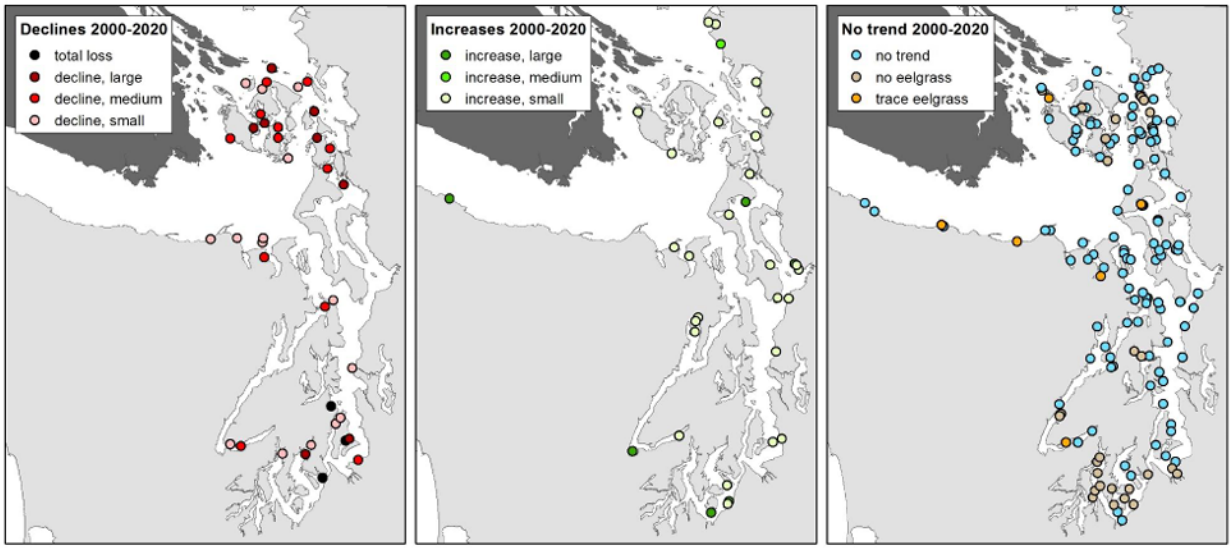

Figure A3: Long-term trends at WA DNR sampling sites between 2015 and 2020. Declines are indicated in different shades of red, increases in different shades of green, and sites with no trends are blue. (Christiaen et al, 2022)

Eelgrass on the Washington coastline are predominately found in the protected areas within the Grays Harbor and Willapa Bay estuaries. In Willapa Bay, WA, a 1990 report by NOAA estimated 510 ha (1,260 acres) of eelgrass (Thom et al. 2003).

Surveys conducted in 2006/07 by the US Department of Agriculture – Agricultural Research Service (USDA-ARS) and repeated in 2013 of Willapa Bay by WA DNR's Aquatic Assessment and Monitoring Team (WA DNR AAMT) to determine the density of eelgrass in Willapa Bay. WA DNR AAMT expanded the survey to include Grays Harbor, which was not included in the 2006/07 survey.

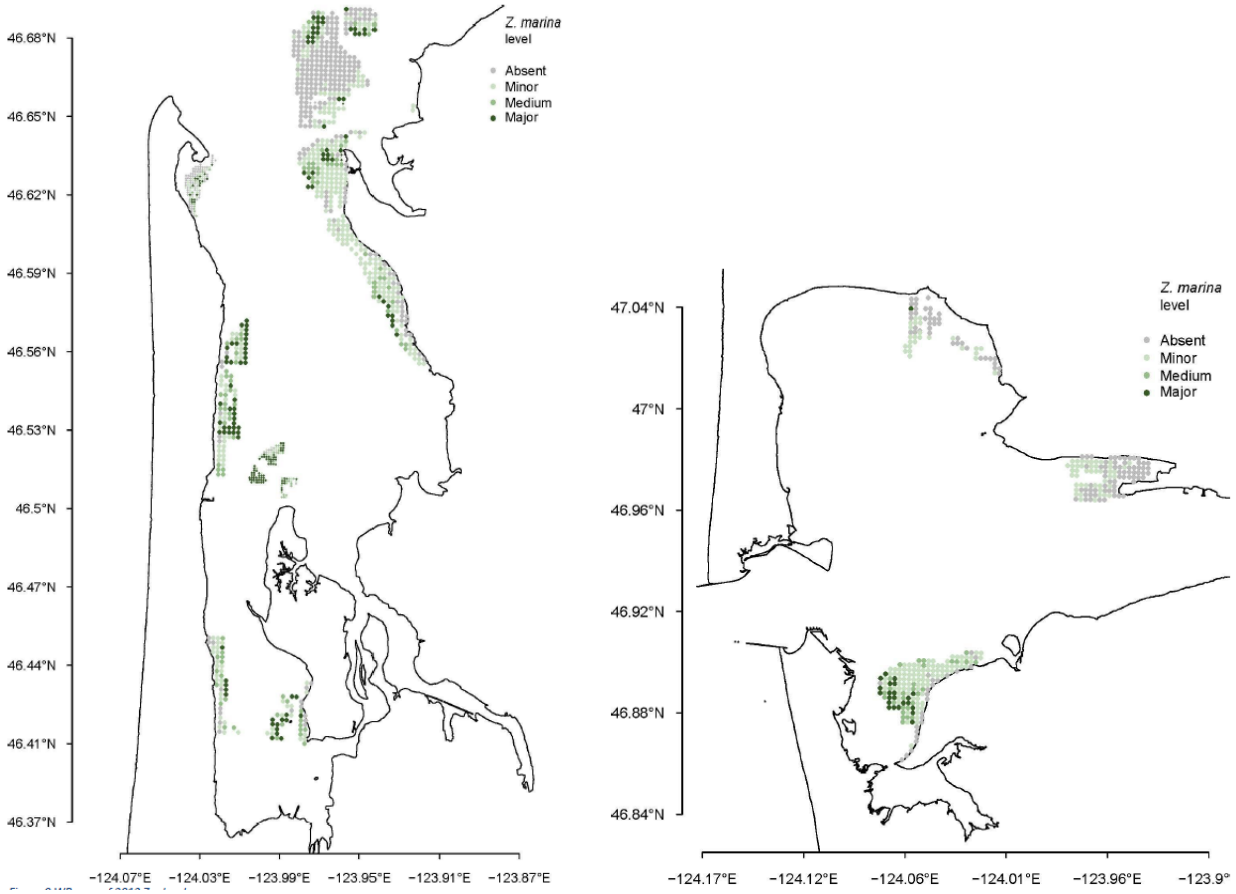

Figure A15: Results of surveys of Grays and Willapa Bay in 2013 of eelgrass conducted by WA DNR. (WA DNR 2013)

APPENDIX B KELP AND EELGRASS INTERACTIONS AND STRESSORS

Kelp forests and eelgrass meadows are highly productive systems that humans interact with and influence. Stressors of kelp and eelgrass have been well documented in literature and described in more detail in the Puget Sound Kelp Conservation and Recovery Plan and the Puget Sound Eelgrass Recovery Plan (Calloway et al., 2020; WA DNR, 2015). A summary of kelp and eelgrass stressors is described in Table B1.

Kelp provides an important habitat for many commercial and recreational fisheries that Washingtonians rely on, yet the decline of many important fish populations can have negative impacts to kelp forests. For example, various rockfish species feed on kelp crab and other invertebrates that graze on kelp. If there is a reduction in the population of rockfish, it is likely that grazer abundances could increase and lead to stress or reduction of kelp forests. These kinds of trophic interactions have been well documented in other areas (Stachowicz et al, 2005).

Recreational harvest of kelp is allowed in Washington for individual use and is jointly managed by WA DNR and WDFW. Healthy kelp forests can be sustainably harvested using best management practices (for more information, please see the WA DNR Seaweed webpage). A recent study found that unsustainable harvest practices negatively impacted kelp densities for up to a year after harvest (Kilgo et al., 2019). WA DNR currently has limited data on recreational harvest rates of kelp and additional data may need to be collected to determine sustainability of current recreational harvest.

Some interactions, like shellfish aquaculture, can result in competition for space and mechanical harvest could physically impact individual plants. However, shellfish aquaculture and eelgrass meadows also have mutual benefits, such as eelgrass's ability to buffer ocean acidification and oysters filtering out pathogens that cause eelgrass wasting disease (Groner et al., 2018).

Summary of Kelp Stressors	
Nutrient Loading	Kelp species require a specific threshold of nitrogen to grow. Too little and kelp will starve; too much nitrogen and other species, like plankton or turf algae, can reduce nutrient availability or displace kelp respectively. Anthropogenic nutrient loading from wastewater treatment plants, stormwater, and other point-and non-point sources of water pollution can have serious indirect impacts on kelp forests.
Climate Change	Kelp forests are generally found in high latitudes and prefer cool water. Warming ocean temperatures threaten kelp forests across the globe. Temperature stress makes kelp less tolerant and more vulnerable to other stressors. Other aspects of climate change related stressors include increased storm surge, sea level rise, and changes in the timing of freshwater inputs, impacting salinity and turbidity.

Fine Sediment Loading	Fine sediment, originating from river discharge, stormwater runoff, and in-water construction activities and coastal development can negatively impact kelp recruitment and microscopic life stage survival by burying suitable substrate and increasing suspended sediment (Airoldi 2003).
Shoreline Activities and Development	Human activities and shoreline development generate a wide range of potential stressors affecting kelp species. These activities include overwater structures, outfalls, shoreline armoring, dredging, marines, and navigation. These activities stress kelp by physically damaging kelp beds via dredging or construction, increased turbidity, shading from overwater structures, and anthropogenic nutrient loading.
Invasive Species: *Sargassum muticum* and *Undaria pinnatifida*	Invasive seaweeds are known to displace native species by relying on quick early growth in the spring to shade out competitors. The invasive seaweed *Sargassum muticum* is known within Puget Sound, and while *Undaria pinnatifida* had not yet been identified in Washington waters, there is concern regarding its current or future presence.

Summary of Eelgrass Stressors	
Climate Change	Both sea temperature and sea-level rise can have significant impacts on eelgrass populations. Elevated temperatures directly affect eelgrass productivity and respiration. Extended periods of high temperatures can reduce eelgrass growth and survival. Sea-level rise will likely result in loss of eelgrass along the deepest edge of existing beds in response to declining light levels, but populations may shift shoreward where able.
Disease	Eelgrass wasting disease epidemics have resulted in widespread population declines globally. Eelgrass wasting disease has been confirmed in the San Juan Archipelago.
Human Activities and Development	Dredge & fill, in-water construction, moorage and anchoring, overwater structures and shoreline armoring degrade habitat and physically harm individual plants.
Nutrient Driven Algal Blooms	Anthropogenic nutrient loading into the nearshore environment can stimulate phytoplankton and macroalgae blooms which can increase turbidity and reduce the maximum depth of light transmission. Large masses of macroalgae can also reduce recruitment success.
Organic Matter Deposition/Sediment Hydrogen Sulfide	The deposition and subsequent decomposition of organic matter can create anaerobic conditions within sediment porewater and contribute to elevated levels of hydrogen sulfide within nearshore sediments.
Sediment Loading	Sediment loading reduces water clarity and can stress eelgrass growth by reducing available photosynthetic light. Sources of sediment loading include river discharge, stormwater runoff and discharges.

Table B1. Summary of kelp and eelgrass stressors. Adapted from the Puget Sound Kelp Recovery Plan and the Puget Sound Eelgrass Recovery Strategy (Calloway et al., 2020; WA DNR, 2015).

APPENDIX C PRIORITIZATION FRAMEWORK DEVELOPMENT

All the kelp forests and eelgrass meadows in Washington are vital to a healthy ecosystem; yet there are areas that are in the greatest need of conservation and recovery actions. WA DNR was tasked by the legislature to collaboratively develop a prioritization framework to identify and prioritize native kelp forest and eelgrass meadow areas in greatest need of conservation and recovery.

Summary of Engagement

WA DNR has developed this plan through a collaborative planning process guided by the 2022 Kelp and Eelgrass Engagement Plan. The Engagement Plan identifies pathways, tools, and opportunities for engagement of Tribes, the public, and stakeholders in development of the Statewide Kelp Forest and Eelgrass Meadow Health and Conservation Prioritization Plan. It outlines a spectrum of engagement which provides four pathways for participation at varying levels of commitment.

The four pathways for public engagement, from least involved to most, are:

> **RECEIVE:** Receive information on Plan development and finalization
> **REVIEW:** Review the final plan and provide feedback
> **INFORM:** Inform development of the priority areas and other aspects of the Prioritization Plan during plan development workshops
> **STEER:** Steer creation of the Prioritization Plan in regular working meetings with WA DNR staff

Tribes were invited to participate at any of the pathways in the spectrum of engagement, as well as through staff-level discussions, formal consultation and additional opportunities for input and review of the draft text. Additional details on Tribal engagement are described in "Kelp and Eelgrass and Tribal Nations" (**page 12**).

Alongside experts from WA DNR, the pathways for public engagement provided iterative input and guidance during development of the Prioritization Plan to ensure the diverse values and needs surrounding kelp and eelgrass were accurately reflected.

Prioritization Framework Development Process

Executive Working Group

The Working Group was established in 2022 to guide WA DNR on creation of the Statewide Kelp and Eelgrass Health and Conservation Prioritization Plan. The Working Group met regularly with accepted responsibilities to provide technical expertise relevant to kelp and eelgrass conservation and recovery, assist in constructing selected text for the Prioritization Plan, help disseminate information relating to the Prioritization Plan to their networks, and advise on implementation of public workshops.

The Working Group provided guidance and feedback to WA DNR throughout development of the Prioritization Plan. The four phases of work the Work Group throughout the first year were:

- **Information Gathering**: Advise WA DNR in developing the current state of knowledge for the Prioritization Plan and workshop materials.
- **Workshop Preparation**: Advise and review workshop goals and agendas. Identify key criteria and data inputs for the prioritization framework and develop next steps following outcomes of the workshops.

- **Tools and Stressors**: Provide feedback to WA DNR on initial list of tools and stressors developed at the workshops. Identify potential partnerships and additional tools.
- **Prioritization Framework Development Oversight**: Advise and review early drafts of prioritization framework report.

The Working Group consists of Tribal representatives and stakeholders invested in kelp and eelgrass. The members were self-nominated through a simple online application process and were selected to represent a diverse interests and expertise in kelp and eelgrass, including at least one of the following:

- Stressors of kelp and eelgrass;
- Current and historical kelp and eelgrass coverage;
- Ongoing kelp and eelgrass recovery efforts;
- Human uses of and relationships with kelp and eelgrass;
- Values and priorities of their respective community relevant to the marine environment; or
- Other knowledge or abilities relevant to the job of the working group.

Public Workshops

WA DNR hosted a series of workshops January to March 2023 to solicit input from the public to inform the prioritization framework. The workshops were intended to reach as broad an audience as possible through a combined virtual and in-person approach as follows:

- **January 31 Virtual Kick-Off Workshop:** WA DNR provided background on the Prioritization Plan and gathered input on values and priorities that helped inform the development of a draft prioritization framework. A total of 154 participants attended the workshop. Full summaries of the Kick-off Workshop can be found here.
- **March Virtual and In-Person Workshops:** WA DNR offered a total of four workshops focused geographically on the Puget Sound and the Washington Coast to gather region-specific input. A total of 127 participants attended the workshops, 91 attended Puget Sound workshop and 36 attended the Washington coast workshop. Summary link for the Puget sound can be found here and the Washington coast can be found here.

Management and Recovery Context

Ecosystem Based Management and Nature Based Solutions

The prioritization framework is built upon the principles of ecosystem-based management. Ecosystem-based management is an adaptive approach that considers the entire ecosystem, including humans, and has been used to better manage other complex ecosystems, such as coral reefs. Ecosystem-based management:

- emphasizes the protection of ecosystem structure, functioning and key processes;
- is place-based in focusing on a specific ecosystem and the range of activities affecting it;
- explicitly accounts for the interconnectedness among systems, such as between air, land and sea; and
- integrates ecological, social, economic and institutional perspectives, recognizing their strong interdependences.

By integrating these principles into the process, WA DNR seeks to develop a plan that is highly collaborative, representative of Washingtonians' values of kelp and eelgrass, and ultimately achieves our collective conservation and recovery goals.

Building off Existing Recovery Plans

The Prioritization Plan advances high-priority strategies identified both in the Puget Sound Kelp Conservation and Recovery Plan and the Puget Sound Eelgrass Recovery Strategy. These two strategies were developed as a framework for research, conservation, recovery, and communication actions aimed at protecting and restoring Puget Sound kelp and eelgrass.

Puget Sound Kelp Conservation and Recovery Plan

The Puget Sound Kelp Conservation and Recovery Plan (Calloway et al., 2020) is a framework for research, conservation, recovery, and communication actions aimed at protecting and restoring Puget Sound kelp species and the goods and services provided by them. The Kelp Plan has identified six strategic goals:

1. Understand and reduce kelp stressors;
2. Deepen understanding of the value of kelp to Puget Sound ecosystems and integrate them 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 Eelgrass Recovery Strategy

The Eelgrass Recovery Strategy (WA DNR 2015) is a comprehensive recovery strategy to advance eelgrass recovery in Puget Sound. The recovery strategy is organized by five overarching goals:

1. Conserve existing eelgrass habitats;
2. Reduce environmental stressors to support natural expansion;
3. Restore and enhance degraded or declining eelgrass beds;
4. Identify eelgrass research priorities; and
5. Expand outreach and education.

Review of Existing Prioritization Frameworks

The prioritization framework described in this report is built upon the work of many others who have previously prioritized habitat for conservation and recovery actions. While there are many other prioritization frameworks in the literature, this framework is primarily influenced by the WA DNR Natural Heritage Program, WA DNR Aquatics Reserves Program, and the Sonoma-Mendocino Kelp Recovery plan (Table C1).

Plan/tool	Relevance	Geographic Focus	Ecological Focus
Natural Heritage Program Ecological Integrity Assessments	Provides a standardized currency of ecosystem integrity across all terrestrial ecosystem types, used for setting conservation priorities, identifying restoration strategies, and monitoring the effectiveness of conservation actions.	Statewide	Developed for terrestrial ecosystems.
Priority Marine Sites for Conservation in the Puget Sound	Identified and prioritized marine habitats with high conservation value within Puget Sound	Puget Sound	Priority aquatic habitats, functions, and features.
Sonoma-Mendocino Bull Kelp Recovery Plan	Identified strategies to prioritize recommended candidate regions for restoration and recovery actions.	California (Sonoma and Mendocino counties)	Bull Kelp

Table C1: Summary of prioritization frameworks referenced in the development of this Prioritization Plan.

- **WA DNR's Natural Heritage Program - *Ecological Integrity Assessments***
  WA DNR's National Heritage Program uses an indicator-based approach developed by NatureServe and the Natural Heritage Network called the Ecological Integrity Assessment to assist in identifying ecosystem conservation priorities. This method aims to measure the ecological integrity of a site through a standardized and repeatable assessment of current ecological conditions, which aids in identifying conservation value, management effects, restoration success, and more. For more information on WA DNR's Ecological Integrity Assessments see https://www.dnr.wa.gov/NHP-EIA.

  The Natural Heritage Program maintains a database of rare and imperiled species and plant communities for the state. Although currently more focused on terrestrial and wetland ecosystems, Ecological Integrity Assessments could be a useful tool to use for site selection and monitoring of actions.

- **WA DNR's *Priority Marine Sites for Conservation in Puget Sound***
  The *Priority Marine Sites for Conservation in Puget Sound* is of particular interest to our process, as it provides an opportunity to cross-reference our current work as well as leverage the work of the committee that provided those recommendations in 2006 (Palazzi & Block, 2006). Although Washington's coastline from the Columbia River Estuary north to Neah Bay was not included in their framework, it is notable that the majority of the areas identified in this 2006 prioritization are also included in our current High Value Areas. While suitable kelp and eelgrass habitats are included in their key habitats, it should be noted that the *Priority Marine Sites* framework considered habitat that would not be considered suitable habitat for kelp and eelgrass, like mudflats and sandflats.

- **Greater Farallones National Marine Sanctuary and California Department of Fish and Wildlife – *Sonoma-Mendocino Bull Kelp Recovery Plan***
  The *Sonoma-Mendocino Bull Kelp Recovery Plan* (referred to hereafter as "the Mendocino Plan") provides an excellent example of a prioritization framework for

recovery actions (Hohman et al., 2019). While focused on a specific species within a specific stretch of California coastline, the overall framework was a useful starting point when considering how we will fulfill the requirements of the Kelp and Eelgrass Plan (see RCW 79.135.440). We scaled up the Mendocino Plan methods, using GIS to assess potential candidate regions, and applied the additional categories described in the RCW of Economic Values and Social-Cultural Values.

The site-selection framework described in the *Sonoma-Mendocino Bull Kelp Recovery Plan* will be of particular interest as a reference for the site-selection process for the Kelp and Eelgrass Plan as well.

Washington State Kelp Strategic Plans/Initiatives and Workgroups

Emphasizing the importance of kelp habitats, Washington is home to a suite of different efforts, initiatives, and workgroups, along with Tribal efforts, that contribute to the collective success in conserving and recovery kelp habitats. Northwest Straits Commission has developed a guide to highlight key differences and relationships between a few large, collaborative efforts that are commonly referenced, to improve the understanding of and dispel any confusion between these efforts (publication pending).

<u>Example Partnerships and Opportunities</u>

There are many high value areas of kelp and eelgrass habitat across Washington that are already under management designations for various conservation or recovery goals. While these areas will not be included in WA DNR's 10,000-acre goal for priority kelp and eelgrass habitats, it is important to emphasize that these areas are of high importance in Washington. In this section, we will highlight the on-going work in these areas, and identify potential opportunities for continued support and collaboration.

Olympic Coast National Marine Sanctuary

The Olympic Coast National Marine Sanctuary (OCNMS) is a 3,188 square mile area of federally designated and managed marine sanctuary off the coast of the Olympic Peninsula. Designated in 1994, OCNMS is recognized as a place of regional, national, and global significance.

The prioritization framework highlights the importance of the highly productive kelp forests within OCNMS - important to the continued survival of numerous ecologically important species of fish, seabirds, and marine mammals; deep importance to coastal Tribes; and exceptional opportunities for scientific research and public awareness and education programs.

OCNMS's inclusion as a High Value Area emphasizes the good to excellent condition of kelp forests found there. These kelp forests are considered stable over time, highlighting both the importance of continued protection and the need to identify opportunities for state and other partners to collectively support the on-going work (Berry et al., 2023).

Potential Tools and Opportunities: There are key opportunities to collectively leverage the existing protections and on-going work on OCNMS. These include, but are not limited to:

- Continued long-term monitoring of the existing kelp forests, including aerial imagery and dive surveys.
- Capacity and funding to integrate new monitoring technology.
- Integrate Indigenous knowledge of the coastal Tribal Nations into management.
- Expand understanding of distribution and extent of eelgrass.

- Develop and implement a public outreach campaign to share the artistic beauty of the kelp in OCNMS to continue to build broad support for kelp within the sanctuary and statewide.

WA DNR Aquatic Reserves

Since 2004, WA DNR has established eight aquatic reserves throughout the state to protect the important native ecosystems on state-owned aquatic lands. These reserves were established through a process to identify and prioritize marine habitats of high conservation value. Through the prioritization process, several WA DNR Aquatic Reserves also arose as High Value Areas due to their ecological, economic, and social-cultural value as it related to kelp and eelgrass habitat.

Potential Tools and Opportunities: Given there are many High Value Areas are also WA DNR Aquatic Reserves, there are opportunities to collectively leverage the on-going work of WA DNR's Aquatic Reserve Program. Aside from being identified as areas of significance, WA DNR Aquatic Reserves, and specifically those identified as High Value Areas, are critical statewide. The Aquatic Reserves Program manages on-going seagrass and environmental monitoring, recreational kelp outreach and monitoring on Smith and Minor Islands Aquatic Reserve, and Acidification Nearshore Monitoring Network sites established on aquatic reserves. WA DNR Aquatic Reserves can also be used as baseline comparisons for future restoration sites on non-reserve lands.

Opportunities to further enhance the on-going work on WA DNR Aquatic Reserves includes, but is not limited to:

- Establishing multiple subtidal temperature loggers on each aquatic reserve to establish local temperature baselines.
- Working with partners, like Reef Check, to establish monitoring sites on and adjacent to aquatic reserve kelp forests.
- Working with Seattle University and non-profits to pilot and establish snorkel transects focused on tracking status and trends of understory kelp and seagrasses and the species that rely upon/impact them.
- Assessing the feasibility and piloting of a video lander pilot project designed to track status and trends of kelp forest habitat and relative abundance of species that impact kelp forests (kelp grazers, their predators, etc.).
- Piloting the use of Autonomous Reef Monitoring Structures to assess biodiversity associated with subtidal habitats like kelp and eelgrasses.
- Identifying areas for expansion of existing or establishing new Aquatic Reserves.

Snohomish Kelp and Eelgrass Protection Zone

The Snohomish Kelp and Eelgrass Protection Zone represents an opportunity that could serve as a model for conservation and recovery of areas highlighted within the Prioritization Plan.

In March 2022, DNR created this first-of-its-kind Kelp and Eelgrass Protection Zone encompassing nearly 2,300 acres of valuable habitat near the mouth of the Snohomish River. The Snohomish Kelp and Eelgrass Protection Zone prohibits development inconsistent with kelp and eelgrass health and recovery for next 50 years with the intent to safeguard critical kelp forests and eelgrass meadows.

This Protection Zone was established by Commissioner Order as part of WA DNR's Watershed Resilience Action Plan, which aims to restore salmon habitat in the Snohomish River watershed on a large scale over the next decade. Similar efforts to connect watershed health to the conservation and recovery of kelp and eelgrass will be a focus for WA DNR in selection of sites for conservation and recovery activities. Language within the Order ensures that this Protection Zone should not be construed to interfere with Tribal rights and authorities.

As implementation continues, we will apply lessons learned from the Snohomish Kelp and Eelgrass Protection Zone implementation planning to the sub-basin engagement and priority area implementation plan development.

APPENDIX D METHODS TO IDENTIFY HIGH VALUE AREAS

This Appendix outlines the methods used to identify the preliminary High Value Areas. It describes what data was used and how it was applied using mapping tools to identify preliminary High Value Areas.

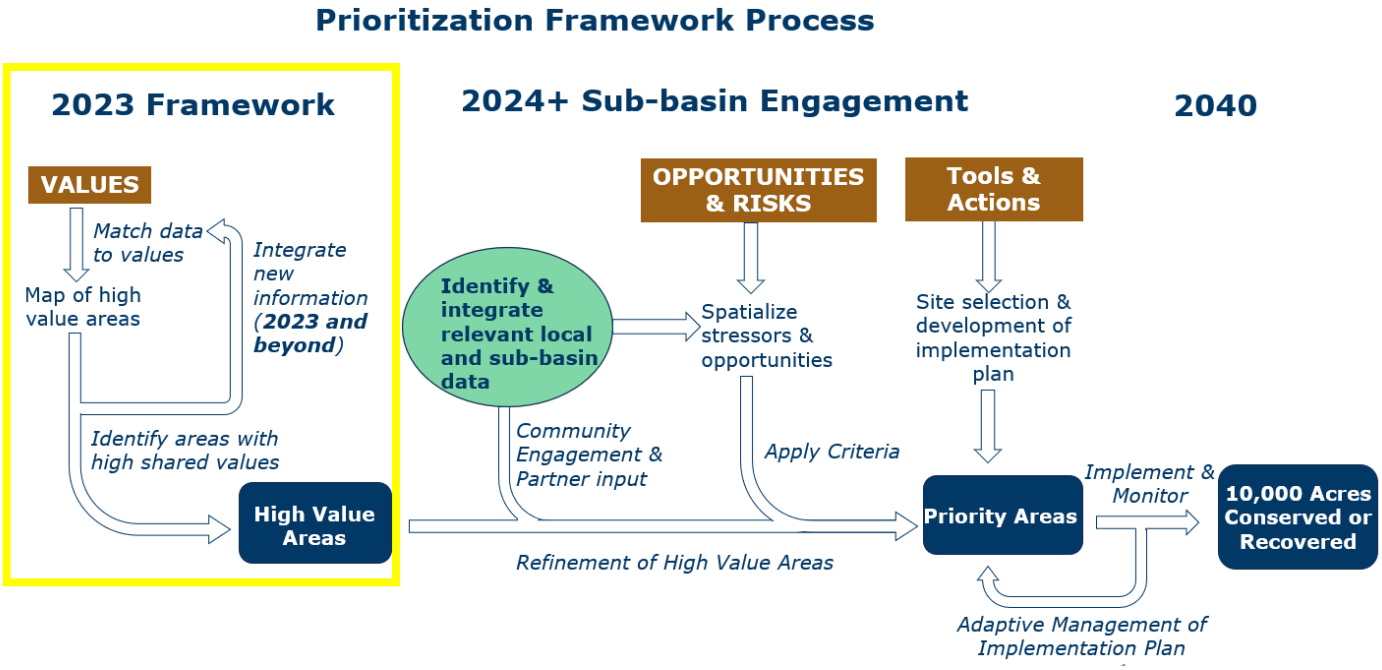

Figure D1: Conceptual model of the methods to identify priority areas.

Compiled Spatial Datasets

The Executive Work Group provided input and feedback to identify data that could serve as an indicator for each of the values described on Table 4. The values and their corresponding datasets are described in Table D1. Although the identified values do not exclusively fit into one of the three categories (ecological, economic and social/cultural), for the purposes of this framework each value was assigned to one category as the primary.

Table D1. Mapped Values

Value	Category	Indicator	Rationale	Source
Designated Critical Salmon Habitat	Ecological	Bocaccio Puget Sound-Georgia Basin ESU Yelloweye Rockfish Puget Sound – Georgia Basin ESU Chinook Puget Sound ESU Chinook Upper Columbia River Spring Run ESU Chum Columbia River ESU Chum Hood Canal Summer Run ESU Coho Lower Columbia River ESU Sockeye Ozette Lake ESU	Kelp and eelgrass provide habitat for ESA species at various life stages.	NOAA National Marine Fisheries Service, Endangered Species Act – Final critical habitat Bocaccio [Puget Sound-Georgia Basin], 2014 NOAA National Marine Fisheries Service, Endangered Species Act – Final critical habitat Rockfish, Yellow Eyed [Puget Sound-Georgia Basin], 2014 NOAA National Marine Fisheries Service, Endangered Species Act – Final critical habitat Salmon, Chinook [Puget Sound ESU], 2005 NOAA National Marine Fisheries Service, Endangered Species Act – Final critical habitat Salmon, Chinook [Upper Columbia River Spring Run ESU], 2005 NOAA National Marine Fisheries Service, Endangered Species Act – Final critical habitat Salmon, Chum [Columbia River ESU], 2005 NOAA National Marine Fisheries Service, Endangered Species Act – Final critical habitat Salmon, Chum [Hood Canal Summer Run ESU], 2005 NOAA National Marine Fisheries Service, Endangered Species Act – Final critical habitat Salmon, Coho [Lower Columbia River ESU], 2016 NOAA National Marine Fisheries Service, Endangered Species Act – Final critical habitat Salmon, Sockeye [Ozette Lake ESU], 2005C
Salmon Habitat	Ecological	Statewide fish distribution data for Salmonid species in Washington	Kelp and eelgrass provide habitat for salmonid species in Washington.	WDFW, Statewide Integrated Fish Distribution, Published: Jan 10, 2014. Updated: April 27, 2023. Accessed: Sept 9, 2023.
Functional Estuaries	Ecological	Major estuaries on the Coast and Puget Sound.	Eelgrass can be found in these major estuaries on the coast and Puget Sound, which provide important habitat for many different species of fish, birds, and other wildlife.	Simenstad, C.A., M. Ramirez, J. Burke, M. Logsdon, H. Shipman, C. Tanner, J. Toft, B. Craig, C. Davis, J. Fung, P. Bloch, K. Fresh, S. Campbell, D. Myers, E. Iverson, A. Bailey, P. Schlenger, C. Kiblinger, P. Myre, W. Gerstel, and A. MacLennan. 2011. Historical Change of Puget Sound Shorelines: Puget Sound Nearshore Ecosystem Project Change Analysis. Puget Sound Nearshore Report No. 2011-01. Published by Washington Department of Fish and Wildlife, Olympia, WA, and U.S. Army Corps of Engineers, Seattle, WA. Identified coastal estuaries, pers. commun. June 12, 2023
Unique Ecological Areas	Ecological	State-owned aquatic lands that were identified during the prioritization process	Priority marine habitats for conservation in the Puget Sound were previously identified by WA DNR and	WA DNR, DNR Aquatic Reserves, Updated: Jun 6, 2023. Accessed: June 12, 2023.

Value	Category	Indicator	Rationale	Source
		for identifying areas for WA DNR Aquatic Reserves, as well as currently existing aquatic reserves.	their expert committee. This process did not include the coast but is important to consider within Puget Sound.	Palazzi D., and P. Bloch. 2006. Priority Marine Sites for Conservation in the Puget Sound. Washington State Department of Natural Resources.
Food Webs Connectivity	Ecological	Forage Fish Spawning and Holding Data	Kelp and eelgrass provide habitat for forage fish species. Forage fish species are critical in other nearshore food webs.	WDFW, Forage Fish Spawning Locations, Updated: Unknown. Accessed: June 12, 2023
Food Web Support	Ecological	Existing kelp forests Existing eelgrass beds	Kelp and eelgrass fuel nearshore food webs as a primary producer and important food source for many species.	**Kelp** includes both understory and canopy forming kelp. Department of Natural Resources. 2001. The Washington State ShoreZone Inventory. Nearshore Habitat Program, Washington State Department of Natural Resources, Olympia, WA. Accessed August 30, 2023. **Eelgrass** uses the SVMP data. Where there are gaps in the survey data, the ShoreZone data was used. Shorezone data included both eelgrass and seagrass layers Department of Natural Resources. 2001. The Washington State ShoreZone Inventory. Nearshore Habitat Program, Washington State Department of Natural Resources, Olympia, WA. Accessed August 30, 2023. WA DNR, 2020. Generalized Seagrass Areas. Updated Jun 17, 2022. Accessed June 12, 2023.
Invertebrate Habitat	Ecological	Abalone habitat, sea cucumber, urchin, sunflower seastar	Kelp and eelgrass are key habitats for native invertebrate species, including some that are threatened and endangered.	WDFW, Priority Habitats and Species, Updated May 2023, Accessed May 30, 2023 *Pycnopodia helianthoides* locations identified via personal comms. WDFW. May 30, 2023.
Important Migratory Bird Habitat	Ecological	Audubon important bird areas	Kelp and eelgrass are important habitats for birds as they migrate, not only as a food source but as resting areas.	National Audubon Society, Important Bird Areas, Created: Unknown. Accessed June 12, 2023
Blue Carbon Potential	Economic	Kelp and eelgrass beds that are stable or increasing in extent.	Kelp and eelgrass contribute to carbon sequestration by taking up organic carbon and storing it. Eelgrass also has the capability to rapidly capture and store	WA DNR, Kelp Forest Alliance of Washington State, Samish Indian Nation, and Northwest Straits Commission, 2022. Floating Kelp Bed Area. Updated 17 Dec, 2022. Accessed June 12, 2023. WA DNR, 2020. Generalized Seagrass Areas. Updated Jun 17, 2022. Accessed June 12, 2023.

Value	Category	Indicator	Rationale	Source
			substantial amounts of carbon in eelgrass sediments.	
Commercial Fishing and Shellfish Aquaculture	Economic	Known areas for coastal Dungeness and groundfish fisheries. Shellfish growing areas as mapped by WA DNR and DOH.	Kelp and eelgrass provide habitat for commercially important species at various life stages. Eelgrass provides ecosystem services that support commercial shellfish operations.	WA DFW, Commercial Groundfish Areas. Published: Unknown. Accessed June 12, 2023. WA DFW, Commercial Dungeness Crab Fishery Mapped Areas, Published: Unknown. Accessed June 12, 2023. WA Department of Health Office of Environmental Health and Safety, 2021. Commercial Shellfish Map Viewer. Updated: Feb. 24, 2022. Accessed: June 12, 2023.
Recreational Diving	Economic	Established dive parks, popular dive sites, sites identified during the Marine Spatial Planning process and sites identified in public workshops.	Kelp and eelgrass habitats support rich marine life that is of high value to divers.	WA DNR, Marine Spatial Planning – NOAA/BOEM: Participatory Mapping. Published: September 7, 2017, Accessed July 12, 2023. WA DFW, Scuba Diving Sites in North Puget Sound, Published May 2009, Accessed June 12, 2023.
Supports Northwest Tourism	Economic	Marine areas and beaches in and adjacent to state parks, national parks, wildlife refuges, WDFW marine preserves, aquatic reserves, and Olympic Coast National Marine Sanctuary.	People come to the NW to enjoy the scenic vistas and the flora/fauna that exist in those vistas. Parks, refuges, and preserves are areas of high use for Washingtonians and visitors to enjoy.	WA DNR, Non-DNR Public Lands, Updated: Jun 6, 2023. Access: June 12, 2023. WA DNR, DNR Aquatic Reserves, Updated: Jun 6, 2023. Accessed: June 12, 2023.
Artistic Value and Sense of Place	Social/ Cultural	Public access to beaches and public boat launches.	Identified by public workshop participants, kelp and eelgrass possess intrinsic spiritual and artistic values.	WA Ecology, Shoreline Public Access Points, Updated March 22, 2023. Accessed June 12, 2023
Marine Managed Areas	Social/ Cultural	Marine managed areas in Washington waters, including marine state parks and marine federal	These areas were identified and prioritized by their respective agencies and have unique	WA DNR, Non-DNR Public Lands, Updated: Jun 6, 2023. Access: June 12, 2023.

Value	Category	Indicator	Rationale	Source
		parks and managed areas.	ecological and social value in Washington.	
Supports Iconic Northwest Species	Social/ Cultural	Areas defined as orca habitat	Not only an iconic species in the NW, Orca are known to frequent kelp beds and these habitats support their prey/food webs.	WDFW, Priority Habitats and Species, Updated May 2023, Accessed May 30, 2023
Recreation and subsistence fishing	Social/ Cultural	Fishing area guide created by WDFW to guide fishers towards areas where particularly good catch rates for certain species may occur.	Kelp and eelgrass provide habitat for subsistence and recreational fisheries at various life stages.	WDFW Major Fishing Areas, Updated May 11, 2023. Accessed June 12, 2023
Recreational Harvest	Social/ Cultural	WA DNR created layer using ShoreZone All Kelp data to identify kelp located on State-owned Aquatic Lands near Shoreline Public Access Points and Fort Flagler, Fort Ebey, and Fort Worden state parks where recreational harvest of kelp is allowed.	Kelp is a traditional food of many people who reside in Washington.	Department of Natural Resources. 2001. The Washington State ShoreZone Inventory. Nearshore Habitat Program, Washington State Department of Natural Resources, Olympia, WA. Accessed August 30, 2023. WA Ecology, Shoreline Public Access Points, Updated March 22, 2023. Accessed June 12, 2023
Tribal Values	Ecological, Economic, and Social-Cultural	Current or historical areas of kelp and eelgrass identified by Tribes as important natural resources.	A multi-faceted value that intersects with many of the values listed in this table, Tribes and Indigenous people residing in Washington have many uses and values around kelp and eelgrass.	Areas as identified by Tribes. Additional areas will be added through consultation and collaboration throughout this process.

Geographic Regions

Washington's nearshore is varied in its types of uses, coastline development, and species that are supported by kelp and eelgrass habitats. Similarly, the anthropogenic stressors vary from the coastal estuaries to the Strait of Juan de Fuca and down to Nisqually Reach. To reflect these geographic differences, there are three broad geographic areas that are used in the prioritization framework (Figure D2). These regions were delineated based on a combination of the foundational need to divide the state into three geographic regions, oceanographic factors, and the sub-basins defined in the Floating Kelp Indicator Report (Berry et al., 2023).

A hexagonal 1sq mile grid was created within each of the regions. The size was selected to reflect the imprecision in spatial resolution in some of the indicators and datasets used in the analysis applying the of their corresponding values linked to available datasets, while producing an output that was specific enough to identify kelp and eelgrass habitats.

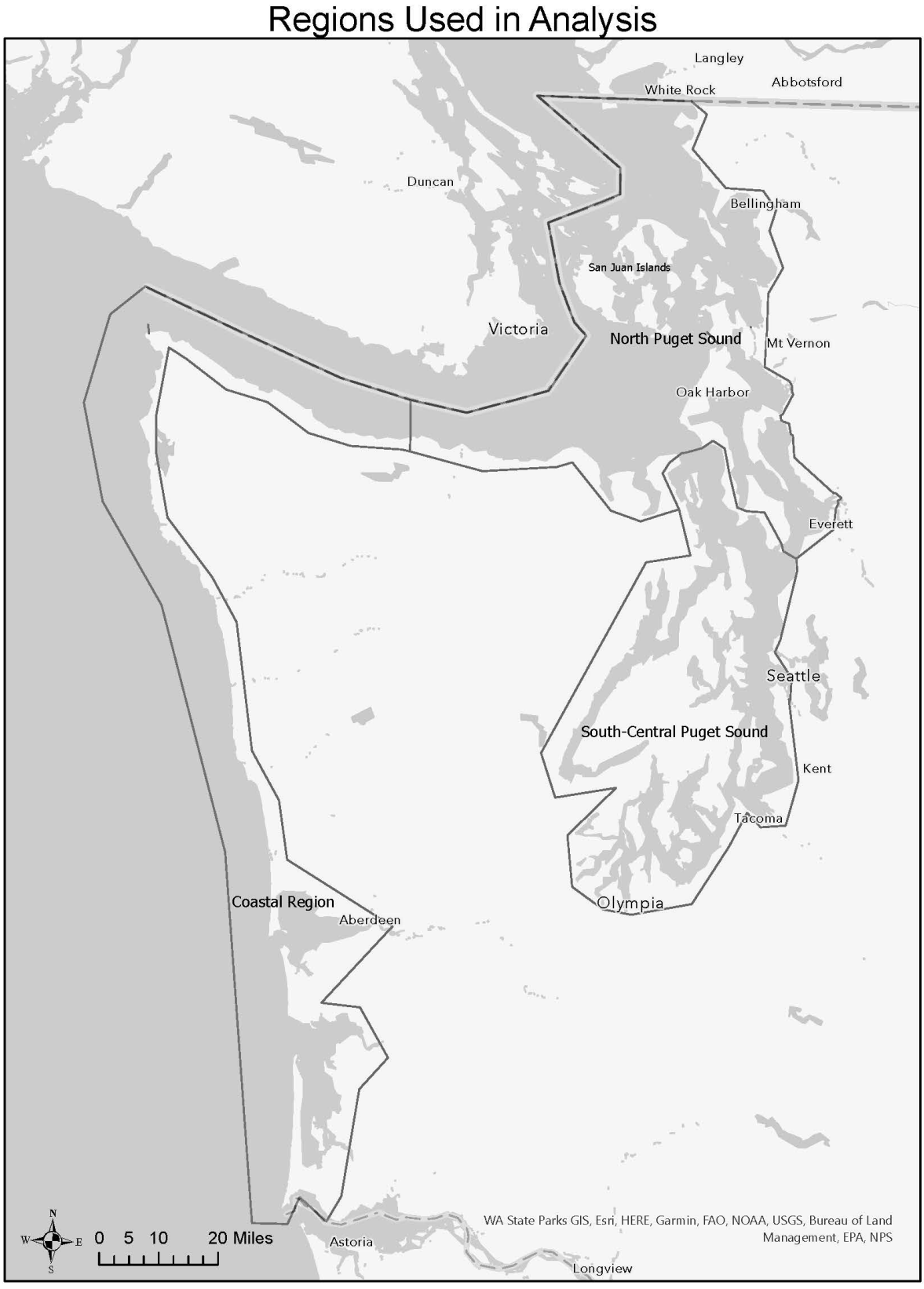

Figure D1: Regions as defined for this analysis.

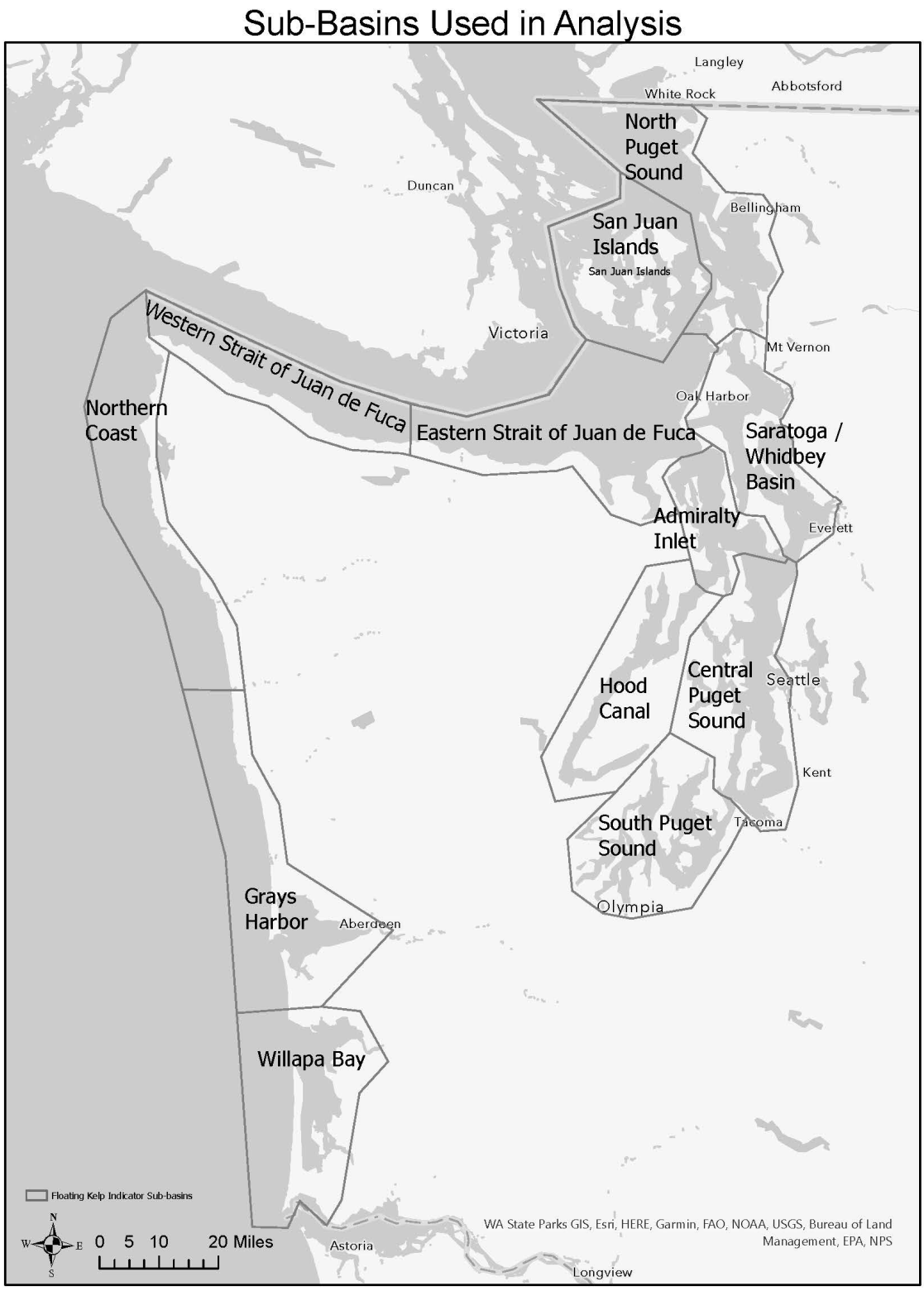

Figure D2: Sub-basins as defined in this analysis. They are based on the Floating Kelp Indicator sub-basins (Berry et al., 2023).

Identifying Areas by Value Category

Using the available datasets identified to represent the corresponding value (see Table D1), each value was mapped onto the grid as present or absent within each 1-mile diameter grid cell. If the applied dataset was present in the grid, a value of one was attributed to that value. All the values in each grid cell were combined to create an "ecological value," "economic value," "social/cultural value" and "total value." Table D2 illustrates how the available datasets were distributed across the three values categories (Ecological, Economic, and Social/Cultural) and across the three regions. The framework is weighted, via number of datasets, towards the Ecological Values to reflect the importance of the Ecological Values to directly contribute to the existence of some of the Economic and Social-Cultural Values.

Number of Datasets Across the Three Regions

	WA Coast	*Eastern Strait, San Juans, and North Puget Sound*	*Central/South Puget Sound*
Ecological Values	14	17	14
Economic Values	6	5	6
Social-Cultural Values	7	6	6
Total	27	28	26

Table D2. Number of datasets for each value category across the three regions.

To identify "High Value Areas," a threshold criterion was defined for each region and each category of criteria (Table D3). These threshold criteria were applied to the grid to highlight where there were areas that were relatively highest across all three categories of values. To further refine the output, an additional criterion was selected to identify where there were areas with strong shared values that were also the highest scoring overall. These are our "High Value Areas."

Criteria for identifying "Areas of High Value"

Category	*Datasets per Grid*
Ecological Values	Coastal Region: Values ≥5 Eastern Strait, San Juans, and North Puget Sound: Values ≥7 South-Central Puget Sound: Values ≥5
Economic Values	All Regions: Values ≥2
Social-Cultural Values	All Regions: Values ≥ 1

Table D3. Criteria for identifying "Areas of High Value."

Based on the values results, an initial set of candidate areas for prioritization were identified where there were strong economic, ecologic, and social-cultural values within each region.

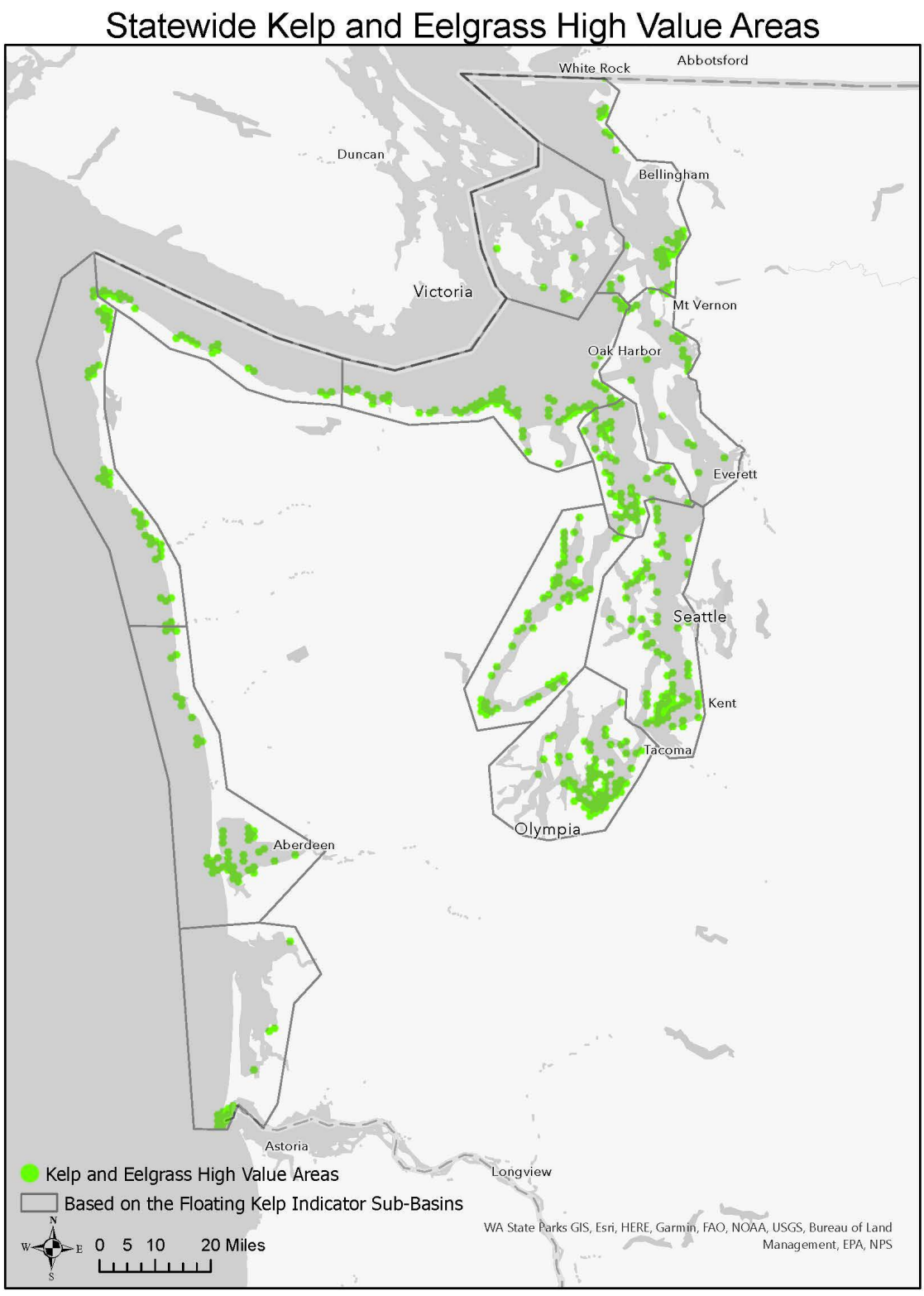

Figure D3: Preliminary High Value Areas, to be used as a non-binding starting point for sub-basin conversations.

Data Gaps and Considerations for Next Steps

There are some values and ecosystem services that kelp and eelgrass provide that are considered a benefit, however, those same values as environmental conditions at high levels can also act as stressors to the health of kelp and eelgrass, such as absorption of nutrients. At this point in the process, we have decided to incorporate stressors and other risks of kelp and eelgrass health will be incorporated during the site refinement and site selection phase. This is because many stressors are site specific, some risks have limited data to help visualize, and place-based knowledge of sites will inform some of these statewide data gaps.

The values that are not included in the mapping analysis of the prioritization framework and justification are:

- **Nutrient Cycling**: While kelp and eelgrass play an important role in nutrient cycling, an excess of nutrients is also a known stressor for kelp and eelgrass. We need to identify where kelp and eelgrass are most beneficial but also identify where there are anthropogenic causes for nutrient inputs to identify potential stressor reduction actions.
- **Ocean Acidification Buffering**: Eelgrass can buffer against ocean acidification; however extremely acidic areas can be a stressor for eelgrass as well. We need to identify where eelgrass is beneficial but also identify where there are anthropogenic causes for ocean acidification for stressor reduction. The same may be the case for kelp, but further research is needed before conclusive statements can be made about the kelp/ocean acidification connection.
- **Sediment and shoreline stabilization**: Eelgrass can provide stabilization to sediments and shoreline habitats during high energy events. However, sedimentation is also a stressor to kelp and eelgrass. We need to identify where eelgrass is beneficial but also identify where there are anthropogenic causes for increased sedimentation for stressor reduction.
- **Tribal Treaty Rights and Indigenous uses**: These areas are highly sensitive and should be identified when working with individual Tribes.
- **Water Quality Improvement**: Kelp and eelgrass can improve water quality by absorption of carbon dioxide and sequestration of nutrients and known pollutants. This can have a beneficial benefit to both local human populations and the ecosystems. However, extremely poor water quality is also a known stressor and should be identified in potential actions.

  Descriptions of example opportunities and risks are included in the Opportunities and Risks in "Sub-basin Scale Engagement and Localized Data Integration" (page 28).

  Other considerations that we may include during the site selection process or as new information is available includes, but isn't limited to:

  - Areas identified as significant by Tribes and Tribal lands, and
  - Areas that support education and science opportunities.

APPENDIX E RESEARCH NECESSARY TO ANALYZE BENEFITS OF SEAWEED AQUACULTURE

Seaweed aquaculture, also known as mariculture or seaweed farming, is the cultivation of various species of marine macroalgae in controlled aquatic environments for commercial purposes. Seaweed aquaculture involves the deliberate cultivation of seaweed species, primarily for their numerous applications in food, agriculture, pharmaceuticals, cosmetics, and biofuel production. This sustainable form of aquaculture offers several ecological benefits, including carbon sequestration, nutrient absorption, and the potential to mitigate ocean acidification.

In the United States, seaweed aquaculture has been gaining momentum as a promising industry due to its environmental advantages and diverse economic opportunities. Various coastal states, such as Maine, Alaska, and California, have initiated seaweed farming projects, exploring the cultivation of native species to foster marine ecosystem conservation while providing a new source of income for coastal communities. With growing awareness of the potential ecological and economic benefits, seaweed aquaculture in the United States holds promise as a sustainable and innovative industry for the future but more information is required to fully identify benefits and potential limitations of the growing field.

Existing and Forthcoming Analyses

In 2023, The Nature Conservancy produced a report, Situation Analysis for Oregon's Emergent Seaweed Aquaculture Industry, which represents the best to-date information relevant to Washington state.

This document highlighted the policy and regulatory considerations for developing a seaweed aquaculture industry in the U.S., with a focus on Oregon. It highlights that favorable regulatory standards are necessary to ensure responsible aquaculture practices. However, the complexity of environmental policies can be challenging for small-scale farmers. In Oregon, regulations are managed by the Oregon Department of State Lands (DSL) and the Oregon Parks and Recreation Department (OPRD). Seaweed aquaculture requires a waterway lease from DSL, and wild kelp harvest is restricted for commercial use but allowed for personal use within specific limits and harvesting methods.

The Analysis emphasizes the need for data-driven guidelines and regulations for product safety and biosecurity. Additionally, public perceptions of aquaculture and partnerships with various stakeholders, including Tribes and First Nations, are crucial for the industry's sustainable growth. Several steps are needed to realize a thriving seaweed aquaculture industry in Oregon, including developing higher-value products, identifying suitable locations, streamlining regulations, and addressing environmental concerns.

A forthcoming analysis from The Nature Conservancy will explore similar aspects of seaweed aquaculture in Washington State, which is expected to reiterate a need for additional research to explore the benefits and risks associated with the industry. In creating the list below, DNR consulted with the Nature Conservancy to preview potential research needs. The below is not an exhaustive list of research needs, and The Nature Conservancy's analysis will include an updated and final recommended list.

Necessary Research in Washington State

To analyze and assess the potential ecological, environmental, and community benefits and mitigate the risks of aquaculture of native seaweed species in Washington state, the following research areas should be considered:

1. Ecological Impact Assessment:
    - Conduct a comprehensive study of the native seaweed species' ecological role and importance in Washington's marine ecosystems.
    - Assess the potential effects of seaweed aquaculture on local biodiversity, including interactions with other marine species.
    - Investigate the ecological impacts of seaweed cultivation on coastal habitats, such as seagrass beds, rocky shores, and intertidal zones.
2. Environmental Monitoring:
    - Implement regular water quality monitoring around seaweed aquaculture sites to evaluate potential changes in nutrient levels, dissolved oxygen, and other relevant parameters.
    - Study the potential for nutrient uptake and biofiltration by cultivated seaweed and its impact on nutrient loading in coastal waters.
    - Analyze the carbon sequestration potential of seaweed aquaculture and its contribution to mitigating climate change.
3. Socioeconomic and Community Assessment:
    - Assess the potential economic benefits of developing a seaweed aquaculture industry in Washington, including job creation and revenue generation.
    - Conduct surveys and interviews to understand the perceptions and attitudes of local communities and stakeholders towards seaweed aquaculture.
    - Identify potential challenges and opportunities for coastal communities in adopting and participating in seaweed aquaculture ventures.
4. Policy and Regulatory Analysis:
    - Examine existing policies and regulations related to aquaculture in Washington state to identify potential barriers or facilitators for native seaweed aquaculture development.
    - Explore best practices from other regions or countries with successful seaweed aquaculture industries to inform regulatory frameworks.
5. Ecosystem Services Valuation:
    - Assess the ecosystem services provided by native seaweed species in natural environments and quantify the potential contributions of seaweed aquaculture to these services.
    - Evaluate the potential role of seaweed aquaculture in coastal habitat restoration and its impact on improving local ecosystem health.
6. Market and Value Chain Analysis:
    - Analyze market demand for native seaweed products, including food, pharmaceuticals, biofuels, and other applications.
    - Evaluate the potential economic viability and scalability of seaweed aquaculture businesses in Washington state.
    - Study the value chain of seaweed products to understand the distribution of benefits among different stakeholders.
7. Technology and Infrastructure Assessment:
    - Explore innovative aquaculture technologies and infrastructure suitable for seaweed cultivation in Washington's marine environment.
    - Investigate potential challenges related to aquaculture equipment, farm site selection, and design.

By conducting research in these areas, policymakers, researchers, and communities can better understand the potential benefits and challenges of seaweed aquaculture in Washington state. The findings can inform decision-making and contribute to the sustainable development of a native seaweed aquaculture industry that considers ecological, environmental, and community well-being.

APPENDIX F: SUMMARY OF PUBLIC COMMENTS AND RESPONSE

- **What we heard**: Concern that valuable kelp and eelgrass habitat were excluded from the prioritization process
- **What we're doing**: WA DNR has developed a sub-basin focused approach that maximizes opportunity for collaboration with Tribes and community engagement to identify priority habitat for conservation and recovery. Beginning in 2024, WA DNR will begin targeted engagement three pilot sub-basins to build partnerships and gather and integrate local data into the statewide framework. WA DNR will use the lessons learned from the pilot process to inform how we will implement the next phase of engagement within the remaining sub-basins. The Prioritization Plan identifies three Pilot Sub-basins for implementation of sub-basin scale investigation. These sub-basins have been chosen as pilots for the opportunities they present to align with ongoing or planned state and federal actions or investments, for data landscapes allowing for well-informed decision-making, or other factors as described below. WA DNR plans to host conversations in each sub-basin to ensure all valuable habitat is considered in the prioritization process. Because of this, no changes have been made to the Prioritization Plan.

- **What we heard:** A need for more detail about how WA DNR intends to pursue Tribal engagement and collaboration to identify priority habitats
- **What we're doing**: WA DNR has sought to collaborate closely with Tribes within development of the Prioritization Plan and will continue to seek Tribes as co-stewardship partners in implementation of the Plan. Additional context was added to clarify how WA DNR has engaged and plans to continue to engage and collaborate with Tribes the "Kelp and Eelgrass and Tribal Nations" section (page 12) and "Tribal and Public Engagement Informs this Process" (page 27). Tribal engagement has informed statewide ecological, economic, and social-cultural categories of values presented in the Prioritization Plan. In addition to offering consultation at any moment in the Prioritization Plan, WA DNR has five Tribal representatives on the Kelp and Eelgrass Plan Working Group, hosted two informational webinars for Tribes, presented Plan development process at the WA DNR Tribal Summit in July 2023, and held a Tribal review period prior to public review. WA DNR has met individually with several interested Tribes who shared specifically and broadly kelp and eelgrass habitats that are of importance, and we have incorporated that information into the prioritization framework information. Future Tribal consultation and collaboration will be incorporated into the prioritization framework, and WA DNR will seek to defer to and ensure alignment with Tribal priorities in the identification of priority areas and development of implementation plans.

- **What we heard:** Enthusiasm for the value of kelp and eelgrass habitats as habitat corridors, especially when spanning sub-basins as defined in the Prioritization Plan to promote habitat connectivity
- **What we're doing**: Habitat connectivity was a key value of kelp and eelgrass habitats that WA DNR heard during public and expert engagement in development of the Prioritization Plan. WA DNR will continue working with a statewide-focused Executive Work Group to provide guidance on direction and opportunities for the program and to support ongoing and new efforts statewide. While the focus will initially be on the pilot sub-basins, WA DNR recognizes the importance of being open to opportunities as they arise to create connectivity statewide. No changes have been made to the Prioritization Plan.

- **What we heard:** Need for greater clarity about how WA DNR will assess and approve the criteria by which an acre of kelp forests and eelgrass meadows can be conserved or recovered
- **What we are doing**: WA DNR recognizes that defining and tracking conservation and recovery criteria will be key to ensure the Plan holds value throughout implementation. To this end, WA DNR will track acreage towards the 10,000 acres goal as acres of habitat that are under WA DNR management specifically for kelp and eelgrass conservation and recovery. Additional criteria for conservation and recovery specific to each area will be collaboratively identified with partners during the site selection and implementation planning process. Additional details about metrics associated with Plan performance and site-specific criteria can be found in WA DNR's Kelp and Eelgrass Monitoring Plan. No changes have been made to the Prioritization Plan.

- **What we heard:** Interest in opportunities to align with and leverage existing and on-going local and regional planning efforts like the work of Salmon Recovery Lead Entities, Marine Resource Committees, and Local Integrating Organizations
- **What we're doing**: Conserving and recovering +10,000 acres of kelp and eelgrass habitat is a big task, and WA DNR recognizes this cannot be done by one agency alone. In developing the Prioritization Plan, WA DNR sought to understand how this work could align to ongoing existing efforts and plans. As WA DNR enters the sub-basin engagement phase, the Agency will seek to deepen this understanding at a local scale by inviting close collaboration with local groups, state partners, Tribal nations, and others to ensure alignment with existing and planned efforts. Because of this, no changes have been made to the Prioritization Plan.

- **What we heard**: Concern about how to incorporate current and emerging invasive species issues into site selection and implementation
- **What we're doing**: WA DNR considers identification of current and future pest and disease considerations high priority for site-selection and data integration during sub-basin scale discussions and statewide alignment. WA DNR will be working with our local, state, federal, and Tribal partners to identify these concerns and corresponding data, as available, and work with partners to identify tools and actions to support the conservation and recovery goals of identified sites. Additionally, climate change impacts and future projections are an important piece of both climate resilience and invasive species management, and WA DNR will continue to engage with local knowledge holders, scientific experts, and others to ensure these data are properly integrated into the next phases of the prioritization framework. Additional context was added to the "Gaps and Needs" section on Invasive Species and Disease on page 27.

- **What we heard**: Additional specific datasets are available that could refine the current mapping efforts
- **What we're doing**: WA DNR recognizes that important data sets may be missing from our current framework and strives to continually improve and update our framework to ensure we are operating from the most up-to-date science and knowledge. The next phase of the framework will prioritize refinement of our framework with local data and knowledge. WA DNR will also be working with interested local partners to identify

additional datasets to incorporate. While we are noting this information for our next phases, no changes were made to the Prioritization Plan.