Kelp Restoration Management Plan
Science Advisory Committee Meeting #6
Thursday, December 5, 2024

Meeting 6 Notes Summary

Welcome & Meeting Overview

The sixth meeting of the Kelp Restoration Management Plan (KRMP) Science Advisory Committee (SAC) was held virtually on December 5, 2024 with seven KRMP SAC members, the KRMP Project Team (i.e., California Department of Fish & Wildlife (CDFW), Ocean Protection Council (OPC), and California Sea Grant (CASG)), and two CASG state fellows. Background materials and a participant agenda were shared in advance to help prepare the SAC for a productive meeting. CASG provided context and instructions to facilitate a group discussion focused on identifying minimum thresholds of prioritized social and ecological indicators that determine management status.

- Facilitator Opening Remarks
    - Highlighted the importance of refining thresholds as a foundational step for effective management
    - Emphasized that management decisions will hinge on reliable and actionable thresholds, which inform status evaluations and guide intervention triggers

Meeting Objectives

- Ensure indicators effectively reflect the status and trends of social and ecological components
- Identify and refine thresholds for social and ecological states to inform management statuses, focusing on the “red/poor” state as a priority
- Set the stage for future discussions on management actions and decision-making tools

Project Timeline

- CASG gave an overview of where this meeting sits in the KRMP Science Needs Assessment timeline. At the KRMP SAC Meeting #5, the SAC identified measurable variables of key indicator outcomes from Meeting #4 and discussed existing monitoring programs and datasets to address gaps. The minimum thresholds of indicators that determine management status are the focus of Meeting #6, with each management status having a suite of associated actions or interventions which we hope to define as the focus of Meeting #7 and future meetings.

Management Status Categories - Social System

The KRMP project team presented the SAC with high-level definitions of kelp social system health status based on current state (status) and potential for change (trends and forecasts of pressures). A model for envisioning how indicators may inform management status was derived from a FEMA "green, yellow, orange, red" scheme, with indicators of kelp social state on the x-axis and potential for change on the y-axis. A task for the SAC prior to Meeting #6 and beyond was to begin establishing minimum indicator thresholds for determining management status of the kelp state.

Indicator Thresholds

- Temperature & Other Abiotic Factors
    - Region-specific variability complicates threshold definitions (e.g., subsurface temperatures lack robust data)
    - Temperature affects kelp indirectly via nutrient availability; thresholds must reflect ecological context

Specificity & Uncertainty

The SAC raised the question of whether and how much to put uncertainty bounds on indicator thresholds, faced with the challenge that very few kelp-specific threshold studies have been published and the research is more focused on bigger jumps (e.g., MHWs, El Niños/La Niñas) and extremes (e.g., mass mortality events). The Project Team clarified that noting this in the exercise documents is useful and for the purposes of this exercise, can be based off of expert opinion. When thinking about what is the threshold for kelp decline (e.g., "red" state) this may not be as concrete. May need to concentrate on a more general indicator of when kelp is stressed (e.g., if it is above a certain temperature, we think kelp will become stressed).

Timescales

The SAC mentioned that determining timescales for measuring and tracking indicators are critical for refining predictions for specific variables. Some variables (e.g., temperature) may require at least annual monitoring in combination with historical measurements (e.g., effects of marine heat waves, El Niños and La Niñas on both giant and bull kelp) to determine whether the threshold is being approached or has been reached, and how to do so operationally warrants further consideration- the beginning of which was discussed later in this meeting. Also specific to temperature is that one specific threshold may not be applicable to the entire cost (e.g., giant kelp starving at higher temperatures than bull kelp), and that temperature alone is not what is affecting kelp but the associated nutrient decline (e.g., kelp storage). The SAC referenced temperature stratification near Santa Catalina Island finding there was kelp high above existing temperature thresholds. They also suggested that there should be an analysis

linking temperature thresholds across regions, especially for subsurface temperature (although subsurface temperature monitoring datasets are limited so will also need to prioritize subsurface data collection).

The SAC mentioned that the question of timescale is different for abiotic (e.g., capturing a cumulative stress metric; temperatures are high but how long have they been high?) vs. biotic factors (e.g., kelp is ephemeral; may be in "red" zone but how long has it been in "red" zone?). It was clarified that timescales fall within thresholds.

Social state indicators
It was agreed that there are significant gaps in understanding social indicator thresholds, and proposed suggestions including identifying clear signals of "red" status (e.g., collapse of resource-based industries like dive shops), exploring data from OPC meetings and CPUE reports to capture early-warning indicators, and incorporating expertise from social scientists (both those on the SAC and outside experts), resource users/stakeholders (e.g., number and type of public comments), and tribal communities to further refine thresholds.

Next steps in threshold identification
The SAC suggested the coordination of a working session or two before the next meeting to work more on defining thresholds for the ecological and social indicators. This idea was agreed upon by the project team and the co-chairs will reach out to coordinate two working session meetings- one for ecological and one for social indicators/thresholds- to be conducted in the new year. The group also thought that independent work of the SAC could proceed in the meantime for the 'easier' indicators.

Fellow presentations
The CASG State Fellows presented the projects they have been working on for the KRMP Science-to-Management process.

Kelp Inventory (Beverly Scharnhorst):

- Compiled a dataset inventory to support indicator refinement:
    - 1,145 datasets identified; 600 categorized based on 22 prioritized indicators.
- Next steps:
    - Refine the inventory by removing duplicates.
    - Reach out to additional data sources via networks and conferences (e.g., Eastern Pacific Kelp (EpaK) Recovery meeting in early 2025).
- Data challenges:
    - Fragmented data among academic labs and NGOs

    - Opportunity to integrate MBC's Southern California Bight regional aerial kelp surveys and other resources

Restoration Framework (Dane Whicker)

- Developing CA-specific restoration planning tools:
    - A dichotomous key to guide project managers through restoration decision-making (e.g., restoration decision tree)
    - Based on TNC's Restoration Guidebook and adapted for CA ecosystems
- Aims to bridge communication gaps among stakeholders with different priorities
- Next steps include refining methodologies and presenting example frameworks