Kelp Restoration and Management Plan
Community Working Group and Science Advisory Committee Joint Meeting
Wednesday, May 21, 2025 | 8:30am - 4:00pm | Santa Rosa, CA
Summary

Overview

The Kelp Restoration Management Plan (KRMP) Community Working Group (CWG) had a joint meeting with the Science Advisory Committee (SAC), held in-person on May 21, 2025 in Santa Rosa, California. In attendance were twenty-one KRMP CWG Members, five KRMP SAC Members, and the KRMP Project Team (i.e., California Department of Fish and Wildlife (CDFW), Ocean Protection Council (OPC), California Sea Grant, and Strategic Earth Consulting). The purpose of the meeting was to foster alignment and collaboration between the CWG and the SAC by creating space for reciprocal exchange of information between them. The Project Team shared updates on the KRMP and the progress of the SAC and CWG. The rest of the meeting was spent engaging in facilitated discussions and an interactive exercise about the health and status of kelp ecosystems, the community's role in monitoring and management, and restoration efforts. A "poster hall" during lunch provided CWG and SAC members with an opportunity to showcase and learn about ongoing work and partnerships across California. In the afternoon, discussions continued on management strategies, harvest frameworks, restoration projects, research needs, community outreach, and capacity-building in kelp forest monitoring and restoration. CWG and SAC members asked questions of one another and shared ideas to align community observations with SAC perspectives. The meeting concluded with a review of next steps for the KRMP process, including the approach for the CWG-only meeting the following day.

Updates

Community Working Group

Since 2023, the CWG has convened to discuss key elements that will shape the KRMP, focusing on ecosystem-based management, restoration approaches, and harvest practices. Their discussions to date underscored the importance of regular monitoring and assessment of California's kelp forests, as well as the need for more robust data on stressors such as marine heatwaves, to improve ecosystem understanding. They also call for the integration of Traditional Ecological Knowledge to inform managers' understanding of kelp forest complexes and decision-making. The CWG also explored restoration methods and emphasized the importance of baseline data and community support for the long-term success of the KRMP. Furthermore, CWG members have acknowledged the need for tailored, co-managed strategies that center on Tribal sovereignty and ensure sustainable use, while raising concerns about equitable regulatory decisions. The CWG will continue refining recommendations in upcoming meetings, incorporating community insights and Indigenous perspectives to support a robust and effective KRMP.

Science Advisory Committee

The SAC has been working to develop a quantitative framework to understand, monitor, address, and inform the state's management of California's kelp forests. Starting in 2023, they developed a core conceptual framework for the kelp ecosystem, taking into account both ecological and social elements, and identifying the various pressures, drivers of change, and important metrics that impact kelp. The SAC has identified and continues to refine a list of indicators and specific, measurable variables (e.g., ocean temperature, kelp forest structure) to assess ecosystem health across ecological, biological, social, cultural, and governance dimensions. They collated information on existing monitoring programs that collect data on these variables. The SAC is currently discussing attributes and thresholds to categorize the health of the kelp ecosystem as "thriving," "fine," "compromised," or "depleted" within the framework. They have begun developing a decision tree to guide effective management strategies across different states of kelp health, and will refine it by incorporating CWG and SAC suggestions.

Discussion & Interactive Exercise: Kelp Ecosystem Health

SAC members explained their efforts in categorizing kelp ecosystem health ("**thriving**," "**fine**," "**compromised**," or "**depleted**"). The four kelp health states may be determined by evaluating kelp cover, the quantitative ecological characteristics of the kelp forest, and community observations. The framework also considers external pressures and metapopulation dynamics to predict whether kelp populations are likely to increase, remain stable, or decline. The SAC shared example indicators that may inform kelp ecosystem health and are under consideration, including external and internal pressures on kelp forest structure, canopy abundance, landscape connectivity, ocean temperature, and social states pertaining to community, management, and governance. Water quality was noted by the CWG as a crucial variable, and the SAC confirmed its inclusion in their considerations.

Since community perspectives are important for characterizing the health of kelp forest ecosystems, the CWG shared real-world observations and experiences through group discussions and an interactive exercise. The CWG and SAC shared qualitative descriptions of kelp forest health (Table 1) to complement the SAC's initial work.

Thriving	Fine	Compromised	Depleted
Kelp is in great condition (e.g., abundant, growing, thick canopy/ understory, shaded/dark beneath the canopy) Kelp forest is resilient to seasonal effects (e.g., extreme tides, storms, temperature changes)	There is a measurable decline in kelp condition from when it was thriving (e.g., initial changes in kelp color and edge structure) It is important to assess whether the changes are seasonal or annual/every few years	Kelp condition is poor (e.g., patchy, scarce, persistent, significant loss)	The kelp condition has significantly diminished (e.g., overgrazed, bare rock, poor kelp condition, there are urchin barrens) or no kelp
Kelp forest is maintaining or increasing species abundance and biodiversity especially of kelp associated species (e.g., abalone is abundant, calico bass on kelp fronds, large male sheephead)	There is a change in the composition of fish species present. Kelp forest is experiencing decreasing species abundance and biodiversity (e.g., disappearance of rocky bottom fishes)	There is an increase in invasive species, competitors and grazers (e.g., sea stars, urchins, strawberry anemones, coralline algae) There is a decrease in kelp-associated species (e.g., lack of sunflower stars, sea otters) There are changes in behavior of kelp-associated species (e.g., calico bass on rocks instead of on kelp)	Species abundance and biodiversity is poor
There is a high degree of connectivity among kelp beds and ecosystems	There is limited ecosystem imbalance	Ecosystem services are in decline	Connectivity among kelp beds and ecosystems is non-existent

Thriving	Fine	Compromised	Depleted
	This is a remnant forest where there are known threats/stressors are present, but they are few		
There are successful and active fisheries around the kelp forest (e.g., red urchin)	There are fisheries that rely on the kelp forest	The number of ocean users (e.g., recreational divers, commercial kelp harvesters in operation) has declined. There are multiple reports from ocean users of a significant change in kelp forest health.	There is a large decline in the number of ocean users (e.g., recreational divers, commercial kelp harvesters in operation)
Healthy, natural river flows, estuary and/or sand systems, that are upland from kelp habitats	Water is still cold and nutrient-rich, but in decline	The water is warm and nutrient-poor There are changes to seabed (e.g., more sediment, fewer rocks)	There is increased sedimentation and less rocky habitat
	Considerations: It was noted that it is important to assess the direction of change in this state (improving from “compromised” or declining from “thriving”)	Considerations: It was noted that it is important to assess the direction of change in this state (improving from “depleted” or declining from “fine”)	

*Table 1. Qualitative descriptions of kelp forest health, categorized as "**thriving**," "**fine**," "**compromised**," or "**depleted**" developed by the CWG and SAC during the joint meeting.*

During discussions on kelp ecosystem health, the CWG and SAC explored data sources to inform health categorization. The SAC outlined a working draft of a two-tiered approach: Tier 1 utilizes statewide, remotely sensed data (e.g., canopy cover), while Tier 2 incorporates subsurface and other data from monitoring programs and community sources, focusing on kelp forest composition, species assemblages, and other relevant factors. CWG members noted challenges in measuring certain variables due to the limited availability of timely data and emphasized the importance of involving local communities in monitoring and reporting to improve data quality and timeliness. They stressed the need for long-term, large-scale data to account for natural variability and accurately assess kelp health. Tribal members highlighted that Traditional Knowledge spans millennia and offers a more accurate baseline than typical Western/institutional science—an insight the SAC supported. Both groups acknowledged limitations of remote sensing and the value of including subsurface and community-sourced data, while also recognizing concerns about delays in collecting and integrating Tier 2 information.

Kelp Management & Restoration Priorities and Community Capacity

The CWG and SAC discussions emphasized the importance of tailored, proactive, and ecosystem-based management for California's kelp forests. They identified the need for site-specific strategies, long-term data collection, and meaningful collaboration between local communities and resource managers. Restoration and maintenance of historically healthy kelp forests (or those deemed "fine"), particularly those near accessible areas like beaches and harbors, was prioritized over efforts in severely depleted kelp forests. The CWG supported approaches that enhance reef connectivity and substrate availability (i.e., availability of rocky vs sandy bottom substrates), and some members generally favored artificial reefs as a management tool.[1] Members stressed that kelp forest protection is an ongoing responsibility with no endpoint.

The CWG also explored grazer management, particularly urchin density reduction, as a tool for restoration and kelp forest management. There was a diversity of viewpoints on grazer management. While Tribal members advocated for non-intervention and respect for natural systems, others supported density reduction if it benefited the ecosystem. For example, when the urchins' biological material remains in the ecosystem (i.e.,., urchin viscera available for other organisms to consume), grazer reduction may be appropriate. Concerns were raised about the unintended ecological consequences of urchin culling, and preferred methods included hand harvest and air lifts. Market-based restoration tools (i.e., ensuring markets are available to sell urchins removed from a kelp forest and reducing waste), clear guidelines for implementation, and boosting predator populations (e.g., sunflower stars) were discussed, alongside the need to better understand the long-term impacts of grazers on rocky reef biodiversity.

[1] Artificial reefs are outside the scope of the KRMP and will be addressed in California's Artificial Reef Program.

Kelp enhancement and kelp aquaculture were explored, including biobanking, spore dispersal, and translocation. Questions arose about broodstock sourcing and genetic boundaries. Some suggested breeding more heat-tolerant kelp species. More research is needed to explore these ideas, including how changing ocean conditions inform these approaches, and the ethical considerations of these tools are an ongoing discussion.

The CWG shared ideas for enhancing data collection by incorporating additional cultural and social variables gathered by communities, aiming to better assess the health of the kelp forests. Community members highlighted that citizen scientists and regular ocean users could be a cost-effective way to regularly collect data. CWG and SAC members discussed the development of a tool for the community to provide data and inform kelp health. A member also suggested a citizen science task force could be created to monitor areas that started to regrow/improve. Tribal members highlighted the value of training youth for restoration work. Broader data collection, including cultural, social, and human-use variables, was also emphasized. Maritime users, including divers, kayakers, boaters, and commercial harvesters, were recognized as valuable contributors to kelp ecosystem health monitoring through tools such as expanded logbooks or online reporting portals. Nongovernmental organizations (NGOs) with extensive volunteer networks were also identified as potential data partners.

CWG members expressed frustration with complex permitting and regulatory barriers. The CWG called for streamlined processes, including multi-use or pre-approved permits, quicker approval turnaround times, single-point-of-contact systems, and improved inter- and intra-agency coordination. Members also suggested different permitting pathways for subsistence harvest. While some of these permitting concerns extend beyond the KRMP's scope, documenting them was seen as critical for future consideration.

Harvest management discussions revealed that some felt current commercial and recreational harvest levels were insignificant enough to not have an impact on kelp density, while some felt it was still important to limit and manage harvest. Best practices included using Tribal traditional harvesting methods, avoiding over-concentration of harvesting in the same areas, rotational access, and community training on best practices for recreational harvest. There was general agreement that Tribal subsistence harvest should not be monetized. Identified research gaps included assessing the potential effects of harvest, the conversion factor for translating biomass (unit harvest is measured in), canopy area (as measured by remote sensing), and the scale of state-wide recreational take.

A critical final conversation tied everything together, with the CWG focusing on how to effectively share information and sound the alarm to managers in real-time when kelp conditions change. The CWG emphasized the importance of real-time information sharing to alert managers when kelp conditions shift, and called for more accessible, synthesized data to support public engagement and citizen science. Ideas from the CWG and SAC conversation included creating a kelp report card/tool, updating the CDFW Giant Kelp and Bull Kelp Enhanced Status Report, and outreach efforts to educate both coastal and inland communities

on the value of healthy kelp ecosystems. Clear communication plans—both ongoing and emergency-focused—were deemed essential for the successful implementation of KRMP.

The CWG also offered feedback on potential management actions that could be considered across the four categories of kelp health state:

- Thriving: Focus on consistent monitoring, comprehensive data integration, lifting unnecessary restrictions, and incorporating Traditional Knowledge into long-term planning.
- Fine: Enhance connectivity between kelp forests, monitor water quality and other conditions more closely, increase subtidal monitoring, and solicit observations from maritime users (e.g., divers and Tribes).
- Compromised: Similar to "fine," prioritize subtidal monitoring and community-sourced insights to verify status.
- Depleted: Identify and address causes quickly (within one year), and activate a well-connected community response network to implement restoration rapidly.

Through these wide-ranging discussions, the CWG underscored that kelp forest management must be adaptive, inclusive, and sustained by both science and community.

Looking Forward

The CWG and SAC are anticipated to continue developing guidance for CDFW over the next 18 months, as the KRMP Project Team continues to assess additional opportunities for the SAC & CWG to stay connected throughout the rest of their meeting timeframes. This meeting summary and future outcomes from CWG and SAC meetings will be shared with CDFW and OPC to ensure community insights are incorporated into the KRMP. Future CWG meetings will continue to be informed by the KRMP SAC meetings, California Fish and Game Commission meetings, OPC meetings, and Tribal discussions.

If you have questions, comments, or would like additional information, please contact kelp@wildlife.ca.gov. If you would like to request government-to-government Tribal consultation on the KRMP, please contact kelp@wildlife.ca.gov. Updates, informational materials, upcoming opportunities, and events will be highlighted on the KRMP Website.