California Coastal Commission
CDP Application Guidance

Aquaculture and Marine Restoration

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Photo Credits: top left - Dr. Danielle Zacherl; top right - Commission staff; bottom left – Maurice Roper; bottom right - CDFW staff

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Glossary of Terms and Acronyms[1]

CCC or Commission – California Coastal Commission
CDFW – California Department of Fish and Wildlife
CDP – coastal development permit
CDPH – California Department of Public Health
CEQA – California Environmental Quality Act
CSI – California Shellfish Initiative
CSLC – California State Lands Commission
EIR – Environmental Impact Report
FGC – California Fish and Game Commission
Harbor District – Humboldt Bay Harbor, Recreation, and Conservation District
LCP – local coastal program
MND – Mitigated Negative Declaration
NEPA – National Environmental Policy Act
NMFS – National Marine Fisheries Service
OPC – California Ocean Protection Council
SB 262 – Senate Bill 262
USACE – United States Army Corps of Engineers
Water Boards – California Regional Water Quality Control Boards

[1] Photo Captions (previous page, clockwise from top right): Alamitos Bay Native Oyster Habitat Project, partnership of Orange County Coastkeeper, Dr. Danielle Zacherl (CSU Fullerton) and Dr. Christine Whitcraft (CSU Long Beach); Grassy Bar Oyster Company bottom bag longlines, Morro Bay; *Macrocystis* growing on Marine BioEnergy depth-cycling buoy, experiment conducted offshore of Catalina Island in collaboration with the University of Southern California Wrigley Institute; Santa Barbara Mariculture mussel cultivation lines during CDFW field inspection.

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I. Background and Context

A. Aquaculture in California

Marine aquaculture has a long history in California (for more on that history, please refer to the California Department of Fish and Wildlife's May 2020 Aquaculture Information Report[2]). Although there are many definitions of aquaculture (which is used synonymously in this document with the term "mariculture,"), the California Coastal Act ties its definition to the state's Fish and Game Code. Section 17 of the Fish and Game Code defines aquaculture as "that form of agriculture devoted to the propagation, cultivation, maintenance, and harvesting of aquatic plants and animals in marine, brackish, and fresh water. `Aquaculture' does not include species of ornamental marine or freshwater plants and animals not utilized for human consumption or bait purposes that are maintained in closed systems for personal, pet industry, or hobby purposes, however, these species continue to be regulated under Chapter 2 (commencing with Section 2116) of Division 3.

Most modern operations have been concentrated in the protected embayments of central and northern California. More specifically, Morro Bay, Tomales Bay and Humboldt Bay support the majority of current and historic aquaculture activities. These operations primarily cultivate Pacific oysters and are located on intertidal mudflat and shallow subtidal areas. Limited intertidal cultivation of juvenile and adult Manila clams also occurs in these bays. The cultivation of Mediterranean mussels is carried out within a limited subtidal portion of Tomales Bay and a larger open ocean facility near Santa Barbara. In addition, onshore and in-water facilities focused on the cultivation of abalone operate in Goleta, Monterey, and Davenport. In total, California has 18 commercial shellfish aquaculture businesses[3] and three aquaculture research operations – two of which are focused on seaweed cultivation. All aquaculture operations located in state waters (the area between the shoreline and three nautical miles offshore) have received or applied for coastal development permits from the Coastal Commission (Commission).

California's aquaculture industry is currently fairly small (less than 500 total acres and roughly $15 million in annual revenue) but there is interest in expanding. In addition, efforts to enhance and increase populations of California's native oyster species (*Ostrea lurida*) and restore kelp habitat are also growing. As part of the review of recent projects and in anticipation of new projects, Commission staff have discussed with representatives of the aquaculture industry the potential benefits of the Commission preparing permit application guidance that would address, at a minimum: 1) the Coastal

[2] https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=180517&inline

[3] Humboldt Bay: Coast Seafoods, Hog Island Oyster Company, Taylor Shellfish, North Bay Oyster Company, Humboldt Bay Oyster Company, Starbird Mariculture and AquaRodeo. Tomales Bay: Hog Island Oyster Company, Tomales Bay Oyster Company, Charles Friend Oyster Company, Point Reyes Oyster Company, Marin Oyster Company, Cove Mussel Company, Starbird Mariculture. Davenport: American Abalone Company. Monterey: Monterey Abalone Company, Pacific Abalone Farms. Morro Bay: Grassy Bar Oyster Company, Morro Bay Oyster Company. Goleta: The Cultured Abalone. Santa Barbara: Santa Barbara Mariculture. Carlsbad: Carlsbad Aquafarms.

Commission's jurisdiction over aquaculture projects, 2) the Coastal Act policies that pertain to aquaculture operations, 3) the types of information and data needed to review a proposed aquaculture project for its consistency with relevant Coastal Act policies, and 4) a step-by-step guide for how to complete a coastal development permit application.

B. Senate Bill 262 and Public Resources Code Section 30612.5

In October 2019, the Legislature passed California Senate Bill (SB) 262. In addition to modifying sections of California's Fish and Game Code related to fishing activities, this bill added a new section to the California Public Resources Code – Section 30612.5. This provision requires the Commission to consult with the California Department of Fish and Wildlife and other agencies and stakeholders and to "develop guidance for applicants for coastal development permits for shellfish, seaweed, and other low-trophic[4] mariculture production and restoration." The purposes of the guidance are to: 1) reduce duplicative or overlapping information requirements during permit application filing, 2) increase state and federal agency coordination, 3) increase regulatory certainty, and 4) reduce the time and cost associated with securing a coastal development permit, to the extent possible. It is to include, but not necessarily be limited to:

- A list of elements required in a project description;
- Projected permit approval timelines;
- A description of how permits can provide the flexibility to allow growers to adapt to new methods;
- Examples of operational changes that could qualify for expedited review, for example, a de minimis waiver or an immaterial permit;
- A description of growing methods and techniques that have been approved by the Commission and the contexts associated with those approvals; and
- A process for incorporating data from comparable growing areas.

Per Section 30612.5, the guidance must be developed by December 31, 2020. The full text of Section 30612.5 is provided in Appendix A.

C. Topics Covered in this Guidance

This guidance document addresses: 1) the Coastal Commission's regulatory authority, 2) the various coastal development permit processes, including requirements for waivers, exemptions and permit amendments, 3) Coastal Act policy issues applicable to aquaculture and marine restoration project types; 4) the Commission staff's process for reviewing a permit application, including coordination with other agencies such as CDFW, and Tribal Consultation, 5) information and data requirements for coastal

[4] Commission staff's understanding of SB 262's use of the term "low-trophic" focuses on species that are primarily plankton feeders that do not require external feed inputs.

development permit applications, 6) application permit process timelines, and 7) a step-by-step guide for how to fill out and complete a coastal development permit application.

This permit guidance addresses projects proposed in marine waters ("State waters") within the coastal development permit jurisdiction of the Coastal Commission. This guidance document does not cover the Coastal Commission's authority over aquaculture, seaweed, or restoration-type projects proposed to be located in federal waters.[5] Also, this guidance document does not cover projects involving the cultivation of marine fish or projects proposed *on land* within the coastal zone.

During scoping for this guidance document, some stakeholders requested that the guidance address in detail other agencies' statutory authorities, review processes and policy requirements that pertain to aquaculture. Such an undertaking would be large, would require the participation of other local, state and federal agencies, and is beyond the scope of what is required by SB 262. However, Appendix C of this guidance document includes a brief description of other government agencies that may have a regulatory role over aquaculture, seaweed, and marine restoration projects proposed within State waters, as well as summaries and references to a variety of existing guidance documents and resources where this type of information can be found.

[5] Through the federal Coastal Zone Management Act, the Commission can review activities outside the coastal zone – including in federal waters - that would have a reasonably foreseeable effect on coastal uses or resources of the California coastal zone. More details about the Commission's authority and review process for these activities can be found on the Commission's website: https://www.coastal.ca.gov/fedcd/fedcndx.html

II. Coastal Commission Authority, Coordination and Sequencing

A. Commission's Role and Authority

The Commission's authority to regulate shellfish, seaweed, and other low-trophic mariculture production and restoration activities is established in the California Coastal Act. All activities that meet the Coastal Act's definition of "development" within California's coastal zone[6] must be authorized through the issuance of a coastal development permit issued by the Commission or a local government with a certified local coastal programs (LCP), unless the activity is specifically exempted from the permit requirement. The Coastal Act defines development in Section 30106 as follows:

> *"Development" means, on land, in or under water, the placement or erection of any solid material or structure; discharge or disposal of any dredged material or of any gaseous, liquid, solid, or thermal waste; grading, removing, dredging, mining, or extraction of any materials; change in the density or intensity of use of land… change in the intensity of use of water, or of access thereto; construction, reconstruction, demolition, or alteration of the size of any structure, including any facility of any private, public, or municipal utility; and the removal or harvesting of major vegetation other than for agricultural purposes, kelp harvesting, and timber operations which are in accordance with a timber harvesting plan submitted pursuant to the provisions of the Z'berg-Nejedly Forest Practice Act of 1973 (commencing with Section 4511)…*

Shellfish, seaweed, and other low-trophic mariculture production and restoration activities that take place within the coastal zone and involve one or more of the activities described above trigger the need for review under the Coastal Act. Specifically, most commercial aquaculture operations involve one or more of the following: 1) placement or erection of solid material or structure in or under water; 2) removal or extraction of materials; 3) changes in the intensity of use of water; and/or 4) construction of structures. Please contact Commission staff with any questions as to whether a particular project meets the definition of development under the Coastal Act.

In addition to the aquaculture activities described above, shellfish, seaweed and other low-trophic restoration activities that involve placement, construction, or removal of

[6] As stated in Section 30103 of the Coastal Act, "'Coastal zone' means that land and water area of the State of California from the Oregon border to the border of the Republic of Mexico, specified on the maps identified and set forth in Section 17 of Chapter 1330 of the Statutes of 1976, extending seaward to the state's outer limit of jurisdiction, including all offshore islands, and extending inland generally 1,000 yards from the mean high tide line of the sea. In significant coastal estuarine, habitat, and recreational areas it extends inland to the first major ridgeline paralleling the sea or five miles from the mean high tide line of the sea, whichever is less, and in developed urban areas the zone generally extends inland less than 1,000 yards. The coastal zone does not include the area of jurisdiction of the San Francisco Bay Conservation and Development Commission, established pursuant to Title 7.2 (commencing with Section 66600) of the Government Code, nor any area contiguous thereto, including any river, stream, tributary, creek, or flood control or drainage channel flowing into such area."

structures and materials, or other activities that meet the Coastal Act definition of development, are also regulated by the Commission. To date, however, such projects have been limited in scope and number. Thus, the Commission staff has far fewer examples to draw from for this CDP application guidance. Accordingly, the remainder of this guidance will be based on those available examples - native shellfish habitat projects and native seaweed and reef restoration projects that the Commission has reviewed and approved over the past ten years. Although a small number, these projects nevertheless provide useful reference for other types of marine habitat creation, enhancement and restoration projects that may be proposed in the future.

Onshore projects
Development activities carried out onshore may also trigger the need for authorization under the Coastal Act. In many locations along the coast, local governments have developed LCPs that have been certified by the Commission. This allows those local governments, rather than the Commission, to review development proposals and issue CDPs.[7] A list of local governments with certified LCPs is available on the Commission's website: https://www.coastal.ca.gov/lcps.html

Applicants for projects that involve development within both the Commission's jurisdiction and an area covered by an LCP may require multiple approvals, though the permitting process can be streamlined. For example, a shellfish nursery located onshore that involves the installation and use of a seawater intake may have the option of 1) seeking separate CDPs from the Commission and local government for the different elements of the project, or 2) seeking a consolidated CDP from the Commission for the entirety of the project, if the Commission, local government, and applicant agree to consolidation. The most appropriate permitting path for these types of projects varies depending on the location and specific elements of the project. Thus, these types of projects are only generally addressed in this guidance. For projects that span multiple jurisdictions, we recommend contacting Commission staff early in the project development process for assistance in outlining the most appropriate and efficient CDP permitting pathway.

Projects outside the Coastal Zone
Although the Commission's permitting jurisdiction is within the coastal zone, it also has regulatory authority over certain types of activities outside the coastal zone if they have a reasonably foreseeable effect on coastal uses or resources of the coastal zone. In the context of aquaculture, this type of regulatory review, referred to as federal consistency review, has been applied to open ocean aquaculture projects located over three miles from shore within federal waters. These types of projects raise additional considerations that are not within the scope of this guidance. More information on the Commission's authority and review process for these types of projects can be provided by Commission staff upon request.

[7] Generally speaking, the Commission has permitting authority over development on tidelands or submerged lands, and local governments with certified LCPs have permitting authority on land. See Pub. Res. Code § 30519.

CDP Issuance and Chapter 3 Policies
In order to issue a coastal development permit, the Commission must find that the proposed project is consistent with the Chapter 3 policies of the Coastal Act. These policies include the protection of coastal biological resources such as marine habitats, wildlife, and water quality; visual resources and coastal views; coastal access; commercial and recreational fishing; and water oriented recreation and boating. Some common areas of Coastal Act analysis involving these policies are discussed in Section V of this document. In addition, Appendix B provides a list of policies from Chapter 3 of the Coastal Act that are frequently found to be relevant for projects focused on shellfish, seaweed, and other low-trophic mariculture production and restoration activities. The policies in Appendix B are listed in the order they appear in the Coastal Act (rather than in order of importance), and not all of the Chapter 3 policies are included.

B. Brief History of Permitting for Aquaculture and Marine Restoration

Aquaculture
The Commission has been reviewing aquaculture projects and issuing coastal development permits for them since the earliest days of the agency's formation in the 1970s and 80s. In its 40+ years of permitting marine aquaculture activities, the Commission has considered projects across the state's coastal zone - from San Diego County to Humboldt Bay – that involve sites onshore, in bays and embayments, and in the open ocean. The Commission has reviewed projects that involve a wide variety of marine species (from shellfish such as mussels, clams, and oysters, to kelp, marine algae and fish) and cultivation methods. The following table provides examples of the different types of cultivation methods the Commission has authorized in recent years and the CDPs that can be referenced for more details.[8]

Cultivation Method	**Type of Marine Environment**	**CDP Nos.**
Bottom bags	Intertidal embayment	9-18-0278
Elevated longlines (hanging bags/baskets)	Intertidal embayment	9-18-0002-A1
Cultch-on-longlines	Intertidal embayment	9-17-0646
Floating longlines	Subtidal embayment Open ocean	2-84-10-A1 E-12-012-A1
Rack and bag	Intertidal embayment	1-94-55-A1
Rafts	Subtidal embayment	9-19-1135

[8] References to specific CDPs are provided throughout this guidance to facilitate additional research. The staff reports associated with these CDPs provide detailed project descriptions, exhibits showing the design and configuration of cultivation equipment, and analyses of Coastal Act consistency. These reports can be accessed from the archived hearing agendas available on the Commission's website: https://www.coastal.ca.gov/meetings/archive/#/ To access the correct archived agenda or staff report, use the search function on this website or include the search terms "Coastal Commission" along with the relevant CDP number in a general search engine. CDP files can also be requested from the Commission directly.

Many of the first coastal development permits were issued for areas such as Humboldt Bay and Tomales Bay that still support robust shellfish cultivation industries and authorized types of intertidal and subtidal cultivation techniques similar to those used today. Although the specific cultivation structures and materials have evolved over the years (from mostly metal and wood cultivation gear in the past to PVC and plastic today), the importance of siting and types of potential effects to coastal resources considered by the Commission are largely the same. For example, in its 1979 authorization of intertidal oyster cultivation operations in northern Humboldt Bay (CDP No. 79-P-71), the Commission analyzed and considered potential effects to eelgrass habitat, shorebird foraging, and recreational uses such as hunting and boating. Nearly 40 years later during its 2017 review of Coast Seafoods' intertidal oyster cultivation operations in Humboldt Bay (CDP No. 9-17-0646), the Commission considered this same suite of potential effects to coastal resources – along with some new issues such as plastic marine debris that have arisen in more recent years as the industry has adopted more plastic materials and concerns about plastic pollution have increased.

In addition to marine debris, the scope of the Commission's review has evolved over time to address other new and emerging issues, including climate change and invasive species. Ocean acidification has also triggered the need for changes and adaptations in shellfish cultivation methods, and changing patterns of ocean currents and temperatures have necessitated a re-examination of historic assumptions about species ranges and naturalization or escapement potential. As the industry in California has evolved in scale and complexity in response to these and other factors, the Commission's review process has expanded to keep pace.

In its many years of permitting aquaculture, the Commission has also seen market trends and interest wax and wane. For example, the mid- to late-1980s saw a huge growth in interest in the cultivation of abalone, both in cages in the ocean and in tanks onshore. Over a dozen different operations were proposed and permitted at the time and many expected growth in that sector to continue and expand long into the future. Today, however, only a handful of abalone aquaculture operations remain. Much of the interest in new facilities is associated with mussel, oyster and seaweed cultivation and in operations in open ocean areas.

Native Shellfish and Seaweed Habitat Creation, Enhancement and Restoration
Similar to aquaculture, the field of marine restoration has evolved over the years. In past decades, adding any kind of hard substrate to the ocean floor was thought to create productive habitat for fish, invertebrates, kelp and shellfish. As a result, "restoration" projects sometimes included building reefs out of any available material, including old tires, toilets, concrete rubble, light poles, train cars, and plastic jugs. As our scientific understanding of how marine habitats function evolved, so has our understanding of what constitutes restoration. In more recent years, the Commission has worked to secure funding to clean up and remove old artificial reef "restoration" projects made from inappropriate materials and to develop the critical review capacity to help prevent similar mistakes in the future.

One approach has been to consider a narrower definition of restoration that is less encompassing of artificial materials, habitats and structures and more aligned with the practice of restoration in the terrestrial environment. That often means focusing on the replacement of a habitat type in locations where that habitat has recently existed. For example, the planting of a new eelgrass bed at site that has previously supported eelgrass, the placement of rock at the site of a historic rocky reef that was buried by sediment (as approved by the Commission in CDP No. 9-18-0629), or the outplanting of intertidal seaweeds to aid in the recovery of lost and imperiled populations (as approved by the Commission in CDP de minimis waiver No. 9-19-0369-W).

This approach, however, does not encompass all projects that benefit marine habitat. Sometimes, information about the location and type of historic habitat is not available. In other cases, an artificial structure or intervention is determined to be a necessary component of a proposed project. These proposed projects may not meet the narrower definition of restoration described above. However, these projects may still be beneficial to the marine environment and consistent with the Coastal Act. Such projects have sometimes been referred to as habitat enhancement or habitat creation projects rather than restoration.

While the Commission has reviewed very few CDP applications in the past decade for projects that include in-place and in-kind restoration of historic or recently lost marine habitats, as described above, (the eelgrass, reef, and seaweed examples noted above are among those few), it has reviewed and approved several projects that have instead focused more broadly on marine habitat enhancement and/or creation. For example, Orange County Coastkeeper has carried out projects in both Upper Newport Bay and Alamitos Bay that involve the placement of bags or loose aggregations of non-native Pacific oyster shell on intertidal mudflats to promote the settlement and population growth of the native Olympia oysters. Although these projects do not meet the narrow definition of restoration presented above because they involve materials that are not natural components of Olympia oyster reefs and were installed at sites in which Olympia oyster reefs have not been documented, they nevertheless create habitat for a native species and serve to promote and enhance its population. These projects are included as case-study examples in this CDP application guidance for shellfish, seaweed and other low-trophic restoration.

C. CEQA and Sequencing of CDP With Other Agency Reviews

1. California Environmental Quality Act (CEQA)

One of the regulatory requirements of the public agency responsible for issuing leases for aquaculture or marine restoration projects (either the California Fish and Game Commission, California State Lands Commission, or local port or harbor district) is compliance with the California Environmental Quality Act. As described on the Governor's Office of Planning and Research website,

> *The California Environmental Quality Act (CEQA) generally requires state and local government agencies to inform decision makers and the public about the*

potential environmental impacts of proposed projects, and to reduce those environmental impacts to the extent feasible.

As described by CDFW's website, another purpose of CEQA review is to "[i]mprove interagency coordination through early consultations, scoping meetings, notices of preparation, and State Clearinghouse review." State and local agencies frequently coordinate project review through the CEQA process, and it is common practice for Commission staff, as time and resources permit, to work with a CEQA lead agency to ensure that the project description and analysis included in the CEQA document address Coastal Act concerns and CDP review needs as much as possible. This helps ensure that the Commission will have the information it needs when a CDP application is filed and can proceed more quickly with that application. In response to industry feedback and requests made during the California Shellfish Initiative process, Commission staff have prioritized early engagement and coordination with CEQA lead agencies on aquaculture projects. This involves both informal efforts and submittal of formal comments during public comment periods to help ensure that the CEQA document includes the full range of project information and details needed by Commission staff to complete its review of a proposed project and develop a recommendation for the Commission regarding the issuance of a CDP.

Along these lines, Commission staff has provided both formal and informal feedback during the preparation of all the CEQA documents for aquaculture projects over the past decade, including the Coast Seafoods intertidal aquaculture operations (CDP No. 9-17-0646); Taylor Shellfish shellfish nursery and associated subtidal aquaculture operations (CDP No. E-11-029); Hog Island Oyster Company shellfish nursery and associated subtidal operations (CDP No. 9-13-0500); Harbor District subtidal aquaculture pre-permitting project (CDP No. 9-16-0204), the new state water bottom lease for Santa Barbara Mariculture (CDP No. E-12-012-A1), and many others. The thorough project descriptions provided in the CEQA documents for these projects significantly sped up the CDP application process and eliminated the potential for duplicative and overlapping information requirements by providing a single, publicly reviewed and vetted document in which the majority of key project details were consolidated.

However, many recent CDP applications for aquaculture operations did not include the development of a CEQA document. In most cases, these applications were submitted to address outstanding Coastal Act violations or regulatory compliance issues at existing operations, and thus did not involve CEQA review. In such cases, Coastal Commission staff must obtain all of the project details needed to complete Coastal Act review solely through the CDP application process. This can lead to a lengthy process to complete a CDP application.

In contrast, new aquaculture and marine restoration projects would be expected to require new leases from the California Fish and Game Commission (FGC), California State Lands Commission (CSLC) or a local government agency, and thus trigger the development of associated CEQA documents. Following this more typical planning and authorization pathway would significantly streamline the Commission's permitting

process and help eliminate duplicative or overlapping information requirements during permit application filing. Section VI of this guidance provides a comprehensive list of the type of information and details that can be required to file a CDP application as complete – most or all of which would typically be provided in a mitigated negative declaration or environmental impact report, if such a CEQA document is prepared. The Commission's regulations specify the types of information that the Commission needs in a permit application.[9] For example, the Commission requires evidence of landowner authorization, typically in the form of a title or lease, as well as information regarding project alternatives and mitigation measures. If the land management agency complies with CEQA by preparing a mitigated negative declaration or environmental impact report, that document would be available at the time the CDP application is filed and the Commission's review process begins, and it would contain much of the information needed by the Commission. Similarly, for activities that involve federal agency permitting, those federal agencies will likely need to complete environmental review pursuant to NEPA before approving a permit. Obtaining such federal environmental review can also assist the Commission and streamline its review of permit applications.

2. Sequencing

In addition to the Coastal Act, a number of other state and federal laws and regulations also apply to aquaculture and restoration activities carried out within California's shoreline, intertidal, and subtidal areas.[10] The majority of these regulations also typically apply to any activity (i.e. not just aquaculture and marine restoration) involving the placement of structures in California's marine environment – including the need for a lease of public tideland, authorization by the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act, and authorization by the California Regional Water Quality Control Board under Section 401 of the Clean Water Act. Some of these other agency authorizations are independent of the Commission's permitting and review process and may occur at any time. For example, the California Department of Public Health's pre-harvest and post-harvest certifications and the California Regional Water Quality Control Board's Clean Water Act Section 401 certification occur on their own timelines and can legally be issued either before or after the Commission acts on an application.[11]

A lease or similar authorization from the land management agency (FGC, CSLC, or, for legislatively granted lands, local government) and registration by CDFW (for commercial aquaculture projects), however, must generally be obtained before a CDP application can be filed and brought to the Commission for its consideration. These requirements are established in the Commission's regulations – Title 14, Section 13053.5(b) of the California Code of Regulations – which require the CDP application to include:

[9] See Title 14 of the California Code of Regulations, Section 13053.5

[10] Appendix C provides a brief summary of the agencies that implement these regulations and references sources of additional information about them.

[11] As noted above in the discussion of CDPH's pre-harvest certification process, however, for aquaculture projects that involve the cultivation of food products for human consumption, obtaining pre-harvest certification as an initial step can help prevent the pursuit of a lease for a site with public health or water quality issues.

A description and documentation of the applicant's legal interest in all the property upon which work would be performed, if the application were approved, e.g., ownership, leasehold, enforceable option, authority to acquire the specific property by eminent domain, and, if a business entity, proof of the applicant's authority to conduct business in California. The application shall also include proof that all holders or owners of any interests of record in the affected property have been notified in writing of the permit application and each invited to join as a co-applicant.

In addition to ensuring that the land owner approves of the use of its property for a project before the Commission can authorize the initiation of project construction activities, this sequencing also facilitates and streamlines the Commission's review by allowing for the development of a CEQA document that compiles most or all of the key project details needed by the Commission for its review under the Coastal Act.

Existing law also establishes the sequencing for the federal agency authorizations. Under the federal Coastal Zone Management Act, an activity proposed by a private entity must be found consistent with a state's approved Coastal Management Program before the federal agency may authorize it. Outside of San Francisco Bay, the Coastal Act serves as California's approved Coastal Management Program, and the Commission's approval of a CDP for a project demonstrates the project's consistency. Operationally, this means that for an aquaculture or marine restoration project requiring a permit from the USACE, the Commission needs to issue a CDP for the project before the USACE may issue its permit.

Despite this required sequencing for the issuance of final authorizations, a project applicant may still elect to submit applications to state and federal agencies simultaneously. This can greatly assist those agencies with interagency coordination, as described further in the following section.

D. Coordination and Consultation

As described in the previous section, aquaculture and marine restoration activities are regulated by the Commission and several other state and federal agencies. Similar to most other work involving development in the ocean, the placement of materials or installation of structures for aquaculture or marine restoration California's marine environment is regulated by a standard set of agencies under a standard set of regulations.[12] For Commission staff, this means that it can apply the same interagency coordination and consultation process to aquaculture and marine restoration that it applies to other types of development activities. As discussed above, the CEQA and NEPA (National Environmental Policy Act) processes can provide a useful framework to facilitate this coordination, but Commission staff typically carries out its own coordination efforts as well.

[12] For more information about these agencies and regulations, please refer to the Appendix C.

Although typically implemented informally, this interagency and government-to-government coordination is a critical component of the Commission's regulatory review process. For projects - including aquaculture and marine restoration - that involve construction activities and placement of structures within the marine environment, Commission staff most typically coordinates with the U.S. Army Corps of Engineers and National Marine Fisheries Service at the federal level and CDFW, the California Fish and Game Commission (or California State Lands Commission – depending on project type and leasing authority), and Regional Water Quality Control Board at the state level. Appendix C provides a brief summary description of these agencies and suggestions for sources of additional information.

Successful interagency and Tribal coordination and consultation relies on early outreach, timely sharing of relevant project information and materials, open and engaged communication and the providing of meaningful opportunities to respond and participate in the Commission's review and decision-making process. Operationally, the coordination and consultation process relies heavily on personal outreach by Commission staff to those with interest in or connection to the area of the proposed project and to agency permitting staff whose jurisdiction includes the proposed site.

This outreach typically occurs by phone or email communication and is triggered either through the receipt of a CDP application or a pre-application meeting or communication with a prospective applicant. As part of this initial outreach, Commission staff encourages prospective applicants and partner agency staff to communicate directly regarding individual agency authorizations and application processes. If other state or federal agency authorization is needed, Commission staff coordinates with that agency on timing and sequencing of decision-making, review of application materials and approaches to address potential adverse impacts associated with the project. In addition, if multiple state and federal agency authorizations are needed, it is often advantageous to set up regular coordination meetings to ensure all agency staff are working with the same information and to identify potential regulatory conflicts and solutions early in the review process. This also makes it easier for an applicant to respond to information requests and to communicate project changes to agency staff. In part to capture this interagency coordination, each Commission staff report includes a section titled "Other Agency Approvals and Consultations" that provides a summary of the consultation and coordination activities that were carried out with each entity, relevant information regarding the results of those efforts, and the status of that entity's authorization of the project, if relevant.[13]

In addition to the informal process of interagency coordination described above, there have also been circumstances where a more formal approach has been implemented.

[13] Examples of such discussions from recent staff reports for aquaculture projects (such as CDP Nos. 2-81-40-A1 and 9-18-0278) can be found on the Commission's website through use of its search function and archived agendas. See https://www.coastal.ca.gov/meetings/archive/#/.

One example is the Commission's Tribal Consultation Policy (Policy), [14] adopted in August 2018. This Policy was developed to provide a specific process for the Commission to consult and work cooperatively with Tribes. Another example is the more specific, formalized process for aquaculture projects within Tomales Bay. This process was established in 2016 as a result of concerns raised by the federal National Oceanic and Atmospheric Administration's Office of National Marine Sanctuaries regarding the introduction and cultivation of non-native shellfish species within the Greater Farallones National Marine Sanctuary (which includes Tomales Bay). The consultation process is laid out in a Memorandum of Agreement signed by the Coastal Commission, Office of National Marine Sanctuaries, CDFW and California Fish and Game Commission. It establishes specific noticing requirements and timelines triggered by the receipt of a lease or CDP application for shellfish aquaculture activities within Tomales Bay. Such processes can be effective in improving and managing multi-agency coordination.

[14] https://documents.coastal.ca.gov/assets/env-justice/tribal-consultation/Adopted-Tribal-Consultation-Policy.pdf

III. Types of Coastal Commission Authorization

Aquaculture and marine restoration projects that meet the Coastal Act definition of development and trigger the need for Commission authorization can generally be approved through one of three permitting pathways: a de minimis waiver; an administrative permit; or a coastal development permit. Details and examples of each pathway are provided below. Each type of approval begins with the submission of a CDP application. When Commission staff receives and reviews such an application, they will coordinate directly with the applicant regarding the most appropriate and efficient permitting process.

A. De Minimis Waiver

The de minimis waiver is the most streamlined of the Commission's three primary permitting processes and is reserved exclusively for projects that the Commission's Executive Director determines will be consistent with the policies of Chapter 3 of the Coastal Act and have no potential for any adverse effect, either individually or cumulatively, on coastal resources.

As described in Section 30624.7 of the Coastal Act and Sections 13238 through 13238.2 of the Commission's regulations, the Executive Director may make such a determination after review of a project's CDP application. The determination takes effect once notice of the waiver determination has been posted and it has been reported to the Commission at the next regularly scheduled Commission hearing. If, at that hearing, four Commissioners object to the Executive Director's determination, the project must be processed as a coastal development permit and heard at a future hearing. The advantages of a de minimis waiver include a smaller filing fee, a shorter review time, and an expedited public hearing. However, an important limitation of the de minimis waiver is that it cannot be amended or modified after it is issued and is thus not appropriate for projects that may change over time.

In general, de minimis waivers are appropriate for small and/or simple projects located away from sensitive coastal resources. Most aquaculture operations are relatively complex and involve a variety of protected coastal resources, and thus do not meet the requirements for a de minimis waiver. In unique situations with limited scale operations located in less sensitive areas, however, the Executive Director has determined that the standard was met, and the Commission did not object. The most recent aquaculture example was a single, 20 foot by 50 foot abalone cultivation raft installed and operated on a mooring approved by the City of Monterey within the Monterey Bay Outer Harbor (CDP No. 9-18-0246-W).

The Commission has also issued de minimis waivers for several projects involving the creation of habitat for native shellfish. Recent examples include a research project involving the placement of oyster shell within a 900 square foot area of intertidal mudflats in Alamitos Bay to create habitat for and augment populations of native oysters

(CDP No. 9-18-0946-W) and a similar, previous effort in Upper Newport Bay (CDP No. E-10-005-W).

B. Administrative Permit

Administrative permits are used for projects that have a potential to result in adverse effects to coastal resources but are limited in scope and size. Section 30624 of the Coastal Act includes specific criteria that projects must meet to qualify for an administrative permit, and the Commission's regulations describe the process for administrative permits.[15] For aquaculture and marine restoration projects, the most relevant of these criteria is that the total project cost does not exceed $100,000.[16] If that criteria is met, the Commission's Executive Director may approve the issuance of an administrative permit. Similar to de minimis waivers, if four Commissioners object to the issuance of an administrative permit, the project must be processed as a coastal development permit at a future hearing. Also similar to de minimis waivers, administrative permits require a smaller filing fee and involve a more expedited public hearing. Review time varies depending on the project.

The most recent example of an aquaculture project processed and approved as an administrative permit was for a small operation in Tomales Bay involving the installation and use of 12 shellfish cultivation rafts (CDP No. 9-19-1135). The development cost of the project was estimated at $54,000, thus qualifying it for the administrative permit process. Another recent administrative permit issued for an aquaculture project involved the experimental cultivation of kelp for three years on five small structures moored at open ocean sites off the coast of Catalina Island (CDP No. 9-16-1153). Similar to the shellfish cultivation raft operation in Tomales Bay, this proposal also fell below the $100,000 administrative permit threshold.

No recent marine restoration, enhancement and native shellfish habitat projects have been approved as administrative permits.

C. Coastal Development Permit (CDP)

The CDP process is the most common permitting process for larger, more complex projects that have a higher total development cost and a greater potential to adversely affect coastal resources. The CDP is the most robust permitting pathway available, but it also requires a lengthier review process followed by a public hearing and larger filing fee as compared to the de minimis waiver and administrative permit. The process is described in greater detail in Sections V and VI of this document.

Most aquaculture projects are processed and approved as CDPs. Recent examples include the intertidal and subtidal shellfish cultivation operations carried out in Tomales Bay by Marin Oyster Company, Hog Island Oyster Company, and Charles Friend

[15] See 14 Cal. Code Regs § 13145 et seq.
[16] Please refer to Section IV of this document for more information about the process used for calculating a project's development cost.

Oyster Company (CDP Nos. 9-18-0002-A1, 1-94-55-A1, and 1-93-073-A1). The most recent example of a marine restoration project approved through the issuance of a CDP is a project involving the installation of roughly nine acres of rocky reef off the coast of Palos Verdes (CDP No. 9-18-0629). The reef is being installed directly over natural rocky reef areas of similar compositions and configurations that were buried in recent decades by sediment from nearby landslides. These projects include large project areas, dozens of acres of cultivation areas, tens of thousands of individual cultivation structures and containers for the aquaculture operations, and include operations and structures that can affect important coastal resources such as recreational areas, fishing grounds, boating routes, and sensitive marine habitat and wildlife areas. Accordingly, these applications were subject to thorough review by the Commission and ultimately approved through the issuance of CDPs.

IV. Post-permit Changes to Project or Operation

A. Types of Permit Amendments

Once a permit (either administrative or regular) has been issued for a project, proposed modifications or changes to the authorized activity are considered through the permit amendment process. Amendments cannot result in permit requirements that lessen the level of protection afforded to coastal resources. The Commission's Executive Director is required to reject an amendment application if he or she determines that the proposed amendment would lessen or avoid the intended effect of an approved or conditionally approved permit (as further described in Section 13166(a) of the Commission's regulations).

The permit amendment process can follow one of two pathways: the immaterial amendment or material amendment. Detailed examples of each pathway are provided below. Although the amendment process applies to both aquaculture and marine restoration projects, the examples below focus solely on aquaculture projects. In recent years there have been no permit amendments applied for or issued for marine restoration projects.

1. Immaterial CDP amendment

Amendments that would not result in adverse impacts are considered immaterial amendments. As further described in Section 13166(b) of the Commission's regulations, "if the Commission's Executive Director determines that a proposed amendment has the potential for adverse impacts, either individually or cumulatively, on coastal resources or public access to and along the shoreline, the amendment shall be deemed a material amendment to the permit."

Immaterial amendments typically include minor changes to a project or operations that would not adversely affect coastal resources or would facilitate changes that increase avoidance and minimization of potential adverse impacts. As a result, immaterial amendment applications are subject to a more expedited review process that is similar to the process used for de minimis waivers. Per Section 13166(b), the Commission must send notice of the proposed immaterial amendment to interested parties, who have ten business days in which to object. If there is no objection, the amendment becomes effective. If there is an objection, the amendment must be reported to the Commission, and if three or more Commissions object to the designation of immateriality, the amendment must be processed as a material amendment.

In addition, the filing fee for immaterial amendment applications is lower than that for CDPs and material amendments.[17]

Because marine restoration and aquaculture projects are often fairly dynamic and subject to frequent changes, adjustments and improvements over time, strategic use of

[17] See 14 Cal. Code Regs § 13055

the immaterial amendment process can be an effective way of providing flexibility to the operation. For example, an immaterial amendment may be a viable option to allow the small-scale, short-term, experimental use of different cultivation techniques or materials needed to help inform decision making regarding future large-scale operations.

No immaterial amendments have been issued for marine restoration projects in recent years. Those issued for aquaculture projects include several that extended permit terms to reflect renewed or extended lease terms (CDP Nos. E-06-003-A2, E-02-005-A5, 9-16-1153-A1); two that allowed for additional paving and grading and redesign of a waste water treatment system associated with an onshore shellfish nursery (CDP Nos. 9-13-0500-A1, 9-13-0500-A2); one that allowed the cultivation of kelp for research purposes on a portion of an existing open-ocean shellfish aquaculture facility (CDP No. E-12-012-A2); and one that allowed for the relocation of cultivation structures (CDP No. 9-17-0646-A1).

2. Material CDP amendment

Material amendments are used for activities that involve large scale or major modifications or alterations to a permitted project or operation that carry with them the potential to adversely affect coastal resources. Compared to an immaterial amendment, a material amendment requires a larger filing fee, longer review process and a public hearing. Depending on the scope of the amendment, the review process can still be relatively efficient because the Commission's review will be focused on the proposed changes rather than the previously authorized activities or structures that are not proposed to be changed. This can limit the scope and complexity of the Commission's review and therefore expedite it.

Examples of aquaculture projects from recent years that followed a typical material CDP amendment process include modifications to an existing operation that involved converting approximately 11 acres from cultch on longlines to elevated basket longlines (CDP No. E-06-003-A1) and the expansion of an existing clam seed cultivation operation through the addition of ten new rafts within a new area (CDP No. E-02-005-A1).

In addition to these straightforward amendment applications, the Commission has also processed a large number of material CDP amendments for aquaculture operations in recent years as part of its effort to bring California's shellfish aquaculture industry into full compliance with the Coastal Act. However, these amendments involved complex, after-the-fact authorization of unpermitted development and were used to address ongoing Coastal Act violations. Thus, these amendments are not representative of the typical material amendment process.

B. Authorization for Repair and Maintenance Work

Section 30610 of the Coastal Act exempts certain classes and types of activities from coastal development permitting requirements. Based on this provision and its implementing regulations, improvements to, or repair and maintenance of, existing

structures are often exempt from CDP requirements. In order to qualify as repair and maintenance activity, the work can not result in an addition to, or enlargement or expansion of, the object of those repair or maintenance activities. However, improvements and repair and maintenance activities that occur in or adjacent to the water or environmentally sensitive habitat areas are not exempt because they involve a risk of substantial adverse environmental impacts.[18] Repair and maintenance of, or improvements to, most aquaculture facilities therefore will not qualify for exemptions from permitting requirements; however, there are other ways to streamline approval of such activity.

In the context of aquaculture operations, the routine and limited in-kind replacement of damaged and missing cultivation structures and equipment – and the collection and removal of gear displaced from cultivation areas – is typically described and authorized within that operation's CDP, and therefore does not trigger the need for a new CDP or CDP amendment to authorize it. Similarly, the removal and replacement of cultivation equipment during harvesting and planting activities also does not trigger new Commission review as long as that activity was described as part of the original project approved through a CDP. This is one more reason that it is important that CDP applications contain a thorough project description.

More intensive and larger scale repair and maintenance activities that are not described within an operation's CDP may require Commission authorization, however. Activities such as the removal and replacement of cultivation structures across an entire growing area, activities requiring the use of mechanized equipment such as construction barges or hydraulic hoists, or the large-scale conversion of one type of cultivation structure to another, may involve a risk of adverse impacts to the environment or public access and should be discussed with Commission staff early in the planning process. Through these discussions, Commission staff will be able to provide more targeted guidance regarding the potential need to seek additional review and authorization and project design or protective measures that could be implemented to avoid or expedite that review. It is essential that permittees who believe a certain activity is exempt from Commission review, or who are not sure whether the activity is covered by the operation's governing CDP, contact Commission staff prior to carrying out that activity. This helps prevent adverse consequences such as enforcement action or the need to seek expensive and time consuming after-the-fact authorization.

The Commission has an established process to review exemption requests in order to help prevent unintentional violations of the Coastal Act. This process involves direct communication between the requesting party and Commission staff (typically by phone or email) and may also involve follow-up questions and clarification regarding the scope and location of proposed activity. In most cases, questions regarding potentially exempted development activities can be resolved by Commission staff within a few days. However, providing as much advance notice as possible is recommended. This can prevent scheduling changes and timing conflicts in case the activity is not exempt

[18] Pub. Res. Code § 30610(b), (d) ; 15 Cal Code Regs. §§ 13252(a)(3), 13253(b).

and additional Commission review and authorization is required. For requests involving written acknowledgement of the exemption from the Commission (i.e. an exemption letter), a nominal filing fee is required and additional processing time may be needed.

C. Unpermitted Development and Non-compliance with CDPs

Development activities carried out without benefit of a CDP are considered unpermitted development and are a violation of the Coastal Act. Similarly, activities carried out in conflict with one or more CDP conditions are also considered to be violations of the Coastal Act. For example, operations or activities that extend beyond a specified permit term or outside the scope of what is described and authorized in a CDP would be considered to be violations of the Coastal Act.

Resolving a Coastal Act violation can be expensive and time consuming. The Commission has the option to address and resolve such violations administratively through after-the-fact permitting. However, Commission regulations require applications for after-the-fact development to pay two to five times the normal CDP application filing fee[19]. In situations where administrative resolution cannot be achieved, the Commission's enforcement division may pursue other types of resolution, including fines, cease-and-desist orders and mandatory restoration. The best way to avoid a costly Coastal Act violation is frequent communication with Commission staff regarding any planned work.

[19] See 14 Cal. Code Regs § 13055(d)

V. Common Areas of Coastal Act Analysis

In reviewing a CDP application, Commission staff are tasked with evaluating the proposed project's consistency with the relevant policies of Chapter 3 of the Coastal Act. Based on that evaluation, Commission staff develops a recommendation as to whether the Commission should approve the permit as submitted, approve it with conditions or modifications, or deny it. Permit conditions are developed that ensure a project will be carried out in a manner consistent with the Coastal Act. Commission staff provides its evaluation and recommendation in a written report that is provided to the applicant, public, and interested parties in advance of a public hearing. At the public hearing, Commission staff presents their evaluation and recommendation to the members of the Commission, the applicant may present information regarding its application and addressing the staff's recommendation, interested parties may comment, and the Commission deliberates and makes a decision regarding the issuance of the CDP. (As described previously, the process for administrative permits and de minimis waivers is more streamlined.) If the Commission approves the project, Commission staff is responsible for oversight to help ensure that the project is carried out consistent with what the Commission authorized and that the applicant complies with any approved permit conditions.

Each CDP application is reviewed by the Commission staff case-by-case, and the Chapter 3 Coastal Act policies that apply to a project proposal depend on the project location and potential impacts of that specific development. This section highlights some of the most common Coastal Act policy issues that arise with marine aquaculture and restoration projects and provides examples from recent Commission CDP decisions to show how the Commission has evaluated these issues under the Coastal Act. The full list of Coastal Act policies likely to be relevant to aquaculture and marine restoration projects is provided in Appendix B.

A. Eelgrass

Eelgrass (*Zostera marina*) can be found in locations targeted for in-water aquaculture or marine restoration projects. Eelgrass provides a variety of essential ecosystem functions, including primary production, predation refuge, nursery functions, physical structure, nutrient cycling, and forage. Eelgrass is a species of special biological significance under the meaning of Section 30230 of the Coastal Act, and the Commission has consistently determined that it warrants special protection under this policy. Providing eelgrass with special protection means that adverse impacts to it are to be avoided if feasible. If avoidance is not feasible, adverse impacts are to be minimized and mitigated.

In-water aquaculture or marine restoration projects can result in loss of eelgrass habitat due to shading and displacement from the installation and presence of cultivation or habitat structures and/or disturbance and damage due to their use. Some oyster aquaculture operators and proponents of native oyster restoration believe that some aspects of aquaculture and native oyster restoration may benefit eelgrass and promote

the establishment or expansion of eelgrass beds into cultivation areas. The Commission has acknowledged that the interaction between shellfish cultivation, native oyster restoration and eelgrass can be complex and includes both positive and negative components; however, the Commission has not found that the expansion of eelgrass as a result of shellfish cultivation or restoration has been conclusively demonstrated.

The Commission has a well-established history of evaluating proposed shellfish and seaweed aquaculture operations and their potential to affect eelgrass habitat. Recent examples include CDP Nos. E-06-003, 9-17-0646, 9-18-0002-A1, 9-18-0163, 9-18-0278, and 2-81-40-A1. In its evaluation of these project types, the Commission's approach has been to encourage the avoidance of potential conflicts through careful siting and spatial separation between eelgrass habitat and proposed aquaculture and native oyster habitat creation projects.

In several recent CDPs, a two-fold approach has been used to achieve this avoidance and spatial separation. The first element relies on historical habitat information and eelgrass habitat surveys of the project site carried out consistent with the survey protocols and methodologies in the National Marine Fisheries Service's California Eelgrass Mitigation Policy and Implementing Guidelines (CEMP). This habitat information is used during project development and siting in order to identify known areas of eelgrass habitat so they can be avoided by siting proposed activities in other locations.

The second element relies on additional surveys carried out immediately prior to construction or installation activities (if those activities are not carried out within the same season that the eelgrass survey was conducted). This additional, pre-construction survey is necessary because (1) eelgrass habitat can move over time and expand or contract as conditions change; and (2) aquaculture operators can sometimes take several years to fully implement permitted expansions or changes to cultivation areas. In some cases, eelgrass habitat has appeared in areas that did not support eelgrass habitat at the time a CDP was issued and the initial eelgrass survey was carried out. Two recent examples of this have occurred in Tomales Bay (CDP No. 1-94-55-A1) and Morro Bay (CDP No. 9-19-0386), where the second eelgrass survey has helped protect this important habitat.

In response to advances in scientific understanding and field observations ("lessons learned"), the Commission's approach to eelgrass protection has evolved in recent years to require the use of pre-permitting and pre-installation survey information in place of single surveys that represent only one point in time; the increasing integration and use of high resolution unmanned aerial vehicle/drone imagery to help determine when and where more rigorous surveys are necessary; and reliance on the detailed field survey methodology described in the National Marine Fisheries Service's California Eelgrass Mitigation Policy and Implementing Guidelines (CEMP) when field surveys are needed.

Research needs
The Commission staff recommends the development of a standardized methodology for using remote survey tools such as unmanned aerial vehicle ("drone") imagery to accurately map eelgrass habitat on a large scale with a fraction of the time, effort and expense required for traditional field methods. Preliminary data collected using drone technology in Tomales Bay and Humboldt Bay has been promising. If these remote techniques are to evolve and be used on a more widespread basis, standardized methodologies should be developed and supported through a comparative assessment of survey results from the same area generated using both remote techniques and the traditional field survey methods described in CEMP.

The other research question is likely to be more difficult to address but would have high practical value – a scientific evaluation of the appropriate separation or "buffer" distance to use between eelgrass habitat and different types of aquaculture and marine restoration related activities (e.g., pedestrian routes used for monitoring or field personnel access, vessel routes, cultivation areas of different types, native oyster habitat creation sites).

B. Marine Debris

Plastic in the ocean is increasingly understood to pose a threat to a wide range of marine organisms as it slowly breaks into smaller and smaller pieces over time. At each step in this process, plastic debris can be ingested by, entrap, or entangle marine wildlife, from whales, dolphins, and seals down to sea turtles, seabirds, and fish.

Marine debris associated with aquaculture is a relatively new concern. Historically, shellfish aquaculture either did not rely on cultivation gear (for example, through direct planting of loose shellfish on mudflats) or made use of natural materials such as wooden stakes that could biodegrade over time. In recent years, however, the use of plastics and off-bottom cultivation methods have grown – particularly with the introduction of plastic cultivation baskets. One California farm, for example, uses roughly 1,000 total miles of nylon rope and line and over 250,000 individual plastic mesh baskets. Some native oyster habitat creation and enhancement projects also use plastic mesh to contain oyster shell and prevent its dispersal and burial. As these cultivation practices have changed over time and gear loss has been documented, the Commission began evaluating each project's use of plastics in gear and the potential for release of plastics into the marine environment.

To address the potential for marine debris and its associated adverse impacts, the Commission has used a multi-pronged approach that focuses on the use of biodegradable materials when feasible, minimizing the release/loss of materials and maximizing the recovery of materials that are unintentionally lost. This approach is explained in the findings the Commission has made in support of several recent CDPs for aquaculture operations – including CDP Nos. 9-18-0002-A1 and 1-94-55-A1 – and memorialized through special conditions included on those CDPs.

Generally, those special conditions require operators to implement a variety of marine debris prevention and response strategies, including:

- Quarterly clean-up events coordinated with other aquaculture companies in the area and other interested parties or organizations;
- Patrolling active cultivation areas for escaped or damaged equipment as soon as safely and reasonably possible following storm or severe wind or weather events;
- Marking shellfish growing equipment (such as bags, baskets, trays, and floats) in an easily identifiable manner with the aquaculture company's name to facilitate accountability, adaptive management and aid in the return of lost equipment to the appropriate party;
- Holding an annual debris reduction training for company employees that covers how to identify materials that are loose or at risk of becoming loose, proper gear repair methods, reducing the loss of any gear type that is frequently lost or consistently found during bay cleanup and inspection activities, and reducing the amount of small plastic gear (such as zip-ties, tags and fasteners) and non-biodegradable material (such as PVC stakes and nylon or polypropylene rope);
- Prohibiting temporary storage of tools and equipment on leased tidelands and surrounding areas; and
- Carrying out regular inspections and maintenance activities to help ensure that broken, collapsed, fallen, or buried gear is fixed or removed in a timely manner.
- Removing out-of-service and abandoned aquaculture gear, structures and equipment.

Through its ongoing monitoring and condition compliance role, the Commission staff will evaluate the success of these measures and work with the industry (see Research Needs below) in developing new approaches to reducing gear loss and the release of plastic debris into the marine environment. One outstanding issue is the problem of "legacy debris" – materials left behind in marine waters by aquaculture operations that ceased years ago. The Commission staff is interested in partnering with industry operators, the California Department Fish and Wildlife and other agencies to explore opportunities to remove abandoned aquaculture equipment.

Research Needs

Needed research relevant to marine debris management includes (1) development and assessment of bio-degradable or non-plastic cultivation materials (durable enough to survive use for years in the marine environment without persisting for decades or centuries); (2) affordable gear marking systems that do not rely on the use of additional plastic materials; (3) determination of areas around aquaculture sites that naturally accumulate lost gear (due to wave, current, or wind action); and (4) operational, equipment and maintenance practices that are most successful at reducing gear loss.

C. Non-native Species

Apart from abalone cultivation, shellfish aquaculture in California relies almost exclusively on the cultivation of three non-native species, the Pacific oyster

(*Crassostrea gigas*), Mediterranean mussel (*Mytilus galloprovincialis*) and Manila clam (*Venerupis (Ruditapes) philippinarum*). These three species are included on the "List of Approved Plants and Animals That May be Propagated by Registered Aquaculturists" included in CDFW's Information Leaflet of Regulations Governing Marine Aquaculture.[20] California also has a native oyster species, the Olympia oyster (*Ostrea lurida*), that has been the focus of habitat creation and enhancement efforts in San Francisco Bay and southern California but it is not currently being cultivated commercially.

Pacific oysters are the most commonly cultivated shellfish species in California and have been the focus of increasing scrutiny in recent years by the Commission and other natural resource agencies, including NOAA's Office of National Marine Sanctuaries. In many other parts of the world where Pacific oysters are also non-native (Australia, South Africa, parts of South America and Europe) they have escaped cultivation and been able to persist in the wild. As noted by CDFW in its California Non-native Estuarine and Marine Organisms (Cal-NEMO) database,[21] this behavior poses risks to native shellfish populations. Other research indicates that the Pacific oyster can pose broader risks to marine species and environments and it is identified as an invasive species in 17 of the 66 countries where it is cultured.[22]

For many years, the dominant thinking in California was that Pacific oysters were not capable of successfully spawning and settling here (likely due to the lack of necessary water temperatures). However, surveys and research published in 2012 and 2015[23] identified persistent populations of Pacific oysters outside of cultivation on Catalina Island and from Los Angeles Harbor south to the Tijuana River Estuary. Observations have also been made in Tomales Bay, and a focused eradication effort was carried out in San Francisco Bay in the mid-2000s.[24] Research indicates that, prior to the past several years, this conspicuous species of shellfish had never before been recorded in such abundance in these locations.[25]

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[20] https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=24338&inline

[21] http://invasions.si.edu/nemesis/calnemo/SpeciesSummary.jsp?TSN=79868

[22] J Keightley, S von der Heyden & S Jackson (2015) Introduced Pacific oysters *Crassostrea gigas* in South Africa: demographic change, genetic diversity and body condition, African Journal of Marine Science, 37:1, 89-98.

[23] Crooks, J.A., K.R. Crooks and A.J. Crooks (2015). Observations of the non-native Pacific oyster (Crassostrea gigas) in San Diego County, California. California Fish and Game 101(2): 101-107; Grosholz, E., R.E. Crafton, R.E. Fontana, J. Pasari, S. Williams and C. Zabin (2012). Aquatic Invasive Species Vector Risk Assessments: An Analysis of Aquaculture as a Vector for Introduced Marine and Estuarine Species in California. University of California, Davis, Final Report to the California Ocean Science Trust & California Ocean Protection Council, July 2012, 75 pp; Grosholz, E.D., R.E. Crafton, R.E. Fontana, J. Pasari, S. Williams and C. Zabin (2015). Aquaculture as a vector for marine invasions in California. Biological Invasions 17: 1471-1484; Merkel and Associates (2015). San Diego Bay Native Oyster Restoration Plan Technical Memorandum: Current Distribution of Oysters in San Diego Bay.

[24] Cohen, Andrew (2006). Survey and Source Determination of the Exotic Oyster *Crassostrea gigas* in San Francisco Bay. San Francisco Estuary Institute.

[25] Carlton J.T. 1979. History, Biogeography, and Ecology of the Introduced Marine and Estuarine Invertebrates of the Pacific Coast of North America. Ph.D. thesis, University of California, Davis CA; Cohen, A.N., L.H. Harris, B.L. Bingham , J.T. Carlton, J.W. Chapman, C.C. Lambert, G. Lambert, J.C. Ljubenkov, S.N. Murray, L.C. Rao, K. Reardon and E. Schwindt (2005). Rapid assessment survey for exotic organisms in southern California bays and harbors, and abundance in port and non-port areas.

Given these observations and the significant habitat and species shifts continuing to occur in the ocean associated with climate change and rising sea surface temperatures, in 2015 the Commission joined with CDFW, the Fish and Game Commission, Ocean Protection Council, and California State Lands Commission to sign a Memorandum of Agreement with the National Oceanic and Atmospheric Administration's Office of National Marine Sanctuaries focused on a consultation process and analysis of adverse impacts for non-native introduced species associated with aquaculture operations within California's National Marine Sanctuaries. Additionally, the Commission has extensively reviewed available scientific research to develop a focused strategy for aquaculture projects in southern California involving the cultivation of Pacific oysters.

This strategy relies on limiting cultivation of Pacific oysters to triploids – a variety developed by the shellfish aquaculture industry that are largely sterile in order to have faster growth rates, higher meat quality, and to allow year-round harvesting. Cultivation of these types of oysters with a very limited ability to successfully reproduce and spread minimizes the potential contribution to the further establishment and spread of Pacific oysters in southern California. See the Commission staff reports or Commission findings in support of CDP Nos. E-12-012-A1 and 9-14-0489 as well as Consistency Certification No. CC-035-12 for additional information.

Research Needs

As noted in the beginning of this section, Pacific oysters are included on CDFW's list of species approved for aquaculture. Given recent research and observations that demonstrate the species' ability to escape from cultivation, the Commission staff believes it is time to re-examine the CDFW-approved species list through a scientific evaluation that includes input, recommendations and guidance from aquatic invasive species experts. Such an evaluation could be managed by the Ocean Protection Council as part of its efforts to develop a California Aquaculture Plan. A new evaluation could also expedite the environmental review process by providing the agencies with state-of-the-art information and analysis needed to support their recommendations and decisions.

In addition, the Commission staff also recommends that surveys should be carried out throughout California to determine the location and extent (spatially and by number of age classes) of wild populations of Pacific oysters. The results from this type of effort would aid in management and future decision-making by showing which areas are most susceptible to colonization by this species, which areas may already have abundant wild populations that can no longer be contained or managed, and which areas continue to be insulated from colonization.

Biological Invasions 7: 995-1002; Crooks et al. 2015; Zacherl, D., C. Fuentes, S. Briley, C. Whitecraft, T. Champieux and A. Bird (2015). Restoration of Native Oysters, *Ostrea lurida*, in Alamitos Bay, CA. Final Report. Prepared for California State Coastal Conservancy and NOAA Restoration Center, August 2015, 23 pp; Novoa A, Talley TS, Talley DM, Crooks JA, Reyns NB (2016) Spatial and Temporal Examination of Bivalve Communities in Several Estuaries of Southern California and Northern Baja California, MX. PLOS ONE 11(3): e0151727.

D. Wildlife

Previous aquaculture and marine restoration projects reviewed and permitted by the Commission have had the potential to affect a variety of types of marine wildlife, including marine mammals, shorebirds, seabirds, and fish. Potential effects to these species include disturbance, spatial exclusion, entanglement, and loss of foraging, nesting or spawning areas. For example, in its evaluation of a nearly 300 acre intertidal and subtidal shellfish cultivation operation in Humboldt Bay, the Commission evaluated potential effects to Pacific herring, longfin smelt, white and green sturgeon, black brant, and migratory shorebirds such as dunlin.

In its evaluation of a proposed reef restoration project near Palos Verdes (CDP No. 9-18-0629) as well as several offshore mussel and kelp cultivation facilities in southern California (CDP Nos. E-12-012-A1 and 9-16-1153; Consistency Certification No. CC-035-12) the Commission carefully evaluated potential entanglement risks to large whales, dolphins and other marine mammals. In its evaluation of subtidal shellfish cultivation operations in Morro Bay (CDP Nos. 9-18-0278), Tomales Bay (CDP No. 9-19-1135) and Humboldt Bay (CDP Nos. 9-13-0500 and E-02-005), the Commission considered potential effects to harbor seals and known haul-out areas due to vessel transit and cultivation activities.

These various wildlife species are marine resources required to be protected through Sections 30230, 30231 and 30233 of the Coastal Act. In particular, Section 30230 requires the Commission to provide special protection for species of special biological significance. In the past, the Commission has considered species of special biological significance to include those identified as threatened, endangered, of special concern, or provided with state and/or federal protection due to their rarity and/or role in the ecosystem.

The Commission has taken a variety of approaches to help ensure that marine restoration and aquaculture activities are carried out consistent with the Coastal Act's marine resource protection policies. These approaches have included permit conditions requiring:

- intake screens and velocity limits to prevent the entrainment and impingement of protected fish species such as larval and juvenile salmonids and longfin smelt;
- vessel management and transit plans to limit disturbances and potential injury to shorebirds, seabirds and marine mammals;
- visual inspections of culture materials for herring spawn prior to planting or harvesting during the appropriate season;
- regular maintenance inspections and repairs to prevent loose lines and materials that may pose an entanglement risk to marine mammals;
- monitoring activities to evaluate the use of cultivation areas by black brant;
- the use of marine observers and safety zones during construction and installation activities; and

- avoidance of areas in which wildlife concentrates in high densities or during sensitive life stages (for example, nesting areas or haul-outs).

For examples of the findings the Commission has made in support of these types of permit conditions, please refer to the Commission's website for CDP Nos. 9-16-0204, 9-17-0646, 9-18-0002-A1, 9-18-0629, and 9-19-0386.

To date, implementation of these measures appears to have been successful in preventing, or at least minimizing, adverse impacts to marine wildlife associated with the installation of marine restoration projects and the installation and operation of in-water aquaculture facilities.

Research Needs
With the growing interest in large-scale offshore aquaculture activities and facilities within and adjacent to large whale migration routes and consistent foraging areas (such as the three 2,000 acre operations currently proposed or in development offshore of southern California), comprehensive scientific analysis and risk management strategies for preventing marine mammal entanglement and injury are becoming increasingly critical. To date, most entanglement risk management strategies have relied on fairly simple efforts to keep facility structures taut and well maintained. However, as the size of facilities increases and challenges related to the ability of agencies to oversee condition compliance persist, other, more effective strategies may be needed. Development of such strategies and research into the efforts that have been deployed successfully in other parts of the world would be highly valuable.

E. Spatial Conflicts

The installation and presence of native shellfish habitat structures, restored habitat and aquaculture facilities has the potential to conflict with and adversely affect other uses and users of coastal and marine areas. For example, placement of aquaculture facilities or habitat structures in commercial and/or recreational fishing areas can limit those activities or increase the potential for gear entanglement, damage and loss. Additionally, facilities and structures placed within navigational routes or recreational boating areas can displace those uses. Aquaculture and monitoring activities and the placement or construction of equipment and materials can also disturb or damage cultural resources. Additionally, aquaculture facilities or restoration/habitat enhancement materials can affect or degrade coastal dependent recreational activities and resources (such as surf breaks, dive sites, and beach areas). The Coastal Act requires effects to each of these coastal uses to be considered and evaluated as part of the CDP review process (specifically, Sections 30210, 30211, 30220, 30221, 30223, 30234, 30234.5, 30244 and 30251 of the Coastal Act). However, the Coastal Act also states that oceanfront land that is suitable for aquaculture shall be protected for that use, and that such uses shall be given priority, except over other coastal dependent developments or uses (Coastal Act Section 30222.5).

To help prevent such conflicts, Commission staff strongly encourages prospective

applicants to carry out a siting analysis that includes information on these types of coastal uses and resources and to use the results of that analysis to inform decisions on which areas to consider for a proposed lease or project. In most situations, viable sites for aquaculture and marine restoration projects can be found in areas where they would not conflict with existing coastal uses.

In situations where projects are proposed for areas that support existing, non-compatible uses, the Commission typically relies on a careful consideration of the likelihood and magnitude of adverse impacts to inform its permitting decisions. Additionally, the Commission also carefully evaluates alternatives (such as alternative locations, sizes, configurations, or timings) to help balance competing uses. For example, an offshore mussel cultivation facility that was initially proposed to take up 1,000 acres within a highly used and valued commercial fishing ground was ultimately revised to be 100 acres in order to reduce conflicts with commercial fisheries (Consistency Certification No. CC-035-12). To address conflicts with recreational hunting in Humboldt Bay, the Commission approved a permit for the expansion of an intertidal shellfish aquaculture facility with the condition that the operator avoid on-water activities during the approximately three days per week in November and early December in which hunting is allowed (CDP No. 9-17-0646).

Research Needs

Informed decisions regarding the type, magnitude and likelihood of spatial use conflicts are heavily reliant on accurate and thorough information about existing uses (e.g., where they occur, when they occur, who takes part in them, and how they may be affected by a proposed activity). Although online spatial data resources such as the marine cadaster, Marine BIOS, vessel AIS databases, and the federal and state databases of commercial and recreational fishing information are constantly growing in capacity, important gaps still remain. Addressing these gaps through the addition of new, quality controlled and stakeholder reviewed data to these existing spatial analysis tools would greatly improve the Commission's ability to identify and address spatial conflicts that may be raised by the projects it reviews and authorizes.

VI. How to Complete a CDP Application

Included below is a step-by-step guide to completing a CDP application for an aquaculture or marine restoration project, including key information and materials that are commonly missing from submitted applications and explanations of key terms and sections of the CDP application form.

Please note that this section is focused primarily on more complex projects seeking new CDPs or material permit amendments and therefore the level of detail suggested – particularly in the project description section – likely would be adjusted for smaller, simpler or temporary projects seeking a de minimis waiver or immaterial amendment. Please refer to Section IV of this guidance for descriptions and examples of these two types of CDP amendments.

In addition, while this guidance is intended to be generally applicable to a wide variety of projects across the state, the diversity of the coastal environment and of aquaculture and restoration projects means that not all project-specific nuances will be captured here. Commission staff is always available to answer questions about the application and review process and to provide project-specific guidance, including through pre-application submittal meetings.

One of the most effective means of reducing duplicative or overlapping information requirements during CDP application filing is to include with that application the CEQA document prepared for the proposed project. Because well-prepared and thorough CEQA documents include detailed project descriptions, providing this document with the CDP application can replace the need to develop and provide the separate detailed project description that is described below.

A. CDP Application Form

The first step in the CDP application process is to download and review the CDP application form that serves as the backbone for the application process. This form can be found on the Commission's website by navigating to the webpage for Coastal Development Permit Applications & Appeal Forms, and following the steps to apply for a permit. For aquaculture and marine restoration projects, the appropriate form to use is the one for the Energy and Ocean Resources Program.[26] The Commission's regulations also describe the minimum information requirements for permit applications.[27]

This form includes the Division title in the header on the first page along with the address of the Commission's headquarters office in San Francisco. Once complete, the application form and all accompanying materials should be submitted via email and hard copy (to the email and physical addresses included on the front page of the

[26] https://documents.coastal.ca.gov/assets/cdp/CDP_Application_Form_Energy.pdf
[27] See 14 Cal. Code Regs § 13053.5

application form). Please note that this application form should be used for all marine aquaculture and marine restoration projects regardless of their location in the state's coastal zone. Although the Commission has local district offices throughout the state, all aquaculture and marine restoration projects are reviewed by staff of the Commission's Energy, Ocean Resources and Federal Consistency Division, which is based in its Headquarters office. Please do not submit CDP applications for aquaculture or marine restoration projects to one of the Commission's district offices (such as the offices in San Diego, Long Beach, Ventura, Santa Cruz, or Arcata).

The CDP application form includes a checklist on its first two pages and a list of required attachments on pages 9 and 10 that should be carefully reviewed and used to help ensure necessary information and materials are included with the application. The application form also includes a series of questions on pages 3 through 8 that should also be reviewed and completed, if relevant. However, because the CDP application form is a universal form used for all types of coastal development, many of these specific questions are not relevant for aquaculture or marine restoration projects. Please leave such questions blank or complete them with the statement "not applicable" or "N/A." Responding to non-applicable questions in this way will not cause the application form to be rejected or found incomplete. If there are questions about how to complete the form or whether an application includes all the necessary components, please reach out to Commission staff for guidance.

B. Project Description

For aquaculture and marine restoration projects, the project description section of the application form is the most important section.

A thorough and detailed project description is important because it allows Commission staff to accurately envision, evaluate and analyze the full range of proposed development activities and potential impacts to coastal resources. This analysis forms the basis of the Commission staff's recommendation to the Commission regarding the project and is necessary if Commission staff is to make an informed and accurate determination regarding the project's consistency with each of the relevant policies of Chapter 3 of the Coastal Act. For reference, the Chapter 3 policies typically found to be relevant for aquaculture and marine restoration projects are included in Appendix B of this guidance.

A complete project description should include detailed information on the proposed development as well as the various steps of the installation or construction process needed to implement a completed project. For projects that will result in ongoing activities, such as shellfish or seaweed cultivation or restoration projects with a research or monitoring component, it is also important for the project description to include details about these ongoing activities. For example, how often and where they're expected to occur, what they entail (for example, inspection, harvest, planting, maintenance and displaced gear collection activities) and the materials and equipment needed to support them. CDP applications for proposed development with a limited duration that

incorporates removal activities should also include detailed information on these activities in the project description.

Although the CDP application form includes several blank lines that could be used to provide a description of the project, for these types of projects a complete description requires substantially more space. Accordingly, the project description should be provided as a separate document or series of pages provided along with the application form. Examples of the project descriptions included with several types of recent aquaculture projects are included in Appendix D to this document. Although later supplemented by the applicants' responses to specific questions from Commission staff, these project descriptions provide most of the key details and are good examples of the level of detail expected for a CDP application.

1. Use of information from other sources for the project description

As noted previously in this guidance, one of the most effective ways to expedite and streamline the CDP review process is to include with the CDP application a draft or final CEQA document (such as a mitigated negative declaration or environmental impact report) prepared for the proposed project. In the vast majority of cases, the project details and descriptions provided in these documents fully meet or exceed the project description requirements of the CDP application. This is particularly true because Commission staff, as part of their interagency coordination responsibilities and commitments made during the California Shellfish Initiative process, strive to work closely with CEQA lead agencies during the development of CEQA documents so that these documents provide the key project information needed for Commission staff to review the project under the Coastal Act. If the CEQA lead agency provides information in the CEQA document that is responsive to requests from Commission staff included in comment letters prepared during the Notice of Preparation or draft CEQA document stages, there is a high likelihood that the CEQA document will meet the project description needs of the CDP application.

Other types of documents can also be included with the CDP application to provide or supplement a project description. For example, application materials prepared for permits or authorizations being sought from other agencies are a useful addition to the CDP application and can help facilitate agency coordination and eliminate duplicative questions or requests for information from multiple agencies.

For these reasons, the checklist provided on the first page of the CDP application form includes "environmental documents for the project" (including all comments and responses) and "verification of all other permits, permissions or approvals applied for or granted by other public agencies." CEQA documents and other agency application materials meet these requirements and, if provided, can ensure the timely filing of a CDP application and enhance the efficiency of staff's review of application materials.

2. Key elements for in-water aquaculture

Provided below are details of key elements to be included in a project description for in –water aquaculture projects. In addition, as described above, Appendix D provides

examples of project descriptions from several recent CDP applications. Although these project descriptions were later supplemented by the applicants' responses to questions from Commission staff, they provide many key details and are useful examples from actual projects.

Location
Location information provided with the CDP application should include maps and descriptions of both the location of the lease area (or parcel if privately owned) as well as the location of any cultivation beds proposed to be installed within that lease area/parcel. More specifically, location information should include GPS coordinates for the corners of the lease area/parcel and individual cultivation beds to facilitate spatial analysis. In addition, maps or figures should also be provided, either in hard copy form or digitally using GIS tools or simplified spatial information programs such as GoogleEarth.

Because most intertidal and subtidal aquaculture projects involve the use of a portion of a lease area/parcel, identifying only the lease area can result in confusion about the scale of proposed operations and potential effects to coastal resources. For example, a recent project in Morro Bay was initially described to include the total acreage of the lease area – over 100 acres – while the actual area proposed to be used for cultivation beds was only about 10 acres. The broader description resulted in concerns raised by a number of public agencies and environmental organizations based on a mistaken understanding that the scale of the proposed project was over ten times larger than it truly was. Clear location information can proactively address and prevent these types of misunderstandings.

Status of lease or land ownership
Applications for aquaculture projects proposed to be carried out in the marine environment should include documentation showing the status of the lease – the terms and conditions included with it, expiration date, legal description, etc. – covering the proposed project area or other evidence of ownership control.

Type and configuration of cultivation equipment
Project descriptions for in-water aquaculture operations should include narrative descriptions and figures showing the type of gear and equipment proposed to be used for cultivation, planting, and harvest activities. Because of the overlapping and conflicting terminology used by many aquaculture operators for the cultivation structures and equipment they use (i.e. the same name used for different types of gear), it is important for the project description to include representative photos or drawings of the gear and equipment proposed to be used. These figures and descriptions should also include the approximate dimensions of the gear.

The project description should also include figures or images showing how the equipment and cultivation structures would be installed within growing areas, including the number of structures and spacing between them. This information assists Commission staff in understanding how the presence and use of this equipment may

affect boating and coastal access across or around cultivation areas as well as how it may affect the biological productivity of these areas and their use by marine organisms such as fish, seabirds, shorebirds, marine mammals, benthic organisms and submerged aquatic vegetation.

Because many of the structures and materials installed in the marine environment as part of aquaculture operations are considered to be "fill,"[28] they trigger the need for specific analysis under Section 30233 of the Coastal Act, including an analysis of alternatives.[29] Accordingly, the project description should also include a description of the alternative types and configurations of cultivation equipment considered and the rationale for the selection of the proposed materials and configurations.

Species to be cultivated
The project description should also indicate the species and life stages (i.e. larvae, juvenile, adult) proposed to be cultivated – including the subspecies or strain, if relevant. A project description should also include information on whether the species to be cultivated would be capable of reproducing or not (because of life stage, triploidy, etc.).

Biological resource information
Included as part of the project description or as a stand-alone component of the CDP application, information should also be provided about the presence and location of areas of special biological significance within the project area. Examples of these areas include marine protected areas, eelgrass and other essential fish habitats, marine mammal haul-out areas, migratory routes and high use areas, seabird roosts or nesting areas, high use areas for shorebirds, areas with concentrations of threatened or endangered species, kelp forests, and rocky reefs. Because of the number and scope of Coastal Act policies focused on the protection of biological resources (for reference, see Appendix B), this information can be one of the most important elements of the CDP application. As part of the review and analysis process, Commission staff typically supplement the CDP application materials with the results of their own data gathering efforts. However, thorough information provided with the application can significantly expedite the review process. Additionally, early collection of this information can help an applicant identify potential challenges or constraints associated with a site and help guide their site selection and project design efforts in a way that increases the likelihood of an approval.

Biological resource information can be gathered from publicly accessible databases and spatial management tools. These include the CDFW MarineBIOS tool[30], the federal marine cadastre[31], maps and resource survey information provided by the Greater Farallones and Channel Islands National Marine Sanctuaries[32], the National Marine

[28] Under section 30108.2 of the Coastal Act, "fill" means earth or any other substance or material, including pilings placed for the purposes of erecting structures thereon, placed in a submerged area.
[29] Refer to the full text of this policy in Appendix B for more information on the three required elements of this analysis.
[30] https://wildlife.ca.gov/Conservation/Marine/GIS/MarineBIOS
[31] https://marinecadastre.gov/
[32] https://farallones.noaa.gov/eco/tomales/map.html

Fisheries Service's marine mammal Biologically Important Area maps[33], the United States Geological Survey's California Seafloor Mapping Program[34], and CEQA or NEPA documents prepared for the project or similar recent projects in the vicinity.

In some cases, however, critical site-specific information must be collected in-situ. For example, in cases where no recent information is available from public sources or if existing data does not provide the appropriate spatial coverage or resolution, data collection may be required. Staff from the Commission and other permitting agencies should be consulted prior to the collection of such data to help ensure it is collected in the appropriate manner and can be accepted and used for the intended purpose. While detailed protocols and methodologies are available for the collection of some types of biological resource information – for example, pages 8 through 11 of the National Marine Fisheries Service's California Eelgrass Mitigation Policy and Implementing Guidelines provide step-by-step guidance on how to carry out an eelgrass survey and present the results – other types do not have protocols that are as well established. Input and guidance from agency staff and other relevant experts can therefore prevent the wasted effort of collecting data that cannot ultimately be used or must be supplemented by additional surveys.

When collecting or compiling biological resources information for a CDP application, it is important to consider the full project area. This includes all areas proposed to be used for project activities that can affect those resources. For example, for intertidal shellfish aquaculture projects, habitat information should be provided for the proposed cultivation areas as well as the areas proposed to be used for staging activities, vessel landing and mooring, access routes to be used by project personnel and other areas that would be used for similar types of activities.

Ancillary structures or infrastructure
When relevant, a complete project description should also describe and provide information about the size, composition and location of structures and infrastructure that would connect an onshore facility to in-water operations (i.e. docks, outfall lines and/or intakes lines).

Best-management practices
The project description should include a description of all relevant best-management practices and resource protection measures proposed to be implemented by the operator/applicant as part of its operation. This information can help Commission staff develop a more accurate understanding of the potential likelihood of adverse impacts to coastal resources.

For example, the relevant best management practices may include information on the type and frequency of maintenance inspections and repair activities carried out to prevent the release of marine debris or entanglement of marine wildlife, fuel and

[33] https://cetsound.noaa.gov/important
[34] https://www.axiomdatascience.com/maps/usgs.php

hazardous material spill prevention efforts (such as the storage of a spill response kit on project vessels), measures to avoid trampling or placement of cultivation gear in eelgrass habitat, use of triploid Pacific oysters to minimize the risk of oysters escaping cultivation and establishing wild populations; and environmental awareness training for field staff.

Access and onshore support
The project description should also include a description of the type and location of proposed onshore support facilities, infrastructure and operations and a description of how access would be provided between the cultivation area and the onshore base of operations. This will help Commission staff understand and evaluate the full suite of proposed activities associated with an in-water aquaculture operation. In some cases, an onshore support site is to be located directly shoreward from the cultivation area and access would be provided by foot. In other cases, the onshore support facilities would be located several miles from the cultivation area and access provided by ocean-going vessels. Inclusion of these details in the project description allows the Commission to understand the full extent of the project area and evaluate potential effects to coastal resources throughout.

Installation
A complete project description should include not only a description of the proposed facility once fully constructed and installed, it should also include a description of how that construction and installation would be carried out. For example, the project description should include the location and size of staging areas to be used for construction materials, the duration of construction activities, and a description of proposed construction activities and equipment. In addition, for proposed facilities in high-energy environments such as open ocean areas or sites with strong tidal currents, the project description should include results of an engineering analysis to document the proposed facility's structural integrity under the full range of conditions that may occur at that site. For facilities that are proposed to be in place permanently or for extended durations, this analysis should include worst case conditions for 20-years, 50-years, or 100-years (depending on the scale and location of the facility and the appropriate engineering standards).

This type of information is important to include because for some projects, the proposed construction work raises different types of potential issues under the Coastal Act compared to the operation of the completed facility. For example, if mechanized hydraulic pile driving equipment would be used to install some elements of the project (mooring piles or cultivation structures), the Commission may need to consider potential adverse impacts to marine wildlife associated with the generation of high levels of underwater sound. Focusing solely on the operation and use of the completed facility would not include this type of analysis and therefore not provide the Commission with a complete understanding of the project's potential impacts to coastal resources.

In addition, similar to siting of project structures, staging areas and other temporary construction-related activities should be carefully sited to avoid potential adverse

impacts to sensitive habitat such as eelgrass. Often, staging areas are proposed for locations that optimally facilitate construction activities but may raise potential adverse impacts or conflicts with coastal resources. For this reason, it is important for the project description to also include a thorough description of construction activities and areas.

Planting, harvest and maintenance activities
A complete project description should also include details about the activities proposed to occur as part of routine planting, harvest and maintenance of cultivation structures. Similar to construction and installation, if planting, harvest or maintenance would involve the use of staging areas or rafts, barges or other floating work platforms, these should be discussed in the project description. The location and size of the areas or facilities should be included along with the manner in which planting, harvest and maintenance is proposed to be carried out and, if relevant, how the support structures (barges, work platforms) would be brought to and maintained in the cultivation area during use.

Relevant qualification and experience
Aquaculture in the marine environment - particularly in open ocean areas - can be very difficult to carry out successfully. Numerous unforeseen challenges may arise, and adaptation and contingency planning in advance can be critical to prevent long-lasting consequences to the operation, environment, or both. Although not a required element of the CDP application or project description, understanding the relevant experience and qualifications of a proposed operator can help the Commission understand how prepared it is to meet such challenges. Therefore, an applicant should consider including in the project description information about their experience and qualifications relevant to the project they propose to carry out.

Operational flexibility and adaptation
Although also not a required element of the CDP application or project description, operational flexibility and the ability to quickly adapt or respond to changing conditions may be facilitated and provided through the project description portion of the CDP application. For example, an application may request authorization for a range of cultivation techniques, species and equipment types that the operator may want to use in the future.

Although a more complex and expansive application that includes multiple types of equipment and species may require a longer review, it can also save time for longer duration projects by reducing or eliminating the need for permit amendments or follow-up reviews. For example, if the project description includes a proposal to use either elevated longlines, bottom bags, or cultivation racks within the same cultivation area and the CDP is approved, the operator would have the ability to switch between these methods at its discretion without needing to seek a permit amendment. Conversely, if only one of these methods was proposed and approved, conversion to another would require a CDP amendment.

The Humboldt Harbor District used this approach in its CDP application for its subtidal pre-permitting project (CDP No. 9-16-0204). The CDP was approved and future operators on the pre-permitted sites now have a large amount of flexibility to experiment with, use, and change cultivation techniques and equipment configurations over time without the need to seek permit amendments or additional authorizations.

Similar to building in operational flexibility regarding the use of different cultivation techniques and equipment, a project description could also propose contingency plans that would be implemented in response to different conditions that may arise over the lifetime of the operation. For example, plans that would be implemented in response to unproductive cultivation areas, predation by wildlife, use of cultivation structures as roosting or haul-out areas by marine mammals or seabirds, equipment failures, etc. If such plans are provided as part of the CDP application and approved as part of the CDP, an operator would be able to implement them without needing to seek a CDP amendment. This approach was used in Morro Bay for one of the intertidal oyster cultivation operations to address seabird roosting. The CDP authorized the use of specific bird deterrent techniques that can be quickly implemented when necessary. The Commission encourages this type of contingency planning to address, in advance, situations and challenges that an operator believes are likely to arise.

Responses to unexpected situations that were not addressed in advance may still be authorized by the Commission through the CDP amendment process or an emergency permit. In the case of emergency situations that require immediate action, the Commission's Executive Director has the ability to provide verbal or written authorization with a very short turnaround.[35] A follow-up CDP or CDP amendment is typically required in these emergency situations but the process allows for that application to be prepared and submitted once the immediate emergency has passed. Non-emergency situations are best handled as an amendment to the underlying permit.

3. Key elements for marine restoration, habitat creation and enhancement

While generally applicable for a wide variety of projects, the following specific details of key project description elements are most relevant for the types of small-scale restoration or habitat creation/enhancement projects the Commission has reviewed and approved in recent years. Examples of project descriptions from several such projects are included in Appendix D.

More detailed guidance on novel or large-scale projects – including "living shoreline" projects – can be provided by Commission staff as part of pre-submittal CDP application discussions. Due to the variety of designs, materials and objectives for these types of projects, it is most effective to provide guidance on a project-specific basis. However, if the number of such projects that are brought before the Commission increases in coming years, this guidance document can be updated to highlight common elements to be included in project descriptions and other specific types of CDP application guidance. Please also note that living shoreline projects may include shoreline

[35] See Coastal Act § 30624(a); 14 Cal. Code Regs § 13136 et seq.

armoring components, in addition to restoration or habitat creation elements, thereby requiring consistency with additional Chapter 3 policies not discussed in this document.

Project location
This information should include the specific location of the proposed restoration activities as well as any staging areas or support locations that would be used during installation/construction or subsequently during any monitoring or maintenance activities proposed to be carried out. For example, if the restoration site is subtidal and temporary mooring of one or more vessels or barges would be required during installation or monitoring, these mooring locations should be identified on a map of the project site along with the site of the restoration area.

Project purpose and performance criteria
Restoration projects are typically proposed with one or more specific quantitative goals (square feet or acres of restored habitat; density of target species; levels of biodiversity or species richness; etc.). Describing these goals and the performance criteria that would be used to assess progress towards achieving them are important to include in project descriptions for restoration projects.

Habitat to be created and installation methods
A project description for a marine restoration project should also include details on the type of habitat proposed to be created or installed and how that creation or installation would be accomplished. For restoration projects, it is also important to include the type and source of any material used in restoration activities. The equipment to be used to support installation activities should be described along with a description of the installation work, vessel and personnel access routes to and from the restoration site, and equipment staging and storage areas. Providing such information allows Commission staff to evaluate not only the proposed restoration but also its potential to affect coastal resources (including access and recreation activities) in adjacent and adjoining areas.

Monitoring activities
Pre- and/or post-installation monitoring is often included as part of a proposed restoration project as a way to document success and identify challenges that may trigger contingency plans or adaptive management activities. The type, frequency, duration and methodologies to be used for such monitoring work should be included in the project descriptions for restoration and habitat creation/enhancement projects.

Performance thresholds and contingency plans
Building on the information provided about monitoring activities, details should also be provided about any performance thresholds proposed to be used to gauge success and failure and guide the implementation of contingency plans or adaptive management measures. For example, if colonization by non-native species is to be evaluated as part of a native oyster habitat creation effort, the level of such colonization (or species involved) that would trigger implementation of contingency measures should be described. Similarly, if burial, erosion or displacement of created habitat is to be

evaluated and used to trigger remedial actions, the trigger points should be included with the project description.

Further, the contingency plans or measures proposed to be implemented in response to these unintentional but foreseeable situations should also be included with the project description. This helps encourage contingency planning during project design and permitting review and can also streamline implementation of adaptive management measures by allowing them to be integrated in advance into the initial CDP rather than through a subsequent CDP amendment. Although not all contingencies can be planned for in advance, many of the most likely or common situations can be predicted and addressed during project development.

Biological resource information
Similar to in-water aquaculture projects, information about the presence and location of sensitive biological resources in the project area should be provided with the CDP application for restoration projects – either as part of the project description or as a separate document.

C. Contact List for Interested Parties

In addition to the project description, a key part of the CDP application is the contact list of parties that own property adjacent to the project site or are known to be interested in the proposed activities and stamped addressed envelopes. Specifically, the CDP application should list the names and addresses for all 1) applicants, 2) agents that may be assisting with the application, 3) property owners and property occupants within 100 feet of the proposed development, excluding roads, 4) interested persons (e.g. neighborhood groups, non-governmental organizations), and 5) other government agencies with jurisdiction or interest in the project (for example, the leasing agency/entity, USACE, Water Boards, CDFW, etc.). When available, email addresses can also be provided, and are in fact preferred, in lieu of mailing addresses.

In addition to the contact list, stamped envelopes should also be provided and addressed to all the parties included on the contact list. The envelopes should not include return addresses since Commission staff will add those at the time they are used for mailing hearing notices. Envelopes do not need to be submitted for contacts where an email address is provided.

The contact list and accompanying envelopes are used to provide notification to property owners and interested parties when the subject CDP application is scheduled for the Commission's consideration at a public hearing. To help ensure adequate noticing, applicants should strive to be as expansive and inclusive as possible when developing the contact list of interested parties.

D. Filing Fees

To file the CDP application, the application package must include a check, made out to the California Coastal Commission, in the amount specified in the fee schedule provided

as Appendix E to the application form. Aquaculture and restoration projects should use the fee based on the total "development cost" in Part II(B) of the fee schedule.

To calculate the total development cost, an applicant should include an estimate of all expenditures, including the cost for planning, engineering, architectural, and other services, the cost of construction, and any other expenses necessary to implement the proposed project. Materials to be purchased to construct, install and carry out the proposed development (such as cultivation gear or habitat materials) should be included in the calculation of project cost. Once the total cost is estimated, the Fee Schedule should be used to find the appropriate development cost range and the corresponding fee amount.

When calculating the CDP application filing fee for projects involving placement of materials in intertidal or subtidal marine areas, an additional fee for "fill" may also be required. As defined in Section 30108.2 of the Coastal Act, "fill" means earth or any other substance or material, including pilings placed for the purposes of erecting structures thereon, placed in a submerged area. If the project would result in the placement of more than 50 cubic yards of fill, the additional fee described in Section III of the fee schedule should be provided.

The fee schedule also includes fees for other types of authorizations including amendments, administrative permits, de minimis waivers and written exemptions. For material CDP amendments, the filing fee is calculated as 50% of the regular CDP fee. The total filing fee is calculated by taking the total project cost, calculated as described above, and determining the corresponding filing fee in the current fee schedule, and then reducing the fee by 50%.

A fee multiplier is required for all applications for "after-the-fact" development—i.e., development that occurred without benefit of a CDP. For these types of projects, the application fee based on development cost should be calculated as described above and in Appendix E to the CDP application form and then multiplied by five.

Finally, please note that all filing fees are readjusted annually for inflation on July 1. For this reason, it is important to review the CDP application form from the Commission website[36] shortly before submittal to confirm filing fee amounts.

E. Public Notice

In addition to the hearing notice that is mailed or emailed to the parties included on the contact list provided with the CDP application, an applicant is also required to complete and post a physical notice at the proposed project site or a nearby publically accessible location. For projects located in the marine environment, appropriate posting locations include nearby coastal access points, harbors, marinas, or beach and coastal parking lots. Notices should not be posted in the ocean or on private property areas not

[36] https://documents.coastal.ca.gov/assets/cdp/CDP_Application_Form_Energy.pdf

accessible by the public.

In completing the public notice, the CDP application number should be provided, if available. If the application number is not available (for example, because the application has yet to be submitted and assigned an application number), it may be posted with just a brief description of the project, including the project location and scope. This description should provide sufficient detail to allow Commission staff to identify the project based on its description on the notice.

Alternatively, the notice may be posted after the application is submitted and assigned an application number. If this approach is used, the signed declaration of posting – provided as Appendix D to the CDP application form – should be provided to Commission staff once posting has been completed.

F. Evidence of Landowner Authorization

The CDP application form should also include a copy of the lease, deed or title to the proposed project property in order to demonstrate to the Commission that the applicant is authorized to use that property for the proposed project.

G. CDP Amendment Application and Review Process

The process of applying for a CDP amendment follows the same general outline as the process described above for new applications. In other words, it begins with completion of the CDP application form, relies heavily on the information included in the project description portion of the form, and includes submittal of the ancillary application materials such as evidence of public notice, contact list and stamped, addressed envelopes. However, the CDP amendment process can be more expedited and efficient. Because immaterial amendment projects are typically minor in nature, the amount of detail needed to complete the application process is significantly less than that required for a material amendment or new CDP. Additionally, if the CDP to be amended was issued recently and some or all of the application materials are still available and relevant (such as the contact list of interested parties, evidence of landowner authorization, CEQA document, etc.), these materials may be pulled from the original CDP application and resubmitted with the amendment application, thus eliminating the need to gather and organize the same materials again.

VII. Application Review and Permitting Timeline

CDP Application Filing
The Coastal Act and the Commission's regulations establish certain deadlines for the review of CDP applications and scheduling of public hearings for the Commission to consider them. The first set of deadlines are for Commission staff to review the CDP application and make a determination regarding completeness of the application.

As described in Section 13056(b) of the Commission's regulations, Commission staff has up to 30 calendar days after receiving an application to determine whether the application is complete.

If a CDP application is found to be incomplete, the applicant is notified and provided with a list of materials or information needed to complete the application. Once the applicant submits these additional materials, Commission staff has an additional 30 calendar days to make a filing determination.

Once a CDP application is determined to be complete, the Permit Streamlining Act requires Commission staff to bring it forward for the Commission's consideration within 180 days.[37] This deadline may be extended a maximum of 90 days by agreement between the applicant and Commission staff.

Application Review Period
In general, the review period for a typical aquaculture or marine restoration project can range from one to two months to several years. This timeline is driven by several factors, but often comes down to how quickly an applicant provides a thorough response to requests for additional information during the completeness review. Commission staff is required to adhere to the deadlines provided in the Commission's regulations and the Permit Streamlining Act. Applicants are not bound by these requirements and thus can take as little or as much time as needed to provide the required information. The most effective way to reduce Commission staff's review time is to submit a thorough and organized application that includes all the required elements as described in Section VI of this guidance.

Additional factors that can affect timing of application review include the complexity of the proposed project, the number and type of potential coastal resource issues it raises, an applicant's flexibility in working with Commission staff on collaborative problem solving, and other existing or prior workload commitments of Commission staff. In general, and particularly for larger or more controversial projects, Commission staff tries to schedule hearings on CDP items in a somewhat local venue so that applicants and other interested parties do not have to travel as far to come to the hearing. The Commission meets once a month in different locations across the state; thus, Commission staff may sometimes wish to expedite a permit or to push it back slightly in order to be able to bring it to a local hearing. In making such a determination, Commission staff would discuss the matter with an applicant.

[37] Cal. Government Code § 65920 et seq.

As described in Section V, other types of approvals generally have shorter review timelines. Based on the three de minimis waivers that have been issued for native shellfish habitat creation projects and the one waiver issued for an aquaculture project, the average review period (from an application being filed as complete to Commission approval) is 74 days.

Only two administrative permits have been issued for aquaculture or restoration projects in the past five years (CDP Nos. 9-16-1153 and 9-19-1135). The total approval processes for these permits were 168 days and 160 days, respectively.

The table below includes a representative sampling of 12 permits processed by the Commission over the past 6 years out of a total of close to two dozen and the total review time for each permit. The review period covers the time period between filing of a complete application and a Commission hearing. Based on these 12 applications, the average review period for a CDP for aquaculture or marine restoration is 138 days. The shortest review and approval was completed in 33 days and the longest took 220 days.

CDP No.	**Date Filed**	**Date Approved**	**Total Days**
9-13-0500	11.27.13	03.13.14	106
9-16-0204	05.26.16	11.04.16	163
9-18-0002-A1	04.06.18	05.09.18	33
9-18-0278	04.10.18	11.09.18	213
E-12-012-A1	05.21.18	07.13.18	54
9-18-0163	07.30.18	03.07.19	220
2-81-40-A1	09.19.18	02.08.19	143
2-84-2-A1	09.19.18	02.08.19	143
2-84-10-A1	09.19.18	02.08.19	143
1-94-55-A1	09.19.18	02.08.19	143
9-18-0629	12.19.18	05.09.19	151
9-19-0386	06.18.19	12.13.19	178
		Average	**138**

Appendix A

Public Resource Code Section 30612.5:

(a) By December 31, 2020, the commission, in consultation with the Department of Fish and Wildlife, any other state agency relevant to coastal permitting, and stakeholders, shall develop guidance for applicants for coastal development permits for shellfish, seaweed, and other low-trophic mariculture production and restoration.
(b) Guidance developed pursuant to this section has the following purposes:
(1) To reduce duplicative or overlapping information requirements during permit application filing.
(2) To increase state and federal agency coordination.
(3) To increase regulatory certainty.
(4) To reduce the time and cost associated with securing a coastal development permit, to the extent possible.
(c) Guidance developed pursuant to this section shall include, but is not limited to, all of the following:
(1) A list of elements required in a project description.
(2) Projected permit approval timelines.
(3) A description of how permits can provide the flexibility to allow growers to adapt to new methods.
(4) Examples of operational changes that could qualify for expedited review, for example, a de minimis waiver or an immaterial permit amendment.
(5) A description of growing methods and techniques that have been approved by the commission and the contexts associated with those approvals.
(6) A process for incorporating data from comparable growing areas.
(d) This section shall remain in effect only until July 1, 2021, and as of that date is repealed.

Appendix B

Relevant Coastal Act Provisions[38]

30100.2. "Aquaculture" means a form of agriculture as defined in Section 17 of the Fish and Game Code. Aquaculture products are agricultural products, and aquaculture facilities and land uses shall be treated as agricultural facilities and land uses in all planning and permit-issuing decisions governed by this division.
(Amended by Stats. 1983, Ch. 131, Sec. 30. Effective June 27, 1983.)

30210. In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.
(Amended by Stats. 1978, Ch. 1075.)

30211. Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.
(Amended by Stats. 1976, Ch. 1331.)

30212. (a) Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where (1) it is inconsistent with public safety, military security needs, or the protection of fragile coastal resources, (2) adequate access exists nearby, or (3) agriculture would be adversely affected. Dedicated accessway shall not be required to be opened to public use until a public agency or private association agrees to accept responsibility for maintenance and liability of the accessway.
(b) For purposes of this section, "new development" does not include:
(1) Replacement of any structure pursuant to the provisions of subdivision (g) of Section 30610.
(2) The demolition and reconstruction of a single-family residence; provided, that the reconstructed residence shall not exceed either the floor area, height or bulk of the former structure by more than 10 percent, and that the reconstructed residence shall be sited in the same location on the affected property as the former structure.
(3) Improvements to any structure which do not change the intensity of its use, which do not increase either the floor area, height, or bulk of the structure by more than 10 percent, which do not block or impede public access, and which do not result in a seaward encroachment by the structure.
(4) The reconstruction or repair of any seawall; provided, however, that the reconstructed or repaired seawall is not seaward of the location of the former structure.

[38] These provisions are listed as they exist as of the date of issuance of this guidance but should not be relied on as the official version of the law. Before relying on these provisions in the future, applicants should check current statutory language to see if there have been any amendments to the provisions.

(5) Any repair or maintenance activity for which the commission has determined, pursuant to Section 30610, that a coastal development permit will be required unless the commission determines that the activity will have an adverse impact on lateral public access along the beach.
As used in this subdivision, “bulk” means total interior cubic volume as measured from the exterior surface of the structure.
(c) Nothing in this division shall restrict public access nor shall it excuse the performance of duties and responsibilities of public agencies which are required by Sections 66478.1 to 66478.14, inclusive, of the Government Code and by Section 4 of Article X of the California Constitution.
(Amended by Stats. 1983, Ch. 744, Sec. 1.)

30220. Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.
(Added by Stats. 1976, Ch. 1330.)

30221. Oceanfront land suitable for recreational use shall be protected for recreational use and development unless present and foreseeable future demand for public or commercial recreational activities that could be accommodated on the property is already adequately provided for in the area.
(Amended by Stats. 1978, Ch. 380.)

30222. The use of private lands suitable for visitor-serving commercial recreational facilities designed to enhance public opportunities for coastal recreation shall have priority over private residential, general industrial, or general commercial development, but not over agriculture or coastal-dependent industry.
(Added by Stats. 1976, Ch. 1330.)

30222.5. Oceanfront land that is suitable for coastal dependent aquaculture shall be protected for that use, and proposals for aquaculture facilities located on those sites shall be given priority, except over other coastal dependent developments or uses.
(Amended by Stats. 2006, Ch. 538, Sec. 589. Effective January 1, 2007.)

30223. Upland areas necessary to support coastal recreational uses shall be reserved for such uses, where feasible.
(Added by Stats. 1976, Ch. 1330.)

30224. Increased recreational boating use of coastal waters shall be encouraged, in accordance with this division, by developing dry storage areas, increasing public launching facilities, providing additional berthing space in existing harbors, limiting non-water-dependent land uses that congest access corridors and preclude boating support facilities, providing harbors of refuge, and by providing for new boating facilities in natural harbors, new protected water areas, and in areas dredged from dry land.
(Added by Stats. 1976, Ch. 1330.)

30230. Marine resources shall be maintained, enhanced, and, where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.
(Added by Stats. 1976, Ch. 1330.)

30231. The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface waterflow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.
(Added by Stats. 1976, Ch. 1330.)

30232. Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur.
(Added by Stats. 1976, Ch. 1330.)

30233. (a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:
(1) New or expanded port, energy, and coastal-dependent industrial facilities, including commercial fishing facilities.
(2) Maintaining existing, or restoring previously dredged, depths in existing navigational channels, turning basins, vessel berthing and mooring areas, and boat launching ramps.
(3) In open coastal waters, other than wetlands, including streams, estuaries, and lakes, new or expanded boating facilities and the placement of structural pilings for public recreational piers that provide public access and recreational opportunities.
(4) Incidental public service purposes, including, but not limited to, burying cables and pipes or inspection of piers and maintenance of existing intake and outfall lines.
(5) Mineral extraction, including sand for restoring beaches, except in environmentally sensitive areas.
(6) Restoration purposes.
(7) Nature study, aquaculture, or similar resource-dependent activities.
(b) Dredging and spoils disposal shall be planned and carried out to avoid significant disruption to marine and wildlife habitats and water circulation. Dredge spoils suitable

for beach replenishment should be transported for these purposes to appropriate beaches or into suitable longshore current systems.
(c) In addition to the other provisions of this section, diking, filling, or dredging in existing estuaries and wetlands shall maintain or enhance the functional capacity of the wetland or estuary. Any alteration of coastal wetlands identified by the Department of Fish and Game, including, but not limited to, the 19 coastal wetlands identified in its report entitled, “Acquisition Priorities for the Coastal Wetlands of California”, shall be limited to very minor incidental public facilities, restorative measures, nature study, commercial fishing facilities in Bodega Bay, and development in already developed parts of south San Diego Bay, if otherwise in accordance with this division.
For the purposes of this section, “commercial fishing facilities in Bodega Bay” means that not less than 80 percent of all boating facilities proposed to be developed or improved, where the improvement would create additional berths in Bodega Bay, shall be designed and used for commercial fishing activities.
(d) Erosion control and flood control facilities constructed on watercourses can impede the movement of sediment and nutrients that would otherwise be carried by storm runoff into coastal waters. To facilitate the continued delivery of these sediments to the littoral zone, whenever feasible, the material removed from these facilities may be placed at appropriate points on the shoreline in accordance with other applicable provisions of this division, where feasible mitigation measures have been provided to minimize adverse environmental effects. Aspects that shall be considered before issuing a coastal development permit for these purposes are the method of placement, time of year of placement, and sensitivity of the placement area.
(Amended by Stats. 2006, Ch. 294, Sec. 1. Effective January 1, 2007.)

30234. Facilities serving the commercial fishing and recreational boating industries shall be protected and, where feasible, upgraded. Existing commercial fishing and recreational boating harbor space shall not be reduced unless the demand for those facilities no longer exists or adequate substitute space has been provided. Proposed recreational boating facilities shall, where feasible, be designed and located in such a fashion as not to interfere with the needs of the commercial fishing industry.
(Added by Stats. 1976, Ch. 1330.)

30234.5. The economic, commercial, and recreational importance of fishing activities shall be recognized and protected.
(Added by Stats. 1991, Ch. 802, Sec. 2.)

30240. (a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.
(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.
(Amended by Stats. 1991, Ch. 285, Sec. 4.)

30244. Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.
(Added by Stats. 1976, Ch. 1330.)

30250. (a) New residential, commercial, or industrial development, except as otherwise provided in this division, shall be located within, contiguous with, or in close proximity to, existing developed areas able to accommodate it or, where such areas are not able to accommodate it, in other areas with adequate public services and where it will not have significant adverse effects, either individually or cumulatively, on coastal resources. In addition, land divisions, other than leases for agricultural uses, outside existing developed areas shall be permitted only where 50 percent of the usable parcels in the area have been developed and the created parcels would be no smaller than the average size of surrounding parcels.
(b) Where feasible, new hazardous industrial development shall be located away from existing developed areas.
(c) Visitor-serving facilities that cannot feasibly be located in existing developed areas shall be located in existing isolated developments or at selected points of attraction for visitors.
(Amended by Stats. 1979, Ch. 1090.)

30251. The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting.
(Added by Stats. 1976, Ch. 1330.)

30252. The location and amount of new development should maintain and enhance public access to the coast by (1) facilitating the provision or extension of transit service, (2) providing commercial facilities within or adjoining residential development or in other areas that will minimize the use of coastal access roads, (3) providing nonautomobile circulation within the development, (4) providing adequate parking facilities or providing substitute means of serving the development with public transportation, (5) assuring the potential for public transit for high intensity uses such as high-rise office buildings, and by (6) assuring that the recreational needs of new residents will not overload nearby coastal recreation areas by correlating the amount of development with local park acquisition and development plans with the provision of onsite recreational facilities to serve the new development.
(Added by Stats. 1976, Ch. 1330.)

30253. New development shall do all of the following:

(a) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.
(b) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs.
(c) Be consistent with requirements imposed by an air pollution control district or the State Air Resources Board as to each particular development.
(d) Minimize energy consumption and vehicle miles traveled.
(e) Where appropriate, protect special communities and neighborhoods that, because of their unique characteristics, are popular visitor destination points for recreational uses.
(Amended by Stats. 2008, Ch. 179, Sec. 187. Effective January 1, 2009.)

30255. Coastal-dependent developments shall have priority over other developments on or near the shoreline. Except as provided elsewhere in this division, coastal-dependent developments shall not be sited in a wetland. When appropriate, coastal-related developments should be accommodated within reasonable proximity to the coastal-dependent uses they support.
(Amended by Stats. 1979, Ch. 1090.)

30411. (a) The Department of Fish and Wildlife and the Fish and Game Commission are the principal state agencies responsible for the establishment and control of wildlife and fishery management programs and the commission shall not establish or impose any controls with respect thereto that duplicate or exceed regulatory controls established by these agencies pursuant to specific statutory requirements or authorization.
(b) The Department of Fish and Wildlife in consultation with the commission and the Division of Boating and Waterways within the Department of Parks and Recreation, may study degraded wetlands and identify those which can most feasibly be restored in conjunction with development of a boating facility as provided in subdivision (a) of Section 30233. Any study conducted under this subdivision shall include consideration of all of the following:
(1) Whether the wetland is so severely degraded and its natural processes so substantially impaired that it is not capable of recovering and maintaining a high level of biological productivity without major restoration activities.
(2) Whether a substantial portion of the degraded wetland, but in no event less than 75 percent, can be restored and maintained as a highly productive wetland in conjunction with a boating facilities project.
(3) Whether restoration of the wetland's natural values, including its biological productivity and wildlife habitat features, can most feasibly be achieved and maintained in conjunction with a boating facility or whether there are other feasible ways to achieve these values.
(c) The Legislature finds and declares that salt water or brackish water aquaculture is a coastal-dependent use which should be encouraged to augment food supplies and to further the policies set forth in Chapter 4 (commencing with Section 825) of Division 1. The Department of Fish and Wildlife may identify coastal sites it determines to be appropriate for aquaculture facilities. If the Department of Fish and Wildlife identifies

these sites, it shall transmit information identifying the sites to the commission and the relevant local government agency. The commission and, where appropriate, local governments shall, consistent with the coastal planning requirements of this division, provide for as many coastal sites identified by the Department of Fish and Wildlife for any uses that are consistent with the policies of Chapter 3 (commencing with Section 30200).

(d) Any agency of the state owning or managing land in the coastal zone for public purposes shall be an active participant in the selection of suitable sites for aquaculture facilities and shall make the land available for use in aquaculture when feasible and consistent with other policies of this division and other law.

(Amended by Stats. 2016, Ch. 86, Sec. 259. (SB 1171) Effective January 1, 2017.)

Appendix C

Additional Guidance Resources and Information on Other Agencies

Existing Regulatory Information and Guidance
In preparing this guidance document, Commission staff have sought to fulfil the requirements of SB 262, which is specifically focused on the CDP application process. Several stakeholders engaged in this process have also expressed the desire to have comprehensive guidance covering all agency requirements and processes. Commission staff agrees that this would be useful and is hopeful that this guidance can contribute to future comprehensive guidance. Additionally, the information in this appendix has been compiled by Commission staff to direct stakeholders to the comprehensive guidance resources and details regarding other agency regulations and review processes that are currently available. Those seeking this type of information are encouraged to seek out the documents and reports described below.

The permits, certifications, leases, and other authorizations issued by the various agencies that have a role in regulating aquaculture in California are publicly available and provide a wealth of information about each agency's regulations and the scope of their review processes. In addition, several environmental review documents have been developed for aquaculture projects in recent years that include specific sections on the overall regulatory setting for the project (in other words, a recitation of the various permits and regulations that apply to it). Additionally, these public documents often generate detailed comment letters from the various state and federal agencies that regulate aquaculture and other types of development activities in California's marine environment. One such document, the Environmental Impact Report (EIR) prepared by the Humboldt Bay Harbor, Recreation, and Conservation District for the Coast Seafoods Permit Renewal and Expansion Project remains available online[39] along with the full suite of comment letters submitted on it by state and federal agencies. These letters typically begin with a summary of the commenting agency's authority and references to the regulations it is tasked with implementing. As such, both the EIR for Coast Seafoods and the comment letters on it provide a wealth of information regarding agency roles and authorities for those interested in additional details.

Further, it should be noted that aquaculture permitting and regulations in California have been the focus of interest and significant effort by both public agencies and private parties over the past decade. Numerous papers and reports have been developed to clarify and described existing regulations and to facilitate increased development and responsible siting. For example, in 2018, the aquaculture advocacy group, Greenwave, released a document titled "Guidelines for California Ocean Farm Permit Approval." These guidelines were developed with input from agency staff and publicly available permit information and include tables and detailed information showing permitting agencies, contact information, regulations, timelines, and projected costs.

[39] http://humboldtbay.org/coast-seafoods-company-humboldt-bay-shellfish-aquaculture-permit-renewal-and-expansion-project

These guidelines built on similar efforts from prior years, including the *2015 California Aquaculture Law Symposium* convened by the National Sea Grant Law Center and the Resnick Program for Food Law and Policy at the UCLA School of Law and the *Methodology for Identifying and Evaluating Shellfish Mariculture Site Development in California* written by Mike Wilson, P.E. and Annalisa Batanides, Esq. in 2016 and published in the open access Sea Grant Law and Policy Journal. This paper provides a thorough examination of aquaculture siting and regulations using examples and case studies from Humboldt Bay and makes a variety of recommendations for facilitating aquaculture development through the use of "pre-feasibility" analyses and implementation of the "pre-permitting" model[40] developed by the Humboldt Bay Harbor, Recreation, and Conservation District (Harbor District).

In addition to the permitting and siting guidelines that have been developed in recent years, the California Shellfish Initiative also focused extensively on providing the aquaculture industry and those interested in native shellfish restoration with information and clarity regarding applicable regulations in California. At the request of the Pacific Shellfish Grower's Association, senior staff from nine state and federal agencies engaged in series of meetings, workshops and discussions referred to as the California Shellfish Initiative over the course of four years (2013-2017). During this process, many hours were dedicated to providing the industry and stakeholders with information about the various regulations that apply to aquaculture operations in California's marine environment, including the scope of these regulations, their legal basis, and the process of seeking and obtaining the authorizations they require. Information from this process was compiled and provided to participants and a number of documents were selected by the Pacific Shellfish Grower's Association for publication on its website[41].

In addition to its efforts as part of the California Shellfish Initiative process, the California Department of Fish and Wildlife (CDFW) also took further steps to provide the aquaculture industry with regulatory information and guidance. These steps were also taken to meet the legislative mandate of the "aquaculture coordinator" position established through Section 15100 of the Fish and Game Code. As described in subpart (c) of that section, one of the required duties of California's aquaculture coordinator position is to "Provide information on all aspects of regulatory compliance to the various sectors of the aquaculture industry." It is Commission staff's understanding that to meet this requirement, the aquaculture coordinator established the online "Permit Guide to Aquaculture in California" several years ago and provided it on the CDFW's

[40] In this novel approach, a public agency, in this case the Harbor District, worked with state and federal agencies to obtain the full suite of regulatory authorizations for aquaculture development at specific sites, with the intent of marketing leases (that included those other authorizations) directly to smaller growers that were assumed to be having a difficult time starting up. Despite the Harbor District's efforts to develop and successfully complete this pre-permitting process for over 20 acres in Humboldt Bay, to date, only a small portion of this area has received interest from aquaculturists in the four years since it was established.

[41] https://pcsga.org/shellfish-initiative/

"Aquaculture Matters" website[42], an online resource dedicated entirely to facilitating aquaculture development in California.

Staff from the Commission and its state and federal agency partners assisted in the development of this online permit guide and provided the content it includes. This general permit guide and the aquaculture coordinator position directly responds to the desire for detailed information about the regulations that apply to aquaculture development in California.

Finally, it is also worth noting that two more recently initiated efforts by the CDFW and California Ocean Protection Council (OPC) appear to be additionally responsive to the desire for information about aquaculture regulations in California. In particular, the Aquaculture Information Report presented at the June 2020 meeting of the Fish and Game Commission includes a chapter dedicated to providing an "overview of current primary national and state policies and management authorities for current marine aquaculture operations and activities that may occur within state waters." This chapter includes a discussion and table of the relevant state and federal agencies, their jurisdictions, and statutory authorities. While this document already includes a significant amount of information, any gaps that it has that are not filled by the previously developed guidance documents, reports, papers, and workshop and symposium summary materials described above could be addressed in a future version of the Aquaculture Information Report.

The OPC is also just beginning its own broad effort to establish and develop an "Aquaculture Plan" for California. While the scope of this effort is currently being discussed, it may be an additional opportunity for general information about aquaculture regulations in California to be compiled and presented.

Other Agency Roles

In addition to the Coastal Act, a number of other state and federal regulations also apply to aquaculture and restoration activities carried out within shoreline, intertidal, and subtidal areas within California. These regulations focus on the private commercial use of public tidelands, the placement of materials and structures within waters used for navigation, the harvest and sale of food products, and the protection of environmental resources such as habitats and wildlife. The recently released draft version of the Aquaculture Information Report prepared by the California Department of Fish and Wildlife (CDFW), includes a thorough list and table showing these different regulations and the state and federal agencies that are tasked with enforcing them. In addition, the general Permit Guide to Aquaculture in California on CDFW's dedicated aquaculture website[43] includes additional information about these agencies and regulations, including contact information for staff to reach out to for additional information. Included below is a brief description of the key agencies that regulate aquaculture in California. For additional information about the scope and focus of these agencies' regulations and

[42] https://permits.aquaculturematters.ca.gov/Permit-Guide
[43] https://aquaculturematters.ca.gov

application processes, please refer to the resources prepared by CDFW or reach out to agency staff directly.

Please also note that with the exception of CDFW's aquaculture registration and importation requirements and the California Department of Public Health's food safety regulations, any activity involving the placement of structures in California's marine environment would be subject to the same regulations.

California Department of Fish and Wildlife (CDFW)
As stated on CDFW's marine aquaculture website[44]:

> *CDFW is the lead agency for leasing and permitting of marine aquaculture on state and private water bottoms in bays and estuaries, and ensures that marine resources and essential habitat are protected. In California, marine aquaculture for commercial purposes is currently limited to oysters, abalone, clams, and mussels.*
>
> [CDFW] *staff is responsible for the following tasks:*

- *Review and set terms and conditions for all marine importation permits, broodstock collection permits, and aquaculture registration forms*
- *Maintain the State marine aquaculture production database, administer annual proof-of-use reporting, and maintain lease rental and production tax records*
- *Provide assistance with lease renewal process for aquaculturists and negotiate lease terms and conditions*
- *Develop recommendations for Fish and Game Commission action*
- *Draft responses to referral letters*
- *Review aquaculture CEQA documents, provide aquaculture expertise and coordinate with Marine Region Environmental Services, CDFW Legal Services, other CDFW -Regions, and other state and federal agencies*
- *Coordinate and assist the Marine Region Shellfish Health Laboratory for eradication of sabellid worm infestation in commercial abalone hatcheries and aquaria, and implement the Sabellid-Free Certification Program*
- *Coordinate disease and health certification for shellfish and other imported animals*

For more information about CDFW's specific responsibilities related to marine aquaculture, please refer to the documents available on its website focused on (1) regulations governing leasing of state water bottoms for aquaculture[45]; (2) regulations governing marine aquaculture[46]; and (3) regulations governing proof-of-use reports for aquaculture leases[47].

[44] https://wildlife.ca.gov/Conservation/Marine/ABMP/Aquaculture
[45] https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=27450&inline
[46] https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=24338&inline
[47] https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=24619&inline

For marine restoration projects, CDFW can take a slightly different role, depending on the type and location of project. For example, projects located within state-designated Marine Protected Areas and/or involving the collection of wild shellfish or seaweed may trigger the need for a Scientific Collecting Permit from CDFW's Marine Region.

California Fish and Game Commission (FGC)

Although it works in close partnership with and is provided with staffing support by CDFW, the FGC is a separate agency led by a five member panel appointed by the Governor and subject to confirmation by the Senate. Among its responsibilities is the establishment of regulations governing fish and wildlife conservation and the leasing of state tidelands and submerged lands for commercial aquaculture. While the FGC makes the final decisions regarding the issuance of leases for aquaculture, CDFW staff or more recently, the state's aquaculture coordinator, informs those decisions through the development of recommendations. The FGC decision-making process involves public hearings and relies on a majority vote of its five Commissioners.

The FGC only considers and issues leases for commercial aquaculture operations on state tidelands and submerged lands that have not been legislatively granted to a local government agency for management. The FGC is not authorized to issue leases for operations that are focused strictly on research, those carried out on privately owned tidelands, or tidelands in areas under local government management (such as most of Humboldt Bay and San Diego Bay). Aquaculture research activities proposed to be carried out on state tidelands would need to be leased by the California State Lands Commission directly. Those on state tidelands granted to local government management would be leased by the appropriate local government agency.

California State Lands Commission (CSLC)

As described in the comment letter it submitted in response to the draft environmental impact report prepared for the Coast Seafoods Permit Renewal and Expansion Project in 2016,

> *The CSLC staff has jurisdiction and management authority over all ungranted tidelands, submerged lands, and the beds of navigable lakes and waterways. The CSLC also has certain residual review authority for tidelands and submerged lands legislatively granted in trust to local jurisdictions (Pub. Resources Code, Section 6009, subd. (c), 6301, 6306). All tidelands and submerged lands, granted or ungranted, as well as navigable lakes and waterways, are subject to the protections of the common law Public Trust Doctrine.*
>
> *As general background, the State of California acquired sovereign ownership of all tidelands and submerged lands and beds of navigable lakes and waterways upon its admission to the United States in 1850. These lands are held for the benefit of all people of the State for statewide Public Trust purposes, which include but are not limited to waterborne commerce, navigation, fisheries, water-related recreation, habitat preservation, and open space. On tidal waterways,*

the State's sovereign fee ownership extends landward to the mean high tide line, except for areas of fill or artificial accretion or where the boundary has been fixed by agreement or a court. Such boundaries may not be readily apparent from present day site inspections.

Operationally, this means that CSLC is responsible for issuing leases for non-commercial aquaculture and restoration activities that involve placement or installation of structures on state tidelands or submerged lands. As described above, CSCL additionally provides Public Trust Doctrine oversight over local government agencies with management responsibility over legislatively-granted state owned tidelands and submerged lands.

California Department of Public Health (CDPH)
As stated on CDFW's Permit Guide to Aquaculture in California,

CDPH regulates the growing, harvesting, processing, and marketing of bivalve shellfish (including oysters, mussels, clams, and scallops) intended for sale for human consumption. CDPH participates in the National Sanitation Shellfish Program. This program is the federal and state cooperative program recognized for the sanitary control of shellfish by the US Food & Drug Administration and the Interstate Shellfish Sanitation Conference. The purpose of the program is to promote and improve the sanitation of shellfish moving in interstate commerce through federal and state cooperation and uniformity of state shellfish programs. Within CDPH, the shellfish sanitation program is divided into two main components: Pre-harvest (administered under the Environmental Management Branch) and Post-harvest (administered under the Food and Drug Branch).

CDFW's Permit Guide to Aquaculture in California elaborates on the Pre-harvest process as follows:

The first step is to contact CDHP with your detailed plan in order to begin the process of a sanitary survey. The classification of the location of your proposed lease will depend on the water quality of the area. The applicant is responsible for collecting water quality samples, as directed by the CDPH. Depending on the classification of the area, a management plan may be necessary. A management plan will involve coordination between local government, waste water treatment, and county health representatives to insure proper water quality is maintained. The plan will include ongoing requirements, such as record keeping, continued sampling, and closure response. Be sure to read the detailed step-by-step process document provided by CDPH[48] as you begin your planning process.

As described on the CDPH guidance document included in the footnote below, the pre-harvest certification process typically requires at least one year of water quality samples, taken during different environmental conditions. For new aquaculture

[48] CDPH's detailed guidance document is available online here: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=27450&inline#page=57

projects, obtaining this certification prior to seeking a lease can help prevent the leasing of sites that turn out to not be viable due to water quality or public health concerns.

California Regional Water Quality Control Boards (Water Boards)

California's Water Boards have the authority to regulate marine aquaculture and restoration activities through the Porter-Cologne Water Quality Control Act and Section 401 of the Clean Water Act. A detailed discussion of this authority is provided on pages 3-46 to 3-48 of the Final Environmental Impact Report released in 2017 for the Coast Seafoods Permit Renewal and Expansion Project. This report is available on the Humboldt Harbor District website[49]. Because there are nine Water Boards – each representing a different area in California – the location of an aquaculture or restoration project will determine which one is most appropriate to approach with questions or requests for application materials. A jurisdictional map of the nine Water Boards is available on the State Water Resources Control Board website[50].

U.S. Army Corps of Engineers (USACE)

USACE has permitting authority over activities involving the placement of structures and materials in the marine and intertidal areas of the United States. This authority is established through Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. As part of its review process, USACE consults with the National Marine Fisheries Service (NMFS) regarding potential effects to federally protected marine species and habitats. When this consultation results in the transmittal of conservation recommendations, USACE may memorialize those recommendations as permit conditions. In addition, because it is typically the sole federal permitting agency involved in reviewing marine aquaculture and restoration projects, USACE is typically the lead agency under the National Environmental Quality Act (NEPA). For new marine restoration projects and in-water aquaculture facilities and operations, this often means that USACE is responsible for the development of an environmental review document that meets the requirements of NEPA. When a similar document is required to be prepared under the California Environmental Quality Act (CEQA), a joint report may be developed.

[49] http://humboldtbay.org/sites/humboldtbay2.org/files/Coast%20Certified%20FEIR%202017.pdf
[50] https://www.waterboards.ca.gov/waterboards_map.html

Appendix D

Example Project Descriptions

Grassy Bar Oyster Company, Inc.
Project description of existing development and request for after the fact authorization.
George Trevelyan, President

The purpose of this document is to describe in detail all of our structures and activities that may be considered to be development under the Coastal Act and thus require permits from the Coastal Commission and Army Corps of Engineers. I am requesting after the fact authorization of these developments.

Grassy Bar Oyster Company, Inc. (GBOC) was founded in July 2009 and incorporated in the state of California in December 2016. GBOC has 7 employees including myself and my son Charles Trevelyan, who serves as Farm Manager. We grow Pacific oysters and Manila clams on 2 state water bottom leases in Morro Bay California. The Lease Agreements for these 2 water bottoms are being sent along with this document. We also operate a "FLUPSY" nursery system located on the City of Morro Bay waterfront. Please see the accompanying KMZ Google Earth File for exact locations and footprints of all GBOC's operations.

1. Floating Upweller Systems (FLUPSYs).
GBOC operates 2 FLUPSYs located at slips HF1 and HF2 at Tidelands Park Marina in Morro Bay near the Public Boat Launch Ramp. The slips are rented from the City of Morro Bay Harbor Department (see attached Rental Agreement).

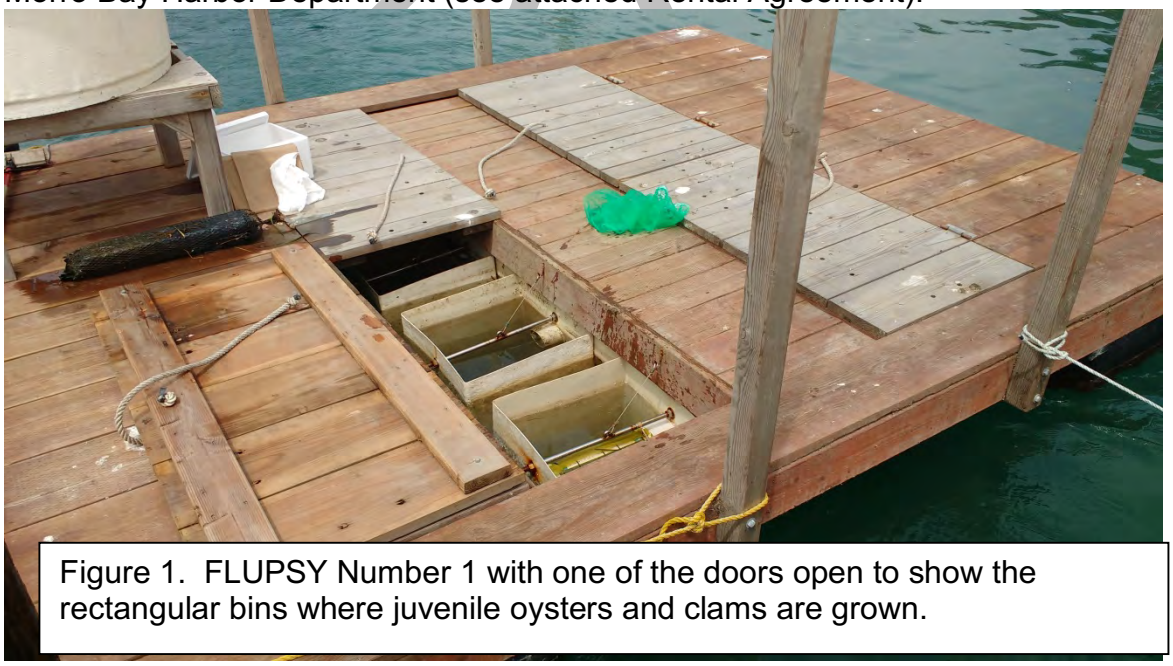


Figure 1. FLUPSY Number 1 with one of the doors open to show the rectangular bins where juvenile oysters and clams are grown.

The FLUPSYs each have 8 bins that are 2 ft by 2 ft, attached to a 12 ft central fiberglass trough that is continually drained by an electric pump. The trough and bins for each FLUPSY are built into a 12.5'x16.5' raft. Plans for the FLUPSYs are found in Appendix A.

The FLUPSYs are stocked with small (3 mm) single Pacific oyster or Manila clam seed and tended daily by manually stirring each bin with a paddle.
The bins are hoisted up out of the water every month or so for cleaning and size sorting using a pulley system hanging from an overhead wooden trellis structure.
One of the FLUPSYS has a hand sorting station for size-sorting small seed (3-10mm). This station consists of a wooden table that supports a round 80 gallon fiberglass tank that is filled with seawater. Hand-held screens of various mesh sizes sit in the tank and are used to manually sift the seed into different size classes.

Empty bins are cleaned there at the FLUPSYS with a gasoline powered pressure washer that is supplied with potable water. The pressure washer is noisy so we only do this between 8am and 5pm. Each bin gets pressure washed about 4 times per year. After about 6 months, when the oyster seed in a bin has reached about 25 mm in length, the bin is brought out to the Raft at State Water Bottom M-614-01-Parcel 1 (referred to here as Parcel 1) for size sorting using the tube sorter. Seed that falls through the 16mm hole size is returned to the FLUPSYS.
The central trough of each FLUPSY is cleaned weekly with the pressure washer or with the paddle.

We stock the FLUPSYs by purchasing approximately 2 million Pacific oyster seed each year, from several hatcheries and import them into Morro Bay after we have obtained an importation permit from CDFW. We also purchased 400,000 Manila clam seed in 2017 as an experiment, and if successful, will purchase more beginning in 2019.

2. Raft
Most of the sorting, bagging, washing and packing of oysters occurs on the 1200 sq. ft. Raft located on Parcel 1.

Figure 2. The Raft during a +0.3 ft low tide. The shed with the green trim houses the seawater pump which operates only when the tide is in.

Plans for the Raft are found in Appendix B. The Raft can be moved around by manually lifting the Danforth style anchors and pushing it with our boat at high tide. The Raft is located over intertidal mud at approximately a +0.5 to +1 ft tidal level. Access to the Raft is by boat at tides of about +1 ft or more. At lower tides, we anchor our boat on the edge of the mud flat and walk across the mud flat to the Raft.

2. Long line bottom bags.

The bins of Pacific oyster seed from the FLUPSYs are passed through a tumbling sorting machine or tube sorter (QuickTube Sorter, Chesapeake Bay Oyster Company) located on the Raft at Parcel 1. The tube sorter is powered by a Honda 2000 portable gasoline powered inverter. The seed that graduates on the tube sorter is stocked into ½"mesh black polyethylene grow-out bags, 38"x24" (Norplex, Inc) at a rate of 150 per bag. These bags are closed with HG-1 galvanized pig rings (Decker Manufacturing Co.) and then tethered to long lines, using 5" branch hangers, sometimes called long line snaps, (Blue Ocean Tackle, Inc) and are spaced about 4" apart.

Figure 3. Close-up showing the stainless steel branch hanger attachment of bags to a long line. Also shown is a stainless steel ring used for tightening and tying off the long lines.

GBOC operates 37 long lines, covering a total of 2.0 acres of intertidal mud flat at approximately a +1 ft tidal level. Twenty seven long lines are located at Parcel 1 and 10 are located at State Water Bottom M-614-02 (known as Lease 02). The 27 at Parcel 1 are divided into 2 separate areas: 19 are in the Upper Terrace area and are designated UT1-UT19, and 8 are in the Central Farm area and are designated CF1- CF8. The 10 at Lease 02 are designated L1-L10. These different areas can be seen on the accompanying Google Earth map.

Figure 4. Long lines in the Central Farm area of Parcel 1.

Figure 5. A 5 ft post anchor made of 2” diameter pvc pipe protruding about 5” up out of the mud.

These long lines vary in length from 169 ft to 455 ft, are spaced 6-10 ft apart, and are made of 3/8” polypropylene line stretched across and lying directly on the intertidal mud, and tied to anchors.

Each anchor consists of a 5 ft length of 2” diameter Schedule 40 pvc pipe driven all the way down into the mud manually with a sledge hammer, so that only a few inches protrude up out of the mud. The anchors are spaced about 120 ft apart along the length and one at each end of the line. There are a total of 114 anchors deployed, 88 at Parcel 1 and 26 at Lease 02.

These pipe anchors can be extracted from the mud during low tide using a 39” sign post puller attached to a pallet puller.

Figure 6. Farm Manager Charles Trevelyan with the tool he developed for extracting posts. The jaw like part is a pallet puller which is chained to a post puller. On this day the tool was used to remove wooden stakes. The stakes in the front 2 bins are made of 1”x4” untreated lumber and were previously used by GBOC to support racks. We removed them because they rotted too quickly. The stakes in the rear-most bin are mostly old “legacy” stakes from a previous grower.

The base of the sign post puller tool is supported by a piece of plywood placed on the mud next to the post to be removed. It is a one person operation that takes 5 minutes per post.

Every 2 weeks on a low tide all the bags on every long line are flipped over or shaken in order to dislodge oysters stuck in the mesh, to improve growth and to control fouling. Bag flipping is done by hand, sometimes with a hand held rake by a crew of 3-5 employees walking up and down the rows.
After 4 to 8 months, the bags are unclipped from the long line and the oysters are sorted on the tube sorter again, but this time using a tube with larger holes. The smaller size class is returned in bags to these same long lines.
3. Untethered bottom bags.
The larger size classes from this sorting procedure are returned to bags that are placed in rows on the intertidal mud, untethered. There are 3.4 acres that are used for untethered bottom bags: 3.17 at Parcel 1 and 0.23 at Lease 02. Like the nearby long line areas, the untethered bottom bag areas are at approximately a +1 ft tidal level. Currently only about 1 acre of this 3.4 acres is planted. As a young crop of oysters grows, it gets spread out onto more acreage until we may use all 3.4 acres.

Figure 7. Untethered bottom bags in the Central Farm area of Parcel 1.

We have learned that the grow-out bags are heavy enough to stay put untethered when the 150 oysters used to stock a bag fills a 2 gallon bucket. Every 2 weeks on a low tide, as with the long line bags, a group of 3 to 5 employees walks up and down the rows, flipping the bags over, using a hand held rake.

After several weeks to months, we begin harvesting these bottom bags. Harvesting is done at higher tides by a person wading in the water and manually lifting a bag off the mud and placing it onto the boat or onto a paddleboard.

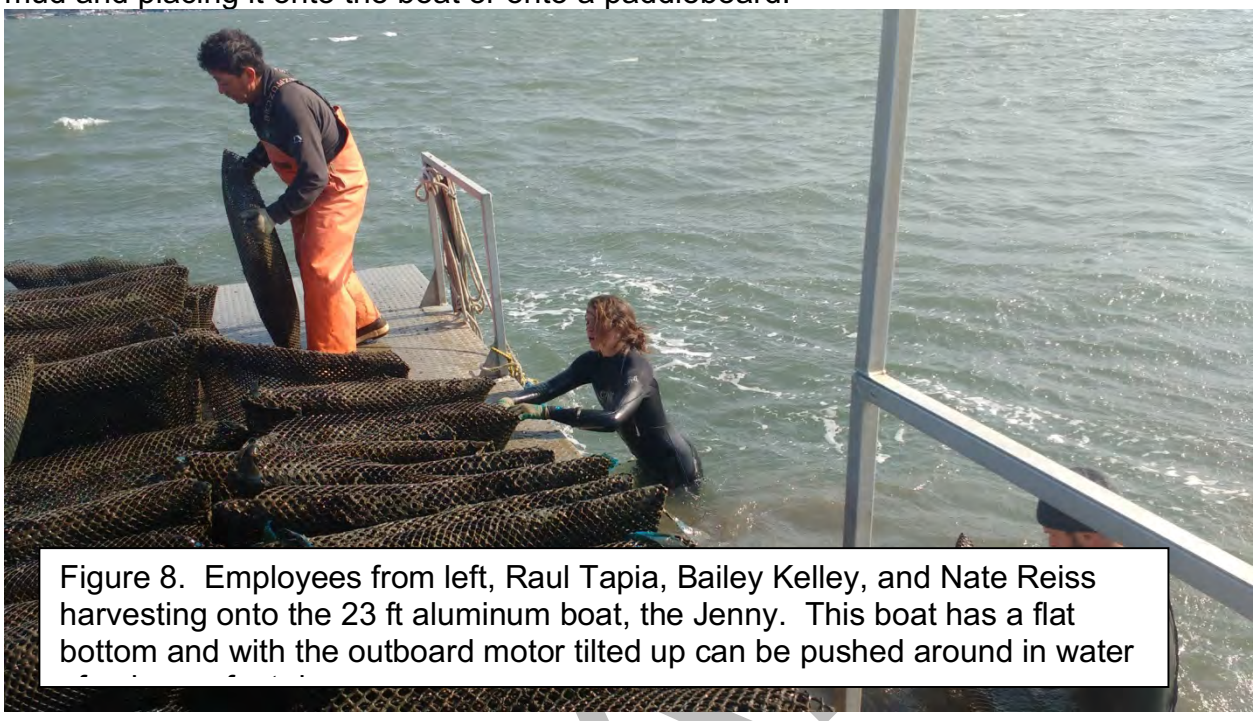


Figure 8. Employees from left, Raul Tapia, Bailey Kelley, and Nate Reiss harvesting onto the 23 ft aluminum boat, the Jenny. This boat has a flat bottom and with the outboard motor tilted up can be pushed around in water

Figure 9. Size sorting by hand at the sorting table on the Raft.

At the Raft, these bags are sorted by hand at the sorting table into different size classes, which are marked with differently colored flagging tape to indicate the different

sizes that we sell. Those oysters that are unsuitable to sell are returned to the bottom bag area.

4. Racks

The oysters that are suitable to sell are returned to grow-out bags and then placed on racks that hold the oysters a few inches up off the bottom so that they can purge themselves of any sand or silt. After 24 hours, these racked oysters are ready to sell. There are 280 ft of racks at Parcel 1 and 60 ft at Lease 02.

Figure 9. Rack CF2 at Parcel 1. This photo was taken during a +0.3 ft low tide

A rack consists of a parallel pair of horizontal 1" pvc pipes, or alternatively, a pair of parallel 5/8" reinforcing rods. These parallel pairs of pipes or rods are spaced 18" apart, and held about 4" above the mud by vertical legs spaced 30" apart. The legs are 1"pvc pipes, 30" long and driven into the mud about 26". The legs are attached to the horizontal pipes or rods with pvc T's. In all, there are 209 legs deployed, 164 at Parcel 1 and 45 at Lease 02. The legs can be removed from the mud using the post puller tool.

The racks that are made with horizontal pvc pipe have 1/8" diameter stainless steel screws screwed into them every 12 inches along their length. The screws are not screwed all the way in, but instead they protrude upward from the pipe about a half inch. Bags of oysters that are placed on these racks are prevented from slipping off the racks by these screws that catch in the bag material.

5. Packing operation

Bags of oysters are removed from the racks, placed on a paddleboard or the Jenny, and taken to the Raft where they are washed, counted, and bagged or boxed and tagged for sale.

Figure 10. Blue insulated totes are often used to transport oysters to the shore for sale. Employee Able Sanchez is counting and bagging and tagging oysters on a stainless steel table at the Raft. In this 2015 photo there is netting to keep out birds covering the raft. We have since removed the netting and now use Gull Sweep rotating bird deterrents instead.

Before packing them for sale the oysters must be washed. This is done by laying the bags of oysters on the deck of the Raft and spraying seawater at them from our 5 h.p. gasoline powered sea water pump located in the pump house on the Raft. The pump house dampens the sound from the noisy pump motor.

The packing activity only occurs when allowed by the California Department of Public Health, and when we have orders for oysters from our customers. Typically we pack oysters for sale 2-3 times per week for about 6 months out of the year.

5. Manila clam nets

We have not sold any Manila clams yet. In 2017 we experimented with 400,000 3mm seed which were grown in the FLUPSYs to 10 mm and then planted under nets on Parcel 1 intertidal mud flats. We experimented with different types of nets and currently have 0.17 acres of nets deployed, all at approximately a +1 ft tidal level. The net that works best is a heavy duty ¼" mesh, 14 ft x 50 ft net, Product Number OV-7822 from Industrial Netting, MN.

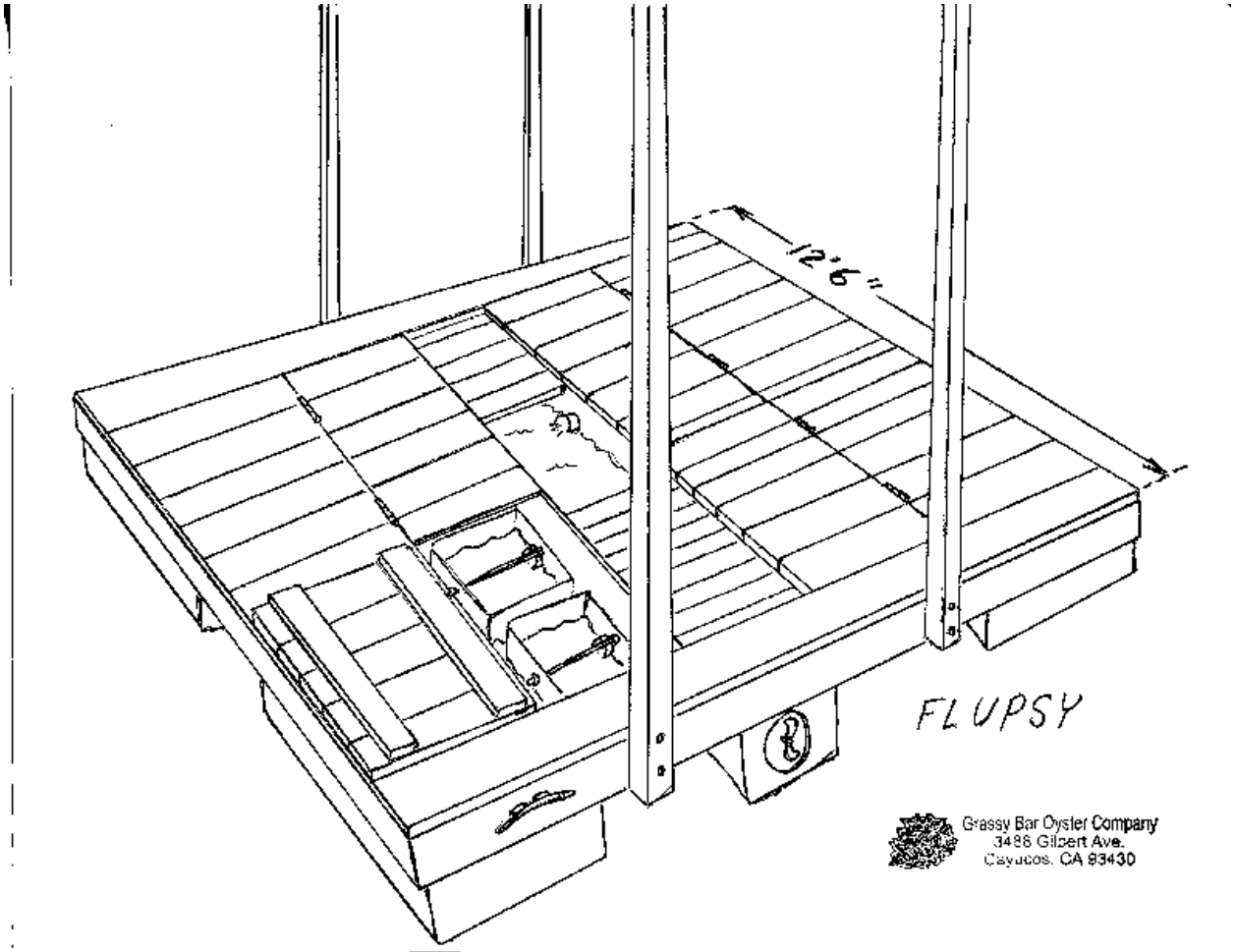
Figure 6. Manila clam nets in the foreground, 14 ft x 50 ft, on Parcel 1 with the perimeter held down with stones and stakes.

One of these nets is planted with 50,000 manila clams by sprinkling the clams under the net as the net is rolled out onto the mud. Then the perimeter is pinned down with 18" steel stakes spaced 18" apart and then stones are placed between the stakes.
We anticipate harvesting one year after planting the nets. Harvesting will be done by hand, using hand rakes. All stakes and stones and netting will be removed and re-used for the next crop.
I plan to use stainless steel stakes in the future and to not use stones, which slide around in the currents.
The nets are brushed at low tide every month with a broom to discourage fouling organisms (mainly macroalgae) from getting established.
6. Tumble culture Line.
This tumble culture line consists of a single 120 ft length of ¼" stainless steel cable suspended 30" above the intertidal mud at Parcel 1 by posts made of 2" or 3" diameter grey pvc pipe spaced 9 ft apart.

Figure 7. Tumble culture line on Parcel 1.

The plans for this tumble culture system can be found in see Appendix C.
The ends of the cable are attached to 66” galvanized steel screw anchors at either end. Forty eight grow-out bags are attached with 5" branch hangers to the cable. Each bag is equipped with an 11” blue floatation buoy that causes the bag to tilt up with the incoming tide. The grow-out bags are each stocked with 150 seed oysters from the FLUPSY. We anticipate harvesting these bags after about 12 months of growth.

Appendix A. FLUPSY PLANS



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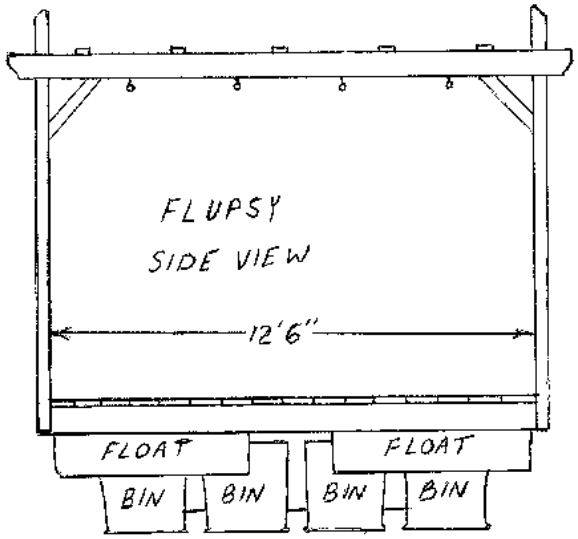
3488 Gilbert Ave.
Cayucos, CA 93430



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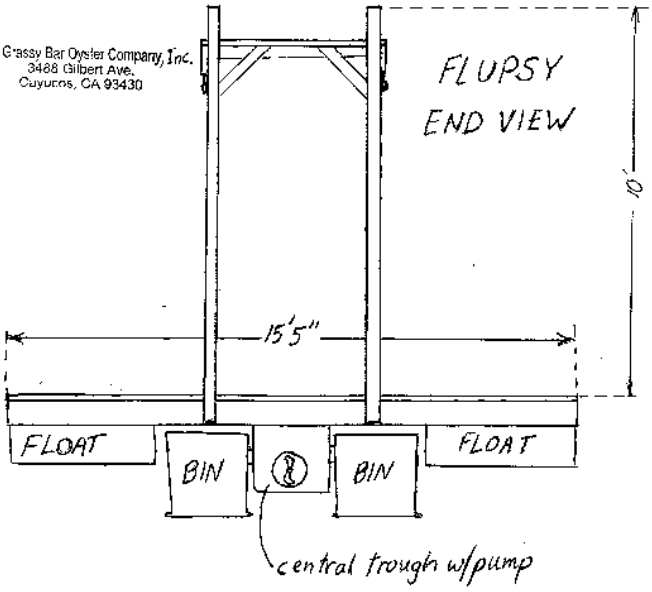
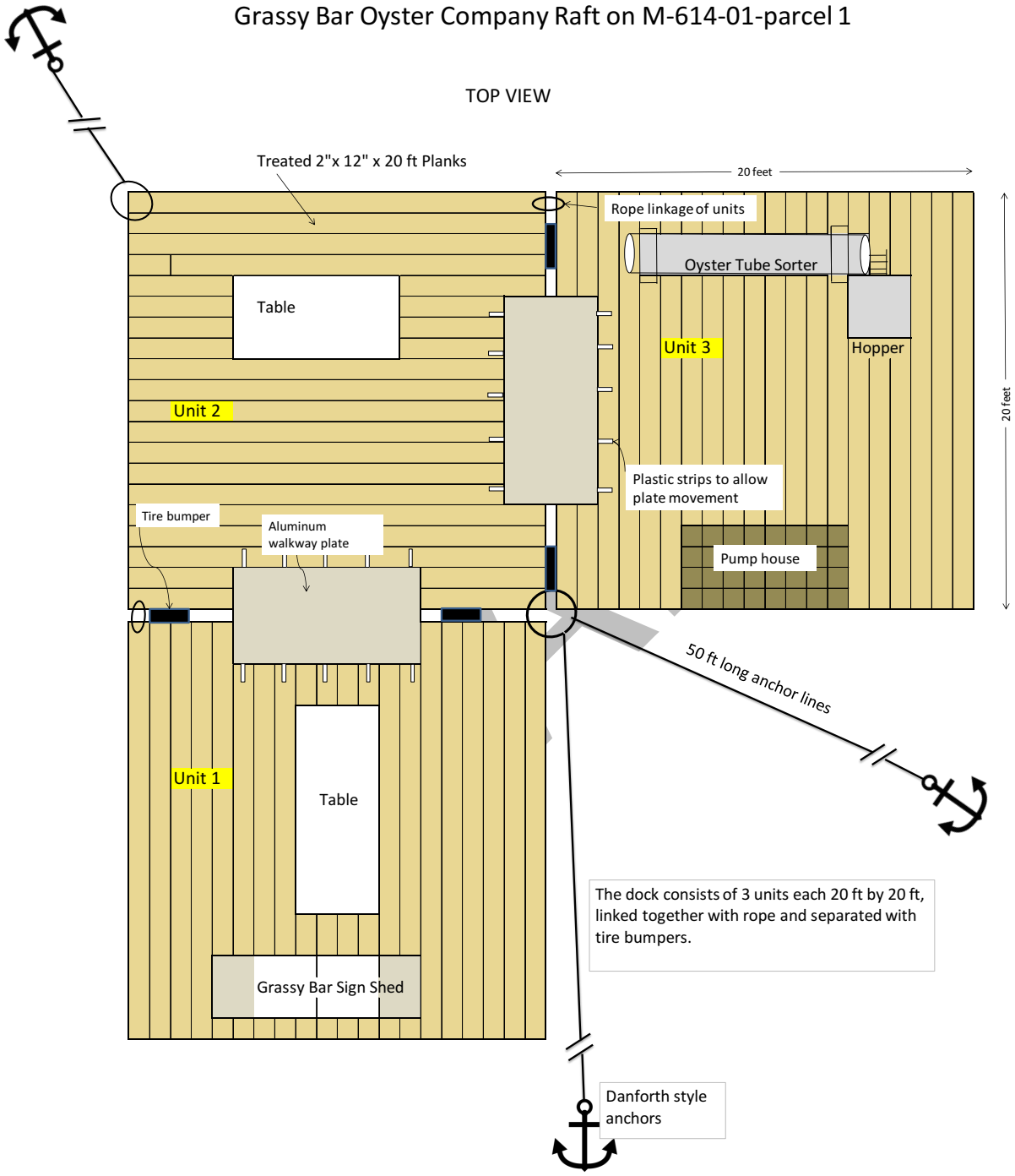
3488 Gilbert Ave.
Cayucos, CA 93430

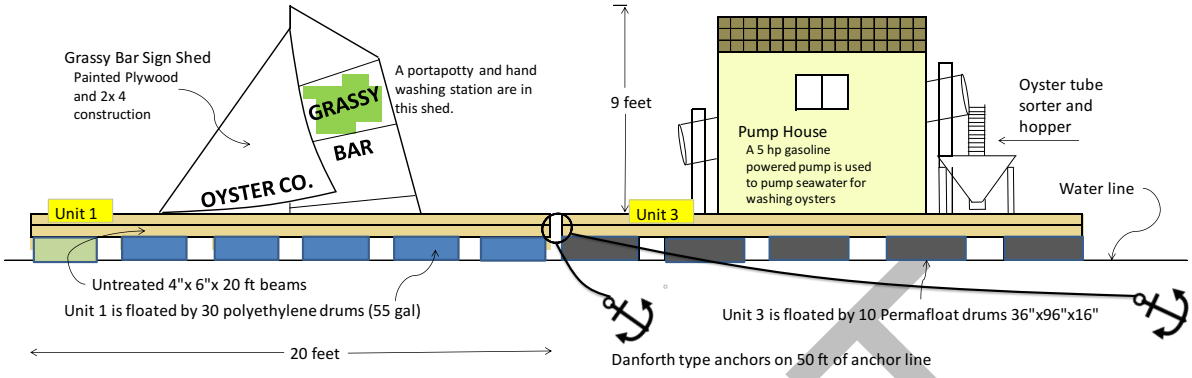


Appendix B. Raft Plans



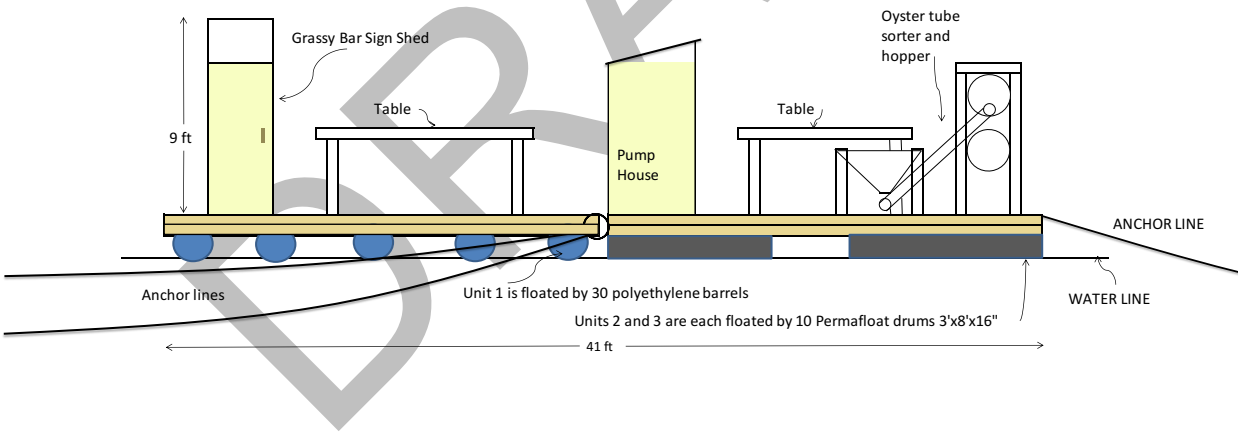
Grassy Bar Oyster Company Raft on M-614-01-parcel 1

FRONT VIEW

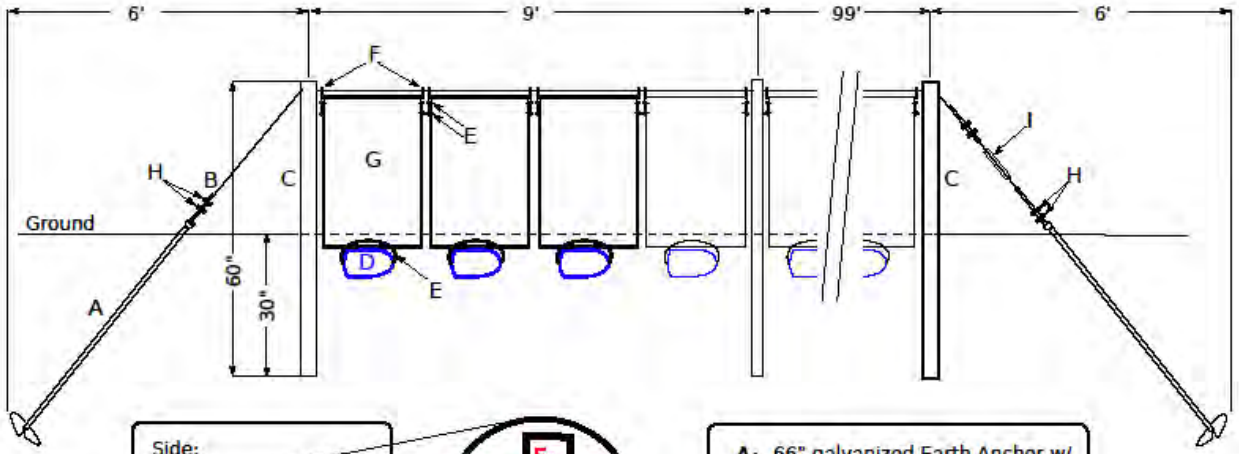


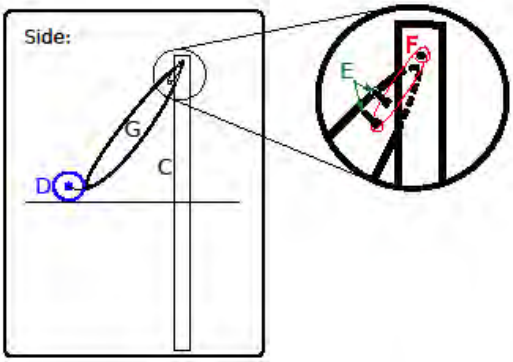
Grassy Bar Oyster Company Raft on M-614-01-Parcel 1

SIDE VIEW



Appendix C. Tumble Culture Plan





A: 66" galvanized Earth Anchor w/ 8" helix, 1" rod

B: 1/4" SS cable

C: 3"x60" grey PVC pipe

D: 5"x11" blue crab float

E: Heavy duty UV resistant cable tie

F: ILS59 5" SS branch hanger

G: 2'x3' HDPE oyster bag, .5" mesh

H: 1/4" SS wire rope clip

I: 1/2" SS turnbuckle

Tumble Culture System
Grassy Bar Oyster Co.
3/19/2018

1

Hog Island Oyster Company: Coastal Development Permit Amendment (CDP #s 2-81-40, 2-84-2, 2-84-10, 1-94-55)

PROJECT DESCRIPTION

December 2017

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TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

Hog Island Oyster Company (HIOC) grows shellfish on four different leases in Tomales Bay, California (Figure 1). The four leases used by HIOC are from the California Department of Fish and Wildlife (CDFW), and were either granted to HIOC directly or acquired from other growers. In addition, each lease has an associated coastal development permit (CDP) issued by the California Coastal Commission (Coastal Commission) that includes authorized activity (Table 1). The total acreage of the leased areas is 168.2 acres, of which HIOC currently operates on approximately 23.1 acres or 13.8% of the total lease area.

Table 1. Location and Activity Previously Reviewed by Coastal Commission for HIOC Leases

CDP No.	Lease No.	Location*	Previously Reviewed Activity		
			Acres**	Species	Methods
2-81-40	M-430-10	Intertidal area halfway between Tom's Point and Miller Park	5.0	Pacific oyster (*Crassostrea gigas*)[1]	racks or stakes
2-84-02	M-430-11	Intertidal area just north of Hog Island	5.0	Pacific oyster	racks[2]
2-84-10	M-430-12	Intertidal area 3 miles south of Marconi Cove	30.0	Pacific oyster, European flat oyster (*Ostrea edulis*), Manila clam (*Venerupis philippinarum*), native littleneck clam (*Protothaca staminea*), northern quahog (*Mercenaria mercenaria*), and bay mussel (*Mytilus edulis*)	racks, trays, floating nursery rafts, floating longlines[3]
1-94-55	M-430-15	Intertidal and subtidal areas adjacent to Tom's Point	128.2	Manila clam, native littleneck clam, northern quahog, Pacific oyster, European flat oyster, Olympia oyster (*O. lurida*), bay mussel, Mediterranean mussel (*M. galloprovincialis*), and red abalone (*Haliotis rufescens*)	racks, bottom bags, longlines, and rafts[4]

*Please refer to Figures 1 to 4 for the lease locations.
**Acreages are based on the most recent lease information from CDFW, and will be confirmed based on GIS mapping.

[1] CDFW Lease Renewal M-430-10 authorized the cultivation of additional species, including the European flat oyster, Atlantic oyster (*C. virginica*), Olympia oyster, Manila clam, and red abalone.

[2] CDFW Lease Renewal M-430-11 authorized the cultivation of additional species, including the European flat oyster, Atlantic oyster, Olympia oyster, Manila clam, Mediterranean mussel and red abalone and authorized stakes, racks, and longlines as approved cultivation methods.

[3] CDFW Lease Renewal M-430-12 additionally authorized the cultivation of the Atlantic oyster and limited cultivation methods to "racks and rafts."

[4] The original permitted species were identified via reference to CDFW Lease M-430-15. CDFW Lease M-430-15 Amendment issued to HIOC on December 9, 2015 further limited permitted cultivation to only Pacific oysters, Manila clams, and bay mussels, using "racks and bags and bottom trays."

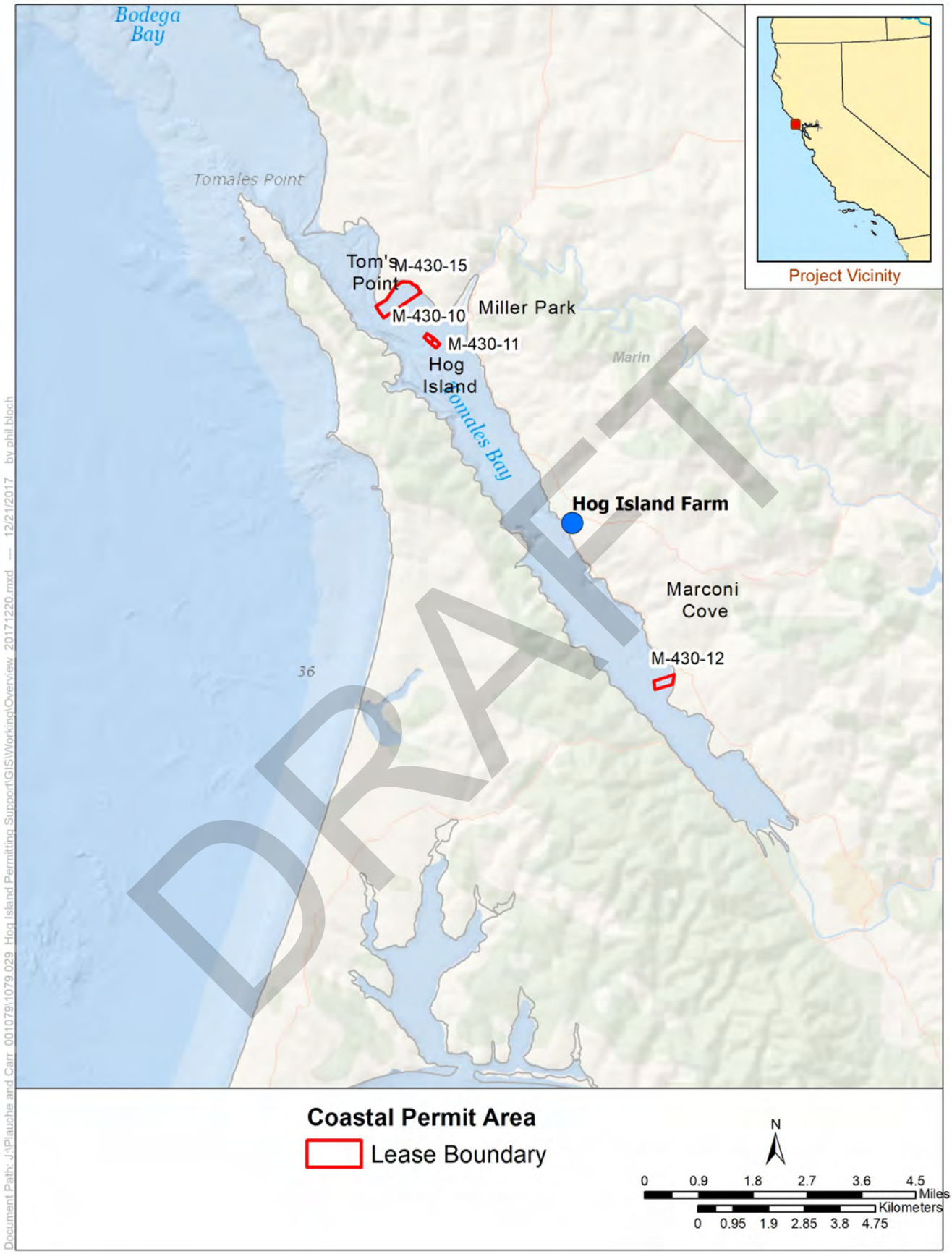

Figure 1. Location of HIOC Operations in Tomales Bay, California

While the above species and methods were described in the project descriptions submitted to the Coastal Commission, the CDPs associated with each lease did not limit HIOC's cultivation to these species and/or methods and did not include a requirement that HIOC amend its CDP prior to using different cultivation techniques. The CDPs, and associated staff reports, generally describe HIOC's activities as beneficial to the biological resources of Tomales Bay. For example, one staff report indicated that: "Raising shellfish enhances the foodchain in that the oysters provide a host for organisms, filter plankton and give off waste bi-products that provide sources of food for other marine species, thus enhancing the commercial fishery in Tomales Bay" (Coastal Commission, Staff Report and Recommendation, Permit Number 2-84-10, 8/1/84).

The majority of HIOC's activities currently being conducted on the leased areas are well within what was previously reviewed by the Coastal Commission and CDFW, and current activities have led to improved conditions due to advances in technology and aquaculture methods over the last 20 years. Shellfish growing and harvest methods have changed incrementally over time to both increase productivity and reduce environmental impacts. Furthermore, eelgrass has increased since HIOC's operations started in 1981, and has moved into culture areas in some locations. Figures 2 through 4 below show HIOC's current cultivated footprint for its Tomales Bay farm and its CDFW lease boundaries.[5]

On October 16, 2017, the Coastal Commission sent a violation notice (No. V-9-17-0112) asserting that HIOC may be out of compliance with their CDPs due to unauthorized activities or structures. The Coastal Commission has asked HIOC to submit an application that provides an update as to HIOC's current cultivation practices on its Tomales Bay farm. This document provides a comparison of the activities previously reviewed by the Coastal Commission and HIOC's current cultivation practices.

Overall, the acreage currently under cultivation by HIOC is significantly less than the amount of cultivation previously reviewed by the Coastal Commission. The original CDPs did not contain a limitation on the amount of cultivation that HIOC could plant within its 168.2 acres of leased area, other than certain restrictions on planting in eelgrass. As described below, the initial site plans included in the project descriptions reviewed by the Coastal Commission contemplated a total of approximately 56 acres of shellfish cultivation. Currently, HIOC cultivates only 23.1 acres. The cultivation methods, spacing (where applicable), species cultivated, and cultivation locations are substantially similar to those previously reviewed by the Coastal Commission and CDFW. As further detailed in Section 4.0 below, in limited circumstances, HIOC has developed new cultivation methods that are used in other areas of the West Coast and provide ecological benefits as compared to older practices. HIOC has also incorporated best management practices (BMPs), above and beyond those required under its CDPs and CDFW leases, to provide environmental sustainability and further reduce potential ecological impacts to Tomales Bay. These measures are described in Section 6.0 below.

[5] The lease boundaries shown are those identified on CDFW lease maps. HIOC anticipates using GIS technology to confirm these lease boundaries in consultation with CDFW.

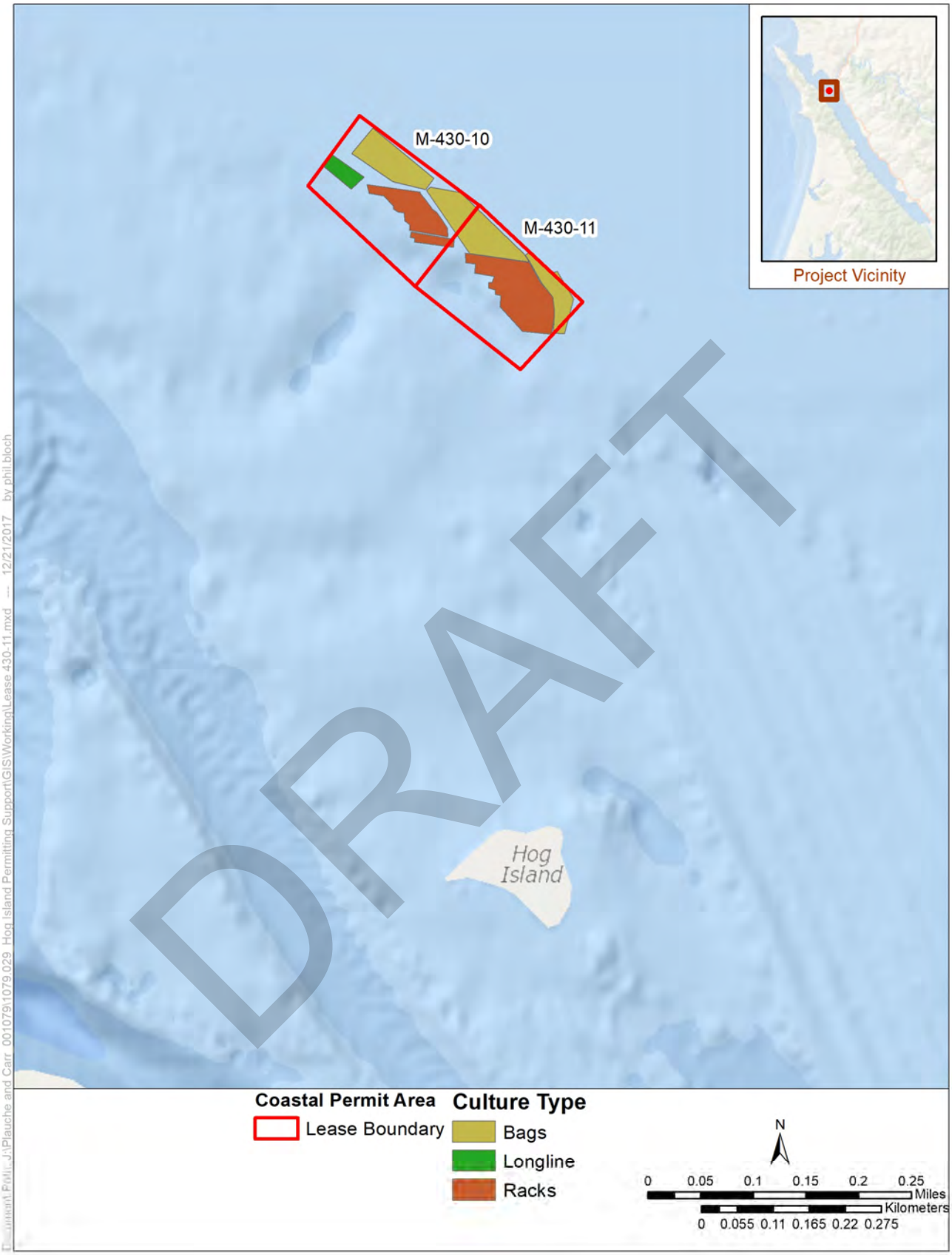

Figure 2. Lease No. M-430-10 (CDP No. 2-81-40) and Lease No. M-430-11 (CDP No. 2-84-02) in Tomales Bay, California

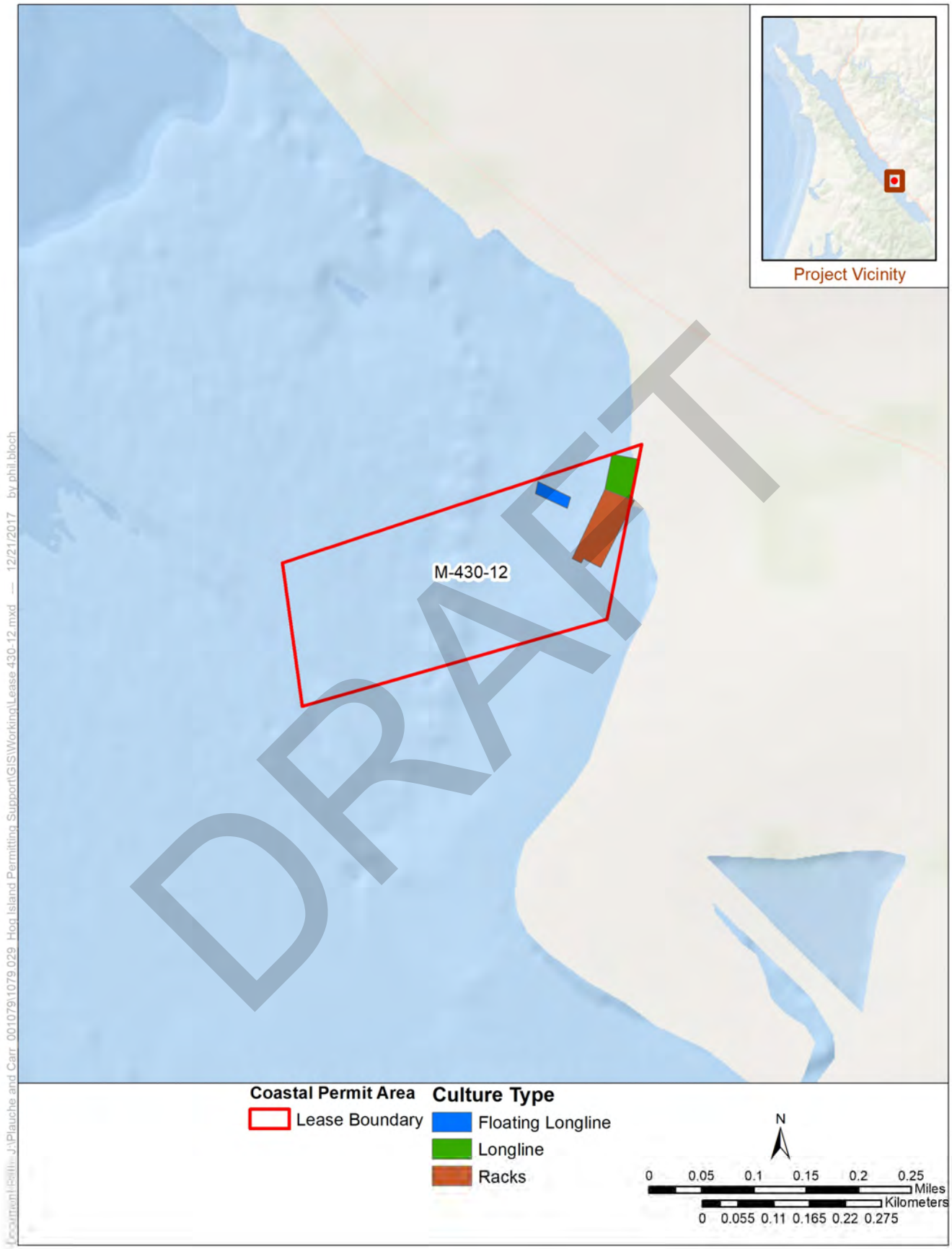

Figure 3. Lease No. M-430-12 (CDP No. 2-84-10) in Tomales Bay, California

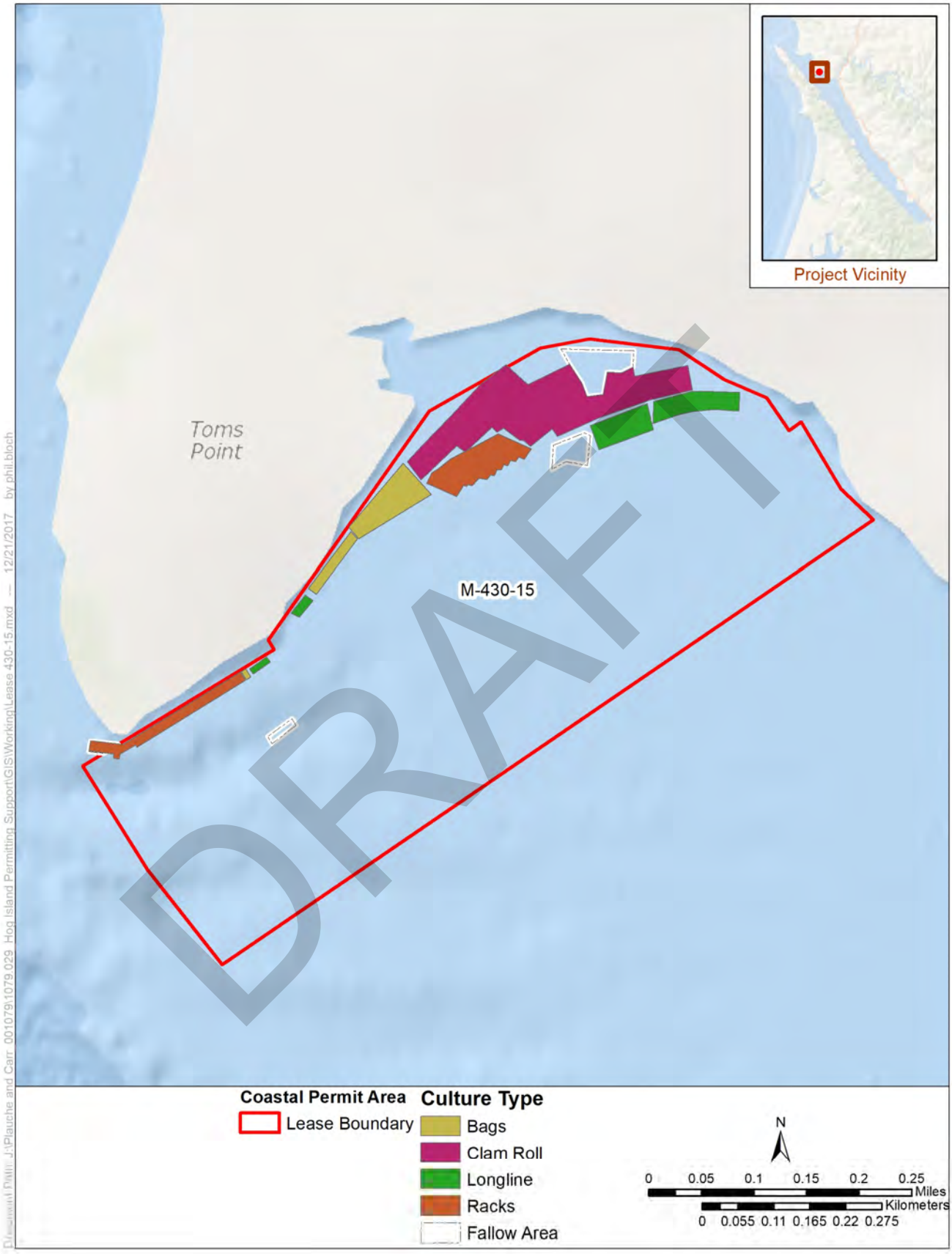

Figure 4. Lease No. M-430-15 (CDP No. 1-94-55) in Tomales Bay, California

2.0 SUMMARY OF PRACTICES PREVIOUSLY REVIEWED BY COASTAL COMMISSION AS COMPARED TO CURRENT CULTIVATION PRACTICES

HIOC's CDPs considered cultivation of 11 different shellfish species using 8 different culture methods (Table 2). Currently, HIOC is cultivating 5 different shellfish species using 5 different culture methods. Most methods currently used by HIOC are consistent with the methods previously approved by the Commission and include racks, bottom bags, longlines, and floating longlines. A description of each cultivation method, and the dimensions and spacing of the gear used, is provided in Section 3.0 below.

Table 2. Comparison of Activities Previously Reviewed and Approved by Coastal Commission and Current Cultivation Practices

Metric	Approved Activities under the CDP	Current Cultivation Practices
Cultivation Species	• Pacific oyster • European flat oyster • Atlantic oyster • Kumamoto oyster[6] • Olympia oyster • Manila clam • Native littleneck clam • Northern quahog • Bay mussel • Mediterranean mussel • Red abalone	• Pacific oyster • European flat oyster • Atlantic oyster • Kumamoto oyster • Manila clam
Cultivation Methods	• Racks: rack-on-pipe and overlapped racks • Stakes • Bottom bags and clam bags • Trays • Longlines • Floating longlines • Floating nursery rafts • Rafts	• Racks rack-on-pipe and overlapped racks • Bottom bags and clam bags • Clam rolls • Longlines • Floating longlines
Acreage by Gear Type*	• 17.0 acres (racks) • 6.0 acres (bottom bags [oysters], stakes, and clam bags) • 28.3 acres (longlines) • 4.7 acres (floating nursery rafts, other rafts, and floating longlines)	• 7.4 acres (racks) • 5.5 acres (bottom bags and clam bags) • 6.9 acres (clam rolls) • 3.0 acres (longlines) • 0.3 acres (floating longlines)
Total Acreage	56.0 acres	23.1 acres
* Note that the acreage by gear type for the approved permit conditions is based on the general lay-out of culture methods presented in the CDPs or staff reports. It is an estimate of what was reviewed in the original permit applications.		

[6] Note that at the time of the CDP approvals, Kumamoto oysters (*C. sikamea*) were viewed as a subset of Pacific oysters and were not separately identified.

3.0 CURRENT CULTIVATION PRACTICES PREVIOUSLY APPROVED BY THE COMMISSION

Both on-bottom and off-bottom cultivation practices were previously reviewed and approved by the Coastal Commission. On-bottom is defined as shellfish or gear that is placed directly to the sediment surface, and off-bottom is defined as shellfish that is grown on structures that are raised above the sediment surface. Each of the specific cultivation practices and types of gear currently used by HIOC are described below.

3.1 On-Bottom Culture Methods

There are two on-bottom culture methods currently used by HIOC that were previously approved by the Coastal Commission: (1) bottom bags, and (2) clam bags. A description of the typical gear used, planting layout, and harvest activities are described below.

3.1.1 Bottom Bags

Bottom bags are typically made from ½-inch VEXAR mesh bags measuring approximately 2 feet by 3 feet (Figures 5 to 6). The bags are stocked with oysters and then attached to parallel 3/8-inch bottom lines that are typically 100 feet to 200 feet long with the use of a stainless-steel (SS) snap hook.

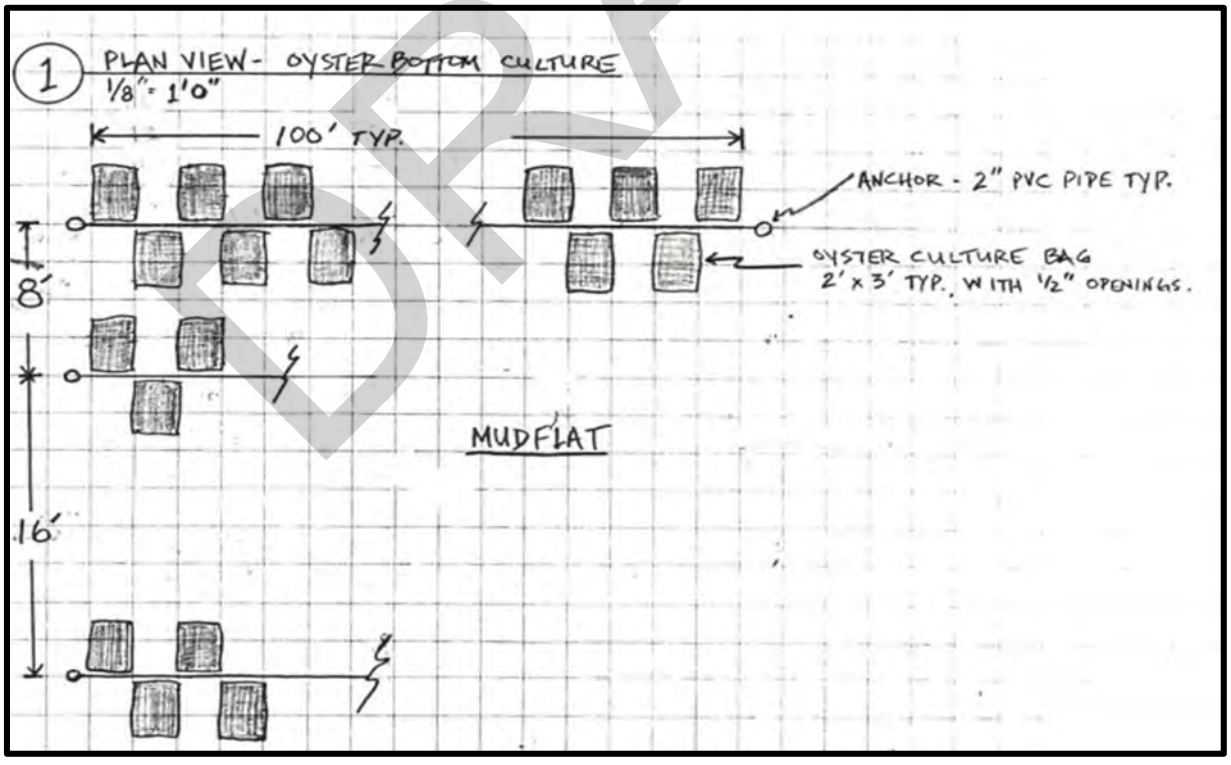

Figure 5. Typical On-Bottom Bag Culture Layout
Note: HIOC does not currently include a 16-foot space between groups of bottom bags. The plan shown is otherwise correct.

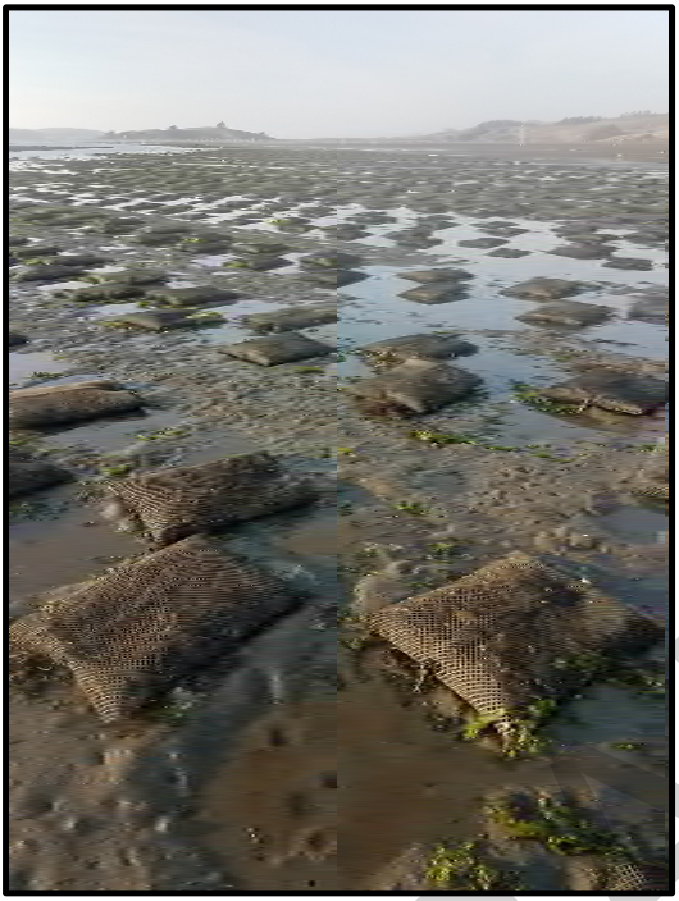

Figure 6. Photograph of On-Bottom Bag Culture with Oysters.

The line is typically anchored at either end to 2-inch polyvinyl chloride (PVC) pipe, or a similar type of post, that is driven into the ground at a sufficient depth to prevent loss. During planting, bags are distributed in secured bundles to their designated lines at a sufficient tide to bring the boat alongside the bottom lines. On the next low tide series (typically the same or following day), the bags are removed from the bundle and attached to the bottom lines. Monthly and/or quarterly maintenance is performed by flipping the bags from one side of the rope to the other by using a hook, which reduces fouling on the bag, tumbles the oysters, redistributes them in the bag, and helps to keep them from being buried. During this process, oysters are also harvested and/or removed from the line for grading and culling, after which point the remaining population remains in the bags for further grow-out. All culling and grading takes place on land at HIOC's facilities.

Harvesting oysters includes floating a boat alongside the lines, generally within a water depth of 1 feet to 3 feet, and the crew releases the SS snap hooks from the bottom line and places the bags on the boat for transport. Alternatively, oysters are harvested at a 4-foot to 6-foot tide by use of a boat mounted crane, which lifts the bags on the line individually onto the boat. Harvests of bottom bags generally takes place between 12 to 18 months after planting. Bottom bags are used in leases M-430-10 (1.93 acres), M-430-11 (1.82 acres), and M-430-15 (1.76 acres).

3.1.2 Clam Bags

Clam bags are typically made from ¼-inch VEXAR mesh bags measuring 30 inches by 18 inches by 4 inches (Figures 7 to 8). The bags are stocked with one shovel full of 3/8-inch minus pea gravel and clams. Bags are closed using galvanized hog rings at both ends.

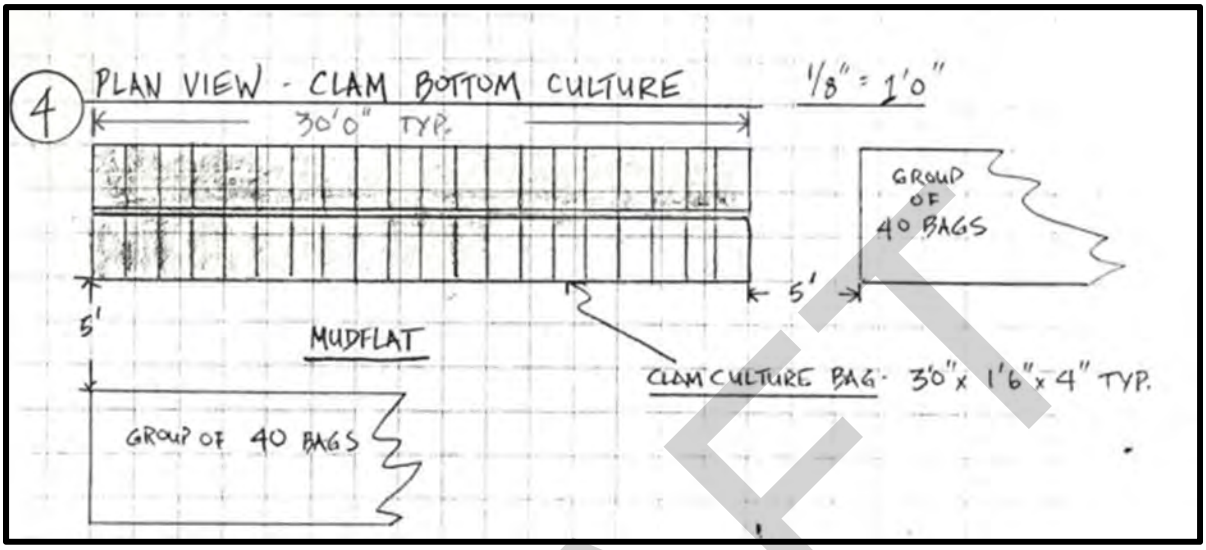

Figure 7. Typical On-Bottom Clam Bag Layout
Note: HIOC does not currently include a 5-foot space between groups of clam bags. The plan shown is otherwise correct.

Figure 8. Photograph of On-Bottom Bag Culture with Clams.

Planting clam bags is scheduled with tide availability and consists of first conveying the clam bags to the predetermined planting area during a high tide by boat, and on the subsequent low tide (typically the same or next day) a shallow trench (3 inches or less) is dug into the mud in parallel rows. After evenly distributing clams and gravel in the bag, the bags are placed into the depression alongside each other and the mud that was scraped off is put back on top the clam bags. Monthly checks are done on the clam bags to insure placement and growth. Occasional maintenance is performed on clam bags generally following storms to ensure that they are in place.

Approximately 2 to 4 years after planting, clam bags are harvested from their planting area. Harvest entails removing the bags from the mud, at which point they are shaken to remove sediment before being loaded onto a boat for transport. All culling and grading takes place on land at HIOC's facilities. The harvest generally takes place with 1 feet to 3 feet of water to allow easy access and loading of the bags onto the boat. Bottom bags are used in Lease No M-430-15 (0.03 acres).

3.2 Off-Bottom Culture Methods

There are four off-bottom culture methods currently used by HIOC that were previously approved by the Coastal Commission: (1) racks-on-pipe, (2) overlapped racks, (3) intertidal longlines, and (4) subtidal floating lines. A description of the typical gear used, planting layout, and harvest activities are described below.

3.2.1 Racks-on-Pipe

Racks-on-pipe typically consist of a 2-foot by 8.5-foot rebar frame to which 4.5-inch VEXAR mesh bags typically measuring 2 feet by 3 feet are attached (Figures 9 to 10). After racks are stocked with oysters, they are placed into the rows by boat during a high tide. On the next low tide series (usually the same or following day), the racks are organized and placed into the notch on their 4 PVC pipe legs. PVC pipe legs are typically 12 inches to 24 inches above grade. A row of racks is typically 300 feet to 600 feet long with 2.5 feet between each rack (front to back). Rows of racks run parallel to each other. There are typically two rows of racks with 3 feet of space between them (left to right) and then a 12-foot to 15-foot space until the next two rows.

Racks are monitored and tipped monthly during their grow-out period. On a quarterly basis, after initial planting, racks can be culled and graded. The harvest of racks entails the crew removing the racks from their PVC legs and placing them on a boat for transport, typically done with 2 feet to 3 feet of water to allow the boat to come up alongside the rows of racks for easier handling by the crew. Alternatively, oysters are harvested at a 4-foot to 6-foot tide by use of a boat mounted crane, which lifts the racks on the line individually onto the boat. Currently, all culling and grading takes place on land at HIOC's facilities. Final harvest of racks is typically 9 to 12 months after the initial planting date.

Racks-on-pipe are used at leases M-430-10 (1.06 acres), M-430-11 (1.69 acres), M-430-12 (0.78 acres), and M-430-15 (1.66 acres).

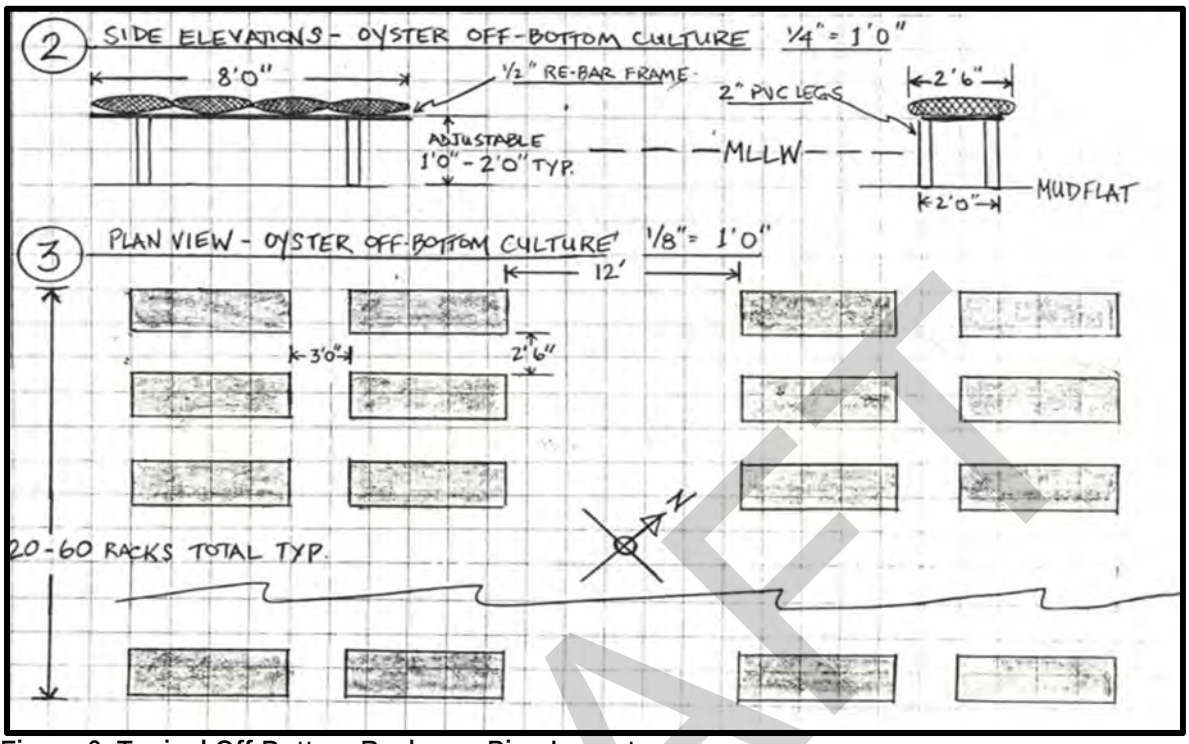

Figure 9. Typical Off-Bottom Racks-on-Pipe Layout


Figure 10. Photograph of Off-Bottom Racks-on-Pipe used by HIOC

3.2.2 Overlapped Racks

In growing areas with heavy wind and wave action, HIOC uses an overlapping rack design to help the racks absorb and deflect the energy from the waves (Figures 11 to 13), which reduces rack displacement. This method is used at all leases: M-430-10 (0.15 acres), M-430-11 (0.50 acres), M-430-12 (0.55 acres), and M-430-15 (0.97 acres). This culture method is typically used at the lower end of the rows where wave action is heaviest. The general layout includes 5 or 10 racks that are overlapped followed by a 5-foot space, except in Lease No. M-430-12, where up to 30 racks can be overlapped followed by a 5-foot space. Planting, maintenance, and harvest would take place as described in the section above for racks-on-pipe.

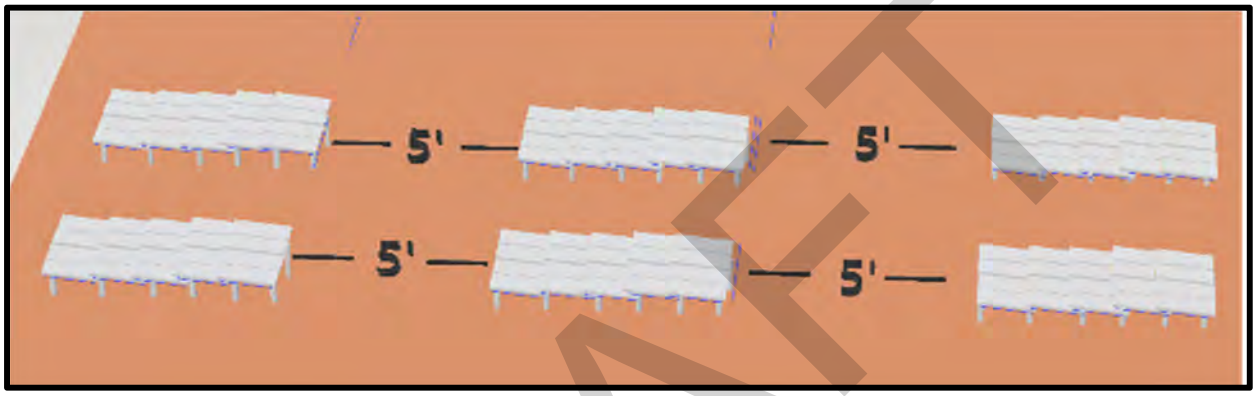

Figure 11. Typical Spacing between Sections of Overlapped Racks

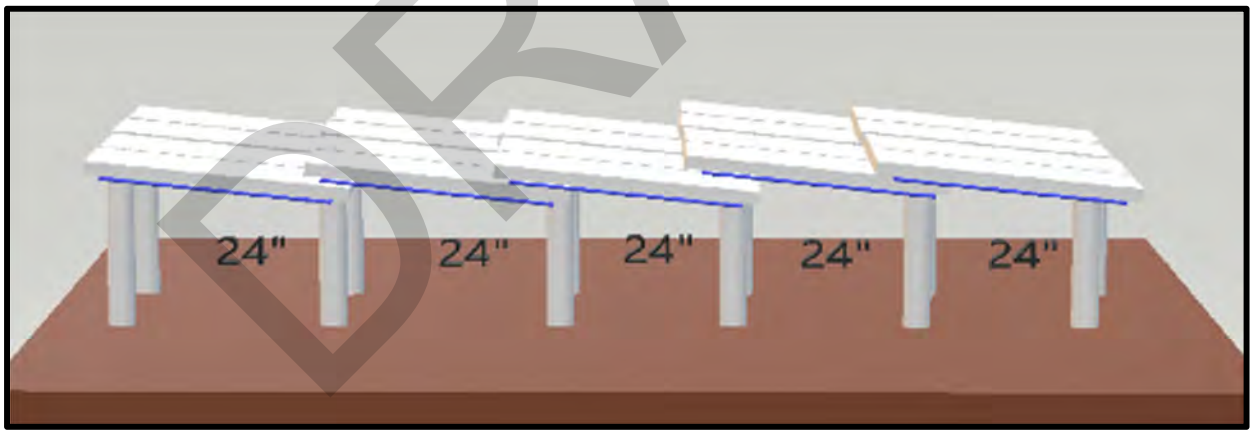

Figure 12. Typical Overlapped Racks Spacing: Side View

Figure 13. Photograph of Off-Bottom Overlapped Racks used by HIOC

3.2.3 Intertidal Longlines

Longlines are typically 100 feet to 300 feet long with anchor posts at either end and supporting posts typically every 8 feet (Figures 14 to 15). There are spaces of approximately 30 inches to 60 inches between lines, and an additional space of 15 feet between grouped sections of 4 lines. The anchor posts are typically galvanized steel pipe, T-stakes, or other suitable materials, and are used to maintain line tension. The supporting posts in between the lines are typically made of schedule 80, 2-inch PVC. Longlines can be 1 foot to 4 feet in elevation above the ground. Lines between the posts are plastic coated with a steel core. Covering that inner line is an outer sleeve that is added to reduce wear.

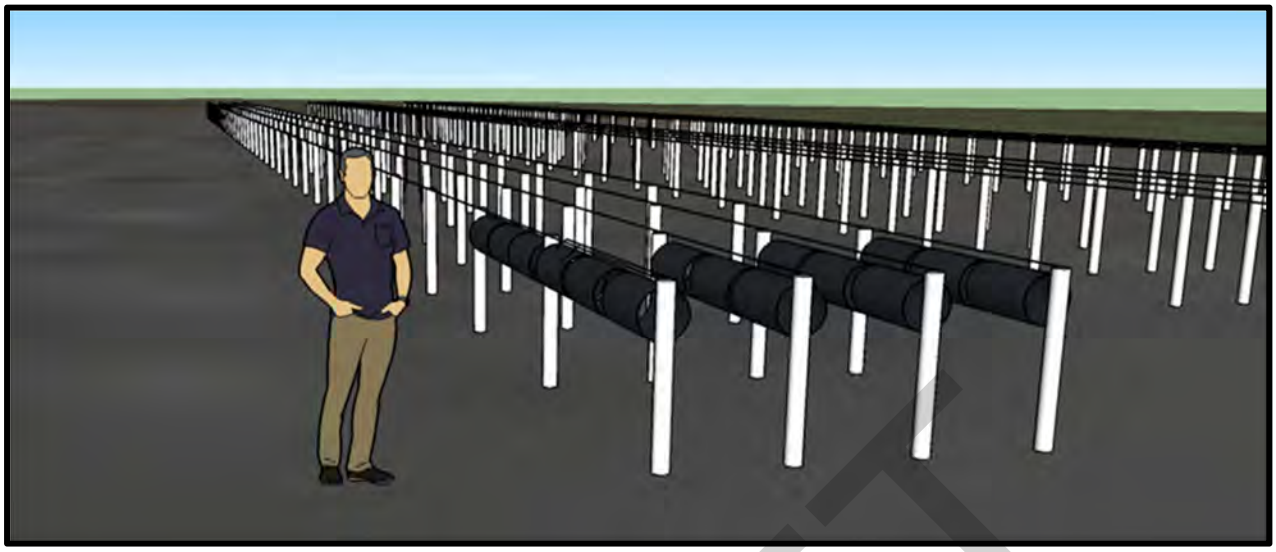

Figure 14. Diagram of Multiple Longlines with Baskets

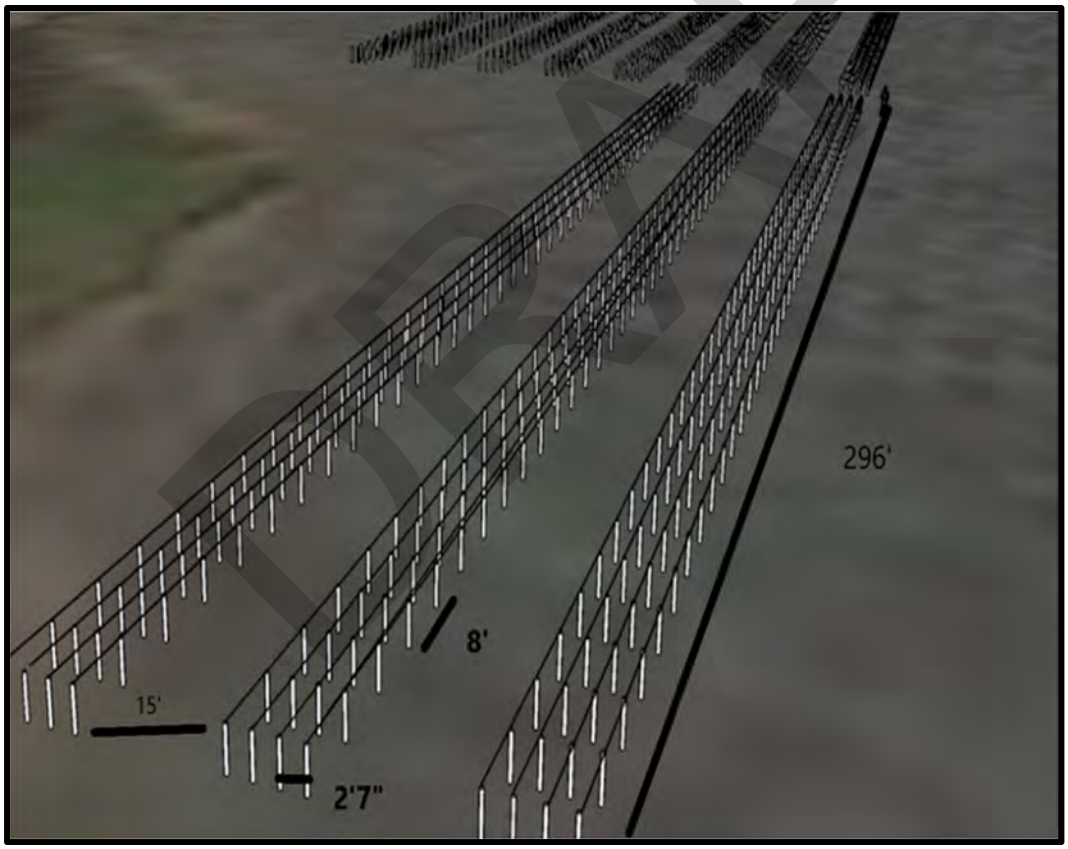

Figure 15. Digital Representation of Longlines

Longlines can hold either bags or baskets with or without floats (Figure 16 to 17). The bags that are used on the longlines are the same as those used in bottom culture, which are typically 2 feet by 3 feet with ½-inch mesh, and can be attached to the line using a SS snap hook or plastic clip

that connects to a plastic bearing. Bags attached to longlines have a small crab float attached to them opposite of the attachment to the longline. Floats are attached to the bag using 3/8-inch polypropylene line. Baskets attached to longlines are typically 2 feet to 4 feet long by 1.5 feet in diameter and are made of high-density polyethylene (HDPE).

Figure 16. Photograph of Tipping Bags Attached to Longlines used by HIOC

Figure 17. Photograph of Longlines with Baskets used by HIOC

After stocking the bags or baskets with oysters, they are transported to the growing areas via boat. The boat runs alongside the longlines and bags/baskets are clipped directly onto the line. Monthly and/or quarterly visits are made to check condition and/or harvest and grade. All culling and grading takes place on land at HIOC's facilities.

Longlines are used at Lease No. M-430-15 (2.07 acres) and 4 lines are located at Lease No. M-430-12 (0.60 acres). In addition, there is a culture method that is being phased out called Stanway units that is used at Lease No. M-430-10 (0.36 acres). These are modified racks that have baskets on top. These are being converted to longlines. All culture gear that has floats are currently in the process of being branded with the company name and phone number.

3.2.4 Subtidal Floating Longlines

Floating longlines are typically 100 feet to 300 feet long (Figures 18 to 20). The lines are anchored at either end with concrete, or appropriately sized Danforth anchors, and chain and/or rope. A single line extends from the mooring to the surface where it is attached to a spacing bar measuring approximately 3 feet. From this spacing bar, two lines, approximately 3 feet apart, run along the surface to the other end where the mooring and attachment system is repeated. In this way, two lines are attached to a single mooring system. There is a 15-foot space between each pair of lines. Floating longlines are used to secure baskets, which are the same type of basket used in intertidal longlines, measuring approximately 2 feet to 4 feet long and approximately 1.5 feet in diameter. There are floats threaded to the line in between each basket. Floating longlines are visited monthly and/or quarterly to check condition and/or harvest and grade. All culling and grading takes place on land at HIOC's facilities.

Figure 18. Photograph of What Floating Longline Look Like at the Water's Surface

Figure 19. Photograph of the Types of Baskets on Floating Longline used by HIOC

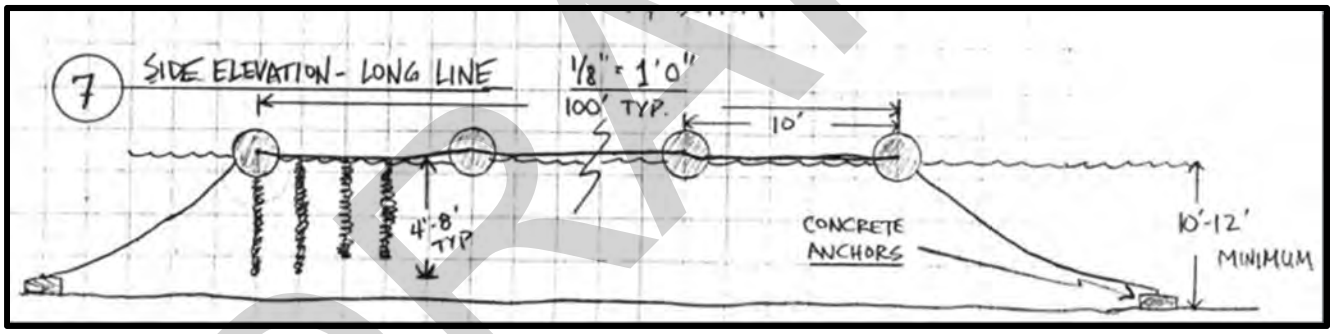

Figure 20. Diagram of Suspended Longline/Sentinel Mussel Layout

Floating longlines are used at Lease No. M-430-12 (0.24 acres), comprised of 10 floating lines. One floating line at Lease No. M-430-15 (<0.05 acres) is currently used to hold sentinel mussels for sampling by California Department of Public Health (CDPH).

4.0 CULTIVATION METHODS NOT PREVIOUSLY REVIEWED BY THE COMMISSION

There is one cultivation method that was not originally reviewed by the Commission: clam rolls used at Lease No. M-430-15 (6.91 acres). This method is based on innovations that have occurred since the CDP was issued in 1994. Clam rolls were first used by HIOC in 2010, and the methods for harvesting the clams was first used approximately three years later (following the grow-out period) in 2013. Clam rolls are similar to other methods used along the West Coast to grow Manila clams directly in the bottom substrate.

Clam rolls are made from ¼-inch VEXAR mesh, typically measuring 4 feet by 100 feet, and laid out in parallel rows (Figure 21). Before placement of the roll, the ground is tilled to allow for clams to bury themselves. This is followed by broadcast seeding within the predetermined footprint. After the mesh is laid out, it is anchored to the mudflat using ½-inch rebar staples or weighted down with rebar along the edges.

Figure 21. Photographs of Clam Rolls used by HIOC

At harvest time, approximately 2 to 4 years after planting, the mesh is removed (as needed) and a water rake is used to collect the clams (Figure 22). The rake is operated in 6 inches to 1-foot of water by a gas-powered pump that uses water to move the sediment and clams through a box with ½-inch mesh (Figure 23). The mesh retains the clams and allows for sediment to resettle. This technique reduces the total amount of substrate affected by HIOC's clam harvest as compared to historic methods, like using clam rakes. The pump itself is kept in a dingy or container to help prevent the potential of gas spilling.

Figure 22. Photograph of Clam Rake and ½-inch Mesh Basket used with the Clam Rake

Figure 23. Pump used to Operate the Clam Rake

5.0 SUPPORT OPERATIONS

Currently, HIOC uses floating work platforms to support their cultivation practices. Because of the efficiencies gained, HIOC proposes to incorporate a work barge into their standard support operations. Both types of vessels are described below.

5.1 Floating Work Platforms

HIOC is currently using floating work platforms that typically measure 8 feet by 12 feet to 15 feet by 30 feet. The work platforms are used to stage materials (e.g., baskets, lines, bags) and tools for maintenance work on the leases. On occasion, they are also used to stage culture gear while awaiting the proper tidal height to be installed at a growing area. The floating work platforms are typically constructed with roto molded floats, wood or aluminum, and plywood decking. They are moved around on the leases (as needed), and do not have a permanent mooring. Generally, the floating work platforms do not remain in the same location longer than one month. Anchoring does not occur in eelgrass beds. Activity associated with the work platforms is limited to 10 or less occasions per month. The work platforms are operated at appropriate depths in a manner that avoids grounding or scouring.

5.2 Work Barge

HIOC is planning to construct a new work barge to support cultivation activities. The work barge would be approximately 15 feet by 30 feet, and constructed of aluminum, wood, roto molded floats, and plywood decking. The work barge would be used for the mechanical grading and culling of oysters to reduce and minimize activities and boat trips on the bay to and from the boat launches. Construction would allow for the work barge to move from lease to lease (as needed) for grading and culling activities. An intake pump would be used to wash shellfish during grading and culling activities. The pump would either be electrically or gas powered, and would be installed with National Marine Fisheries Service (NMFS)-approved intake screens to avoid entrainment of juvenile fish. Discharge from the pump would also be screened to minimize sediment going back into the bay. The work barge would not have a permanent mooring and would not be anchored in any one place longer than one month. The work barge would not be anchored in or above an eelgrass bed. It would be operated at depths necessary to prevent grounding or scouring. Activity on the barge itself would vary seasonally and range from 0 days to 12 days per month.

6.0 BEST MANAGEMENT PRACTICES

Since its CDPs were issued, HIOC has continued to implement best management practices (BMPs) to improve environmental sustainability and further minimize ecological impacts in Tomales Bay. For example, HIOC has partnered with local stakeholders to develop a Marine Debris Management Plan (Appendix A) that has reduced culture debris to approximately 100 to 150 pieces of displaced gear annually (or approximately 1.0% to 1.5% of HIOC's total gear used).

Table 3. Current BMPs used by HIOC

Topic	Best Management Practice	Additional Documentation
Marine Debris	HIOC will implement a marine debris management plan that has been developed for Tomales Bay shellfish aquaculture operations.	Appendix A – Marine Debris Management Plan
Eelgrass (*Zostera marina*) Mapping	HIOC will continue working with The Nature Conservancy and UC Santa Cruz to map eelgrass in Tomales Bay over multiple years to better understand interactions between its culture gear/operations and eelgrass.	Appendix B – Tomales Bay Eelgrass Project
Eelgrass Beds	The CDP for Lease No. 430-10 requires a 5-foot buffer from eelgrass beds (as they existed in 1981). The CDP for Lease No. 430-15 requires that HIOC "not cut or disturb any eelgrass growing on the bay bottom during the installation or use of the proposed shellfish cultivation apparatus."	CDP No. 2-81-40 (Lease No. 430-10) CDP No. 1-94-55 (Lease No. 430-15)
Vessel Motors and Other Motors	HIOC uses highly efficient 4-stroke outboards and other motors (e.g., gas-powered motor for clam rake) that uses National Marine Fisheries Service-approved fish screens. All motors are muffled to reduce noise.	None
Vessel Maintenance and Fueling	HIOC maintains all vessels used in culture activities to limit the likelihood of release of fuels, lubricants, or other potentially toxic materials associated with vessels due to accident, upset, or other unplanned events. HIOC uses marine grade fuel cans that are refilled on land, and HIOC carries oil spill absorption pads and seals wash decks or isolates fuel areas prior to fueling to prevent contaminants from entering the water.	None
Vessel Anchors	HIOC anchors large vessels in the channel outside of eelgrass beds and uses smaller skiffs where eelgrass is present when the area is inundated.	None
Vessel Routes	HIOC has established vessel routes used to access their intertidal leases in areas with submerged aquatic vegetation (SAV) to avoid and minimize the potential to disturb SAV.	Appendix C – Vessel Routes
Pacific Herring (*Clupea pallasii*)	In any cultivation beds within or adjacent to eelgrass areas, HIOC will conduct visual surveys for Pacific herring spawn prior to conducting activities during the herring spawning season (October to April). If herring spawn is present, HIOC will suspend activities in the areas where spawning has occurred until the eggs have hatched and spawn is no longer present (typically 2 weeks).	None
Marine Mammal Haul Out Areas	HIOC maintains a 100-yard distance from identified seal or other marine mammal haul out areas on Pelican Point, Duck Island, and the east side of Hog Island.	Appendix C – Vessel Routes
Fish and Wildlife	During vessel transit, harvest, maintenance, inspection, and planting operations, HIOC avoids approaching, chasing, flushing, or directly disturbing shorebirds, waterfowl, seabirds, or marine mammals.	Appendix C – Vessel Routes

Appendix A
Marine Debris Management Plan

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APPENDIX A: MARINE DEBRIS MANAGEMENT PLAN

Hog Island Oyster Company (HIOC) worked closely with local citizens to address marine debris management. HIOC does a quarterly bay clean-up, with emphasis on the four HIOC leases (M-430-10, M-430-11, M-430-12, and M-430-15). There is an organized clean-up with all the Tomales Bay growers, and the goal is to conduct bi-weekly bay clean-ups on different sections of the bay. Figure A-1 and Figure A-2 provide the breakdown of responsibilities for clean-up events by grower. HIOC also helps organize a yearly bay clean-up event on California Coastal Clean Up Day. In addition to aquaculture debris, materials from other sources are also collected. During the 2016 to 2017 clean-up effort, waste associated with recreation (e.g., hats, cigarettes, styrofoam) and food (e.g., food wrappers, bottles) comprised the largest amount of debris collected.

The specific action items that are part of the marine debris management plan include:

- Regularly educate staff on the issues of marine debris. Ensure that all staff do not litter.
- Growers must strive to continually improve gear, so that breakage and scattering of debris is minimized.
- Avoid the use of any single-use materials. Minimize waste generation, practicing the principals of reduction, re-use, recycling and recovery. Purchase materials with a long a life span, preferably reusable but at least recyclable.
- Secure all buoys/floats properly to minimize loss.
- When tossing out loose bags or bundles of lightweight seed bags ensure that all bags are either heavy enough not to drift away or secured/anchored to prevent drifting or movement. All loose bags shall be secured within two weeks of being tossed out if not sooner.
- Avoid leaving tools, loose gear and construction materials on leases and surrounding area for longer than one week. All materials staged on leases shall be secured to prevent movement and or burial.
- If a culture method is unsuccessful, or is not in use for over a period of one year, all materials will be promptly removed.
- At a minimum, leases and surrounding areas shall be patrolled for lost and broken gear monthly. Patrols should occur as soon as possible or at least within two-weeks of any high wind or storm event.
- Growers will participate in quarterly bay clean-ups, which include walking the bay, shoreline and wetlands, to get to hard to reach areas. An itemized list of any, and all

debris (including shellfish gear), collected will be recorded and communicated to other growers. The goal is to reduce the total volume of debris that is accumulating in Tomales Bay.

- Growers will work with and collaborate with local community and other coastal clean-up people/organizations to coordinate bay wide clean-up efforts. All trash will be collected (including non-shellfish items) at all times.
- A review of lease escrow accounts shall occur on a regular basis to ensure that adequate funds are available to clean up abandoned leases. Growers shall retain the right to perform the clean-up of any abandoned leases themselves, so as to not decrease the balance in the escrow account.

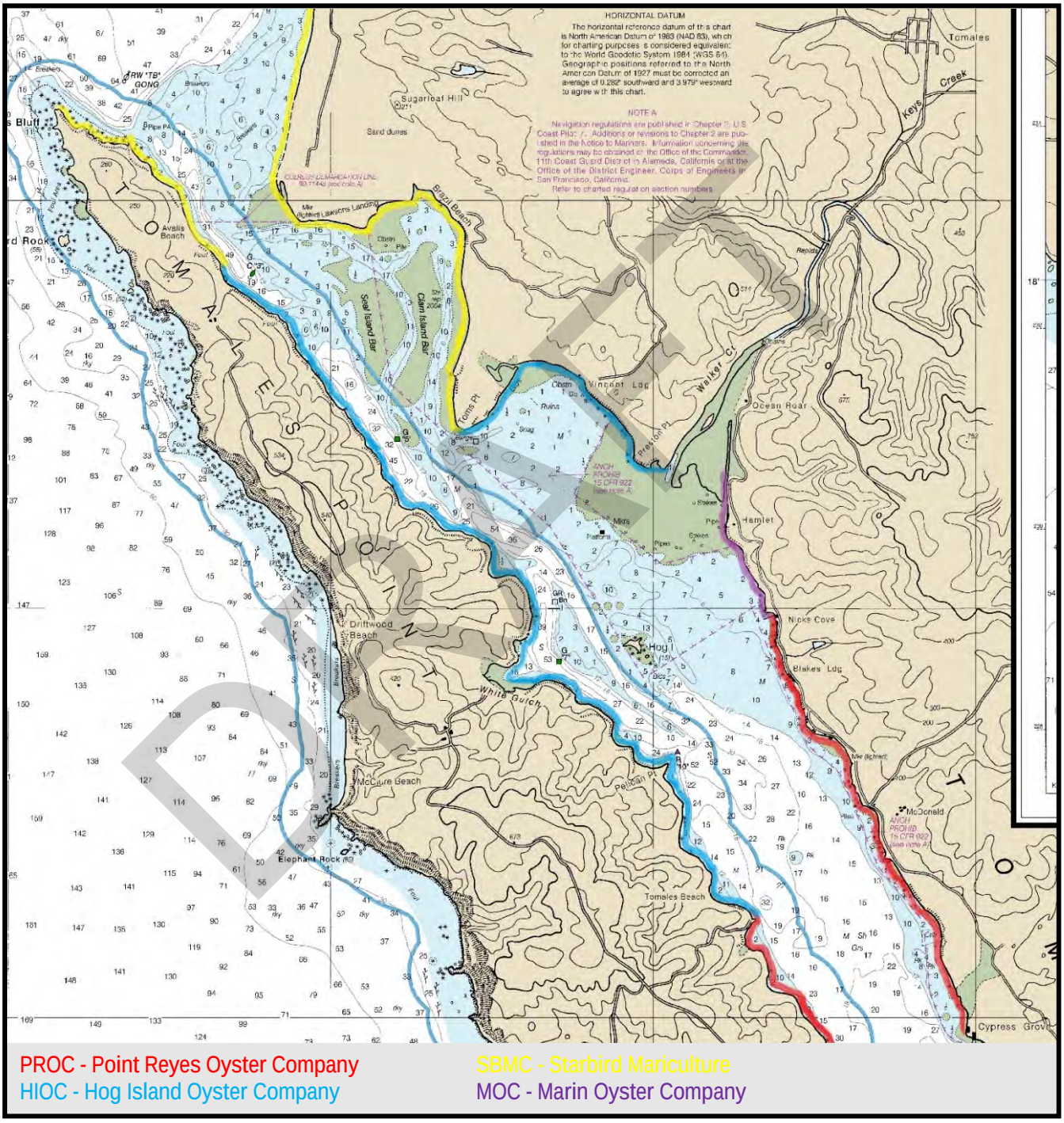

Figure A-1: Breakdown of Grower Responsible for Northern Tomales Bay Shorelines.

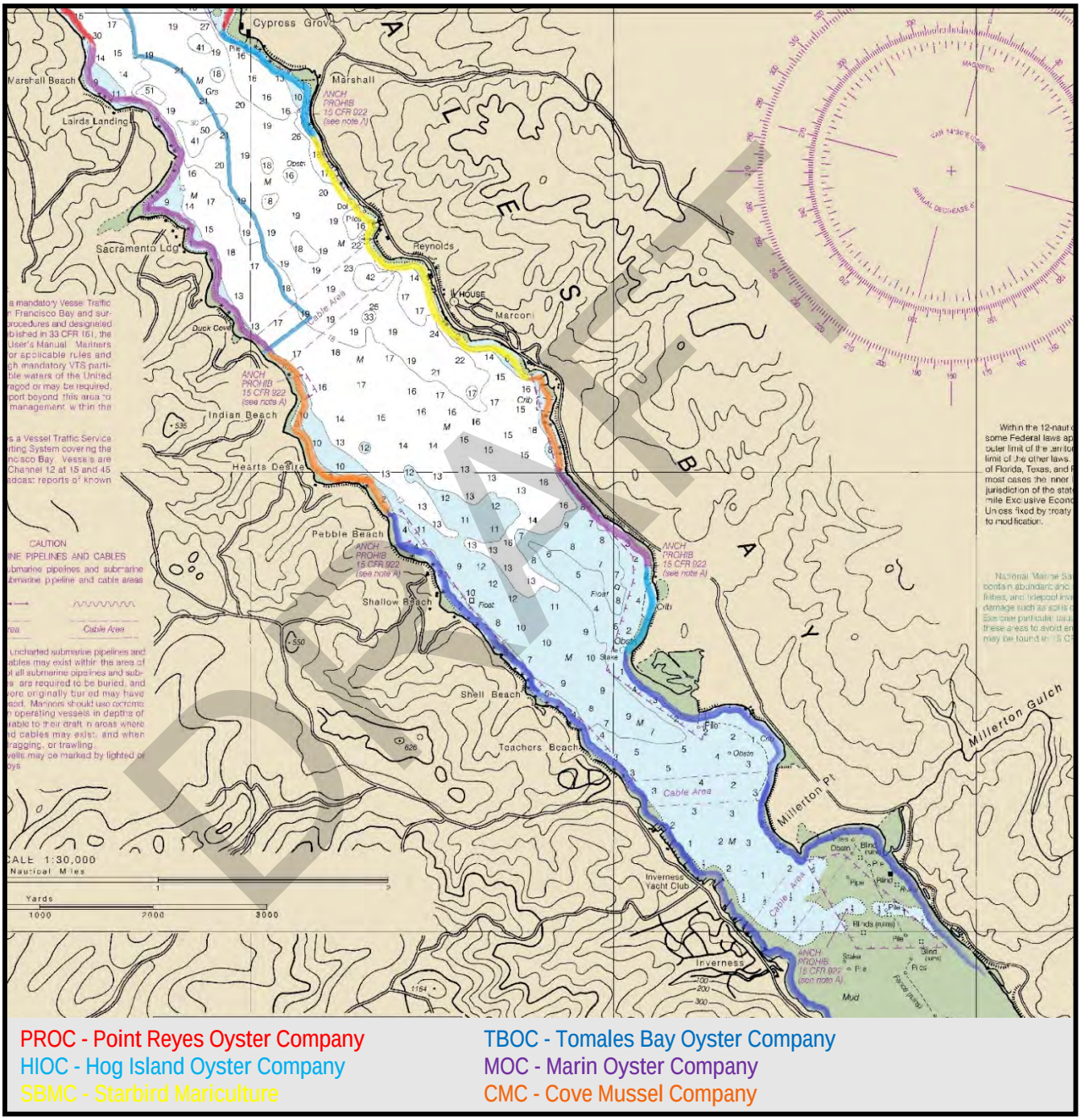

Figure A-2: Breakdown of Grower Responsible for Southern Tomales Bay Shorelines.

Appendix B
Tomales Bay Eelgrass Mapping

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APPENDIX B: TOMALES BAY EELGRASS MAPPING

The following scope of work was developed by Dr. Kristy Kroeker's lab from U.C. Santa Cruz (UCSC).

SCOPE OF WORK

In the absence of good data, state and federal regulations calling for no-net-loss of native seagrasses to protect essential fish habitat have led managers to take a precautionary approach when approving activities that may have an impact on these habitats. This has seriously constrained the expansion of shellfish aquaculture in California and elsewhere.

Both oyster aquaculture proponents and regulatory agencies need more information about the impacts of various aquaculture methods on seagrass growth and abundance. This information will improve the industry's ability to provide a high-quality, sustainable product with minimal adverse ecological impact and maximum ecological benefit. It will help the regulatory agencies develop permit conditions that are truly protective of the environment. Survey methods need to be developed that are inexpensive and easy to operationalize, produce high-quality data, and can be implemented regularly – preferably by permittees.

Unmanned aerial vehicles (UAVs or drones) are powerful new tools with myriad applications for science. Scientists are already employing UAVs in several locations to map out kelp forests and seagrass ecosystems, quickly and inexpensively generating data that can help improve our understanding of the impacts of oyster culture on seagrass and its associated marine communities.

The purpose of this project is to design a scientifically-rigorous monitoring program that can document trends in seagrass growth and abundance in the Tomales Bay and Humboldt Bay operations of the Hog Island Oyster Company using UAVs. Dr. Kroeker ("Grantee") will work closely with TNC staff to develop the methods necessary to monitor eelgrass and aquaculture interactions over time in Tomales Bay and Humboldt Bay, CA, that can be used by HIOC to establish a long-term monitoring program.

In particular, Grantee will collaborate with The Nature Conservancy ("TNC") and Hog Island Oyster Company ("HIOC") to develop a monitoring program to measure the area of eelgrass cover and seagrass ecosystem function in three locations with and without HIOC aquaculture operations. The Grantee will focus initial work on the recent (winter 2016) HIOC aquaculture deployment at Tom's Point in Tomales Bay to develop methods. In addition, the Grantee will replicate the methods developed at Tom's Point for the two new HIOC leases in Humboldt Bay.

Grantee will design the sampling scheme, including both in-situ monitoring and drone surveys - and participate in initial unmanned aerial vehicles ("UAV") surveys that will be piloted by TNC or HIOC staff. The sampling will follow a BACI (before-after-control-impact) design, with unmanned aerial and subtidal sampling occurring before and after the aquaculture deployment in control and impact (i.e., aquaculture deployment) locations. For the Tom's Point deployment, the Grantee will rely on a modified BACI design using aerial surveys collected in 2013 by other investigators to provide the "before" data. In addition, the Grantee will sample three control sites of similar area to the aquaculture deployment with increasing distance from the aquaculture lease. This will increase power and provide an opportunity to test what attributes are preferable (e.g., distance from impact site) for future control sites. Each "site" (e.g., aquaculture lease plus three controls) will include ~5 onshore-to-offshore aerial and subtidal transects, that cross the seagrass to mud transition zone, with those in the aquaculture lease occurring between the rows of the rack and bag aquaculture deployments. This design will allow the Grantee to monitor onshore encroachment or offshore retreat of seagrass with the aquaculture. These methods will be modified as is pertinent for sampling of the two Humboldt Bay leases, with at least one control and one "impact" site for each lease.

Grantee will perform SCUBA surveys to quantify the relationship between measures of eelgrass cover from UAV surveys and important seagrass attributes used to determine eelgrass and ecosystem status by state and federal agencies and other scientists (e.g., seagrass density, algal and invertebrate abundance, and community structure).

Grantee will perform in situ environmental monitoring at one control and the impact site for each aquaculture lease to better understand the potential drivers of eelgrass-aquaculture interactions (e.g., turbidity and PAR). This will include multi-day deployments of PAR sensors (and other sensors provided by the Kroeker Lab at no cost). In addition, the Grantee will collect discrete water samples at all control and impact sites in Tomales Bay for carbonate chemistry and nutrients characterization, which will be processed in the Kroeker Lab at UCSC.

Last, Grantee will analyze the seasonal patterns in eelgrass and aquaculture interactions for the 2017 eelgrass growing season (spring-fall) to produce a peer-reviewed publication, to be co-authored with TNC science staff.

DELIVERABLES

1. Long-term monitoring design for aquaculture leases, based off of the work performed under this grant.

2. Final report on seagrass and aquaculture interactions at Tom's Point aquaculture lease, plus other leases if access is granted by HIOC with adequate time to undertake surveys during the grant period.
3. Peer-reviewed publication on aquaculture-seagrass interactions, and mechanisms underlying the outcomes using this case study.

BUDGET

The grant will be used to support PhD student Sarah Lummis to lead monitoring design (1), final report (2), and the peer-reviewed publication (3).

In addition, the grant will be used to support 1 month of summer salary for PI Kristy Kroeker, to mentor the graduate student, oversee project, and contribute to writing of final report and peer-reviewed publication.

Last, the grant will be used to purchase 2 PAR sensors, which will allow us to test the mechanisms underlying changes in seagrass cover associated with aquaculture (e.g., light availability). All other water samples will be processed at UCSC in the Kroeker Lab at no cost.

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Appendix C
Vessel Routes

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APPENDIX C: VESSEL ROUTES

Hog Island Oyster Company (HIOC) has developed vessel routes in and around SAV or near marine mammal haul-out locations and areas where marine birds congregate. The following information is based on current best management practices associated with typical operations.

Vessel Routes in SAV

At low tides (≤ 3 feet), HIOC will avoid navigating over native eelgrass (*Zostera marina*) beds by staying in deeper channels, as much as possible, using the routes established on the route map (Figure C-1). Lease M-430-12 in the south end of the bay has deep water access to the lease area and therefore does not have a specified route. Larger work barges and work platforms are anchored outside of eelgrass and smaller skiffs are used to access any areas where eelgrass is present. All boats have an onboard global positioning system (GPS), and HIOC deploys floating markers, where appropriate, on the leases. Using these routes will help minimize impacts to eelgrass beds. In periods of darkness or inclement weather, HIOC staff use lights and onboard GPS units to aid navigation.

Vessel Routes Near Marine Mammal Haul-out Locations or Marine Birds

HIOC will maintain a distance of at least 100 yards from any identified seal haul-out site and will not intentionally approach any observed marine mammal in the water. Identified seal haul-out locations in Tomales Bay include Pelican Point, Duck Island, and the east side of Hog Island (Figure C-1). HIOC will report any injured or dead seals to the Marine Mammal Center, 415-289-SEAL. In addition, HIOC will avoid disrupting or hurting birds that are in the bay, especially during feeding events.

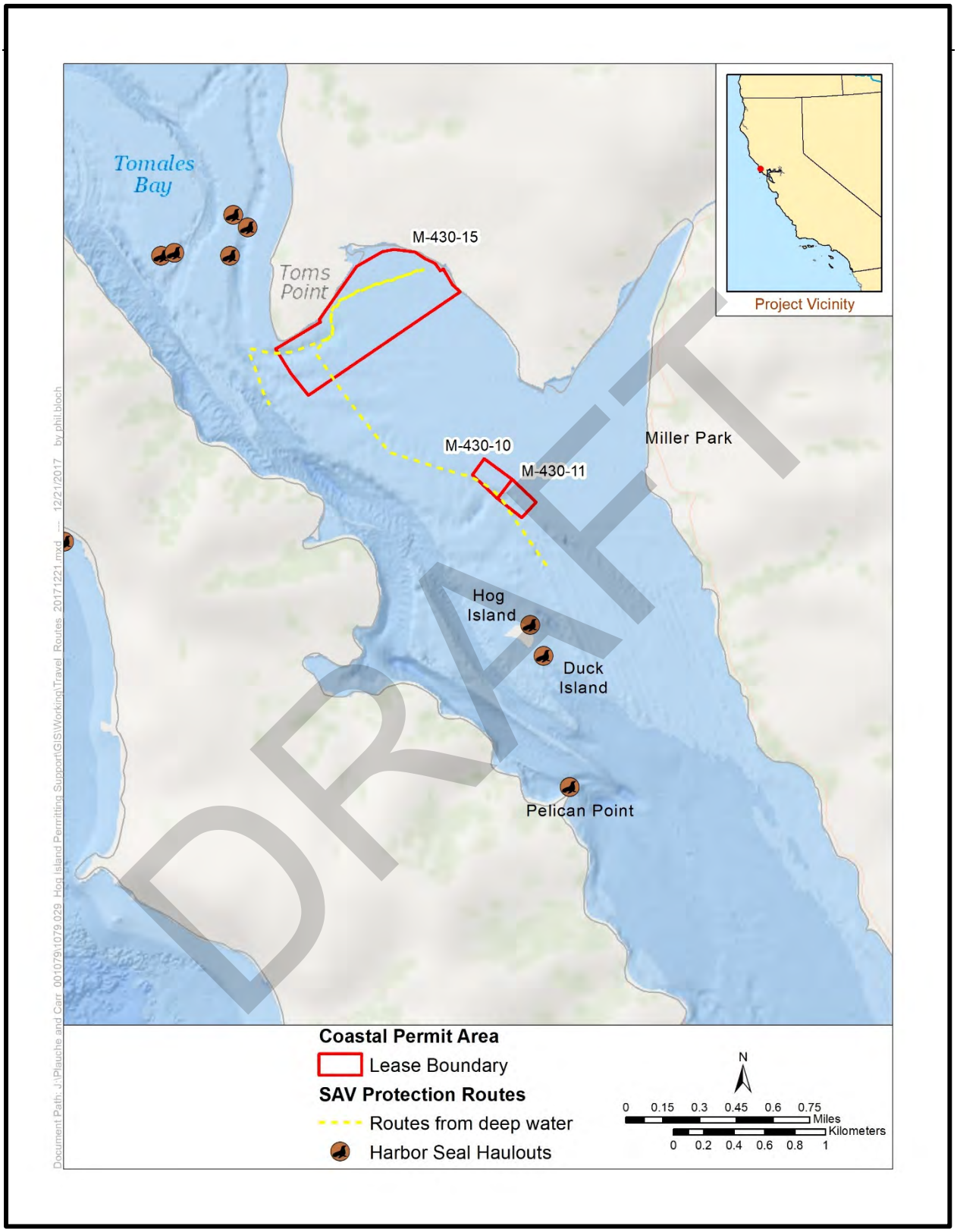

Figure C-1: Vessel Route to access Leases No. M-430-10, M-430-11, and M-430-15 from East Channel or West Shore in Tomales Bay, California.