STAFF SUMMARY FOR DECEMBER 11-12, 2019

33. HOG ISLAND OYSTER COMPANY

Today's Item **Information ☐** **Action ☒**

Consider approving amendments to Hog Island Oyster Company's state water bottom lease numbers M-430-10, M-430-11, M-430-12 and M-430-15 for the purposes of aquaculture in Tomales Bay.

Summary of Previous/Future Actions

- Approved Lease M-430-10 renewal for 25 years — Nov 3, 2005; Santa Barbara
- Approved Lease M-430-11 renewal for 25 years — Feb 8, 2008; San Diego
- Approved Lease M-430-12 renewal for 15 years — Aug 3, 2011; Sacramento
- Approved Lease M-430-15 renewal for 15 years — Dec 9-10, 2015; San Diego
- FGC received request for four lease amendments — Feb 6, 2019; Sacramento
- FGC confirmed that continued operations were authorized during amendment process — Jun 11, 2019; Redding
- **Today approve amendments for four Leases** — **Dec 11-12, 2019; Sacramento**

Background

FGC has the authority to lease state water bottoms to any person for aquaculture for an initial lease term not to exceed 25 years (sections 15400 and 15405, California Fish and Game Code). Regulations require that any changes to existing leases must be approved by FGC (Section 237(c)(1), Title 14, California Code of Regulations).

Hog Island Oyster Company (HIOC) currently cultures shellfish on four state water bottom leases (M-430-10, M-430-11, M-430-12 and M-430-15) for purposes of aquaculture in Tomales Bay under lease renewals approved by FGC between 2005 and 2015 for periods of 25 or 15 years. At its Feb 2019 meeting, FGC received a request from HIOC to amend the four leases to ensure consistency in the types of species and culture methods authorized, following its application to the California Coastal Commission (CCC) to update and consolidate coastal development permits for the lease areas (Exhibit 1).

The culture species requested by HIOC for the four lease areas are Pacific oyster (*Crassostrea gigas*), Eastern oyster (*Crassostrea virginica*), Kumamoto oyster (*Crassostrea sikamea*), European flat oyster (*Ostrea edulis*), Olympia oyster (*Ostrea lurida*), Manila clam (*Venerupis phillipinarum*), and Mediterranean mussel (*Mytilus galloprovincialis*).

The culture methods requested for the four lease areas are rack and bag, bottom bag, intertidal longlines, floating longlines, rafts and bottom trays; the request for bottom trays was later withdrawn by the lessee and is not considered further here.

HIOC acknowledged inconsistencies in its current operations relative to lease authorizations, which it wishes to rectify through the proposed lease amendments; a comparison of desired versus authorized species and methods by lease are shown in Exhibit 2. In May 2019, FGC staff notified HIOC that it would be allowed to continue its current operations within the

existing, legally-defined lease boundaries for one year while the lease amendment process ensued (Exhibit 3); FGC affirmed this action at its Jun 2019 meeting.

As part of the CCC's CDP amendment process, the proposed species and methods were evaluated for environmental impacts. For purposes of the proposed CDP amendment, CCC prepared a substitute environmental document consistent with its certified regulatory program identified in the California Environmental Quality Act (CEQA) guidelines and codified in Section 15251 of Title 14, California Code of Regulations. In so doing, CCC determined that the project, as conditioned, incorporates measures necessary to avoid any significant environmental effects based on the CCC's permit conditions (Exhibit 4).

FGC staff and DFW have reviewed the CCC's record on behalf of FGC as a responsible agency and concurs that no significant effects will result from the approval of the project based not only on the CDP conditions, but also the conditions in the draft lease amendments.

Based on its review of the proposed culture species and methods, DFW supports authorizing the species and methods (excluding bottom trays) in the four lease areas for consistency, recognizing that FGC approval does not supersede permit conditions from other regulatory agencies (Exhibit 5).

Subsequent to its application for lease amendments, HIOC notified FGC staff and DFW staff that it wishes to amend the boundary lines for two of the lease areas (M-430-10 and M-430-12), consistent with its approved CDP; DFW staff will work with HIOC to resolve boundary inconsistencies and the request will be scheduled for FGC consideration at a later date.

Significant Public Comments

The Environmental Action Committee of West Marin supports the HIOC lease agreements as well as development of an aquaculture best management practices rulemaking (Exhibit 6).

Recommendation

FGC staff: Support the DFW recommendation. In exercising its own independent judgment, FGC can rely upon the California Coastal Commission's substitute environmental document with FGC as a responsible agency under Section 15253 of the CEQA guidelines.

DFW: Support the lease amendments for cultivating the species and methods requested by HIOC and evaluated under the California Coastal Commission's CDP for leases M-430-10, M-430-11, M-430-12, and M-430-15 for the purposes of aquaculture.

Exhibits

1. Letter from John Finger, Hog Island Oyster Company, requesting lease amendments, received via email on Jan 30, 2019
2. Tables depicting authorized and desired species and methods for Hog Island Oyster Company leases
3. Letter from FGC to John Finger, Hog Island Oyster Company, dated May 30, 2019
4. *Adopted Findings, Hog Island Oyster Company, Inc.,* California Coastal Commission, dated Feb 8, 2019

5. DFW memo, dated Nov 19, 2019
6. Email letter from Morgan Patton and Ashley Eagle-Gibbs, Environmental Action Committee of West Marin, received Nov 26, 2019

Motion/Direction

Moved by _____ and seconded by _____ that the Commission has reviewed and considered the California Coastal Commission's substitute environmental document and related documents, as well as the record before this Commission. This Commission has determined, consistent with Section 15253 of the CEQA implementing guidelines, that changes or alterations have been required through the coastal development permit which avoid any significant environmental effects as identified in the substitute environmental document and the project as approved will not have a significant effect on the environment due to coastal development permit conditions and the amended lease conditions. Therefore, this Commission approves the amendments to state water bottom leases with Hog Island Oyster Company, numbers M-430-10, M-430-11, M-430-12 and M-430-15, to allow for cultivation of the species and cultivation methods identified in the staff summary.

OR

Moved by _____ and seconded by _____ that the Commission denies the application for lease amendments to the species and methods by Hog Island Oyster Company for state water bottom lease numbers M-430-10, M-430-11, M-430-12, and M-430-15 for purposes of aquaculture in Tomales Bay.

HOG ISLAND OYSTER CO.
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January 28, 2019

Melissa Miller-Henson
Acting Executive Director
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090

Dear Ms. Miller-Henson,

We are the current leaseholder of four state tideland parcels in Tomales Bay (M430-10, M430-11, M430-12, and M430-15). We have been operating a shellfish farm on these leased tidelands for several decades. We are currently updating our Coastal Development permits with the California Coastal Commission, combining the four existing CDPs, some which have become outdated, into one CDP. We are undergoing a similar process to update our permits with the U.S. Army Corps of Engineers. During this process, we realized that we also need to update the allowed species and culture methods on our leases with the Commission.

We would like to amend our leases to insure that they are all consistent, in terms of allowed species and culture types. We are not proposing any increases in acreage, new species, or new cultivation methods as compared to what is currently utilized on at least a portion of our leases.

We would like to amend our leases so that they each allow cultivation of the following species: Pacific oyster (*Crassostrea gigas*), Eastern oyster (*Crassostrea virgincia*), Kumamoto oyster (*Crassostrea sikamea*), European flat oyster (*Ostrea edulis*), Olympia oyster (*Ostrea lurida*), Manila clam (*Venerupis phillipinarum*), and Mediterranean mussel (*Mytilus galloprovincialis*). We would also like to amend all leases to allow the use of the following cultivation types: rack and bag, bag/tray on bottom, intertidal longlines (with bags/baskets), floating longlines, and rafts.

While we may not employ all techniques or species on each lease at the same time, this approach would allow us the flexibility to farm adaptively in a changing environment. We believe that our existing methods are environmentally sustainable and can be used interchangeably without a significant impact on the surrounding habitat. This flexible and adaptive management approach is also anticipated to allow Hog Island to increase productivity and efficiency, permitting modifications in the farm footprint in response to ecological conditions, environmental changes, and market conditions.

We have also attached a table showing the currently allowed species and culture types, as well as our project description submitted to the Coastal Commission.

Thank you,

John Finger

Ⓑ HOG ISLAND OYSTER CO. IS A CERTIFIED B CORPORATION - PEOPLE USING BUSINESS AS A FORCE FOR GOOD
20215 SHORELINE HWY PO BOX 829 MARSHALL, CA 94940 PHONE 415 663 9218 FAX 415 663 9246

Lease Species and Gear Comparison

Lease No.	Location*	Permitted Species and Methods			Current Cultivation	
		Acres	Species	Methods	Species	Methods
M-430-10	Intertidal area halfway between Tom's Point and Miller Park	5.0	Manila clam, Pacific oyster, European flat oyster, Eastern oyster, Olympia oyster, and red abalone	Racks and stakes	Pacific oyster, European flat oyster, Atlantic oyster, Kumamoto oyster	Racks, bottom bags, intertidal longlines, and Stanway units (to be phased out)
M-430-11	Intertidal area just north of Hog Island	5.0	Manila clam, Pacific oyster, European flat oyster, Eastern oyster, Olympia oyster, Mediterranean mussel, and red abalone	Stakes, racks, and longlines	Pacific oyster, European flat oyster, Atlantic oyster, Kumamoto oyster	Racks and bottom bags
M-430-12	Intertidal area 3 miles south of Marconi Cove	30.0	Pacific oyster, Eastern oyster, European flat oyster, Quahog clams, Manila clams, native littleneck clams, and Bay mussel	Racks and rafts	Pacific oyster and Kumamoto oyster	Racks, intertidal longlines, and floating longlines
M-430-15	Intertidal and subtidal areas adjacent to Tom's Point	128.2	Pacific oyster, Manila clams, and Bay mussel	Racks and bottom bags	Pacific oyster and Manila clams	Bottom bags, intertidal longlines, racks, and clam roll (to be phased out)

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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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."

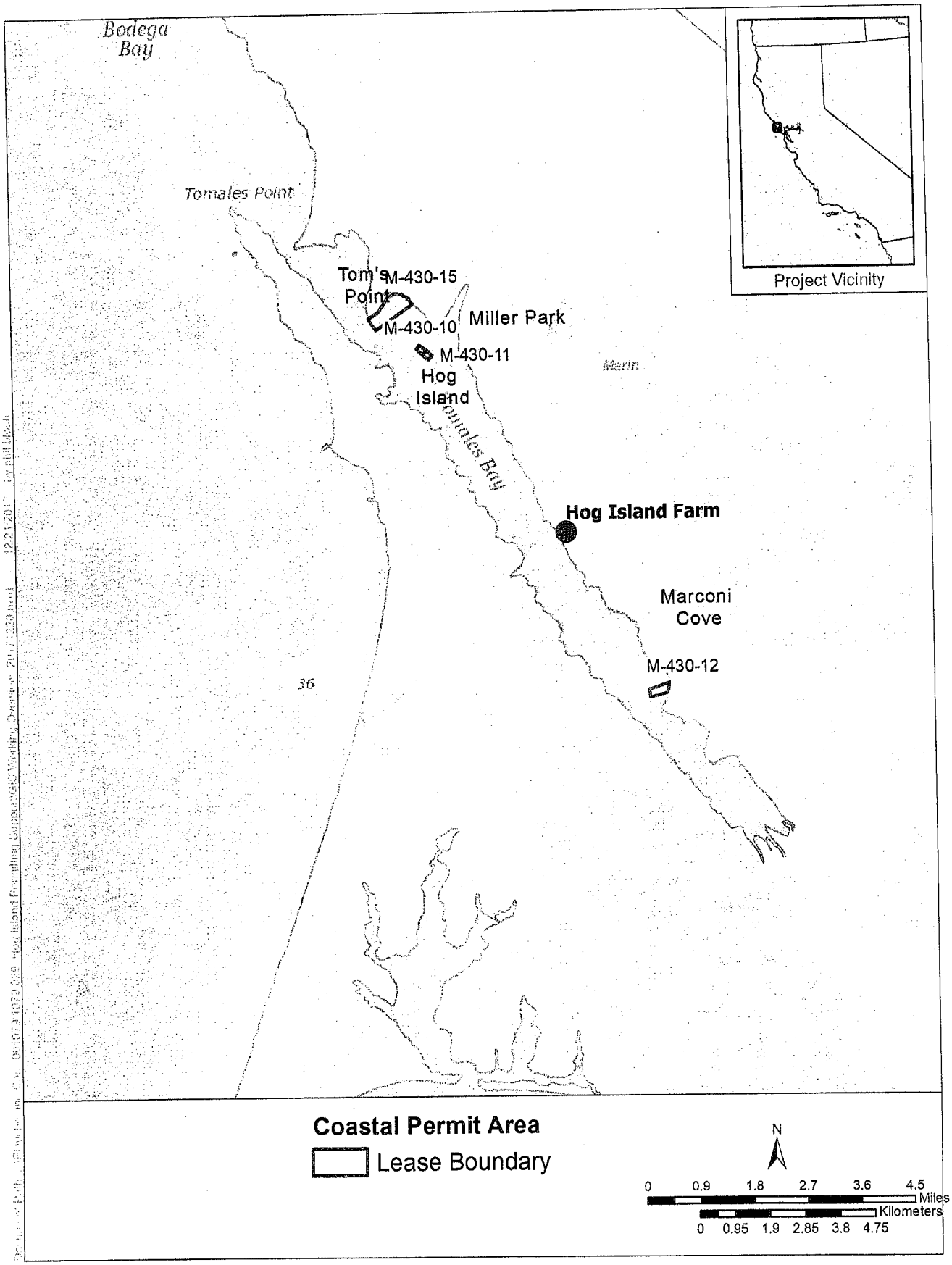

Figure 1. Location of HIOC Operations in Tomales Bay, California

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.

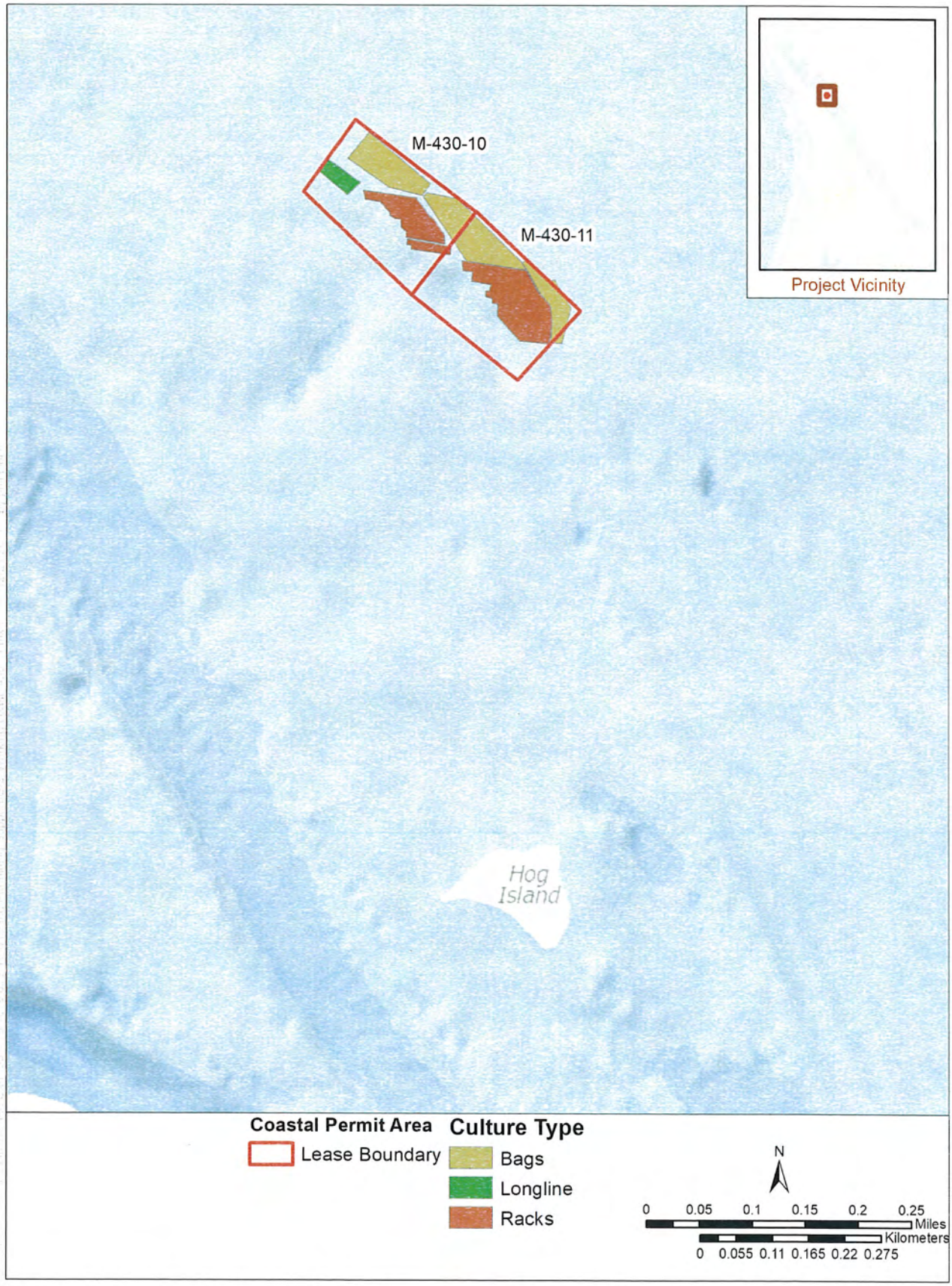

Figure 2. Lease No. M-430-10 (CDP No. 2-81-40) and Lease No. M-430-11 (CDP No. 2-84-02) in Tomales Bay, California

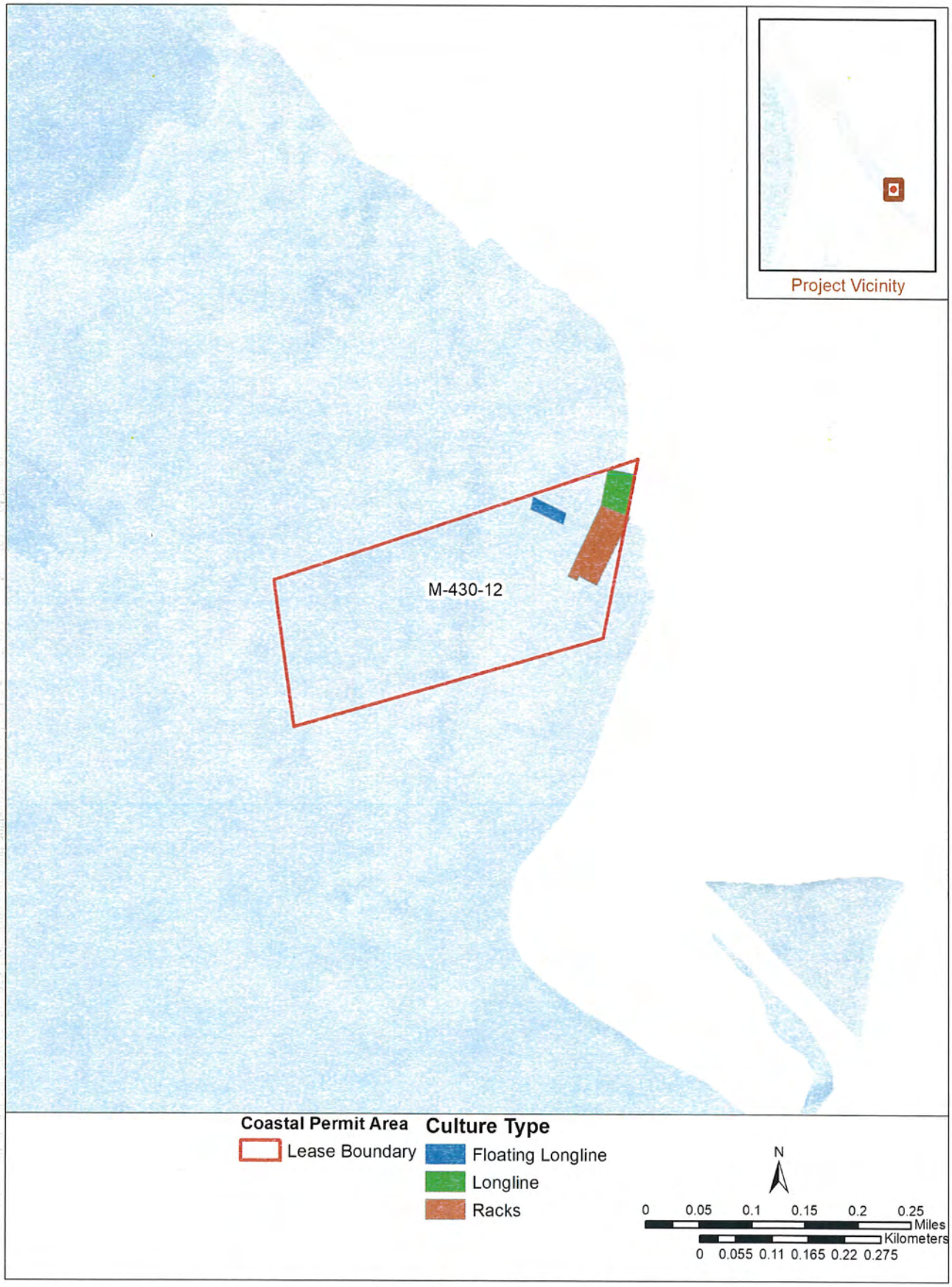

Figure 3. Lease No. M-430-12 (CDP No. 2-84-10) in Tomales Bay, California

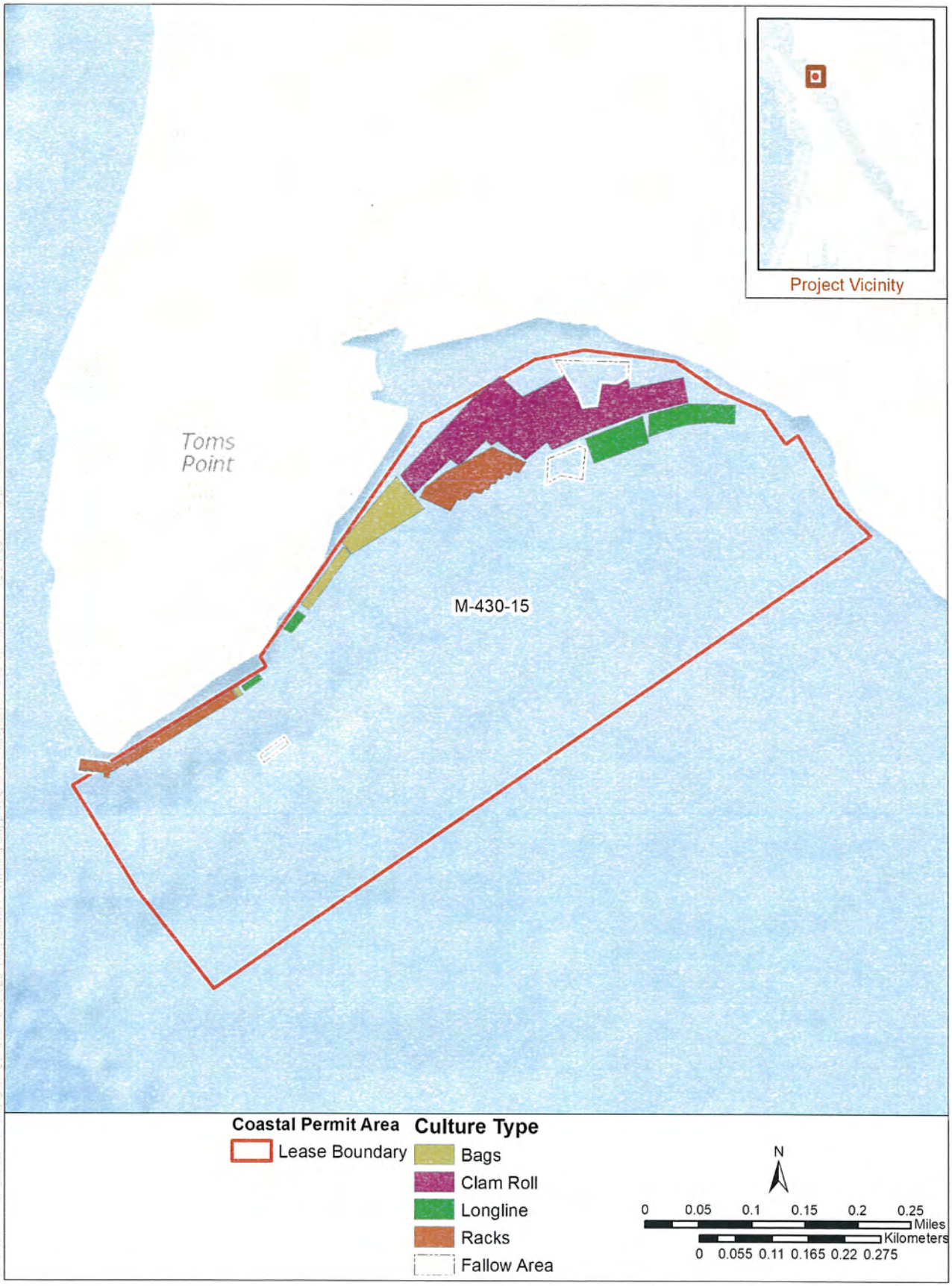

Figure 4. Lease No. M-430-15 (CDP No. 1-94-55) in Tomales Bay, California

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.

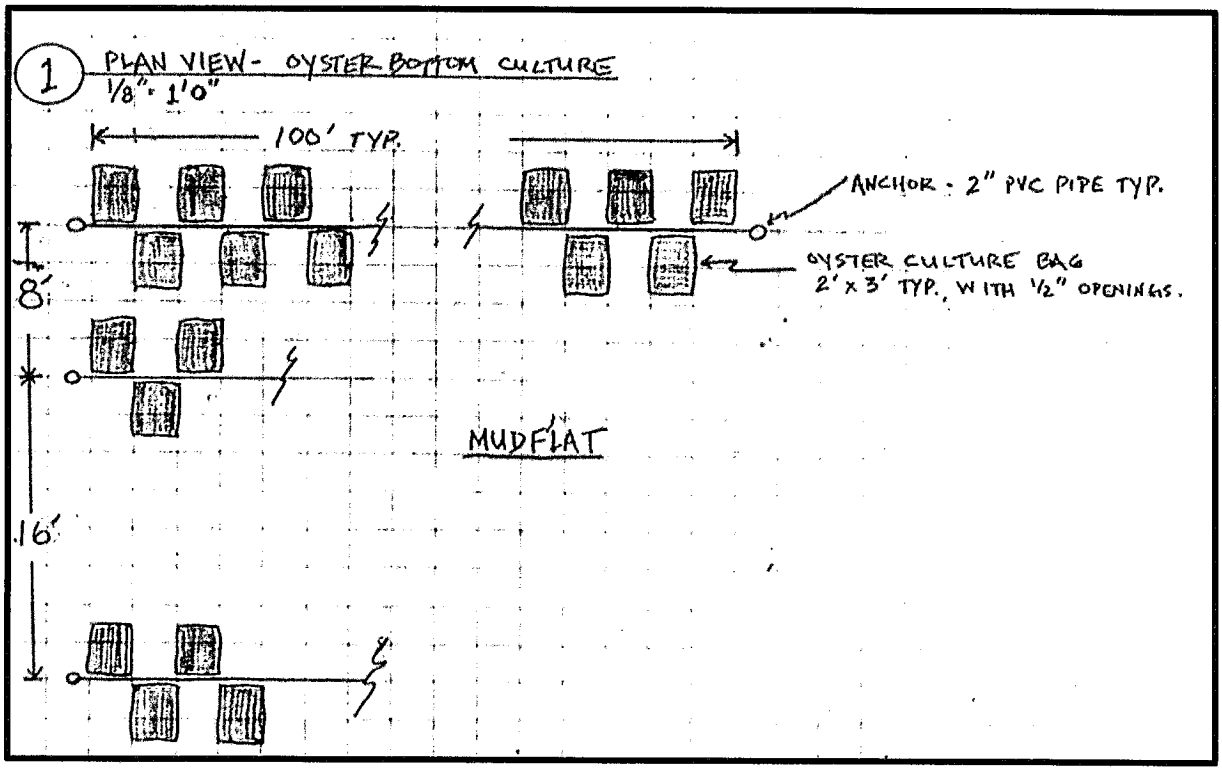

Figure 5. Typical On-Bottom Bag Culture Layout
Note: HIOC does not currently include a 16-foot space between groups of bottom bags. The plan shown is otherwise correct.

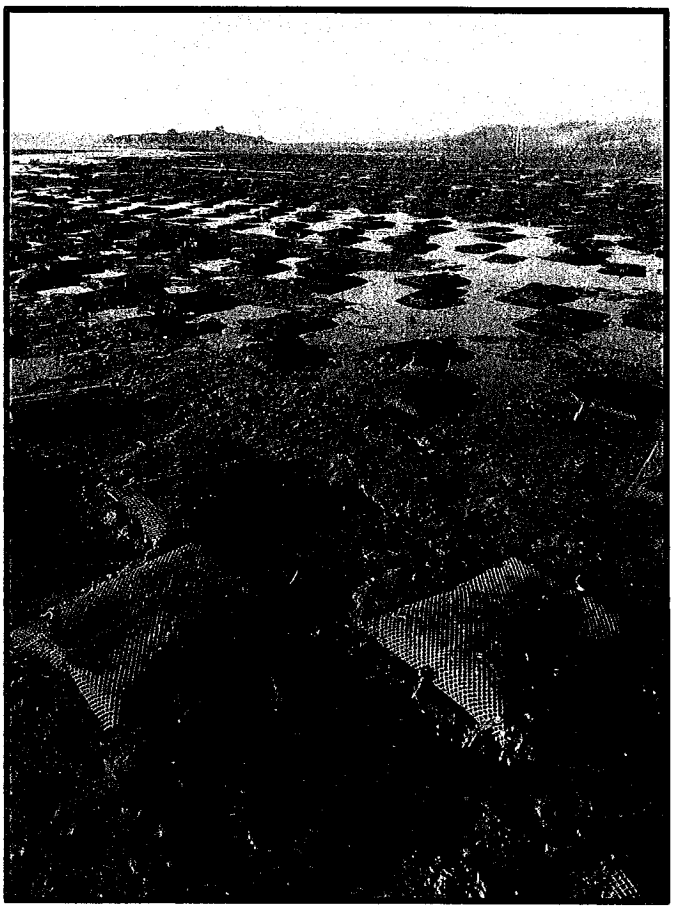

Figure 6. Photograph of On-Bottom Bag Culture with Oysters.

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.

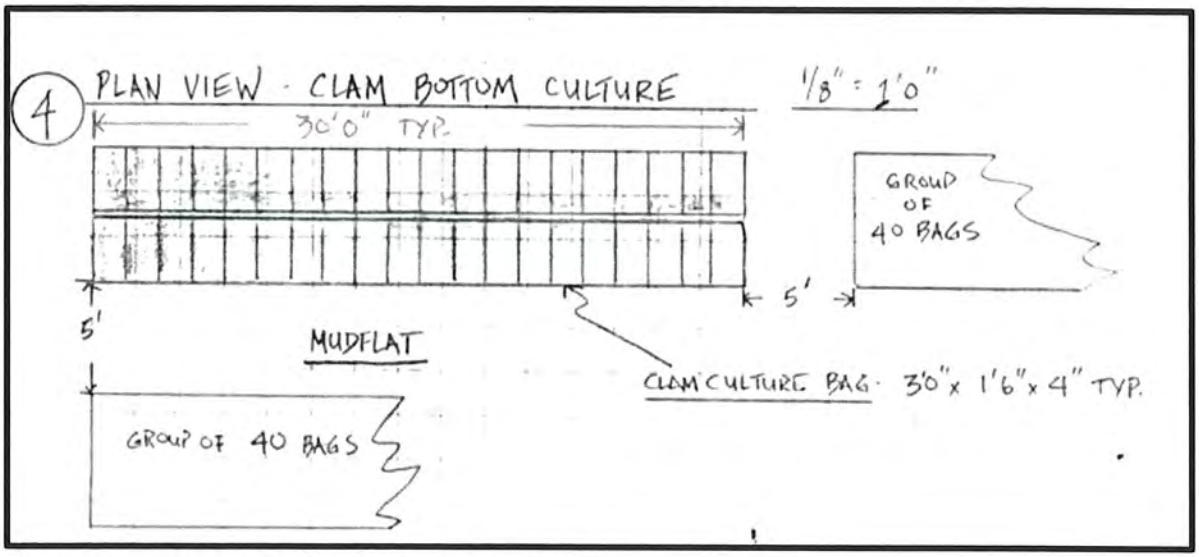

Figure 7. Typical On-Bottom Clam Bag Layout
Note: HIOC does not currently include a 5-foot space between groups of clam bags. The plan shown is otherwise correct.

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).

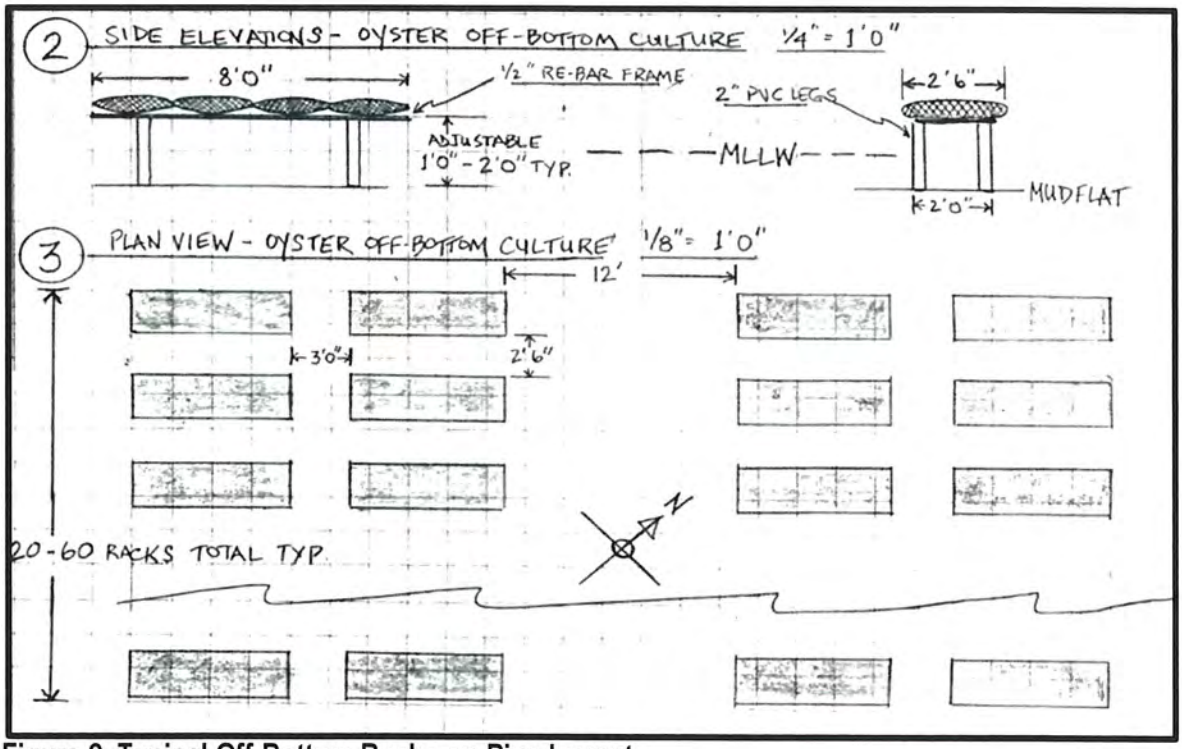

Figure 9. Typical Off-Bottom Racks-on-Pipe Layout

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.

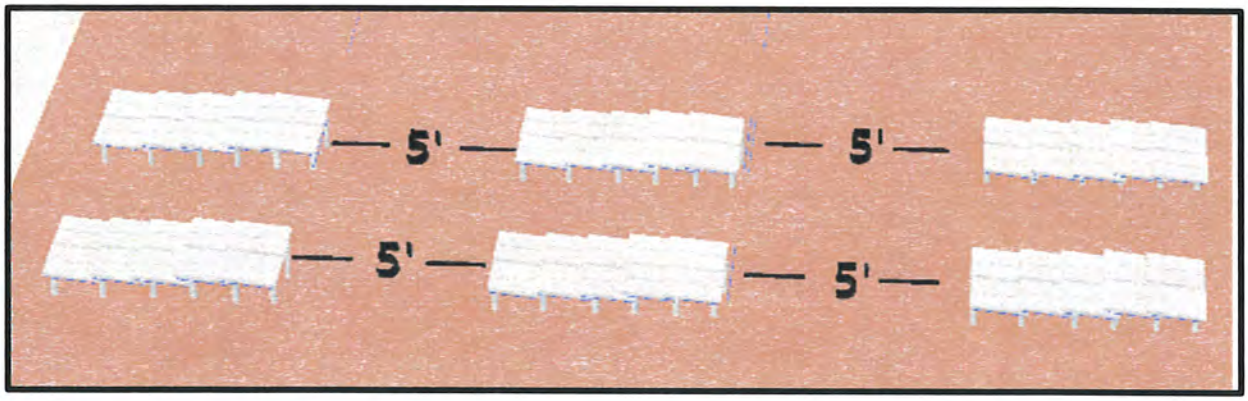

Figure 11. Typical Spacing between Sections of Overlapped Racks

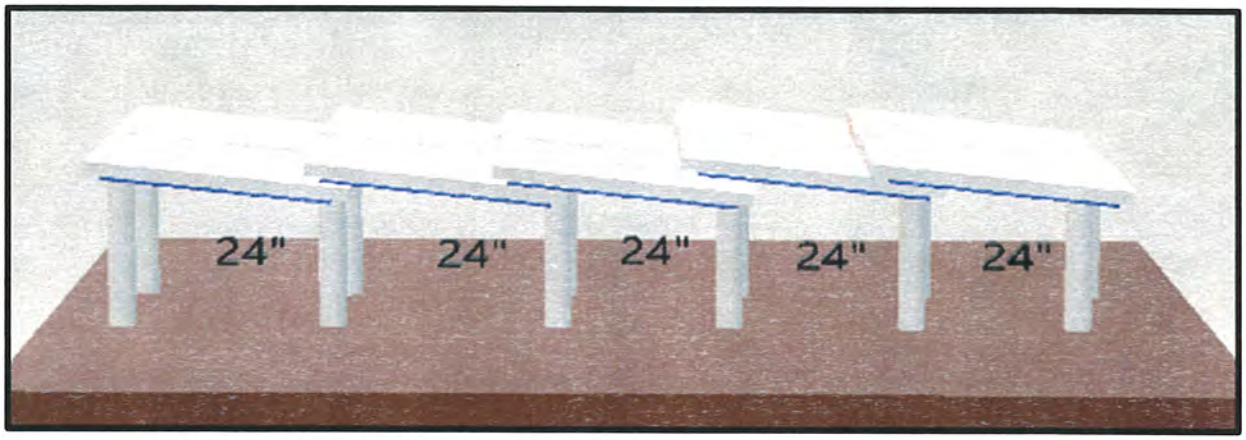

Figure 12. Typical Overlapped Racks Spacing: Side View

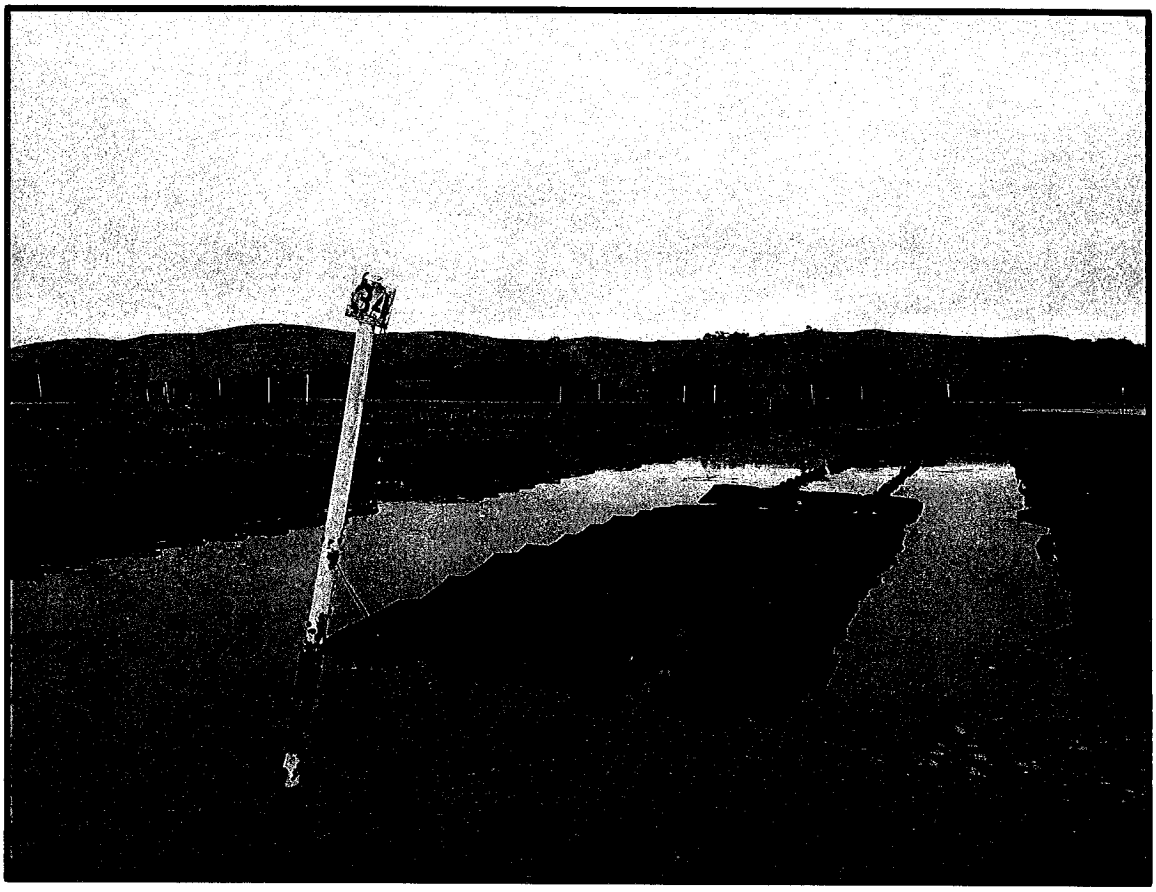

Figure 13. Photograph of Off-Bottom Overlapped Racks used by HIOC

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.

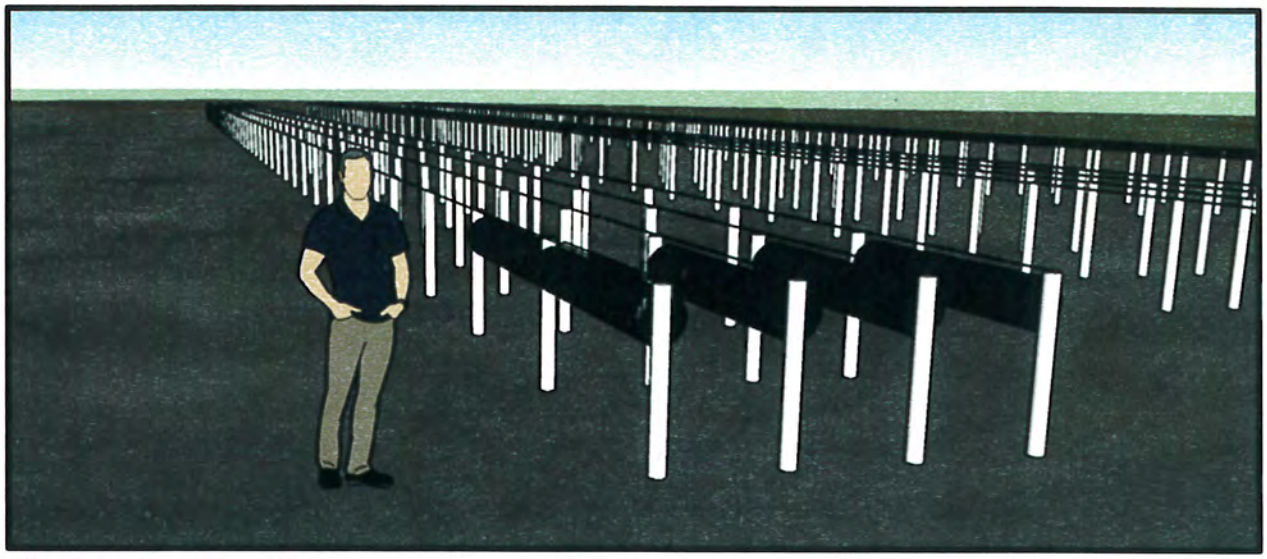

Figure 14. Diagram of Multiple Longlines with Baskets

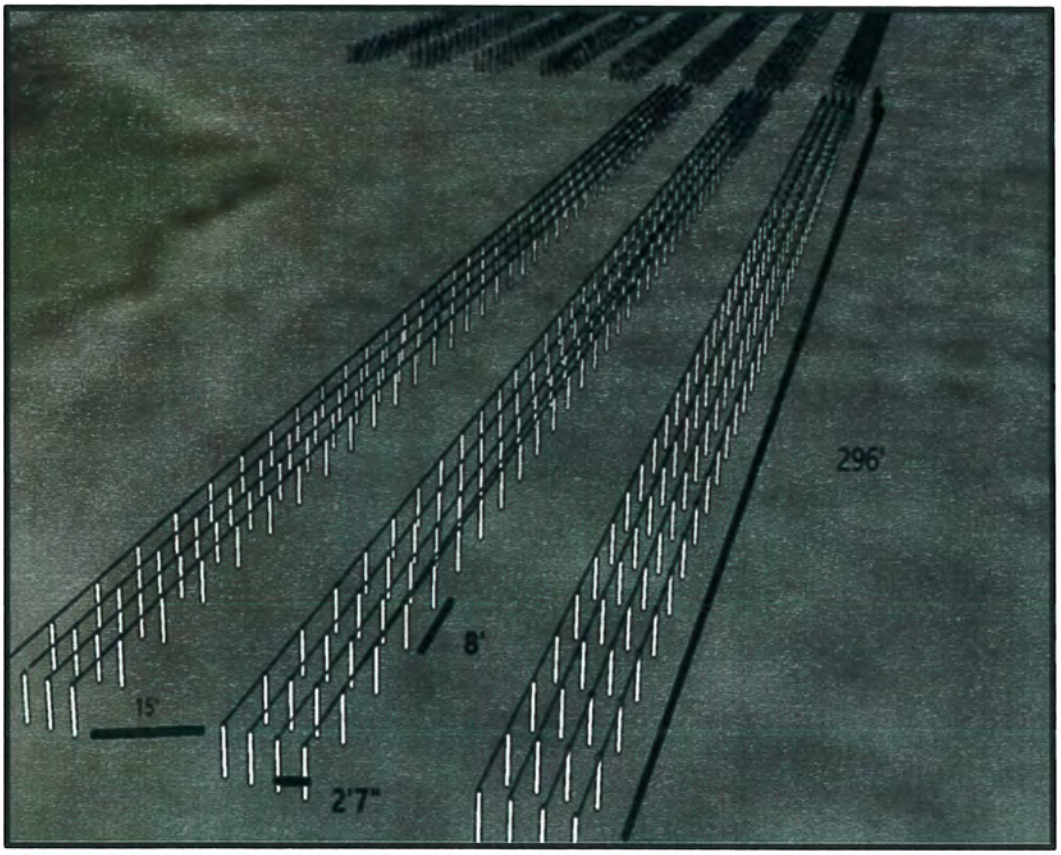

Figure 15. Digital Representation of Longlines

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

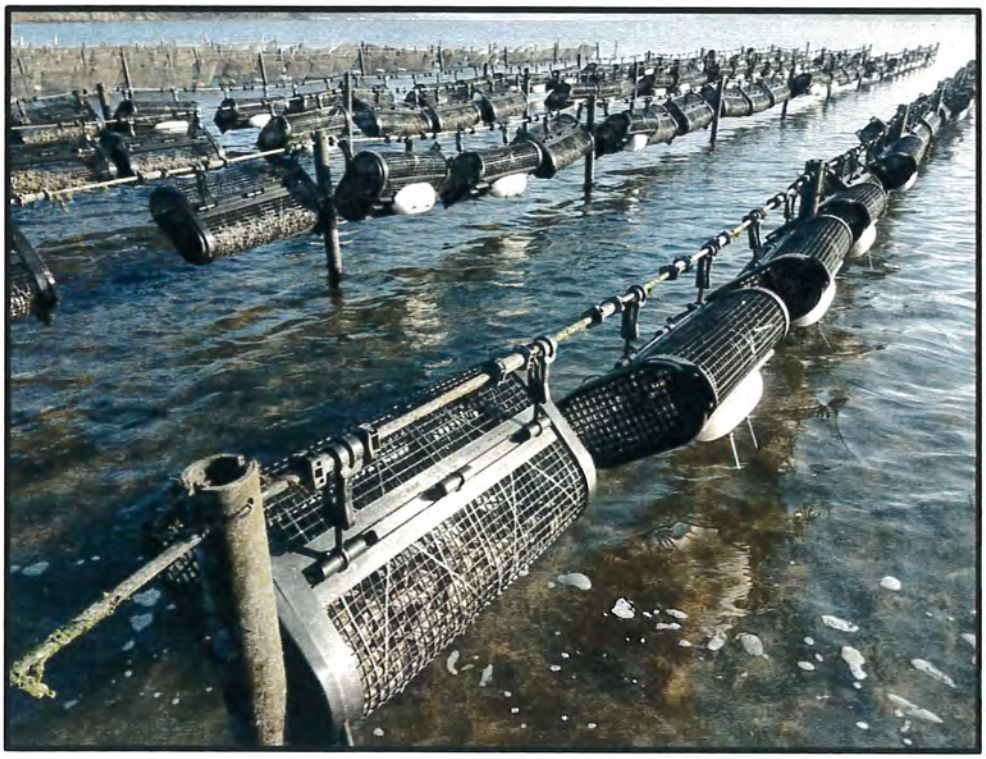

Figure 17. Photograph of Longlines with Baskets used by HIOC

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.

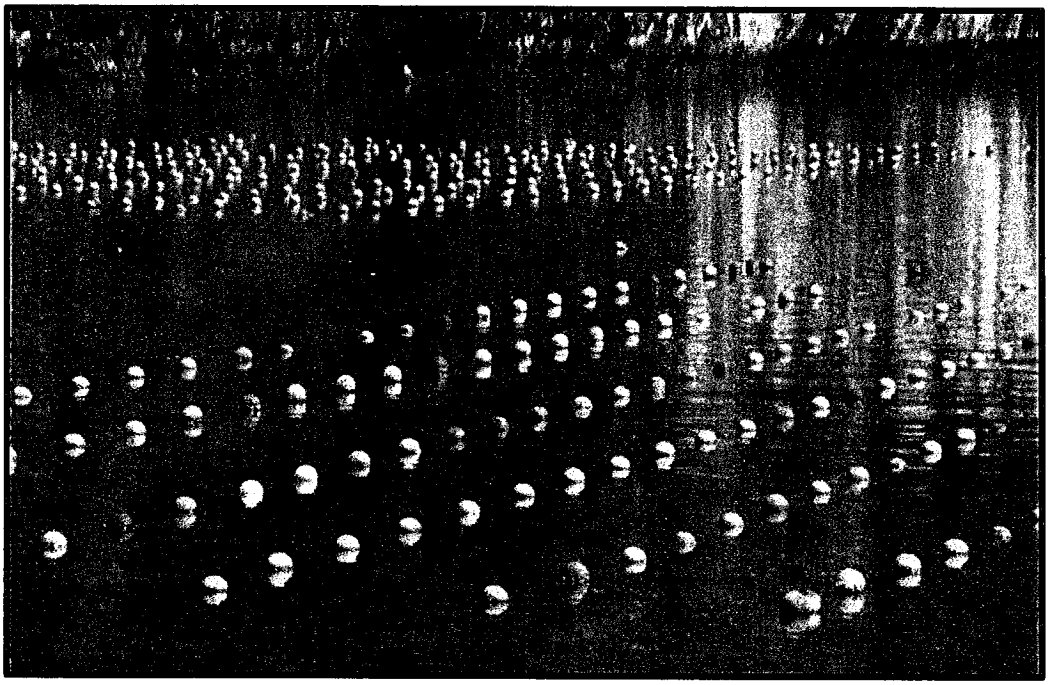

Figure 18. Photograph of What Floating Longline Look Like at the Water's Surface

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

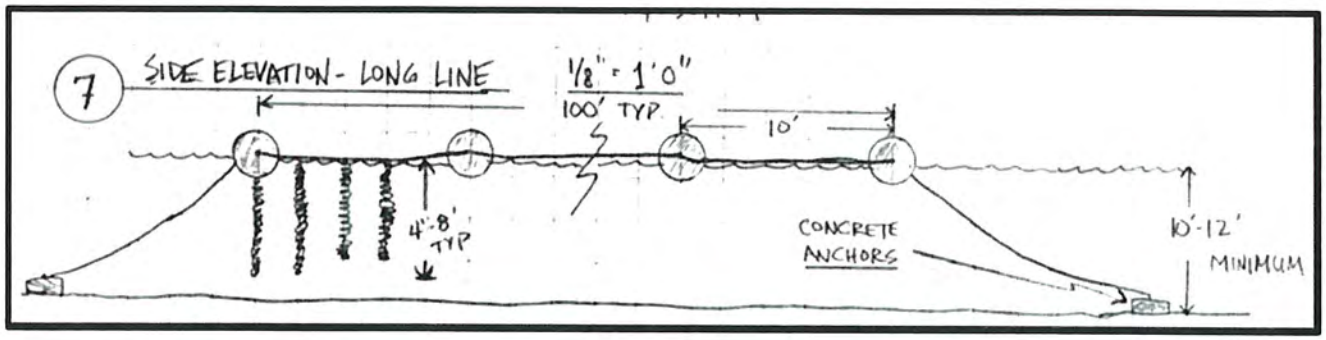

Figure 20. Diagram of Suspended Longline/Sentinel Mussel Layout

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.

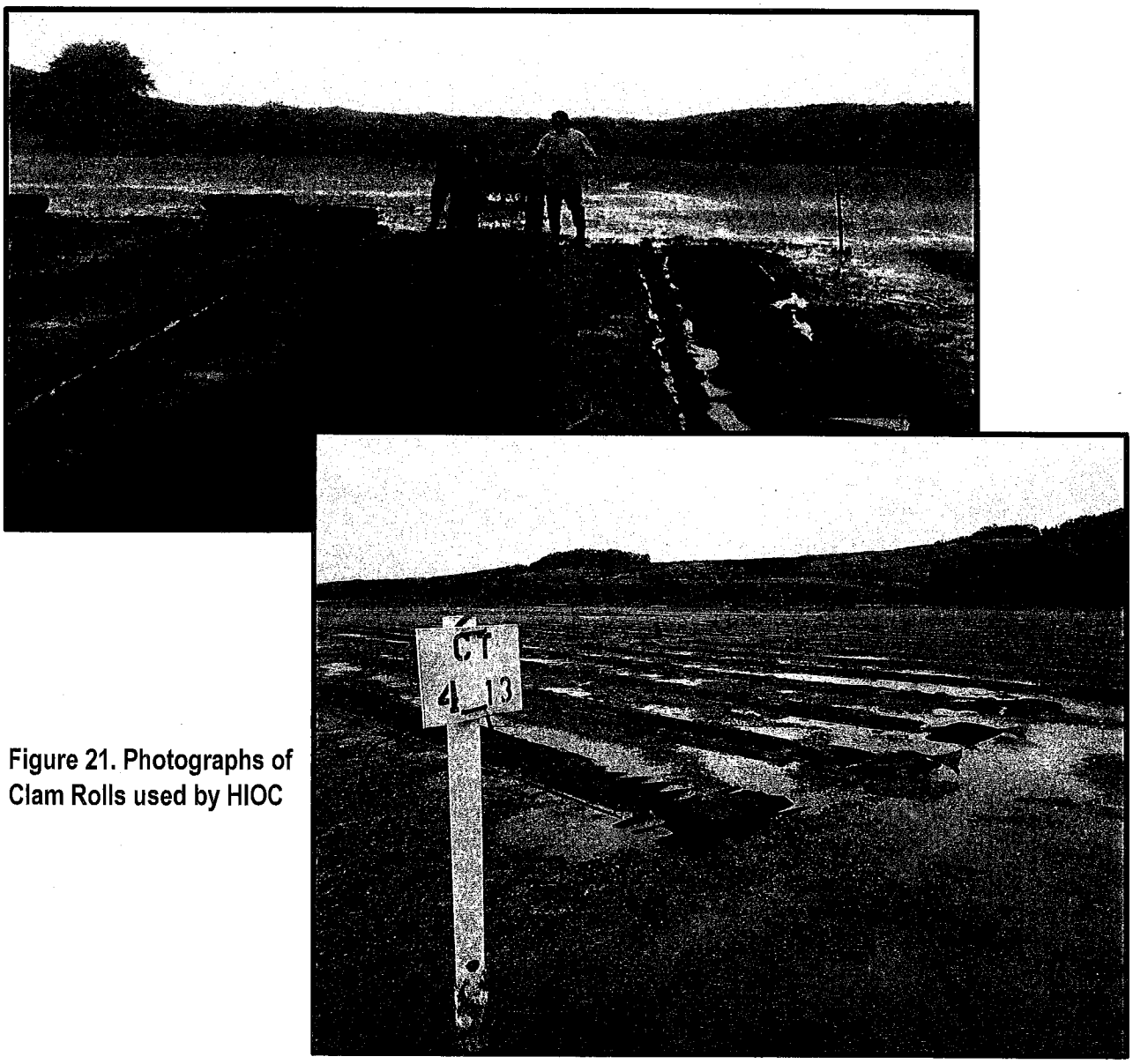

Figure 21. Photographs of Clam Rolls used by HIOC

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.

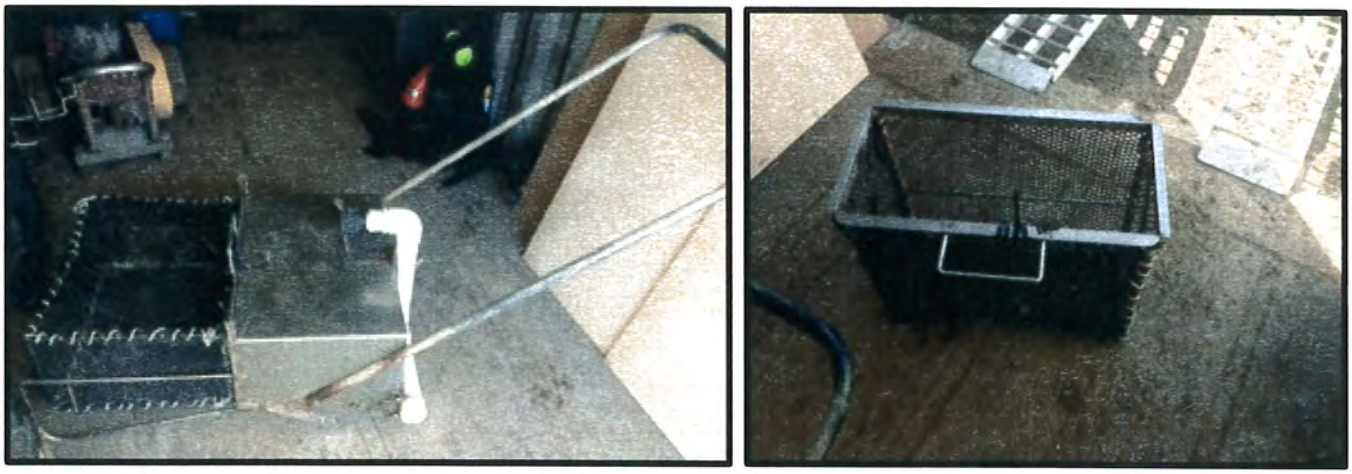

Figure 22. Photograph of Clam Rake and ½-inch Mesh Basket used with the Clam Rake

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.

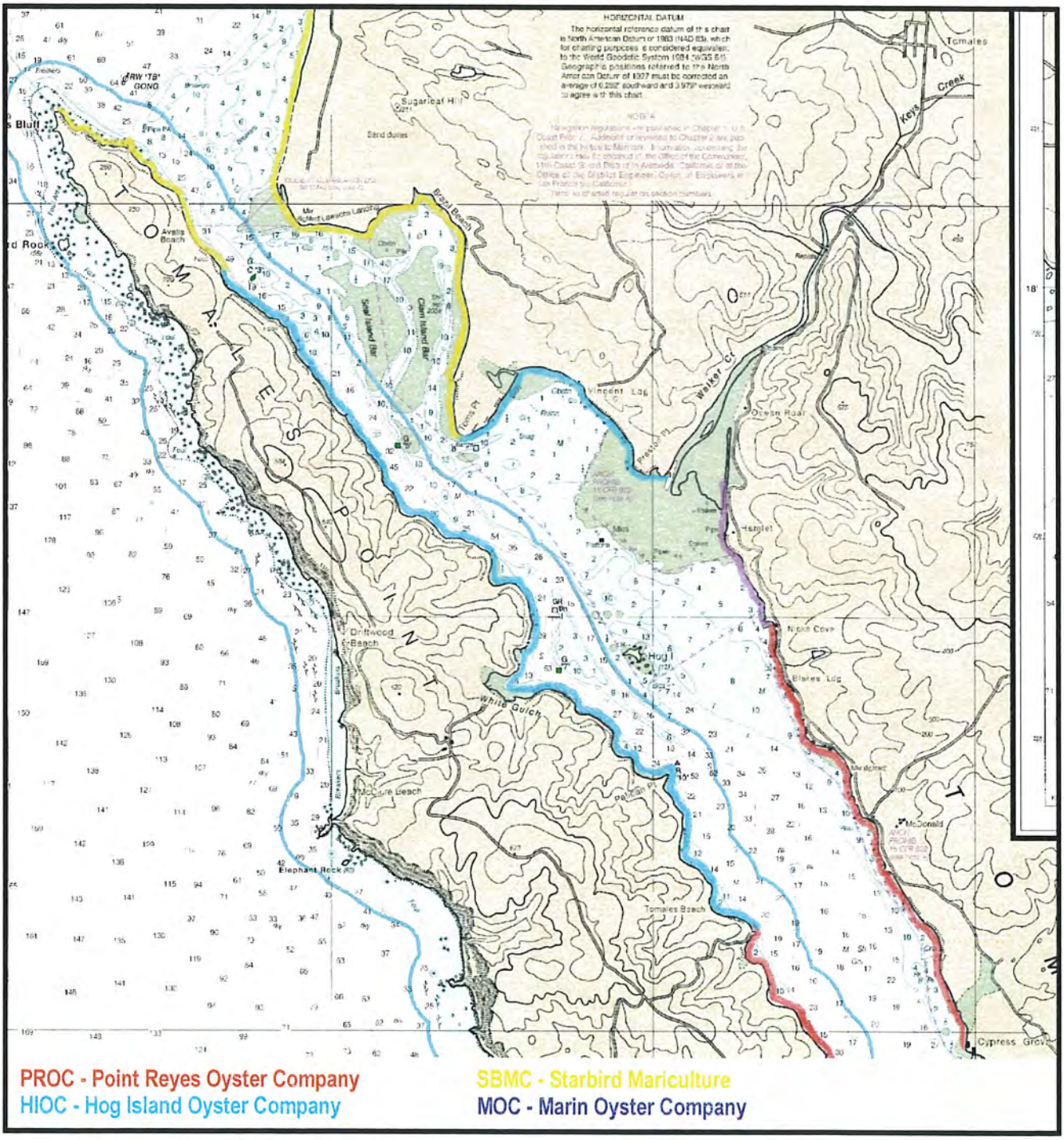

Figure A-1: Breakdown of Grower Responsible for Northern Tomales Bay Shorelines.

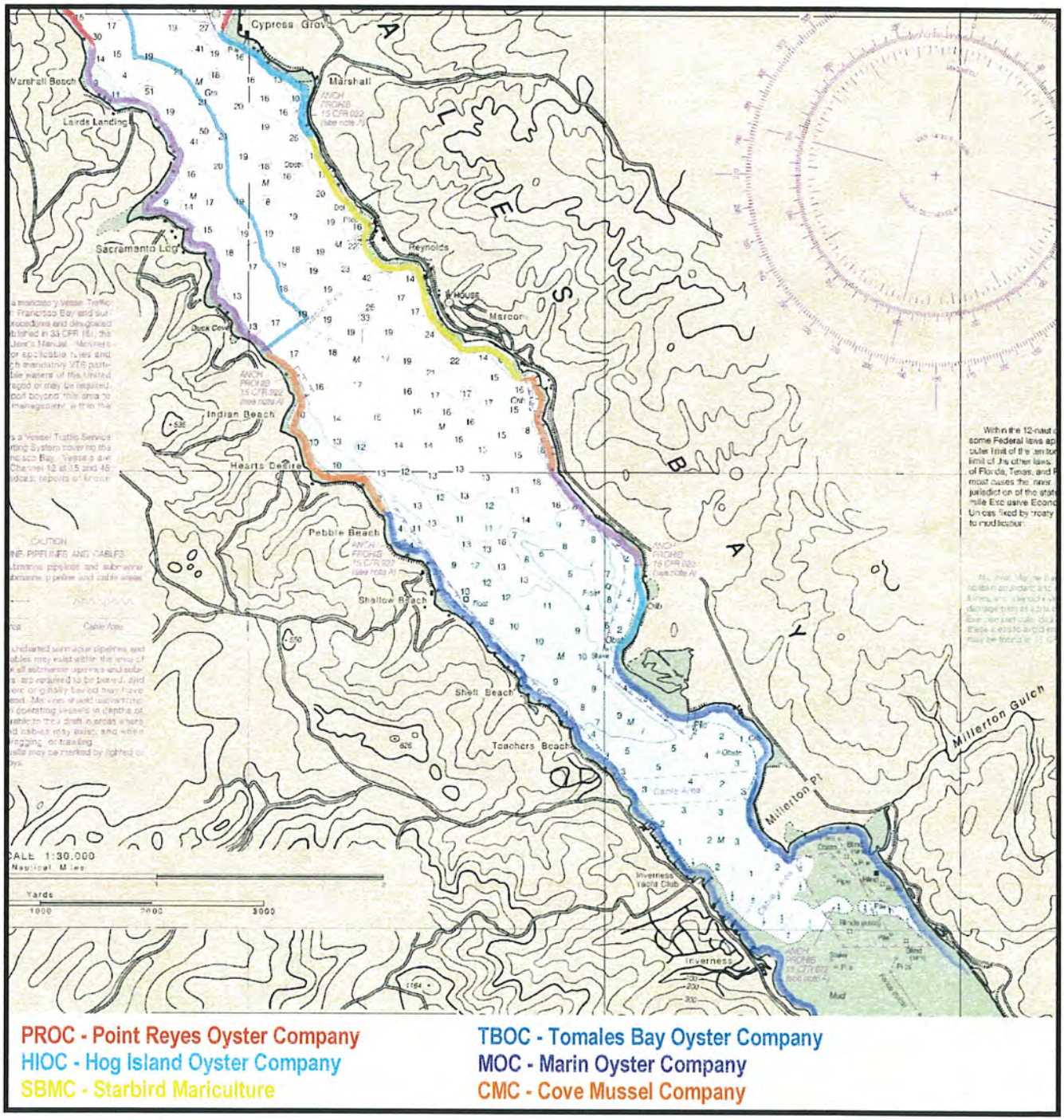

Figure A-2: Breakdown of Grower Responsible for Southern Tomales Bay Shorelines.

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.

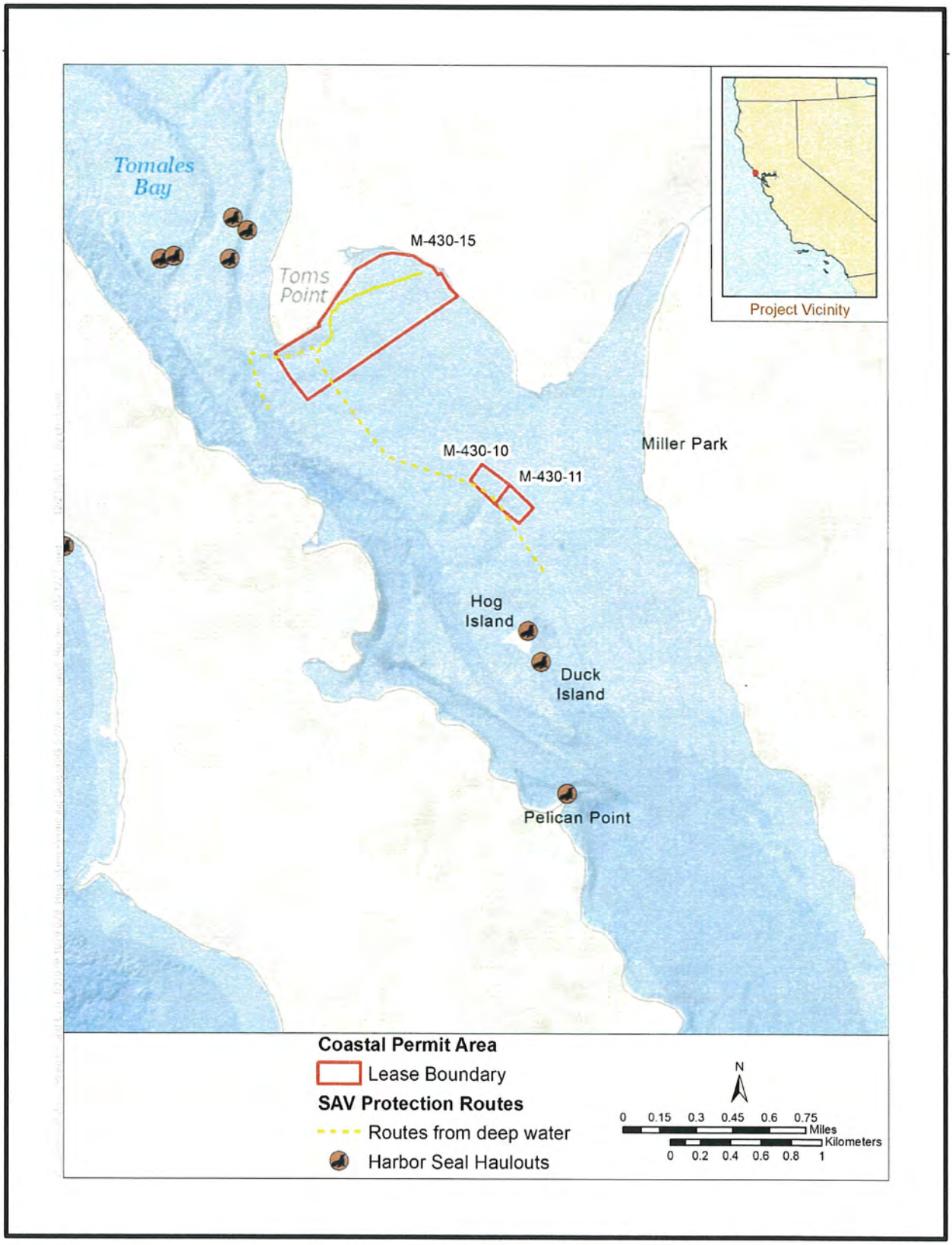

Figure C-1: Vessel Route to access Leases No. M-430-10, M-430-11, and M-430-15 from East Channel or West Shore in Tomales Bay, California.

Hog Island Oyster Company
(PERMIT NOS. 14381N63, 15340N63, 15588N63, AND 20842N63)
PROJECT DESCRIPTION

August 2018

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FIGURES

APPENDICES

1.0 INTRODUCTION

Hog Island Oyster Company (HIOC) grows shellfish on four different leases in Tomales Bay, California (Figures 1 to 4). The four leases used by HIOC are from the California Fish and Game Commission (CFGC) and were either granted to HIOC directly or acquired from other growers. In addition, each lease has an associated permit issued by the U.S. Army Corps of Engineers (Corps) that includes authorized activity (Table 1). The total acreage of the leased areas is 168.2 acres, of which HIOC currently operates on approximately 25.23 acres or 15% of the total lease area.

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

Permit No.	Lease No.	Location*	Previously Reviewed Activity	
			Acres	Methods
14381N63	M-430-10	Intertidal area halfway between Tom's Point and Miller Park	5.0	racks or stakes
15340N63	M-430-11	Intertidal area just north of Hog Island	5.0	racks, longlines[1]
15588N63	M-430-12	Intertidal area 3 miles south of Marconi Cove	30.0	racks, trays, floating nursery rafts, floating longlines[2]
20842N63	M-430-15	Intertidal and subtidal areas adjacent to Tom's Point	128.2	racks, bottom bags, longlines, and rafts[3]
*Please refer to Figures 1 to 4 for the lease locations.				

While the above species and methods were described in the project descriptions submitted to the Corps, the permits 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 permit prior to using different cultivation techniques. HIOC's activities currently being conducted on the leased areas are well within what was previously reviewed by the Corps and have led to improved conditions due to advances in technology and aquaculture methods over the last 30 years. The 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. Table 2 shows HIOC's total existing cultivation. Table 3 describes the total amount of existing gear.

[1] CFGC Lease Renewal M-430-11 authorized stakes, racks, and longlines as approved cultivation methods.
[2] CFGC Lease Renewal M-430-12 limited cultivation methods to "racks and rafts."
[3] CFGC Lease M-430-15 Amendment issued to HIOC on December 9, 2015 limited permitted cultivation to only "racks and bags and bottom trays."

Table 2. Total Existing Cultivation (Acreage)

Culture Type	Acres Per Lease Area				Total
	M-430-10	M-430-11	M-430-12	M-430-15	
Overlapped Racks	0.6	0.48	1.34	0.97	3.39
Regular Racks	1.78	1.35	0	1.66	4.79
Bottom Bags	1.83	2	0	1.77	5.6
Clam Bags	0	0	0	0.03	0.03
Clam Rolls[4]	0	0	0	6.89	6.89
Floating Culture	0	0	1.07	0	1.07
Seapa/Tipping Bags	0	0.36	0	3.1	3.46
Total	**4.21**	**4.19**	**2.41**	**14.42**	**25.23**

Table 3. Total Existing Cultivation (Estimated Number of Gear)

Culture Type	Number of Gear Per Lease Area			Total
	M-430-10/430-11[5]	M-430-12	M-430-15	
Overlapped Racks	1000 racks	1200	1140	3,340
Regular Racks	1500 racks	0	900	2,400
Bottom Bags	8750 bags	0	3500	12,250
Clam Bags	0 bags	0	270	270
Clam Rolls	0 rolls	0	292	292
Floating Culture	3 Tray Barges	10 lines	0	3 Tray Barges 10 Floating Lines
Seapa/Tipping Bags	510 (Stanways)[6]	0	83 longlines	510 Stanways 83 longlines

Figures 1 through 4 below show HIOC's current cultivated footprint and CFGC lease boundaries.[7]

[4] In response to a request by the Coastal Commission, HIOC has agreed to discontinue planting clams in rolls. HIOC will harvest any clams previously planted in clam rolls as the existing clam populations become market size. Harvest of existing clam rolls will take approximately three years to complete.

[5] Leases M-430-10 and 430-11 are managed as a single farm area; therefore, they are treated as a single cultivated farm for the purposes of this table.

[6] HIOC plans to discontinue the use of Stanway units, which are a type of longline culture located within approximately 0.4 acres of Lease 430-11. Removal of the Stanway units will begin with all product being harvested and/or transferred. A crew will then unbolt and dissemble the Stanway units at low tide. 2x6 timbers will be bundled and picked up at high tide by boat. Any Helix anchors will be unscrewed at low tide and removed. Buys will be attached with rope to any remaining concrete. The units will then be pulled out by a boat mounted crane. Once HIOC obtains approval for longlines from all required governmental agencies, the units would be removed within 12-18 months.

[7] Note that the lease boundaries depicted on Figures 2 through 4 and Figures 24 through 26 are approximate and must be confirmed with CFGC. In the event that any existing cultivation is confirmed to be outside of HIOC's lease boundaries, HIOC will either relocate the cultivated product to within its lease boundaries or request an amendment to the lease boundaries from CFGC.

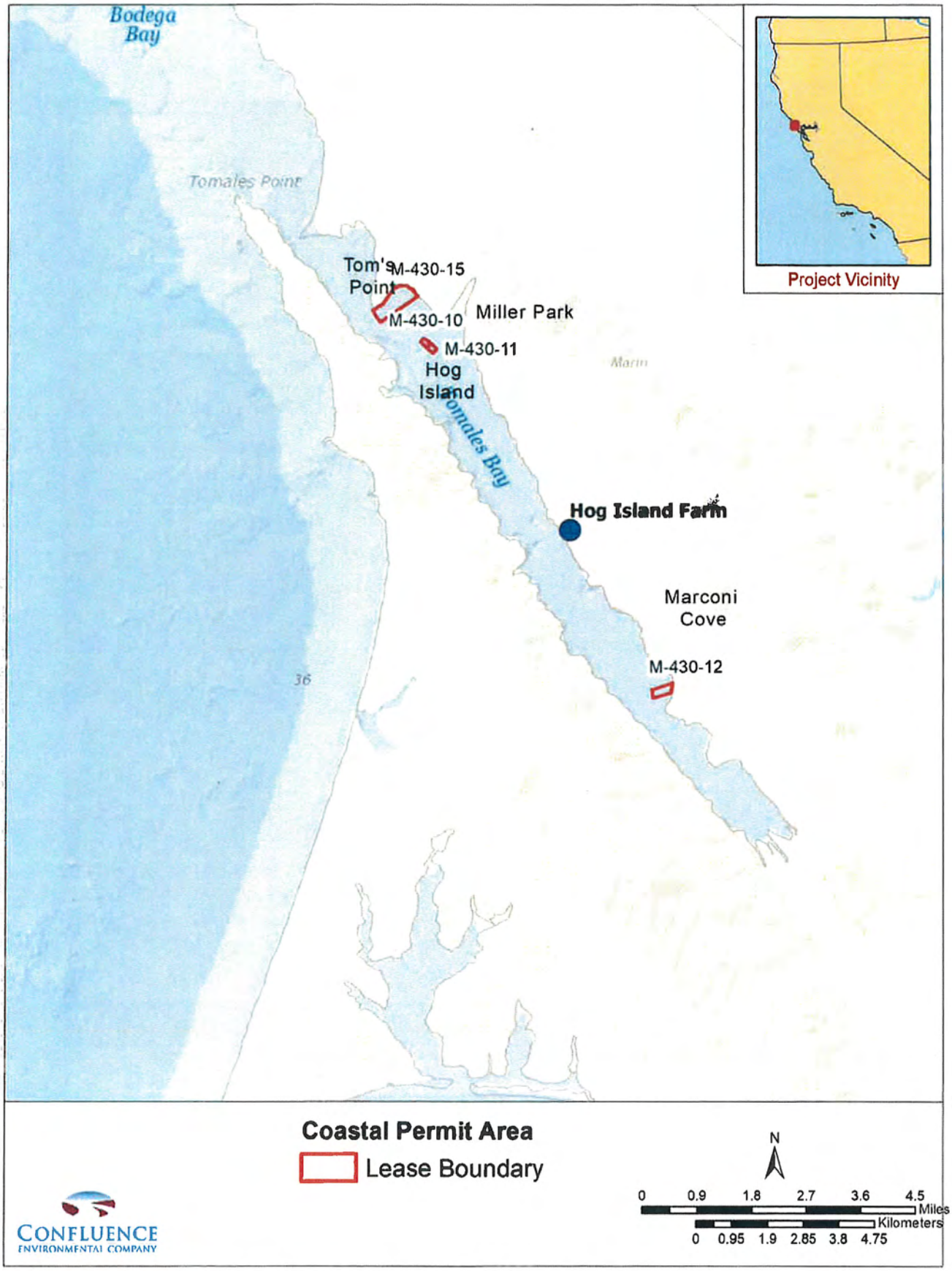

Figure 1. Location of HIOC Operations in Tomales Bay, California

Figure 2. Existing Cultivation Activity – CFGC Lease M-430-15

Figure 3. Existing Cultivation Activity – CFGC Leases M-430-10 and M-410-11

Figure 4. Existing Cultivation Activity – CFGC Lease M-430-12

Overall, the acreage currently under cultivation by HIOC is significantly less than the amount of cultivation previously reviewed by the Corps. The original CDPs did not contain any 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 Corps contemplated a total of approximately 65.7 acres of shellfish cultivation. The cultivation methods, spacing (where applicable), species cultivated, and cultivation locations are substantially similar to those previously reviewed by the Corps. HIOC has also incorporated best management practices, above and beyond those required under its Corps permits, to provide environmental sustainability and further reduce any ecological impacts to Tomales Bay. These measures are described in Section 6.

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

HIOC's permits considered cultivation using 8 different culture methods (Table 2). Currently, HIOC is using 5 different culture methods. Most methods currently used by HIOC are consistent with the methods previously approved by the Corps 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 4. Comparison of Cultivation Methods Previously Reviewed and Approved by Corps and Current Cultivation Practices

	Approved Activities under Corps Permits	Current Cultivation Practices
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 • Longlines • Floating longlines • Clam rolls (to be discontinued)

We determined the cultivated acreage previously reviewed by the Corps as follows:

- Permit 14381N63, which approved cultivation on Lease M-430-10, considered 5 acres of cultivation. Cultivation was shown on site plans in all areas of the CFGC lease.

- Permit 15340N63, which approved cultivation on Lease M-430-11, considered 5 acres of cultivation with no further limitations on acreage or cultivated areas.

- Permit 15588N63, which approved cultivation on Lease M-430-12, considered 25 acres of cultivation. Cultivation was shown on site plans in all areas of the CFGC lease, with appropriate spacing between gear and navigational access lanes. No restrictions were placed on planted acreage or cultivated areas.

- Permit 20842N63, which approved cultivation on Lease M-430-15, considered a total of 30.7 acres of intertidal (on-bottom and off-bottom) culture and floating aquaculture, which includes spacing between gear and navigational access lanes. The proposed cultivation was shown on site plans attached to the application.

Therefore, it appears that the Corps previously reviewed a total of 65.7 acres of cultivation within HIOC's leased footprint, which totals 168.2 acres. As shown in Section 4 below, HIOC's proposed cultivated acreage is approximately 10 acres less than that previously reviewed by Corps as part of its original permit approvals.

3.0 CURRENT CULTIVATION PRACTICES PREVIOUSLY APPROVED BY THE CORPS

Both on-bottom and off-bottom cultivation practices were previously reviewed and approved by the Corps. 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 Corps: (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.

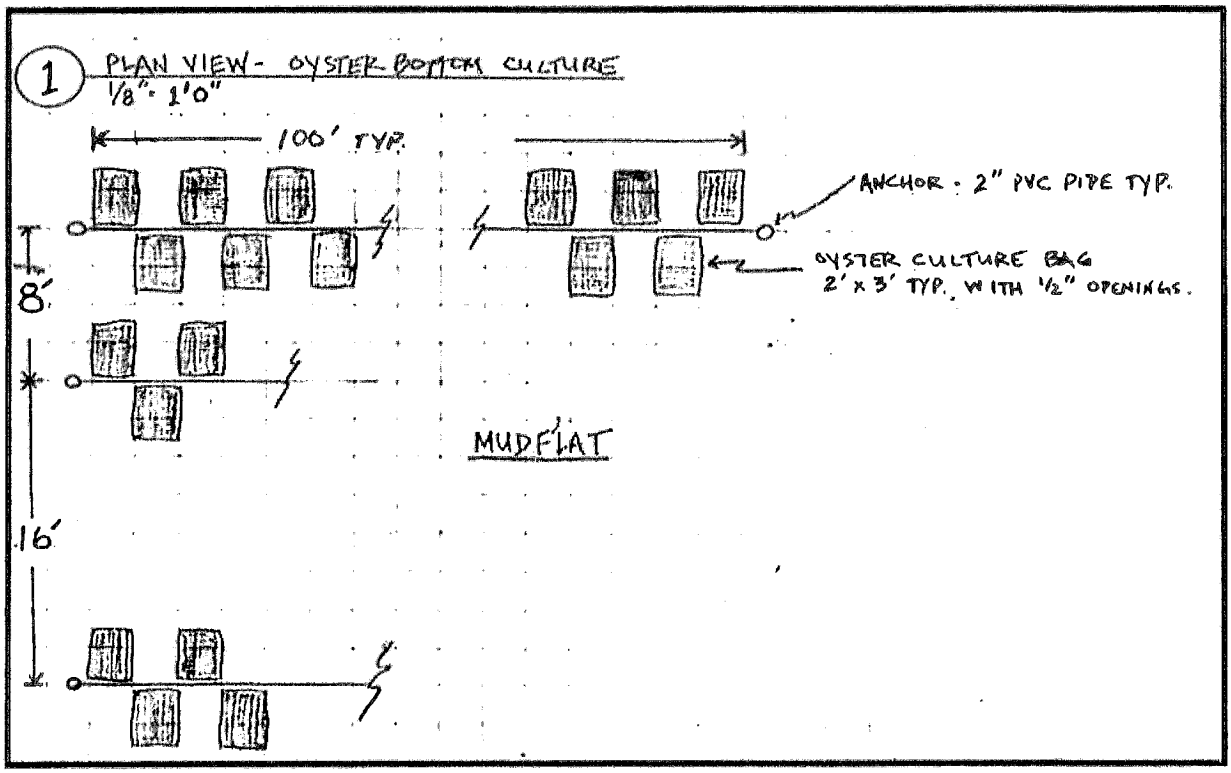

Figure 5. Typical On-Bottom Bag Culture Layout (Note: HIOC does not currently include a 16' space between groups of bags. The plan shown is otherwise correct)

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 (1.83 acres), M-430-11 (2 acres), and M-430-15 (1.77 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.

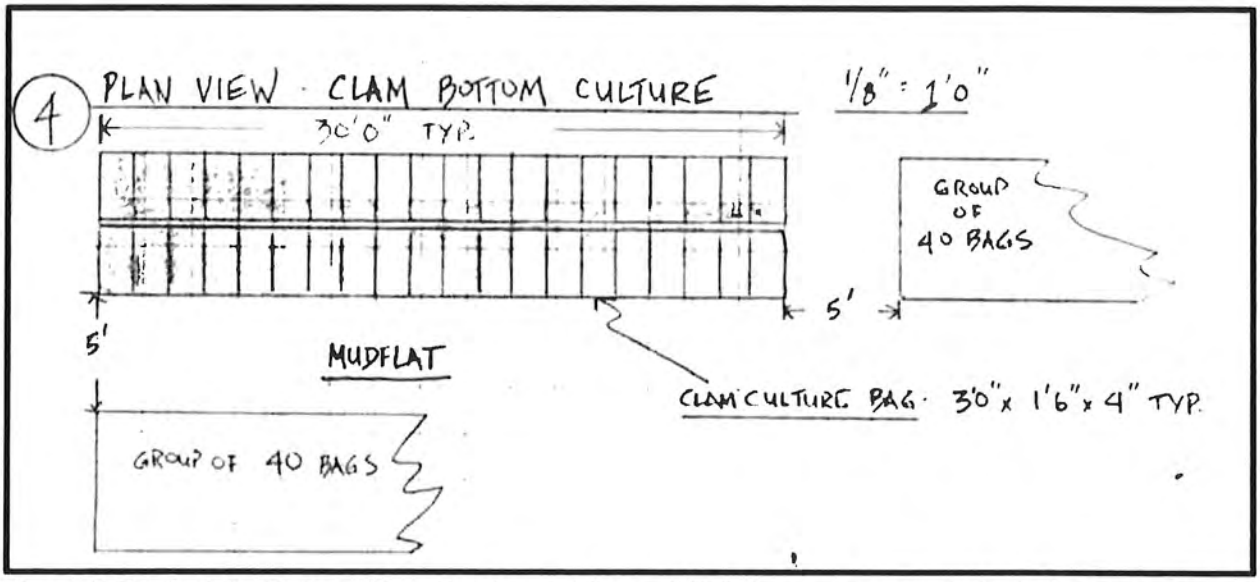

Figure 7. Typical On-Bottom Clam Bag Layout (Note: HIOC does not currently include a 5' space between groups of bags. The plan shown is otherwise correct)

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 of 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 within 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 Corps: (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 (1.78 acres), M-430-11 (1.35 acres), and M-430-15 (1.66 acres).

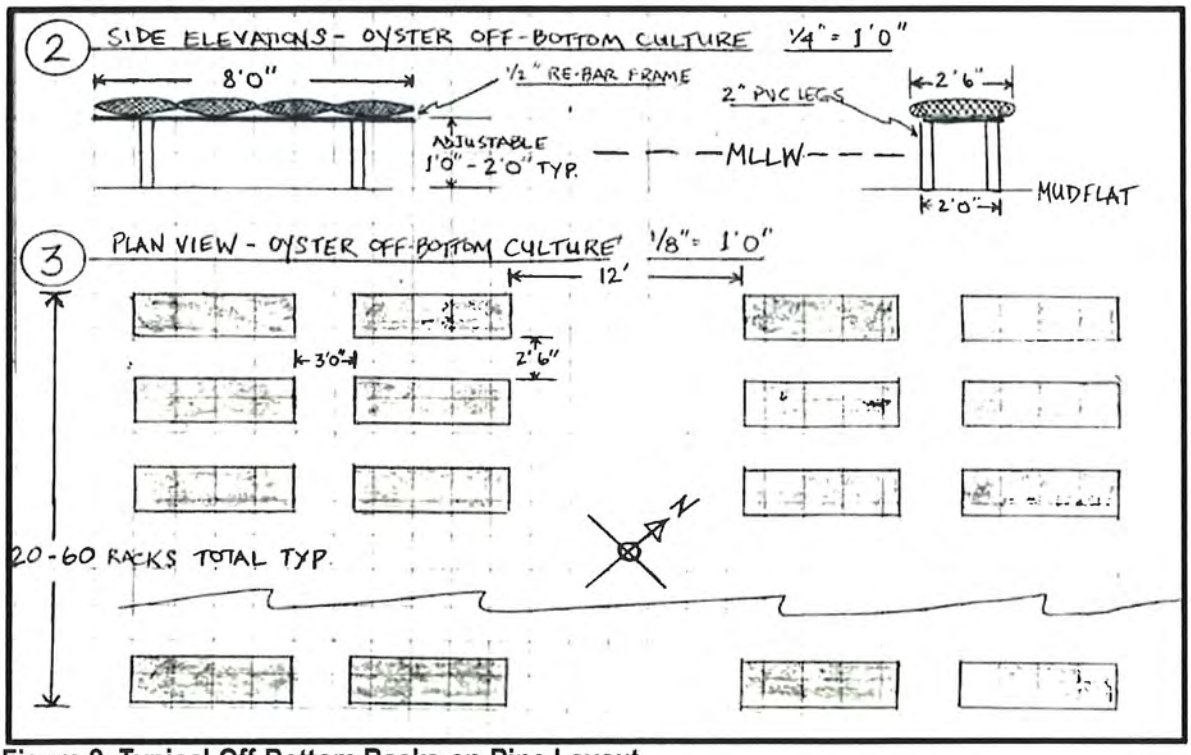

Figure 9. Typical Off-Bottom Racks-on-Pipe Layout

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 (0.6 acres), M-430-11 (0.48 acres), M-430-12 (1.34 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.

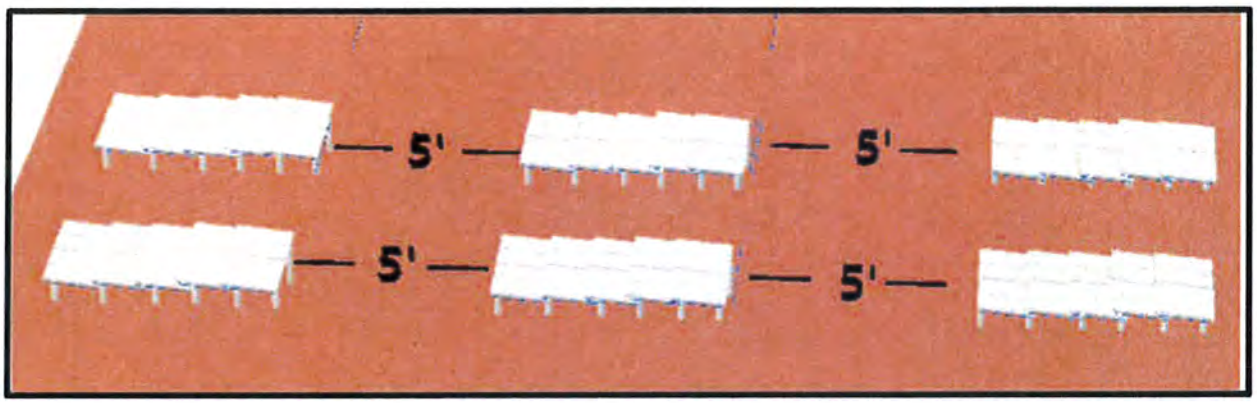

Figure 11. Typical Spacing between Sections of Overlapped Racks

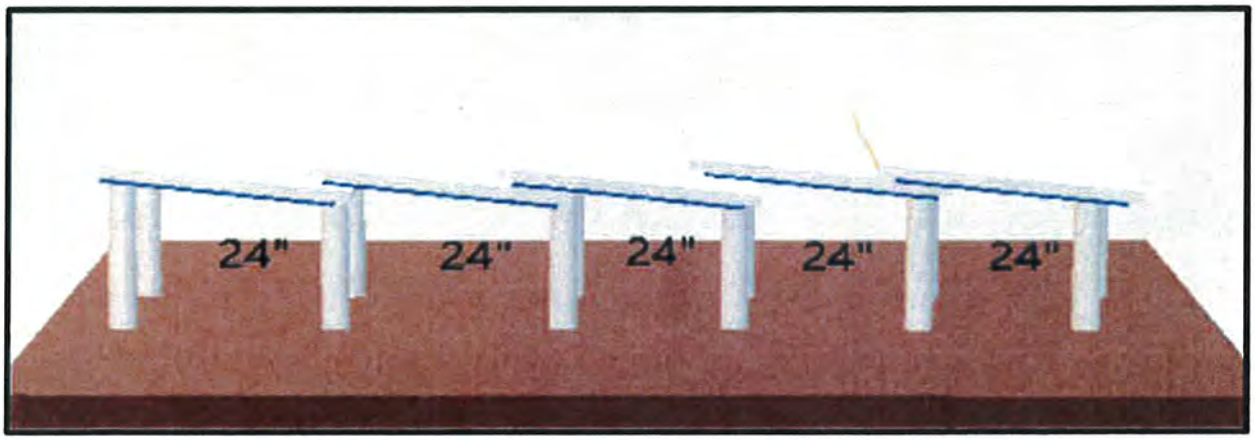

Figure 12. Typical Overlapped Racks Spacing: Side View

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.

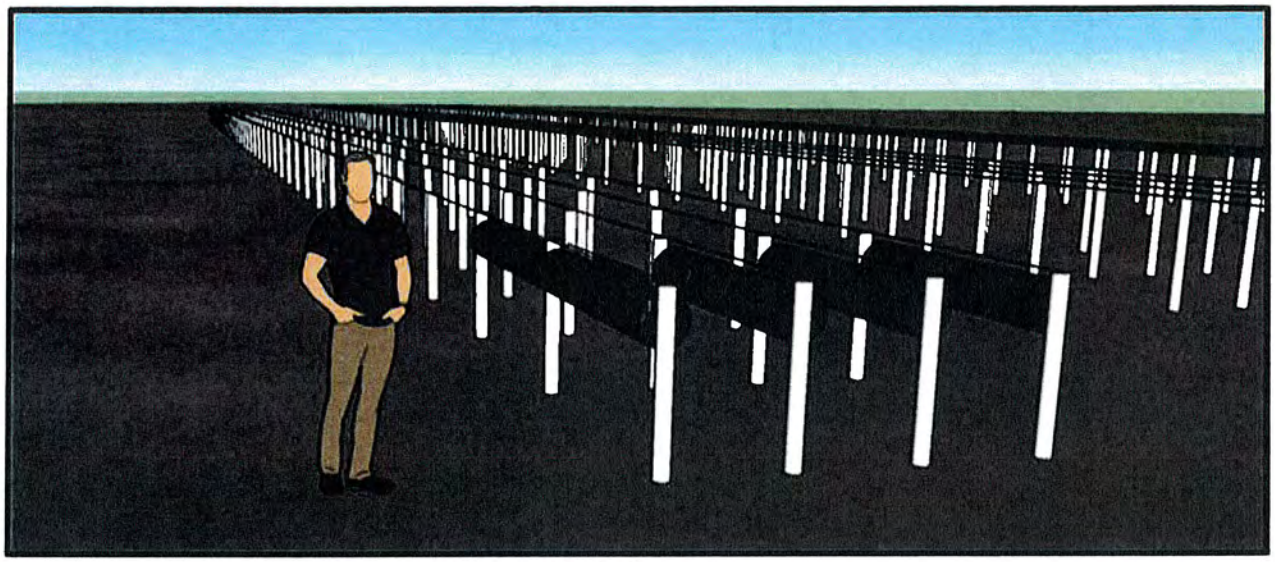

Figure 14. Diagram of Multiple Longlines with Baskets

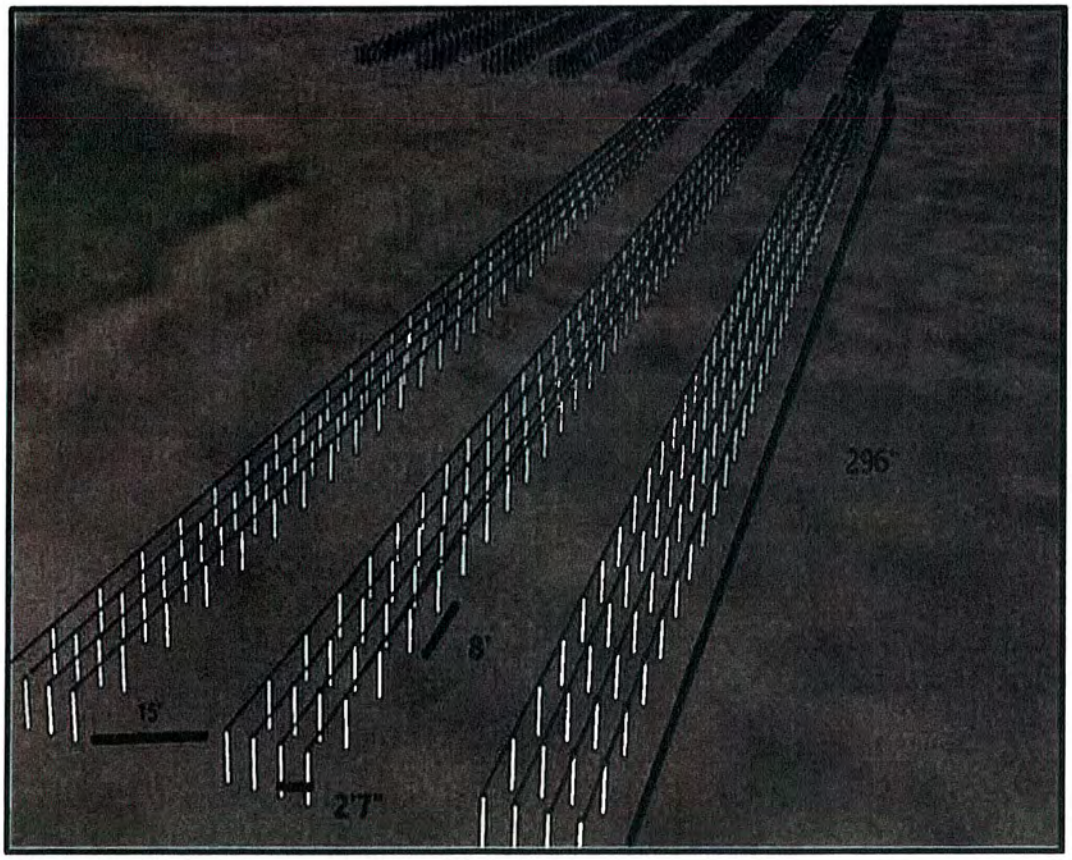

Figure 15. Digital Representation of Longlines

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 (3.1 acres) and Lease No. M-430-11 (0.36 acres). 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

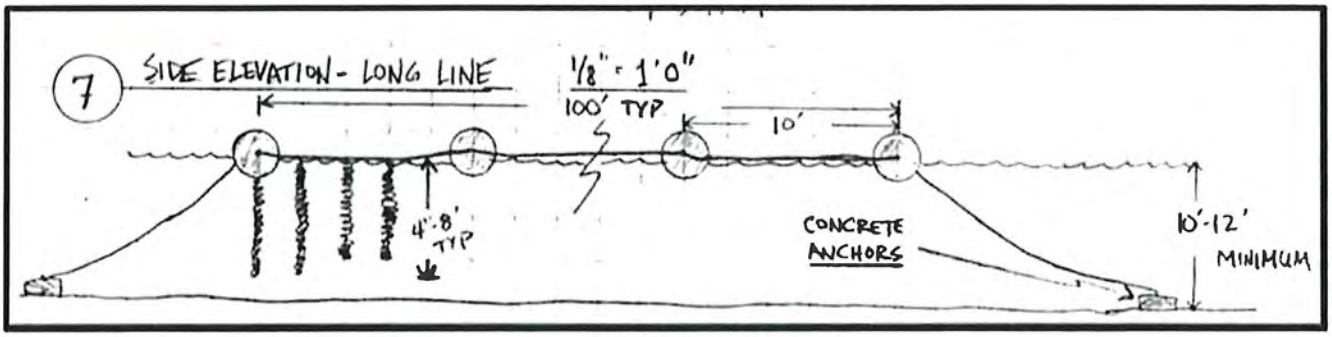

Figure 20. Diagram of Suspended Longline/Sentinel Mussel Layout

All floating bags and baskets will be marked or branded with Hog Island's name and phone number. Hog Island plans on having all floating gear marked by the end of 2019. Floating longlines are used at Lease No. M-430-12 (1.07 acres), comprised of 10 floating lines. One floating line at Lease No. M-430-15 is currently used to hold sentinel mussels for sampling by California Department of Public Health (CDPH).

3.2.5 Tray Barges

Tray barges (defined in Table 1 as floating culture) were previously permitted by the Corps pursuant to Permit Nos. 15588N63 and 20842N63 and are currently located on Lease 430-10. Tray barges have hanging Seapa baskets that hang below the floating barge. The barges are 25'x8' with a 4'x8' plywood deck directly over the floats at either end. The middle of the tray barge has 7 2" diameter aluminum poles with rope approximately 15' between each. This

minimizes the need for multiple anchors. If multiple tray barge chains were used, they would be spaced approximately 20′ apart. Tray barge anchors are located at 38° 12.271'N, 122° 56.158'W and 38° 12.261'N, 122° 56.165'W. Pictures of the existing tray barges are shown in Figures 21 and 22. A diagram of the tray barge design is included as Figure 23. The current locations of the tray barges are shown in Figure 27.

Figure 21. Existing Tray Barge Located in Lease 430-10.

Figure 22. Picture of Existing Tray Barge Used for Seapa Baskets

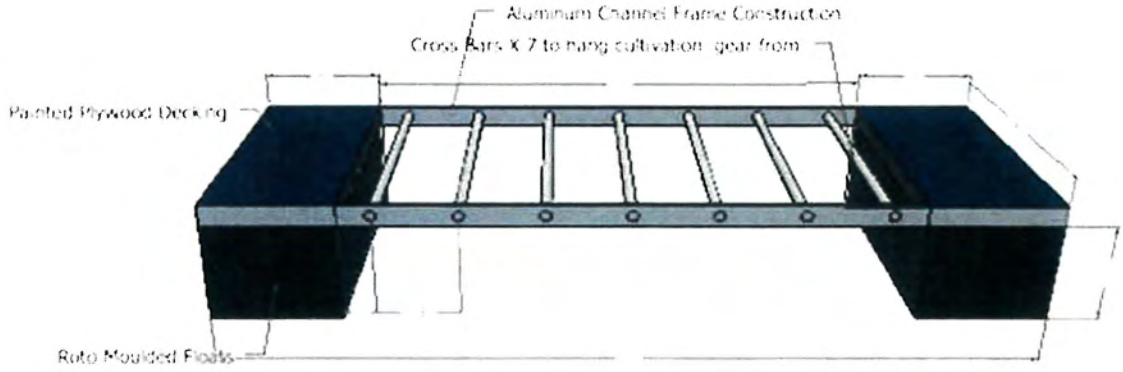

Figure 23. Diagram of Tray Barge Design

4.0 PROPOSED CULTIVATION PLAN

In discussions with the Coastal Commission, CFGC, and the California Department of Fish and Wildlife, and in response to a request from the Coastal Commission regarding HIOC's future cultivation plans for its leased area, HIOC submitted the following proposed cultivation plan, which includes both existing and proposed cultivation.

Table 4. Total Proposed Cultivation

Culture Type	Acres Per Lease Area				Total
	M-430-10	M-430-11	M-430-12	M-430-15	
Overlapped Racks	0.61	0.48	0	0	1.09
Regular Racks	2.5	1.35	0.82	2.62	7.29
Bottom Bags	1.14	1.69	0.29	0	3.12
Clam Bags	0	0	0	4.61	4.61
Floating Culture	1.53	0.85	4.72	3.58	10.68
Seapa/Tipping Bags	0	1.65	2.22	25.34	29.21
Total	**5.78**	**6.02**	**8.05**	**36.15**	**56**

The proposed culture activity for each lease area is shown in Figures 21 through 23 below. HIOC is seeking authorization to use all of the techniques and cultivate all of the species described in this project description on each of our leases to allow us the flexibility to farm adaptively in a changing farm environment. We believe that our existing methods are environmentally sustainable, in many ways are less impactful as compared to those previously reviewed by the Corps in our existing permits and can be used interchangeably without a significant impact to the surrounding environment. HIOC also requests the flexibility to modify its planted footprint within its leased area without additional approval from the Corps provided that (1) all cultivation takes place within its existing leased boundaries, (2) HIOC does not exceed the overall proposed 56 acres of total cultivation, (3) any relocated cultivation does not take place in eelgrass beds (except to the extent that such areas have been previously reviewed and approved for cultivation by the Corps in previous permits), and (4) the total proposed cultivation is not more dense that that approved by the Corps based upon the estimated densities described in Table 5 below.

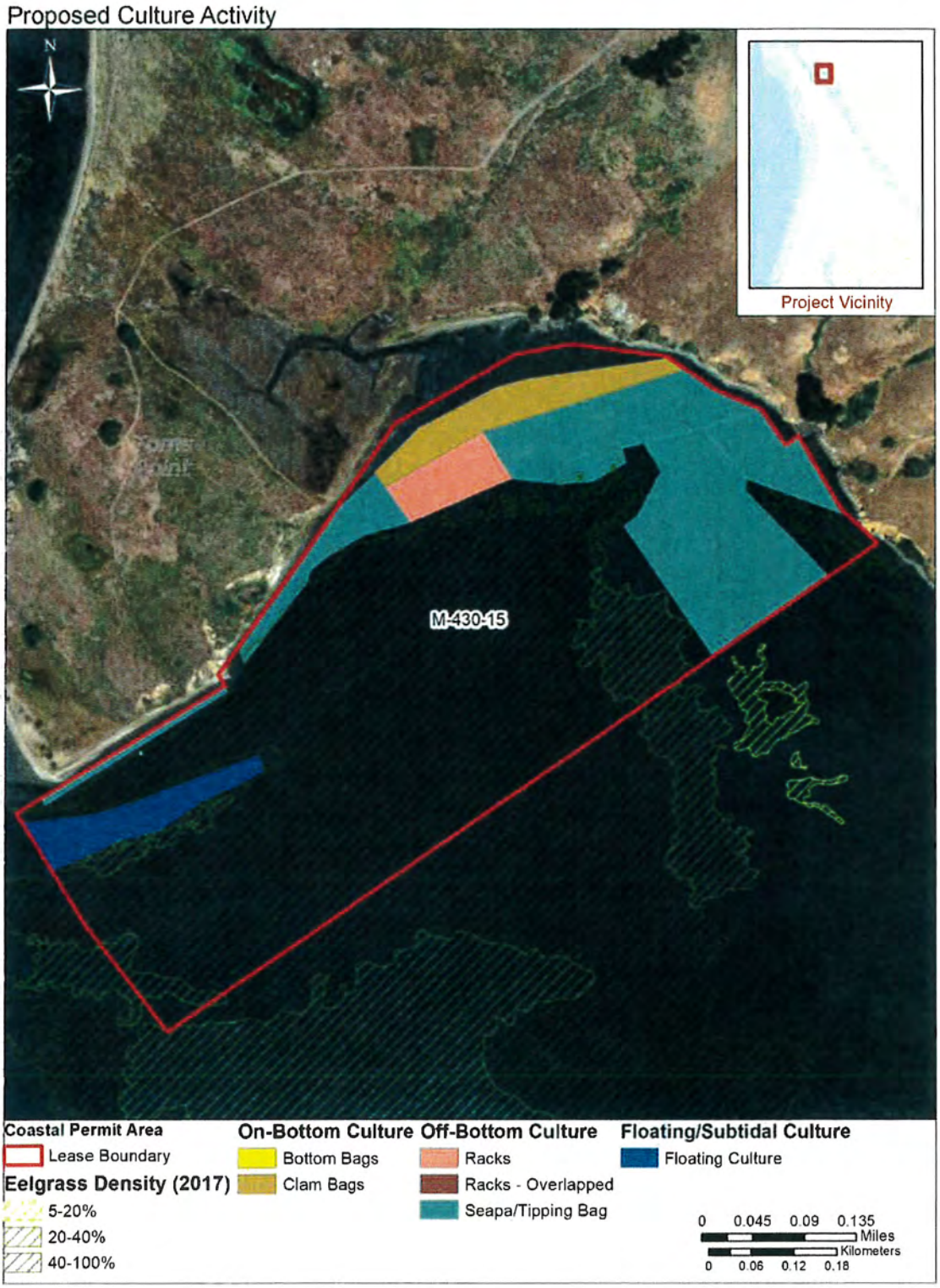

Figure 24. Proposed Cultivation Activity – CFGC Lease M-430-15

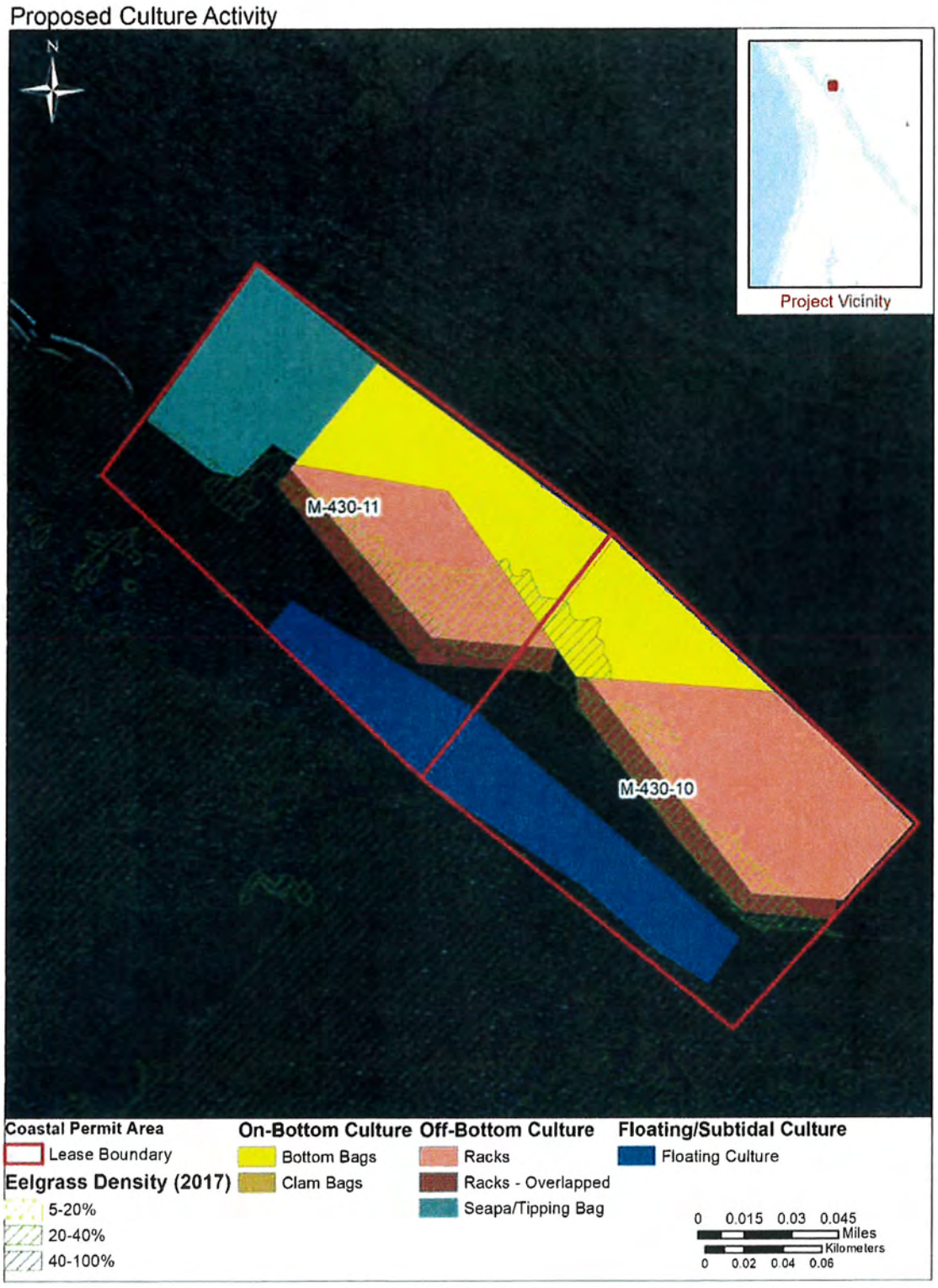

Figure 25. Proposed Cultivation Activity – CFGC Leases M-430-10 and M-410-11

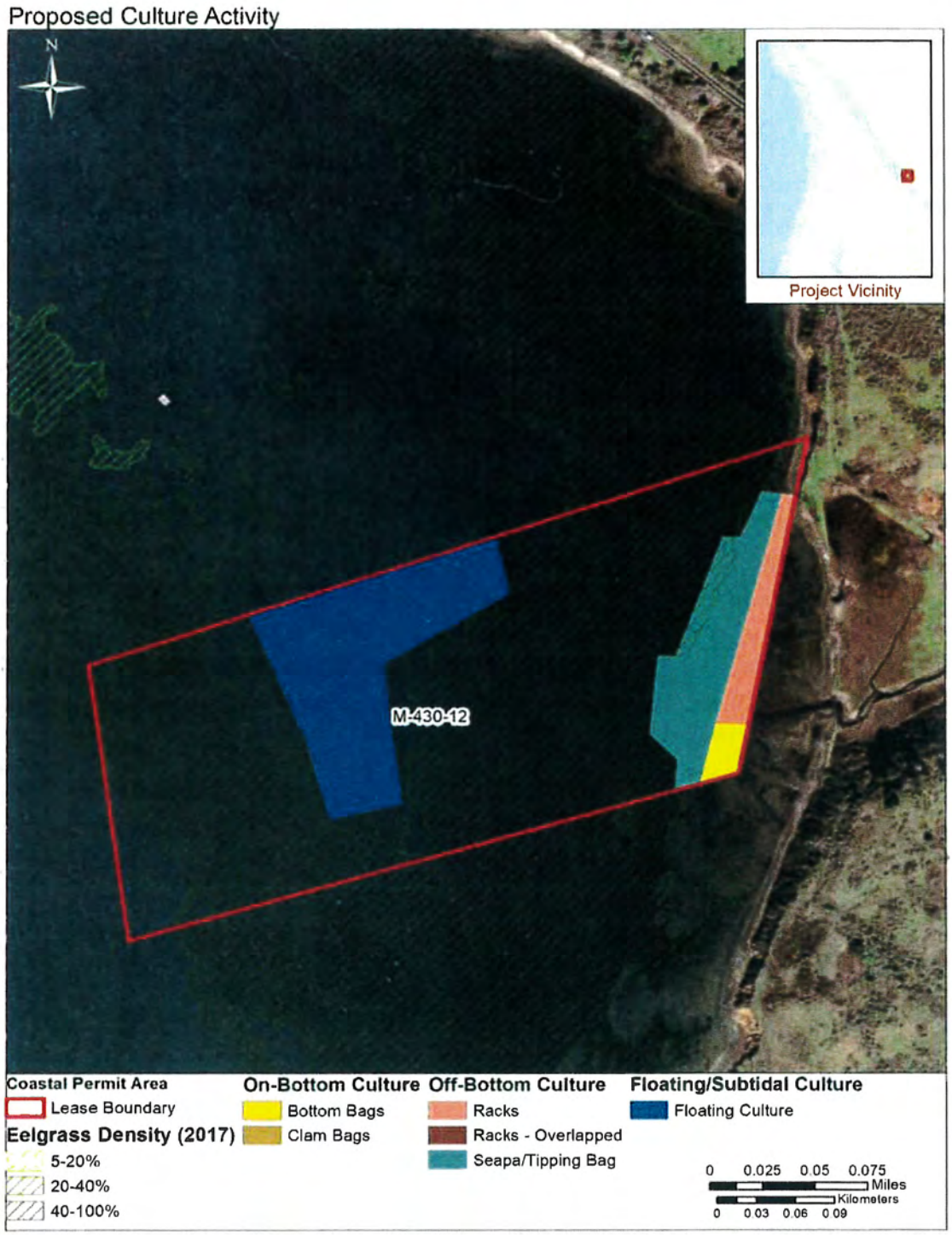

Figure 26. Proposed Cultivation Activity – CFGC Lease M-430-12

Table 5. Proposed Total Amount of Each Cultivation Type and Density

Culture Type	#/Acre	% Coverage/Acre	% Uncovered/Acre	Total Gear Proposed[8]
Overlapped Racks (5 Overlap)	1190 racks	45%	55%	1,297
Regular Racks	622 racks	29%	71%	4,534
Bottom Bags	3111 bags	42%	58%	9,706
Clam Bags	3872 bags	33%	67%	17,850
Floating Culture	10 lines	17%	83%	107
Seapa/Tipping Bags	36 lines	32%	68%	1,052

HIOC is not seeking approval for any species other than those previously approved by regulatory agencies. The previously approved species are: Pacific oyster (*Crassotrea gigas*), European flat oyster (*Ostrea edulis*), Atlantic oyster (*Crassotrea virginica*), Kumamoto oyster (*Crassotrea sikamea*), Manila clam (*Venerupis philippinarum*), native littleneck clam (*Protothaca staminea*), northern quahog (*Mercenaria mercenaria*), bay mussel (*Mytilus edulis*), Olympia oyster (*Ostrea lurida*), Mediterranean mussel (*Mytilus galloprovincialis*), and red abalone (*Haliotis rufescens*). HIOC seeks approval to cultivate these species on all of its leases, consistent with the cultivation methods described above. While HIOC retains the right to cultivate each of the previously approved species, the species that HIOC currently cultivates are Pacific oysters, Manila clams, European flat oysters, Atlantic oysters, Kumamoto oysters, and Manila clams. Oysters would be planted on all of HIOC's leases. HIOC is only currently planning to cultivate Manila clams on Lease 430-15 but, as noted above, seeks approval to cultivate Manila clams on any of its leases in the future.

The eelgrass beds shown in Figures 2 through 4 and 24 through 26 are based upon eelgrass surveys conducted by Merkel and Associates in August 2017 on behalf of the National Marine Fisheries Service. The survey complies with the California Eelgrass Mitigation Policy guidelines for eelgrass surveys.

Based upon these survey results, below in Tables 6 and 7 is a summary of the overlap between HIOC's existing culture and eelgrass. As noted in the authorizations associated with Hog Island's permits, no existing culture was planted in eelgrass; the existing overlap is associated with eelgrass moving into Hog Island's cultivated area. The permits associated with Leases 430-10, 430-11, and 430-15 also contemplated a 5 ft. buffer from existing eelgrass beds. HIOC has incorporated these conditions in its BMPs listed below.

[8] Total Gear Proposed is approximate based on the estimated maximum amount per acre. Planting limitations and operational considerations will govern the total number of each cultivation type planted, which will be less than the maximum represented in this column.

There are a number of documented instances where, similar to HIOC's farm, eelgrass has moved into cultivated aquaculture areas. Eelgrass beds frequently migrate into areas where suitable habitat is present in response to environmental stressors. As long the eelgrass bed persists over time it contains the potential to spread or move into unoccupied habitats when conditions are suitable. Environmental stressors that may affect an eelgrass bed's boundaries include desiccation, wind and wave stresses, and water clarity which controls the photosynthetic activity of eelgrass and often limits the lower distribution of eelgrass beds. Off-bottom aquaculture gear may alter shading, reduce wind-wave energy, and create small depressions near installed gear. These features may limit desiccation stress and reduce disturbance from storms allowing eelgrass to persist or expand into higher elevations than might otherwise be occupied.

Further, some stressors are affected by long-term climactic and tidal cycles which may affect average tide elevation, rainfall, and temperature conditions. These conditions tend to drive responses of eelgrass at larger scales and may affect eelgrass distribution throughout Tomales Bay. For these reasons, eelgrass may have moved into areas currently occupied by HIOC aquaculture activity despite the absence of eelgrass when aquaculture gear was installed. The presence of eelgrass in areas where aquaculture gear is present may suggest a positive relationship between aquaculture activities and eelgrass at the upper margin of eelgrass distribution where shading and other characteristics of shellfish growing may improve conditions for eelgrass.

HIOC is in compliance with its Corps permit conditions associated with eelgrass. In fact, as shown in Tables 6 and 7, even though HIOC is proposing additional acreage as compared to its existing footprint, it would reduce its overall footprint in eelgrass by approximately 0.55 acres. HIOC still seeks the ability to move its cultivated plots to other areas within its leased boundaries, including both areas where there is no eelgrass and areas previously approved by the Corps (i.e. areas where there was no eelgrass when the original permits were approved but where eelgrass has moved into HIOC's cultivated plots). HIOC would continue to avoid areas that have not previously been planted and contain eelgrass.

Table 6. Existing Culture Overlap with Eelgrass (Acres)

Culture Type	**Lease Area**									
	M 430-10		M430-11		M430-12		M430-15		Total	
	No Eelgrass	Eelgrass	No Eelgrass	Eelgrass	No Eelgrass	Eelgrass	No Eelgrass	Eelgrass	No Eelgrass	Eelgrass
Overlapped Racks	0.07	0.53	0.06	0.42	1	0.34	0.94	0.03	2.07	1.32
Regular Racks	1.53	0.25	0.67	0.68	0	0	1.66	0	3.86	0.93
Bottom Bags	1.63	0.2	1.92	0.08	0	0	1.76	0.01	5.31	0.29
Clam Bags	0	0	0	0	0	0	0.03	0	0.03	0
Clam Rolls	0	0	0	0	0	0	6.89	0	6.89	0
Floating Culture	0	0	0	0	0.51	0.56	0	0	0.51	0.56
Seapa/Tipping Bags	0	0	0.32	0.04	0	0	3.06	0.04	3.38	0.08
Total	**3.23**	**0.98**	**2.97**	**1.22**	**1.51**	**0.9**	**14.34**	**0.08**	**22.05**	**3.18**

Table 7 – Proposed Culture Overlap with Eelgrass (Acres)

Culture Type	**Lease Area**									
	M 430-10		M430-11		M430-12		M430-15		Total	
	No Eelgrass	Eelgrass	No Eelgrass	Eelgrass	No Eelgrass	Eelgrass	No Eelgrass	Eelgrass	No Eelgrass	Eelgrass
Overlapped Racks	0.07	0.54	0.06	0.42	0	0	0	0	0.13	0.96
Regular Racks	2.25	0.25	0.67	0.68	0.82	0	2.62	0	6.36	0.93
Bottom Bags	0.94	0.2	1.61	0.08	0.29	0	0	0	2.84	0.28
Clam Bags	0	0	0	0	0	0	4.61	0	4.61	0
Floating Culture	1.53	0	0.85	0	4.72	0	3.58	0	10.68	0
Seapa/Tipping Bags	0	0	1.62	0.03	1.94	0.28	25.19	0.15	28.75	0.46
Total	**4.79**	**0.99**	**4.81**	**1.21**	**7.77**	**0.28**	**36**	**0.15**	**53.37**	**2.63**

5.0 ASSOCIATED OPERATIONS

While the operations listed below are not "structures" subject to Corps permitting, a description of these operations is provided to give the Corps a more complete understanding of HIOC's operations. Currently, HIOC uses floating work platforms to support their cultivation practices.

5.1 Floating Work Platforms

Currently, HIOC uses two floating work platforms to support their cultivation practices on Leas 430-15. Work platforms 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. Work platforms will not be anchored or moored in eelgrass areas and moorage lines will be set far enough away as to not allow the platforms to go in to eelgrass areas.

5.2 Associated Vehicle Use

HIOC is not currently using any vehicles on its leases but has used them in the recent past (only 2017) in clam planting operations as well as beach cleans and general lease maintenance. HIOC has designated specific tracks, depicted in Figure 27, that avoid eelgrass and other marine vegetation. Hog Island plans to use 1 to 4 passenger ATV and/or UTV's with either 4 or 6 wheels or tracks to occasionally transport personnel and/or gear into and around leases. These vehicles would also be used to perform general lease maintenance and clean up. Vehicle access is provided by boat for Lease 430-15. Vehicle access to Lease 430-12 will be provided either by land or by boat. Fueling of these vehicles would take place at Hog Island's upland operations. Fuel consumption while in the growing areas would not exceed the available fuel in the tank and therefore refueling would not be needed while in the growing area. Vehicle use is not expected to increase. It should be noted that there is historical ATV use on the high tide line of Lease 430-15 from neighboring ranchers and Audubon.

Hog island currently has 3 vessels that are directly involved in farm operations, including one 40′ custom aluminum shellfish tender and two 24′ Carolina skiffs. Collective vessel activity of all leases includes 0 to 4 trips daily, 10 to 20 trips weekly, and 500 to 1,000 trips annually. Vessel routes are shown on Figures 27 and 28. Hog Island utilizes Miller Point Boat Launch and Marconi Cove for vessel launches. These locations are shown on Figure 28. The high tide route permits vessels to pass over eelgrass at tidal elevations that prevent damage or scour. The low

tide route avoids eelgrass to the maximum extent possible at all other times. These routes are physically marked, recorded in our boats' GPS devices, and included in our internal boat captain curriculum. These routes are marked with 10' long 2" white PVC pipe with reflective tape in shallow areas and with white crab buoys and black and white polyform buoys with reflective tape in deeper areas. These buoys are attached to small concrete anchors with polypropylene rope.

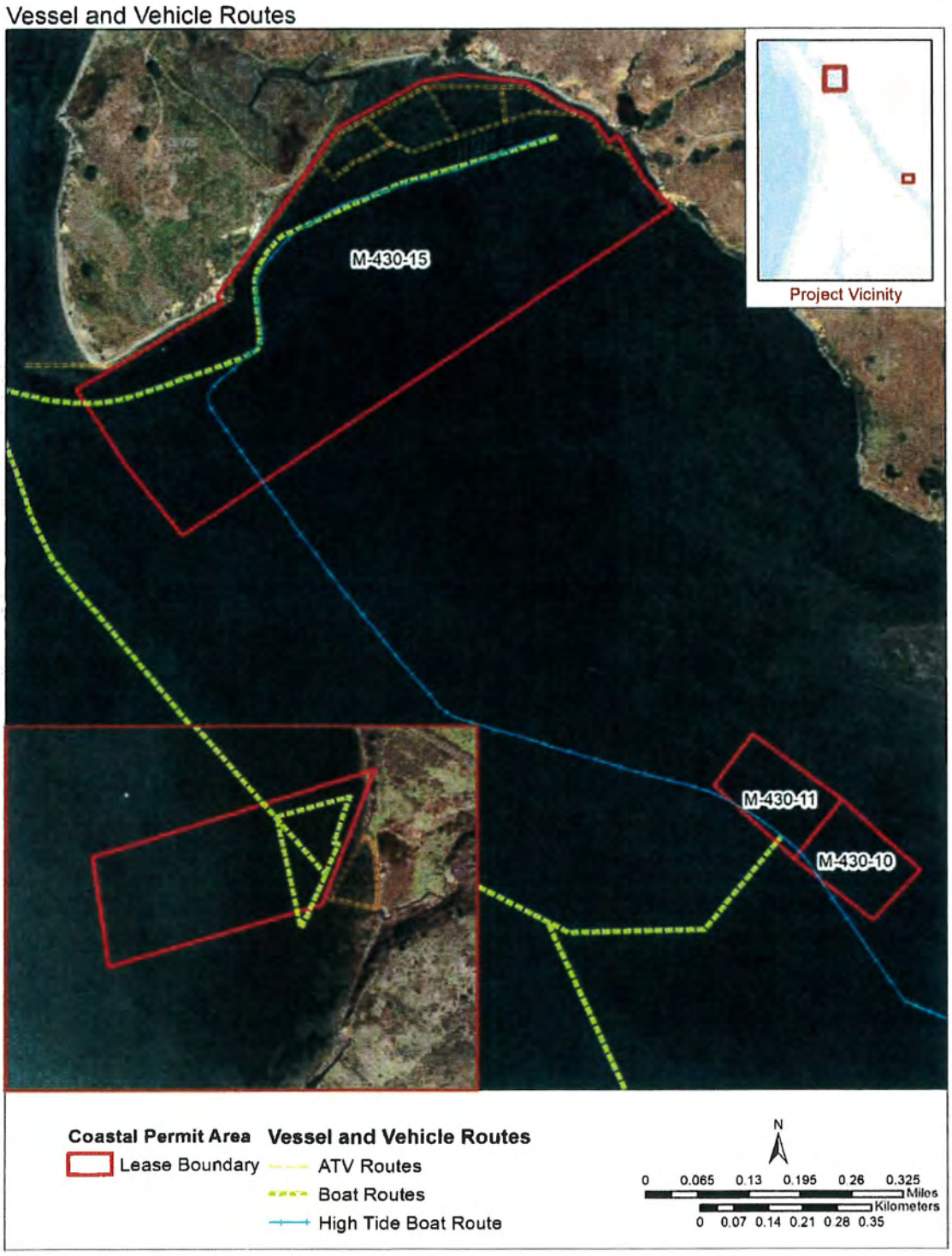

Figure 27: ATV and Vessel Routes

Figure 28: Vessel Routes and Boat Launches

5.3 Associated Support Posts, Anchors, and Marker Stakes

5.3.1 Support Posts

Longline support post and anchors (end post) are driven using sledge hammers, hand-held post pounders, and/or a gas or pneumatic hand-held post pounder. Posts are removed by first loosening them by twisting with a pipe wrench and then tying a clove hitch around pipes and pulling them out using a boat mounted crane. Material used in end posts has a serviceable life of at least 15 years. On the rare occasion that pipes are broken or damaged and cannot be repaired, they are replaced. Hog Island has had to replace three pipes within the last three years.

5.3.2 Anchors

Floating longline anchors consist of either 250 or 500 lb. Danforth anchors or concrete anchors. 250 lb. anchors are normally used for longlines and 500 lb. anchors are used for tray barges. Concrete anchors will vary from 150 to 500 lbs. They will be cylindrically shaped and measure between 12″ D x 36″ H to 24″ D x 36″ H. Most anchors will have a short length of 3/8″ to 1″ chain between 4′ and 10′ in length connected directly to the mooring. The chain will be followed up by a polypropylene or similar material rope in between the length of 4′ to 25′, depending on depth of water. The location of the existing and proposed anchor locations is shown in Figure 27. The existing anchor locations are as follows:

Lease 430-15: Anchors for floating line (sentinel mussels): 38° 12.852'N, 122° 57.055'W and 38° 12.841'N, 122° 57.081'W.

Lease 430-12: Anchors for each floating line:

38° 7.397'N, 122° 52.043'W and 38° 7.410'N, 122° 52.070'W
38° 7.408'N, 122° 52.033'W and 38° 7.423'N, 122° 52.060'W
38° 7.416'N, 122° 52.021'W and 38° 7.428'N, 122° 52.050'W
38° 7.427'N, 122° 52.011'W and 38° 7.439'N, 122° 52.041'W
38° 7.433'N, 122° 52.000'W and 38° 7.448'N, 122° 52.032'W

Lease 430-10: Anchors for the tray barges:

38° 12.279'N, 122° 56.133'W and 38° 12.291'N, 122° 56.149'W

Two anchors are required for each pair of floating longlines and two larger anchors are required for each tray barge group. If Hog Island planted the maximum amount of floating longlines, it would need to install approximately 108 additional anchors. These anchors will be located within the area proposed for floating culture, as shown in Figures 23 through 26. Work platforms are anchored with 25 lb. Danforth anchors with 3/8″ polypropylene or similar material rope.

Figure 29: Location of Anchors, Bed Markers, and Tray Barges

5.3.3 Markers

Cultivation areas are marked with 10' long 2" white PVC pipe with a horizontal strip of reflective tape and marked with an approximately 5" x 6" white PVC sheet with a number that identifies the row (for racks) or line (for bottom and tipping bags), as well as the area for clam rolls. Rows and lines are marked at the bottom and top of every 5th row or line. Clam areas are marked on four corners (two with square sheets and two without) by planting group.

6.0 BEST MANAGEMENT PRACTICES

Since its permits 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 taken 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 8. 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 permits for Lease Nos. 430-10, 430-11, and 430-15 require a 5-foot buffer from eelgrass beds (as they existed at the time the permits were issued).	Permits 14381N63, 15340N63, and 20842N63
Vessel Motors and Other Motors	HIOC uses highly efficient 4-stroke outboards and other motors (e.g., gas-powered motor for clam rake) that use 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.	See Figures 28 and 29
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.	See Figures 28 and 29
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.	See Figures 28 and 29

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.

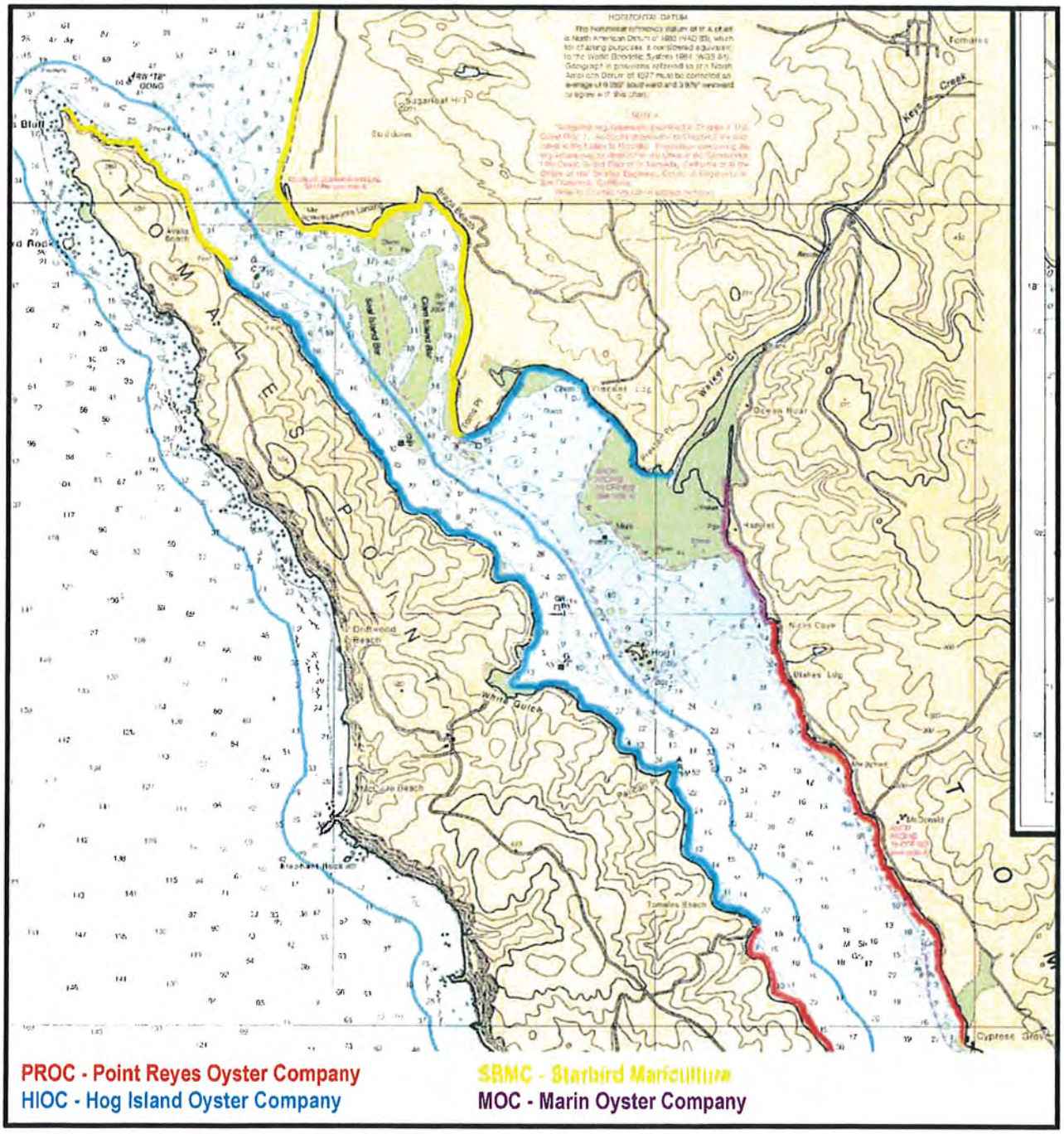

Figure A-1: Breakdown of Grower Responsible for Northern Tomales Bay Shorelines.

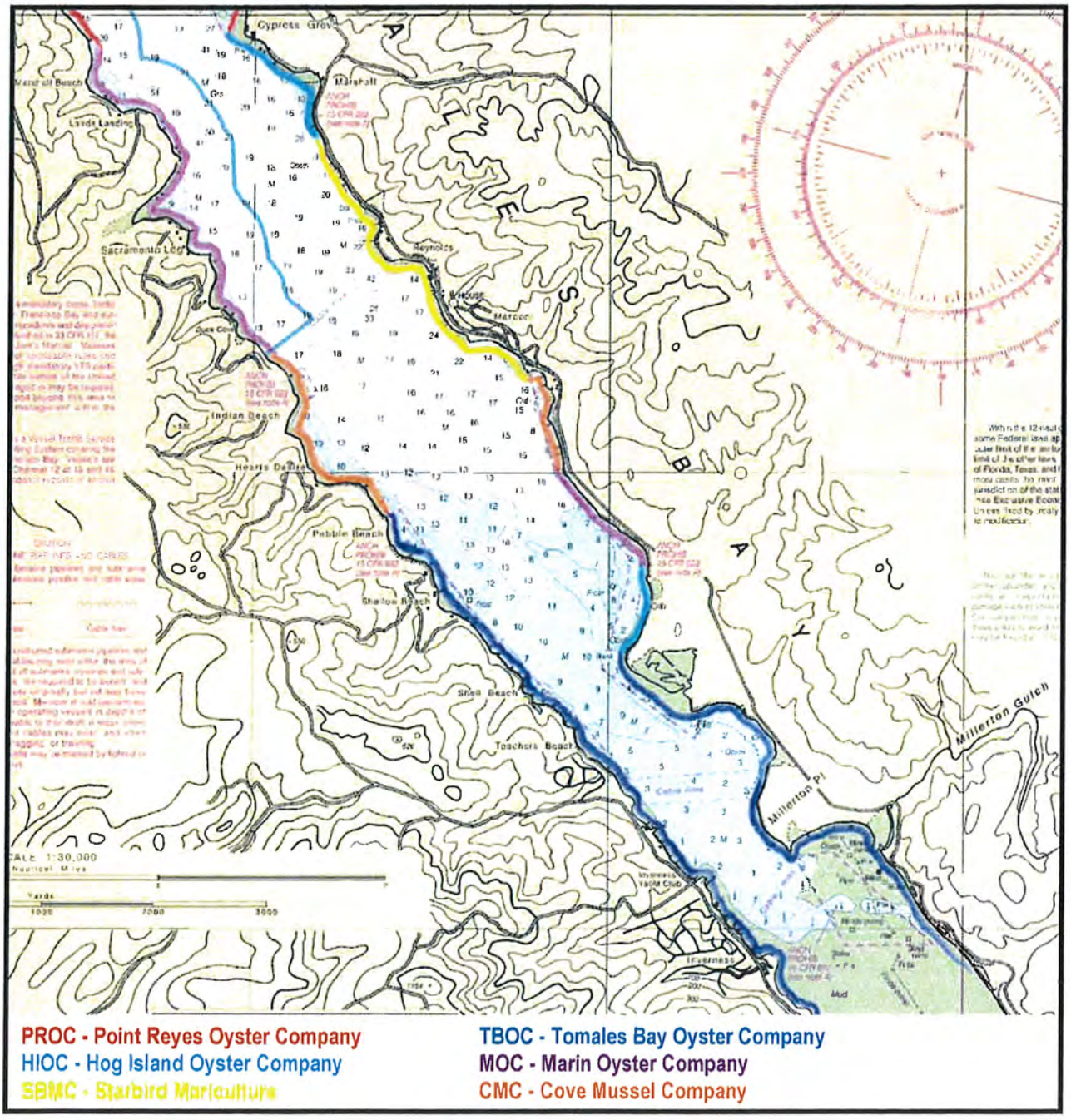

Figure A-2: Breakdown of Grower Responsible for Southern Tomales Bay Shorelines.

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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Proposed Species and Culture Methods for Hog Island Oyster Company Lease Amendments

List of species and culture methods currently authorized in each of four state water bottom lease areas held by Hog Island Oyster Company and proposed species and culture methods as requested in lease amendment application dated January 13, 2019. An "x" indicates either proposed in the lease amendment application or authorized under terms and conditions for the current lease.

Table 1: Authorized and Proposed Species

Species Name	Proposed	M-430-10 Authorized	M-430-11 Authorized	M-430-12 Authorized	M-430-15 Authorized
Manilla clam	x	x	x	x	x
Pacific oyster	x	x	x	x	x
Eastern oyster	x	x	x	x	
Kumamoto oyster	x				
European flat oyster	x	x	x	x	
Olympia oyster	x	x	x		
Mediterranean mussel	x		x		
Native oysters		x	x		
Red abalone		x	x		
Quahog clam				x	
Native littleneck clams				x	
Bay mussels				x	x

Table 2: Authorized and Proposed Culture Methods

Culture Method	Proposed	M-430-10 Authorized	M-430-11 Authorized	M-430-12 Authorized	M-430-15 Authorized
Rack and Bag	x	x	x	x	x
Bottom Bags	x				x
Intertidal longlines (with bags/baskets)	x				
Floating longlines	x		x		
Rafts	x			x	
Stakes and/or modified stakes		x	x		

Commissioners
Eric Sklar, President
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Jacque Hostler-Carmesin, Vice President
McKinleyville
Russell E. Burns, Member
Napa
Peter S. Silva, Member
Jamul
Samantha Murray, Member
Del Mar

STATE OF CALIFORNIA
Gavin Newsom, Governor

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Wildlife Heritage and Conservation
Since 1870

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May 30, 2019

John Finger, Co-founder and CEO
Hog Island Oyster Co.
20215 Shoreline Highway
Marshall, CA 94940

Sent via email to john@hogislandoysters.com

Dear Mr. Finger:

This letter is in response to your January 28, 2019 request to amend Hog Island Oyster Company's state water bottom leases for four state tideland parcels in Tomales Bay (leases M-430-10, M-430-11, M-430-12, and M-430-15). Your request was received by the California Fish and Game Commission (Commission) at its February 6, 2019 meeting and, subsequently, the Commission forwarded your request to the California Department of Fish and Wildlife (Department) for review. Final action by the Commission will be scheduled once the environmental review pursuant to the California Environmental Quality Act (CEQA) is completed, and the Department has submitted its review and recommendations to the Commission.

As stated in your letter, you are requesting to amend the list of culture methods and species currently authorized in each lease, to create a consistent set of culture methods and species authorized for the four lease areas; in essence, you are requesting to receive after-the-fact authorization for currently unauthorized species and culture practices. The Commission appreciates that you are seeking to rectify inconsistencies between the current culture methods and species you employ and those authorized in each lease.

The Commission's expectation is that once the lease amendment process is completed, that Hog Island Oyster Company will remain in compliance with the terms and conditions for each lease, including adhering to authorized culture species, culture methods, and lease boundaries. While the review and amendment process is underway, Hog Island Oyster Company may continue current aquaculture operations within the legally-defined boundaries of parcels M430-10, M430-11, M430-12 and M430-15 for up to one year from the date of this letter. The Commission is scheduled to

affirm this provision for continued operations at its June 12-13, 2019 meeting in Redding.

If you have any questions, please contact Elizabeth Pope, the Commission's Acting Marine Advisor, at Elizabeth.Pope@fgc.ca.gov, or fgc@fgc.ca.gov.

Sincerely,

Original signature on file

Melissa Miller-Henson
Acting Executive Director

ec: Craig Shuman, Regional Manager, Marine Region, California Department of Fish and Wildlife, Craig.Shuman@wildlife.ca.gov
Kirsten Ramey, Program Manager, Marine Region, California Department of Fish and Wildlife, Kirsten.Ramey@wildlife.ca.gov
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Bryan Matsumoto, Senior Project Manager, U.S. Army Corps of Engineers, bryan.t.matsumoto@usace.army.mil

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F14a-d

Filed: 9/19/2018
180th Day: 3/18/2019
270th Day: 6/16/2019
Staff: C. Teufel-SF
Staff Report: 1/24/2019
Hearing Date: 2/8/2019

ADOPTED FINDINGS

Application Nos.:	**2-81-40-A1; 2-84-2-A1; 2-84-10-A1; 1-94-55-A1**
Applicant:	**Hog Island Oyster Company, Inc.**
Location:	Tomales Bay, Marin County.
Project Description:	Request for after-the-fact approval for installation and use of on-bottom and off-bottom oyster and clam cultivation equipment and proposed expansion of shellfish cultivation through the use of new equipment and species within four State water bottom leases in Tomales Bay, Marin Co.
Commission Action:	Approval with conditions.

SUMMARY

Hog Island Oyster Company, Inc. (HIOC) has carried out shellfish aquaculture operations in Tomales Bay since the early 1980s. Over this time, HIOC's operations have expanded from a

single five acre lease to include four separate State water bottom leases covering a total of approximately 168 acres. HIOC's current operations are carried out within nearly 26 of these 168 acres. In the early 1980s and 1990s, CDPs were issued for each of the leases now included in HIOC's operation. Two of these CDPs were issued to the prior holder of HIOC's leases and the other two were issued to earlier iterations of HIOC's company. These four CDPs specify the types of shellfish that can be grown on the leases and the equipment and areas that are to be used for this cultivation. However, as HIOC's operation grew and evolved to incorporate new methods and areas, the CDPs for its leases were not amended to keep pace. HIOC began to use shellfish species, equipment, structures and areas beyond those authorized in its CDPs.

Due to HIOC's failure to obtain the necessary authorizations prior to carrying out development activities, violations of the Coastal Act exist within the areas of its operations. These include, but are not limited to, installation and use of on- and off-bottom shellfish cultivation structures and equipment for many years across roughly 17 acres in Tomales Bay; operation of all-terrain vehicles (ATVs) within intertidal mudflats; disturbance and damage to sensitive eelgrass habitat; and operation of mechanical shellfish harvesting equipment.

HIOC refutes the allegation that its use of cultivation methods, shellfish species, and equipment not described in the CDPs for its leases constitutes unpermitted development. Commission staff disagrees with this position and has informed HIOC of its belief that only those structures, species, and activities described in HIOC's CDPs make up the Commission-approved development for each lease. Despite its disagreement with Commission staff regarding the scope of the CDPs for its leases, HIOC has agreed with the approach Commission staff suggested for addressing it. That approach involves HIOC amending the four permits for its leases so that they accurately reflect the type and amount of shellfish cultivation activities that HIOC currently practices within them.

Therefore, in response to notification by Commission permitting and enforcement staff about its alleged Coastal Act violations – as well as its desire to expand its aquaculture operations - HIOC prepared and submitted amendment applications for each of its four CDPs. These amendments request after-the-fact approval for development activities HIOC has carried out without benefit of Coastal Act review. Approval of these applications pursuant to the staff recommendations, issuance of the amended permits, and the applicant's subsequent compliance with all terms and conditions of the amended permits, will result in resolution of the above described violations.

In addition to requesting after-the-fact permit amendments in order to resolve its Coastal Act violations, HIOC also proposes to expand its operations. Specifically, HIOC seeks to increase its operation to include a total of seven species and seven types of cultivation structures in different areas across approximately 54.37 acres. Approximately 15.75 acres of this roughly 54 acre expanded operation would be focused on cultivation methods already authorized in the CDPs for those leases. Assuming these acres would be used consistent with all aspects of those permits in their current form (i.e. eelgrass would be avoided and the shellfish species grown limited to those currently approved in the CDP for that area), HIOC could pursue this expansion without additional Commission review. The remaining acres of its proposed expansion would be new proposed development for which HIOC seeks the Commission's approval through amendments

to its four permits. For efficiency, all four of HIOC's proposed CDP amendments are being considered in this single report and recommendation.

For HIOC, an important aspect of its proposed project is the establishment of an efficient and expeditious process for obtaining regulatory authorization for future changes to its operations. For example, HIOC anticipates that in the future, it may want to substitute one type of shellfish growing method for another within the proposed cultivation areas shown on **Exhibit 3**. If it does so, HIOC would like the flexibility to be able to carry out such substitutions without a lengthy regulatory review. The Commission shares HIOC's interest in using the most efficient and effective regulatory process for considering future changes to its operations. As such, whenever the Executive Director determines that such changes can be accomplished consistent with all relevant Special Conditions and without potential adverse impacts to coastal resources or public access, they would be processed as immaterial permit amendments.

Potential Coastal Act issues raised by HIOC's proposed project primarily involve marine biological resources. Tomales Bay supports a wide range of ecologically important and sensitive marine habitats and wildlife, and many of these habitats and species can be found in and around HIOC's current and proposed operations. For example, all four of HIOC's lease areas support extensive beds of eelgrass and foraging habitat for a wide variety of shorebirds and marine wildlife.

In order to ensure that these coastal resources are appropriately protected, Commission staff is recommending several Special Conditions be added to HIOC's permits. These would: establish a permit term that is consistent with the current term of HIOC's State leases (**Special Condition 1**); protect eelgrass by requiring HIOC to carry out surveys of proposed cultivation areas prior to installing new cultivation structures and to adjust the location of these structures if eelgrass is found (**Special Condition 2**); protect marine habitat, wildlife and water quality by requiring HIOC to phase out its use of two cultivation methods and fully remove their associated structures (**Special Conditions 6** and **7)**; reduce marine debris in Tomales Bay by requiring HIOC to implement a series of debris prevention and recovery practices (**Special Condition 11**); and memorialize HIOC's commitment to implement a variety of mitigation measures it has proposed to benefit the marine biological resources of Tomales Bay (**Special Conditions 5** and **8**). Commission staff believes that the implementation of **Special Conditions 1** through **13** will reduce impacts to marine resources such that the projects can be found consistent with the marine resources policies of the Coastal Act.

The Commission staff therefore recommends that the Commission **APPROVE** coastal development permit amendment applications 2-81-40-A1, 2-84-2-A1, 2-84-10-A1 and 1-94-55-A1, as conditioned. The motions to carry out this recommendation are on page 5. The standard of review is Chapter 3 of the Coastal Act.

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APPENDICES

EXHIBITS

I. MOTIONS AND RESOLUTION

Motion 1:

*I move that the Commission **approve** Coastal Development Permit Amendment 2-81-40-A1 subject to the conditions set forth in the staff recommendation specified below.*

Motion 2:

*I move that the Commission **approve** Coastal Development Permit Amendment 2-84-2-A1 subject to the conditions set forth in the staff recommendation specified below.*

Motion 3:

*I move that the Commission **approve** Coastal Development Permit Amendment 2-84-10-A1 subject to the conditions set forth in the staff recommendation specified below.*

Motion 4:

*I move that the Commission **approve** Coastal Development Permit Amendment 2-94-55-A1 subject to the conditions set forth in the staff recommendation specified below.*

Staff recommends a **YES** vote on the foregoing motions. Passage of these motions will result in approval of the permit as conditioned and adoption of the following resolution and findings. The motion passes only by affirmative vote of a majority of Commissioners present.

Resolution:

The Commission hereby approves the Coastal Development Permit Amendments for the proposed project and adopts the findings set forth below on grounds that the development as conditioned will be in conformity with the policies of Chapter 3 of the Coastal Act. Approval of the permit amendments complies with the California Environmental Quality Act because either 1) feasible mitigation measures and/or alternatives have been incorporated to substantially lessen any significant adverse effects of the development on the environment, or 2) there are no further feasible mitigation measures or alternatives that would substantially lessen any significant adverse impacts of the development on the environment.

II. STANDARD CONDITIONS

1. **Notice of Receipt and Acknowledgment**. The permit is not valid and development shall not commence until a copy of the permit, signed by the applicant or authorized agent,

acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.

2. **Expiration**. If development has not commenced, the permit will expire two years from the date on which the Commission voted on the application. Development shall be pursued in a diligent manner and completed in a reasonable period of time. Application for extension of the permit must be made prior to the expiration date.

3. **Interpretation**. Any questions of intent of interpretation of any condition will be resolved by the Executive Director or the Commission.

4. **Assignment**. The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.

5. **Terms and Conditions Run with the Land**. These terms and conditions shall be perpetual, and it is the intention of the Commission and the applicant to bind all future owners and possessors of the subject property to the terms and conditions.

III. SPECIAL CONDITIONS

Existing Special Conditions of CDP No. 2-84-10:
1. All work shall be carried out in conformance with restrictions established by the Department of Fish and Game. (See Exhibit C).

Excerpt of relevant section from "Exhibit C" of CDP No. 2-84-10:
1. Rack culture will not be used in waters less than 3 feet deep at MLW (0.0 tidal datum). Racks employed will not extend higher than two feet above the water surface at MLW.
2. Rack modules will be spaced a minimum of 16 feet apart to allow for boat passage at median water levels.
3. Submerged racks will be buoyed in a manner that will allow for the free passage of boats at all stages of the tide.
4. Rafts will be placed offshore of rack modules in a manner that will not prevent passage between the racks and will be suitably marked to prevent hazards to navigation.

Existing Special Conditions of CDP No. 1-94-55:
1. U.S. Army Corps of Engineers Review. Prior to the commencement of construction, the application shall provide to the Executive Director a copy of a U.S. Army Corps of Engineers permit, letter of permission, or nationwide permit for the project.
2. Protection of Eelgrass. The applicant shall not cut or disturb any eel grass growing on the bay bottom during the installation or use of the proposed shellfish cultivation apparatus.
3. Removal of Cultivation Apparatus when Lease Terminates. Within 90 days of termination or abandonment of the subject lease by the applicant or any assignees to this permit, the applicant or assignees shall remove all aquaculture apparatus from the affected lease area.

CDP Nos. 2-81-40 and 2-84-2 do not currently include Special Conditions.

Except for Special Condition 7, which applies only to Coastal Development Permit Amendment 2-84-2-A1, the following Special Conditions will be included on CDP Amendment numbers 2-81-40-A1, 2-84-2-A1, 2-84-10-A1 and 1-94-55-A1 and will supersede and replace all special conditions (which are listed above) from CDP Nos. 2-84-10 and 1-94-55:

1. **Permit Term Limit and Scope.** Authorization for development activities on the State Water Bottom Lease associated with this permit shall expire on the current date of that lease's expiration (for example, November 2, 2030, February 7, 2033, July 1, 2027, and April 28, 2032, for leases M-430-10, M-430-11, M-430-12, and M-430-15, respectively). If the terms of the lease(s) are amended or a new lease issued by the California Fish and Game Commission, HIOC may submit an application for a permit amendment requesting an extension of the permit term. HIOC shall, no less than 60 days prior to permit expiration or the cessation of its operations on the State Water Bottom Lease associated with this permit, submit a complete application to amend this permit to remove all cultivation equipment and accumulations of oyster shell and return the lease areas to a natural condition.

   Unless further limited by implementation of the Special Conditions, the scope of this permit shall be limited to those cultivation structures, gear types, configurations and activities described in **Appendix B** that correspond with those included on that lease in the relevant figure in **Exhibit 3.** All bottom bags and floating bags used for oyster cultivation shall be affixed to anchored lines or racks.

2. **Eelgrass Habitat and New Cultivation Areas.** No shellfish cultivation equipment, anchors, or other structures, gear or equipment shall be installed or placed on, in, or over eelgrass habitat, as determined by the Executive Director using the definition of eelgrass habitat in the National Marine Fisheries Service's October 2014 California Eelgrass Mitigation Policy (CEMP). Prior to placing or installing structures or equipment on any shellfish cultivation area not shown on **Exhibit 2** ("existing cultivation areas") HIOC shall submit, for Executive Director review and approval, information collected within the most recent eelgrass growing season (May through September) demonstrating that no eelgrass is present within the area in which installation or placement is proposed. If eelgrass is present or the Executive Director does not approve the information (for example, because it is inconclusive, out of date, of inadequate resolution, or improperly collected), HIOC shall retain the services of a qualified, independent third party to carry out an eelgrass survey of that area. The survey shall be carried out consistent with the methodology and protocols established in the CEMP and shall be carried out during the eelgrass growing season in which installation activities will occur (or the previous growing season if installation will occur after the completion of one growing season and prior to the start of the next). Within 30 days of survey completion, the results of the eelgrass survey shall be provided to the Executive Director for review and approval along with a map or diagram showing the footprint and location of proposed cultivation structures and equipment relative to nearby eelgrass habitat and demonstrating that installation within eelgrass habitat, as defined in the CEMP, will not occur. While installation of shellfish cultivation structures and equipment shall be prohibited within eelgrass habitat, as defined in the CEMP, if such eelgrass habitat

moves or expands into areas with existing cultivation structures and/or equipment, HIOC may continue to maintain and use these areas for shellfish cultivation.

3. **Pre-installation Lease Line Survey.** Within 120 days of permit issuance, and prior to installation of any new shellfish cultivation structures or equipment, HIOC shall coordinate with staff of the California Department of Fish and Wildlife (CDFW) to retain the services of a qualified, independent third party surveyor or pursue other similar methods preferred by CDFW to determine the location and configuration of HIOC's State water bottom leases by December 31, 2019. These deadlines may be extended by the Executive Director upon request from HIOC and CDFW. The results of the lease delineation efforts and discussions with CDFW staff shall be provided to the Executive Director and used to determine the GPS coordinates for the corners of HIOC's leases. HIOC shall mark these locations using PVC stakes or buoys within 30 days of completion of lease delineation efforts. If the results indicate that any of HIOC's existing cultivation areas, structures or equipment are located outside of its leases, HIOC shall relocate or remove these cultivation areas within 90 days of completion of lease delineation efforts. Placement or use of cultivation structures or equipment outside of designated lease areas shall be prohibited.

4. **Amendment of State Water Bottom Lease.** Prior to installation or expanded use of any cultivation method and/or species not already included in the State Water Bottom Lease associated with this permit, HIOC shall submit to the Executive Director evidence that this lease has been amended by the California Fish and Game Commission (FGC) to allow these species and/or method(s) to be used. Without such evidence, HIOC's operations on the lease associated with this permit shall be limited to the species and methods that the Fish and Game Commission specifically allows on that lease. Any cultivation methods or species currently being used on the lease associated with this permit that have not been approved for that lease by the FGC shall be removed unless or until such approval is granted by the FGC. Such removal shall begin within 60 days and be completed within 120 days of permit issuance. If HIOC or FGC staff provides the Executive Director with evidence that the FGC allows certain methods or species to continue to be used pending a lease amendment review, HIOC may continue to use those methods and/or species on that lease.

5. **Removal and Disposal of Abandoned Structures.** Within 24 months of permit issuance, HIOC shall collect and remove all abandoned shellfish cultivation structures (including wooden posts and remnants of cultivation racks) in the immediate vicinity of State Water Bottom Lease No. M-430-15. All collected materials shall be properly disposed of at a certified onshore landfill or waste receiving facility. Upon completion of removal activities, HIOC shall provide, for Executive Director review and approval, a report documenting the estimated amount of material removed, the areas from which it was removed, and before/after photographs of the removal areas.

6. **Clam Cultivation and Harvest.** All future plantings of Manila clams shall be carried out using confined cultivation gear such as trays or "clam bags" (as described in **Appendix B**). To prevent escape of Manila clams from cultivation areas and to minimize excavation and disturbance of benthic habitat during harvest, direct planting of Manila clams into mudflat areas shall be prohibited. Removal of clams and equipment from existing unconfined clam

cultivation areas (also known as "clam rolls") shall begin within 30 days of permit issuance and shall be fully completed within 18 months of permit issuance. Within 14 days of completion, HIOC shall provide, for Executive Director review and approval, a report documenting that complete removal has occurred. This report shall be developed by an independent third-party approved by the Executive Director. Any remaining "clam roll" equipment, associated materials, and debris documented in this report shall be removed by HIOC within 30 days of providing the report to the Executive Director. Any such supplemental removal activity shall be documented by the same approved independent third-party in a supplemental report submitted to the Executive Director for review and approval within 14 days of the completion of the supplemental removal activity.

To limit turbidity and dispersal of disturbed sediments during harvest or collection of existing unconfined Manila clams removed pursuant to this condition, harvest/collection shall be carried out using non-motorized hand tools at tidal heights when the cultivation areas are fully exposed out of the water and all harvest/collection areas shall be fully encircled with a perimeter turbidity curtain. The turbidity curtain shall be maintained in place for two tidal cycles or until the water within the harvest area is visually similar to surrounding waters, whichever is longer. If turbidity curtains cannot be adequately maintained in place for this duration (due to currents, wind, etc.), they may be removed early with the approval of the Executive Director. Collected Manila clams that are not mature enough for harvest or cannot be harvested due to California Department of Public Health closures may be re-planted in approved areas using clam bags or cultivation trays.

7. **Removal of Stanway Structures.** Within 30 days of permit issuance, HIOC shall begin removing all its existing Stanway cultivation structures (including footings, support posts, support frames and Stanway cylinders) and associated equipment from State Water Bottom Lease No. M-430-11. All Stanway cultivation structures and associated equipment shall be completely removed within 12 months. All collected materials that cannot be recycled or reused onshore, shall be properly disposed of at a certified onshore landfill or waste receiving facility. Within 14 days of completion, HIOC shall provide, for Executive Director review and approval, a report documenting that complete removal has occurred. This report shall be developed by an independent third-party approved by the Executive Director. Any remaining Stanway cultivation structures or associated equipment, materials or debris documented in this report shall be removed by HIOC within 30 days. Within 14 days of the completion of this supplemental removal activity, it shall be documented by the same approved independent third-party in a supplemental report submitted to the Executive Director for review and approval.

8. **Eelgrass Habitat and Existing Cultivation Areas.** Those areas in which cultivation structures or equipment are present within eelgrass shown on the Greater Farallones National Marine Sanctuary's 2017 eelgrass map (as shown in **Exhibit 2 and Exhibit 6**) shall be cleared of all existing cultivation structures, gear, and/or equipment by May 1, 2019. Existing cultivation gear on lease M-430-15 and cultivation racks on leases M-430-10 and M-430-11 shall be exempt from this removal requirement.

9. **Cultivation Site Access and Vessel Use.** During vessel transit, harvest, maintenance,

inspection, and planting operations, HIOC shall avoid approaching, chasing, flushing, or directly disturbing shorebirds, waterfowl, seabirds, or marine mammals. In addition, typical in-water operations involving boat use shall be carried out consistent with the vessel routes and vessel management measures included in **Exhibit 4**. The use of cars, trucks, all-terrain vehicles or other wheeled or tracked motorized vehicles shall be prohibited on the intertidal lease areas associated with this permit.

10. **Annual Report.** By December 31 of each year, HIOC shall submit to the Executive Director an annual report with information regarding the results of quarterly cleanup events carried out as described in **Special Condition 11(D)** and the date of training, training materials, meeting minutes, and list of attendees from the Marine Debris Reduction Training described in **Special Condition 11(C)**. In addition, the annual report shall include information on the estimated number of cultivation bags and/or baskets lost, replaced, and recovered throughout the course of the year, as well as any design, management, or operational changes implemented to address issues that have arisen with the expanded use of elevated cultivation bags and/or baskets. The annual report shall also include a description of any significant changes to the type, quantity and configuration of cultivation equipment that are being considered and any resource or operational challenges that are emerging.

11. **Marine Debris Reduction and Management.** HIOC shall carry out operations consistent with the following marine debris reduction and management practices:

    A. **Storm Damage and Debris**. In the event that its shellfish culture gear or equipment becomes displaced or dislodged from culture beds, it shall be HIOC's responsibility to retrieve the material from the shoreline, open water, eelgrass beds, mudflat, or submerged bottom with minimal damage to the resources affected. Once located, such material shall be removed as soon as feasible and properly disposed of, recycled, or returned to use. As soon as safely and reasonably possible following storm or severe wind or weather events, HIOC shall patrol all of its active cultivation areas for escaped or damaged aquaculture equipment. All equipment that cannot be repaired and placed back into service shall be properly recycled or properly disposed of at a certified onshore waste disposal facility. In addition, HIOC shall retrieve or repair any escaped or damaged aquaculture equipment that it encounters while conducting routine daily and/or monthly maintenance activities associated with shellfish culture (e.g. bed inspections, shellfish harvest and planting). If the escaped gear cannot be repaired and replaced on the shellfish bed, it shall be properly recycled or disposed of at a certified onshore waste disposal facility.

    B. **Gear Marking.** HIOC shall mark shellfish culture bags (clam bags, oyster bottom bags, tipping bags and floating bags), cultivation baskets, trays and floats in an easily identifiable manner with identification information including its company name. Markings shall be securely attached and robust enough to remain attached and legible after an extended period in the marine environment (e.g. heat transfer, hot stamp, etching, etc.). Existing clam bags, cultivation baskets, bottom bags, tipping bags/floating bags and floats currently in use shall be marked or replaced with

marked versions when replanted, and all unmarked gear shall be marked in this way within 24 months of the Commission's approval of this permit amendment.

As an alternative to marking each individual non-floating cultivation bag (bottom bags and clam bags), HIOC may, within 90 days, submit an Alternative Gear Identification Plan (AGIP). This AGIP shall be submitted for Executive Director review and approval and shall describe (1) how identification of gear ownership (i.e. the entity responsible for proper gear placement, use, and recovery) would be achieved without markings on individual pieces of cultivation gear; (2) how this alternative identification method would be implemented and maintained; and (3) the proposed timeline for implementation. If the Executive Director approves the AGIP, HIOC shall implement it according to the proposed timeline. If HIOC fails to submit the AGIP by the specified deadline or the Executive Director determines that the alternative method would not provide at least an equivalent level of ownership identification as the use of markings on individual pieces of gear, HIOC shall proceed with the marking of all non-floating shellfish cultivation bags (bottom bags and clam bags) as described in the preceding paragraph. Regardless of the Executive Director's approval of the AGIP, HIOC shall mark all cultivation baskets and floating cultivation equipment (including cultivation baskets with floats, tipping bags, floating bags, and floats) as described in the preceding paragraph.

C. Marine Debris Reduction Training. WITHIN 30 DAYS OF ISSUANCE OF THIS PERMIT, HIOC shall conduct an employee training regarding marine debris issues, including covering how to identify culture gear or associated materials (marking stakes, support posts, longlines, label tags, clasps, etc.) that are loose or at risk of becoming loose, proper gear repair methods, and how to completely remove gear from out-of-production areas. Particular focus shall be placed on management and maintenance practices to reduce the loss of any gear type that is frequently lost or consistently found during bay cleanup and inspection activities. This training shall be repeated on an annual basis throughout the term of the permit. During trainings, HIOC's employees shall be encouraged to consider and implement field and management practices that reduce 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) used in its operations.

D. Cleanup Events. HIOC shall continue to carry out quarterly cleanup events in Tomales Bay in coordination with other interested parties or organizations. Cleanup events shall include walking different portions of the bay and shorelines to pick up escaped shellfish gear and other trash (regardless of whether it is generated by the project). The volume and type of shellfish gear collected and the cleanup location (marked on a map) and duration of cleanup activity shall be recorded and documented in the annual report submitted to the Executive Director of the Commission. If persistent discoveries of certain gear types are made, HIOC shall evaluate (and if feasible, implement use of) alternative gear types or practices that would reduce these persistent sources of debris.

E. Ongoing Operations. With the exception of materials temporarily and securely stored on its three floating work platforms, HIOC shall not leave or temporarily store tools, loose gear, or construction materials on its leased tidelands or surrounding areas. Work platforms shall not be used for long-term (months to years) storage or stockpiling of shellfish cultivation gear, and temporarily (days to weeks) stored or stockpiled gear shall be minimized and secured or maintained in covered containers whenever feasible. All aquaculture gear installed on and in use in active cultivation sites shall be kept neat and secure and maintained in functional condition. HIOC shall carry out regular bed inspections and maintenance activities to help ensure that broken, collapsed, fallen, or buried gear is fixed or removed in a timely manner. In addition, all mesh cultivation bags in use by HIOC for oyster cultivation shall be placed within designated areas and tethered to anchor lines, elevated tipping lines, racks or tray barges.

F. Bed Cleaning at Harvest. At the time of harvest of each cultivation area, HIOC shall carry out a thorough inspection to locate and remove loose, abandoned or out of use equipment, tools, and accumulations of oysters from the surrounding substrate. Oyster shell shall not be intentionally placed or deposited within the lease outside of cultivation gear, and oysters or oyster shell accidentally spilled during harvest shall be immediately collected and removed.

G. Excessive Gear Loss or Maintenance Failures. If the Executive Director determines that HIOC is responsible for excessive loss of aquaculture equipment (including bottom bags, tipping bags or cultivation baskets) into the marine environment or is consistently failing to maintain its equipment in an intact and serviceable condition, HIOC shall, within 60 days of the Executive Director's written notification, submit a complete permit amendment application to modify its cultivation equipment and/or operational practices to address the issue, unless the Executive Director determines that no such amendment is necessary to implement the necessary changes.

12. Hazardous Material Spill Prevention and Response Plan. WITHIN 60 DAYS OF PERMIT ISSUANCE, HIOC shall submit for Executive Director review and written approval, a project-specific Spill Prevention and Response Plan (SPRP) for work vessels, barges, and gasoline powered machinery that will be used during project construction and operational activities. HIOC and its personnel shall be trained in, and adhere to, the emergency procedures and spill prevention and response measures specified in the SPRP during all project installation and operations. The SPRP shall provide for emergency response and spill control procedures to be taken to stop or control the source of the spill and to contain and clean up the spill. The SPRP shall include, at a minimum: (a) identification of potential spill sources and quantity estimates of a project specific reasonable worst case spill; (b) identification of prevention and response equipment and measures/procedures that will be taken to prevent potential spills and to protect marine and shoreline resources in the event of a spill. Spill prevention and response equipment shall be kept onboard project vessels and barges at all times; (c) a prohibition on vessel fueling/refueling activities outside of designated fueling stations, carried out with spill

prevention and response protocols in place; and (d) emergency response and notification procedures, including a list of contacts to call in the event of a spill.

13. **Other Agency Review and Approval.** PRIOR TO COMMENCEMENT OF PROPOSED CONSTRUCTION AND/OR INSTALLATION ACTIVITES, HIOC shall submit to the Executive Director written evidence that all necessary permits, permissions, approvals, and/or authorizations for the approved project have been granted, including those from the Regional Water Quality Control Board, California Fish and Game Commission and U.S. Army Corps of Engineers. Any changes to the approved project required by these agencies shall be reported to the Executive Director. No changes to the approved project shall occur without an amendment to this permit unless the Executive Director determines that no amendment is legally necessary.

IV. FINDINGS AND DECLARATIONS

A. BACKGROUND AND PROJECT DESCRIPTION

Hog Island Oyster Company (HIOC) has been carrying out shellfish aquaculture in Tomales Bay since approximately 1984. Since that time it has grown into the second largest shellfish aquaculture company in California, with farming operations in Tomales Bay and Humboldt Bay as well as a series of restaurants in Marin County and San Francisco and onshore shellfish nursery and processing facilities. Although not included in the proposed project or CDPs discussed below, HIOC's onshore processing facility for Tomales Bay, located in the town of Marshall along the eastern shoreline of the bay, is in integral part of its shellfish cultivation efforts in Tomales Bay and serves as its base of operations. This site (referred to as "Hog Island Farm" in the figure below) is used for receiving, cleaning, processing, packaging, shipping and direct sales of the shellfish HIOC grows on its four leases in Tomales Bay (those leases are spread across the bay and are identified as M-430-10, M-430-11, M-430-12 and M-430-15 in the figure below).

Permit History

CDP No. 2-84-2
Based on the Commission's permit records, HIOC's shellfish aquaculture operations in Tomales Bay began on the five acre State Water Bottom Lease No. M-430-11 around March 1984. This is when the Commission issued CDP No. 2-84-2 for the placement and use of racks for oyster[1] cultivation on the lease. This lease is located in the northern part of Tomales Bay near the mouth of Walker Creek and is adjacent to dozens of acres included in other shellfish aquaculture leases currently being used by Marin Oyster Company, Point Reyes Oyster Company and Tomales Bay Oyster Company.

CDP No. 2-81-40
HIOC's operations expanded in September 1992 when it began operating on another five acre lease in the northern part of Tomales Bay. This lease, State Water Bottom Lease No. M-430-10, is located directly south of HIOC's first lease (as shown in **Exhibit 1**). Approximately ten years earlier, in May 1981, this lease was allotted to the Great American Oyster Co., and several months after that, the Commission authorized use of its five acres for cultivation of Pacific oysters (*Crassostrea gigas*[2]) using racks and stakes through CDP No. 2-81-40. Although HIOC took over operation of this lease area in 1992, the CDP was not formally transferred and remains in the name of Great American Oyster Company (a business that no longer exists).

CDP No. 1-94-55
Also in September 1992, HIOC – in joint venture with another company - gained a third lease area, the approximately 128 acre State Water Bottom Lease No. M-430-15. This lease is one of the largest in Tomales Bay and is located the farthest north, surrounding an onshore area owned by Audubon Canyon Ranch and known as Tom's Point. Two years later, in response to concerns raised by Commission staff and other aquaculture operators about HIOC's use of this second lease area for shellfish cultivation without benefit of a coastal development permit, HIOC and its partner applied for a CDP. This permit (CDP No. 1-94-055) was approved by the Commission in September of 1994 and granted to Tom's Point Shellfish. The CDP authorizes the use of a mapped portion of the lease for cultivation of unspecified types of oysters, clams, mussels, and abalone. Oysters were approved to be grown using plastic mesh "bottom bags" (either secured to an anchored rope and placed in rows on the mudflat directly or supported on metal re-bar racks); clams using partially buried plastic mesh bottom bags arranged in rows; and mussels and abalone in deeper water using wooden rafts and/or longlines held in place with anchors and supported by buoys. The CDP includes conditions requiring evidence of authorization from the U.S. Army Corps of Engineers; protection of eelgrass from damage or disturbance; and complete removal of cultivation equipment upon lease termination. In June 1995, HIOC's partnership venture ceased

[1] The species of oyster to be cultivated on these racks was not specified in the permit but the associated Lease of State Water Bottoms from the time mentions three oyster species: Pacific oysters (*Crassostrea gigas*), Eastern oysters (*Crassostrea virginica*) and European oysters (*Ostrea edulis*).

[2] As a result of recent genetic analysis, the Pacific oyster has been re-classified under a new genus and is now referred to as *Magallana gigas* (Salvi et al. 2014 and Salvi and Mariottini 2017). However, because this change is so recent and was not done with consensus from the scientific community (for example, see Bayne et al. 2017), the formerly common scientific name for the species, *Crassostrea gigas,* is used in this report.

(Tom's Point Shellfish) and HIOC assumed the full rights and responsibilities of the lease. CDP No. 1-94-055 was not formally transferred and remains in the name of Tom's Point Shellfish.

CDP No. 2-84-10
Similarly, HIOC has also been operating its fourth and final lease (the 25 acre State Water Bottom Lease No. M-430-12) under a CDP initially issued to another entity. This is one of the southern-most aquaculture leases in Tomales Bay and is located directly offshore of a portion of Tomales Bay State Park known as Tomasini Point. The lease is between two other leases currently operated by Tomales Bay Oyster Company and Point Reyes Oyster Company, respectively. The permit for this lease, CDP No. 2-84-10, was issued to Intertidal Aquafarms in 1984 and authorizes the installation and use up to five acres for ten 160-square foot floating rafts and 1,000 18-square foot wooden racks. These racks and rafts are to be used for the cultivation of bay mussels (*Mytilus edulis*), Pacific and European flat oysters, and three species of clams – Japanese littleneck/Manila clam, common littleneck, and northern quahog (*Venerupis japonica*/*Venerupis philippinarum, Venerupis staminea* and *Mercenaria mercenaria*, respectively). The CDP also includes conditions requiring all the cultivation racks to be installed in waters with a depth of at least three feet at mean low water and to be configured and marked so they would avoid impeding or limiting boat passage and navigation. HIOC's use of this lease area began in 1998 and continues today. The CDP remains in the name of Intertidal Aquafarms.

Current Operations
In total, HIOC's four current leases include roughly 163 acres of subtidal and intertidal land within Tomales Bay (**Exhibit 1**). Within these 163 acres, HIOC's current operations are made up of over a dozen separate plots or cultivation beds that cover approximately 25 total acres. The figures in **Exhibit 2** show the location of these cultivation beds and note the types of structures and equipment that have been installed within them. **Appendix B** provides a more detailed description of each of the methods HIOC currently uses. The remaining approximately 138 acres of HIOC's leases are not currently used for shellfish aquaculture. Some of these areas are not in use because they support eelgrass beds that are required to be protected from damage and disturbance. Other areas have yet to be brought into use or may have physical features such as deep water channels or tidal sloughs that limit their use for the type of shellfish farming HIOC has historically practiced.

While each of the CDPs for HIOC's leases describe specific areas and cultivation methods that are approved for use, over time, HIOC's operations changed to include other areas and methods not described or evaluated in its permits. In some cases, these new methods were pursued on a short-term trial basis and discontinued, in other cases, new methods were installed across several acres and have been in use for many years. Despite these ongoing changes to its operations, HIOC did not seek to amend or modify any of the CDPs for its leases to ensure that they continued to reflect the species, areas, equipment and methods it was using. As a result, HIOC's current operations deviate in many respects from those described and authorized in its permits. Of HIOC's approximately 25 acre existing operation, at least 17 acres of it are focused on shellfish species and/or the use of cultivation methods, structures, and equipment that were not considered or approved in its CDPs.

Many of these cultivation methods have also not been approved for use within HIOC's leases by the Fish and Game Commission. For example, since 2010, nearly seven acres of lease M-430-15 have been used for a method referred to by HIOC as "clam rolls." This method is further described in **Appendix B** but generally involves the tilling of large mudflat areas so they can then be directly planted with tens of thousands of young, non-native Manila clams. Approximately 400 square foot sheets of fine plastic mesh are then affixed to the surface of the mudflats over the seeded clams to limit predation. This method was not considered, discussed or authorized in the CDP for this lease area, and the lease itself includes a special condition that states: "Shellfish cultivation methods on this lease shall be confined to racks and bags and bottom trays. No other mode of operation or culture method is authorized."

In its recent approval of CDP No. 9-18-0278 for Grassy Bar Oyster Company in Morro Bay, the Commission prohibited use of this cultivation method due to concerns about potential adverse impacts to marine biological resources and water quality. As part of its project, HIOC is proposing to continue its use of this method for up to two years – until its current crop of clams is ready for harvest. At that point, as detailed further in **Appendix B**, the clams are proposed to be harvested using a gasoline powered hydraulic excavation and filtration system called a "water rake," and the plastic mesh currently in place within the approximately 6.9 acre area of lease M-430-15 would be removed. This method of cultivation is more intensive and has a greater potential to result in adverse impacts to marine biological resources and water quality compared to those approved by the Commission in the CDP for lease M-430-15.

Some of the other methods HIOC currently uses, however, appear to be less intensive and make use of less permanent and smaller, less substantial structures than those approved by the Commission several decades ago. For example, CDP Nos. 2-81-40 and 2-84-10 authorize the installation and use of large timber framed support racks that would extend six feet above the mudflats and require significant effort and seafloor disturbance to construct, install, and eventually remove. The removal of dozens of acres of such structures from Drakes Estero has cost the National Park Service several million dollars and required the use of mechanized equipment. Instead of using such structures, HIOC uses smaller, lighter, and shorter rack structures comprised of PVC and rebar that can be much more easily installed, relocated, and removed using only hand labor.

Along the same lines, another of the cultivation methods that HIOC uses involves the placement of plastic mesh bottom bags directly on the mudflats. Despite its inclusion in only one of HIOC's CDPs, this method is currently in use or has been used on all four of HIOC's leases. It is also the most commonly used method of shellfish cultivation in California and has been approved by the Commission in many CDPs over the years (including the CDP issued in 1994 for HIOC's lease M-430-15). However, at the time HIOC's other three CDPs were issued - the early 1980s - use of this method was less common and successful and it was not proposed by the applicants for those CDPs or considered by the Commission at that time. Several of the other cultivation methods that are in use on HIOC's leases but not included in its CDPs – such as floating longlines and elevated basket lines – are also commonly used methods that the Commission has authorized in Tomales Bay and elsewhere over the years.

Despite some of these methods being common in California and more advanced than several of those approved for use in HIOC's original CDPs, it is nevertheless important for their use to be evaluated on a site- and project-specific basis before such use begins. For areas like Tomales Bay that support a wealth of ecological resources, this helps ensure that appropriate protection measures and practices are in place and a means of regulatory oversight is in place to provide a greater assurance that such measures and practices are followed.

Table 1 below provides a comparison between the shellfish cultivation methods approved in HIOC's CDPs and those currently in use on each of its leases. More specific descriptions of each of the methods currently in use are provided in **Appendix B**. **Appendix C** provides descriptions of each of the permitted methods, excerpted from the Commission's original findings for each CDP and their associated exhibits. Table 2 below provides the acreage of each different cultivation method in each lease. In these two tables, the methods and acres not approved in each CDP are shown in bold.

Table 1: Comparison of Permitted and Existing Cultivation Methods

Lease No.	CDP No.	CDP Approved Methods	Methods Currently in Use
M-430-10	2-81-40	racks; stakes	racks; **bottom bags; rafts**
M-430-11	2-84-2	racks	racks; **bottom bags; Stanway units**
M-430-12	2-84-10	wooden racks; rafts	**floating longlines; rebar/PVC racks; basket lines, bottom bags**
M-430-15	1-94-55	bottom bags; racks; rafts; mussel lines	**clam rolls;** bottom bags; racks; **tipping lines; basket lines**; rafts

Table 2: Acreage of Existing Operations

Culture Type	Acres per Lease/CDP				Total
	M-430-10	M-430-11	M-430-12	M-430-15	
	2-81-40	2-84-2	2-84-10	1-94-55	
Overlapped racks	0.6	0.48	**1.34**	0.97	3.39
Regular racks	1.78	1.35	0	1.66	4.79
Stanway units	0	**0.36**	0	0	0.36
Bottom bags	**1.83**	**2**	0	1.77	5.6
Clam bags	0	0	0	0.03	0.03
Clam rolls	0	0	0	**6.89**	6.89
Floating culture	**~0.5**	0	**1.07**	0	1.57
Basket/tipping lines	0	0	0	**3.1**	3.1
TOTAL	4.71	4.19	2.41	14.42	25.23

As shown in **Appendix C**, several of the CDPs for HIOC's leases include detailed descriptions, schematic diagrams, and narrative descriptions of the cultivation methods and equipment that are approved for use on that lease. These materials clarify the meaning of the more general terms such as "racks," "stakes," and "mussel lines" used in the table above and provide a more complete understanding of the type of activities that were considered and authorized by the Commission in these permits.

It should be noted, however, that HIOC refutes the allegation that its use of cultivation methods, shellfish species and equipment not described in the CDPs for its leases constitutes unpermitted development. In its permit amendment application materials, HIOC summarizes its position by stating that "While the above species and methods [those included in the table above as "CDP approved"] were described in the project descriptions submitted to the 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." Commission staff disagrees with this position and has informed HIOC of its belief that only those structures and activities described in the CDPs make up the Commission-approved development for each lease.

Requests for After-the-Fact Approval

Despite its disagreement with Commission staff regarding the scope of the CDPs for its leases, HIOC has agreed with the approach Commission staff suggested for addressing it. That approach involves HIOC amending the four permits for its leases so that they accurately reflect the type and amount of shellfish cultivation activities that HIOC currently practices within them. Because these activities occurred in the past or are ongoing, the permit amendments would need to be considered after-the-fact. HIOC has therefore submitted an application to amend its four permits and request after-the-fact authorization for its installation and use of those cultivation structures and methods that are not currently described or considered in its CDPs. Specifically, HIOC is requesting after-the-fact approval for its cultivation of the following species and installation and use of the following types and approximate quantities of cultivation structures on its leases:

Table 3: Species and Activities Considered for After-the-fact Authorization

Lease M-430-10/CDP No. 2-81-40
Species: Atlantic/Eastern oysters, European oysters, Kumamoto oysters; *Methods:* approximately 1.83 acres of bottom bags (~4,180 bags) and up to six floating barges/rafts
Lease M-430-11/CDP No. 2-84-2
Methods: approximately two acres of bottom bags (~4,570 bags) and 0.36 acres of Stanways (up to 51 structures with ten units each)
Lease M-430-12/CDP No. 2-84-10
Species: Atlantic/Eastern oysters, Kumamoto oysters; *Methods:* approximately 1.34 acres of rebar and PVC racks (1200 racks); 1.07 acres of floating longlines (10 lines); 0.76 acres of bottom bags (~2,364 bags); and 0.6 acres of basket lines (four lines)*
Lease M-430-15/CDP No. 1-94-55
Methods: approximately 6.9 acres of clam rolls (292 400-square foot rolls); 3.1 acres of basket lines and tipping lines (83 lines); and up to three floating work platforms

*Both the bottom bags and basket lines were installed in recent years but have since been removed.

Activities involved with the initial installation and subsequent use of these methods for shellfish cultivation are further described in **Appendix B**. Most of these activities have been carried out on an ongoing basis for many years, some likely since the early days of HIOC's operations in the 1980s and 90s. Others - including the 2010 installation and use of clam rolls in lease M-430-15 and the 2015-2018 installation of floating longlines, basket lines, and bottom bags within lease M-430-12 – have occurred more recently.

HIOC also requests after-the-fact approval for its installation and continuing use of roughly 1,200 individual rebar and PVC cultivation racks across 1.34 acres of shallow intertidal habitat on lease M-430-12. The CDP for this lease (CDP No. 2-84-10) authorized a different type, construction and configuration of racks in this lease and its Special Condition 1 required those racks to be installed below a minimum water depth and to include certain navigational markings and lanes. The racks that HIOC installed and continues to use on lease M-430-12 do not appear to meet the requirements of Special Condition 1 and deviate from the description included in the permit. As part of its request, HIOC would eliminate Special Condition 1 of CDP No. 2-84-10 and continue its use of the racks currently in place on lease M-430-12 for another several years.

Finally, HIOC's request for after-the-fact approval also includes several additional structures and activities it has installed or carried out on its leases. These include the temporary mooring and use of several floating work platforms and the use of an all-terrain vehicle (ATV) on the mudflats of leases M-430-12 and M-430-15 to support operations in those areas. HIOC describes its use of the work platforms as follows:

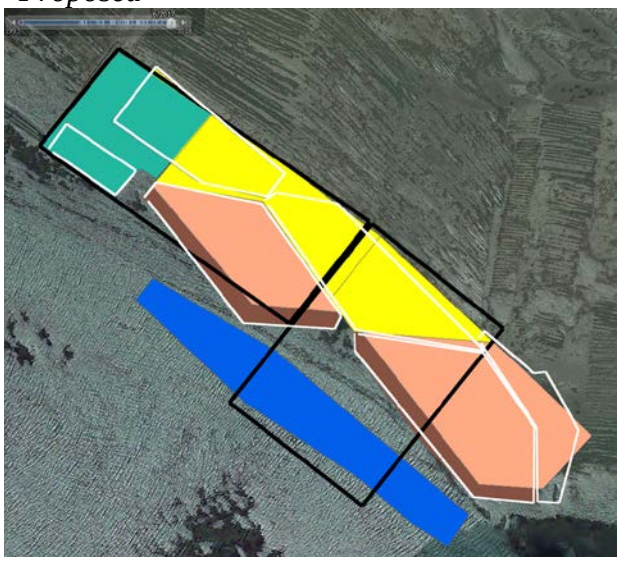
> *HIOC is currently using floating work platforms that typically measure 8 feet by 12 feet to 15 feet by 30 feet. The work platforms are used to stage materials (e.g., baskets, lines, bags) and tools for maintenance work on the leases. On occasion, they are also used to stage culture gear while awaiting 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.*

The following series of figures shows graphically the portions of HIOC's existing operations that are authorized in its current CDPs (in green) and those cultivation areas that were installed and operated without benefit of CDP amendments and for which it is seeking after-the-fact approval (in red). The black outlines show a rough approximation of the lease sizes and dimensions that are described in HIOC's existing CDPs. Also shown alongside each figure are graphical representations of the expansion activities proposed for each lease. For reference, the existing cultivation areas are outlined in white. The various colors used for the cultivation areas represent different types of cultivation structures (key provided below).

Leases M-430-10 and M-430-11 (CDP Nos. 2-81-40 and 2-84-2)

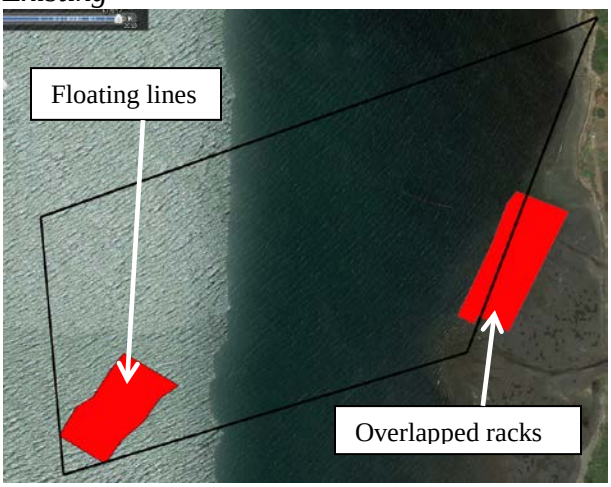
Existing

Proposed

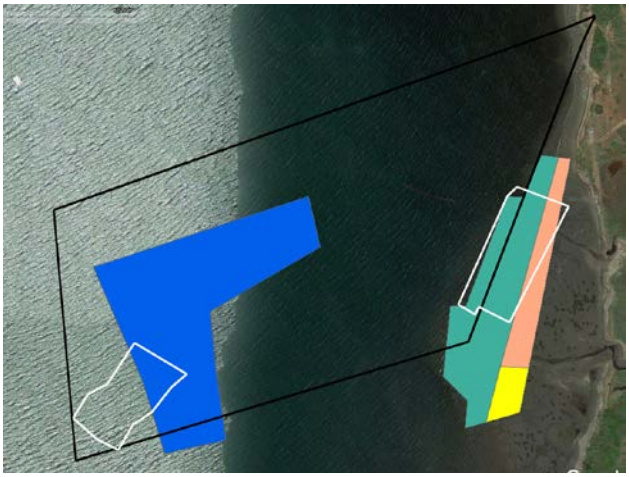


Lease M-430-12 (CDP No. 2-84-10)

Existing

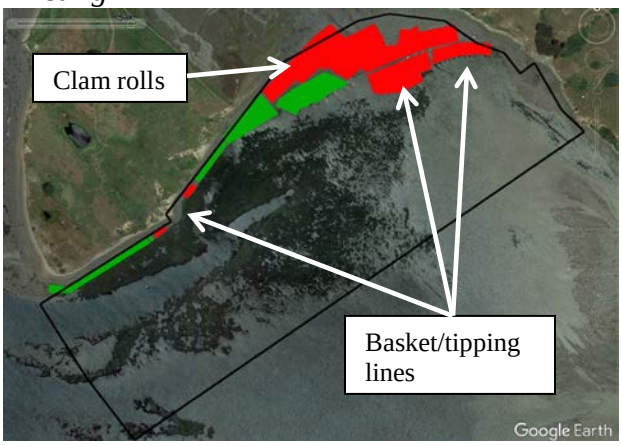


Proposed



Lease M-430-15 (CDP No. 1-94-55)

Existing



Proposed

Proposed New Development
HIOC's application for permit amendments additionally includes a proposal to expand its existing operations to include the use of additional acreage, cultivation methods, and shellfish species on each of its leases. Table 4 below lists the methods HIOC proposes to use on each lease, and **Exhibit 3** shows the location and size of the area on each lease in which the proposed methods would be used. The acreages highlighted in bold in the table represent cultivation methods not included or authorized in HIOC's existing CDP for that particular lease. HIOC proposes to add these methods, described in greater detail in **Appendix B**, to those currently included in its CDPs and to expand (or reduce from current levels) its use of them, as reflected in Table 4.

The use, installation, maintenance, and/or removal of these cultivation methods and associated equipment make up the scope of the new proposed development under review by the Commission in the permit amendments HIOC is requesting. As indicated on Table 4 below, a portion of HIOC's proposed expansion appears to already be authorized in its existing CDPs. Specifically, as long as it is carried out in a manner that does not disturb or damage eelgrass, HIOC's increased use of racks on lease M-430-10 and increased use of floating culture, clam bags, and racks on lease M-430-15 are allowed by the CDPs for those leases. These areas combined with other approved methods that would continue to be used at existing levels make up approximately 15 of the 54 acre expanded operation.

However, the majority of HIOC's proposed expansion – a total of nearly 5.5 acres of floating culture in leases M-430-10 and M-430-12 and the 29.21 acres proposed to be used for basket and/or tipping bag longlines across leases M-430-11, M-430-12 and M-430-15 – would be new development for which HIOC is seeking authorization from the Commission. Additionally, HIOC's continued or expanded use of bottom bags in leases M-430-10 (1.14 acres), M-430-11 (1.69 acres) and M-430-12 (0.29 acres), as well as its installation and use of PVC/rebar regular racks in 0.82 acres of the shallow intertidal portion of lease M-430-12, are also not authorized in HIOC's existing CDPs and would be considered new development as well.

Although this table indicates that HIOC's use of 1.34 acres of overlapped racks on lease M-430-12, 0.36 acres of Stanways on lease M-430-11, and 6.89 acres of clam rolls on lease M-430-15 would cease, these methods are proposed to be phased out over the next two or more years and HIOC would continue using them at their present levels until then. This limited term continued use would also be considered new development.

The location of HIOC's proposed new development activities for each lease are shown in the figures in **Exhibit 3**. Table 5 below shows the total proposed quantity of cultivation gear of each type that would be installed throughout its four leases to achieve the 54.37 acre expanded operation as well as the proposed density of this gear, based on the configurations described in **Appendix B**.

The term "floating culture" in the tables above refers to the use of floating longlines and/or tray barges, as described in **Appendix B**. These lines and barges would be used to hold up cultivation baskets and/or stacks of plastic mesh trays used to grow oysters as well as hanging ropes used to grow mussels.

Table 4: Proposed and Existing Cultivation Methods and Acreages

Culture Type	Acres per Lease/CDP*				Total
	M-430-10	M-430-11	M-430-12	M-430-15	Proposed (existing)
	2-81-40	2-84-2	2-84-10	1-94-55	
Overlapped racks	0.61 (0.6)	0.48 (0.48)	**0 (1.34)**	0 (0.97)	1.09 (3.39)
Regular racks	2.5 (1.78)	1.35 (1.35)	**0.82 (0)**	2.62 (1.66)	7.29 (4.79)
Stanway units	0 (0)	**0 (0.36)**	0 (0)	0 (0)	0 (0.36)
Bottom bags	**1.14 (1.83)**	**1.69 (2)**	**0.29 (0)**	0 (1.77)	3.12 (5.6)
Clam bags	0 (0)	0 (0)	0 (0)	4.61 (0.03)	4.61 (0.03)
Clam rolls	0 (0)	0 (0)	0 (0)	**0 (6.89)**	0 (6.89)
Floating culture	**0.75 (0.5)**	0 (0)	**4.72 (1.07)**	3.58 (0)	9.05 (1.57)
Basket/tipping lines	0 (0)	**1.65 (0)**	**2.22 (0)**	**25.34 (3.1)**	29.21 (3.1)
TOTAL	5 (4.71)	5.17** (4.19)	8.05 (2.41)	36.15 (14.42)	54.37 (25.73)

*Numbers in parentheses show the amount of acreage used for each method in HIOC's existing operation; numbers in bold denote cultivation methods not already approved in the existing CDP for that lease.

This proposed acreage exceeds the five acre size of lease M-430-11. However, once the results of lease surveys are available and HIOC has coordinated with CDFW regarding the approved legal dimensions of the leases, HIOC would adjust the size and location of proposed cultivation areas to remain within its delineated lease and at or below the maximum lease size. **Special Condition 3 would memorialize this process and prohibit HIOC from installing or using cultivation equipment outside the boundaries of its leases.

Table 5: Proposed Density and Quantity of Cultivation Equipment per Acre of Cultivation Bed

Culture Type	# per acre of cultivation bed	% of bed with gear	% of bed without gear	Total Quantity of Gear (lease 430-10/-11/-12/-15)
Overlapped racks	1190 racks	45%	55%	1,297 racks (725/571/0/0)
Regular racks	622 racks	29%	71%	4,534 racks (1555/839/510/1629)
Bottom bags	3111 bags	42%	58%	9,706 bags (3546/5257/902/0)
Clam bags	3872 bags	33%	67%	17,850 bags (0/0/0/17,850)
Floating culture	10 lines	17%	83%	90 lines (7/0/48/35)
Basket/tipping lines	36 lines	32%	68%	1,052 lines (0/59/80/912)

As shown in Table 4 above and **Exhibit 3**, in addition to proposing to make use of new or different cultivation methods and species than those currently included in the CDPs for its leases, HIOC is also proposing to expand its operations. This expansion, from the roughly 25 acres currently in use to a proposed 54 acres, would be spread throughout HIOC's four leases but would be concentrated primarily within leases M-430-12 and M-430-15. The area of use within those leases would grow from an existing 2.41 acres in M-430-12 and 14.42 acres in M-430-15 to approximately 8.05 acres and 36.15 acres, respectively. While operations on leases M-430-10 and M-430-11 are also proposed to increase, the amount of increase on these smaller five acre

leases would be more limited – from 4.21 acres to 5.0 acres on M-430-10 and from 4.19 acres to 5.0 acres on M-430-11.

Several aspects of this proposed expansion should be noted: (1) the expansion acreage described above and in Table 3 is proposed contingent on an absence of eelgrass within the new proposed cultivation areas; (2) the area estimates for HIOC's cultivation beds do not assume that cultivation gear would be placed on every square inch of the cultivation beds shown in **Exhibit 3** - they include in the estimate access lanes and open spaces between individual cultivation structures and groups of structures based on the configurations and densities described in **Appendix B** and shown in Table 4 above; and (3) although HIOC's current operations include only 25 of the 168 total acres in its leases, the existing CDPs for those leases authorize HIOC to use more acreage – as long as that additional acreage is used for the cultivation methods authorized for that lease in its associated CDP and is used without disturbance or damage to eelgrass (as discussed in each of those CDPs).

On the final point above – the acreage approved in HIOC's existing CDPs – HIOC's application includes information indicating its belief that the CDPs for its leases currently authorize it to carry out shellfish cultivation on roughly 65 acres across its four leases (5 acres each in leases M-430-10 and -11, 25 acres in lease M-430-12, and 30 acres in lease M-430-15).

However, Commission staff's review of the existing CDPs indicates that HIOC's estimate of 65 "permitted acres" is likely high. For example, for the 25 acre lease M-430-12, HIOC's estimate assumes that the Commission authorized the installation and use of cultivation gear throughout the entirety of the leases (a total of 25 acres). The Special Conditions, Commission findings, project description, and exhibits included with this CDP, however, describe limitations on both total acreage and areas available for use. For example, the Commission's findings in support of its approval for the CDP on lease M-430-12 discuss how no more than five of the lease's 25 acres would be in use for shellfish cultivation, stating that "Only 20% (5 acres) of the site proposed would be developed pursuant to Department of Fish and Game restrictions." Further, Special Condition 1 of this lease's CDP establishes restrictions on the use of the shallower portions of the lease.

Additionally, HIOC's operations on all four of its leases are required (through its leases and/or permits) to be carried out in a manner that protects eelgrass from damage and disturbance. The presence of eelgrass within the lease areas therefore limits the acreage in them that is available for use. Because the size and location of eelgrass beds fluctuate over time and HIOC's CDPs do not limit their protection of eelgrass beds to only those found in certain areas, the area within each lease that can be used without disturbing or damaging eelgrass may change from year to year. This issue is further discussed in the section of this report focused on Marine Resources.

Shellfish Species

Using these methods, HIOC proposes to plant and grow the following seven shellfish species on each of its four leases: Pacific oyster (*Crassostrea gigas*), Atlantic/Eastern oyster (*C. virginica*), Kumamoto oyster (*C. sikamea*), European flat oyster (*Ostrea edulis*), Olympia oyster (*Ostrea lurida*), Manila clam (*Venerupis philippinarum*), and Mediterranean mussels (*Mytilus galloprovincialis*). This list of species would replace the list of species currently included in

each of the CDPs for HIOC's leases. Rather than continuing the current situation where each of HIOC's CDPs authorizes a different number and suite of shellfish species, this proposed change would standardize the CDPs by amending each of them to include the same seven species. In order to accomplish this, the approved species in each CDP would be revised or clarified to include only the seven listed above, as described in Table 6, below.

Table 6: CDP Approved and Proposed Shellfish Species

CDP/Lease	2-81-40/430-10	2-84-2/430-11	2-84-10/430-12	1-94-55/430-15
CDP Approved Spp.	Pacific oysters	"oysters"	Pacific and European flat oysters, Manila clam, common littleneck clam, northern quahog, bay mussels	"oysters, clams, mussels, abalone"
Proposed Spp.	Pacific oyster, Eastern oyster, Kumamoto oyster, European oyster, Olympia oyster, Manila clam, Mediterranean mussels.	Pacific oyster, Eastern oyster, Kumamoto oyster, European oyster, Olympia oyster, Manila clam, Mediterranean mussels.	Pacific oyster, Eastern oyster, Kumamoto oyster, European oyster, Olympia oyster, Manila clam, Mediterranean mussels.	Pacific oyster, Eastern oyster, Kumamoto oyster, European oyster, Olympia oyster, Manila clam, Mediterranean mussels.

State Water Bottom Leases

Several of the species (including the Kumamoto oysters and California mussels discussed above) and cultivation methods in the existing and proposed operations on HIOC's leases have also not yet been approved for use within those leases by the California Fish and Game Commission – the agency responsible for the issuance and management of aquaculture leases on state lands. Similar to the situation with its CDPs, although each of HIOC's leases authorizes only a specific list of cultivation methods and species, its current operations include additional species and methods not included in those lists. For reference, the approved methods and species for each lease are provided in the table below:

Table 7: Lease Approved Cultivation Methods and Species

Lease No.	**M-430-10**	**M-430-11**	**M-430-12**	**M-430-15**
Species	Pacific, European, Eastern and Olympia oysters; Manila clams; red abalone	Pacific, European, Eastern and Olympia oysters; Manila clams; Mediterranean mussel; red abalone	Pacific, European and Eastern oysters; quahog clams; Manila clams; native littleneck clams; bay mussels	Pacific oysters; Manila clams; bay mussels
Methods	"racks and stakes"	"stakes, modified stakes, racks, and longline"	"racks and rafts"	"racks and bags and bottom trays"

Because some of the species and cultivation methods in HIOC's existing and proposed operations have not been authorized on its leases by the California Fish and Game Commission (FGC), **Special Condition 4** would require HIOC to submit evidence to the Commission's Executive Director that its leases have been amended by the FGC to allow these species and/or methods to be used. This evidence would be required to be submitted prior to installation or expanded use of any cultivation method and/or species not already included in a lease. Without such evidence, HIOC's operations on a particular lease would be limited to the species and methods that the Fish and Game Commission already specifically allows on that lease. **Special Condition 4** would also require that any cultivation methods or species currently being used on a lease that have not been approved for that lease by the FGC be removed until such approval is granted. If HIOC provides the Executive Director with evidence from FGC that it will allow certain methods or species to continue to be used pending lease amendment review, those methods or species may remain in use until that lease amendment review is concluded.

Timing of Expansion
HIOC anticipates installing cultivation structures and equipment within its proposed 28.6 acres of expansion areas incrementally over approximately the next seven years.

The first areas of new cultivation gear to be installed would be in lease M-430-12, where HIOC anticipates spending the next one to two years removing 1.34 acres of existing overlapping racks from the intertidal zone and replacing them with 0.82 acres of its "regular racks" (described in **Appendix B**), 0.29 acres of bottom bags, and 2.22 acres of elevated basket and/or tipping bag longlines. As shown in **Exhibit 3**, the elevated longlines would be installed at the outer edge of the intertidal mudflat with the racks and bottom bags placed on the landward side. As a result of this proposed expansion and conversion, HIOC's intertidal cultivation activities on lease M-430-12 would increase by roughly two acres. Concurrently, HIOC would also begin to install roughly 4.72 acres of floating longlines in the subtidal portion of lease M-430-12 as well. These buoyed lines would be used to support submerged cultivation baskets or groups of plastic mesh trays. The ten floating longlines that are currently spread across roughly one acre of this lease's subtidal area would be relocated as part of this effort and brought into the new area of lease M-430-12 proposed to be used for floating culture (as shown in **Exhibits 2** and **3**).

Once the expansion of operations on lease M-430-12 is completed, HIOC expects to begin working on lease M-430-11. Proposed expansion activities on lease M-430-11 would include removal of the 49 Stanway units currently in place and installation of 2.22 acres of elevated basket and/or tipping bag longlines in that location and the area immediately surrounding it. HIOC anticipates this removal and installation activity taking up to one year to complete. It would be carried out roughly concurrent to the installation of tray barges within an approximately 0.75 acre subtidal area of lease M-430-10 and the conversion of an approximately 0.69 acre intertidal area of that lease from bottom bags to racks.

In the final phase of its expansion, HIOC would spend an estimated three to five years expanding and modifying its operations on lease M-430-15. On this lease, HIOC would begin by removing its clam roll equipment from the entire 6.89 acre intertidal area dedicated to this use and converting all but the most shoreward 0.5 acres to use for clam bags, elevated basket and/or tipping bag longlines, and racks. HIOC also proposes to remove existing cultivation equipment

from the 1.77 acres used for bottom bags and the roughly one acre used for overlapping racks on lease M-430-15 and installing elevated basket and/or tipping bag longlines within these areas. In addition to these conversions, HIOC's use of elevated longlines would also expand through their installation in new areas – particularly in the north-eastern part of the lease as shown in **Exhibit 3**. Ultimately, HIOC anticipates installing an additional 22.24 acres of elevated basket and/or tipping bag longlines within lease M-430-15 by the year 2025. During this time, its 1.66 acre area currently in use for racks would also be expanded to cover up to 2.62 acres and it would additionally install up to 3.58 acres of floating culture (tray barges and floating longlines).

Installation/Removal Activities

To install the new proposed floating cultivation equipment – tray barges and floating longlines - in subtidal areas, HIOC proposes to make on-site observations and check the latest available eelgrass survey data to help ensure that equipment would not be placed within eelgrass habitat. If eelgrass is not found, HIOC would start with the installation of mooring blocks or Danforth-type anchors. Each pair of floating longlines or group of tray barges would involve the placement of two anchoring devices – one at each end. These anchors would typically be 250 pound Danforth anchors for longlines and 500 pound Danforth anchors for tray barges. The anchors are affixed to the cultivation equipment with a combination of chain and nylon rope. To install floating cultivation equipment within the total of 9 acres across its four leases, HIOC anticipates placing a total of 90 anchors. Once the anchors are in place, HIOC would use its vessels to carry or tow the cultivation equipment into place and arrange it for use.

Installation of elevated basket or tipping bag longlines would involve the placement of anchoring posts at either end of each line as well as support posts along the length of each line. These posts are typically two inch diameter PVC sections that are driven into the ground using hand-held non-mechanized sledge hammers and post-pounders and/or gas powered or pneumatic post-pounders. Lines are typically 100 to 300 feet long, one to four feet high with posts installed every eight feet. Once the lines are installed, groups of tipping bags (plastic mesh bottom bags with floats attached) or cultivation baskets are transported to the site on one of HIOC's vessels and/or ATVs and affixed to the lines by hand.

HIOC would use similar methods to install overlapped racks and regular racks – first using hand tools to install the rack's PVC pipe legs in the ground and then affixing the metal frame rack above the legs. The rack legs typically extend one to two feet above the ground and support two foot wide by eight foot long rebar racks with up to four plastic mesh bottom bags affixed to it. Materials are transported to installation sites using vessels at higher tides or ATVs at lower tides. Because of the depth, substrate type and location of leases M-430-12 and M-430-15, HIOC only proposes to use its ATV on those sites.

Installation of bottom bags involves the placement of two inch diameter anchor posts at either end of a 100 to 200 foot long nylon rope. This rope rests directly on the mudflat and each plastic mesh bottom bag is affixed to it using stainless steel snap hooks. Clam bags are installed in a similar manner, but because the bags are stocked with gravel to facilitate growth and survival of the planted clams, these bags are typically placed in rows or partially buried in the mudflats without anchoring lines.

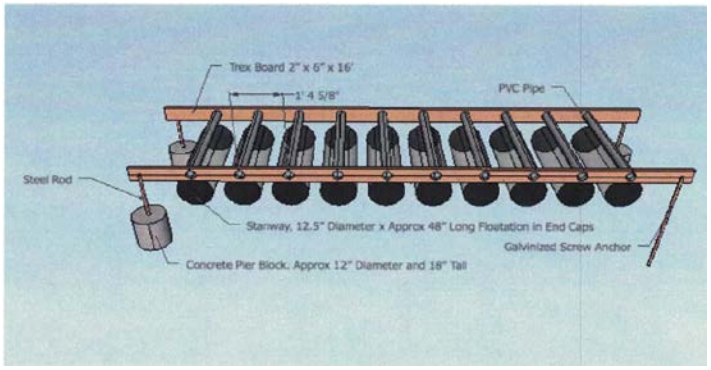
In addition to proposing to install new cultivation equipment, HIOC also proposes to remove existing equipment from several areas. Equipment would be removed from these areas to allow them to be converted from one growing method to another or because their use is being discontinued. Removal activities would be focused on clam rolls, overlapped racks and bottom bags in lease M-430-15; overlapped racks and floating longlines in lease M-430-12; and Stanway units in lease M-430-11.

To remove the clam rolls, HIOC would roll up each 400 square foot mesh sheet during harvest, tie it closed with rope and then load it onto a vessel for transport to HIOC's onshore processing facility in the town of Marshall. The clams buried below each clam roll would then be harvested using the gas-powered hydraulic "clam rake" described in **Appendix B**.

In its application, HIOC describes its proposed removal of its 49 Stanway units as follows,

> *Removal of the Stanway units will begin with all product being harvested and/or transferred. A crew will then unbolt and dissemble Stanway units at low tide. 2x6 Trex-timbers will be bundled and picked up at high tide by boat. Any Helix anchors will be unscrewed at low tide and removed. Buoys will be attached to any remaining concrete. The units will then be pulled out by a boat mounted crane. The schedule for removal is dependent on Hog Island's ability to obtain Commission approval to reinstall intertidal longlines that can be used to contain transferred product. Once the Commission approves the proposed longlines, removal of the existing Stanway units would take approximately 12 to 18 months.*

HIOC's application also includes the following diagram and representative photograph of the Stanway units.



Removal of racks and bottom bags would be simpler and would be accomplished through the extraction and collection of PVC anchoring posts, nylon ropes, and support legs once the mesh bags are removed as part of harvest activities. HIOC expects to be able to extract these posts using hand labor at low tide or through the use of its boat mounted crane at higher tide when vessel access to the work sites would be available. Removed equipment would be transferred to one of HIOC's vessels for transport to its onshore processing facility.

Removal of the floating longlines on the subtidal portion of lease M-430-12 would be carried out through the use of a vessel capable of lifting each of the ten 200 pound anchors used to maintain these lines in place. Once removed, these longlines are proposed to be relocated to an adjacent subtidal area of lease M-430-12, outside of the area of eelgrass habitat that was mapped in 2017.

Lease Sizes and Configurations

During its review of HIOC's application and the proposed project, Commission staff identified a variety of outstanding questions and discrepancies regarding the size and configuration of HIOC's state water bottom leases. These issues include inconsistencies between the sizes, configurations and legal descriptions of the original lease allotments included with HIOC's initial CDPs (issued in the early 1980s and 1990s) and those included in maps and materials produced by the California Department of Fish and Wildlife (CDFW), including those included with HIOC's 2012 renewal of leases M-430-10 and M-430-11 and M-430-12. In some cases, the more recently described lease lines and configurations (which also appear to be reflected in **Exhibits 2 and 3**) deviate significantly from the originals and alter the type, location, and amount of habitat included within the leases. Discussions of these issues between Commission staff, HIOC and CDFW indicate that these changes may not have been intentional or made as part of formal lease amendments. Additionally, because these changes appeared fairly recently and were not made at the request of HIOC, it appears that most of HIOC's existing operations continue to be located and configured in alignment with the original and historic lease sizes and shapes rather than the new ones. In some cases, this may result in the siting of some of HIOC's cultivation equipment outside of the lease areas most recently described in CDFW materials. However, for its proposed expansion, HIOC appears to using the new lease configurations – which would result in its placement and use of cultivation equipment outside of the areas described in the original lease allotments and CDP materials. For example, the configuration and location of lease M-430-11 described in the original lease allotment materials shows that it includes only intertidal habitats. The more recent size and configuration of the lease in some CDFW materials, however, indicates that it now includes subtidal habitats as well. Because HIOC's proposed expansion includes placement and use of floating cultivation equipment (floating longlines and/or rafts) in this subtidal area, it is unclear whether the location of this new proposed cultivation area is within or outside HIOC's lease.

To address this confusion, **Special Condition 3** would require HIOC to coordinate with CDFW staff to have an independent survey of the boundaries of its four leases carried out by a professional surveyor within 120 days of permit issuance and prior to installation or use of shellfish cultivation equipment within any Commission approved expansion areas (those areas not currently in use for shellfish cultivation that HIOC proposes to use). The results of the lease surveys and discussions with CDFW staff would be used to determine the GPS coordinates for the corners of HIOC's leases and to mark them in the field using PVC stakes or buoys. If the results indicate that any of HIOC's existing cultivation areas are located outside of its leases, HIOC would relocate or remove these cultivation areas within 90 days. **Special Condition 3** would also prohibit the installation or use of cultivation equipment on any portion of expansion areas located outside of HIOC's leases.

Planting, Harvest and Maintenance Activities
HIOC's planting, harvest and maintenance activities are further described in **Appendix B** and would primarily be carried out on its intertidal lease areas during low tides when the cultivation equipment is exposed and its personnel can walk among it. To move personnel, shellfish and equipment between its cultivation areas and onshore processing facility, HIOC would make use of a variety of different outboard motor powered flat bottomed vessels. Maintenance activities on HIOC's lease areas include periodically flipping, shaking, inspecting and collecting cultivation equipment (bottom bags, cultivation baskets, racks) for sorting. This activity is carried out primarily using hand labor at low tides for intertidal equipment, and with the use of support vessels at higher tides for subtidal equipment such as floating longlines and tray barges.

As HIOC's operations increase along with its proposed expansion, the frequency and duration of these planting, harvest and maintenance activities is expected to increase, resulting in additional vessel traffic and personnel on HIOC's leases and Tomales Bay.

Vessel Use and Transit Route
HIOC's current operations make use of three vessels – two 24 foot skiffs and a custom 40 foot vessel equipped with a hydraulic crane for assisting in planting and harvest operations. **Exhibit 4** shows the access routes and landing sites most typically used by these vessels as they move between the Miller Point Boat Launch, Marconi Cove and the four lease areas.

With its 25 acres of existing operations, HIOC estimates that these vessels make up to four daily trips between all of its leases and between 10 and 20 trips per week. As HIOC's operations expand across the 54 proposed acres, it estimates that the level of activity would increase by approximately 50%, resulting in two to six vessel trips per day and 15 to 30 per week on Tomales Bay. Additionally, during the roughly seven years that HIOC anticipates would be needed to complete its proposed installation of new cultivation equipment and structures, it is likely that activity levels within the lease being focused on at that time may increase further.

B. OTHER AGENCY APPROVALS

U.S. Army Corps of Engineers
Shortly after the four original CDPs were issued for shellfish cultivation operations on Hog Island Oyster Company's (HIOC) lease areas, the U.S. Army Corps of Engineers (ACOE) also issued permits for these operations under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. However, similar to the deviation that exists between HIOC's current operations and those authorized in its CDPs, a similar deviation also exists between HIOC's current operations and those authorized by the ACOE. HIOC is currently working with the ACOE to address this situation and has provided ACOE staff with a description of its operations and background information. In addition, HIOC's proposed expansion also triggers regulatory review by the ACOE. HIOC has indicated to Commission staff that it is in the process of preparing and submitting permit applications to the ACOE. Commission staff has provided opportunities for input and regular updates to ACOE staff throughout its review of this CDP application.

National Marine Fisheries Service
As part of the ACOE permit review process, it would consult with the National Marine Fisheries Service (NMFS) to evaluate potential issues associated with Essential Fish Habitat and Protected Species. Commission staff also reached out to NMFS during the review of this application for permit amendments, specifically, regarding the project's potential to adversely affect eelgrass habitat and the application of appropriate protection measures.

Greater Farallones National Marine Sanctuary
Tomales Bay is within the Greater Farallones National Marine Sanctuary and under management by the Office of National Marine Sanctuaries (ONMS). Commission staff coordinated its review of the proposed project with ONMS staff and solicited early input from them, consistent with the state and federal agency coordination process established for shellfish aquaculture projects in Tomales Bay through a Memorandum of Agreement signed in 2016. In addition, ONMS staff provided information to Commission staff about the presence and location of sensitive marine resources in the project area, including the results of eelgrass mapping and survey efforts carried out on behalf of ONMS in 2017.

San Francisco Bay Regional Water Quality Control Board
Projects involving discharges of dredged or fill material to waters of the United States that require permits from the U.S. Army Corps of Engineers under Clean Water Act Section 404 are often also required to obtain authorization from the Regional Water Quality Control Board (RWQCB) under Clean Water Act Section 401. Commission staff provided opportunities for input and updates to RWQCB staff during its review of this CDP application. As its application to the ACOE is processed, HIOC anticipates reaching out to staff of the San Francisco Bay RWQCB regarding its permitting process and requirements.

California Fish and Game Commission
HIOC's operation is carried out within State Water Bottom Lease Nos. M-430-10, M-430-11, M-430-12, and M-430-15. These leases were renewed in recent years for a period of 15-years by the Fish and Game Commission, and unless renewed, will terminate between July of 2027 and February of 2033. These leases establish the shellfish species and cultivation methods to be used by HIOC and require HIOC to obtain and adhere to permits and authorizations from all other relevant agencies. During the course of this permit review, Commission staff reached out to and solicited input from California Department of Fish and Wildlife staff regarding the consistency of HIOC's current and proposed operations with its leases and the steps necessary to address existing discrepancies. These discussions helped inform the development of **Special Condition 4** which would require HIOC to provide evidence that its leases have been appropriately amended prior to installing or continuing to use shellfish cultivation methods and/or species that are not authorized in its leases.

California Department of Fish and Wildlife
HIOC's aquaculture operations are required to be registered annually with the California Department of Fish and Wildlife (CDFW) and to adhere to a variety of protocols related to introduced species and the importation of oyster seed. HIOC has a consistent compliance record with these regulations and has a valid registration for 2018.

Tribal Outreach and Consultations
During the process of reviewing HIOC's CDP application for this project and developing this recommendation, Commission staff reached out to representatives from Native American Tribes understood to have current and/or historic connections to the project area. These Tribes include the Federated Indians of Graton Rancheria and the Kashia Band of Pomo Indians of the Stewarts Point Rancheria. Contact information for these Tribal Representatives was gathered from the Native American Heritage Commission's Native American Contact Lists dated July 23, 2018. No Tribe responded with feedback or concerns.

C. FILL OF OPEN COASTAL WATERS

Section 30233(a) of the Coastal Act states, in part:

> *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 on 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.*

The installation and maintenance of shellfish cultivation equipment (including bottom bags, floating longline anchors, anchoring and support posts, rack supports, Stanway anchors, and "clam roll" nets) on intertidal and subtidal portions of Tomales Bay associated with HIOC's proposed expansion and the activities for which it is requesting after-the-fact approval, constitute "fill" as defined by the Coastal Act. Section 30108.2 of the Coastal Act states:

> *"Fill" means earth or any other substance or material, including pilings placed for the purpose of erecting structures thereon, placed in a submerged area.*

Coastal Act Section 30233(a) permits fill in coastal waters if three tests are met: (1) the fill constitutes an allowable use under 30233(a); (2) there is no feasible less environmentally damaging alternative; and (3) feasible mitigation measures have been provided to minimize any adverse effects.

Although each of HIOC's four CDPs already authorize the placement of fill within the coastal waters associated with that CDP, the authorized fill is limited to that associated with the cultivation methods approved by that permit. Because HIOC is requesting after-the-fact approval for its use of cultivation methods that were not approved in those CDPs – and is proposing to expand their use (as shown in Table 4 above) – the fill associated with these "non-approved" cultivation methods must also be authorized. With the exception of clam bags – which are approved in the CDP for lease M-430-15 and only proposed to be used on that lease (and therefore not discussed further) – at least one of HIOC's CDPs does not include each of the cultivation methods in its existing and proposed operation. Therefore, the discussion below considers the fill associated with each of these methods (bottom bags, regular racks, overlapping racks, basket lines, tipping bag lines, floating longlines, tray barges, clam rolls, and Stanway units). Rather than divide the discussion into four parts – one for each permit and associated suite of cultivation methods being considered for that permit – for the sake of efficiency and simplicity, the evaluation of the fill associated with each cultivation method is combined into a single discussion.

Allowable use

HIOC proposes to place – and seeks after-the-fact authorization for - fill in coastal waters for the purpose of cultivating oysters and clams. As discussed above, HIOC's proposed project is an aquaculture project, and as such qualifies as an "allowable use" under 30233(a)(7). The project is therefore consistent with the first test of Section 30233(a).

Alternatives

The Commission investigated project alternatives that would reduce or eliminate the need for fill. Due to the force of tides and currents within HIOC's leases, the presence of shellfish predators, as well as the design of the structures and gear associated with the cultivation methods and activities employed by HIOC, a system of anchoring and support posts, anchors, bottom bags and other cultivation gear is an essential element. For on-bottom cultivation, use of mesh bags allows the shellfish being grown to remain contained and consolidated during grow-out so they may be fully recovered at harvest with minimal habitat disturbance (particularly in comparison to unconsolidated placement of oysters or clams directly on the substrate, which can significantly alter the substrate and require mechanical or hydraulic dredging techniques to harvest). Therefore, eliminating fill is not a feasible alternative for this type of shellfish culture operation.

The Commission considered several alternative anchoring and post systems to those proposed by HIOC for its elevated basket and tipping bay longlines and bottom bag longlines, including different types of posts and stakes and different post spacing configurations. While a wider spacing of support posts would be possible, to maintain the oyster cultivation equipment above the substrate and within the target area of tidal influence would result in high levels of tension and weight on the horizontal lines and would therefore require larger posts, more substantial support cables, and/or anchoring systems on each end of the lines. These larger, more permanent

structures would require more substantial installation methods, including the possible need for mechanized equipment (such as powered augers, water jets, or pile drivers). This would likely result in the installation of fewer larger structures rather than more numerous smaller structures, thereby not likely reducing the overall amount of fill required. Further, the larger structures would be more difficult to remove or adjust in the future and may require more intensive extraction methods, thus increasing the amount and severity of habitat disturbance that would occur during these activities.

Alternative anchoring methods for HIOC's floating longlines, and tray barges were also considered. HIOC's proposed method of mooring these structures in place relies on the use of Danforth-type anchors or concrete blocks deployed at either end of the structures or lines. Danforth anchors are commonly used marine moorings that rely on both a weighted section and a section that digs into or self-buries in the substrate when pulled laterally. Accordingly, these types of anchors can remain small while being just as effective as much larger moorings that rely on mass alone. This smaller size helps reduce the disturbance footprint associated with each individual anchor. While other anchoring options – such as helical screw-type anchors – are also available that would have an even smaller disturbance footprint, because such anchors need to be drilled into the substrate, they function as more permanent moorings and are more difficult to install and remove. Because HIOC periodically relocates its floating longlines, tray barges and their associated anchors, use of helical screw anchors would be impractical.

Alternatives to the use of bottom bags were also considered, including the elimination of the bags and the use of support posts or racks to elevate a greater number of them above the mudflats. As noted above, elimination of the bags entirely would not reduce the total amount of proposed fill and would result in the placement of loose oysters and shell directly on the mudflats, increasing the loss and dispersal of shell, altering the physical makeup of the mudflats themselves, and requiring the use of harvest techniques that result in substantial disturbance and displacement of benthic habitat. As such, this alternative would not be less environmentally damaging than the proposed use of bottom bags.

While the use of posts or racks to elevate more of the bottom bags off of the mudflats would reduce the amount of direct fill, the environmental benefits of such efforts are not clear. These types of elevated alternatives may facilitate access to the mudflats for foraging wildlife such as fish, bat rays, and shorebirds when compared to the use and placement of mesh bottom bags directly on the substrate, but even this is not certain. Some species of birds have been shown to largely avoid elevated structures, and the interaction of other species of birds and marine animals with them has yet to be carefully evaluated. As such, it cannot be stated with confidence that the use of elevated gear in place of on-bottom gear would significantly increase foraging activity or opportunities. Additionally, a greater number of more robust, elevated structures may have shading effects and affect currents, hydrology, and sediment transport/deposition in ways that bottom bags do not. Other effects are likely to be similar between the two alternatives. For example, oyster feeding and the deposition of organic material onto the underlying substrate is likely to occur at similar rates between the two cultivation methods. While elevated gear in some locations may facilitate flushing, water movement, and dilution of organic materials, in other locations, the more substantial and robust gear in the water column associated with

elevated gear may alter current speeds and directions in ways that would concentrate organic wastes.

Based on current scientific understanding, it appears that the use of bottom bags versus elevated gear at similar densities simply results in trading some effects for others with no clear overall advantages in impact potential or magnitude. The critical considerations appear to be with the density of cultivated oysters and installed equipment (lower densities have lower potential for adverse effects), as well as maintenance and operational practices. Assuming similar densities and practices, it does not appear to be less environmentally damaging to replace bottom culture gear with elevated culture gear or vice versa. Because HIOC is proposing – and requesting after-the-fact approval for – the use of a range of on-bottom and elevated oyster cultivation equipment (including two types of racks, elevated basket and tipping bag lines, and bottom bags), it appears that the slight environmental tradeoffs associated with each different method would be balanced within and across its lease areas.

However, some exceptions to this exist - two of the cultivation methods HIOC is using appear to have superior alternatives.

For example, alternatives to HIOC's use of plastic mesh clam nets were also considered due to the potential for the use of these nets to result in adverse environmental effects. HIOC proposes to continue using a total of nearly 117,000 square feet of plastic mesh netting placed as a cover over approximately 292 400-square foot areas of mudflats seeded with Manila clams. While light and thin, these nets cover large contiguous areas of benthic habitat, limiting or precluding foraging by marine species ranging from shorebirds to fish, rays, skates and small sharks. Additionally, the nets pose a potential entanglement risk for small fish and invertebrates that may become trapped while trying to swim or burrow through the nets or entangled when the nets are occasionally swept away during storms or high winds. While some of these potential adverse impacts may also be associated with other types of cultivation gear such as bottom bags, bottom bags are intentionally shifted, moved and collected on a frequent and regular basis by HIOC personnel as part of the cultivation process and as such, do not affect any particular area of benthic habitat for more than two or three weeks. In contrast, the clam netting would be in place and static for a year or more. This would result in long-term lost or limited foraging opportunities and entanglement risk over a locally significant area – nearly 6.9 acres - of mudflats near Tom's Point. These large contiguous areas are distinct from the much smaller (six square foot) areas covered by individual bottom bags or clam bags and would therefore result in a more significant suite of effects.

In addition, HIOC's method of using clam rolls also involves the use a gasoline powered "clam rake" device that uses jets of water to burrow into the mudflats and push sediment through a coarse filter or screen designed to capture and collect the clams being harvested. In addition to disturbing and churning up the sediment in the mudflats, unearthing and exposing a variety of native invertebrate and shellfish species to possible predation, the clam rake also increases turbidity and decreases water quality in the surrounding area during its use.

As a result, alternative cultivation methods for Manila clams were considered that would not require the long-term placement of large contiguous netting on mudflat areas and the shallow

excavation and sifting of those same mudflats during harvest. These methods include confining the clams within mesh bottom bags or trays in place of their unconfined placement directly into mudflats that must then be covered by netting. One of these methods, placement of clams in mesh bottom bags, is already carried out by HIOC on lease M-430-15 and was approved for that lease in CDP No. 1-94-55.

In addition to limiting entanglement risk and loss of foraging opportunities for marine wildlife, the use of confined cultivation gear for clams would also significantly reduce the chance of non-native clams escaping from cultivation and establishing wild populations (it would be nearly impossible to collect and remove all of the seeded clams once they are allowed to burrow freely into mudflats, but if they are contained within trays or bags, their complete removal can be better assured). Additionally, growing clams in confined gear would eliminate the need for excavating and digging up benthic habitat during harvest. As the Commission also found in its recent approval of CDP No. 9-18-0278 (Grassy Bar Oyster Company), cultivation of clams using confined gear is a less environmentally damaging alternative to the method that has been carried out by HIOC on approximately 6.9 acres of lease M-430-15 since 2010.

Although HIOC is voluntarily ceasing its use of this method, it nevertheless proposes to continue to use it for up to two additional years as it waits for its most recently planted crops of clams to mature and grow to harvest size. To memorialize HIOC's commitment to discontinue its use of clam rolls, **Special Condition 6** would therefore require the use of confined gear such as bags or trays for future Manila clam cultivation. In addition, **Special Condition 6** would also require HIOC to expedite its phase out of this method by initiating removal within 30 days of permit issuance and setting a deadline of 18 months for all of its remaining clam rolls to be removed. If clams collected during this removal effort have not yet achieved marketable size – or if they are collected during a period when the lease is closed to harvest by the California Department of Public Health due to water quality precautions – those clams may be re-planted in clam bags within the same area of lease M-430-15 until they are suitable for harvest. Further, **Special Condition 6** would also establish a variety of water quality protection measures to be implemented during the collection or harvest of clams currently planted in the clam rows. Based on the results of its most recent clam growth and status survey on January 17th, HIOC anticipates that it would be able to remove up to 150 of its approximately 270 remaining clam rolls within the next three to four months.

The other cultivation method for which environmentally superior alternatives exist is HIOC's Stanway units. As shown in the photograph and schematic diagram of these units, they are much more substantial than the other cultivation structures that HIOC uses and each one includes up to four concrete footings to hold the unit's vertical support posts in place as well as a horizontal pair of 16 foot long support boards made from composite lumber. Held between the horizontal supports on each unit and elevated above the mudflats are ten cylindrical mesh tubes called Stanways into which oysters are planted. When the contained oysters are ready for harvesting or sorting, the entire Stanway cylinder is removed. Although an effective means of growing oysters, HIOC's use of these Stanway units has been problematic for several reasons.

Foremost, because the Stanway cylinders provide structural stability to the support structures, when they are removed during harvest, the support structures often warp, collapse and

periodically break apart. When this occurs, any remaining Stanway cylinders can be released and the lumber on the Stanway unit can break free. This marine debris can be transported into sensitive habitat areas such as eelgrass beds where it can smother and damage the plants within. Over the past several years, loose lumber from HIOC's Stanway structures and cylindrical Stanways has been found throughout the northern part of Tomales Bay, both in intertidal habitat and shoreline areas. Additionally, large amounts of loose lumber have also periodically been found within the area in which the Stanways are currently installed. The proximity of eelgrass beds to this area raises particular concerns about the loss of material and debris from use of the Stanway cultivation method.

Secondarily, because the support structures used in Stanway units are so large and heavy – and are held in place with concrete footings – their installation, replacement and removal requires extensive effort, including excavation and the use of a small boat-mounted crane. These activities can result in locally significant disturbance of the seafloor and can negatively affect water quality and nearby habitat through the release of turbidity clouds. Further, the aspects of installation and removal that rely on hand-labor can also be extensive and can require frequent visits by several workers, resulting in trampling and disturbance of the surrounding mudflats. Although only 49 Stanway units are currently in place in lease M-430-11, the level of activity associated with their removal is high enough for HIOC to estimate that it will take 12 to 18 months to remove them.

Due to the adverse impacts associated with its use, Commission staff compared the Stanway cultivation method to alternative methods of shellfish cultivation also practiced by HIOC in Tomales Bay, including racks, basket lines, tipping bags, and bottom bags. Although each of these methods have also been known to release marine debris into the bay, because they are much more commonly and extensively used – when compared to Stanways which are used only by HIOC on a small part of its lease M-430-11 – management and maintenance practices have been developed to limit and address this issue. Additionally, all of these alternative methods rely on the use of gear and structures that are smaller, lighter, and can more easily be installed, repaired and removed. As a result, these methods have clear advantages over the more cumbersome and permanent Stanway units in that they can be installed, relocated, and removed in days rather than months and without the locally significant disturbance to substrate habitat and mudflats.

While HIOC is also proposing to phase-out its use of this cultivation method, that phase-out is not proposed to occur until 2021. In order to expedite the discontinuation of this method and the adoption of environmentally superior alternatives, **Special Condition 7** would require HIOC to begin removal operations within 30 days of permit issuance and complete them within 12 months. In order to ensure that the Stanway structures and associated materials are fully and completely removed, **Special Condition 7** would also require a third-party, independent inspection to be carried out of the Stanway cultivation area at the completion of removal activities. This report would be submitted for the Executive Director's review and approval and would document the condition of the area. Any cultivation equipment or associated material documented in the report would be required to be removed by HIOC within 30 days.

The remainder of the proposed project includes a mix of contained bottom culture (mesh bottom bags and clam bags) as well as off-bottom culture techniques (overlapped racks and regular racks), using a support system with a minimal footprint that does not include the permanent placement or pile driving of anchors or supports. These project elements reduce the amount of fill compared to the alternative types and configurations of posts and stakes that the Commission considered. In addition, other than the clam cultivation and Stanway alternatives discussed above, there do not appear to be other alternative cultivation methods that would be less environmentally damaging. The Commission therefore finds that with the implementation of **Special Conditions 6 and 7,** the proposed project minimizes the amount of fill to the maximum extent feasible, so that the project is the least environmentally damaging feasible alternative and is therefore consistent with the second test of Section 30233(a).

Mitigation Measures
The final test of Coastal Act Section 30233(a) requires that feasible mitigation measures have been provided to minimize any adverse effects of the fill.

After-the-fact Development
As discussed above regarding HIOC's past and proposed use of clam rolls in lease M-430-15 and Stanway units in lease M-430-11, the placement of this fill has and is likely to continue to result in adverse environmental effects.

Additionally, as discussed in the Marine Resources section below, the placement of several hundred individual PVC support posts and anchoring stakes on bay sediment (as part of its unpermitted installation of overlapped racks in the shallow intertidal area of lease M-430-12 and basket lines and tipping lines on lease M-430-15) is expected to result in loss of benthic habitat and mortality and disturbance to associated organisms. However, given the small total amount of this fill and its dispersion over a large number of very small individual sites (less than four square inches each), as well as the abundance of benthic habitat in Tomales Bay similar to that which would be filled, adverse impacts associated with the installation and presence of these oyster cultivation support and anchoring systems would be minimal. The exception to this is that a portion of the area used for overlapped racks in lease M-430-12 also supports eelgrass habitat. This habitat is adversely affected by the displacement and disturbance associated with the presence and use of those racks. Due to the complexity of this issue, it is discussed separately in the Marine Resources section of this report.

However, HIOC's request for after-the-fact approvals also include a more substantial amount of fill, that associated with the placement onto the substrate of six square foot oyster bottom bags. HIOC is requesting after-the-fact approval for unpermitted placement of approximately 4,200 bottom bags in lease M-430-10; 4,600 in lease M-430-11; and 2,300 in lease M-430-12 (although this group of bottom bags has been removed). These bottom bags have been spread across 1.83 acres, 2.00 acres, and 0.76 acres in leases M-430-10, -11, and -12, respectively. Within these areas, the bottom bags have directly occupied roughly 0.58 acres, 0.63 acres, and 0.32 acres, respectively.

These bottom bags are typically in place, lying on the intertidal mudflats, for 12 to 24 months at a time as the oysters within them grow to harvestable size. While the placement of these mesh

bags on top of the substrate would not result in the loss or removal of this substrate from the bay, the presence of the oyster shell filled mesh bags and the biological processes of the living oysters themselves may have localized effects on the underlying and adjacent benthic habitat and influence the type and abundance of organisms that it supports. These effects are associated with physical smothering or displacement from the bags and shells, as well as organic enrichment due to the deposition of biological waste from oyster filtration and feeding. By affecting benthic ecology (species composition, richness, abundance and dominance) in these ways, this fill may also affect other larger species such as fish, rays, sharks and shorebirds that forage on intertidal mudflats. In addition to effects on foraging associated with changes in the type and abundance of species present within the habitat below and adjacent to the bottom bag cultivation areas, foraging would also be affected by the presence of the plastic mesh bags themselves which in some cases may block access to prey.

Additionally, information included with HIOC's application indicates that some of the areas used by HIOC for bottom bags on leases M-430-10 and M-430-11 overlap with eelgrass habitat. The presence of bottom bags in these areas and their associated maintenance, harvest, and planting activities are likely to disturb, damage, and displace this eelgrass habitat. Due to the complexity of this issue, it is discussed separately in the Marine Resources section of this report.

In addition to its proposed phase-out of the clam roll and Stanway cultivation methods – which would be expedited and inspected for completeness through **Special Conditions 6 and 7** – HIOC has also included information in its application for permit amendments demonstrating the work it has and would continue to do to make up for the adverse environmental effects associated with the placement of fill for which it is seeking after-the-fact approval. Specifically, HIOC identifies the efforts its staff has made over the past several years and will continue to make over the course of its permit terms to benefit the coastal and marine biological resources of Tomales Bay.

These efforts include participation (staff and boat support) for roughly two decades in the annual Bay Clean Up event with staff from the Environmental Action Coalition of West Marin, Tomales Bay State Park, and the Tomales Bay Association. As noted by HIOC, "During that time, we have removed hundreds of tires, many pieces of creosote treated lumber, and even a few engine blocks (as well as lots of miscellaneous plastic debris)." HIOC commits to continuing to participate in these events for the remaining term of its permits.

Additionally, starting three years ago, HIOC initiated an effort involving its staff and staff from the other five shellfish aquaculture companies operating in Tomales Bay to carry out quarterly clean-ups along the bay's shoreline. These efforts were coordinated to include the entire 30+ mile long shoreline of Tomales Bay and from 2016 through 2018, resulted in the collection and disposal of close to 12,000 individual pieces of debris, much of it plastic. Although some of this debris (about 1,000 pieces) likely originated from the bay's aquaculture operations, the vast majority did not. In 2018, HIOC staff carried out at least 49 clean-up events in Tomales Bay, from a few minutes to several hours. Most recently, HIOC staff spent nearly seven hours in December 2018 carrying out shoreline clean-up work and collected 78 items, most of which were not aquaculture related. HIOC has also committed to continuing these clean-up efforts throughout the term of its permits.

In addition to this work to remove general waste from the bay and shoreline, HIOC has also carried out and committed to more focused efforts to collect and remove more substantial materials from Tomales Bay. Several years ago, HIOC's staff removed roughly 500 feet of fencing that had been illegally installed within lease M-430-15, and over the next several years HIOC has also committed to collecting and fully removing all of the abandoned wooden cultivation structures that pre-date HIOC's operations in lease M-430-15 and are still present in the area, including approximately 150 vertical wooden posts that have been in place for at least 25 years. The removal of these posts from Tomales Bay would open an area of intertidal and subtidal habitat that has been occupied by fill for at least 25 years and would help prevent additional habitat disturbance and displacement in the future as these timbers inevitably break apart and disperse. Additionally, because these posts may be constructed from treated lumber that could be leaching or dispersing copper and arsenic based compounds into the surrounding water and sediment, their removal would provide additional water quality benefits. **Special Conditions 5 and 11** would memorialize several of these ongoing commitments by requiring HIOC to complete its removal of abandoned aquaculture structures within 24 months of permit issuance and continue its quarterly clean-up efforts.

To help further reduce the potential for adverse environmental impacts associated with HIOC's placement and maintenance of fill, the Commission is requiring in **Special Condition 3** that HIOC coordinate with CDFW and retain the services of a professional surveyor to accurately and conclusively establish the configuration and location of its lease boundaries. With the addition of this mitigation measure, existing confusion about the size and location of HIOC's leases would be addressed, therefore allowing HIOC to better concentrate and more effectively contain its cultivation activities within its leases. Further, **Special Condition 11** would also limit the potential loss and dispersal of cultivation gear by requiring that all bottom bags in use by HIOC be placed within designated areas and tethered to anchor lines, elevated lines or racks. **Special Condition 9** would require HIOC to adhere to the cultivation site access plan included with its amendment application that includes wildlife disturbance measures and mapped transit corridors that would limit the loss and disturbance of eelgrass habitat due to prop-cutting or interactions with outboard motors. Finally, **Special Condition 11** would create a variety of marine debris prevention and response protocols that would reduce the likelihood of debris loss and increase opportunities for its recovery.

Proposed New Development

HIOC is also proposing to place and maintain fill in coastal waters as part of its proposed expansion. As discussed previously, some of the proposed expansion would be allowed by HIOC's CDPs even without amendment. However, the majority of the proposed expansion would be subject to the Commission's review.

Specifically, HIOC proposes to amend its four CDPs to permanently retain most of the development for which it is seeking after-the-fact approval and to also install and operate an additional 22.14 acres of basket lines/tipping lines in lease M-430-15; an additional 3.68 acres of floating culture, 0.29 acres of bottom bags, and 0.82 acres of regular racks in lease M-430-12; an additional 1.65 acres of basket lines/tipping lines in lease M-430-11; and an additional 0.25 acres of floating culture in lease M-430-10.

Because the expanded use of these cultivation methods within these leases raise similar considerations and would result in similar potential environmental effects as those previously discussed above, rather than duplicate that analysis, the following discussion will focus on those issues unique to the proposed expansion. For example, HIOC's installation of cultivation structures in new areas and expansion of existing cultivation areas into surrounding areas that are not currently used for cultivation raises the possibility for adverse interactions with sensitive habitat such as eelgrass. To address this issue, **Special Condition 2** would require HIOC to carry out a survey of each new cultivation area and to provide the results to the Executive Director for review and approval prior to initiating installation activities. This Special Condition would further prohibit HIOC from installing new cultivation equipment within or adjacent to eelgrass habitat, thus providing an additional assurance that such habitat would be protected from the new proposed cultivation activities.

Another unique issue raised by the proposed expansion concerns the volume of additional cultivation gear that HIOC would bring into use on the new cultivation beds. HIOC proposes to install up to 1,052 basket/tipping lines across its four leases (approximately 59 on lease M-430-11; 80 on lease M-430-12 and an additional 800 on lease M-430-15). Each of these lines would support 108 plastic mesh cultivation baskets or 144 hanging plastic mesh bottom bags, for a combined total of over new 113,000 baskets or over 151,000 new bottom/tipping bags across all 1,052 lines. This would be in addition to the tens of thousands of bottom bags, clam bags, and mesh bags on racks that would be used on the other cultivation beds that HIOC is proposing to retain or expand.

Although HIOC has committed to continue to implement the marine debris prevention and response measures that it has voluntarily implemented in recent years – its quarterly and annual clean-up efforts as well as those additional measures described in **Exhibit 5** – and it anticipates being able to reduce its gear loss to approximately 1%, given the number of individual pieces of cultivation equipment that it would be introducing to Tomales Bay and the amount of plastic in each piece of gear, even 1% would equate to a large volume of plastic debris. This is an issue that the Commission has consistently considered and addressed in all of the shellfish aquaculture operations it has authorized over the past six years years – as global understanding has grown about the scope and consequences of marine debris and the use of plastic materials and equipment has increased in shellfish cultivation operations. These permits, CDP Nos. E-12-012-A1, 9-17-0646, 9-18-0002-A1, 9-18-0278 and Consistency Certification No. CC-035-12, all include similar requirements to those in **Special Condition 11,** which focuses both on the minimization of initial gear loss and maximization of recovery efforts for the loss that still occurs. Given the nature of shellfish cultivation in the marine environment, complete loss prevention would likely be unattainable. However, loss prevention measures combined with implementation of consistent recovery efforts that also include collection of non-aquaculture debris would help ensure that unavoidable loss of aquaculture material is made up for through recovery of a commensurate amount of marine debris from Tomales Bay (both aquaculture and general debris).

The final unique issue raised by HIOC's proposed expansion is that it includes the continued use of aquaculture equipment and structures within areas of eelgrass habitat. This issue is further discussed in the section on Marine Resources below but it should be noted that as part of its

expansion, HIOC has committed to removing existing gear from three areas (an estimated maximum of 1.26 acres across lease M-430-11 and M-430-12) that overlap with eelgrass habitat. Although HIOC maintains that no eelgrass was present at the time these structures and equipment were installed and that the eelgrass habitat moved into the area subsequently, it would nevertheless remove equipment from these areas and install new equipment outside of the current extent of the eelgrass beds. These eelgrass beds are anticipated to expand into the areas from which the gear would be removed. **Special Condition 8** would memorialize this commitment and help ensure that the opportunity for eelgrass expansion into the removal areas is maximized by having HIOC carry out the removal work outside the eelgrass growing season when it is less likely to be damaged or disturbed, submit a report to the Executive Director documenting that complete removal has occurred, and to carry out installation of replacement gear consistent with the requirements of **Special Condition 2.** This condition prohibits installation of new cultivation gear or structures within eelgrass, and requires eelgrass surveys of new installation areas to be completed and provided to the Executive Director for review and approval prior to the initiation of installation activities.

The Commission finds that with the addition of **Special Conditions 2, 3, 5, 8, 9 and 11**, feasible mitigation measures have been provided to minimize any adverse effects of fill, and, therefore, that the third and final test of Coastal Act Section 30233(a) has been met.

Conclusion
Because the three tests have been met, the Commission finds the proposed project, as conditioned, is consistent with Section 30233(a) of the Coastal Act.

D. MARINE RESOURCES

Section 30230 of the Coastal Act states:

> *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.*

Section 30231 of the Coastal Act states:

> *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 water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

The proposed project is located on four separate areas of intertidal mudflats and subtidal land within the northern and southern portions of Tomales Bay (**Exhibit 1**). These four areas are within leases of state tidelands issued to HIOC (lease nos. M-430-10, M-430-11, M-430-12, and M-430-15) by the Fish and Game Commission and combined, they cover roughly 128 acres.

The portion of HIOC's existing shellfish aquaculture operation for which it is seeking after-the-fact authorization includes the installation and use of shellfish cultivation structures and equipment on approximately 2.33 total acres in lease M-430-10; 2.36 acres in lease M-430-11; 2.41 acres in lease M-430-12; and 9.99 acres in lease M-430-15 – as shown in Table 8, below.

Additionally, HIOC also proposes to expand its operations within all four of its leases. Specifically, it is seeking the Commission's approval to retain and operate most of the acres of cultivation beds listed above and to install and operate new shellfish cultivation structures and equipment on 0.75 acres in lease M-430-10; 1.65 acres in lease M-430-11; 8.05 acres in lease M-430-12; and 22.24 acres in lease M-430-15. The activities proposed within these areas are shown below in Table 8 and described in **Appendix B**. Rather than refer to specific acreage estimates for each cultivation method and lease throughout the remainder of this section, references will instead be made to the estimates included in Table 8.

As described in the initial section of this report, in its total existing and expanded operations (shown in **Exhibits 2 and 3**), these "after-the-fact activities" and proposed activities are combined with those for which HIOC's CDPs already provide authorization.

Table 8: After-the-fact (ATF) and Proposed (New) Development

Culture Type	**Acres per Lease/CDP**							
	M-430-10		M-430-11		M-430-12		M-430-15	
	2-81-40		2-84-2		2-84-10		1-94-55	
	ATF	New	ATF	New	ATF	New	ATF	New
Overlapped racks	-	-	-	-	1.34	0	-	-
Regular racks	-	-	-	-	0	0.82	-	-
Stanway units	-	-	0.36	0**	-	-	-	-
Bottom bags	1.83	1.14	2	1.69	0.76*	0.29	-	-
Clam bags	-	-	-	-	-	-	-	-
Clam rolls	-	-	-	-	-	-	6.89	0**
Floating culture	0.5	0.75	-	-	1.07	4.72	-	-
Basket/tipping lines	-	-	-	1.65	0.6*	2.22	3.1	22.14
TOTAL^	2.33	1.89	2.36	2.34	2.41	8.05	9.99	25.34

*The four basket lines and 0.76 acres of bottom bags that were in place in lease M-430-12 have since been removed.
**The 0.36 acres of Stanways in lease M-430-11 and 6.89 acres of clam rolls in lease M-430-15 are proposed to be phased-out but would continue to be in place for approximately two additional years.
^The estimates in this row reflect the acreage of new cultivation structures that would be installed on each lease combined with the acres of ATF development that HIOC proposes to retain in place.

The on- and off-bottom intertidal and off-bottom subtidal shellfish cultivation activities HIOC is proposing and those for which it is seeking after-the-fact approval have the potential to cause

adverse impacts to shorebirds, marine wildlife, and benthic and water column habitats and species.

Benthic Habitat and Eelgrass
Tomales Bay provides extensive eelgrass habitat with nearly a thousand acres spread throughout the bay - mostly within depths of about six feet of average daily low tides. Based on the most recent baywide survey data, collected in 2017 on behalf of the Greater Farallones National Marine Sanctuary (Sanctuary), eelgrass beds extend into all four of HIOC's leases (as shown in **Exhibits 2 and 3**).

In addition to eelgrass, HIOC's leases include intertidal and subtidal areas comprised of various types of mud- and sand-flats, channels, and areas of exposed gravel or cobblestones.

Potential adverse impacts to benthic habitats from the proposed project include: (1) loss of eelgrass habitat due to shading and displacement from the installation and presence of cultivation structures and/or disturbance and damage due to their use; (2) smothering of organisms and loss or disturbance of mudflat habitat due to the presence of bottom bags, racks, anchors, support posts, and mesh nets; and (3) disturbance to sediments and organisms from installation of anchoring and support posts associated with racks, elevated cultivation basket or tipping bag lines or racks; removal activities; and ongoing operations (planting and harvest of oysters and clams and equipment maintenance), including operation of all-terrain vehicles on intertidal areas.

Eelgrass
Eelgrass (*Zostera marina*) 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 it warrants special protection under this policy.

Based on the results of the Sanctuary's 2017 eelgrass survey, eelgrass beds cover a substantial portion of all four of HIOC's leases, ranging from roughly 25% to 60% of each lease. Although more recent comprehensive surveys of HIOC's leases have not been carried out, aerial imagery and site visits carried out by Commission staff in 2018 confirm that eelgrass continued to be present within many of these areas during the most recent eelgrass growing season.

Proposed New Development
In order to avoid adverse impacts to eelgrass habitat associated within its proposed expansion, HIOC has located and configured its new cultivation beds to avoid all eelgrass habitat shown in the Sanctuary's 2017 eelgrass surveys (as shown in **Exhibit 3**). Despite its intention, however, this effort may not be sufficient to ensure that the eelgrass beds within HIOC's leases are protected. Because the location and size of eelgrass beds in Tomales Bay are known to shift and move throughout the year and between seasons, by the time HIOC begins installation activities on a new cultivation beds within a particular lease – which may be several years from now, the results of the 2017 surveys may no longer accurately reflect the location and extent of eelgrass within HIOC's leases. Further, while the Sanctuary's 2017 eelgrass surveys may be helpful as an initial planning tool for HIOC's project, these surveys were carried out to assist the Sanctuary

in its identification of appropriate vessel mooring areas throughout Tomales Bay and may therefore not have the appropriate resolution and accuracy needed for fine-scale cultivation bed siting and impact assessment efforts within each of HIOC's leases.

As such, more focused and updated surveys would be necessary to help ensure that the new cultivation beds HIOC proposes – including the floating culture in lease M-430-10; the basket/tipping lines in M-430-11; the racks, bottom bags, floating culture, and basket/tipping lines in lease M-430-12; and the basket tipping lines in lease M-430-15 (as shown in Table 8) – would not be installed in areas with eelgrass habitat. Therefore, prior to the initiation of installation activities for each new cultivation bed to be installed that growing season, **Special Condition 2** would require HIOC to provide, for Executive Director review and approval, the results of eelgrass surveys of those areas. Additionally, **Special Condition 2** would also require that HIOC also provide the Executive Director with a map showing the footprint and location of proposed cultivation structures and equipment relative to nearby eelgrass beds and demonstrating that installation within or adjacent to eelgrass would not occur.

HIOC has conveyed to Commission staff its strong belief that some aspects of its cultivation operations may benefit eelgrass habitat and promote the establishment or expansion of eelgrass beds into cultivation areas. Although these effects have not been well established scientifically, the interaction between shellfish cultivation and eelgrass can often be complex and site specific and include both positive and negative components. Therefore, if some of HIOC's cultivation activities in some areas are indeed able to contribute to the establishment or expansion of eelgrass habitat in those areas, it may be prudent to allow those activities to continue. Accordingly, **Special Condition 2** would also establish that once new cultivation beds are installed in areas that have been documented as not supporting eelgrass habitat, they may continue to be used even if the location and/or size of nearby eelgrass beds shift in the future to encompass some or all of them.

This approach would protect eelgrass habitat from the potential adverse impacts associated with the installation and use of cultivation beds in portions of HIOC's leases that do not currently support shellfish aquaculture structures and equipment. However, HIOC's expansion project also includes a proposal to retain much of the existing unpermitted development it is requesting the Commission to authorize after-the-fact (such as the bottom bags areas on leases M-430-10 and M-430-11), as well as a proposal to remove and replace some of this existing unpermitted development with different types of cultivation structures. For example, after phasing out the use of the Stanway system on lease M-430-11, HIOC proposes to fully remove the approximately 49 existing structures and install basket lines/tipping lines in their place. Similarly, HIOC also proposes to remove the overlapped racks from lease M-430-12 and install basket lines/tipping lines and racks in their place. As shown on **Exhibit 2**, some of these areas of existing unpermitted development that are proposed to be retained or modified also support eelgrass habitat. Based on information included in HIOC's application for permit amendments – derived from calculations of the eelgrass areas shown in **Exhibit 2** – approximately 1.26 acres of eelgrass habitat is present within the existing unpermitted cultivation beds that HIOC is proposing to retain or modify as part of its expansion project. Although this approximate

acreage may be a significant overestimation[3], 2018 site visits by Commission staff to some of these areas confirm that a modest amount of eelgrass habitat is indeed present between cultivation structures and equipment in at least some of them.

However, as discussed further below regarding HIOC's request for after-the-fact approval for the installation and use of cultivation structures and equipment within these areas, HIOC has repeatedly stated to Commission staff that no eelgrass beds were present within these areas at the time the aquaculture equipment was installed and that only after it had been in place and in use for a period of time did the eelgrass begin to appear. Nevertheless, to help ensure that its operations continue to be carried out in a manner that minimizes the loss, damage or disturbance of eelgrass habitat, during its proposed modification of existing cultivation beds within eelgrass, HIOC has committed to installing the new cultivation gear outside of eelgrass habitat. Specifically, when HIOC removes the Stanway systems from lease M-430-11, it would only install the proposed basket/tipping lines in that portion of the Stanway area that does not support eelgrass habitat. A similar approach would be taken with the overlapped racks on lease M-430-12 - once the racks are removed, the new gear would be installed outside of the existing eelgrass beds. **Special Condition 8** would memorialize and build on this approach by requiring the same process used for new cultivation beds in these areas - "prior to installation" eelgrass surveys, reporting of results for Executive Director review and approval, and maps showing the location of proposed gear relative to nearby eelgrass beds. Combined with its proposal to relocate the ten existing floating longlines in lease M-430-12 – several of which are located within an area identified as eelgrass habitat in the Sanctuary's 2017 baywide survey – Special Condition 8 would result in the removal of existing cultivation gear from within up to 0.94 acres of eelgrass habitat.

HIOC proposes to retain the remaining area of its unpermitted cultivation beds within eelgrass habitat (an estimated maximum of 0.32 acres). These areas would be primarily made up of 0.2 acres and 0.08 acres of bottom bags in leases M-430-10 and M-430-11 and 0.04 acres of basket lines/tipping lines in lease M-430-15. However, as discussed below, after an extensive review of available information, Commission staff has found no evidence that contradicts HIOC's statements that eelgrass beds appeared in these areas only after the cultivation structures and equipment had been installed and in use for a sustained period of time.

[3] HIOC's acreage estimate is based on an assumption that (1) the 2017 survey results are completely accurate at the scale of HIOC's cultivation beds and are appropriate to use to develop these estimates; and (2) the entirety of these "overlap" areas shown on **Exhibit 2** (areas where mapped eelgrass habitat overlaps a portion of a cultivation bed) should indeed be considered eelgrass habitat. However, the 2017 surveys were not carried out for this purpose and are likely not accurate at this scale and in these areas due to the methodology used. Further, it may not be appropriate to assume that 100% of these areas would be eelgrass habitat but for the presence of the cultivation structures. Due to the configuration of HIOC's gear and presence of access lanes and open areas between structures, typically over 50% of a cultivation bed is *not* occupied or covered by gear. It is often this open area that is occupied with eelgrass when it occurs within a cultivation bed. HIOC's acreage estimate assumes that the remaining area that is covered with cultivation equipment would also be eelgrass habitat. However, even if the cultivation equipment was not present in these areas, their physical and environmental conditions may not be appropriate to support eelgrass.

After-the-fact Development

Included among those cultivation areas for which HIOC is requesting after-the-fact approval are portions of several that overlap with areas identified as eelgrass habitat in the mapping of Tomales Bay carried out on behalf of the Greater Farallones National Marine Sanctuary in 2017. The results of this mapping effort are included on the figures of HIOC's existing and proposed cultivation areas provided in **Exhibits 2 and 3**. As shown in **Exhibit 2**, the areas identified as eelgrass habitat include portions of: the bottom bag cultivation area (0.2 acres) in lease M-430-10; the bottom bag cultivation area (0.08 acres) and Stanway area (0.04) in lease M-430-11; the overlapped racks (0.34 acres) and floating longlines (0.56 acres) in lease M-430-12; and the cultivation basket/tipping lines (0.04 acres) in lease M-430-15. Although HIOC is proposing to discontinue its use of and remove equipment from the largest of these areas – those associated with the racks and floating longlines in lease M-430-12 – and the small area of Stanway structures in lease M-430-11, its request for after-the-fact approval for the past and current unpermitted use of these areas must still be considered.

In making this request, HIOC has repeatedly stressed to Commission staff that while eelgrass is present among its existing cultivation structures and equipment in these portions of its four leases, at the time the structures were installed – which in some cases was 10 to 20 years ago – the areas did not support eelgrass. In support of this position, HIOC has noted that each of its CDPs establishes that eelgrass is to be avoided during the placement and use of cultivation equipment and that it has consistently adhered to this requirement and tried to manage its operations in as ecologically sensitive a manner as possible. HIOC has further expressed its belief that some aspects of its operations may have served to promote the establishment or expansion of eelgrass beds in and around its cultivation areas, including those for which it is seeking after-the-fact approval.

Because the question of whether or not HIOC's cultivation beds were installed in eelgrass habitat has critical bearing on the consistency of its after-the-fact requests with the Coastal Act's marine resource policies (which require special protection to be provided for areas of special biological significance, such as eelgrass beds), it is one that Commission staff has spent a significant amount of time evaluating. That evaluation has included an extensive review of the available files associated with HIOC's original CDPs, as well as the results of eelgrass mapping of Tomales Bay carried out by CDFW over the past several decades, archives of historic aerial photographs, and relevant historic reports and discussions of eelgrass health and abundance in the bay.

Based on this information, there is no evidence to contradict HIOC's statements that eelgrass habitat was not present when it initially installed cultivation structures within those portions of its leases that are shown in **Exhibit 2** as containing both cultivation beds and eelgrass. Additionally, a comparison of historic eelgrass maps from the early 1990s (close to the time much of HIOCs cultivation areas were installed) with those developed more recently, suggests that in some areas of the bay, the size and extent of eelgrass beds appear to have increased. Included in these areas are the three leases that include the majority of HIOC's cultivation areas within eelgrass habitat – leases M-430-10, M-430-11 and M-430-12. This information appears to support HIOC's statements and indicates that eelgrass around these leases may have

undergone a larger scale expansion that has brought it into portions of those areas in which HIOC had installed cultivation structures and equipment.

Although it could be argued that the requirements and commitments included in HIOC's CDPs for it to avoid disturbance or damage to eelgrass (or placement of cultivation structures within or adjacent to it) should have caused HIOC to remove those portions of its cultivation beds that eelgrass may have appeared in, this does not appear to have been the Commission's intent in approving those CDPs. The CDPs instead appear to have been focused on protecting the eelgrass that was present within and around the leases when they were first brought into use for shellfish cultivation and the initial build-out and installation of cultivation equipment occurred. The current situation - eelgrass beds apparently moving into areas with cultivation equipment already installed - does not appear to be one that the Commission previously considered.

Considering it now suggests that it would be unreasonable to require HIOC to establish an operation under one set of conditions (the location of eelgrass beds at the time cultivation structures are installed in a lease) and then to continually adjust it as those conditions change (the eelgrass beds in that lease expand or move). While the type of cultivation equipment it uses would technically make it possible for HIOC to relocate and shift operations within its leases in response to the ebb and flow of the eelgrass beds they support, the effort that would be involved to manage an expanding and contracting operation like this would make such an approach infeasible. Adding to this infeasibility is the multi-year growth cycle for oysters and clams that requires cultivation gear to remain in place for between one and three years after initial planting has occurred. Further, some of the cultivation equipment authorized in HIOC's CDPs (but never installed) requires larger, more substantial construction and installation activities and cannot be so easily removed and relocated on a continuing basis. If it was the Commission's intent for HIOC to adjust the location of its established gear based on the appearance of eelgrass, it is unlikely some of these types of gear (for example, large wooden racks) would have been included in the CDPs. Finally, a situation where some or all of its established cultivation areas could be lost each year based on the appearance of eelgrass within them would be one that would strongly discourage HIOC from positively valuing and promoting the presence and growth of eelgrass within its leases. Accordingly, it is reasonable to assume that HIOC's CDPs allow it to continue using cultivation areas within eelgrass habitat as long as (1) that habitat was not present at the time the cultivation areas were initially installed; and (2) to the extent feasible, the continuing use of those cultivation areas is carried out in a manner that minimizes damage and disturbance of eelgrass. However, HIOC was not permitted to install new types of equipment in particular areas, and after-the-fact authorization for that equipment should account for the fact that, even if no eelgrass was present when the unpermitted equipment was first installed, eelgrass is present now.

Accordingly, **Special Conditions 7 and 8** require HIOC to discontinue its use of cultivation methods and areas with some of the highest potential to result in eelgrass disturbance and/or damage, and to remove equipment that was installed without authorization in areas that now contain eelgrass habitat. Specifically, Special Condition 8 requires floating lines and overlapped racks to be removed from within approximately 0.56 acre and 0.34 acre areas of mapped eelgrass, respectively. Additionally, on leases M-430-10 and M-430-11, Special Condition 8 requires mesh bottom bags to be removed from a total of approximately 0.28 acres of mapped

eelgrass. Each of these areas are shown in **Exhibit 6**. HIOC's appears to have carried out its operation in a manner that minimizes damage and disturbance to eelgrass and to be dedicated to continuing to do so.

Smothering and Disturbance
The three elements of HIOC's proposed expansion and after-the-fact development that would primarily result in smothering and disturbance of benthic habitat are (1) the presence of the PVC anchoring stakes and support posts for oyster cultivation equipment (racks, bottom bag longlines and elevated basket lines/tipping bag lines); (2) the presence of bottom bag cultivation gear; and (3) the presence and maintenance of mesh netting over mudflat areas planted with Manila clams and the subsequent excavation of those clams during harvest.

<u>After-the-fact Development</u>
HIOC's application includes a request for after-the-fact authorization for placement of PVC post supports and anchoring systems for bottom bag lines on lease M-430-10; bottom bag lines and Stanway structures on lease M-430-11; bottom bag lines, basket lines and overlapped racks on lease M-430-12; and basket lines/tipping lines on lease M-430-15. The placement and maintenance of several hundred small-diameter PVC stakes and posts associated with HIOC's use of these cultivation methods on each lease is expected to result in the long-term displacement and loss of up to 20-square feet of benthic habitat known to support marine invertebrate communities and foraging habitat for shorebirds and marine wildlife. In addition, this activity would result in the short-term disturbance of mudflat areas adjacent to stake due to the foot traffic and trampling associated with its installation.

However, the lost and displaced habitat would be spread across hundreds of individual sites – each with an area of between one and three square inches – and would therefore be insignificant. Additionally, in the context of each lease area and Tomales Bay as a whole, the loss of less than up to 20-square feet of mudflat habitat and short-term disturbance of adjacent areas due to foot traffic and trampling is not anticipated to adversely affect the biological productivity of the bay or measurably reduce populations of the marine organisms that inhabit and rely on this habitat. Habitat mapping and aerial surveys of Tomales Bay have shown that benthic habitat comprised of fine sand and silt sediment similar to the habitat present at the project sites is extensive (covering hundreds of acres) and many of these areas support similar species and populations of marine life. Given the small size of the benthic footprint and associated disturbance areas relative to the abundance of similar benthic habitat in Tomales Bay, as well as the dispersion of this footprint over several hundred very small individual sites, adverse impacts associated with the installation and presence of the system of PVC support and anchoring posts and stakes associated with the shellfish cultivation gear for which HIOC is requesting after-the-fact approval would be minimal.

Other elements of the unpermitted cultivation gear HIOC has installed would also involve the placement of fill on benthic habitat. For example, the placement and use for oyster culture of over 4,000 six-square foot bottom bags on leases M-430-10 and M-430-11 and over 2,000 bottom bags on lease M-430-12 (although these bags have since been removed) also resulted in the smothering and disturbance of benthic habitat. The total area be covered by these bags would be between roughly a quarter- and a half-acre on each of these three leases, spread across

several dozen rows of bags, each between 100 and 200 feet long and three-feet wide. As discussed in a variety of studies, use of mudflats in this way may affect it in several ways, including by altering the chemical condition of the sediment and influencing the type, abundance, and diversity of species it supports. These effects result from sedimentation and organic enrichment caused by the oysters, as well as predator exclusion and current dampening from the presence of the aquaculture equipment on the surface of the mudflats.

Because the feeding activity of bivalve filter-feeders such as oysters results in the packaging of fine suspended material into larger feces that can rapidly settle to the seabed (especially under conditions with slow or poor water flushing and exchange) in areas of intensive shellfish cultivation, primary production and energy flow can be diverted from planktonic to benthic food webs. While the dynamics of bivalve feces deposition (settling velocity, disaggregation rate and resuspension) are poorly understood, enhanced sedimentation under areas of cultured shellfish is well documented (Castel et al. 1989; Mojica and Nelson 1993; Nugues et al. 1996; Spencer et al. 1996; Drake and Arias 1997; Spencer et al. 1997; Spencer et al. 1998; De Grave et al. 2001; Kaiser 2001; Crawford et al. 2003; Forrest and Creese 2006; Mitchell 2006; Bouchet and Sauriau 2008). As is the case for fin fish aquaculture, the accumulation of organic material beneath shellfish aquaculture facilities may result in the generation of an anaerobic environment that promotes ammonification and sulfate reduction, increased sediment bacterial abundance, and changes in benthic community structure and biomass.

The magnitude and extent of these effects is strongly influenced by several factors, including stocking density (the number of oysters within the cultivation gear), current speed, coverage area (the total amount of contiguous area occupied by cultivation gear), coverage duration (length of time cultivation gear is in place before being moved) and fallowing frequency. In general, studies suggest that cultivation at low densities in areas with strong currents and with more separation between cultivation equipment, more frequent shifting of equipment and use of fallowing (rest periods between uses of an area) is likely to result in less substantial and more localized effects. In contrast, high density, long-term, extensive, fixed cultivation in more enclosed areas is likely to exacerbate environmental effects and lead to more severe disturbance to benthic habitat and communities. However, as a series of studies by Spencer et al. (1996, 1997, 1998) demonstrate, some benthic communities can be resilient to these types of disturbances and can return to reference conditions within months of an aquaculture harvest and removal of aquaculture equipment, even after significant changes have taken place.

Although the total area that has been used for oyster bottom cultivation by HIOC within leases M-430-10, M-430-11 and M-430-12 is not insignificant, the location of the bottom bag areas on each lease in exposed areas near the edge of Tomales Bay's deep water channels and subtidal habitats, the modest stocking density used for its cultivation bags (typically less than 200 oysters per bag), and the configuration of its longlines in rows with gaps of four to five feet between them would limit the amount and extent of disturbance to benthic habitat that would result from the proposed operation.

In addition, HIOC's operational practices provide opportunities for periodic recovery to occur within the benthic habitat of its cultivation areas. For example, as oysters grow, HIOC staff routinely shift, flip, and relocate cultivation bottom bags - thus exposing previously covered

areas of substrate. This is done every two months on average. Also, because the longlines are anchored in place only at the two ends (between 100 and 200-feet apart), current and wave action during the intervening period is also responsible for moving and shifting the bags along the longline rows. This movement of bags, both natural and intentional, should minimize the magnitude of any effects that the cultivation gear and oysters may be having on the benthic habitat and its associated species by distributing those effects across the cultivation area.

Although specific testing and detailed analysis of the benthic habitat has not been carried out within the portions of leases M-430-10, M-430-11 and M-430-12 that are (or have) been used for bottom bags, available information from research carried out in other areas suggests that the effects to benthic habitat from this aspect of HIOC's oyster cultivation operation would be - at most - modest, localized and not likely to persist once the area is left fallow or returned to a natural condition.

HIOC's use of large areas of mesh netting for clam cultivation ("clam rolls") on lease M-430-15 and the subsequent excavation of benthic habitat to harvest those clams has the potential to result in more significant adverse impacts to benthic habitats than its use of bottom bags. Since 2010, HIOC has installed and used up to 400-square foot nets with ¼ inch mesh to cover the surface of mudflats over a total area of approximately 2.7 acres. This total area has been spread between up to 292 individual sites within a larger 6.9 acre area (as shown in **Exhibit 2**) and each of the individual nets measures 4 feet wide by 100 feet long. Before the nets are rolled and staked in place, the mudflat that is to be covered is tilled (mechanically disturbed) and tens of thousands of young Manila clams are spread across it and allowed to burrow below the surface. Unlike the bottom bags used for growing oysters that would be lifted and moved every two weeks, these mesh sheets or nets are typically maintained in place for three years or more as the clams planted into the mudflat below them grow to harvest size.

The purpose of the netting is to protect the growing clams by keeping away all fish, birds, large invertebrates and marine mammals such as sea otters that may feed on them. Due to the small size of the mesh in the netting, however, and its coverage of large areas of mudflats, the nets would also prevent a wide range of biological uses and activities that would typically occur in mudflats. For example, in addition to preventing foraging on clams, the nets would also prevent foraging on most of the native shellfish and invertebrates that live within mudflats. In addition, the nets would also limit or prevent many species from burrowing into or gaining access to the habitat within the covered mudflat areas. Those animals that try to burrow or forage through the netting may risk injury or entanglement due to contact with the netting and those that are able to gain access may face competition for food and habitat from the large number of planted clams. As a result of this exclusion, competition and limitation on foraging activity, the covered mudflats would likely support a reduced or significantly altered community of species and would not maintain the biological productivity typical of mudflat habitats within Tomales Bay.

Further, when the Manila clams buried within these mudflat areas are ready to be harvested, HIOC uses a gasoline powered device to excavate and pump water through the sediments in order to sift through them and collect and remove the cultivated clams. This harvest activity would result in significant additional disturbance to the mudflat habitats - churning them up, injuring, displacing or exposing to predation the other species living within them, and leaving

large areas with disturbed and altered sediments that would be prone to dispersing into surrounding areas and releasing clouds of turbidity as the bay's tides enter and withdraw. Although HIOC typically staggers its planting activities so that the entire clam roll area is not ready for harvest at the same time, the movement of sediment and turbidity away from even limited harvest activities has the potential to adversely affect a much larger area of surrounding habitat as well, including sites that support eelgrass habitat.

While it is no longer possible to prevent the adverse impacts to mudflat habitats and their biological productivity by prohibiting HIOC's past use of the clam roll cultivation method on lease M-430-15 (these activities have been carried out since 2010), because the sites that are currently planted have yet to be harvested or replanted, additional future impacts may still be avoided and minimized. Therefore, **Special Condition 6** would require HIOC to implement several measures to reduce habitat loss and disturbance during future Manila clam harvesting and cultivation efforts. These measures would include a prohibition on cultivating Manila clams outside of confined equipment, a requirement that harvest activities be carried out exclusively during low tides and within a perimeter of turbidity curtains to prevent the dispersal of sediment and turbid water away from the cultivation sites and into surrounding habitat areas. **Special Condition 6** would also require that clam harvest be carried out exclusively with non-motorized hand tools in order to minimize habitat disturbance.

Because HIOC has proposed to discontinue its use of this cultivation method, **Special Condition 6** would also establish a timeline of 18 months for the existing clam rolls to be collected and removed. While HIOC anticipates being able to remove over half (up to 150) of the approximately 270 clams rolls currently in place within the next three to four months, because the clams in the remaining rolls are still well below market size, they would need to remain in place for up to 18 more months in order for HIOC to increase its chance of salvaging and harvesting viable product from them.

In order to help compensate for the adverse impacts to marine resources associated with HIOC's past and limited continuing use of this cultivation method, HIOC included information in its application for permit amendments demonstrating the efforts its staff has made over the past several years and will continue to make over the course of its permit term to benefit the coastal and marine biological resources of Tomales Bay.

As described in the previous section of this report on Fill of Open Coastal Waters, these efforts include two decades of participation in annual Bay Clean Up events; three years of participation in quarterly clean-up events with the other five shellfish aquaculture companies operating in Tomales Bay; as well as more focused efforts to collect and remove roughly 500 feet of fencing that had been illegally installed within lease M-430-15 and commitments to collecting and fully removing all of the abandoned wooden cultivation structures that pre-date HIOC's operations in lease M-430-15 and are still present in the area, including approximately 150 vertical wooden posts that have been in place for at least 25 years.

The removal of these posts from Tomales Bay would open an area of intertidal and subtidal habitat that has been occupied by fill for at least 25 years and would help prevent additional habitat disturbance and displacement in the future as these timbers inevitably break apart and

disperse. Additionally, because these posts may be constructed from treated lumber that could be leaching or dispersing copper and arsenic based compounds into the surrounding water and sediment, their removal would provide additional water quality benefits. **Special Conditions 5 and 11** would memorialize several of these ongoing commitments by requiring HIOC to complete its removal of abandoned aquaculture structures within 24 months of permit issuance and continue its quarterly clean-up efforts.

Proposed Development

In addition to that resulting from the activities described above, smothering and disturbance of benthic habitat would also occur as part of several aspects of HIOC's proposed expansion activities on its four leases. However, the majority of these effects would be associated with the significant proposed expansion of HIOC's basket line/tipping line cultivation areas. Roughly two acres of basket line/tipping line cultivation structures would be installed on leases M-430-11 and M-430-12 but lease M-430-15 is proposed to support significantly more – up to 22.24 acres beyond the 3.1 acres currently in place on that lease. In total, HIOC proposes to install up to 1,000 additional basket lines/tipping lines across these three leases. As detailed in **Appendix B**, each line would include a total of approximately 38 support posts and anchoring posts, each with a diameter of roughly three square inches. The combined total area that would be occupied by these posts would be nearly 800 square feet, most of which would be located within lease M-430-15.

Although this is a modest area of benthic habitat that would be disturbed and displaced by the installation of PVC posts, it would be dispersed across roughly 38,000 individual sites on the three leases and would therefore be insignificant. In the context of each lease area and Tomales Bay as a whole, the loss of this amount of mudflat habitat and short-term disturbance of adjacent areas due to foot traffic and trampling is not anticipated to adversely affect the biological productivity of the bay or measurably reduce populations of the marine organisms that inhabit and rely on this habitat.

The remaining elements of HIOC's proposed expansion project - including the removal of Stanway cultivation equipment from lease M-430-11 and overlapped racks from lease M-430-12 and the installation of floating culture and racks on lease M-430-12 – would result in a more limited amount of loss and short term disturbance of benthic habitat and would also not lead to significant adverse effects on the biological productivity of coastal waters in HIOC's leases or Tomales Bay.

Benthic Disturbance from Operations

Movement of personnel and equipment to the project sites, as well as maintenance and use of the aquaculture structures, also have the potential to result in disturbance of benthic habitats and eelgrass. This disturbance would be most likely to occur during the transit of project vessels and personnel to and from the cultivation sites, the staging of equipment and supplies for periodic repair and replacement of cultivation structures, and operations on the mudflats such as planting, harvest, and maintenance activities. The activities associated with the development HIOC is proposing and that for which it is requesting after-the-fact approval are similar and will be discussed in combination below. These activities would be carried out during a range of high and low tides and would involve the landing of one or more small project vessels on the mudflats

near the cultivation areas, the loading or offloading of equipment and shellfish, and the movement of project personnel by foot and vehicle among the bottom bags, racks, clam bags, clam rows, basket/tipping lines, or other aquaculture sites.

As detailed in **Appendix B**, each of HIOC's cultivation areas is configured to include open areas between cultivation structures in order to provide access. The minimum amount of open area per acre ranges from roughly 55% to 83% based on the cultivation method in use, and each line or row of tethered bottom bags, basket/tipping lines, racks, clam rolls, and Stanway units would be separated from adjacent lines by at least several feet to allow access along its length. Mooring of project vessels, offloading of equipment, and movement of HIOC's employees among these access corridors on foot or by vehicle would result in the disturbance, crushing, and damage to benthic habitats and species. Assuming that the majority of planting, harvest, and maintenance activities would be focused within these corridors along each line or row of cultivation equipment, the acreage amounts in Table 8 above reflect the estimated overall activity footprint of HIOC's proposed and "after-the-fact" operations on each lease (rather than simply the area that would be occupied by the gear itself). These areas would be adversely affected during the initial installation of the cultivation structures, and periodically disturbed as a result of their ongoing maintenance and use. Additional areas would also be disturbed during the transit of project vessels to and from the lease, their mooring on tidelands, and the loading and offloading of equipment associated with the installation of the cultivation equipment. Additionally, HIOC's proposed twice monthly use of all-terrain vehicles to support installation, maintenance, harvest and planting operations on leases M-430-12 and M-430-15 would also result in expanded areas of disturbance on these leases.

To address the potential adverse impacts to marine biological resources and species of special biological significance, such as eelgrass, associated with this amount of disturbance to benthic habitats, HIOC has integrated several resource protection measures into its operations. For example, HIOC typically uses consistent vessel access routes when coming and going from its cultivation areas (as shown in **Exhibit 4**) and makes use of floating work platforms to temporarily stage equipment in consolidated, secure areas away from benthic habitats. Because eelgrass habitat is present within and adjacent to all four of HIOC's leases, its use of a consistent route limits the amount of eelgrass habitat that its vessels pass through. Because the use of outboard motors through eelgrass habitat at some tidal heights can cause the eelgrass to be cut or uprooted, limiting vessel transit to a single area would protect eelgrass in other surrounding areas.

To memorialize this aspect of HIOC's operations to establish consistent vessel and personnel transit routes that avoid sensitive habitat areas such as eelgrass beds and marine mammal haul-outs, the Commission is requiring in **Special Condition 9** that HIOC continue to implement and adhere to the vessel routes and best management practices included in its application (provided in **Exhibit 4**). **Special Condition 9** would also prohibit HIOC's future use of all-terrain vehicles (ATVs) or other wheeled or tracked vehicles on its leases that result in higher levels of benthic disturbance compared to vessel and foot traffic. Although HIOC only proposes to use ATVs on its leases on a twice per month basis, even this limited use would lead to the compaction and alteration of mudflat areas.

Additionally, to prevent benthic disturbance associated with the onsite storage/staging of materials on the lease area – and the potential loss or displacement of equipment into surrounding habitat areas due to current and tidal action - **Special Condition 11** would prohibit the staging and storage of equipment, tools, and materials on HIOC's cultivation sites (with the exception of materials securely stored on floating work platforms) and require that HIOC implement a variety of measures to avoid and address the accidental loss and displacement of cultivation gear and equipment. Such measures would include regular maintenance inspections during harvest to identify and correct worn or weathered gear at risk of breaking or escaping; clean-up events to recover materials that are accidentally lost; staff training to ensure best management practices are understood and used; and gear marking to help prevent loss and facilitate recovery. Further, **Special Condition 2** also requires that HIOC avoid placement of gear, structures, or equipment on or directly adjacent to areas occupied with eelgrass and make use of only new cultivation areas once eelgrass surveys have been carried out and no eelgrass has been observed. The installation and use of cultivation equipment within such sites would concentrate HIOC's activities within those portions of its lease areas that are already periodically disturbed by ongoing aquaculture activities and that have historically supported limited eelgrass habitat.

Wildlife Disturbance

Tomales Bay is protected as part of the Greater Farallones National Marine Sanctuary and recognized by the intergovernmental Ramsar Convention as a "Wetland of International Importance." In addition to supporting a range of rare and sensitive habitat types, it is also home to an abundance of large and small wildlife from harbor seals and sea lions to well over 100 species of resident and migratory birds. HIOC's proposed operation has the potential to negatively affect a number of these species through disturbance and interference with natural behavior such as foraging and resting.

Marine Mammals

Several of the intertidal mudflat and shoreline areas of Tomales Bay are used as haul-out and resting sites by the bay's resident population of harbor seals. While none of these areas are located within HIOC's leases, several can be found along the vessel routes it uses to move between those leases and vessel launch sites as Millerton Point and Marconi Cove (as shown in **Exhibit 4**). While HIOC's vessel routes near Hog Island and Duck Island are located approximately 1,000 feet from the marine mammal use areas on those islands - much farther than the 150 foot minimum buffer distance recommended by the National Marine Fisheries Service - both harbor seals and California sea lions have been observed throughout the waters of Tomales Bay and may be encountered there at any time. Additionally, whale species including the California gray whale may be occasionally present within Tomales Bay's northern area.

To ensure these species and their critical use areas are appropriately protected, **Special Conditions 3 and 9** would restrict HIOC from installing and using cultivation equipment outside its state water bottom leases and would memorialize HIOC's commitment (as reflected in its Vessel Management Plan included as **Exhibit 4**) to avoid chasing, flushing, or directly disturbing marine mammals during vessel transit, harvest, maintenance or inspection activities. Additionally, **Special Condition 11** would help minimize the loss of aquaculture materials from

HIOC's operations and contribute to the removal of plastic debris materials from the bay that may present an injury risk to marine mammals from entanglement or ingestion.

Shorebirds, Seabirds and Waterfowl
The mudflats and intertidal areas of Tomales Bay – including those within and around HIOC's four lease areas – are widely regarded as critically important foraging habitat for a wide range of resident and migratory seabirds, shorebirds, and waterfowl such as black brant, least tern, dunlin, and several species of plover and sandpiper. Although Tomales Bay also contains extensive mudflat areas outside of HIOC's leases, the intertidal habitat within these leases – particularly lease M-430-15 - is known to support shorebird foraging. To help ensure that this foraging activity continues in these areas and disturbance from HIOC's operations are minimized, **Special Condition 9** would memorialize HIOC's commitment (as reflected in its Vessel Management Plan included as **Exhibit 4**) to avoid approaching, chasing, flushing, or directly disturbing shorebirds, waterfowl, seabirds during vessel transit, harvest, maintenance, inspection, and planting operations. In addition, the requirements in **Special Condition 6** would also benefit shorebird and waterfowl foraging within lease M-430-15, specifically, by expediting the phase-out and removal of the approximately 117,000 square feet of mesh netting currently in place on the mudflats as part of HIOC's clam rolls. Once this material is fully removed, access to foraging within these mudflat areas will be improved.

Marine Debris
The shellfish cultivation operations for which HIOC requests after-the-fact authorization and those included within its proposed expanded aquaculture operation include the placement and maintenance of several hundred thousand individual pieces of plastic and PVC in Tomales Bay. This material is associated with the several thousand linear feet of nylon rope that would be used for bottom bag longlines; the tens of thousands of PVC posts that would be used to support the racks and elevated basket lines/tipping lines and to anchor the bottom bag lines; the approximately 270, 400 square foot mesh clam rolls; the approximately 200,000 two-foot wide by three-foot long plastic mesh bottom bags; and up to 115,000 two-foot long by one-foot wide plastic mesh cultivation baskets. As has been well documented in parts of Tomales Bay and Humboldt Bay near shellfish aquaculture operations, some of this material can disperse into the environment as debris – either due to inadequate maintenance and inspection operations or challenging oceanographic conditions (currents, tides, and wave action).

While HIOC has a strong record of careful maintenance and marine debris prevention (as reflected in the Marine Debris Plan included with its application and the results of its baywide clean-up efforts), information submitted to Commission staff over the past several years indicates that loss of cultivation gear and marine debris remains an unresolved issue in Tomales Bay. The use of common gear types, such as similarly designed bottom bags, and the lack of identifying marks or tags on this gear also makes it difficult to determine which operations within Tomales Bay contribute the most and least to this issue. Cultivation equipment, bottom bags and cultivation baskets in particular, have been recovered throughout Tomales Bay and from open coastal beaches in the surrounding region. This equipment has been found smothering eelgrass habitat, buried in mudflats, and dispersed among tidal salt marshes. The durability of the HDPE plastics used for much of the common cultivation equipment means that if it escapes, it can persist in the environment for many decades.

Even once it degrades, 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.

To address the potential ongoing and future release and distribution of marine debris resulting from HIOC's shellfish cultivation operations, the Commission is requiring in **Special Condition 11** that HIOC implement or continue a variety of best practices, including those focused on inspections following storm events; debris reduction trainings for field employees; quarterly cleanup events; gear marking; field storage of tools and construction materials; and comprehensive debris cleaning and removal activities carried out on each bed at the time of its harvest. Although HIOC currently carries out a number of these practices voluntarily – including recently committing to mark all floating cultivation gear (cultivation baskets and tipping bags) – memorializing these practices through operational requirements would help further ensure that they continue in the future. These requirements would reduce the long-term accumulation of debris within cultivation beds, prevent debris generation and loss, and promote recovery of materials lost due to storm action or other unavoidable causes. To further limit potential loss of the most common type of aquaculture debris found in Tomales Bay – bottom bags – **Special Condition 11** would require all bottom bags within HIOC's operation to be affixed to anchoring lines, racks, elevated longlines, or floating longlines when in use. HIOC currently operates consistent with this requirement.

An additional source of aquaculture related marine debris in Tomales Bay and several other areas with long histories of shellfish cultivation has been associated with businesses that have ceased operations and left behind large quantities of equipment, cultivation structures, and gear within intertidal or subtidal lease areas. To address this issue and help ensure that funding is available to carry out clean-up of abandoned operations, the California Fish and Game Commission requires – as part of its leasing of state tidelands – that the lessees deposit funds into escrow accounts so that funding is available to be used in the event that an operation ceases prior to recovering and fully removing its equipment. HIOC has contributed funding to the escrow accounts consistent with this requirement. However, the funds deposited into these accounts have often been based on only rough approximations of clean-up, removal, and disposal costs that do not include an accurate or transparent accounting showing how they were estimated. As such, the funds in the escrow accounts for many aquaculture leases do not appear sufficient to cover actual clean-up costs. While staff of the California Fish and Game Commission and California Department of Fish and Game are working to address this issue, some lessees in Tomales Bay have taken steps to proactively develop and document more accurate clean-up cost estimates or simply to augment the funds in the escrow accounts for their leases. The availability of these funds - in combination with the requirement in **Special Condition 1** that HIOC seek a permit amendment to remove its cultivation equipment from the bay prior to the expiration of its permit and cessation of its operations – would help ensure that HIOC's existing and proposed cultivation equipment is ultimately removed from the bay and does not become marine debris. In other words, these measures would help prevent any subsequent holder of HIOC's lease areas from encountering the same type of debris nuisance that HIOC inherited on its lease M-430-15 and has committed to address (as memorialized through **Special Condition 5**).

Shellfish Species

Some of the most significant marine resource issues associated with the introduction of new shellfish species to aquaculture operations within an area relate to the potential for new invasive marine species to become established or introduced. Because shellfish propagate through the release of reproductive material into the water column and the development of microscopic larvae which drift with the currents and swim for days to weeks before settling, the first introduction or approval of a new species of shellfish to a bay is typically more consequential than subsequent introductions or approvals at new sites within that bay. In other words, once a sufficient number of reproductive shellfish are present within a single site in a bay, they can settle and establish nearly anywhere within that bay. Accordingly, a key factor in evaluating the seven shellfish species proposed by HIOC to be grown on each of its leases is whether or not they are already approved for cultivation and used elsewhere within Tomales Bay. Of the seven shellfish species HIOC proposes to cultivate on each of its four leases, three of them – Pacific oysters, European oysters, and Manila clams – are already specifically included in at least one of HIOC's CDPs. Of the other four species, one is native to California waters – the Olympia oyster – and therefore raises no concern about invasion or establishment. The other three species – Mediterranean mussel, Atlantic/Eastern oyster and Kumamoto oyster - include species of oysters that may have been considered by the Commission in the two of HIOC's CDPs that authorize the cultivation of unspecified types of oysters (CDP Nos. 2-84-2 and 1-94-55). It is difficult to know for certain because both of these CDPs simply refer generally to the cultivation of "oysters" without describing the particular species of oyster.

However, the lease documents submitted with the original applications appear to provide some clarity as to which species of oysters were being considered. The original lease documents for M-430-11 included in the application for CDP No. 2-84-2 notes that "the applicant proposes to cultivate Pacific oysters (*Crassostrea gigas*), Eastern oysters (*C. virginica*), European oysters (*Ostrea edulis*)…" thus suggesting that the unspecified "oysters" approved by the Commission in CDP No. 2-84-2 may have been limited to these three species. If this was the case, Eastern oysters would be a species that the Commission also considered and approved and the only species currently proposed that that are not already authorized for use by at least one of HIOC's CDPs would be the non-native Kumamoto oyster and the native Olympia oyster and California mussel.

The lease document submitted with the original application for CDP No. 1-94-55 does not include or discuss any of these three species, noting that the lease is "for the sole purpose of cultivating Pacific oyster (*Crassostrea gigas*), Manila clam (*Tapes japonica*), and bay mussel (*Mytilus edulis*)."

Assuming that these CDPs authorized the same oyster species described in the original lease documents, the only types of shellfish HIOC is proposing to cultivate that are not already authorized for use by at least one of its CDPs are the non-native Kumamoto oyster and Mediterranean mussel and the native Olympia oyster. As previously noted, the Olympia oyster is a species native to and present within many of California's marine ecosystems are will therefore not be discussed further. Potential adverse impacts to coastal resources associated with cultivation of the Kumamoto oyster and Mediterranean mussel are further discussed below.

Mediterranean mussels
Similar to the Pacific oyster, this is a species that is not native to California that has been brought here and many other places throughout the world for aquaculture. In California, the Mediterranean mussel has already become well established and extremely abundant in the wild. Surveys by Suchanek et al. (1997) demonstrate that it is now among the most abundant mussel species between Marin County and San Diego, and research by Geller (1999) suggests that since the 1900s, the Mediterranean mussel may have completely replaced and/or hybridized with the native blue mussel (*Mytilus trossulus*) between Monterey Bay and San Diego.

Given the existing abundance of this species throughout both the project area and the wider California coastline, the proposed cultivation efforts by HIOC would have an insignificant contribution to the continued presence of the species in the area. The proposed location of HIOC's mussel cultivation areas (subtidal portions of leases M-430-10, M-430-12, and M-430-15) does not introduce a source of reproductive material to current systems and larval transport pathways that are not currently available to the species. Several existing aquaculture leases in Tomales Bay already include Mediterranean mussels as an approved species (including HIOC's lease M-430-11). The water column at the project site is therefore likely to already contain Mediterranean mussel larvae from both wild and cultivated populations and the proposed project is therefore unlikely to result in the release of reproductive material for this species in an area in which none currently exists.

Kumamoto Oyster
Based on information available on the California Non-native Estuarine and Marine Organisms (Cal-NEMO) database, a joint effort by the California Department of Fish and Wildlife and the Smithsonian Environmental Research Center, the Kumamoto poses little or no risk of escaping cultivation or becoming established in California's marine waters:

> *This species has been spawned in hatcheries and cultivated on the West Coast of the US and Mexico without any documented natural reproduction (Hedgecock et al. 1993; Coan et al. 2000; Washington Sea Grant 2002; Caceres-Martinez et al. 2012). Plantings of this oyster in Atlantic France, Brazil, and Tasmania have not resulted in reproduction or in successful commercial culture (Simoes Ramos et al. 1986; English et al. 2000; Goulletquer et al. 2002).*
> …
> *Dates of the introduction of Crassostrea sikamea to the West Coast of the US are uncertain, because this oyster was long regarded as a variety or subspecies of the Pacific Oyster (C. gigas). Websites of some oyster farms state that culture started in the 1940s, but Hedgecock et al. (1993) trace the two major cultured stocks to two separate importations in the 1970s. One was by the Oregon Oyster Company, which reared the oysters at the Hatfield Marine Science Center in Newport, Oregon (OR). Some oysters from this importation were later reared by Taylor Shellfish Inc. in Puget Sound, Washington (WA). This stock included oysters with C. sikamea morphology and genotypes, but also many hybrids with C. gigas morphology. A second stock was imported around the same time by the Coast Oyster Co. and initially reared in Humboldt Bay, California (CA). Of the 29 individuals examined, one was C. gigas by morphology and genotype. Reproduction of both stocks was/is dependent on hatcheries and apparently limited by low water temperature (Washington Sea Grant*

> *2013). However, natural reproduction is not known even in the warm waters of Pacific Mexico, where C. sikamea is cultured (Cáceres-Martinez et al. 2012). Currently, the Kumamoto Oyster is less widely cultured on the West coast than C. gigas, but it is highly regarded for good flavor and a good quantity of meat despite its small size. It also benefits from the absence of spawning during the summer months, when other oysters are spawning and less desirable (Washington Sea Grant 2013). In the USA, the Kumamoto Oyster is currently cultured in Puget Sound, WA; Yaquina Bay, OR; Humboldt Bay, CA; Tomales Bay, CA; and Morro Bay, CA (Hedgecock 1993; Moore et al. 2014). It is also reared in Bahia San Quintin, Mexico (Cáceres-Martinez et al. 2012). There is no reported evidence for reproduction of C. sikamea in North American waters.*

In addition, HIOC has informed Commission staff that it has been cultivating Kumamoto oysters in Tomales Bay for many years. During this time, there have been no records or reports from Tomales Bay of Kumamoto oysters establishing in the wild.

Conclusion
Although the Commission finds that the project (comprised of both the proposed development and that for which HIOC is requesting after-the-fact approval) has the potential to adversely impact marine resources and the biological productivity of coastal waters, with implementation of **Special Conditions 1** through **13**, the project would be carried out in a manner in which marine resources are maintained, species of special biological significance are given special protection, the biological productivity of coastal waters is sustained, and healthy populations of all species of marine organisms will be maintained. In addition, the proposed project, as conditioned, is expected to maintain the biological productivity of coastal waters appropriate to maintain optimum populations of marine organisms. The Commission therefore finds that the proposed project, as conditioned, is consistent with the marine resource sections (Sections 30230 and 30231) of the Coastal Act.

E. ALLEGED VIOLATION
As noted above in the Summary, violations of the Coastal Act exist on the subject property, including, but not limited to, installation and use of on- and off-bottom shellfish cultivation structures and equipment for many years across roughly 17 acres in Tomales Bay; operation of all-terrain vehicles (ATVs) within intertidal mudflats; disturbance and damage to sensitive eelgrass habitat; and operation of mechanical shellfish harvesting equipment. In response to notification by Commission permitting and enforcement staff about these Coastal Act violations, as well as its desire to carry out additional proposed development, HIOC submitted this application to amend its four CDPs. Approval of this application pursuant to the staff recommendation, issuance of the amended permits, and the applicant's subsequent compliance with all terms and conditions of those permits would result in resolution of the above described violations.

Although development has taken place prior to the submission of these Coastal Development Permit amendment applications, consideration of the applications by the Commission has been based solely upon the Chapter 3 policies of the Coastal Act. Commission review and action on these permit amendments does not constitute a waiver of any legal action with regard to the alleged violations, nor does it constitute an implied statement of the Commission's position

regarding the legality of development, other than the development addressed herein, undertaken on the subject sites without coastal permits or permit amendments. In fact, approval of these permit amendments is possible only because of the conditions included herein, and failure to comply with these conditions would also constitute a violation of these permits and of the Coastal Act. Accordingly, the applicant remains subject to enforcement action just as it was prior to these permit amendment approvals for engaging in unpermitted development, unless and until the conditions of approval included in these amended permits are satisfied.

Failure to comply with the terms and conditions of these amended permits may result in the institution of enforcement action under the provisions of Chapter 9 of the Coastal Act. Only as conditioned is the proposed development consistent with the Coastal Act.

F. California Environmental Quality Act

Section 13096 of the Commission's administrative regulations requires Commission approval of coastal development permit or amendment applications to be supported by a finding showing the applications, as modified by any conditions of approval, to be consistent with any applicable requirements of the California Environmental Quality Act ("CEQA"). Section 21080.5(d)(2)(A) of CEQA prohibits approval of a proposed development if there are feasible alternatives or feasible mitigation measures available that would substantially lessen any significant impacts that the activity may have on the environment. As described above, the project as conditioned herein incorporates measures necessary to avoid any significant environmental effects under the Coastal Act, and there are no less environmentally damaging feasible alternatives, nor additional feasible mitigation measures. Therefore, the proposed project is consistent with CEQA.

2-81-40-A1; 2-84-2-A1; 2-84-10-A1 and 1-94-55-A1 (Hog Island Oyster Company, Inc.)

Appendix A: Substantive File Documents

Coastal Development Permits and Application Materials:

Coastal Development Permit Application Nos. 2-81-40-A1, 2-84-2-A1, 2-84-10-A1 and 1-94-55-A1 associated files.

Coastal Development Permit Nos. 2-81-40, 2-84-2, 2-84-10, 1-94-55, E-11-029; E-12-012-A1; 9-17-0646; 9-18-0002-A1; 9-18-0278

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2-81-40-A1; 2-84-2-A1; 2-84-10-A1; 1-94-55-A1
(HOG ISLAND OYSTER COMPANY)

FEBRUARY 8, 2019

APPENDIX B

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.

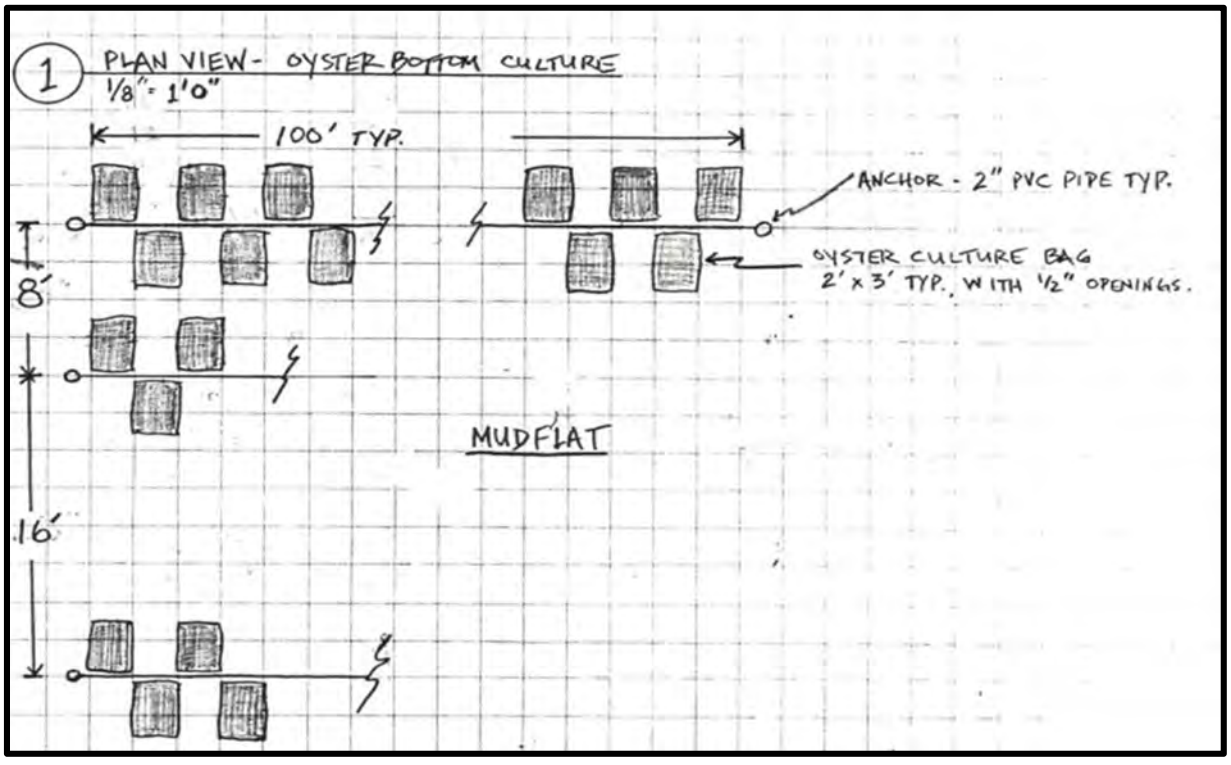

Figure 5. Typical On-Bottom Bag Culture Layout
Note: HIOC does not currently include a 16-foot space between groups of bottom bags. The plan shown is otherwise correct.

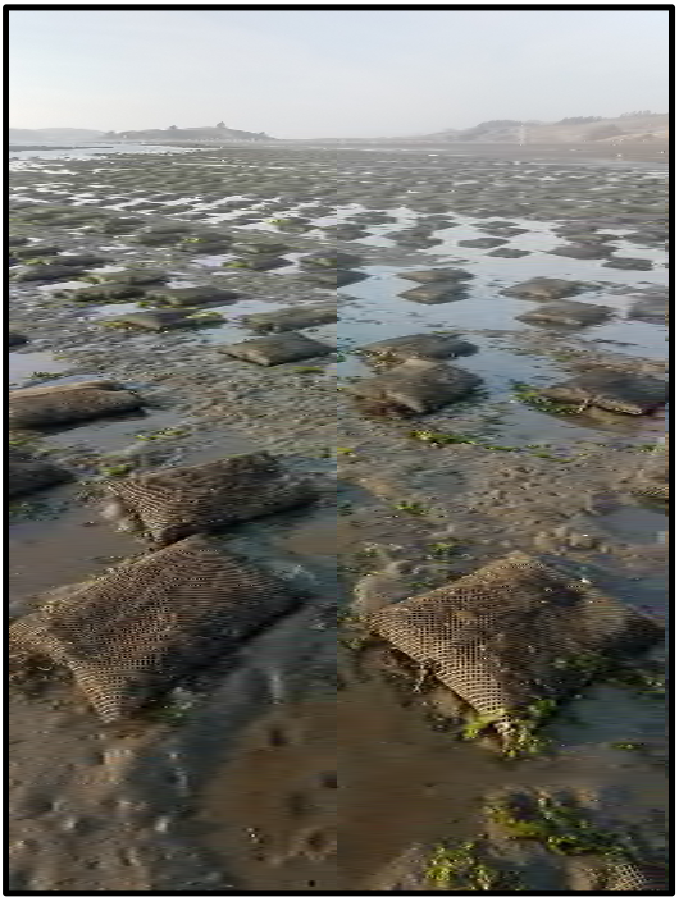

Figure 6. Photograph of On-Bottom Bag Culture with Oysters.

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.

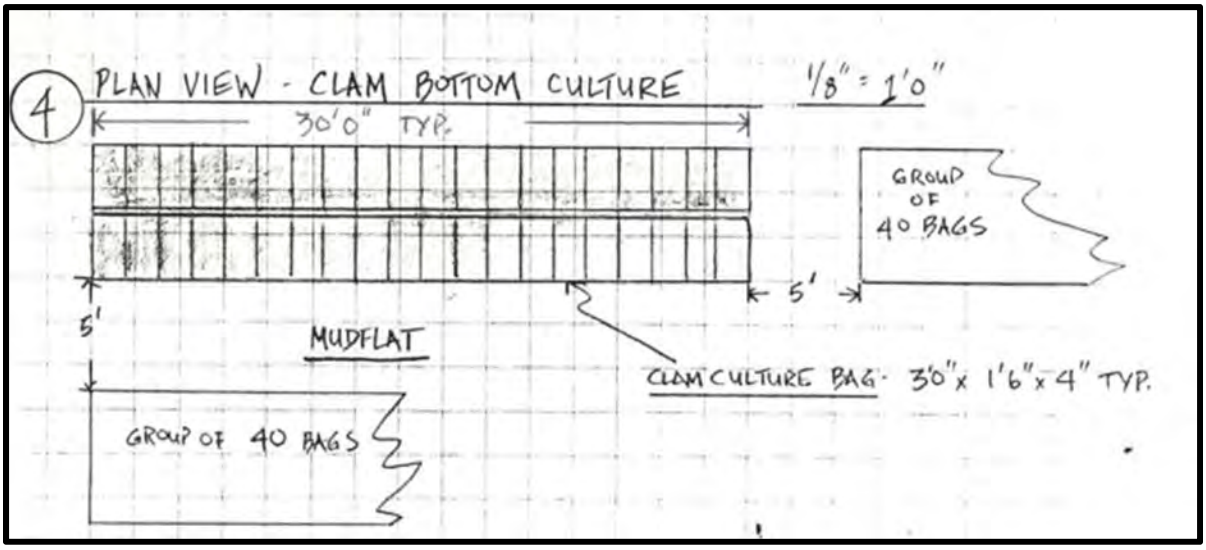

Figure 7. Typical On-Bottom Clam Bag Layout
Note: HIOC does not currently include a 5-foot space between groups of clam bags. The plan shown is otherwise correct.

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

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).

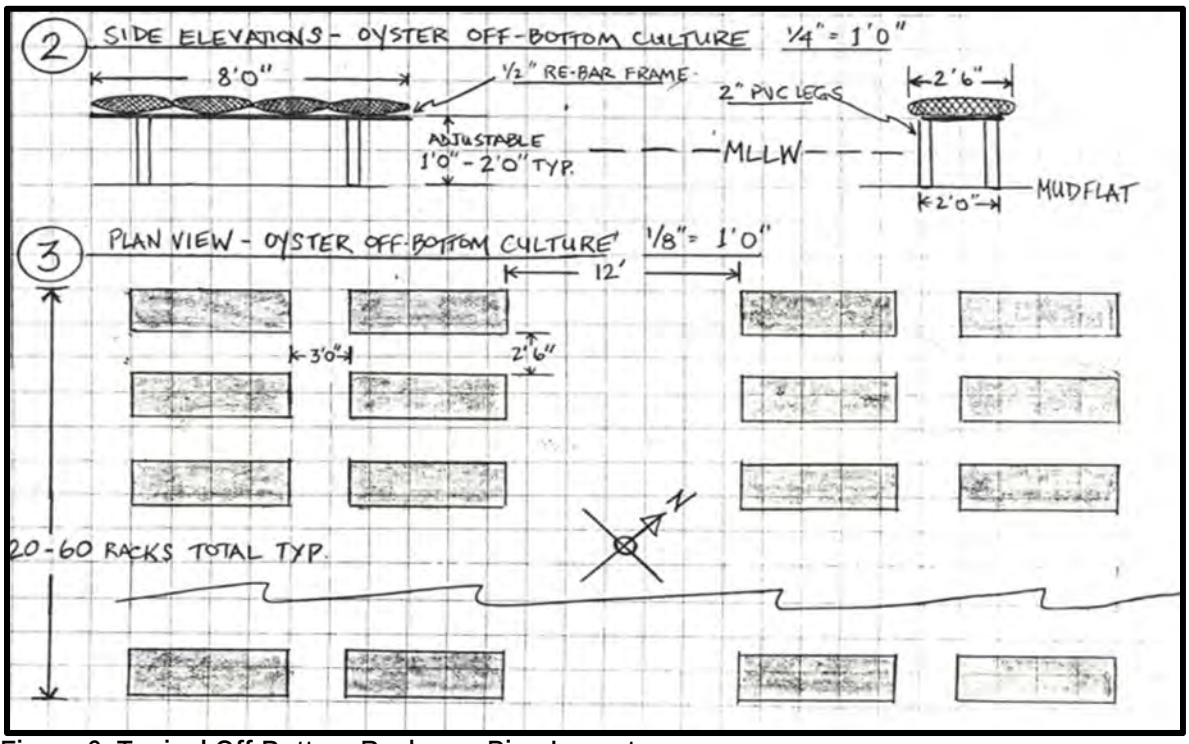

Figure 9. Typical Off-Bottom Racks-on-Pipe Layout


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.

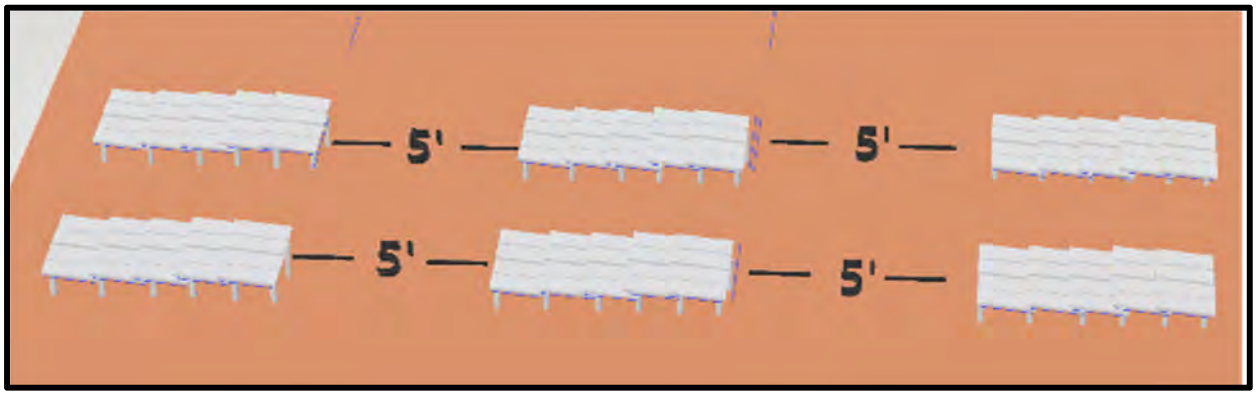

Figure 11. Typical Spacing between Sections of Overlapped Racks

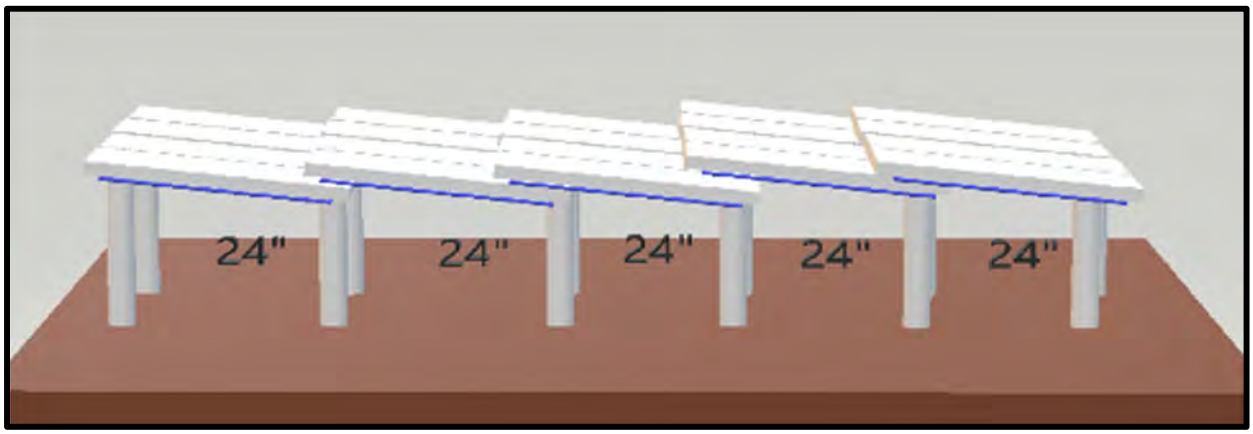

Figure 12. Typical Overlapped Racks Spacing: Side View

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.

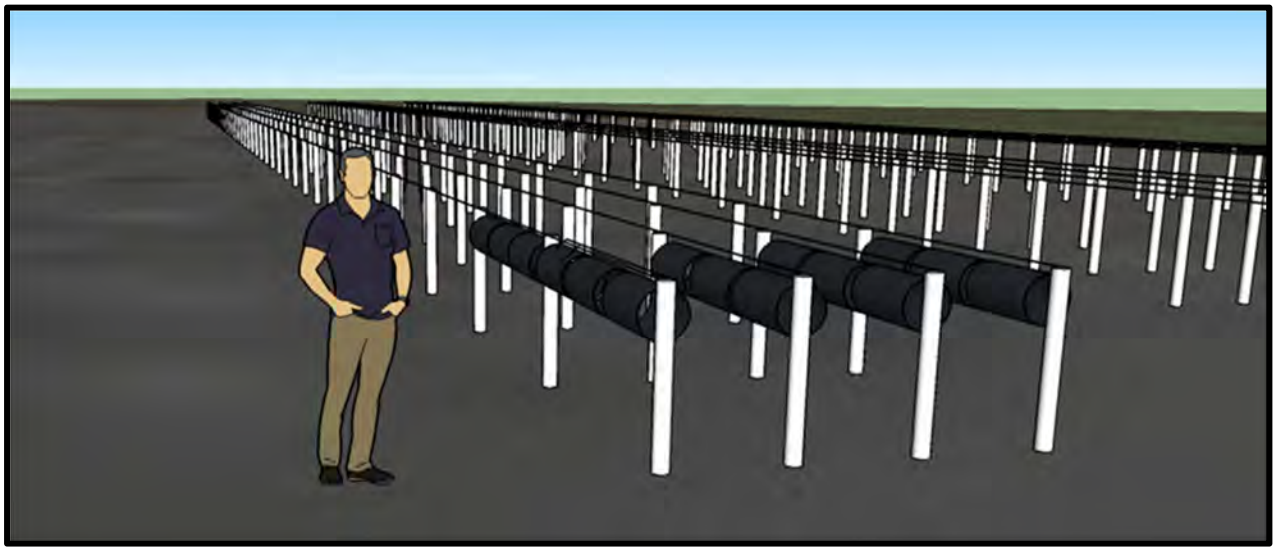

Figure 14. Diagram of Multiple Longlines with Baskets

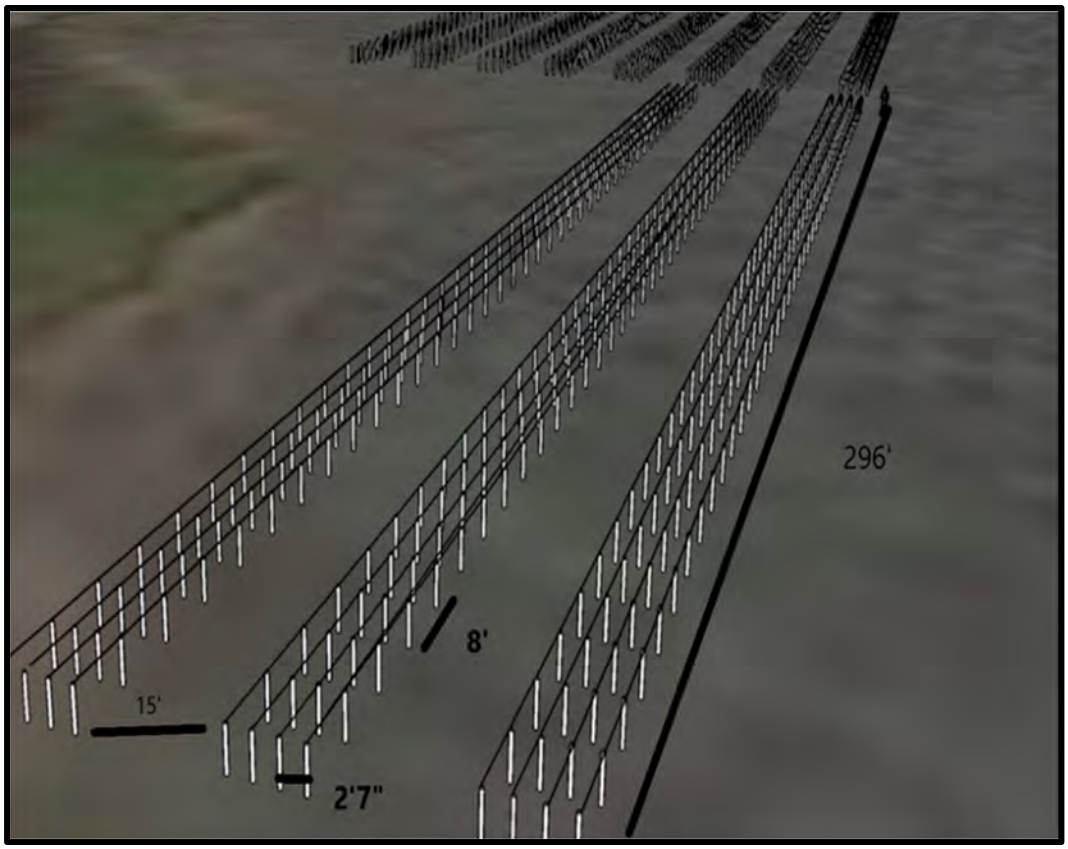

Figure 15. Digital Representation of Longlines

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

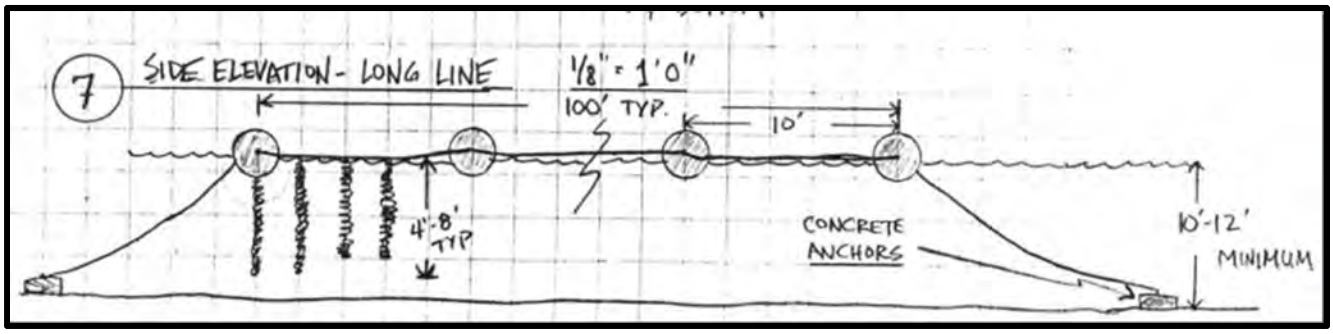

Figure 20. Diagram of Suspended Longline/Sentinel Mussel Layout

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).

Clam Rolls

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

Tray Barges

Tray barges have hanging Seapa baskets that hang below the floating barge. The barges are 25'x8' with a 4'x8' plywood deck directly over the floats at either end. The middle of the tray barge has 7 2" diameter aluminum poles with rope approximately 15' between each. This minimizes the need for multiple anchors. If multiple tray barge chains were used, they would be spaced approximately 20' apart. Tray barge anchors are located at 38° 12.271'N, 122° 56.158'W and 38° 12.261'N, 122° 56.165'W. Pictures of the existing tray barges are shown in Figures 4 and 5. A diagram of the tray barge design is included as Figure 6. The current locations of the tray barges are shown in Figure 14.

Figure 5: Picture of Existing Tray Barge Used for Seapa Baskets

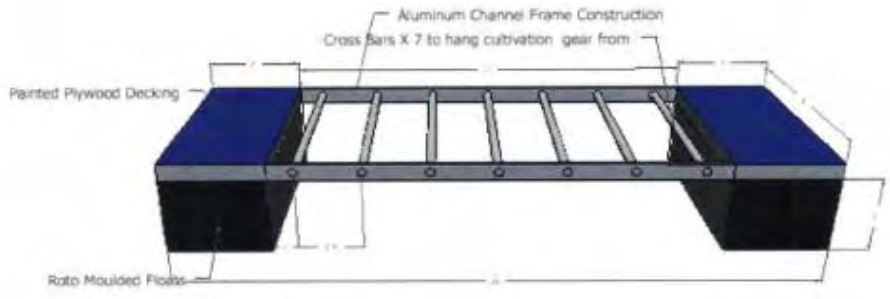

Figure 6: Diagram of Tray Barge Design

Table 2 – Proposed Total Amount of Each Cultivation Type and Density

Culture Type	#/Acre	% Coverage/Acre	% Uncovered/Acre	Total Gear Proposed[1]
Overlapped Racks (5 Overlap)	1190 racks	45%	55%	1,297
Regular Racks	622 racks	29%	71%	4,534
Bottom Bags	3111 bags	42%	58%	9,706
Clam Bags	3872 bags	33%	67%	17,850
Floating Culture	10 lines	17%	83%	107
Seapa/Tipping Bags	36 lines	32%	68%	1,052

[1]**Total Gear Proposed is approximate based on the estimated maximum amount per acre. Planting limitations and operational considerations will govern the total number of each cultivation type planted, which will be less than the maximum represented in this column.**

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2-81-40-A1; 2-84-2-A1; 2-84-10-A1; 1-94-55-A1
(HOG ISLAND OYSTER COMPANY)

FEBRUARY 8, 2019

APPENDIX C

Documents from CDP No. 2-81-40 for Lease No. M-430-10

631 Howard Street, 4th floor
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(415) 543-8555 Ext. 252

FILED: 10/9/81
49th DAY: 11/27/81
ETING OF: 11/3-5/81
STAFF: Edward F. Biels

STAFF REPORT - CONSENT CALENDAR

APPLICANT: James T. Hollibaugh/Great American Oyster Company

PERMIT NUMBER: 2-81-40

PROJECT LOCATION: Leased tidelands in Tomales Bay, approximately half way between Tom's Point and Miller Park, Marin County

PROJECT DESCRIPTION: Placement of racks and stakes for cultivation of giant Pacific oysters on no more than 5 acres of submerged tidelands.

STAFF RECOMMENDATION:

The staff recommends that the Commission adopt the following resolution:

I. APPROVAL WITH CONDITIONS.

The Commission hereby grants a permit for the proposed development subject to the conditions below, on the grounds that as conditioned, the development will be in conformity with the provisions of Chapter 3 of the California Coastal Act of 1976, will not prejudice the ability of the local government having jurisdiction over the area to prepare a Local Coastal Program conforming to the provisions of Chapter 3 of the Coastal Act, and will not have any significant adverse impacts on the environment within the meaning of the California Environmental Quality Act.

II. CONDITIONS

1. Notice of Receipt and Acknowledgement. The permit is not valid and development shall not commence until a copy of the permit, signed by the permittee or authorized agent, acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.

2. Expiration. If development has not commenced, the permit will expire two years from the date on which the Commission voted on the application. Development shall be pursued in a diligent manner and completed in a reasonable period of time. Application for extension of the permit must be made prior to the expiration date.

3. Compliance. All development must occur in strict compliance with the proposal as set forth in the application for permit, subject to any special conditions set forth below. Any deviation from the approved plans must be reviewed and approved by the staff and may require Commission approval.

4. Interpretation. Any questions of intent or interpretation of any condition will be resolved by the Executive Director or the Commission.

5. Inspections. The Commission staff shall be allowed to inspect the site and the development during construction, subject to 24-hour advance notice.

6. Assignment. The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.

7. Terms and Conditions Run with the Land. These terms and conditions shall be perpetual, and it is the intention of the Commission and the permittee to bind all future owners and possessors of the subject property to the terms and conditions.

III. FINDINGS AND DECLARATIONS

1. Site Description. The site of this project is a 5 acre area of tidelands which has been leased by the California Department of Fish and Game to the applicant for mariculture purposes. The lease area has been designated as Lease No. 430-10, which expires in 2006.

2. Project Description.

This project proposes to rear giant Pacific oysters (Crassotrea gigas) from seeded cultch, which will be grown either on racks or stakes, depending on water depth. Visible structures would be poles supporting reflectors which would be 4 feet above the water surface at highest high water. These structures would be on racks at the west corners of the lease. According to the State Department of Fish and Game, the area proposed for culture is not highly visible, it is sheltered from wave and wind action and herring fishing is not pursued in the area. In addition the area in the vicinity of the allottment receives minimal use from fisher men and recreational boaters because of shallow water and dense growth of eel grass.

3. Relationship of the Project to Coastal Act Policies. The County of Marin has prepared a Land Use Plan for the Tomales Bay area (Local Coastal Program, Northern Marin County, Unit II). The Coastal Commission has conditionally certified the plan. The County is now preparing the necessary zoning ordinances and other materials to implement the Land Use Plan.

The approved Land Use Plan devotes considerable attention to the issue of mariculture in Tomales Bay. The Plan generally supports and encourages mariculture in the coastal zone, while recognizing that mariculture uses must be balanced with the need to provide for other uses, such as commercial fishing, recreational clamming and boating, and the need to protect coastal wildlife, water, and visual resources.

The Land Use Planincludes specific policies which seek, among other things, to:

— Limit the total acreage of Tomales Bay which is devoted to mariculture to 900 acres during the next 5 years (819 acres are currently allotted or leased by the Department of Fish and Game, of which only a small portion is presently in use).

— Enhance flexibility in mariculture operations by reducing the size of and tenure of new allotments and leases. (Existing allotments and leases would be unaffected).

— Protect eelgrass beds in the bay which are a very significant resource to fisheries and wildlife.

— Avoid the importation of exotic fish, shellfish or other species into Tomales Bay.

— Provide sufficient on-shore support facilities to accommodate the mariculture operations.

— Maintain public access to and along the shoreline of the bay and boating access within the bay.

The project is consistent with the Land Use Plan in that:

a) It will occur in an area allotted by the State Department of Fish and Game for mariculture purposed;

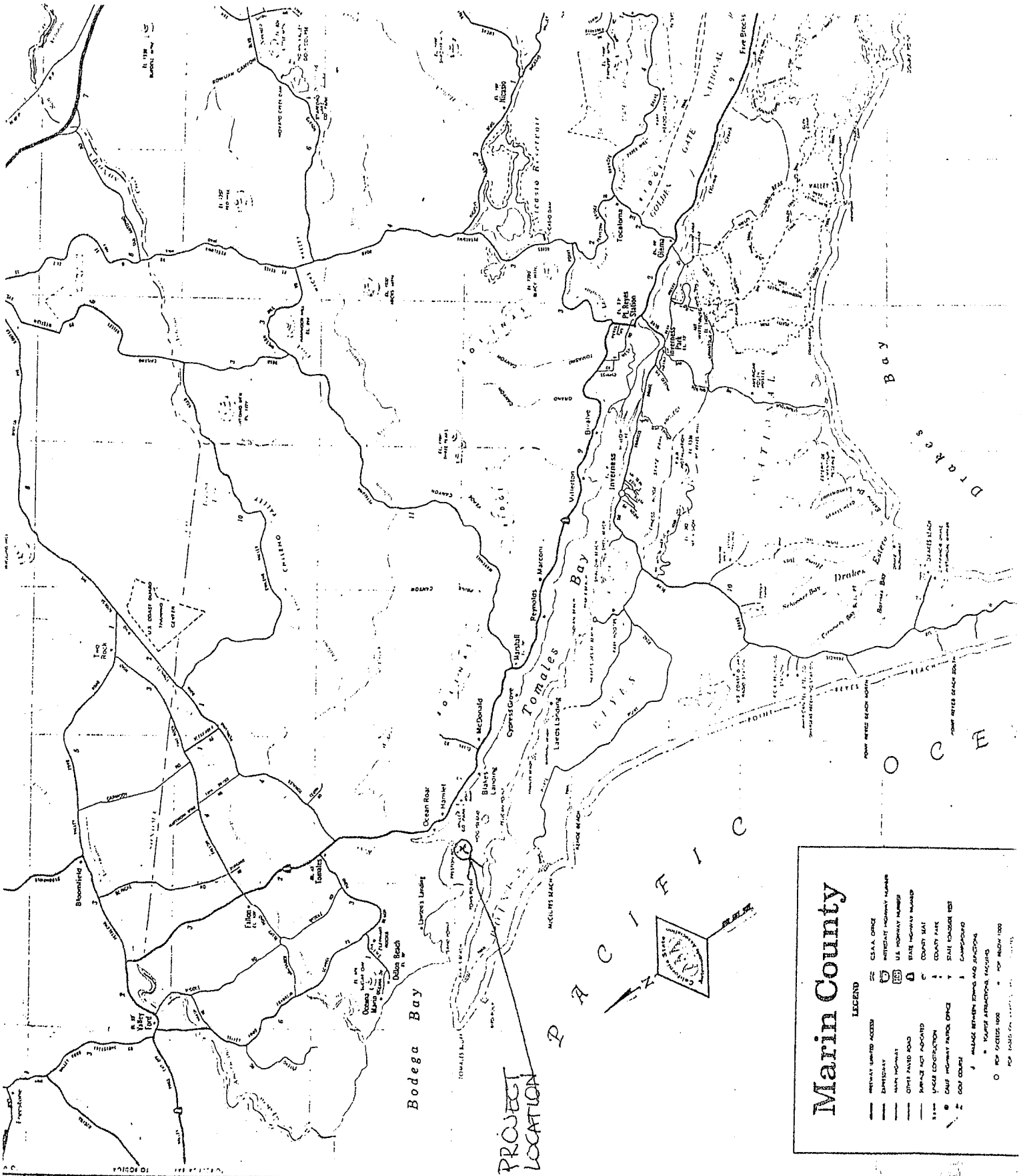
b) It will be sited in such a way as to avoid placement of structures in areas with eelgrass growth;

c) No exotic fish, shellfish or other species will be imported into Tomales Bay,

d) Existing facilities exist (Johnson Oyster Co.) for processing shellfish; an existing marina will be utilized for transfer; and

e) Public access and boating will not be affected by the project.

Therefore, for all of the reasons stated above this project is consistent with the public access and public recreation policies of Chapter 3 of the Coastal Act of 1976.


Marin County
LEGEND
PROJECT LOCATION
Bodega Bay
Tomales Bay
PACIFIC OCEAN
Point Reyes Station
Inverness
Olema
Tocaloma
Bolinas
Stinson Beach
Drakes Bay
Point Reyes Beach North
Point Reyes Beach South
Bloomfield
Valley Ford
Tomales
Dillon Beach
Ocean Roar
Hamlet
Blakes Landing
Lawsons Landing
McDonald
Cypress Grove
Marshall
Marconi
Tocaloma
Olema
Bolinas
Stinson Beach
Drakes Estero
Schooner Bay
Limantour Spit
Point Reyes Beach North
Point Reyes Beach South
Two Rocks
Petaluma
Fairfax
San Rafael
Golden Gate National Recreation Area

State of California, Edmund G. Brown Jr., Governor
North Central District
California Coastal Commission
631 Howard Street, 4th floor
San Francisco, California 94105
(415) 543-8555 Ext. 252

File

COASTAL DEVELOPMENT PERMIT NO: 2-81-40

RECEIVED
NOV 18 1981
CALIFORNIA
COASTAL COMMISSION

On November 4, 1981, The California Coastal Commission granted to James T. Hollibaugh/Great American Oyster Company this permit for the development described below, subject to the attached Standard and Special conditions.

Project Location: Leased tidelands in Tomales Bay, approximately half way between Tom's Point and Miller Park, Marin County

Project Description: Placement of racks and stakes for cultivation of giant Pacific oysters on no more than 5 acres of submerged tidelands. (Mariculture Lease No. 430-10)

Issued on behalf of the California Coastal Commission by

MICHAEL L. FISCHER
Executive Director
and

Steven F. Kaufman
North Central District Manager

IMPORTANT: THIS PERMIT IS NOT VALID UNLESS AND UNTIL A COPY OF THE PERMIT WITH THE SIGNED ACKNOWLEDGEMENT HAS BEEN RETURNED TO THE COMMISSION OFFICE.

ACKNOWLEDGEMENT

The undersigned permittee acknowledges receipt of this permit and agrees to abide by all terms and conditions thereof.

Nov 18 1981 X James T Hollibaugh
Date Signature of Permittee

COASTAL DEVELOPMENT PERMIT NO. 2-81-40

RECEIVED
NOV 1 1981
CALIFORNIA
COASTAL COMMISSION

STANDARD CONDITIONS:

1. Notice of Receipt and Acknowledgement. The permit is not valid and development shall not commence until a copy of the permit, signed by the permittee or authorized agent, acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.

2. Expiration. If development has not commenced, the permit will expire two years from the date on which the Commission voted on the application. Development shall be pursued in a diligent manner and completed in a reasonable period of time. Application for extension of the permit must be made prior to the expiration date.

3. Compliance. All development must occur in strict compliance with the proposal as set forth in the application for permit, subject to any special conditions set forth below. Any deviation from the approved plans must be reviewed and approved by the staff and may require Commission approval.

4. Interpretation. Any questions of intent or interpretation of any condition will be resolved by the Executive Director or the Commission.

5. Inspections. The Commission staff shall be allowed to inspect the site and the development during construction, subject to 24-hour advance notice.

6. Assignment. The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.

7. Terms and Conditions Run with the Land. These terms and conditions shall be perpetual, and it is the intention of the Commission and the permittee to bind all future owners and possessors of the subject property to the terms and conditions.

Item 4 2-01-82

MARIN COUNTY

ENVIRONMENTAL PROTECTION COMMITTEE

MINUTES

February 25, 1982

RECEIVED
MAR 25 1982
CALIFORNIA
COASTAL COMMISSION

PRESENT: Pierre Joske, Director of Parks & Recreation (Chairman)
Marge Macris, Planning Director
Ray Thomson, Director of Public Works
Mehdi Sadjadi, Secretary
James T. Hollibaugh, Applicant for Tidelands Permit No. T-81-08

1. T-81-08, Great American Oyster Co., State Water Bottom Allotment 430-10

Tidelands Permit to construct shellfish cultivation structures in Tomales Bay to be used to grow shellfish to marketable size. After harvesting, the process of growing shellfish would be repeated.

This permit was continued from the February 11, 1982, meeting at which time the Negative Declaration was granted. After viewing the site and questioning the applicant in detail about his operation; the size, shape and location of the allotment; and the effect of this operation on recreational boating activities, the Committee was able to make all of the required findings in order to grant the permit, subject to the following conditions:

1. No oyster racks shall be installed within area of the leasehold where eelgrass is identified and located.

2. The racks shall be removed and the area returned to its original conditions if the lease is abandoned for any reason.

The Committee stated for the record that future requests for facilities will be reviewed for possible adverse affect on boating in Tomales Bay.

APPROVED WITH CONDITIONS

MEHDI SADJADI
Secretary

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105

SPNCO-RN
No. 14381N63

17 November 1981

CALIFORNIA COASTAL COMMISSION
NORTH CENTRAL REGION
1050 NORTHGATE DRIVE, SUITE 130
SAN RAFAEL, CA 94903

RECEIVED
NOV 2 1981
CALIFORNIA
COASTAL COMMISSION

Gentlemen:

Mr. James Hollibaugh of Great American Oyster Company, 3282 Hagen Road, Napa, California 94558, has applied for a Department of the Army permit to place shellfish cultivation structures in a 5-acre State Lease area of Tomales Bay, between Hog Island and Preston Point. The attached drawings show layout detail of the structures. The structures would be used to grow junvenile shellfish to marketable size. After harvesting, new junvenile shellfish would be placed in the lease area and the grow-out process repeated.

Please expedite your comments to this office and, if your agency has permitting authority over the above-described work, please indicate whether you have received an application and, if so, the status of that application. If you have any questions concerning this matter, please call or write Mr. Paul Portch of our Regulatory Functions Branch (telephone 415-556-5426). Please address correspondence to the District Engineer, and refer to the file number at the head of this letter.

Sincerely,

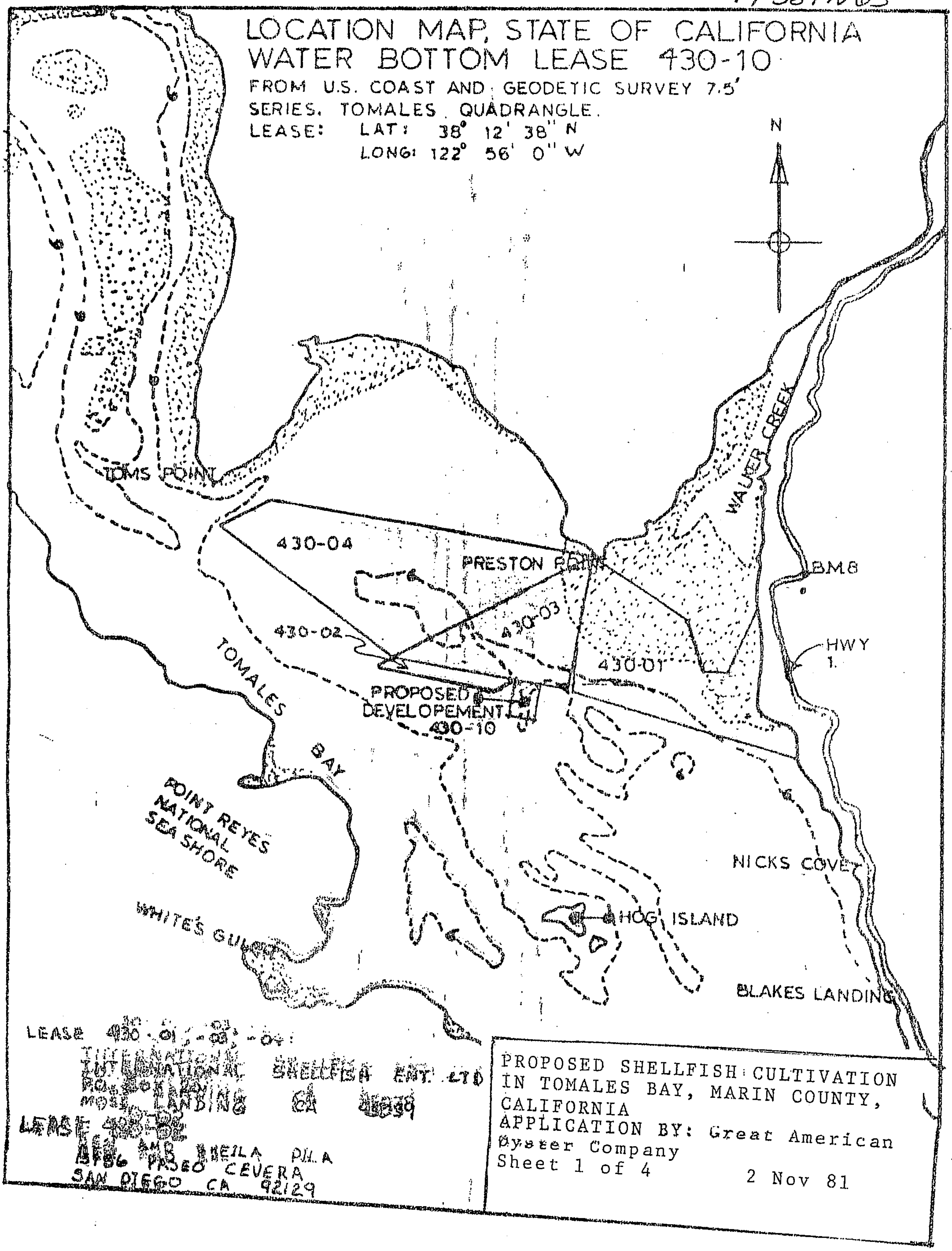
Calvin C. Fong

CALVIN C. FONG
Chief, Regulatory
Functions Branch

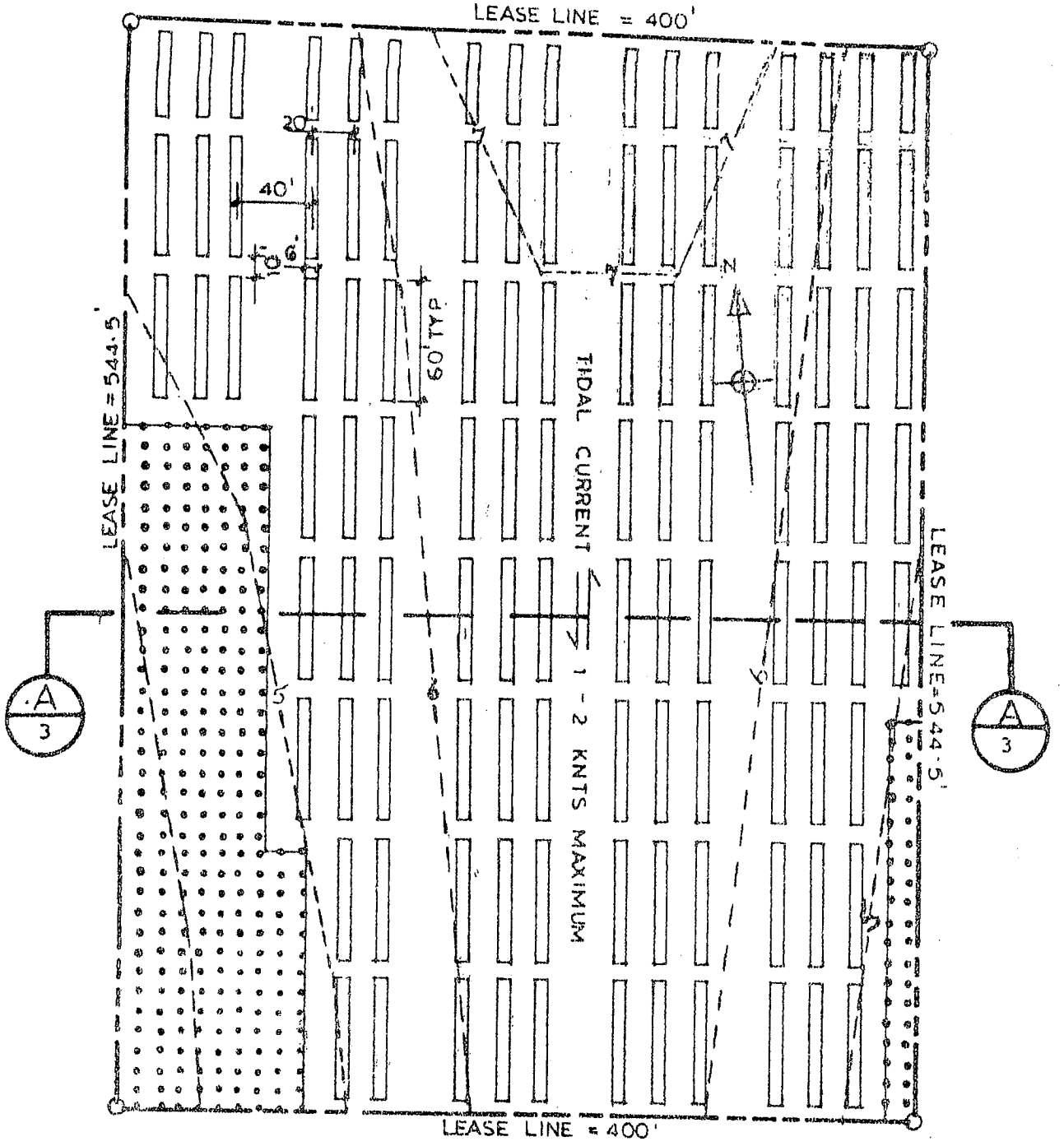
1 Inclosure
As stated

SPN FL 559, 1 Jun 1978

#14381N63


LOCATION MAP, STATE OF CALIFORNIA
WATER BOTTOM LEASE 430-10
FROM U.S. COAST AND GEODETIC SURVEY 7.5'
SERIES. TOMALES QUADRANGLE.
LEASE: LAT: 38° 12' 38" N
LONG: 122° 56' 0" W
N
TOMS POINT
430-04
PRESTON POINT
430-02
430-03
430-01
WALKER CREEK
BM8
HWY 1.
PROPOSED DEVELOPEMENT 430-10
TOMALES BAY
POINT REYES NATIONAL SEA SHORE
NICKS COVE
HOG ISLAND
WHITES GULCH
BLAKES LANDING
LEASE 430-01, -03, -04:
INTERNATIONAL SHELLFISH ENT. LTD
MOSS LANDING CA
LEASE 430-02
SHEILA PILA
PASEO CEVERA
SAN DIEGO CA 92129
PROPOSED SHELLFISH CULTIVATION IN TOMALES BAY, MARIN COUNTY, CALIFORNIA
APPLICATION BY: Great American Oyster Company
Sheet 1 of 4
2 Nov 81

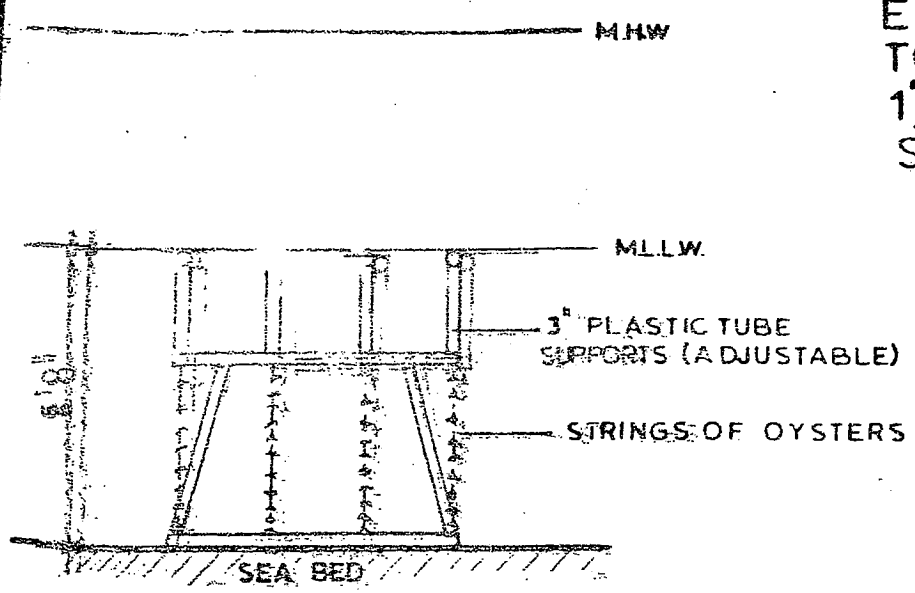
#1438IN63



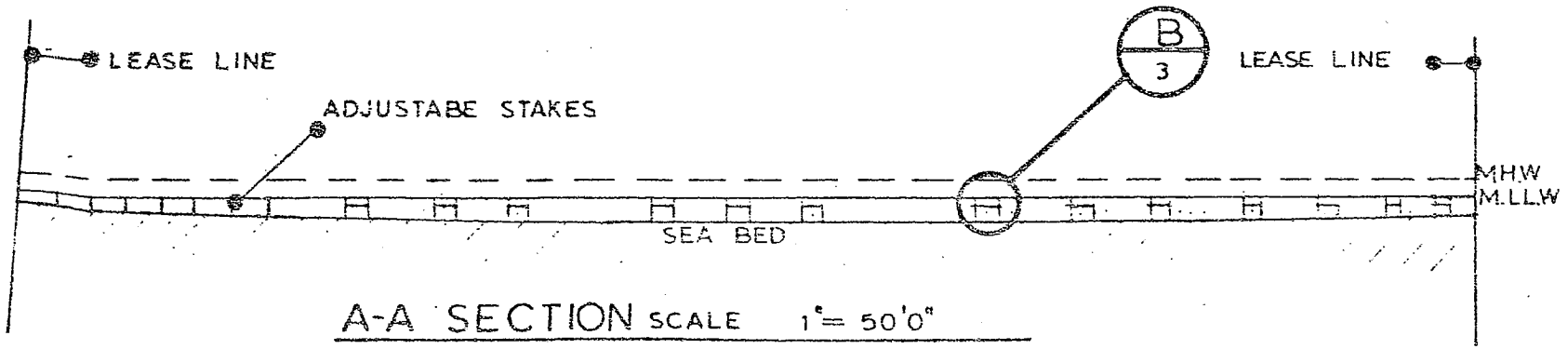
Plan at maximum development proposed for oyster culture on California State Waterbottom Lease Number 430-10 showing approximate position of racks and stakes(oblongs and dots, respectively) used to subsurface growing oysters. Racks or stakes will not be placed in or within five feet of Zostera (Eelgrass) beds. Spacing on stakes variable North/South direction 2-10 feet. Contours give depth below Mean Lower Low Water. SCALE 1"=80'0"

PROPOSED SHELLFISH CULTIVATION IN TOMALES BAY, MARIN COUNTY, CALIFORNIA
APPLICATION BY: Great American Oyster Company
Sheet 2 of
2 Nov 81

CROSS SECTION AND END ELEVATION OF SUPPORT RACKS. TO BE CONSTRUCTED OF 1", 2" OR 3" DIA P.V.C PIPE OR SIMILAR MATERIAL



B END ELEVATION SCALE 1/4"=1'0"



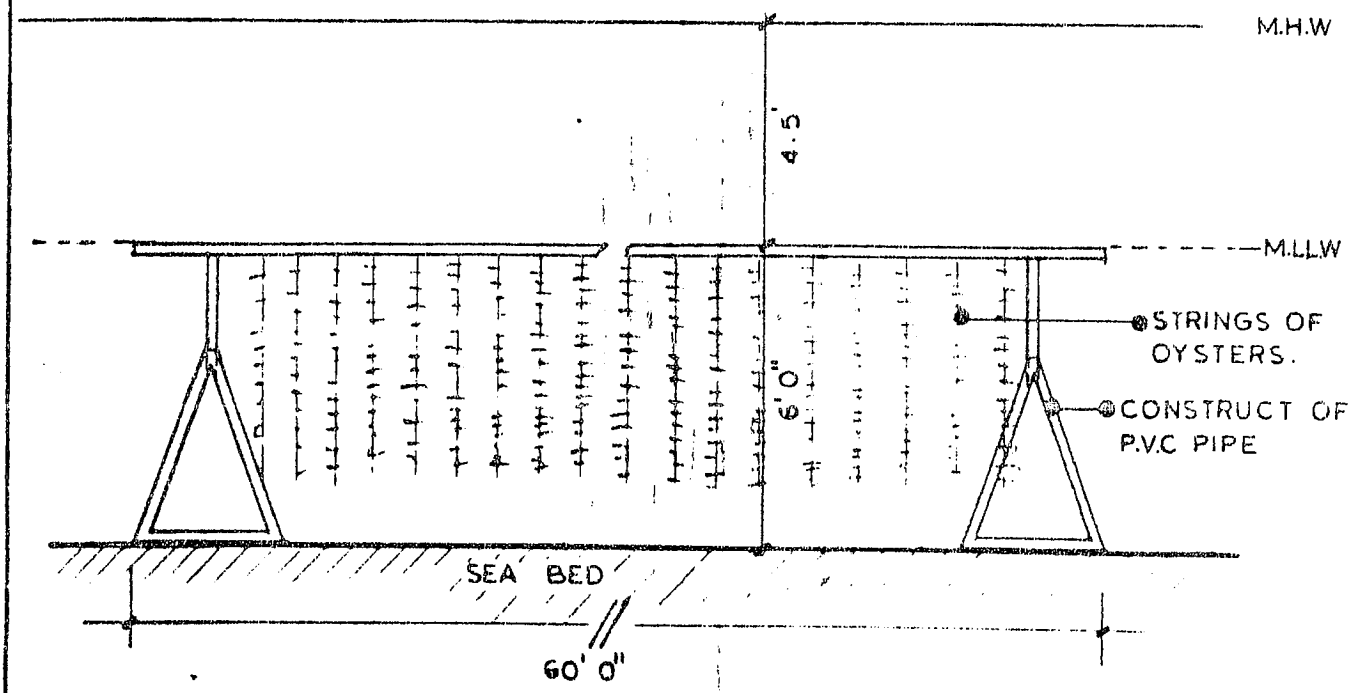
A-A SECTION SCALE 1"= 50'0"

PROPOSED SHELLFISH CULTIVATION IN TOMALES BAY, MARIN COUNTY, CALIFORNIA
APPLICATION BY: Great American Oyster Company
Sheet 3 of 4
2 Nov 81

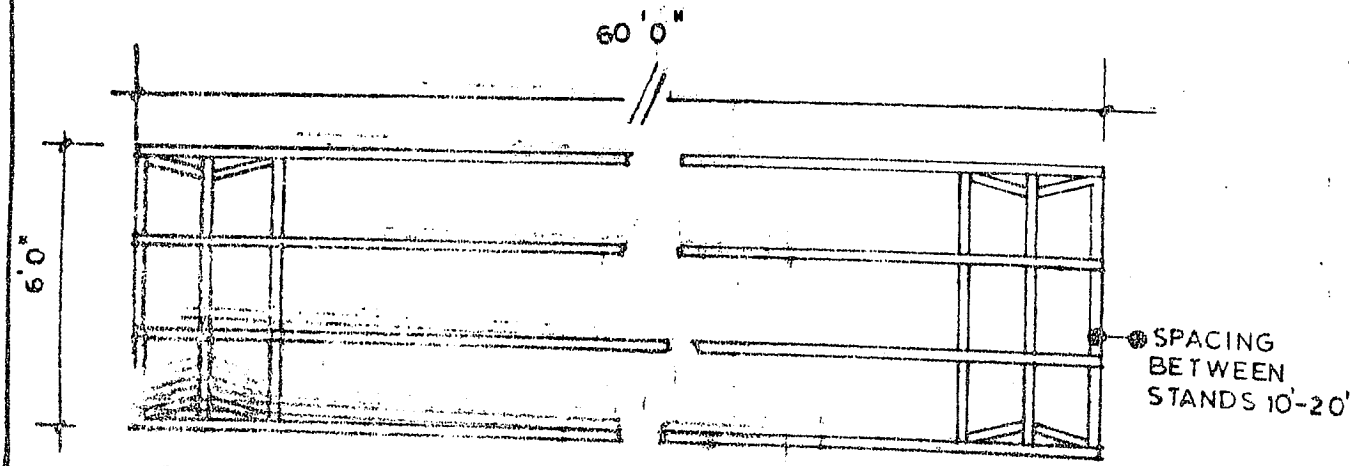
#438/1163

1438N63

PLAN VIEW AND SIDE ELEVATION OF OYSTER RACKS. TO BE CONSTRUCTED OF 1",2" AND 3" DIA P.V.C PIPE OR SIMILAR MATERIAL



SIDE ELEVATION OYSTER RACKS SCALE 1/4"=1'0"



PLAN VIEW OYSTER RACKS SCALE 1/4" = 1'0"

PROPOSED SHELLFISH CULTIVATION IN TOMALES BAY, MARIN COUNTY, CALIFORNIA
APPLICATION BY: Great American Oyster Company
Sheet 4 of 4 2 Nov 81

Documents from CDP No. 2-84-2 for Lease No. M-430-11

3-1-84

California Coastal Commission
631 Howard Street, 4th Floor
San Francisco, California 94105
(415) 543-8555

Permit Application No. 2-84-2

ADMINISTRATIVE PERMIT

APPLICANT: Hog Island Shellfish Farms

PROJECT DESCRIPTION: State Water Bottom Lease #430-11 for oyster culture.

PROJECT LOCATION: State Water Bottom Lease #430-11, Tomales Bay, Marin County

EXECUTIVE DIRECTOR'S DETERMINATION:

Pursuant to PRC Section 30624, the Executive Director hereby determines that the proposed development, subject to Standard and Special Conditions as attached, is in conformity with the provisions of Chapter 3 of the Coastal Act of 1976, will not prejudice the ability of the local government to prepare a Local Coastal Program that is in conformity with the provisions of Chapter 3, and will not have any significant impacts on the environment within the meaning of the California Environmental Quality Act. Any development located between the nearest public road and the sea is in conformity with the public access and public recreation policies of Chapter 3.

Additional reasons for this determination, and for any special conditions, may be discussed on the reverse (Page 2).

NOTE: The Commission's Regulations provide that this permit shall be reported to the Commission at its next meeting. If one-third or more of the appointed membership of the Commission so request, a permit will not be issued for this permit application. Instead, the application will be removed from the administrative calendar and set for public hearing at a subsequent Commission meetting. Our office will notify you if such removal occurs.

This permit will be reported to the Commission at the following time and place:

Date: Wednesday, March 14, 1984

TIME: 10:00 A.M.

PLACE: Grosvenor Airport Inn
380 South Airport Boulevard
South San Francisco, California
(415) 873-3200

IMPORTANT - Before you may proceed with development the following must occur:

For this permit to become effective you must sign Page 2 of the enclosed duplicate acknowledging the permit's receipt and accepting its contents, including all conditions, and return it to our office. Following the Commission's meeting, and once we have received the signed acknowledgment and evidence of compliance with all special conditions, we will send you an authorization to proceed with development.

MICHAEL L. FISCHER
Executive Director

by: Edward F. Bielski

EDWARD F. BIELSKI Permit Analyst

Permit Application No. 2-84-2

STANDARD CONDITIONS:

1. Notice of Receipt and Acknowledgement. The permit is not valid and development shall not commence until a copy of the permit, signed by the permittee or authorized agent, acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.

2. Expiration. If development has not commenced, the permit will expire two years from the date this permit is reported to the Commission. Development shall be pursued in a diligent manner and completed in a reasonable period of time. Application for extension of the permit must be made prior to the expiration date.

3. Compliance. All development must occur in strict compliance with the proposal as set forth in the application for permit, subject to any special conditions set forth below. Any deviation from the approved plans must be reviewed and approved by the staff and may require Commission approval.

4. Interpretation. Any questions of intent or interpretation of any condition will be resolved by the Executive Director or the Commission.

5. Inspections. The Commission staff shall be allowed to inspect the site and the project during its development, subject to 24-hour advance notice.

6. Assignment. The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.

7. Terms and Conditions Run with the Land. These terms and conditions shall be perpetual, and it is the intention of the Commission and the permittee to bind all future owners and possessors of the subject property to the terms and conditions.

EXECUTIVE DIRECTOR'S DETERMINATION (continued):

See Page 3

SPECIAL CONDITIONS: NONE

ACKNOWLEDGEMENT OF PERMIT RECEIPT/ACCEPTANCE OF CONTENTS:

I/We acknowledge that I/we have received a copy of this permit and have accepted its contents including all conditions.

Applicant's Signature

Date of Signing

EXECUTIVE DIRECTOR'S DETERMINATION (Continued):

Section 30233 of the Coastal Act provides in part, that the filling of open coastal waters shall be limited to (among others) aquaculture. A very small amount of fill in the form of oyster racks will be placed on State Water Bottom Lease #M430-11. The State Department of Fish and Game has found that no irreversible modification of the environment will result from the proposed action and that no mitigation measures are required. The Department found that "the benefits accrued through the production of high quality protein oysters would more than compensate for any minor infrigement that may occur on public use of the Bay. Support frames used for holding oysters will also provide an attachment surface for marine organisms and additional habitat and attraction for species of fish used by sportsmen. The cultivation of oysters in the area considered would have no detrimental effect on the marine, bird, or animal populations utilizing the Bay. Minimum restrictions on recreational or commercial boating activities are expected because deepwater areas of the Bay were purposely avoided."

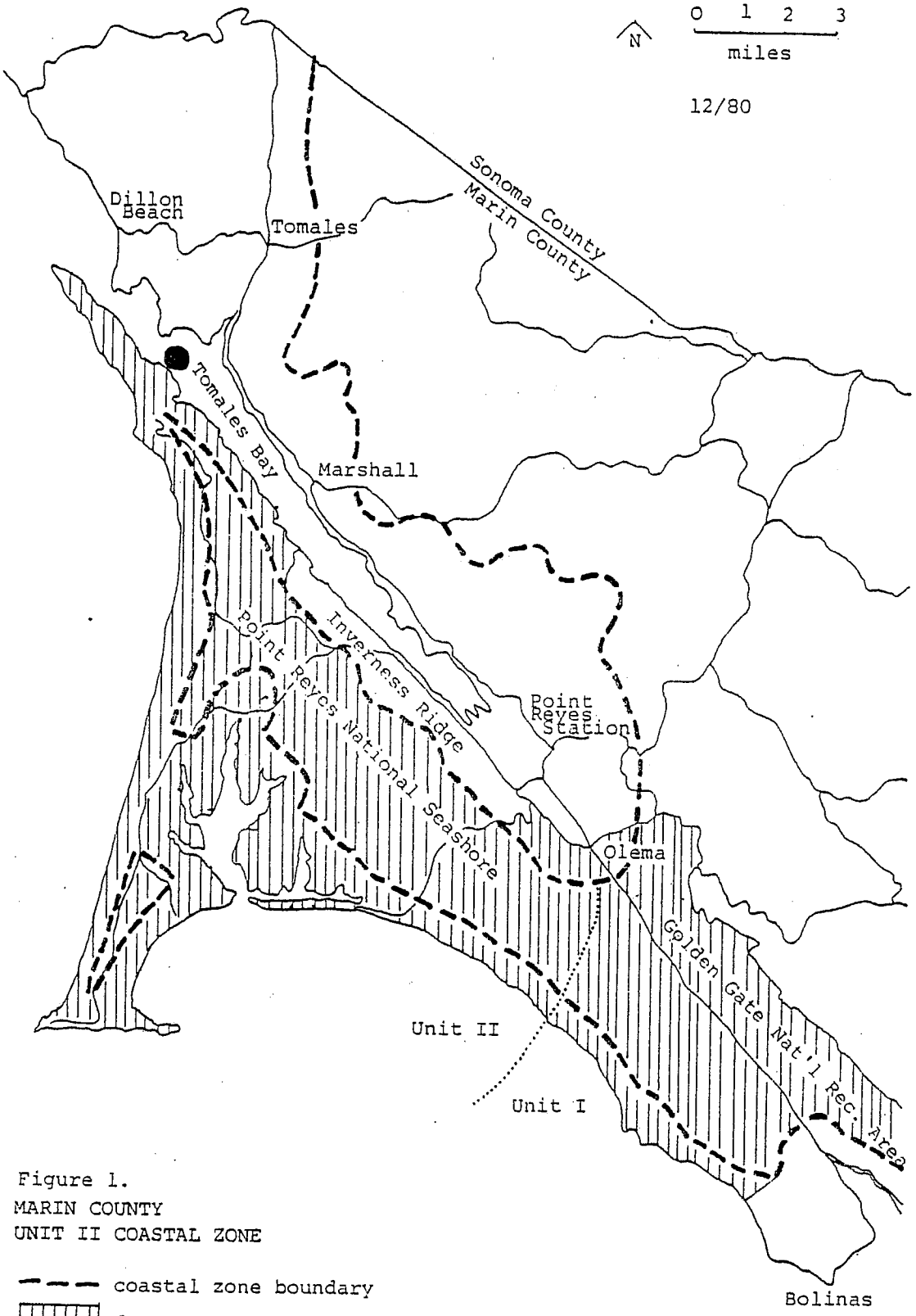


Figure 1.
MARIN COUNTY
UNIT II COASTAL ZONE

coastal zone boundary

federal parklands

EXHIBIT A
PROJECT LOCATION
2-84-2
HOG ISLAND SHELLFISH FARMS

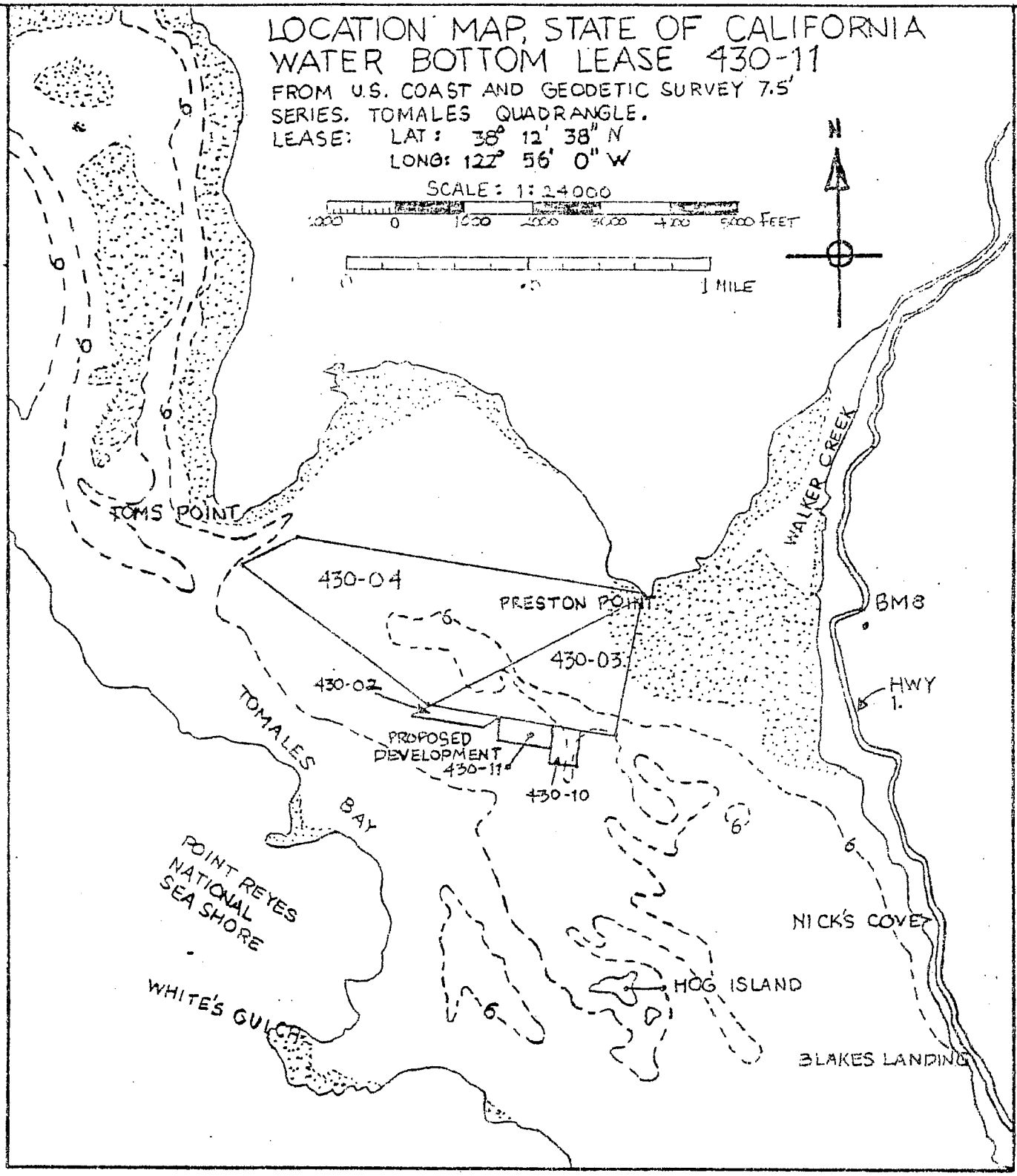


EXHIBIT B
2-84-2
HOG ISLAND SHELLFISH FA
PROPOSED SHELLFISH OPERATION

PURPOSE: COMMERCIAL SHELLFISH CULTIVATION
DATUM MEAN LOWER LOW WATER, U.S.G.S.
ADJACENT PROPERTY OWNERS:
(1) LEASE 430-02: BAY BOTTOM BEDS CO. 260 SUNSET WY BOX 262 STAR RTE. MUIR BEACH, CA.
(2) LEASE 430-04: GREAT AMERICAN OYSTER CO. [illegible]

IN TOMALES BAY
~~AK~~ NEAR MARSHALL
COUNTY OF MARIN STATE CALIFORNIA
APPLICATION BY JOHN FINGER

DEVELOPMENT PLAN FOR STATE OF CALIFORNIA

WATERBOTTOM LEASE 430-11

The objective of this project is to provide structures for the off-bottom culture of shellfish (i.e. oysters, mussels, clams). Seed purchased from commercial sources would be grown to market size using several different methods: Seed attached to substrates such as oyster shell or rope would be supported by stakes, or suspended by racks; single seed would be enclosed in trays and plastic mesh bags and supported by racks.

The depth over most of the lease is less than 5' below Mean Lower Low Water. All structures placed on the lease would not exceed a maximum height of 1' above MLLW. In addition, no structures would be placed in or within 5' of any Zostera marina (Eelgrass) existing on the lease.

A stake and rope unit (hereafter called long-lines) would consist of a 100' length of rope supported at 4' to 6' intervals by stakes. (Fig. C) Stakes would be constructed of a suitable material, probably 1" ID PVC, or metal bar or wood; and would be driven 1' to 2' into the substrate. Seed-bearing substrate would be attached to the rope at 12" to 16" intervals. Long-lines would be placed with their long axes roughly parallel to the tidal current vectors, and would be arranged side by side in groups of four, with 3' to 5' spacing between each line. Groups would be spaced 20' apart in

the long dimension and 20' apart in the short dimension. (Sheet 4, PLAN)

Racks with trays or bags would be placed on some of the deeper areas of the lease. (Sheet 4, PLAN) Racks would be constructed of a suitable material (reinforcing metal bar, plastic pipe, or wood) and would be approximately 12' long by 4' wide. (Fig. A&B) Up to 8 trays or bags would be attached per rack. These would be made using a dark-colored plastic mesh, so as to reduce the visual impact from Highway 1.

Racks would probably be placed with their long axes parallel to the tidal current vectors and would be spaced 6' apart in the short dimension and 8' apart in the long dimension. (Sheet 4, PLAN) There would be up to 10 racks across (in the short dimension). Also, two 20' channels would exist to allow access into the other areas of the lease, and a minimal 40' separation zone would exist between any rack areas and long-line areas. (Sheet 4, PLAN)

Before any structures were placed on the lease, the lease area would be delineated by corner posts extending to a height of approximately 10' above Mean Lower Low Water. These posts would bear signs and radar reflecting material. As shown on the PLAN view at maximum development, there would be approximately 320 racks and 18 long-line groups. If possible, a few (3-5) long-line groups would be placed on the lease in the Fall of 1983, along with about 50-100 racks. Maximum development of the lease area should be reached during the following (1984) summer season. No structures would be permanently fastened to the seafloor and would be removed if the lease is abandoned for any reason.

Documents from CDP No. 2-84-10 for Lease No. M-430-12

8555

August 1, 1984

CONSENT CALENDAR

STAFF REPORT AND RECOMMENDATION
(For Commission Consideration August 21-24, 1984)

a w/c 8-0-1
8/27/84

APPLICANT: William C. Callahan, Intertidal Aquafarms

PERMIT NUMBER: 2-84-10

PROJECT LOCATION: State Water Bottom lease M430-12, east Tomales Bay, approximately three miles south of Marconi Cove, Marin County. (See Exhibits A and B).

PROJECT DESCRIPTION: Propagation of shellfish using rack and raft methods for cultivation on 25 acre allotment in Tomales Bay.

SUBSTANTIVE FILE DOCUMENTS:

1. Permit 2-81-19 (Morgan Oyster Co.)
2. Permit 2-81-40 (Great American Oyster Co.)
3. Permit 2-82-38 (Golden Gate Oyster Co.)
4. Permit 2-83-22 (Bay Bottom Beds, Inc.)
5. Permit 2-84-2 (Hog Island Shellfish Farms)
6. Permit 2-84-6 (Half-Shell Ventures, Inc.)
7. Marin County Local Coastal Program (12-1-80)
8. State Water Bottom Lease M430-12

STAFF NOTE: Marin County has assumed coastal permit jurisdiction in most of its coastal zone, but the project site is located in an area of Coastal Commission original permit jurisdiction.

STAFF RECOMMENDATION

The staff recommends that the Commission adopt the following resolution:

I. Approval with conditions.

The commission hereby grants, subject to the conditions below, a permit for the proposed development on the grounds that the development, as conditioned, will be in conformity with the provisions of Chapter 3 of the California Coastal Act of 1976, and will not prejudice the ability of the County of Marin to implement the Local Coastal Program (LCP) in conformity with the provisions of Chapter 3 of the Coastal Act, and will not have any significant

adverse impacts on the environment within the meaning of the California Environmental Quality Act.

II. Standard Conditions See Attachment X.

III. SPECIAL CONDITIONS

1. All rack culture shall be conducted in water depth of no less than three feet mean low water (MLW). Racks shall not extend higher than two feet above mean low water.

2. Rack modules shall be placed at a minimum of 16 feet apart to allow for boat passage.

3. Buoys to mark submerged rafts shall be placed to allow passage of boats at all stages of the tide as determined by the Department of Fish and Game.

4. Rafts shall be located in a manner not to prevent passage between racks and marked to prevent hazards to navigation as determined by the Department of Fish and Game.

IV. Findings and Declarations. The Commission hereby finds and declares as follows:

A. Site Description. The project site is located on the east side of Tomales Bay, Marin County, three miles south of Marconi Cove; State Water Bottom lease M430-12. (See Exhibit B).

B. Project Description. The company proposes to propagate Pacific oysters (Crassostrea gigas) and European flat oysters (Ostrea eudlis), Japanese littleneck clams (Venerupis japonica), common littleneck clams (V. staminea), northern quahog clam (Mercenaria mercenaria) and bay mussel (Mytilus edulis), using rack, tray and floating nursery rafts for cultivation. Access to the culture area will be from the Marconi Cove Marina, one mile (by water) to the north. Boats used for tending the lease will be launched at the marina ramp. Shellfish produced on the lease will be transported from the marina by truck for distribution. Ten floating nursery rafts will be used to culture small seed before they are planted on the racks. The rafts will be 20' x 8' feet in size (160 square feet) and visible during all stages of the tide (See Exhibit D). The rafts will be anchored to the bottom, will be visible to boaters using the area and will be marked and placed so that they will not block boat passage to the shoreline, or impede navigation. Public access along the shoreline and by boat at high tide will be maintained.

Ten racks would be initially placed on the allotment for experimental purposes. Ultimately 1,000 racks would be placed on the allotment. The racks would be 6 feet long, 3 feet wide, and 3 feet high. The racks would be placed ten feet apart in rows of 10 in 100 x 100 foot squares with 20' between each square. (See Exhibit E). The spacing will allow adequate room for boat passage

at median tide levels and exceeds Department of Fish & Game standards.

C. Relationship of the Project to the Local Coastal Program. Although the Coastal Act is the standard for granting permits in the Commission's original permit jurisdiction area, the Commission may use the Local Coastal Program for guidance. The certified Local Coastal Program for Marin County provides, in part, that

> "the County of Marin supports and encourages mariculture in its coastal zone for the purposes of producing food, enhancing and restoring fisheries stocks, and contributing to the State's economy... The need for mariculture sites in coastal waters must be balanced with the need to provide for other uses, such as commercial fishing, recreational clamming and boating, and the need to protect coastal wildlife, water and visual resources."

The LCP policies set forth general standards and procedures for all mariculture operations which apply to the total acreage that may be allotted or leased in Tomales Bay, the size of allotments or leases, the protection of eelgrass beds, prohibition of importation of exotic species, public access, boating access, marking of structures, on-shore support facilities and visual impacts. Although the LCP proposes permit procedures for mariculture permits to be issued by the County, the County has chosen to process permit applications under its procedures for Tidelands Permits pursuant to Chapter 22.77 of the Marin County Code, which parallel the suggested procedures in the LCP.

With regard to the standards set forth in the LCP, the total acreage designated for mariculture operations is limited to 900 acres which includes 819 acres of existing allotments and leases and a maximum of 81 acres of new allotments and leases. These allotments and leases are equivalent to approximately 10.5 % of the Bay's 7,760 acres and are grouped at the northern and southern ends of the Bay, with a few small areas scattered in between. Despite the size of the allotments, only about 120 acres are under active cultivation, due to Fish and Game restrictions. Since the preparation of the LCP in December 1980, one large leaseholder, International Shellfish (total acreage 419) has ceased operations. The Commission has approved mariculture permits with a total acreage of 175. Of that amount 147 acres were reassigned. Approximately 352 acres of existing allotments are available, and 53 acres of new allotments. The total number of acreage currently allotted in Tomales Bay (625) is far below the limit set in the LCP. As the lease for the subject application is 25 acres and is also reassigned it is consistent with the LCP policy.

The LCP provides that new allotment sizes are limited to 5 acres. Applicants must demonstrate (per LCP policy) that the production requirements of the Department of Fish & Game for each five acre

parcel are met before being granted a permit to develop additional acreage. As this acreage allocation would not encumber new water bottoms, but would be comprised of a portion of an oyster allotment declared abandoned by the Department of Fish and Game, the five acre limitation imposed on new oyster allotments would not apply. The LCP policy encourages the Department of Fish & Game to limit new allotments and leases in Tomales Bay to 10 years subject to renewal up to 25 years. The applicants lease is consistent with LCP policy. No exotic species will be used. The applicant does not propose any structures or facilities that would interfere with public access to and along the shoreline. The siting of the rafts and racks would not interfere with recreational boating.

D. Relevant Coastal Act Policies

1. Water and Marine Resources. Section 30230 of the Coastal Act provides, in part, that "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 (among others) purposes."

Oyster culture has been conducted in Tomales Bay since the late nineteenth century. 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.

The State Department of Fish and Game is the responsible agency for allocating oyster allotments in Tomales Bay. That agency places restrictions on how oysters and shellfish may be cultivated. The State Department of Health Services reviews and recommends each mariculture allotment application to the Department of Fish and Game. Based on the recommendation of the Department of Health Services, the Department of Fish and Game then certifies the application. Both Departments have acted upon and approved this application. Each agency placed restrictions on the manner in which shellfish will be harvested. Those restrictions have been incorporated into the special conditions for this permit.

The Commission finds that the biological productivity and healthy populations of marine organisms will be maintained consistent with Section 30230 of the Coastal Act.

2. Section 30233 of the Coastal Act provides in part, that the filling of open coastal waters shall be limited to (among others) aquaculture. A very small amount of fill (less than three-quarters of an acre) in the form of oyster racks will be placed on State Water Bottom Lease #M430-12.

The racks are placed in such a way to utilize the least amount of Bay bottom and will be located out of the intertidal zone so as not to interfere with clam and other shellfish habitats.

No stands of eel-grass would be affected by placement of the structures. As the fill proposed is for aquaculture and is the minimum amount necessary, it is consistent with Section 30233 of the Act.

3. Recreational Boating. Section 30221 of the Act provides, in part, that "Increased recreational boating use of coastal waters shall be encouraged, in accordance with this division, by... limiting non-water-dependent land uses..." Aquaculture, as defined in the Act is a coastal dependent use. No non water dependent land uses are proposed. Section 30234 of the Act further provides for the protection and enhancement of facilities for recreational boating, and protects against the reduction of recreational harbor space. This project will be served by a small boat launched from the Marconi Cove marina, a commercial and recreational facility. When not in use the boat will be in dry storage. No recreational space or use of the facility will be adversely impacted by this project. The racks and rafts are situated in such a way to provide minimal use of the allotment and yet to provide for maximum boat access through the allotment area for fishing, recreational boating and access to the shoreline. Furthermore the rafts & racks will be marked for the safety of recreational boaters. The Commission finds that the project is consistent with Sections 30221 and 30234 of the Coastal Act.

4. Visual Resources. Section 30251 of the Coastal Act provides, in part, that, "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... (and) to be visually compatible with the character of surrounding areas." Tomales Bay has a scenic shoreline. Existing oyster culture facilities using buoys are visible from Highway One. Weathered oyster fences and old stakes and pilings from previous oyster operations are also visible. The project as proposed utilizes both raft and rack culture. As the racks are placed on the Bay bottom, they would only be visible at lowest tides. The rafts would be visible at all times. However most of the allotment area is obscured from view from Highway One by Tomasini Point. The small area that is visible is a considerable distance from the roadway. Because such a small area of the Bay is utilized for mariculture, the project will have minimal impact on visual resources and thus is consistent with Section 30251 of the Coastal Act.

EFB:rlw/ld31

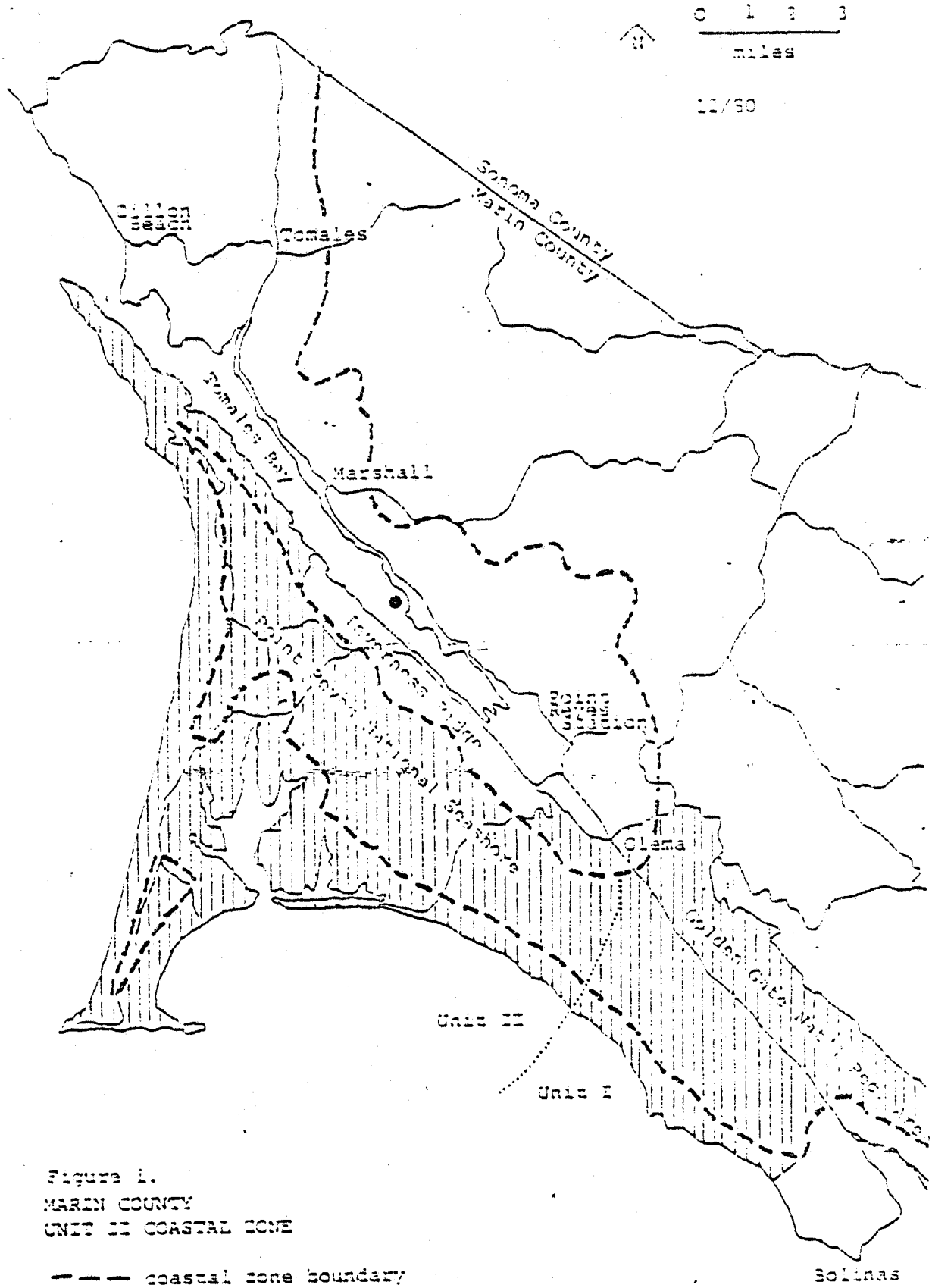
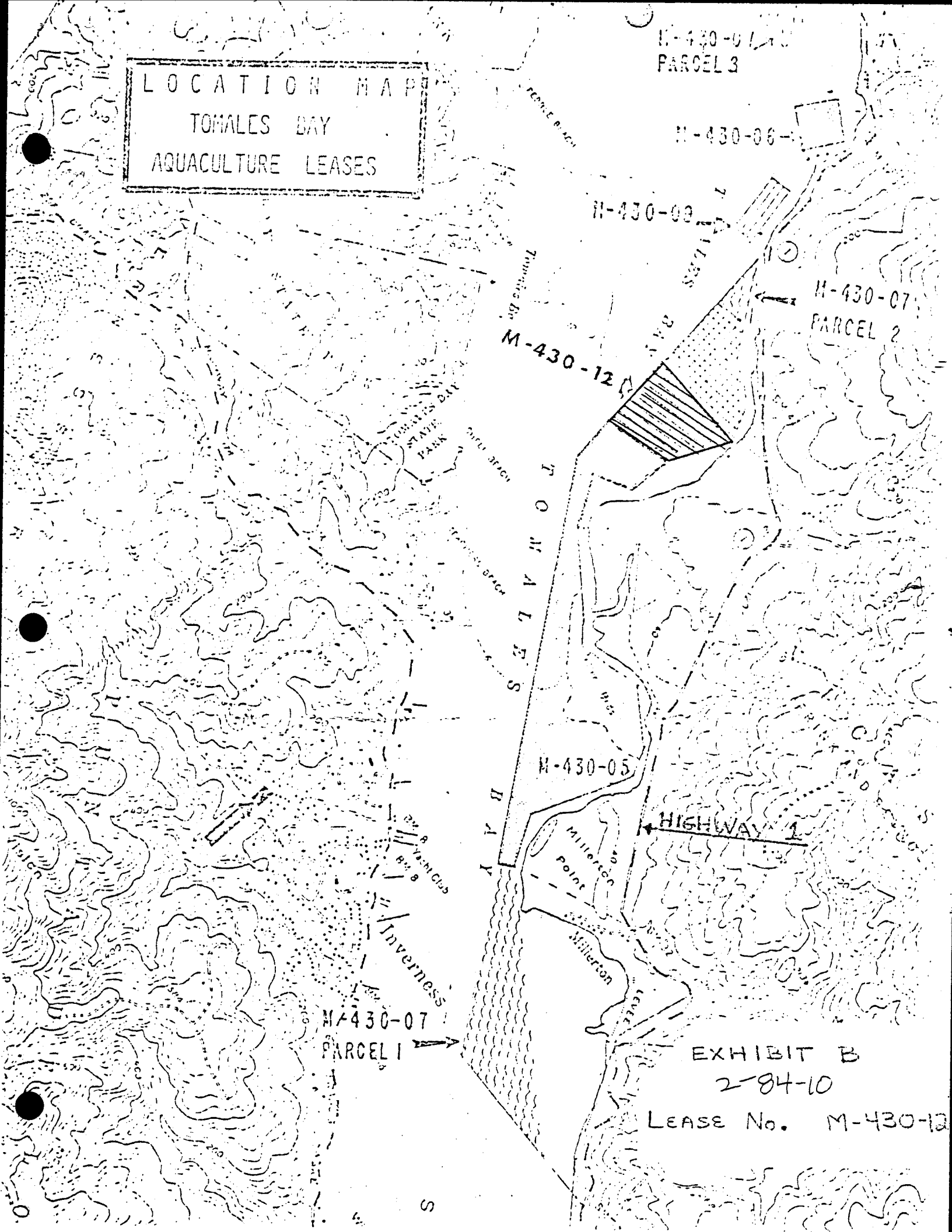


Figure 1.
MARIN COUNTY
UNIT II COASTAL ZONE

— — — coastal zone boundary

federal parklands

EXHIBIT A
• PROJECT LOCATION
2-84-10
INTERTIDAL AQUAFARMS


LOCATION MAP
TOMALES BAY
AQUACULTURE LEASES
M-430-01
PARCEL 3
M-430-06
M-430-08
M-430-07
PARCEL 2
M-430-12
M-430-05
HIGHWAY 1
Millerton Point
Millerton
Inverness
M-430-07
PARCEL 1
EXHIBIT B
2-84-10
LEASE No. M-430-12

The cultivation methods proposed for the lease are currently being used in Tomales Bay and there is no evidence that their continued use in the area of this proposed lease would be either detrimental to the environment, or disruptive to other bay uses.

Recommended Action

The Department of Fish and Game recommends that the commission publish notice of intent to lease the described area to William C. Callahan, Intertidal Aquafarms. Conditions imposed on the lease should include:

1. Rack culture will not be used in waters less than 3 feet deep at MLW (0.0 tidal datum). Racks employed will not extend higher than two feet above the water surface at MLW.

2. Rack modules will be spaced a minimum of 16 feet apart to allow for boat passage at median water levels.

3. Submerged racks will be buoyed in a manner that will allow for the free passage of boats at all stages of the tide.

4. Rafts will be placed offshore of rack modules in a manner that will not prevent passage between the racks and will be suitably marked to prevent hazards to navigation..

Alternatives to the Recommended Action

Alternatives to the recommended action were considered. Each considered alternative and the actions taken are as follows:

Denial of Lease. Failure to grant the lease would deny an approved use of the clean waters of Tomales Bay which are ideal for the cultivation of shellfish. Denial of the lease would preclude a productive use of the bay that extends back at least to 1875.

Reduction in Acreage Requested. The acreage applied for is not considered excessive for the intended purpose. Planting and harvesting requirements established by the commission will determine if the proposed lease will be used in the prescribed manner. If the allotted acreage is not cultivated at the required level, then the lease can be reduced in proportion to the level of cultivation. Therefore, there are no grounds for reducing the acreage applied for.

Denial of Rack or Raft Culture. The use of racks and rafts for cultivation will enable the applicant to utilize the lease more efficiently. The proposed cultivation methods would cause minimal conflict with other uses of the area and would not be highly visible from Highway 1. The denial of rack or raft culture in the proposed location cannot be supported as an appropriate alternative.

Mitigation Measures

No irreversible modification of the environment will r
proposed action; therefore, no mitigation measures are
the county in the form of increased employment and the
shellfish on these state water bottoms, would more tha

to
ity
or

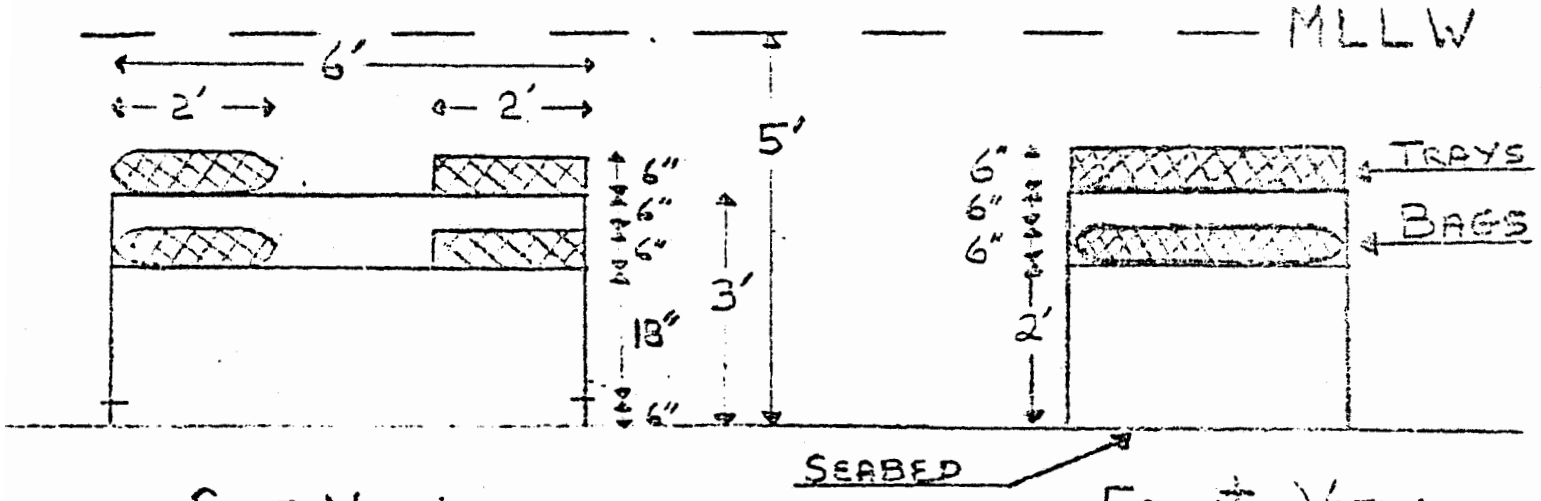
EXHIBIT NO. C
APPLICATION NO. 2-84-10
Fish & Game Restrictions

California Coastal Commission

SECTION VIEW

Bottom Racks with Bags or Trays

Scale 1cm = 1'

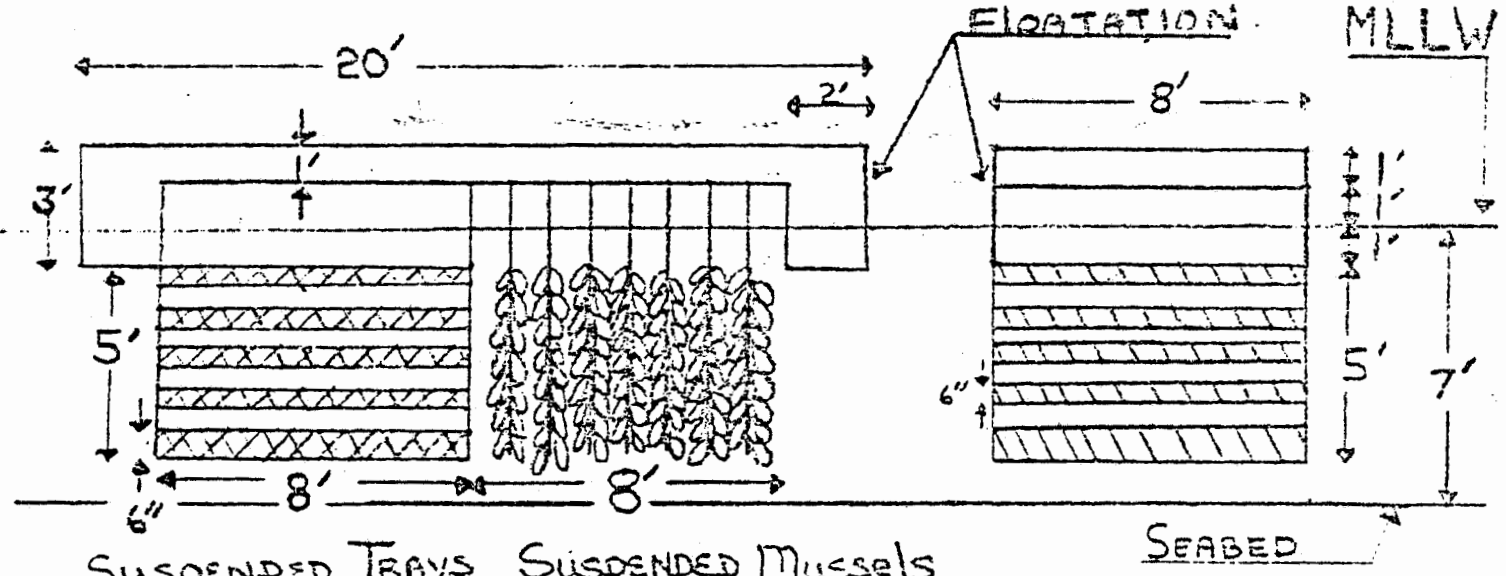


SIDE VIEW

FRONT VIEW

Floating Rafts with Trays and Ropes

Scale 1cm = 2'



Suspended Trays Suspended Mussels

SIDE VIEW

FRONT VIEW

PURPOSE: Commercial Aquaculture

DATUM MEAN LOW LOW WATER U.S.G.S. IN Tomales

ADJACENT PROPERTY OWNERS:

(1) Tomales Bay Oyster Co.

(2) Half Shell Ventures, Inc

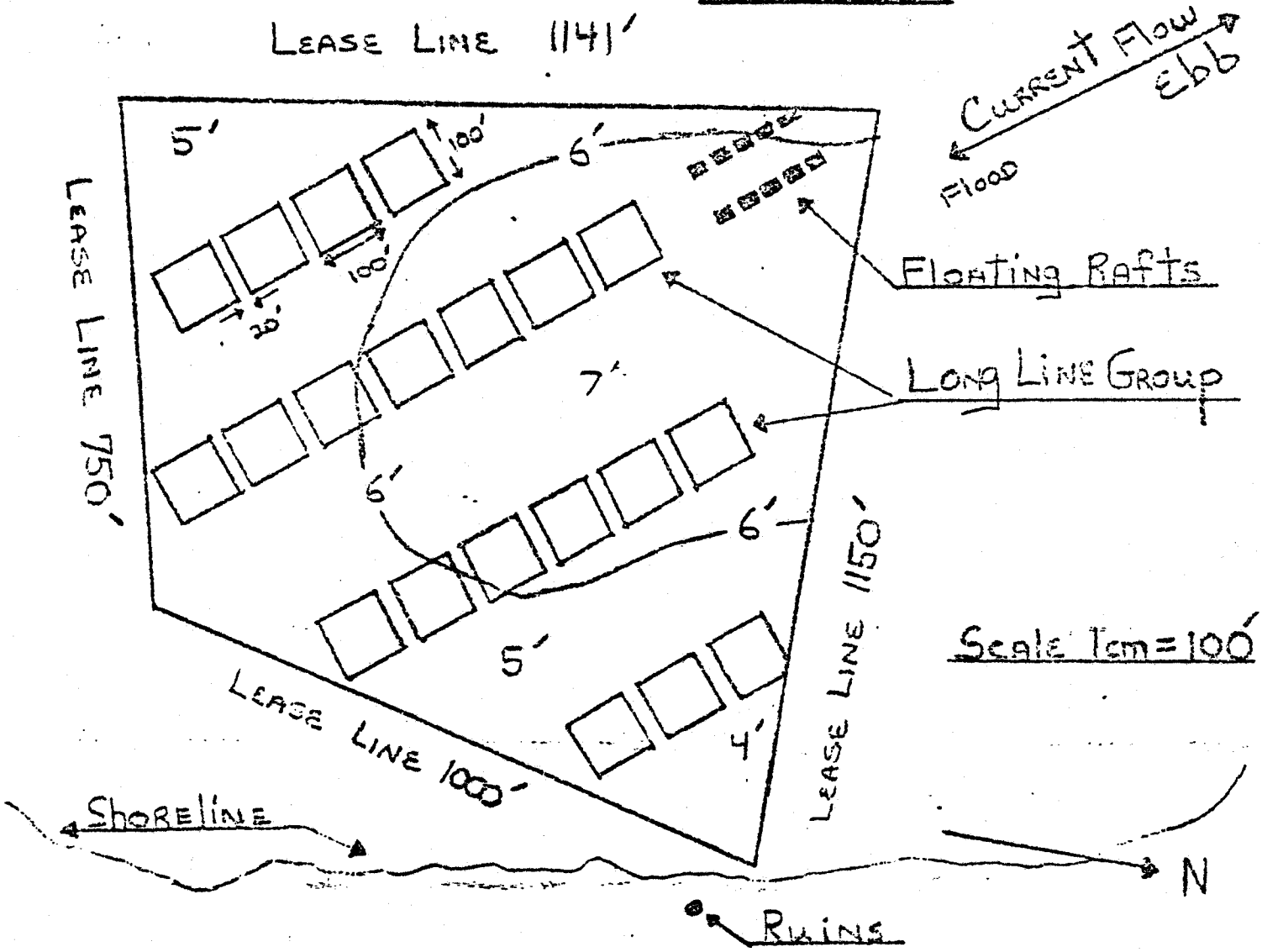
AT - NEAR Mi

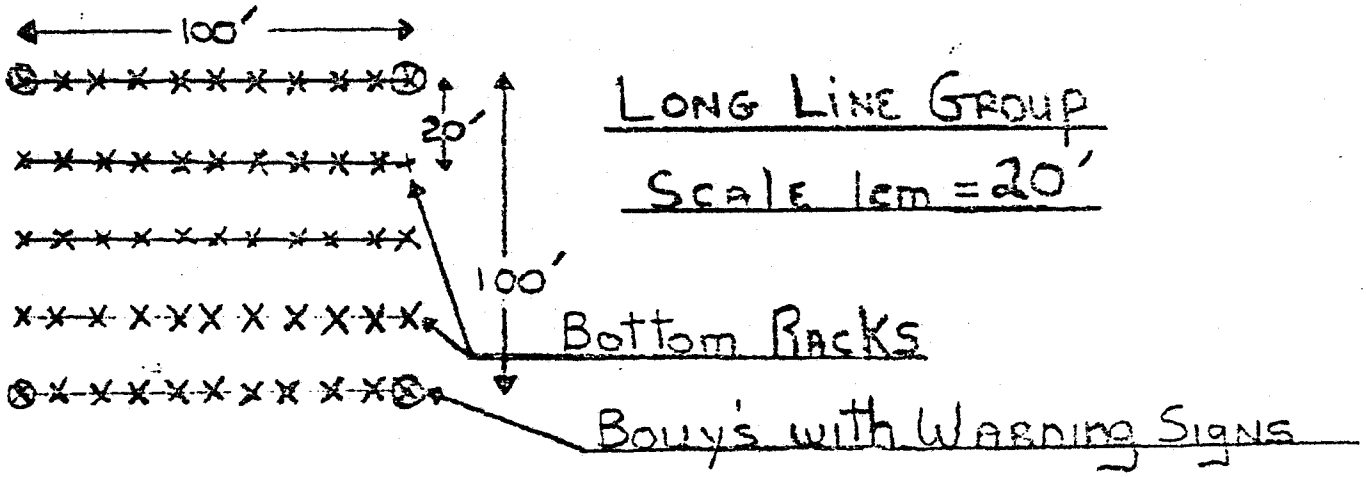
COUNTY OF Mar

APPLICATION BY L

EXHIBIT NO. D
APPLICATION NO. 2-84-10
Callahan/Intertidal
California Coastal Commission

PLAN VIEW





PURPOSE: Commercial Aquaculture
DATUM MEAN LOW LOW WATER U.S.G.S.
ADJACENT PROPERTY OWNERS:
① Tomales Bay Oyster Co
② Half Shell Ventures, Inc.

IN Tom
AT/NEAR
COUNTY OF
APPLICATIO

AN

EXHIBIT NO. E
APPLICATION NO. 2-84-10
Callahan/Intertidal
California Coastal Commission

Documents from CDP No. 1-94-55 for Lease No. M-430-15

NORTH COAST AREA
45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105-2219
(415) 904-5260

PETE WILSON, Governor

Th 6b

Filed:	August 5, 1994
49th Day:	September 23, 1994
180th Day:	February 1, 1995
Staff:	Bill Van Beckum
Staff Report:	September 2, 1994
Hearing Date:	September 15, 1994
Commission Action:	a w/c 8-0 9/15/94 Eureka

STAFF REPORT: CONSENT CALENDAR

APPLICATION NO.: **1-94-55**

APPLICANT: **TOM'S POINT SHELLFISH**

PROJECT LOCATION: In an intertidal and submerged area of Tomales Bay (State Water Bottoms Lease M-430-15) adjacent to Tom's Point, in Marin County

PROJECT DESCRIPTION: Install shellfish cultivation apparatus for aquaculture in a 128.2-acre area leased from the Department of Fish & Game.

LOCAL APPROVALS RECEIVED: None required.

SUBSTANTIVE FILE DOCUMENTS: Marin County LCP, incorporating Department of Fish and Game Negative Declaration for Tomales Bay aquaculture projects.

STAFF RECOMMENDATION

The staff recommends that the Commission adopt the following resolution:

I. Approval with Conditions.

The Commission hereby grants a permit, subject to the conditions below, for the proposed development on the grounds that the development will be in conformity with the provisions of Chapter 3 of the California Coastal Act of 1976, will not prejudice the ability of the local government having jurisdiction over the area to prepare a Local Coastal Program conforming to the provisions of Chapter 3 of the Coastal Act, and will not have any significant adverse impacts on the environment within the meaning of the California Environmental Quality Act.

II. Standard Conditions. See attached.

III. Special Conditions.

1. U.S. Army Corps of Engineers Review.

PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, the applicant shall provide to the Executive Director a copy of a U.S. Army Corps of Engineers permit, letter of permission, or nationwide permit for the project.

2. Protection of Eel Grass.

The applicant shall not cut or disturb any eel grass growing on the bay bottom during the installation or use of the proposed shellfish cultivation apparatus.

3. Removal of Cultivation Apparatus when Lease Terminates.

Within 90 days of termination or abandonment of the subject lease by the applicant or any assignees to this permit, the applicant or assignees shall remove all aquaculture apparatus from the affected lease area.

IV. Findings and Declarations.

The Commission hereby finds and declares as follows:

A. Site Description

The project site consists of an intertidal and submerged parcel off the east shore of Tomales Bay (Exhibits 1-3). This parcel has been leased to the applicant, by the California Department of Fish and Game, for aquaculture purposes.

The lease area, lease No. M-430-15, covers an area of 128.2 acres adjacent to the east side of Tom's Point (Exhibits 2 and 3). This site is the most northerly of Fish and Game's Tomales Bay lease areas, and is approximately a quarter mile northwest of of the site of an earlier Commission permit for aquaculture facilities (Coastal Permit No. 1-93-73, Bay Bottom Beds, Inc., for lease No. M-430-04 for a 61.9-acre site).

The bay bottom at the lease site supports a variety of benthic organisms. In addition, scattered beds of eel grass grow in moderately shallow parts of the lease area (Exhibit 5).

B. Project Description

The applicant proposes to utilize the site for shellfish (bivalve) culture. The California Department of Fish and Game is the responsible agency for allocating and overseeing aquaculture allotments in Tomales Bay, pursuant to provisions of the Fish and Game Code. The lease agreement with the Department of Fish and Game specifies the types of shellfish which may be raised and the

types of cultivation methods that may be used within the lease area. The lease's development plan (Exhibit 4) outlines the types of shellfish proposed to be raised and the associated culture methods.

Exhibit 5 is a plan view of the proposed placement of culture apparatus within the lease area. Exhibits 6 and 7 illustrate and describe the culture methods. Processing and equipment storage will occur at the existing land base for the Hog Island Oyster Company, 3 miles to the south, in Marshall, at 20215 Highway One. No new shoreline support facilities are proposed in this application.

C. Protection of Coastal Waters and Marine Resources.

The intertidal and submerged lands where the aquaculture apparatus will be installed contain a variety of biological resources, including eelgrass habitat and various benthic organisms. The installation of racks, weights, and other shellfish cultivation apparatus could potentially disturb such resources and have other impacts on the marine environment as well. The principal impacts are discussed below.

1. Potential Impacts of Fill on Coastal Waters

a. Effects on Eel Grass

The Marin County Local Coastal Program (LCP) Mariculture Component includes the following discussion on the protection of eelgrass, from the possible effects of aquaculture apparatus practices:

> Under existing law, eelgrass beds are protected from cutting or disturbance, and the Department of Fish and Game has the responsibility for ensuring their protection. According to the Department, mariculture operators whose allotments encompass eelgrass beds can only efficiently operate in the channels and openings within the beds. Their boats and barges are shallow draft and what little vegetation that is clipped soon regenerates. Surveys of eelgrass beds by the Department indicate that oyster culture as practiced in Tomales Bay is not a threat to this vegetation.

b. Effects on Siltation

The following paragraph from the Marin County LCP Mariculture Component discusses the effect of mariculture structures on siltation rates.

> As far as siltation is concerned, the Department of Fish and Game does not anticipate that existing or proposed mariculture structures in Tomales Bay will seriously impede tidal flows or cause excessive siltation. The early use of stingray fences in the Bay caused a greater impediment to flows than existing structures and there is no evidence that these fences, the remains of which can still be seen, caused excessive siltation or scouring of bay bottoms. Dense eelgrass beds

> would be as likely to cause settling of fine silt particles as mariculture structures; however, tidal currents prevent this from happening by maintaining the particles in suspension. Stream-borne sediment, deposited at the mouths of Walker and Lagunitas Creeks, is due to upstream erosion in the watershed, not to mariculture structures in the path of the flow.

c. Apparatus Hazards

Abandoned, unmaintained culture apparatus could create not only a safety hazard, to boaters, if it became dislodged or broken apart during a storm, but could also, under the same circumstances, make its way into sensitive habitat areas in and along the bay.

2. Coastal Act Resource Protection Policies

Coastal Act Section 30411(c) notes that:

> 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 ... The Department of Fish and Game may identify sites it determines to be appropriate for aquaculture facilities..... it shall transmit information identifying the sites to the Commission and the relevant local government agency.

Consistent with Section 30411(c), the certified Marin County LCP "Mariculture Component" describes the areas within Tomales Bay that have been designated by the Department of Fish and Game as suitable for aquaculture leases. Another section of the Coastal Act, Section 30411(a), points out that the Department of Fish and Game and the Fish and Game Commission are the principal state agencies responsible for the establishment and control of wildlife and fishery management programs. However, the Coastal Act also requires, in Section 30411(c), that:

> The Commission, and where appropriate, local governments shall ... provide for as many coastal sites identified by the Department of Fish and Game for any uses that are consistent with the policies of Chapter 3 ... of this division.

Aquaculture projects are therefore subject not only to requirements of the Fish and Game Code but to separate Coastal Act requirements. The Coastal Commission, to approve any aquaculture project, such as proposed in this application for development in designated aquaculture lease areas, must find the project consistent with Chapter 3 policies, discussed below, that relate to marine environment uses.

A number of Coastal Act policies address the protection of marine environments from the impacts of aquaculture operations. Section 30230 provides, in part, that "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 ... purposes." Coastal Act Section 30233(a) allows the placement of structures or other fill in coastal waters, wetlands, and estuaries, but only where the project is limited to one of eight specified uses, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects. Section 30108.2 of the Coastal Act defines "fill" as any "substance or material ... placed in a submerged area." Therefore, the floating or submerged apparatus associated with the various culture methods, including the various anchoring devices to be used, constitute "fill."

3. Permissible Use for Fill

The proposed project qualifies under Section 30233(a) as a permissible use for fill in coastal waters. The proposed use, aquaculture, is a "resource dependent" use, that is, one that in order to function at all depends on resources available in the bay's waters. Fill for aquaculture is permissible specifically under Section 30233(a)(8).

4. Alternatives

As noted above, Section 30233(a) does not allow fill in coastal waters when there are feasible less environmentally damaging alternatives. No such alternatives exist for the proposed project.

To perform its function of cultivating shellfish, the proposed fill must be located in coastal waters. There is no feasible upland alternative for the proposed use.

The Department of Fish and Game considered alternative locations within Tomales Bay when determining which sites to lease for aquaculture. A primary consideration in drawing the boundaries of the lease areas was the avoidance of the bay's larger masses of eel grass. Because of the ubiquitous nature of small, scattered eel grass beds in moderately shallow parts of Tomales Bay, however, the presence of some eel grass within the lease areas is unavoidable. In any event, the applicant has no alternative for locating the aquaculture structures in any areas other than those designated by the Department of Fish and Game.

5. Sustaining Biological Productivity and Providing Feasible Mitigation

The California Fish and Game Code includes various requirements pertaining to the designation of aquaculture lease areas that relate to the protection of marine organisms. For example, included in the lease agreement that is the subject of this permit application are prohibitions against disposing of any wastes within the lease area. The lease agreement also requires the applicant's participation in monitoring programs relating to Tomales Bay sedimentation and wintering shorebirds.

Concerns have been raised that (a) the results of the monitoring program should be known before the lease area is developed, and (b) the proposed project might compromise any control area for the study. The monitoring programs, coordinated by the Department of Fish and Game, do not contain any provisions that would require final analysis of the sedimentation and bird studies prior to developing the lease area as proposed in this application. In addition the Department of Fish and Game staff, in discussions and correspondence with Commission staff, has not expressed concerns that lease development might compromise any control area for the study.

While Department of Fish and Game lease agreements for Tomales Bay aquaculture contain no specific restrictions requiring minimum distances between mariculture apparatus and eel grass beds, the agreements require that "no eel grass.... shall be cut or disturbed." The lease agreements also require each lessee to participate in a program "monitoring the health of eelgrass beds located on the lease." This requirement and the other lease agreement provisions noted above are intended to ensure that the project will not contribute over time to any significant adverse change in the Tomales Bay ecosystem. Compliance with these provisions to protect the marine environment is required for the leases to be kept active; Section L of the subject lease agreement provides in part that:

> If any of the environmental monitoring programs discussed above indicate, or any other reliable information leads the Lessor to conclude that Lessee's aquaculture operation is directly associated with a significant adverse change in the Tomales Bay ecosystem, Lessor shall notify the Executive Director of the Fish and Game Commission and the Lessee of such findings. Upon receipt of notice, Lessee shall take all necessary steps to modify, relocate or discontinue the operation in accordance with the Lessor's advice, unless Lessee demonstrates that its aquaculture operations are not a substantial factor, directly or cumulatively, causing the adverse environmental change. Failure to promptly respond shall be grounds for termination of the lease.

Section D of the lease agreement delineates the grounds by which the lease may be terminated should the culture apparatus fall into a state of disrepair, and furthermore requires an escrow deposit "as a financial guarantee of growing structure removal and/or clean-up expense in the event a lease is abandoned or otherwise terminated."

Section D. of the lease agreements further provides that:

> If Lessee abandons this lease without removing growing structures therefrom, the escrow deposit shall be expended to remove growing structures, or otherwise clean, or in the alternative, the remaining lessees in Tomales Bay and the Tomales Bay Shellfish Growers Association may undertake the clean-up leaving the secured amount whole.

As long as the project is carried out as specified in the application materials, which include the already signed lease agreement, the project will

be consistent with the marine environment protection policies of Coastal Act Sections 30230 and will provide feasible mitigation measures to minimize adverse environmental effects consistent with Section 30233. To ensure that the project is carried out according to the intent of the lease agreement's protection provisions, the Commission attaches Special Condition No. 2 which incorporates the lease's prohibitions on eel grass cutting and disturbance and also specifies that the prohibition is applicable at all times of project implementation, i.e., during cultivation apparatus installation and use. In addition, the Commission attaches Special Condition No. 3, which requires the removal of all culture apparatus within 90 days of lease termination or abandonment. Special Condition No. 3 will allow sufficient time for apparatus removal yet ensure that the time that any unmaintained and potentially environmentally damaging or hazardous apparatus remains in the bay is minimized.

6. Conclusion to Finding C

The Commission finds that as conditioned to ensure that the project is carried out in accordance with the protective provisions of the Fish and Game lease agreement, the proposed project is consistent with Sections 30230 and 30233. As discussed above, the project satisfies the three tests set forth by Section 30233(a) for any project involving the filling of coastal waters to be permitted. The project is a resource dependent allowable use, it is located in the best locations to minimize impacts on Tomales Bay eel grass beds and, there are no feasible less environmetally damaging alternatives, and as conditioned, provides adequate mitigation measures to protect eel grass populations within the lease area and other sensitive habitats within the marine environment. With these protections, the project will be carried out in a manner that will sustain the biological productivity of coastal waters and will maintain healthy populations of marine organisms adequate for long term commercial purposes consistent with Section 30230.

D. Visual Resources

Section 30251 of the Coastal Act provides in part that:

> "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 ... (and) to be visually compatible with the character of surrounding areas."

The subject lease area is visible from various public vantage points along the east shore of Tomales Bay. The visibility of each proposed aquaculture apparatus will vary, depending on the distance the apparatus is from the shore, the kind of apparatus, and the stage of the tide. For example, at periods of very low tides, normally submerged apparatus would be exposed and could be visible. Despite their visibility, the aquaculture apparatus should not adversely affect visual resources. The layouts and types of apparatus that are proposed are not unlike those normally used in any modern aquaculture

activities. The Marin County Local Coastal Program provides a general description of visual impacts of aquaculture activities on the landscape that helps put the situation in perspective:

> Though not invisible, mariculture structures can be viewed as part of the local color of Tomales Bay and tangible evidence that the Bay is being used for the beneficial use of producing food. Similar structures have been used in Drake's Estero, in the middle of the National seashore, for many years and have been favorably received by the public.

Whatever a visitor's visual perception of aquaculture apparatus in Drakes Estero may be, the experience of viewing similar apparatus in Tomales Bay is apt to be different because of the different uses of the two areas. Although Drakes Estero does contain some limited oyster farming operations, the Estero essentially is a mostly undeveloped passive recreation area. Tomales Bay, on the other hand, is the setting for not just recreation and oyster farming operations, but a variety of commercial fishing and boating activities in and on its waters. An aquaculture operation may be more in character with the more intensive uses being made of Tomales Bay. Therefore, the Commission finds that the proposed development is consistent with Coastal Act Section 30251 as the proposed shellfish apparatus is consistent with the visual character of the area and the structures will not adversely affect views to and along the coast.

E. U.S. Army Corps of Engineers Review.

The project requires review and approval by the U.S. Army Corps of Engineers. Pursuant to the Federal Coastal Zone Management Act, any permit issued by a federal agency for activities that affect the coastal zone must be consistent with the coastal zone management program for that state. Under agreements between the Coastal Commission and the U.S. Army Corps of Engineers, the Corps will not issue a permit until the Coastal Commission approves a federal consistency certification for the project or approves a permit. To ensure that the project ultimately approved by the Corps is the same as the project authorized herein, the Commission attaches Special Condition No. 1 which requires the permittee to submit to the Executive Director evidence of U.S. Army Corps of Engineers approval of the project prior to the commencement of work.

F. Public Access

Section 30211 of the Coastal Act requires that development not interfere with the public's right to access gained by use or legislative authorization. In applying Section 30211 the Commission is limited by the need to show that any denial of a permit application based on this section or any decision to grant a permit subject to special conditions requiring public access is necessary to avoid or offset a project's adverse impact on existing or potential access.

No part of the proposed project includes development on land. Boat access to the lease areas is available at an existing land base in Marshall. No public

recreational access that could potentially be affected by the project exists at the land base. The project will not create any additional demand for public access, as the aquaculture operations will not bring large numbers of new residents, workers, or visitors to the site who would use public access facilities, nor will it decrease the availability of nearby access in any way. The Commission therefore finds that the project is consistent with the Commission's coastal access policies.

Furthermore, even if the project did include land-based facilities, such land uses would receive a high-priority under Coastal Act Section 30222.5. That policy directs that aquaculture facilities receive high priority in land use planning, higher than all uses except other coastal dependent developments or uses.

G. Marin County Local Coastal Program

Marin County's Local Coastal Program (LCP), which includes a "Mariculture Component" that incorporates the Department of Fish and Game Negative Declaration for Tomales Bay aquaculture projects, was certified by the Commission in 1982. The LCP defines "mariculture" as "the term used to describe saltwater or marine aquaculture" and uses the term throughout the Mariculture Component "since all aquaculture in Marin's coastal zone occurs in saltwater."

The proposed project conforms to the LCP Mariculture Component's "general policy" that states in part:

> The County of Marin supports and encourages mariculture in its coastal zone for the purposes of producing food ... and contributing to the State's economy. This policy recognizes, however, that the need for mariculture sites in coastal waters must be balanced with the need to provide for other uses, such as commercial fishing, recreational clamming and boating, and the need to protect coastal wildlife, water, and visual resources.

The Mariculture Component also contains provisions that relate specifically to Tomales Bay, such as a provision limiting the total acreage designated for mariculture to 900 acres (11.6% of the Bay's 7,760 acres of water surface). This figure recognized the 819 acres of allotments that existed in 1979, leaving a maximum of 81 acres for new allotments. The LCP also places a 5-acre maximum size limit for new "allotments and leases considered for development in a coastal permit," except for the 819 acres of "allotments and leases in existence at the time of LCP adoption." The Department of Fish and Game, the agency administering mariculture leases within Tomales Bay, considers the 128.2-acre lease area that is the site of the current permit application to be part of the 819 acres unaffected by the LCP 5-acre size limitations. The Commissiion finds that the project is consistent with the intent of the LCP to support mariculture on state tidelands in Tomales Bay, where LCP policies are advisory rather than binding.

The requirements of other LCP mariculture policies, relating, e.g., to protecting eelgrass beds and to marking structures for boating safety, are satisfactorily addressed by terms and conditions contained in the actual lease agreements that have been entered into by the applicant and the Department of Fish and Game.

H. California Environmental Quality Act (CEQA)

The proposed project as conditioned will not contribute to any significant adverse change in the Tomales Bay ecosystem, and will not have a significant adverse effect on the environment within the meaning of CEQA.

Attached Exhibits

1. Regional Location Map
2.-3. Lease/Project Site
4. Development Plan
5. Project Plan View
6.-7.. Culture Apparatus Types

BVB/ltc/bvb
7328p

ATTACHMENT A

Standard Conditions

1. Notice of Receipt and Acknowledgment. The permit is not valid and development shall not commence until a copy of the permit, signed by the permittee or authorized agent, acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.

2. Expiration. If development has not commenced, the permit will expire two years from the date on which the Commission voted on the application. Development shall be pursued in a diligent manner and completed in a reasonable period of time. Application for extension of the permit must be made prior to the expiration date.

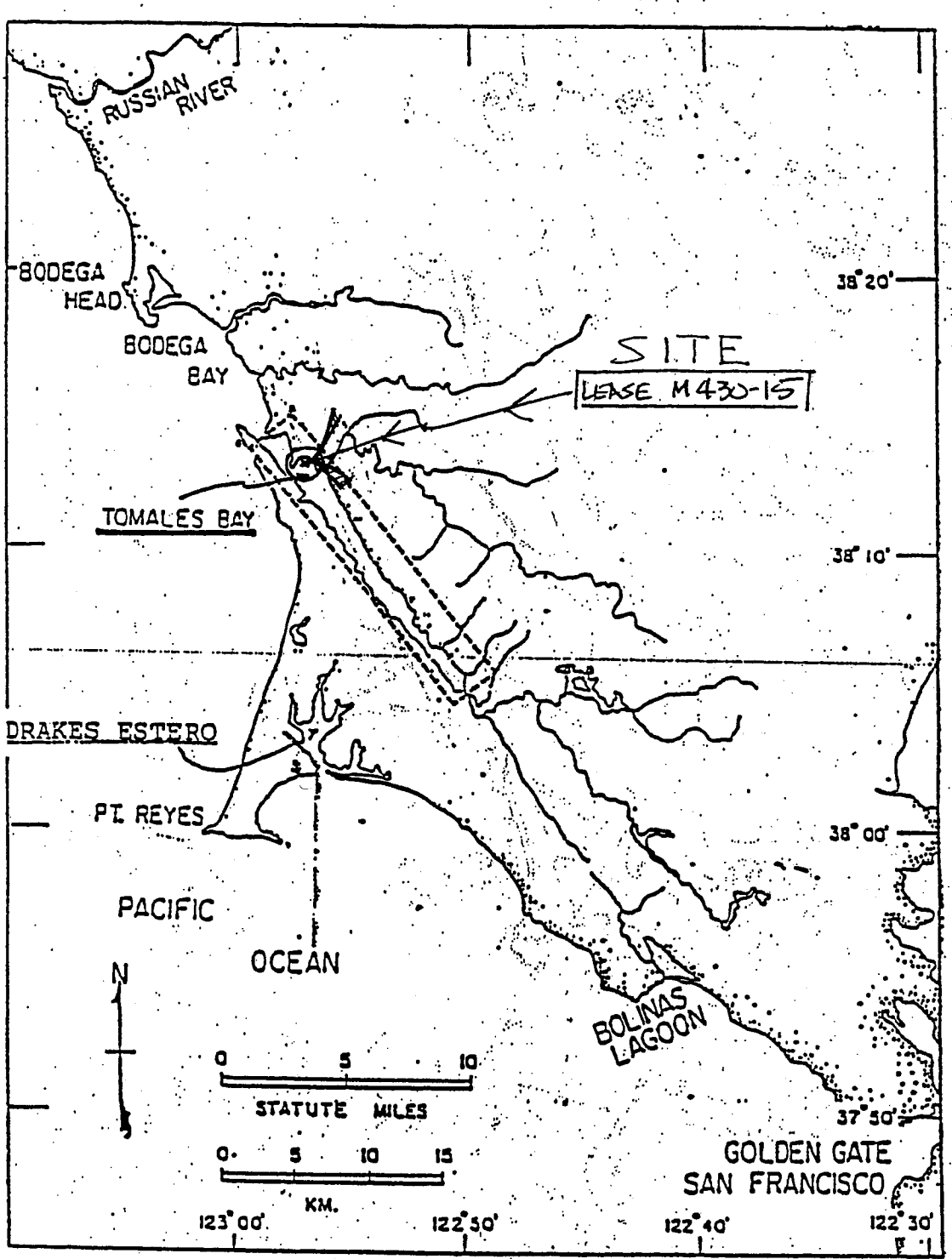
3. Compliance. All development must occur in strict compliance with the proposal as set forth in the application for permit, subject to any special conditions set forth below. Any deviation from the approved plans must be reviewed and approved by the staff and may require Commission approval.

4. Interpretation. Any questions of intent of interpretation of any condition will be resolved by the Executive Director or the Commission.

5. Inspections. The Commission staff shall be allowed to inspect the site and the development during construction, subject to 24-hour advance notice.

6. Assignment. The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.

7. Terms and Conditions Run with the Land. These terms and conditions shall be perpetual, and it is the intention of the Commission and the permittee to bind all future owners and possessors of the subject property to the terms and conditions.



Location of Tomales Bay in western Marin County.

EXHIBIT NO. 1
APPLICATION NO. 1-94-55 TOM'S POINT SHELLFISH
Regional Location
California Coastal Commission

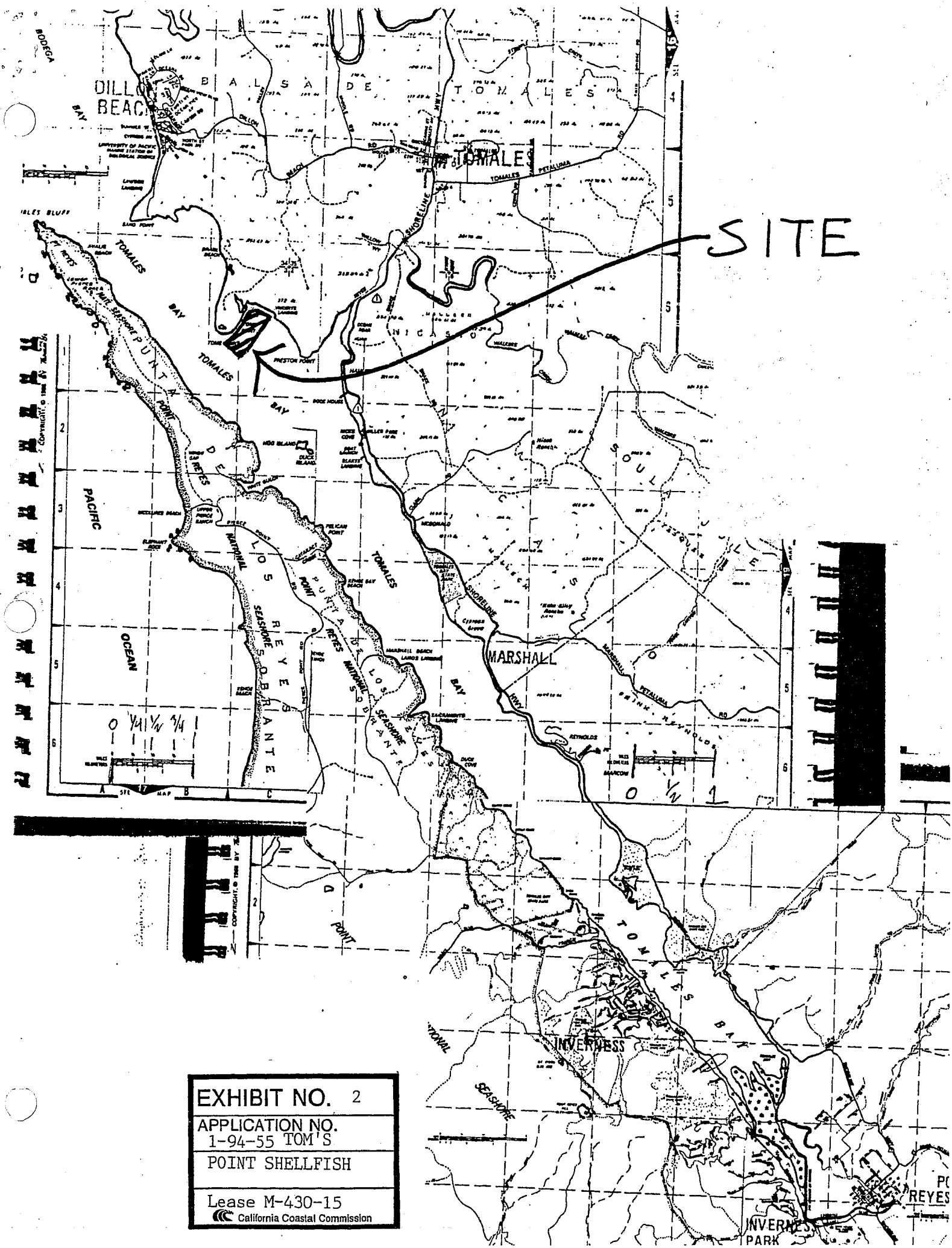


EXHIBIT NO. 2

APPLICATION NO. 1-94-55 TOM'S

POINT SHELLFISH

Lease M-430-15

California Coastal Commission

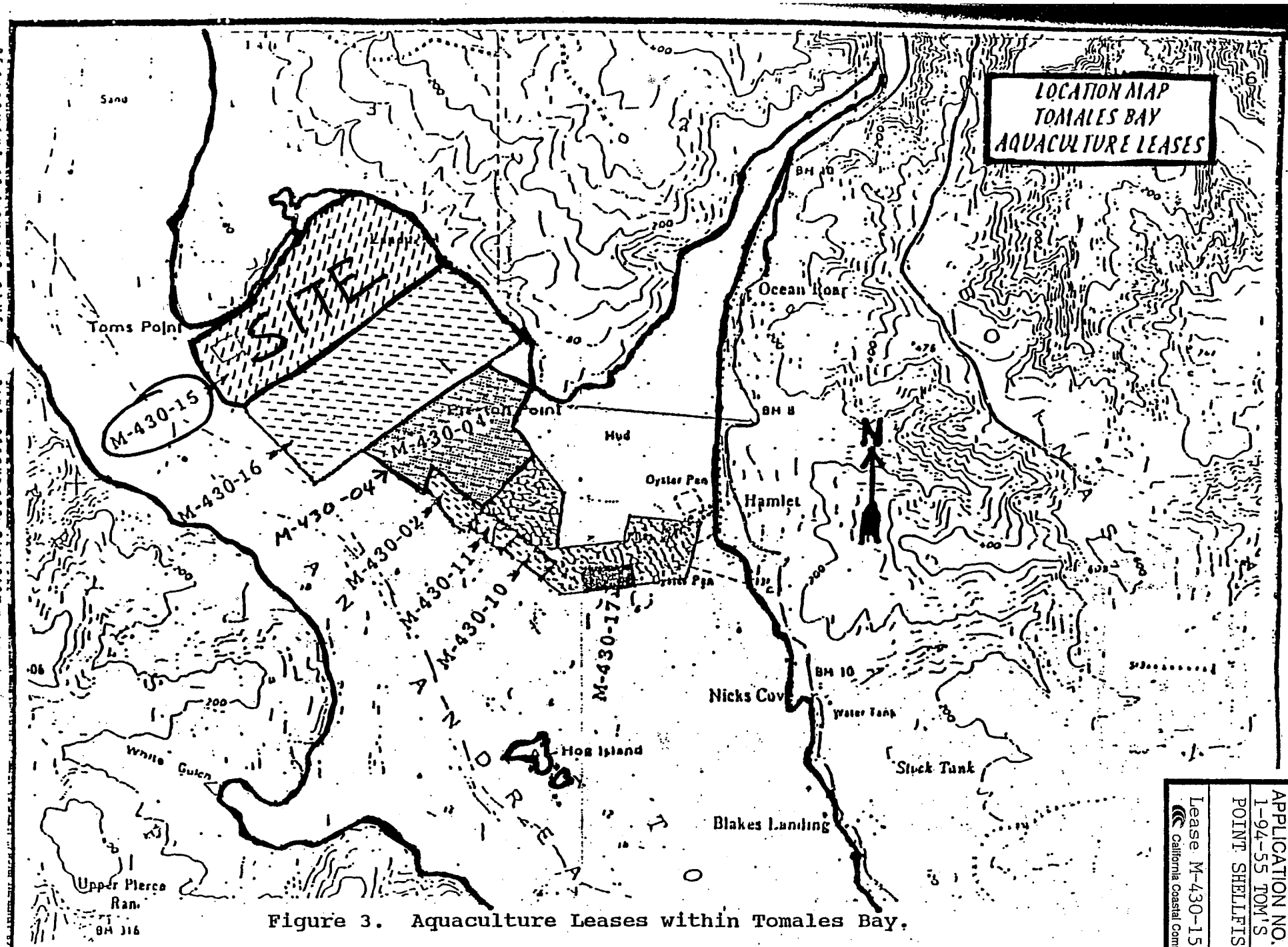


Figure 3. Aquaculture Leases within Tomales Bay.

Development Plan For State of California
Waterbottom Lease M 430-15

The objective of this project is to develop lease M 430-15 for the culture of shellfish (oysters, clams, mussels, abalone). Seed purchased from commercial sources would be grown to marrket size using off - bottom and on - bottom methods.

State lease M 430-15 is approximately 128 acres in area. The water depth over most of the lease is less than 5 feet below MLLW. Several deeper channels exist on the western portion of the lease. Eelgrass beds cover approximately 50% of the lease, predominently the southeast portions. No structures would be placed in or within 5 feet of any eelgrass beds currently existing on the lease.

Most of the culture methods proposed are already in use on state lease 430-10 & 430-11, leased by Hog Island Oyster Company (HIOC). Processing and equipment storage shall occur at the existing land base for HIOC, 3 miles to the south, at 20215 HWY 1, Marshall.

Descriptions of the proposed culture methods are as follows:

Oysters will be grown on - bottom and off - bottom. On - bottom culture will take place between 0.0' & 1,0' above MLLW. Oysters will be grown in black plastic mesh bags, approximately 2'x3' in size. About 50 bags would be tied onto 1/4" rope secured on the mudflats. Bags would be spaced alternately side by side to allow for water circulation (fig. 1). Spacing between lines (ropes) would be 8' & 16' alternately (fig. 1). Off - bottom culture would consist of 4 - 5 bags plastic mesh bags attached to 4'x8' re-bar frames. These frames would be supported 1' - 2' above the mudflat by (4) 2" PVC pipe legs (fig. 2). Racks would be placed in areas that are exposed at -0.5' to 1.0' in tidal height. Racks would be placed with their long axis perpendicular to the prevailing N/W winds in rows that are parallel to this direction (fig. 3). Rows would vary in length from 20 to 60 racks. Spacing would be 2.5' between racks and 3' & 12' alternately between rows (fig. 3). Major groups (100 - 400 racks) would be separated by a minimum of 50'. During harvest the re-bar frames are lifted off leaving only PVC pipe legs. Areas are typically left fallow after harvests for 2 to 6 months.

Clams will be grown on - bottom in black plastic mesh bags measuring 3'x1.5'x4"H. Bags will be placed in groups of 40, consisting of 2 rows side by side 20 bags each. Rows would be oriented parralel or perpendicular to the shoreline, depending on bottom topography. Groups of clam bags would be placed on the bottom between 0.5' & 1.5' above MLLW. Spaces of .5' to the sides and ends would exist between all groups (fig 4). Growth time would be approximately 1 1/2 years and areas would be left fallow approximately 6 months before planting another group. A small number of rafts and /or longlines would be used for mussel and abalone culture in the deeper areas of the lease (site plan). Rafts would be constructed of wood, polyethylene, polypropylene, and /or PVC plastic. Mussel rafts would be approximately 20'Lx8'W with mussels suspended below on 4' to 8' ropes (fig. 5). Abalone rafts would be approximately 4'Lx3'Wx3' deep (fig. 6). Approximately 10 rafts would be used at maximum build - out. Long - lines, if used instead of rafts, would approximate specifications detailed in fig. 7.

The lease would be delineated by corner posts extending 10' above MLLW, or buoys. As shown on the plan view, at maximum development, there would be approximately 2 groups of oyster racks, 5 groups of clam bags/oyster bags, and 10 rafts/long lines. Maximum development of the lease should take around three years from commencement of work. No structures would be permanantly fastened to the seafloor and would be removed if the lease is abandoned for any reason.

EXHIBIT NO. 4
APPLICATION NO.
1-94-55 TOM'S
POINT SHELLFISH
Development Plan

California Coastal Commission

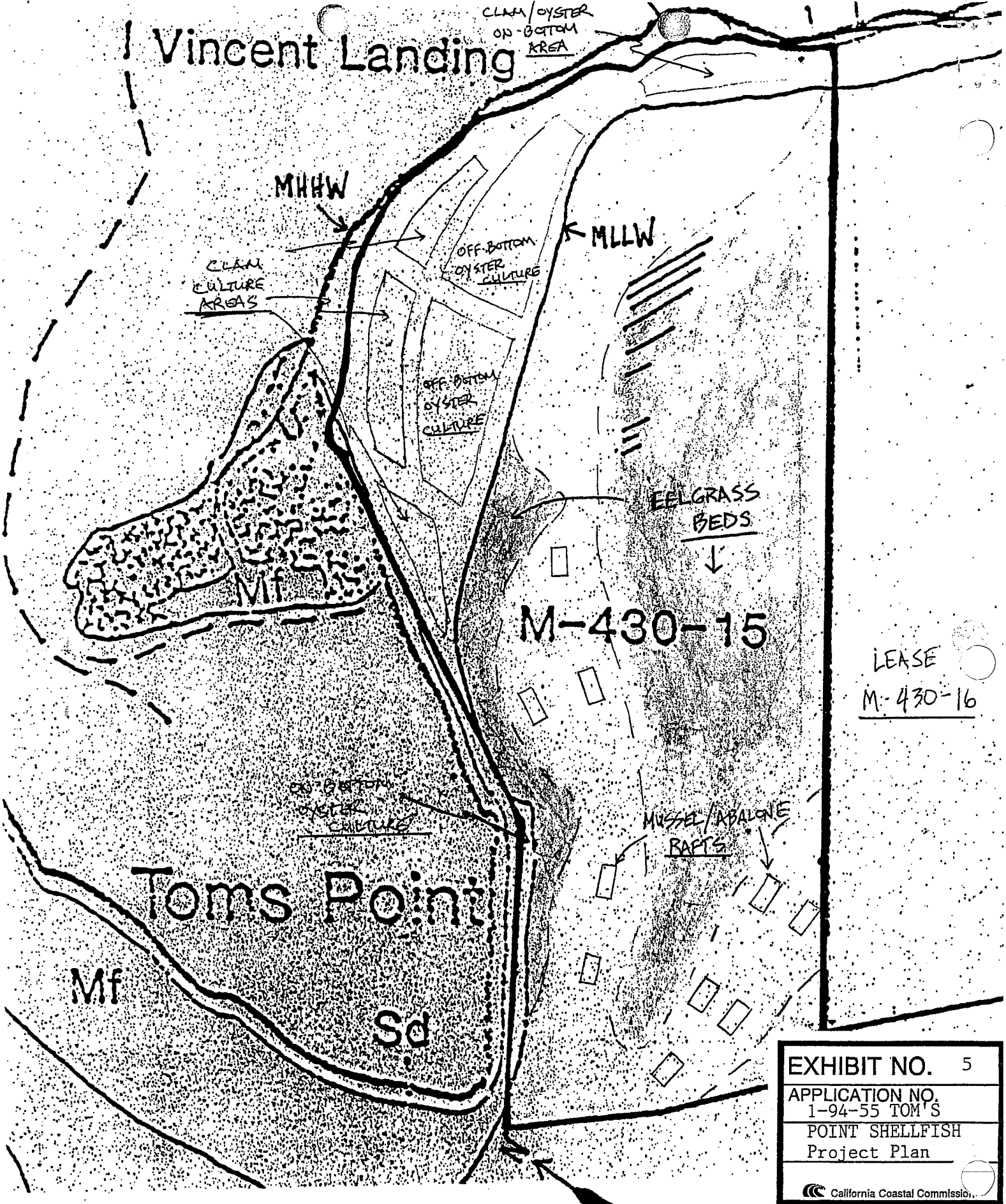


EXHIBIT NO. 5

APPLICATION NO. 1-94-55 TOM'S POINT SHELLFISH Project Plan

California Coastal Commission

SITE PLAN - PROPOSED DEVELOPMENT PLAN FOR STATE AQUACULTURE LEASE M 430-15

1 PLAN VIEW - OYSTER BOTTOM CULTURE
1/8" = 1'0"

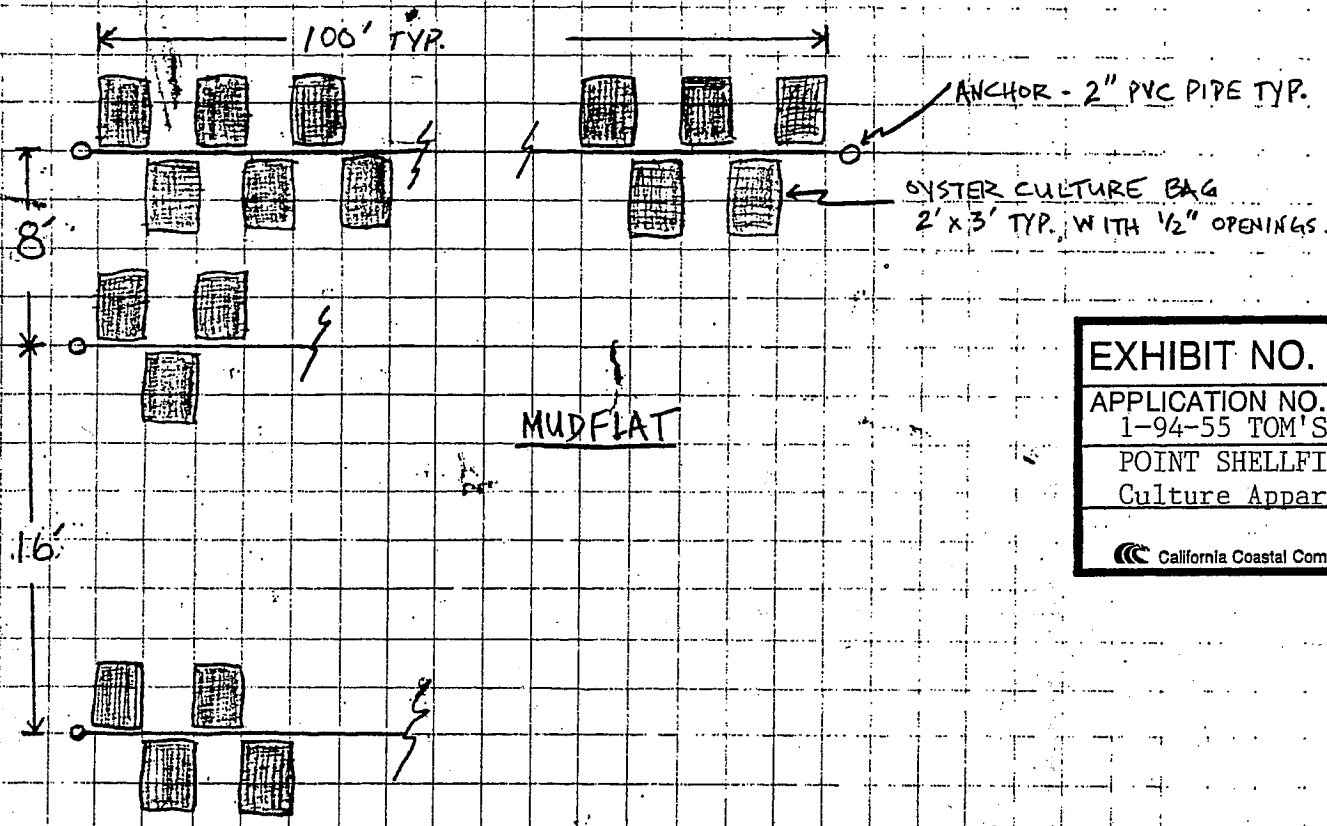
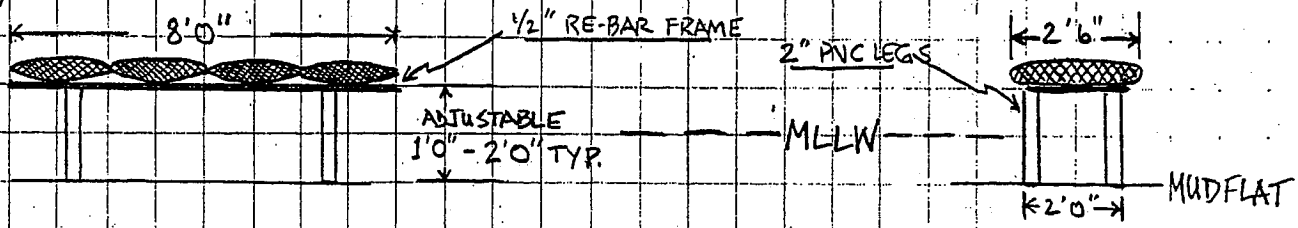


EXHIBIT NO. 6
APPLICATION NO. 1-94-55 TOM'S
POINT SHELLFISH Culture Apparatus
California Coastal Commission

2 SIDE ELEVATIONS - OYSTER OFF-BOTTOM CULTURE 1/4" = 1'0"



3 PLAN VIEW - OYSTER OFF-BOTTOM CULTURE 1/8" = 1'0"

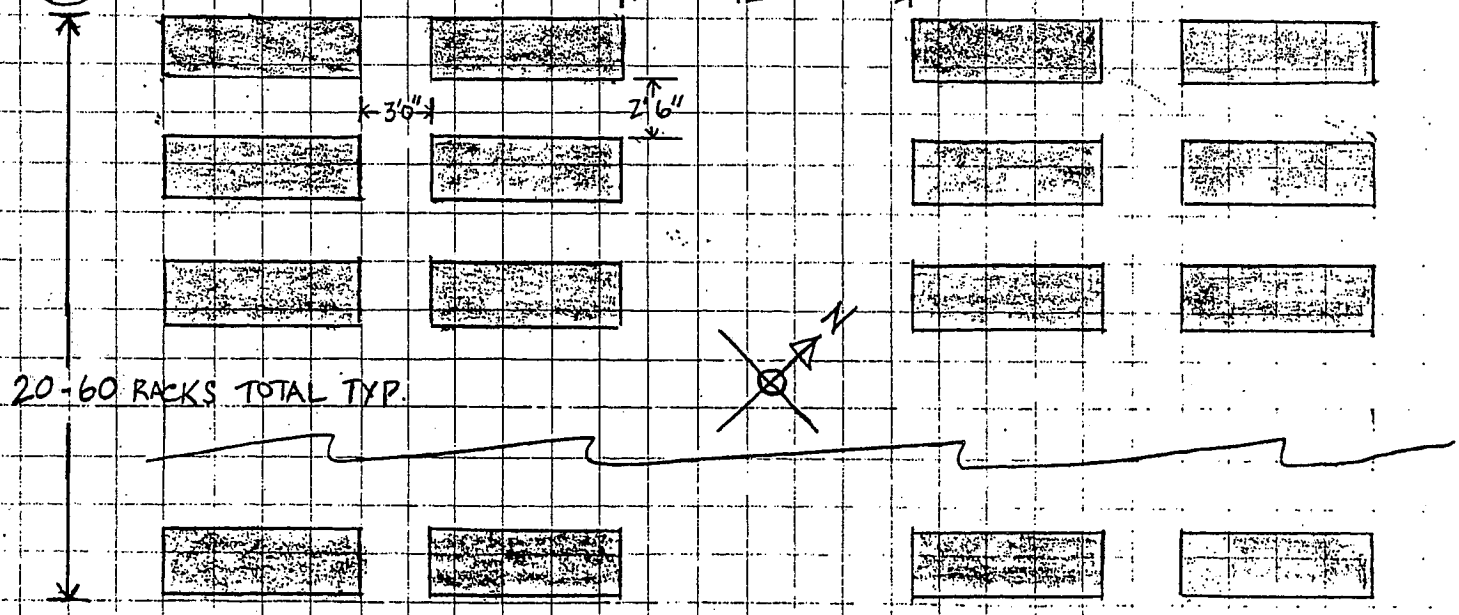
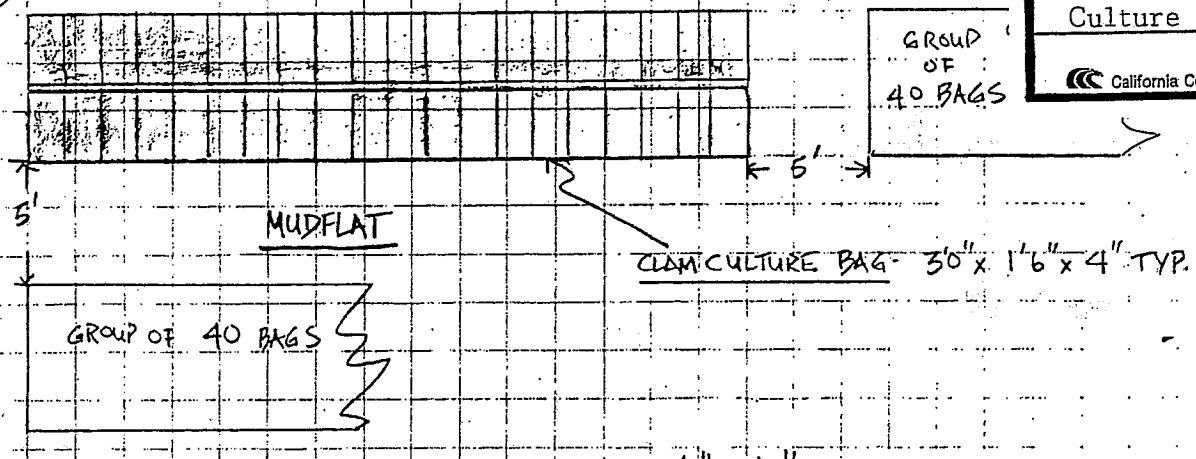


EXHIBIT NO. 7
APPLICATION NO. 1-94-55 TOM'S POINT SHELLFISH Culture Appara[illegible]s
California Coastal Commis

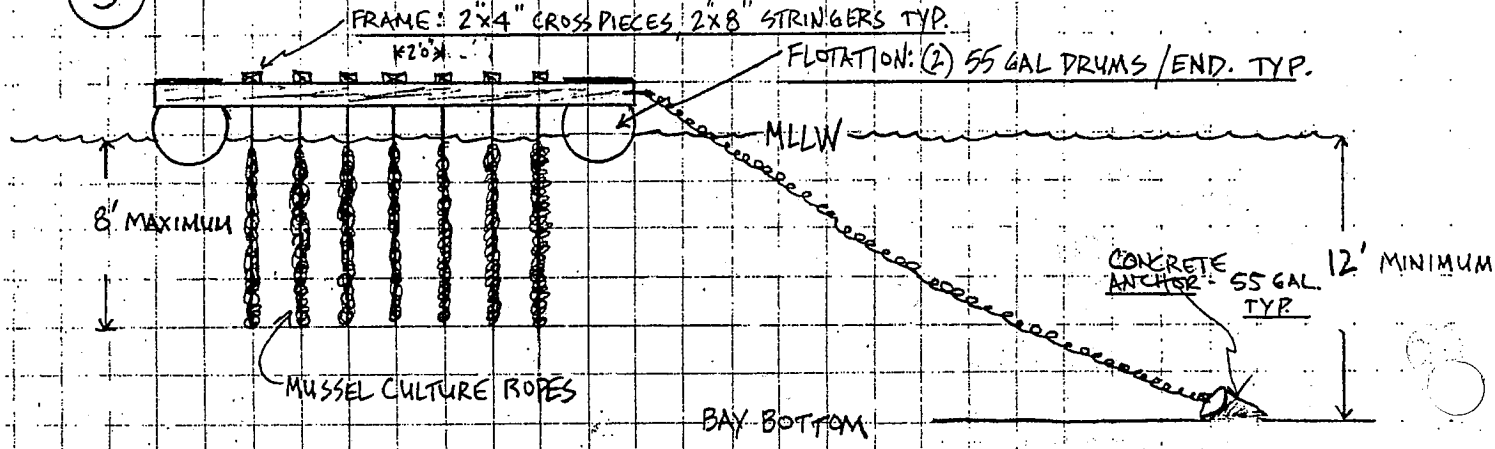
4 PLAN VIEW - CLAM BOTTOM CULTURE

1/8" = 1'0"



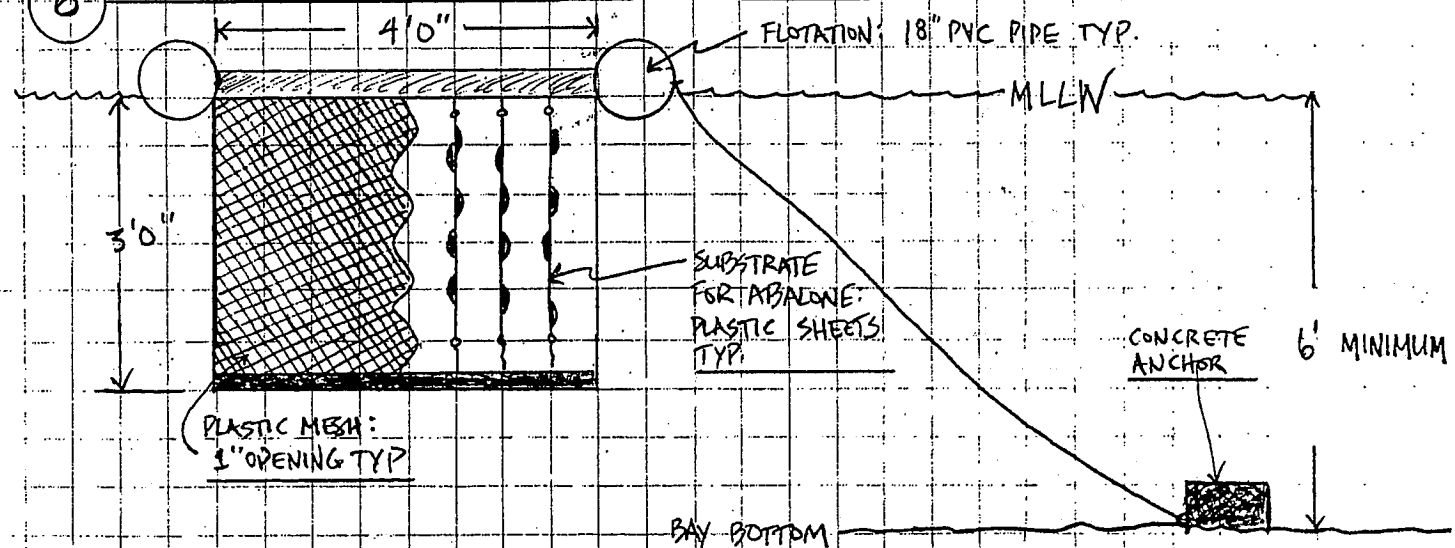
5 SIDE ELEVATION - MUSSEL RAFT

1/4" - 1'0"



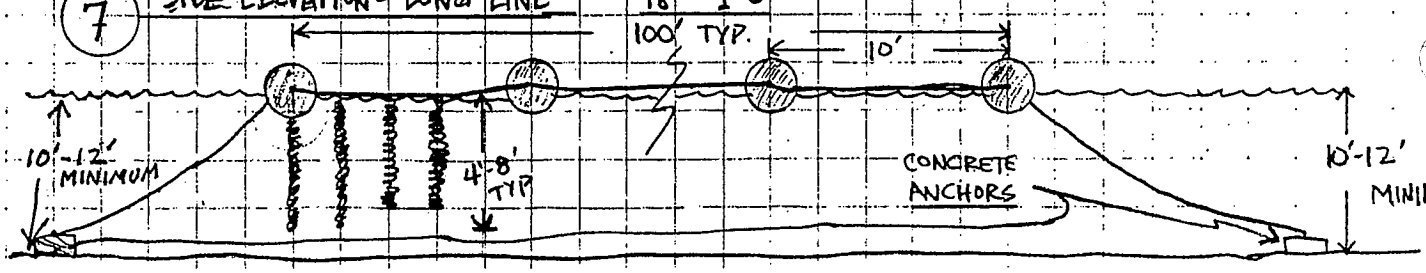
6 SIDE ELEVATION - ABALONE RAFT

1/2" = 1'0"



7 SIDE ELEVATION - LONG LINE

1/8" = 1'0"



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2-81-40-A1; 2-84-2-A1; 2-84-10-A1; 1-94-55-A1

(HOG ISLAND OYSTER COMPANY)

FEBRUARY 8, 2019

EXHIBITS

Table of Contents

EXHIBIT 1 - Project Area and Location of State Water Bottom Leases (page 1 of 1)

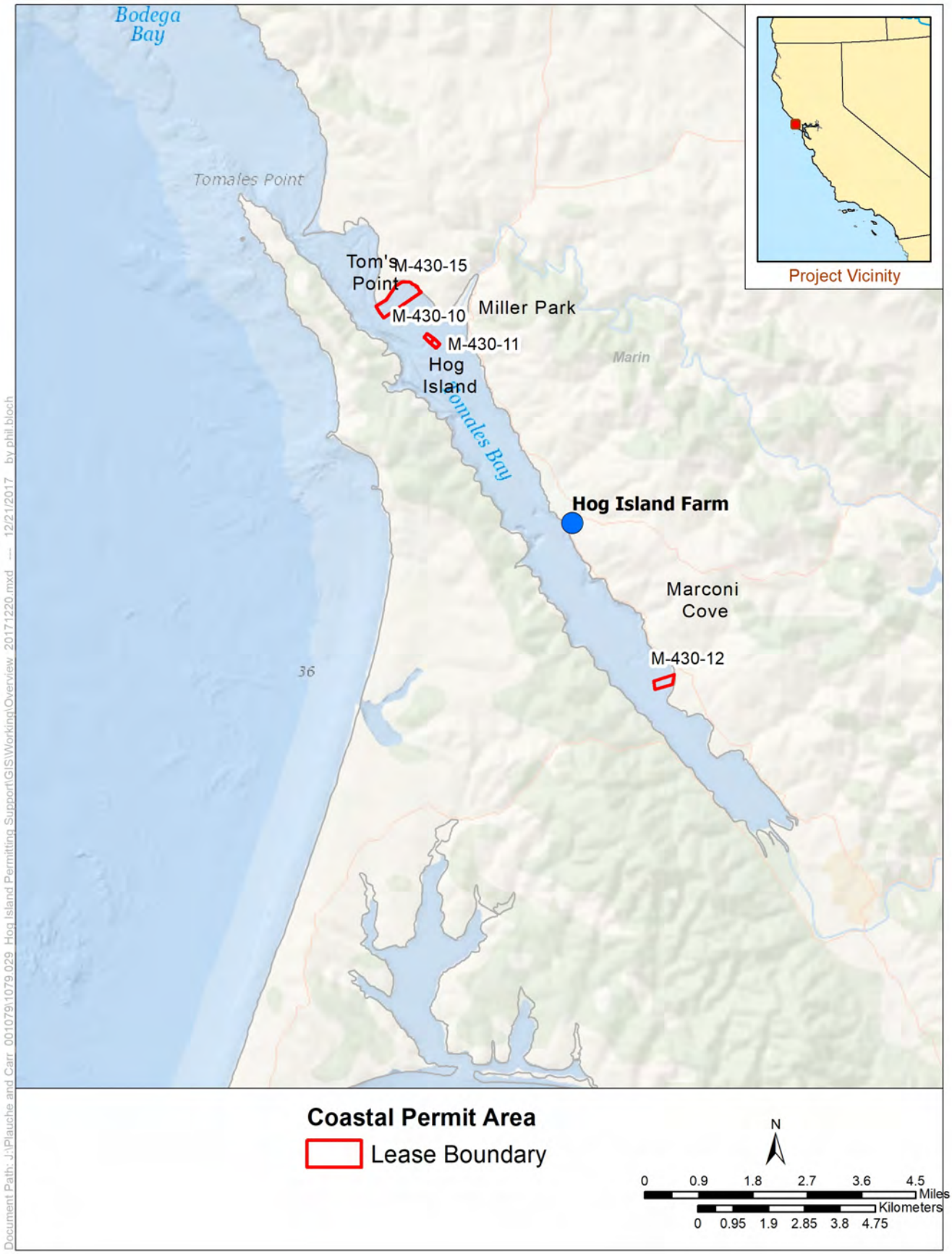


Figure 1. Location of HIOC Operations in Tomales Bay, California

EXHIBIT 2 - Maps of Existing Operations in State Water Bottom Leases (page 1 of 3)

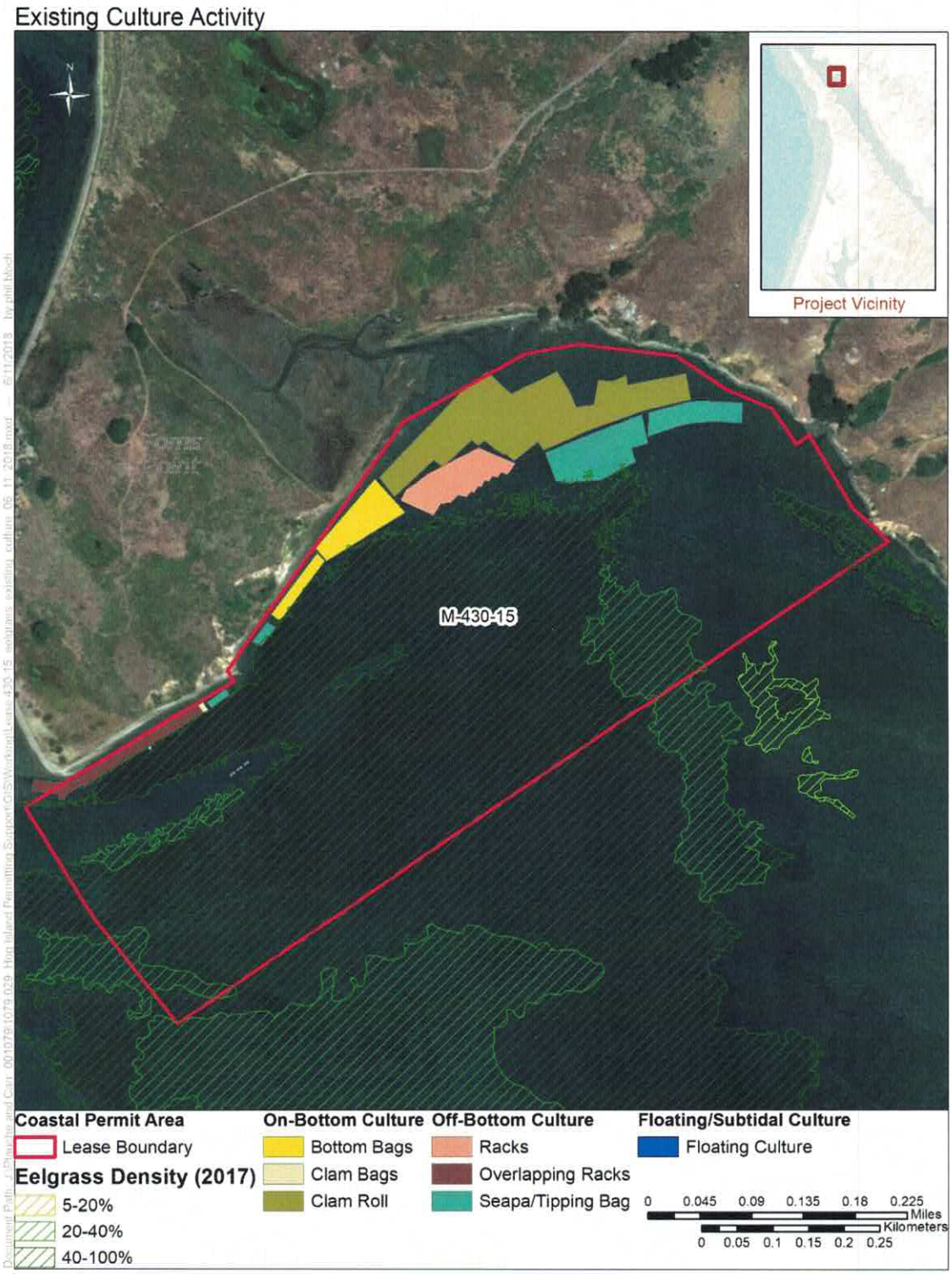


Figure 7: Existing Cultivation Activity – CFGC Lease M-430-15

EXHIBIT 3 - Maps of Existing Operations in State Water Bottom Leases (page 2 of 3)

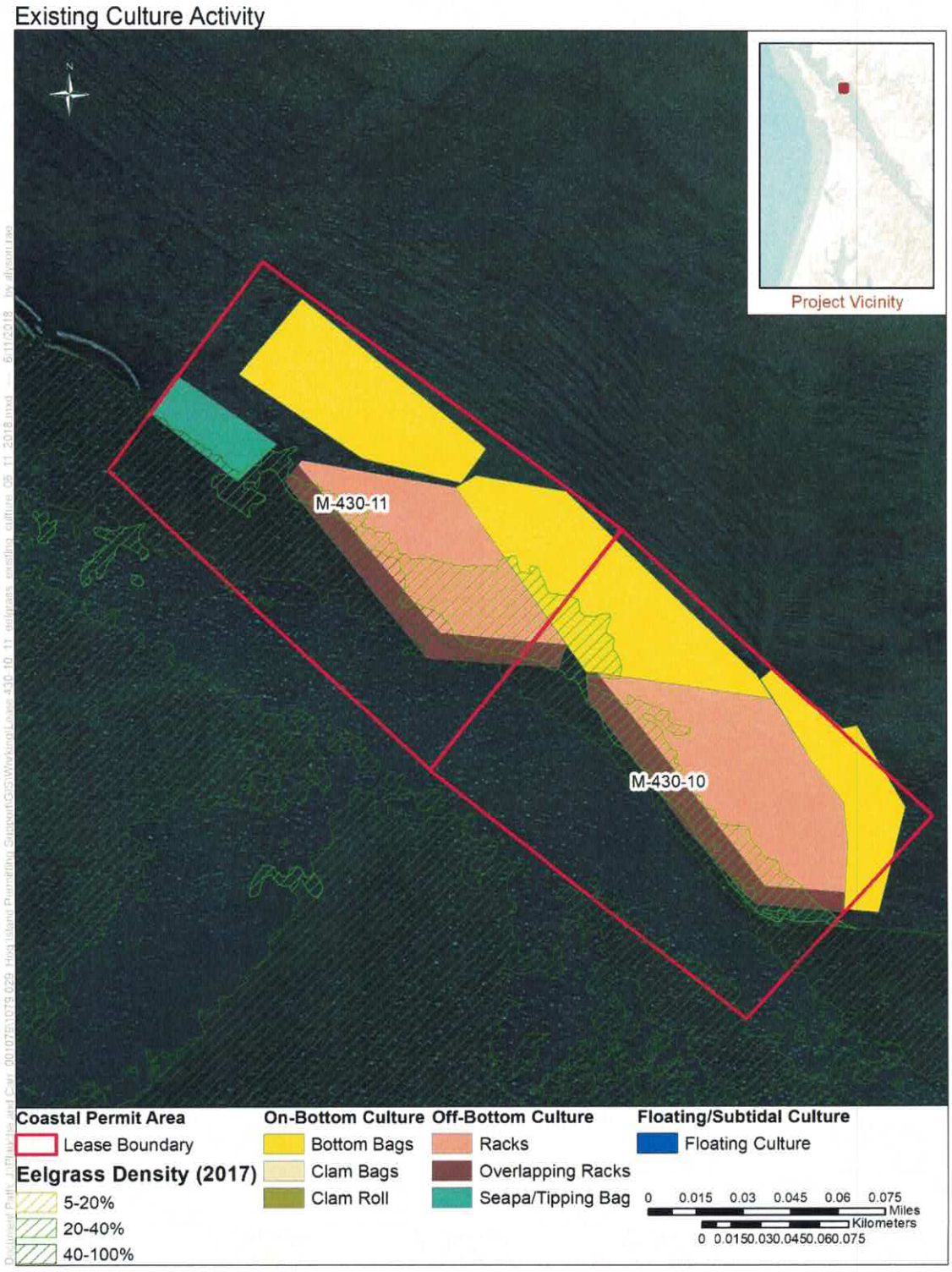


Figure 8: Existing Cultivation Activity – CFGC Leases M-430-10 and M-410-11

EXHIBIT 3 - Maps of Existing Operations in State Water Bottom Leases (page 3 of 3)

Figure 9: Existing Cultivation Activity – CFGC Lease M-430-12

EXHIBIT 3 - Maps of Proposed Expanded Operations in State Water Bottom Leases (page 1 of 3)

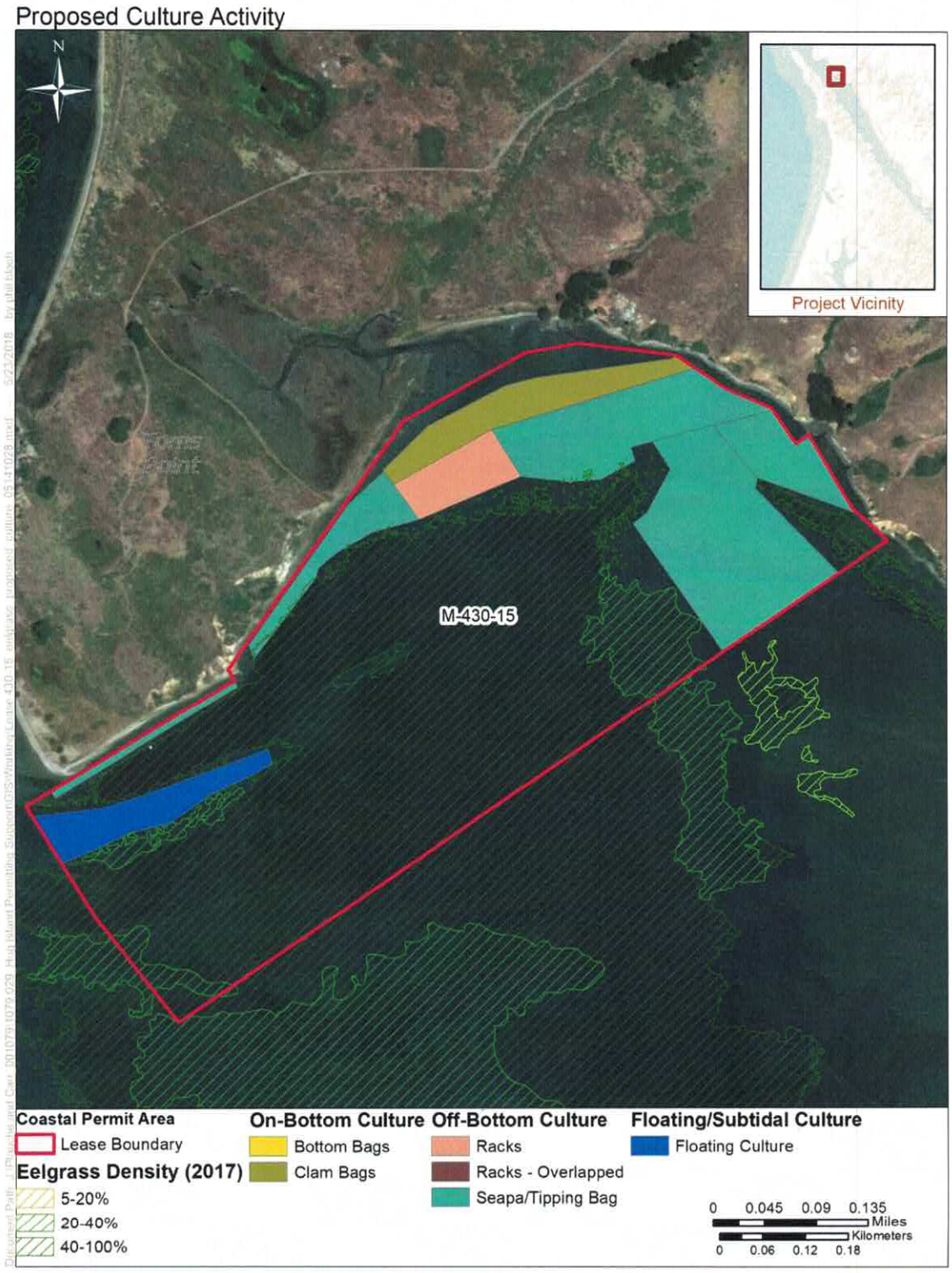


Figure 1: Proposed Cultivation Activity – CFGC Lease M-430-15

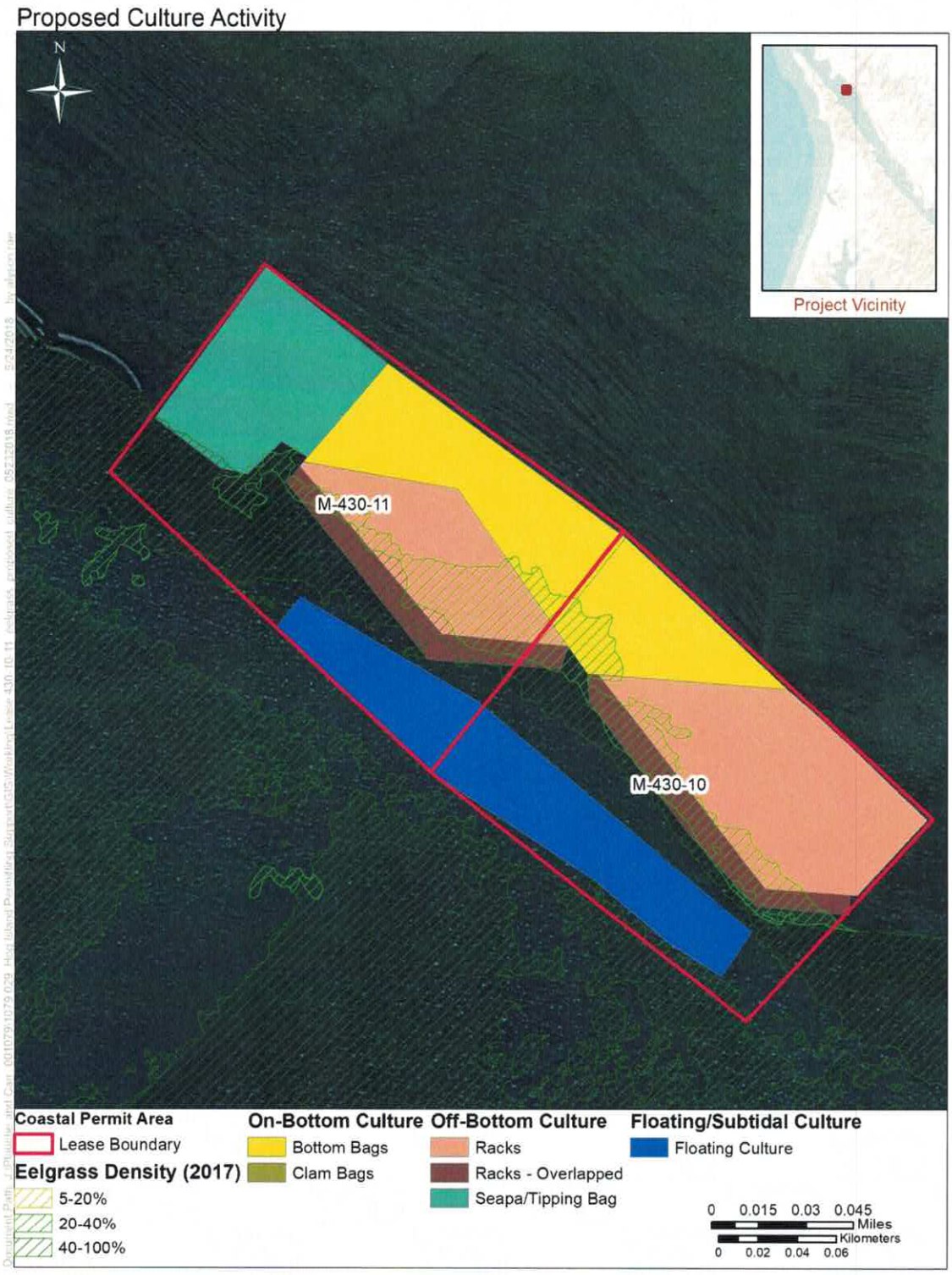


Figure 2: Proposed Cultivation Activity – CFGC Leases M-430-10 and M-410-11

EXHIBIT 3 - Maps of Proposed Expanded Operations in State Water Bottom Leases (page 3 of 3)

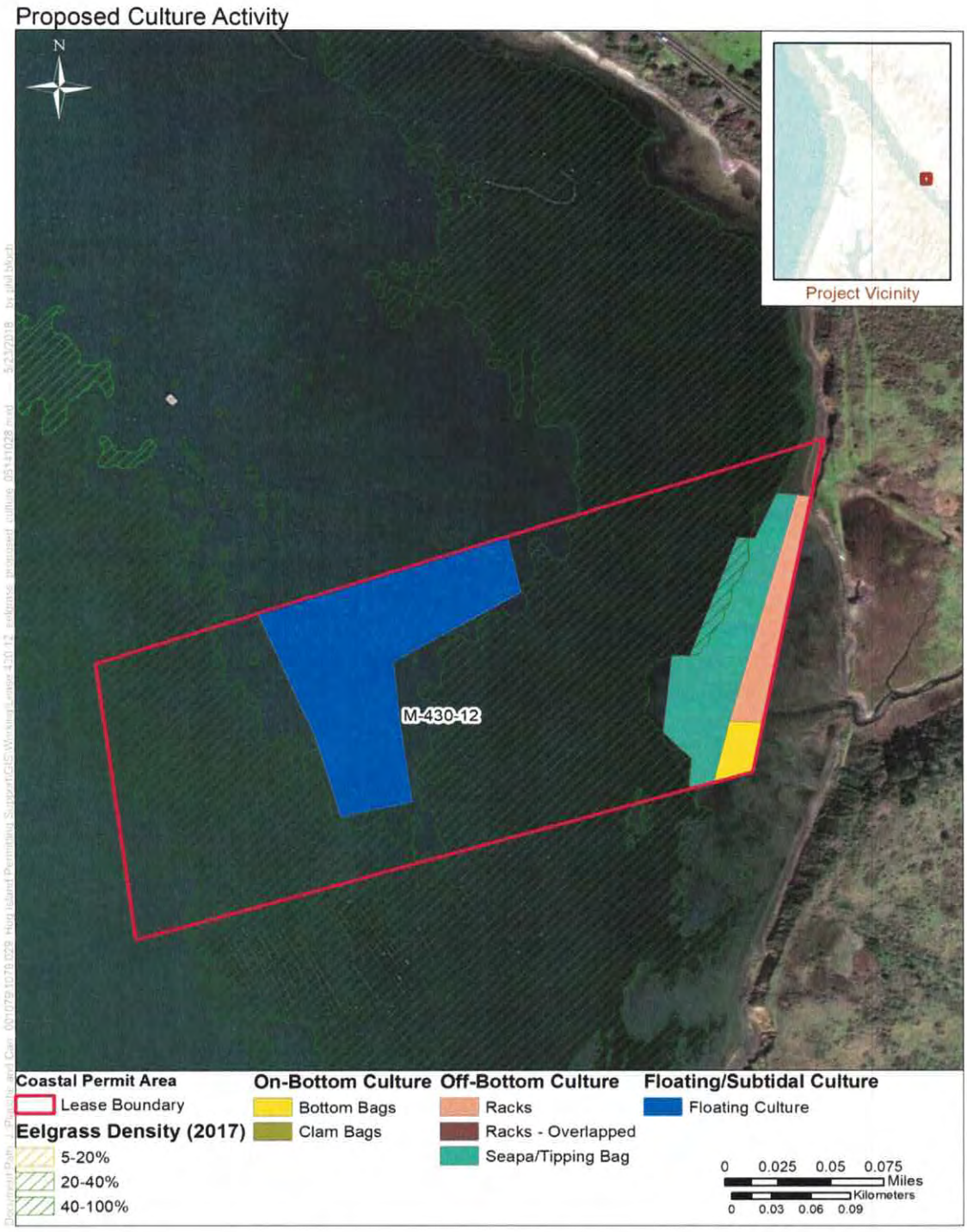


Figure 3: Proposed Cultivation Activity – CFGC Lease M-430-12[4]

[4] This plan and Tables 1 and 2 include the modifications discussed in our January 25, 2018 letter to Commission staff.

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.

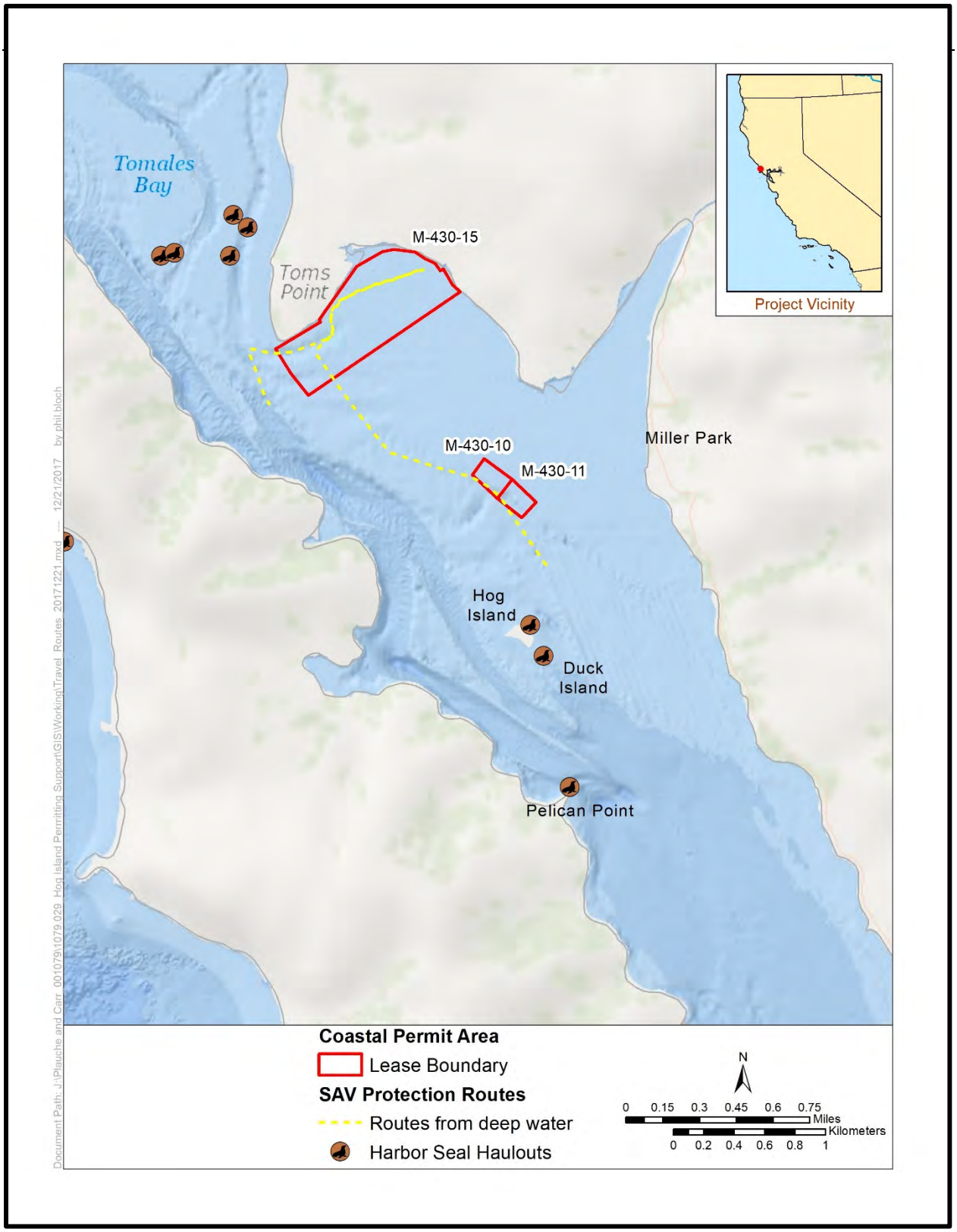


Figure C-1: Vessel Route to access Leases No. M-430-10, M-430-11, and M-430-15 from East Channel or West Shore in Tomales Bay, California.

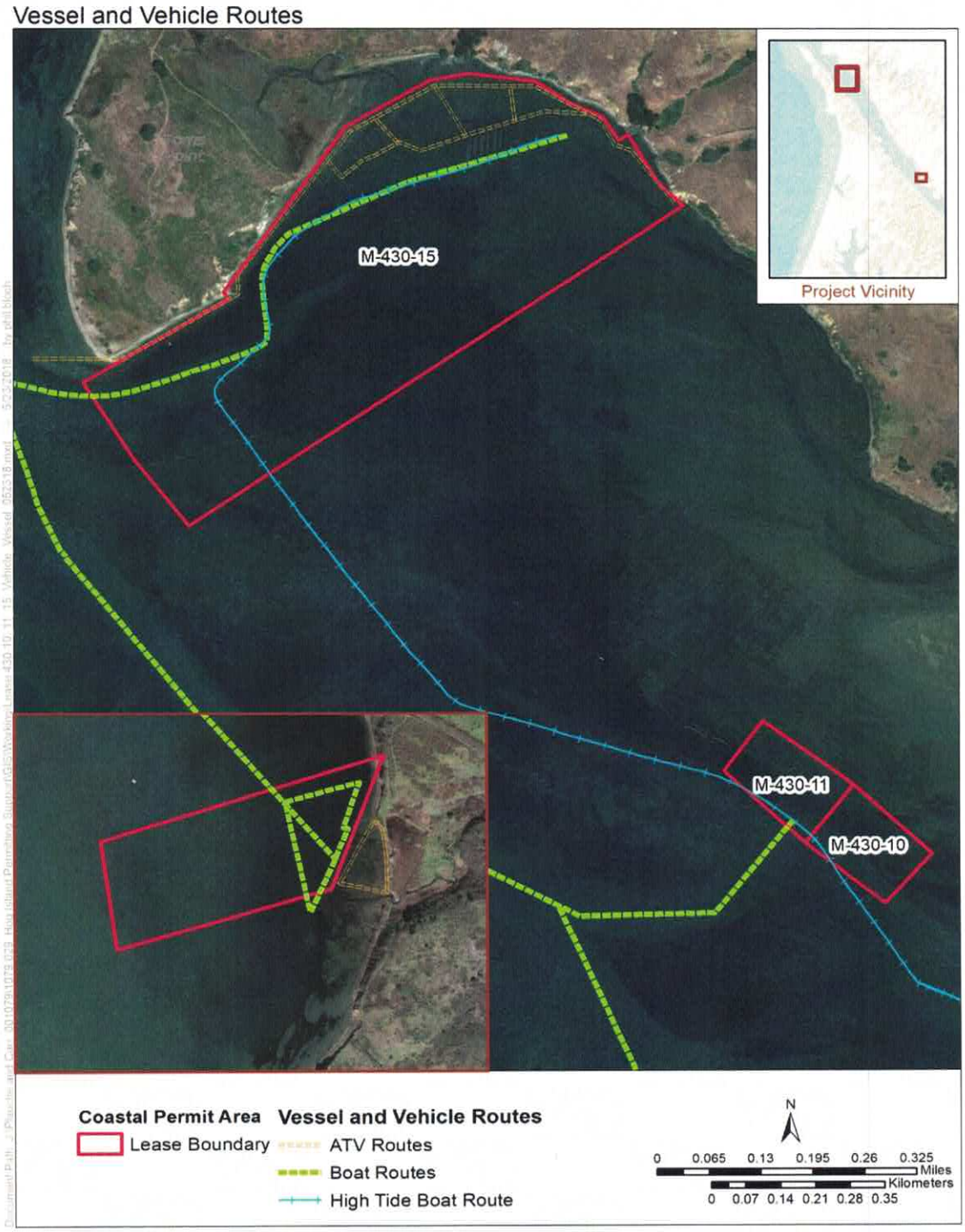


Figure 15: ATV and Vessel Routes

EXHIBIT 4 - Vessel Access Routes and Management Measures (page 4 of 4)

Figure 16: Vessel Routes and Boat Launches

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

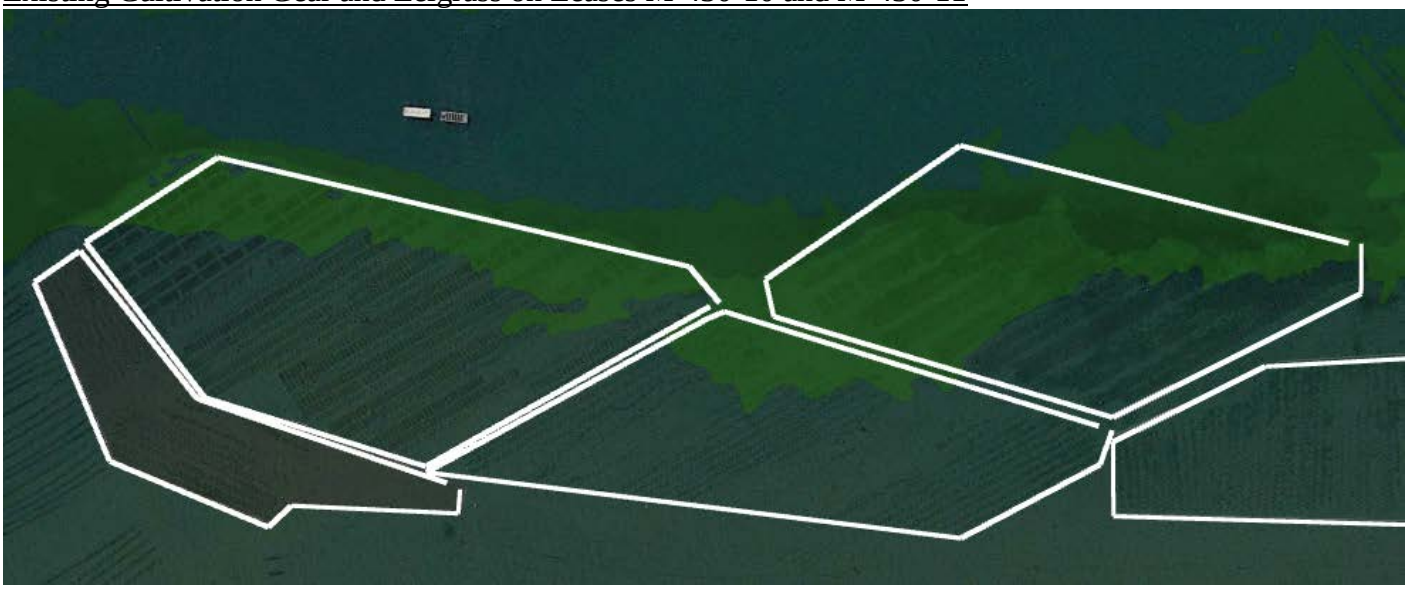
debris (including shellfish gear), collected will be recorded and communicated to other growers. The goal is to reduce the total volume of debris that is accumulating in Tomales Bay.

- 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.

EXHIBIT 6 – Existing Cultivation Gear and Eelgrass (page 1 of 2)

On the following figures, the results of the National Marine Sanctuary's 2017 eelgrass survey are indicated in green, the approximate boundaries of cultivation beds are shown in white and existing cultivation gear, structures, and equipment is shown in the underlying aerial photograph.

Existing Cultivation Gear and Eelgrass on Leases M-430-10 and M-430-11



Existing Floating Cultivation Gear and Eelgrass on Lease M-430-12

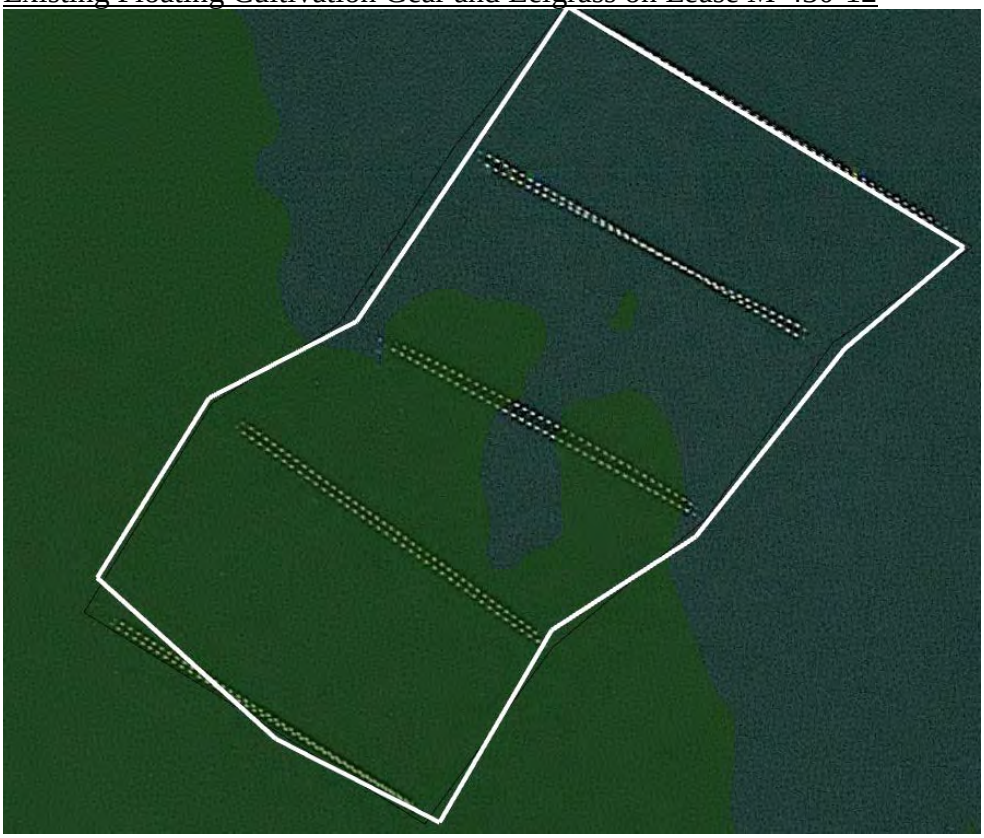


EXHIBIT 6 – Existing Cultivation Gear and Eelgrass (page 2 of 2)

Existing Overlapped Racks and Eelgrass on Lease M-430-12

State of California
Department of Fish and Wildlife

Memorandum

Date: November 26, 2019

Received December 6, 2019.
Signed original on file.

To: Melissa Miller-Henson
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: **Request to consider approval of lease amendments requested by Hog Island Oyster Company for State Water Bottom Lease Nos. M-430-10, M-430-11, M-430-12, and M-430-15 for purposes of aquaculture in Tomales Bay**

The Department of Fish and Wildlife (Department) recommends that, pursuant to Fish and Game Code § 15400, the Fish and Game Commission (Commission) approve amendments to each of the four leases in Tomales Bay, M-430-10, M-430-11, M-430-12, and M-430-15, to allow the same set of approved species and certain cultivation methods.

Background
The Commission received a request dated January 28, 2019 from Mr. John Finger, co-owner of Hog Island Oyster Company (HIOC), that each of the four leases in Tomales Bay, M-430-10, M-430-11, M-430-12, and M-430-15 be amended to allow the same set of species and cultivation methods to give them the flexibility to manage their operations more adaptively in a changing environment. The Department of Fish and Wildlife (Department) is providing the following comments in support of its recommendation.

HIOC requests the following species be permitted on each of their leases: Pacific oyster (*Crassostrea gigas*), Eastern oyster (*Crassostrea virginica*), Kumamoto oyster (*Crassostrea sikamea*), European flat oyster (*Ostrea edulis*), Olympia oyster (*Ostrea lurida*), Manila clam (*Venerupis phillipinarum*), and Mediterranean mussel (*Mytilus galloprovincialis*). The species requested all have a history of approval from the Commission, including various combinations on HIOC's four existing leases and are among the most cultivated species in California. The Department supports the approval of these species in each of the HIOC Tomales Bay leases.

HIOC has also requested that cultivation methods, which have previously been approved in varying combinations across its leases be uniformly approved for each of its four Tomales Bay leases. Requested methods included: rack and bag, bag/tray on bottom, intertidal longlines (with bags/baskets), floating longlines, and rafts. With the exception of bottom trays, these methods have commonly been used in shellfish cultivation in California and have previous authorization from the Commission in Tomales Bay and elsewhere in California.

The Department supports the use of rack and bag, bottom bag, intertidal longlines, floating longlines, and rafts, but not the bottom tray method. However, the Department has confirmed that HIOC no longer uses nor does it seek approval of the bottom tray method in its amended leases.

While the Department supports the cultivation of the species and the remaining methods requested by HIOC, the environmental impact of a particular cultivation practice is site-specific and not uniform across all areas of HIOC's four leases. Site- and project-specific evaluation is important to preserve the integrity of Tomales Bay's important ecological resources.

The Department agrees with the environmental review completed by the California Coastal Commission (CCC) in approving all but the bottom tray cultivation method throughout HIOC's four lease areas. The Department recommends the Commission consider utilizing the environmental analysis described in the CCC's Coastal Development Permit Amendments in granting approval of the four requested lease amendments.

The approval of the above suite of species and methods for each lease does not supersede permit conditions and prohibitions from other regulatory agencies and would require additional approvals before deviating from permitted activities. If a lease authorizes methods not currently authorized in the associated CCC Coastal Development Permit (CDP), an amendment to the CDP would be needed prior to installing and using that particular method in an approved cultivation area.

The Department recommends approval of the request to amend state water bottom leases M-430-10, M-430-11, M-430-12, and M-430-15 to uniformly allow the same set of approved species: Pacific oyster (*Crassostrea gigas*), Eastern oyster (*Crassostrea virginica*), Kumamoto oyster (*Crassostrea sikamea*), European flat oyster (*Ostrea edulis*), Olympia oyster (*Ostrea lurida*), Manila clam (*Venerupis phillipinarum*), and Mediterranean mussel (*Mytilus galloprovincialis*), as well as rack and bag, bottom bag, intertidal longlines, floating longlines, and rafts as approved cultivation methods.

If you have any questions regarding this item, please contact Randy Lovell, State Aquaculture Coordinator at (916) 445-2008 or by email at randy.lovell@wildlife.ca.gov.

ec: Department of Fish and Wildlife

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Development Director

Patricia Wimpfheimer
Bookkeeper

November 26, 2019

California Fish and Game Commission
P.O. Box 944209
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Via electronic delivery to: fgc@fgc.ca.gov

Re: Comments on FGC Agenda Item 33
Hog Island Oyster Company

Dear Commissioners,

The Environmental Action Committee of West Marin (EAC) is based in Point Reyes Station and has been working to protect the unique lands, waters, and biodiversity of West Marin since 1971. Since our inception, we have been committed to the health of West Marin's estuaries, bays, and watersheds including our strong focus on Tomales Bay.

We submit these brief comments for inclusion in the binder, as the binder materials will not be made available until after the comment deadline. We continue to point out that it is procedurally problematic that the comment deadline (for inclusion in the binder) is in advance of the public's opportunity to review the substantive binder materials.

That being said, we submit brief generally supportive comments, which we may supplement, regarding Agenda Item 33, Hog Island Oyster Company.

Regarding Agenda Item 33, your consideration of approving lease amendments applied for by Hog Island Oyster Company for State

Water Bottom Lease Nos. M-430-10, M-430-11, M-430-12, and M-430-15 for purposes of aquaculture in Tomales Bay, we remind the Fish and Game Commission (Commission) that we have been advocating to the Commission for aquaculture best management practices since 2015.

Many of the goals supported by a best management practices rulemaking have been accomplished through the California Coastal Commission's (CCC) coastal development permit (CDP) amendments, in which the CCC is including enforceable permit conditions around marine debris and other environmental considerations. We continue to support the CCC's efforts and your Commission's consistency with these efforts. While many improvements have been made on Tomales Bay related to the loss of aquaculture marine debris, the Bay continues to depend on all of the state agencies' close attention to any and all industrial practices on the Bay. While we are supportive of lease amendments which make the leases consistent with the actual practices and the applicable CDPs, we also point out that it would be better if this was not an after the fact process, which may inherently discourage compliance.

We thank Hog Island Oyster Company for their willingness to come into compliance and work with local stakeholders, as well as the state agencies. In sum, we appreciate your consideration of our comments; and without a chance to review the binder, we are in general support of Agenda Item 33.

Respectfully,

Morgan Patton
Executive Director

Ashley Eagle-Gibbs
Conservation Director

cc: Susan Ashcraft, California Fish and Game Commission
Elizabeth Pope, California Fish and Game Commission
Terry Sawyer, Hog Island Oyster Company
John Finger, Hog Island Oyster Company