Guide to Leasing & Permitting for Bull Kelp Farming and Restoration Projects in California Using Suspended Longline Gear

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Last updated: October 21, 2024

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Glossary of Terms & Acronyms

AOA: Aquaculture Areas of Opportunity (NOAA)
AR: Aquaculture Registration (annual; issued by CDFW)
BCP: Wild Broodstock Collection Permit (issued by CDFW)
CCC: California Coastal Commission
CDFW, or the Department: California Department of Fish and Wildlife
CFGC: California Fish and Game Commission
CC: Consistency Certification
CDP: Coastal Development Permit (issued by CCC)
CEQA: California Environmental Quality Act (1970)
CSLC: California State Lands Commission
CZMA: Coastal Zone Management Act
DA: Department of Army
DEIR: Draft Environmental Impact Report
EA: Environmental Assessment
EIR: Environmental Impact Report
EIS: Environmental Impact Study
EPA: U.S. Environmental Protection Agency
ESA: Endangered Species Act
FWS: U.S. Fish & Wildlife Service
HAPC: Habitats of Particular Concern
HBHRCD: Harbor District, or Humboldt Bay Harbor, Recreation, and Conservation District
MPA: Marine Protected Area
NAHC: Native American Heritage Commission
NEPA: National Environmental Policy Act (1969)
NMFS: National Marine Fisheries Service; also known as NOAA Fisheries
NMS: National Marine Sanctuary
NOAA: National Oceanic Atmospheric Administration
ONMS: Office of National Marine Sanctuaries
OPC: Ocean Protection Council
RAC: Regional Aquaculture Coordinator
SAC: State Aquaculture Coordinator
SCP: Scientific Collecting Permit
TMSN: Tribal Marine Stewards Network
USACE: U.S. Army Corps of Engineers
USCG: U.S. Coast Guard

Executive Summary

Bull kelp populations off the coast of California are under threat. 96% of bull kelp (*Nereocystis luetkeana*) forests in northern California have disappeared in the past decade–devastating both ecosystems and livelihoods.[1] Restoration managers need more tools in the toolbox to achieve restoration and recovery at scale, and ocean farmers possess tools and skills that could be deployed to support coastwide restoration efforts.

GreenWave partnered with The Nature Conservancy–California Oceans Program in 2020 to develop a strategy for ocean farmers to support critical bull kelp restoration needs. This collaboration had three core objectives: build bull kelp seed production skills and infrastructure, test bull kelp cultivation methods using suspended longline gear that could support restoration and commercial needs, and investigate leasing and permitting pathways for bull kelp cultivation to scale population restoration and recovery.

This Guide pertains to the last objective. Specifically, GreenWave sought to compare the process for leasing and permitting for commercial versus restoration-only kelp cultivation projects using suspended longline gear in different locations along the California coast and to assess what changes, if any, had occurred since 2018 when GreenWave released the *Guide to Navigating Lease & Permit Approvals for Ocean Farming in California*.[2]

There have been some notable advances since 2018:

- The Kashia Band of Pomo Indians of the Stewarts Point Rancheria, the Amah Mutsun Tribal Band, the Resighini Rancheria, and the Tolowa Dee-ni' Nation co-founded the Tribal Marine Stewards Network.
- The National Oceanic and Atmospheric Administration (NOAA) Fisheries program published an Aquaculture Opportunity Area Atlas for Federal Waters in the Southern California Bight.
- Ocean Rainforest, a Faroese company, expanded operations to California and obtained permits to install a temporary research and demonstration farm for *Macrocystis* (giant kelp) on an 86-acre site 4.4 miles offshore in the Southern California Bight, within the proposed AOA.
- The California Fish and Game Commission in coordination with the California Department of Fish and Wildlife published new criteria for public interest determination for shellfish and seaweed aquaculture operations in State Waters.
- GreenWave established the first commercially permitted bull kelp farm in California, in Humboldt Bay, and supported the development of other operations in and near Humboldt Bay including a commercially permitted bull kelp farm, a kelp research lab, and a commercial-ready bull kelp seed nursery.
- The Nature Conservancy and Kelp Forest Alliance published the Kelp Restoration Guidebook: Lessons Learned from Kelp Restoration Projects Around the World and

hosted two annual Eastern Pacific Kelp Recovery Workshops to bring together practitioners and restoration managers from Baja to Alaska.
- NOAA officially designated the Chumash Heritage National Marine Sanctuary, which encompasses over 4.500 square miles off of California's coast between San Luis Obisbo and the Channel Islands.

At least two factors remain unchanged since the publication of GreenWave's 2018 report: the process for navigating lease and permitting approvals for commercial seaweed farming in California is more complex and costly than other coastal states where seaweed farming is permitted—by a significant margin, and California's bull kelp forests are declining at an unprecedented rate. Policies to protect and restore bull kelp populations need to be enacted now, and ocean farming should be added to the suite of solutions for restoration managers and coastal communities.

Introduction

This Guide is a companion to *Lease and Permitting Pathways for Bull Kelp Farming and Restoration Projects in California Using Suspended Longline Gear,* a diagram that illustrates key steps in the leasing and permitting process for bull kelp longline cultivation in federal waters (3–200 miles off the coast of California), state waters (0–3 miles off the coast), and granted tidelands (including but not limited to select ports and harbor districts) (see Appendix). In the companion diagram, the pathway for leasing and permitting for commercial cultivation in federal waters is highlighted in blue; state waters in green; and granted tidelands in red. The pathway for restoration projects is summarized on the right-hand side under the heading Restoration / Non-Commercial. Together, the Guide and diagram highlight similarities and differences in the leasing and permitting processes for commercial ocean farms and non-commercial restoration activities. This Guide summarizes the key elements of the process in each location.

The Guide makes the case for proactively engaging Tribal stakeholders. The Guide then describes the pathway for commercially permitted operations in federal, state, and granted tidelands and then outlines the path for restoration-only projects using suspended longline gear. The final section of the Guide describes key observations and recommendations for moving forward, including opportunities for a dual-purpose approach to farming that stimulates coastal livelihoods and restores depleted bull kelp forests along the California coast.

Tribal Engagement and Coastal Resource Management

The State of California is located on the unceded territories of 109 federally recognized tribes and the dozens of tribes throughout the state who are seeking recognition. Portions of the California coastline are of significance to Tribes and Indigenous communities. In 2022, the Kashia Band of Pomo Indians of the Stewarts Point Rancheria, the Amah Mutsun Tribal Band, the Resighini Rancheria (Yurok), and the Tolowa Dee-ni' Nation co-founded the Tribal Marine Stewards Network (TMSN) to "steward, protect, and restore the ocean and coastal resources within [the Tribes'] ancestral territories."[4][9] State agencies are working with Tribes to establish co-management strategies for ancestral lands and waters, including 220 miles of Pacific coastline within the territories of the TMSN.[a][3]

Tribal engagement is vital to kelp restoration and kelp farming projects in California. If a project does not originate from within a Tribe, consultation should start early in the process regardless of location and project purpose. Tribes are government entities, and official consultation is a government-to-government process.[b] While an applicant may conduct outreach to Tribes at any stage in the lease or permit application process, official coordination will involve key state and federal officials, including the California Department of Fish and Wildlife (CDFW) and the U.S. Army Corps of Engineers (USACE).

CDFW's Tribal Consultation Policy directs CDFW's Office of Aquaculture and CDFW Tribal Liaison to assist in coordinating consultations.[4][5] New California Environmental Quality Act (CEQA) guidelines require communication and consideration from Tribes, both federally recognized and not, for all projects subject to the CEQA process. Tribes will be consulted to ensure that projects are aligned with the following:

1. Tribal management practices
2. Farm sites do not impede Tribal access and use
3. Farm sites are not in locations of cultural significance and/or traditional fishing grounds

Chumash Heritage National Marine Sanctuary

In 2024, NOAA's Office of National Marine Sanctuaries (ONMS) is officially designated the Chumash Heritage National Marine Sanctuary to protect the region's important marine ecosystem, maritime heritage resources, and cultural values of Indigenous communities. The sanctuary stretches along the coastline joining Chumash

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[a] The Santa Ynez Band of Chumash Indians joined the TMSN shortly after its founding. A core aim of the TMSN is to increase coastal Tribes' monitoring and management of ancestral lands and waters. The TMSN is focused on monitoring projects for species important to the Tribes, leading cultural education and tribal science programs in their communities, and stewarding information repositories to safely house their community knowledge in the form of an Indigenous and Traditional Knowledge (ITK) Database. For more information about the TMSN and ITK Database, see https://tribalmsn.org/.

[b] To learn more about Tribal lands and Tribal consultation in California, contact the Native American Heritage Commission https://nahc.ca.gov.

territories adjacent to most of San Luis Obispo and Santa Barbara counties, and provides a haven for marine mammals, invertebrates, sea birds, and fishes, creates an overarching framework for community-based spatial management of potential threats, invites collaborative co-stewardship with local Tribes, and recognizes Indigenous and tribal history and culture in the area.

Commercial Cultivation

Overview

Typical suspended longline gear for kelp cultivation consists of horizontal longlines positioned within 1–3 meters of the water surface. The longlines are seeded with kelp spores that use the longline as substrate for growth. The horizontal growlines are kept under tension and are maintained at the desired depth and position in the water through the use of anchors (on either end of the horizontal longlines) and buoys (which are visible at the water surface). While longline system designs are site specific, these basic design concepts can be adapted to suit the needs of different sites and species. Kelp farmers operating in deep water sites widely use suspended longline gear due to operational considerations such as ease of deployment, monitoring and maintenance, harvest, and retrieval. The modular designs improve their scalability and adaptability to different sites, species, and contexts.

Of the U.S. states that have a process for leasing and permitting for kelp farming, the State of California's is the most complex and costly.[6] Suspended longline gear for bull kelp is no exception. The pathway to approval for a commercial operation entails coordination with numerous regulatory agencies, submission of applications to state and federal agencies, completion of various studies based on the location, purpose, and methods, and opportunities for members of the public to weigh in on positive and negative impacts of the proposed operation. While application and lease costs may be low (from hundreds to thousands of dollars), necessary environmental impact studies require steep upfront costs (up to hundreds of thousands of dollars), such that cost may be a barrier to entry for small-scale farm businesses and/or for the diversification of fishing fleets into ocean farming activities.

However, the State of California Department of Fish and Wildlife and Department of Fish and Game have made progress within the past several years to develop a more transparent leasing and permitting process for aquaculture operations, including seaweed farms, and there are bright spots that signal opportunities for prospective ocean farmers. Namely, the proposed development of Aquaculture Opportunity Areas in federal waters and the establishment of Mariculture Pre-Permitted Areas within granted tidelands along the north coast.

Regardless of location, the journey for a prospective kelp farmer intending to use suspended longline cultivation techniques begins with the development of a written project plan that describes the intent of the project, the desired cultivation methods (i.e. the type of equipment, proposed design, amount of space needed, species intended for cultivation, etc.), and one or more sites—in federal waters, state waters, and/or granted tidelands—that may be well-suited for the proposed operation. With a project description in hand and location in mind, the prospective farmer may initiate consultation with agency officials who coordinate aquaculture activities in that location. The remainder of this section describes key entities and agencies and relevant lease and permit considerations for commercial cultivation in federal waters, state waters, and granted tidelands.

Federal Waters

A key distinction between federal waters and other potential aquatic farm locations in California is that leases are not issued in federal waters, only permits and related authorizations. Numerous federal and state agencies and Tribal entities may be involved in the permitting process, including but not limited to: National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries), U.S. Army Corps of Engineers (USACE), U.S. Coast Guard (USCG), Environmental Protection Agency (EPA), Department of Defense (DOD), California Coastal Commission (CCC), California Department of Fish and Wildlife (CDFW), and regional Tribal governments and representatives.[7] The NOAA Regional Aquaculture Coordinator (RAC) is the first point of contact for proposed aquaculture operations in federal waters.[c] The NOAA RAC serves as a liaison between the applicant and other agency officials, but the USACE is likely to be the lead permitting agency in federal waters.[d]

USACE permits are required for structures—including kelp cultivation longlines and anchors—in all navigable waters of the U.S. below the mean high tide line, including federal *and* state waters.[8] There are different types of USACE permits, including but not limited to Standard Permits, General Permits, and Letters of Permission.[9] Working in consultation with NOAA Fisheries, the USACE[10] will determine the appropriate permit application for the proposed project, will lead the National Environmental Policy Act (NEPA) process and multi-agency review,[11,12] and will determine the pathway for environmental reporting, such as through an Environmental Assessment (EA) and/or Environmental Impact Statement (EIS).[e,13] This portion of the process can take months to years, depending on the size, complexity, and location of the proposed project.[f]

In addition to the applications and environmental reviews required by federal agencies, the California Coastal Commission (CCC) plays an important role in the aquaculture permitting process for sites in federal waters off of the California coast. The Coastal Zone Management Act (CZMA) of 1972 created a federal-state partnership for the management of coastal resources.[15] The federal division of the CCC reviews applications and proposed projects for compliance and consistency with applicable California laws, including the California Coastal Act of 1976. For the prospective ocean farmer, this means that they must submit an application to

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[c] See a full list of NOAA RACs here: https://www.fisheries.noaa.gov/contact-directory/regional-aquaculture-coordinators

[d] In other words, once an application is submitted to the USACE, the USACE will lead the multi-agency review process and will lead the National Environmental Policy Act (NEPA) process.

[e] NOAA will lead coordination on Section 7 Endangered Species Act (ESA) consultations. This process requires submission of a range of supporting information for multi-agency staff to review and show compliance with existing policies.[14] Refer to federal regulations, including the Clean Water Act, Rivers and Harbors Act, Endangered Species Act, Essential Fish Habitat under the Magnuson-Stevens Act, Marine Mammal Protection Act, National Marine Sanctuaries Act.

[f] Environmental reporting requirements may have the biggest impact on the timeline, and will be site and project specific. For more information on USACE permit application processing time, refer to the Code of Federal Regulations 33 CFR 325.2.[48]

the CCC federal division for a Consistency Certification (CC) concurrent to the USACE permit application process. USACE permits will not be approved without the CC approval.

If the CC is approved and USACE permits are issued, other permits and registrations are required before an operation can be deployed, such as the USCG Private Aids to Navigation (PATON), and the CDFW Broodstock Collection Permit and Aquaculture Registration–for collecting seed material and landing harvest in state waters, respectively.[16,17] Bond payments, mitigative measures, and monitoring requirements will impact final startup and operational costs.

Important Considerations

Ocean farms in federal waters may be farther from real and perceived conflicts in the near coastal environment, but they may also be more expensive to permit, deploy, monitor, and maintain, due to their distance from shore and the rapid increase in water depth along the Pacific Coast. Regardless of location, ocean farms are in the public commons. It is imperative that ocean farmers diligently monitor and maintain their operations with care and respect for the ocean ecosystem and other marine resource users.

In 2019, a broken underwater line from Catalina Sea Ranch (CSR), the first aquaculture operation approved in Federal Waters off the coast of California (in 2017)[50], ensnared the prop of a passing boat, causing it to capsize and drown its operator.[51] This was a preventable tragedy in the wake of various failures by CSR to properly maintain the infrastructure on their 100-acre mussel farm.[52]

In addition to closer scrutiny during the leasing and permitting process, new monitoring and reporting requirements and inspection protocols may be put in place to ensure farms are in compliance with the terms and conditions of their permits, and to prevent such a tragedy from recurring.

Federal Aquaculture Opportunity Areas

In 2021 NOAA National Centers for Coastal Ocean Science (NCCOS) published an Aquaculture Opportunity Area (AOA) Atlas for the Southern California Bight.[18] An AOA is an area that has been evaluated for suitability for commercial aquaculture activities, including seaweed cultivation. Establishing an AOA involves a public process and rigorous analysis of the best available science to identify sites where aquaculture is suited to environmental, social, and economic criteria.[19] NOAA is in the process of completing a Programmatic Environmental Impact Statement (PEIS) for the AOA. If the PEIS is approved, the permitting process stands to be more streamlined than in areas outside of the AOA, but the applicant will still have to submit

necessary applications and complete studies specific to their site and operation.[g] Although an applicant seeking an aquaculture permit will be required to complete various environmental reviews, siting a farm within an AOA is likely to expedite the process.

Ocean Rainforest, a Faroese company, expanded to California and secured permits to install a temporary research and demonstration farm for *Macrocystis pyrifera* (giant kelp) on an 86-acre site 4.4 miles offshore in the Southern California Bight, within the proposed AOA.[53]

The Southern California Bight is outside of the natural range of bull kelp and this AOA may not be suitable for bull kelp cultivation or restoration activities. However, the establishment of an AOA is an important step forward for prospective kelp farmers statewide. If successful, we hope to see replication of the AOA process in other areas off the California coast in both federal and state waters.

State Waters

There are multiple state agencies involved in aquaculture leasing and permitting in California, including the California Department of Fish & Wildlife (CDFW), California Fish & Game Commission (CFGC), California Coastal Commission (CCC), California State Lands Commission (SLC), U.S. Army Corps of Engineers (USACE), U.S. Coast Guard (USCG), and Tribal governments and representatives. Although the California Fish & Game Commission (CFGC) is the leasing agency in all but a handful of cases, the CDFW State Aquaculture Coordinator (SAC) serves as a liaison between a prospective ocean farmer and other agencies involved in the leasing and permitting process and is the first point of contact for a prospective applicant. Other agencies take part in the pre-application consultation and throughout the leasing and permitting process, during the multi-agency review period, public comment period, and submission of supplemental applications.[20,21]

In general, the order of activities is as follows: after an initial consultation with the SAC, and a pre-application meeting with relevant agencies of jurisdiction, a prospective ocean farmer will prepare and submit an application for a state water bottom lease to the CFGC. Once the application is reviewed for compliance and deemed complete, the lead permitting agency will initiate the California Environmental Quality Act (CEQA) review of the proposed project, the applicant (or a consultant hired on behalf of the applicant) will complete necessary documents and studies (i.e. the EA, EIR, or EIS). Concurrently, the applicant will initiate the permit applications with the CCC and USACE. The CEQA process and associated environmental studies and public consultations have to be completed before a Public Interest Determination (PID) is

[g] Permits include but are not limited to those required by the USACE (i.e. Individual Permit, Nationwide Permit, or Letter of Permission), the California Coastal Commission (Consistency Certification) U.S. Coast Guard (Private Aids to Navigation), and CDFW Broodstock Collection Permit and/or Aquaculture Registration. Necessary studies will be determined upon application review, and may include an Environmental Assessment (EA) or Environmental Impact Statement (EIS).

issued. The CEQA process, environmental reviews, and public process will take months to years to complete, depending upon the project and location.

If a project is deemed to be in the Public Interest, the lease decision and final CEQA determination may be issued in rapid succession. Only after the lease agreement is executed can a prospective farmer finalize their applications for the CCC and USACE. The prospective farmer then takes part in a federal review, through USACE, similar to that described in the Federal Waters section above.

Prospective farmers will also need to secure USCG PATON permits, CDFW Aquaculture Registration for farming activities, and CDFW Broodstock Collection and Kelp Harvest Permits for collecting seed material.

From beginning to end, this is a process that stands to take years and can lead to significant costs incurred, depending on the type of environmental review and other studies necessary to evaluate compliance with California law.[h] As a result, the process of securing a lease and permits to cultivate seaweed in state waters may favor companies with greater financial risk tolerance and the temperament to navigate a years-long process, the ability to fund costly environmental impact studies, and the willingness to grapple with the uncertainty of whether or not a lease or permits will be granted after investing significant time and financial resources.[54]

Important Considerations

California has a long history of managing coastal waters for the wild harvest of seaweeds[i]–including bull kelp and giant kelp–but open-water seaweed cultivation in the State is in its nascency. While seaweed cultivation technologies are fairly well established elsewhere in North America and internationally, the combination of California's rugged coastline and complex regulatory landscape have stifled the expansion of these practices in State Waters. Importantly, no new leases for the cultivation of seaweed and/or shellfish in state waters have been issued by the CFGC in over 30 years.[j][2,22]

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[h] State and federal agencies are obligated to follow strict timelines for review, public comment, and decision making. In other regions where seaweed farming is permitted, agency officials have noted that incomplete or inconsistent applications lead to significant back-and-forth between the applicant and agency before an application can be deemed complete and the review process initiated. Pre-application consultations may reduce mistakes and subsequent back-and-forth. Studies ordered to determine impacts of a proposed project will also affect the permitting timeline.

[i] The wild kelp fishery in California's State Waters is managed spatially through Administrative Kelp Beds (AKBs). Though not completely contiguous, AKBs span the California coastline from the CA-OR border to CA-Mexico border, from the mean high tide line to up to three miles offshore (in State Waters). There are 87 AKBs of different sizes, conditions, and classifications. AKB classifications include: Open (open to commercial harvest, but no leases are issued), Closed (closed to commercial kelp harvest, except for edible seaweeds), Leasable (available for harvest until the bed is leased), and Lease Only (closed to all harvesting until an exclusive lease is issued). There is no current guidance on how to best site kelp farming operations within the AKBs. CDFW is developing a statewide Kelp Restoration and Management Plan which may inform future guidance.

[j] Several land-based tank culture operations have been approved, and some small-scale, temporary research pilots have been approved, but no marine sites have been permitted for commercial cultivation. GreenWave (2018) and personal correspondence with CDFW, April 2024.

In June 2020, following a spike in interest in new aquaculture leases and amendments to existing leases, the CFGC Marine Resources Committee imposed a hiatus on the leasing program and embarked on a review of the criteria for the public interest determination for new lease applications.[23] The effort was meant, in part, to promote better coordination across state agencies and to develop a more transparent leasing process for aquaculture operations in state waters. The hiatus was lifted in April 2021 and CFGC adopted new public interest determination criteria in 2023.[24] Although the process is more well defined than before the 2020 hiatus, it has yet to be tested. It is unclear how this new criteria will impact the time and costs associated with leasing and permitting.

Granted Tidelands

Granted tidelands are tidal and submerged public trust lands within the boundaries of the waters of the State of California, which the State grants to a local municipality or other entity to manage in trust for the people of California.[25] Examples of entities with granted tidelands include the Humboldt Bay Harbor, Recreation, and Conservation District (HBHRCD); the Noyo Harbor District; the San Diego Unified Port District; many cities and counties; and various special districts and educational institutions along the California coast. The CDFW SAC is the best first point of contact prior to pursuing an aquaculture lease and permit within granted tidelands.

The availability of leases for aquaculture operations and the leasing process will vary depending upon the location and entity overseeing lease options. In most cases, the subsequent permitting process within granted tidelands is likely to mirror that described in the previous section: State Waters. However, there is a small but significant bright spot for prospective bull kelp farmers in Humboldt Bay, which also has important implications for bull kelp restoration. The remainder of this section focuses on Humboldt Bay and provides an example for a pathway that may be possible for other granted tidelands in the future.

Humboldt Bay Harbor, Recreation, and Conservation District (HBHRCD) Mariculture Pre-Permitting Project

In 2016, the Humboldt Harbor, Recreation, and Conservation District (the District) received authorization from the CCC and other authorities for the Humboldt Bay Mariculture Pre-Permitting Project (the Project).[26] The Project established three pre-permitted sites covering approximately 21 acres of subtidal lands for the purpose of leasing to private mariculture businesses for the cultivation of shellfish (in floating up-weller systems, or FLUPSYs) and/or native red macroalgae (seaweed). The District is authorized to lease these sites or portions thereof to private growers that abide by the provisions of the District's existing permits. Neither this User Guide nor the accompanying diagram go into the details of the process that the District underwent to secure approvals for the Project. However, the process and the outcomes are relevant to prospective farmers and other entities with granted tidelands that may be well suited to mariculture activities. The Project's Final Environmental Impact Report (FEIR) (SCH# 2013062068),[27,28] CCC Coastal Development Permit (CDP 9-16-0204),[29] North Coast Regional

Water Quality Control Board (NCRWQCB), and U.S. Army Corps of Engineers (ACOE) authorizations, each contain mitigation measures and special conditions that must be complied with prior to and during all mariculture growing operations for seaweed and shellfish culture. Project mitigation measures and conditions are extended from the District to lessees through lease agreements issued by the District.

As described in the FEIR, prior to conducting marine macroalgae culture, lessees must develop a Culture Description that demonstrates how the proposed project will comply with all required conditions and thresholds.[30] The District and CCC review and approve all proposed Culture Descriptions to ensure project compliance with regulatory conditions prior to the award and execution of a lease agreement, and before any mariculture activities can begin.

GreenWave Humboldt Lease Example

In a test of this process, GreenWave worked with the District to identify a site appropriate for suspended longline gear and developed that site for the cultivation of bull kelp for commercial and restoration purposes. The process began with a Letter of Interest to the District in fall 2019 in response to a Request for Letters of Interest,[31] and an evaluation of lease options in coordination with the District. GreenWave honed in on one site (Subtidal Site #2) that appeared best suited to the organization's cultivation goals, hired a contractor to complete an eelgrass survey on that site, developed farm designs that would not impact eelgrass populations, and drafted a Culture Description (CD) to describe the site, farm gear, and proposed operations.

When the original Mariculture Pre-Permitted Project was approved in 2016, it was limited to the nursery culture of shellfish and cultivation of native red macroalgae, not bull kelp or other brown macroalgaes.[k] While completing the studies and reports described above, GreenWave also supported partners at Cal Poly Humboldt to demonstrate proof-of-concept for the cultivation of approved species of red macroalgae.[l] Once researchers at Cal Poly completed one cultivation season in the Bay, the Project's permit was amended by the CCC at the request of the District in 2021 to include species of brown macroalgae, including bull kelp.

Once the permit amendment was in place, GreenWave submitted a draft CD to the District in

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[k] Species approved in the original Project include: nursery culture of Kumamoto oysters, Pacific oysters and Manila clams, and native red macroalgaes such as Chondracanthus, Gracilaria, Palmaria, and Porphyra.

[l] The original Mariculture Pre-Permitting Project included approvals for five species of red macroalgae, but no species of brown macroalgae. Before considering an amendment to the Project, the District and the CCC first wanted proof-of-concept for the species that were already approved. Considering this, GreenWave partnered with Cal Poly Humboldt (then Humboldt State University) to support a research team at the Cal Poly Trinidad Marine Lab in obtaining a lease and permissions to cultivate five species of red seaweed in Humboldt Bay. GreenWave developed the Culture Description for the team, advised them on farm designs, and provided guidance on deployment, monitoring, maintenance, and harvest of their longlines. After one season of the Cal Poly team cultivating red macroalgae, the CCC and District approved an amendment to incorporate brown macroalgae including bull kelp (Nereocystis luetkeana) and sugar kelp (Saccharina latissima).

January 2021. GreenWave made improvements to the draft CD in consultation with the District before a final CD was sent to the CCC for compliance review in July 2021.[32] Aside from the hard costs associated with the eelgrass survey, and GreenWave staff time required to prepare the CD, no fees were incurred by GreenWave during this process. Once the CD was approved by both the District and the CCC, GreenWave secured Aquaculture Registration from CDFW and the District executed a lease agreement with GreenWave. The District levied lease fees per acre per month and GreenWave paid the fees annually in lump sum.

In addition to the lease agreement and Aquaculture Registration, GreenWave and partners obtained a CDFW Broodstock Collection Permit and Kelp Harvesters License for the procurement of seed material, and a USCG PATON permit for the deployment of regulatory marker buoys around the perimeter of the farm site. GreenWave purchased and deployed farm gear and initiated cultivation in October 2021. GreenWave's farm in Humboldt Bay was the first to be commercially permitted for marine bull kelp cultivation in California.[33]

The streamlined leasing and permitting processes in Humboldt Bay significantly reduces the barrier to entry for new seaweed farm operations in California. However, the sites are limited in size, and farming opportunities are further limited by the presence of eelgrass in some areas. Lessees pay for access to the sites with fees levied per acre, per month, regardless of the presence of eelgrass—and therefore productive footprint. At the time that GreenWave held a lease (2021–2024), fees across sites ranged from $300–$600 per acre per month depending on the site and other factors. This is not an insignificant operational cost. To put this recurring cost in context, fees for seaweed farm sites in other states across the U.S. range from $25 per acre per year in Connecticut State Waters[34] to $450 for the first acre plus $125 for each additional acre or portion thereof up to 30 acres in Alaska State Waters.[35] In other words, a three-acre site in Connecticut costs $75 per year in lease/licensing fees; the same size site in Alaska costs $700; the same size site in Humboldt Bay costs $10,800–$21,600 per year.

Kelp Restoration

There are numerous active and passive approaches to bull kelp restoration, including urchin removal, transplantation of mature thalli, attachment spore bags to reef substrate, and outplanting spore-seeded longlines to substrate just off the ocean floor.[36] According to CDFW, restoration efforts for various kelp species have been underway in California since at least the 1960s.[37] Historically, leases have not been required for kelp restoration projects in state waters, and permit requirements have varied depending on the location and type of intervention.

In most cases, the Scientific Collecting Permit (SCP)[38] issued by the Department of Fish & Wildlife is the main permitting vehicle for kelp restoration projects. Restoration managers have utilized the SCP to enable the deployment of numerous temporary, pilot-scale kelp restoration initiatives over the past several decades, including for kelp longlines attached to or slightly above the ocean floor.[m,39,40,41]

Applying for an SCP is a relatively straightforward and inexpensive process, but the installation and maintenance of kelp restoration projects can be costly. As a result, kelp restoration has not been widely implemented as a statewide management tool. Instead, restoration efforts tend to be deployed by a host of research institutions, private companies, non-governmental organizations (NGOs), and volunteers to address very localized issues.[37]

The focus of this User Guide is on the use of suspended longline systems (or suspended gear) to support commercial cultivation and restoration activities. Suspended gear has not yet been utilized *solely* for bull kelp restoration purposes in California, and no one has attempted to secure permissions for this approach via the SCP.

Although this pathway has not been tested, conversations with agency officials suggest that a different approach will be necessary for suspended gear.[43] In these discussions, officials indicated that, like other restoration interventions, longline cultivation used for the sole purpose of restoration would likely *not* require a lease, as leases are reserved for commercial activities and restoration alone is non-commercial.[n] But the similarities stop there. The permitting process is likely to mirror that of commercial operations regardless of location due to the type of gear and its position within the water column within meters of the water surface.

In addition to the SCP, there are two additional mechanisms for streamlining the permitting process that should be considered for kelp restoration projects using longline gear:

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[m] More recently, an active kelp restoration project located in Federal waters applying the "green gravel" method inside the Greater Farallones National Marine Sanctuary (GFNMS) has been both funded and approved by NOAA Fisheries. Bricks inoculated with kelp spores, spore bags, grow-lines with kelp sporophytes will be attached to the ocean floor.[42]

[n] Various agencies are responsible for managing public trust lands in California, such as the CFGC and State Lands Commission (SLC), and each has the authority to determine if a lease is required or not.

- a categorical exemption for certain types of restoration projects established in CEQAs regulatory guidelines, Section 15333,[44] and
- a temporary statutory exemption for restoration projects established by the California legislature through Senate Bill (SB) 155[45]

CEQA Section 15333 provides exemption for small restoration projects not exceeding five acres in size that meet specific criteria. Senate Bill (SB) 155, signed by Governor Gavin Newsom in 2021, provides CEQA statutory exemption for restoration projects (or SERP) that meet certain criteria. The SERP is effective until January 1, 2025.[46] Initial consultation with the CDFW SAC is a necessary first step in evaluating the regulatory approval process and potential for categorical or statutory exemptions. The CDFW SAC and lead agency for CEQA, determined based on the proposed location of the project, may request CDFW SERP consultation.[47]

Although CEQA exemption may expedite the permitting of critical kelp restoration projects, an exemption would not impact the process for permits and authorizations required by other local, state, and federal entities for suspended longline gear.

Discussion

Over the past several years, state agencies, Tribes, NGOs, and related groups have mobilized to address devastating kelp forest loss. The California Ocean Protection Council (OPC) 2020–2025 Strategic Plan prioritizes the restoration and protection of California's kelp ecosystems and the promotion of sustainable aquaculture.[55] CDFW, in partnership with the OPC, is developing a coast-wide kelp restoration and management plan.[56] In 2023, The Nature Conservancy–California Oceans Program and the Kelp Forest Alliance launched the Eastern Pacific Kelp Forest Restoration Workshop to align and coordinate coastwide restoration efforts from Baja Mexico to the western end of the Alaska Peninsula.[57] Universities and non-profit groups, such as GreenWave, have made progress in establishing kelp seed nurseries and training students and practitioners in producing bull kelp seed for farming and restoration initiatives.[58]

California needs all hands on deck to support critical bull kelp restoration needs. Ocean farmers possess tools and skills that could support kelp restoration, and also have the economic incentive to monitor and maintain their crops. When paired with other types of restoration interventions, bull kelp cultivation on suspended longline gear holds promise for expanding and expediting the restoration and recovery of kelp populations along California's north coast and elsewhere. Designing and deploying commercial farms that also provide restoration value could help expedite coastwide bull kelp recovery.

But the current process for leasing and permitting suspended longline gear, whether for commercial or restoration purposes, poses a substantial obstacle to achieving these objectives. While permitting suspended longline gear for restoration-only projects may entail a shorter timeline compared to commercial leasing and permitting, the process is still likely to be more time-consuming than other restoration methods. Moreover, the costs associated with leasing and permitting commercial operations, even within limited pre-permitted areas, are likely to constrain access and hinder implementation efforts.

Ocean farmers are working in the public commons and proposed projects are assessed to ensure that operations are in the public interest. The potential for bull kelp farms to provide restoration benefits should be a core consideration. GreenWave recommends the following actions to enable sustainable, affordable, and scalable kelp restoration and recovery in California:

- Create a joint-agency application for marine seaweed cultivation
- Develop policies which streamline review of commercial bull kelp cultivation projects that prioritize providing restoration benefits (through reserving sorus tissue or adult sporophytes for transplantation, or other methods)
- Engage NOAA in the expansion of the California AOA Atlas to include sites in state waters, particularly those impacted by dramatic decline in bull kelp populations, and/or

implement a similar coastwide spatial planning effort to identify sites suitable for kelp farming and/or restoration activities
- Allocate funding for granted tidelands to replicate the pre-permitting model executed by the HBHRCD
- Support the development of a fee structure that enables a diversity of sizes and scales of ocean farming businesses and/or provides credit or incentives to operations producing bull kelp for restoration projects

Alongside these long-term efforts, prospective farmers committed to dual-purpose enterprises should consider a pathway that isn't illustrated on the accompanying diagram:

- Work with restoration managers to identify sites where suspended longline cultivation could enhance existing interventions (i.e. urchin removal) and expedite population recovery
- Develop a farm and experimental design to test this hypothesis
- Initiate consultation with the CDFW SAC to evaluate future lease opportunities, submit an application for an aquaculture lease in the desired area
- Pursue SCP or other permits and approvals for a limited-term non-commercial research farm to provide proof-of-concept
- Begin implementation of restoration interventions and experimental designs
- Pursue permits and approvals for a long-term commercial operation

Enabling the development of commercial kelp farms that also support restoration goals could create new revenue generation opportunities for fishers, ocean farmers, and others impacted by the loss of natural bull kelp forests while fostering restoration and recovery at the ecosystem scale. A dual-purpose farm model may also hold promise for other kelp species and regions impacted by kelp forest decline.

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Appendix

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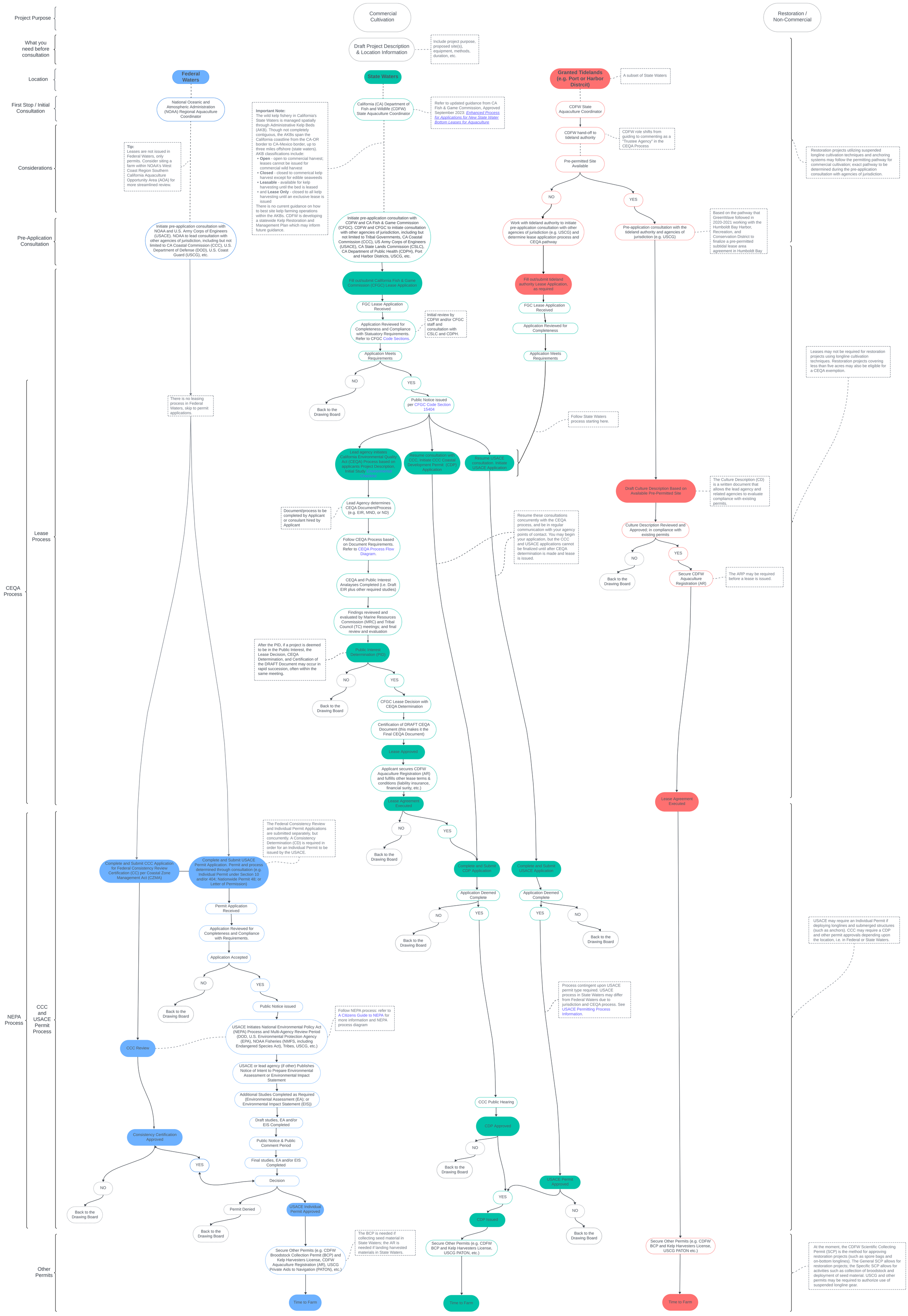
LEASING & PERMITTING PATHWAYS FOR BULL KELP FARMING & RESTORATION PROJECTS IN CALIFORNIA USING SUSPENDED LONGLINE GEAR

Prepared by GreenWave August 2024



Disclaimer: The information represented in this diagram is based on GreenWave's interpretation of publically available resources, conversations with agency officials, and first-hand experience navigating the leasing and permitting process (in Granted Tidelands). This information is not peer reviewed and has not been approved or endoresed by officials at the named State and Federal agencies or local jurisdictions. The User Guide that accompanies this diagram provides additional context, resources, and citations.

GREENWAVE