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STAFF REPORT: REGULAR CALENDAR

Application No.: 9-16-0204

Applicant: Humboldt Bay Harbor, Recreation, and Conservation District

Agents: Plan West

Location: Samoa Peninsula, Humboldt County.

Project Description: Placement and operation of approximately three total acres of shellfish nursery rafts, floating upwelling systems (FLUPSYs), macroalgae cultivation longlines, and floating walkways across three areas of submerged lands with sizes between 6.0 and 8.6 acres.

Staff Recommendation: Approval with conditions.

SUMMARY OF STAFF RECOMMENDATION

As part of its effort to promote aquaculture development in Humboldt Bay, the Humboldt Harbor, Recreation, and Conservation District (Harbor District) proposes to obtain the necessary state and federal authorizations (including those from the Commission, Regional Water Quality Control Board, and U.S Army Corps of Engineers) for shellfish and macroalgae/kelp aquaculture on three areas of submerged lands within Humboldt Bay. Upon receiving these authorizations, the Harbor District would issue leases to individual businesses to carry out the shellfish and macroalgae cultivation activities proposed in the Harbor District's coastal development permit

application. This approach, referred to by the Harbor District as its “Pre-permitting Project,” was developed in consultation with the relevant state and federal resource agency staff and is intended to provide small aquaculture start-up businesses and entrepreneurs that may be deterred from the potential expense and challenge of permitting processes with an expedited and lower-cost opportunity to initiate and develop aquaculture operations in Humboldt Bay. Although it is taking on the responsibilities of the permitting processes, the Harbor District anticipates an economic benefit from the Pre-permitting Project because it would generate revenue from leases on subtidal lands under its management that do not currently support development.

The three areas selected by the Harbor District for this project are 6.0 acres, 6.6 acres and 8.6 acres in size and are proposed to support 0.87 acres, 0.96 acres, and 1.25 acres of aquaculture activities, respectively. These aquaculture activities would include installation and operation of shellfish nursery rafts for growing small, immature shellfish that would be sold or transferred elsewhere for culture, floating upwelling systems (FLUPSYs) for growing juvenile shellfish, and macroalgae cultivation longlines for growing various species of kelp for human consumption or other commercial use. Floating walkways and mooring systems would also be installed and used to facilitate aquaculture operations. Cultivated shellfish species would be limited to Pacific oysters (*Crassostrea gigas*), Kumamoto oysters (*Crassostrea sikamea*), and Manila clams (*Tapes philippinarum*). Cultivated macroalgae would be limited to native red algae such as *Chondracanthus*, *Gracilaria*, *Palmaria* and *Porphyra* species.

In order to facilitate project permitting and environmental analysis and also provide individual leaseholders with the flexibility to design, implement, and alter cultivation operations according to their interests, abilities, and successes, the Harbor District proposes to set maximum thresholds for the size and intensity of aquaculture activities within the three project areas rather than provide specific descriptions of how each area would be configured and used. Specifically, each of the three cultivation areas would have a maximum total surface area, volume, benthic footprint, biomass of cultured shellfish, and level of activity that all aquaculture operations within it would need to remain below. This approach is predicated on the idea that as long as an acceptable threshold is established and maintained, the individual elements and activities carried out under that threshold do not need to be specified. For example, as long as the total surface area threshold is not exceeded, the number, size, design, and configuration of nursery rafts, FLUPSYs, and cultivation rafts can be changed without triggering a permit amendment or reanalysis of environmental impacts.

For the three project areas, the proposed maximum thresholds per acre would be 6,322 square feet of aquaculture operations; 19,357 cubic feet of aquaculture equipment in the water column; 102 square feet of fill (footprint of anchors and mooring systems); and 216 pounds (dry weight) of cultured shellfish biomass. The maximum threshold for each project area – based on its acreage – is shown in the table below. Daily activity by shellfish growers is expected at each site year-round.

Site Name	Size of Site (acres)	Surface Area of Aquaculture (ft ²)	Volume of Aquaculture (ft ³)	Fill/Mooring Footprint (ft ²)	Biomass of Shellfish (lbs – dry weight)
Subtidal 1	6.6	41,752	127,756	673	1426

Subtidal 2	8.6	54,370	166,472	878	1859
Subtidal 3	6.0	37,932	116,142	612	1296

In addition to these maximum area, volume, fill, and biomass levels, the Harbor District also proposes to include a ten foot wide gap or buffer between each contiguous 10,000 square feet of aquaculture structures.

The key Coastal Act issue of concern with the installation and operation of aquaculture equipment included in the proposed project is the potential for these activities to adversely affect marine resources by (1) altering benthic, water column, and surface water habitat characteristics; (2) providing a source for potential disturbance, injury, and predation to marine wildlife; and (3) promoting the spread and dispersion of non-native marine organisms.

The Commission staff believes that with implementation of recommended [Special Conditions 1-13](#), the project can be carried out consistent with the marine resource and water quality protection policies of the Coastal Act. [Special Condition 1](#) would establish a ten year permit term limit to allow for an evaluation of the Harbor District’s innovative “pre-permitting” approach and provide an opportunity for adaptive management to address any issues that may arise regarding the Harbor District’s leases within the three subtidal sites. During the term of this permit, additional opportunities for adaptive management to address emerging issues would also be provided by [Special Condition 12](#) which requires annual reporting of lease status and inspection results. In addition, [Special Conditions 2-5](#) would further reduce potential marine resource impacts by: (1) reducing the potential release of invasive species into Humboldt Bay during maintenance cleaning; (2) requiring the installation of passive wildlife exclusion devices if colonization of the rafts by marine mammals or seabirds begins to occur; and (3) requiring the design of seawater intake systems to reflect current standards established to minimize the entrainment and impingement effects. Further, [Special Conditions 6 and 7](#) would ensure that appropriate underwater sound and wildlife monitoring occurs during pile driving activities to provide protection for sensitive marine mammal and fish species. [Special Conditions 8-11](#) would provide for additional marine resource protection by focusing on the protection and preservation of benthic habitat areas and eelgrass beds, requiring that: (1) eelgrass beds mapped according to the protocols in the National Marine Fisheries Service’s California Eelgrass Mitigation Plan be protected with a buffer of at least 30 feet; (2) the Harbor District submit for Executive Director review and approval the Marine Habitat Mitigation Plan that it is developing to remove derelict piles from the bay as compensation for the up to eight piles it proposes to install; (3) derelict or abandoned structures and equipment be removed from lease areas if they are abandoned or revoked; and (4) appropriate best management practices be carried out to prevent the release of marine debris. Finally, [Special Condition 13](#) would ensure that all other state and federal authorizations are in place prior to the initiation of construction or installation activities.

Commission staff therefore recommends that the Commission **APPROVE** coastal development permit application 9-16-0204, as conditioned.

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EXHIBITS

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[Exhibit 3 – Example Configuration of Aquaculture Structures on a Project Site](#)

I. MOTION AND RESOLUTION

Motion:

I move that the Commission approve Coastal Development Permit 9-16-0204 subject to conditions set forth in the staff recommendation specified below.

Staff recommends a **YES** vote on the foregoing motion. Passage of this motion 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 9-16-0204 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 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 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 applicant to bind all future owners and possessors of the subject property to the terms and conditions.

III. SPECIAL CONDITIONS

1. **Permit Term Limit.** This coastal development permit shall expire upon expiration of Humboldt Bay Harbor, Recreation, and Conservation District (Harbor District) Permit No. 13-03 but not later than February 25, 2026 (the maximum term provided for Harbor District Permit No. 13-03). Prior to this February 25, 2026 expiration date, the Harbor District may apply to the Commission for a permit amendment to extend the term of this permit for an additional ten year period if a new Harbor District permit is issued with a similar term. This permit amendment application shall include a report describing (1) the status of aquaculture operations within the three subtidal sites; (2) the consistency of these operations with all provisions and conditions included in their leases and the Harbor District's state and federal permits and authorizations; and (3) the current and projected level of demand for coastal-dependent industrial uses along the shoreline of Humboldt Bay and the land and infrastructure available to accommodate that demand. The information in this report shall be reviewed and an analysis of it provided to the Commission for consideration if an amendment application to extend this permit term is made. All individual leases for aquaculture activities within each of the subtidal sites shall be revoked by the Harbor District if this permit expires without replacement or an amendment to extend the permit term limit.
2. **Maintenance Cleaning.** All maintenance cleaning operations of the raft hulls, raft floats, and well infrastructure (not including floating upwelling system bins) within Subtidal Site 1, 2, and 3 shall be carried out onshore. All biofouling organisms and biological materials removed during these cleaning operations shall be collected and disposed of at an appropriate upland facility. Regular scraping of the floating upwelling system channels can occur on the rafts, provided that all biofouling organisms and biological materials are contained using tarps and/or screens. No discharge of untreated wash water or biofouling materials into Humboldt Bay shall occur during maintenance cleaning operations.
3. **Marine Wildlife.** If any marine mammals or more than ten pelicans and/or cormorants at any one time are observed on one of the nursery rafts, cultivation rafts or FLUPSYs for more than two weeks, the Harbor District shall within 10 days notify the Executive Director and within 30 days of such notification to the Executive Director submit, for review and approval, a plan to install passive deterrent devices (such as exclusionary fencing or netting) to prevent future use of the rafts or FLUPSYs by marine mammals or seabirds. The Harbor District shall install or require relevant lessee(s) to install the passive deterrent devices and maintain them as approved by the Executive Director.
4. **Intake System Design.** Intake systems shall be limited to those on nursery rafts and floating upwelling systems and shall be designed with a screened intake with (a) round or square openings of no more than 3/32 inches or slotted/wedge wire openings of no more than 1.75 millimeters, a screen area of at least 5 square feet per cubic foot per second water volume intake, a minimum open area of 27%, and a maximum intake water approach velocity of 0.2 feet per second if a self-cleaning device is installed that clears the entire screen face at least once every five minutes; or (b) round or square openings of no more than 3/32 inches or slotted/wedge wire openings of no more than 1.75 millimeters, a screen area of at least 20 square feet per cubic foot per second water volume intake, a minimum

open area of 27%, and a maximum intake water approach velocity of 0.05 feet per second if a self-cleaning device is not installed.

5. Non-native Species Management. All aquaculture operations within Subtidal Sites 1, 2, and 3 shall: (1) use screens during washdown of Manila clam seed and equipment to contain all clams regardless of size and prevent seed from falling into the bay; (2) remove all Manila clam seed from the nursery raft and FLUPSY system prior to reaching 12 millimeters shell size, at which size they are not sexually mature; (3) not discard culled shellfish into Humboldt Bay; and (4) be limited to the cultivation of Pacific oysters (*Crassostrea gigas*), Kumamoto oysters (*Crassostrea sikamea*), Manila clam seed (*Tapes philippinarum*), and native red algae such as *Chondracanthus*, *Gracilaria*, *Palmaria*, and *Porphyra* species. Culture of additional shellfish or algae species may be considered through an amendment to this permit.

6. Pile Driving Marine Wildlife Precautions.

- (a) Pile driving shall not occur between July 1st and October 15th.
- (b) A marine mammal monitor approved by the Executive Director shall be present at all times during pile driving. The monitor shall ensure that the Harbor District and its contractors fully comply with the conditions of this permit related to biological protection during pile driving.
- (c) During pile driving of the initial five piles used for the Harbor District's acoustic testing, work that causes elevated levels of underwater sound shall be suspended if any marine mammal is observed within or approaching 500 meters of the work site. For the first two piles, this 500 meter wide area surrounding the work site shall be the Hazard Zone. Pile driving may resume once the mammal is observed outside of this Hazard Zone or more than 30 minutes have elapsed since the last sighting of the marine mammal within the Hazard Zone. After the initial two piles, the width of the Hazard Zone shall be determined based on the results of hydroacoustic monitoring showing the maximum distance from the work site at which the recorded peak sound pressure level (SPL) exceeds 196 dB¹ re 1 μPa or the calculated cumulative sound exposure level (SEL) exceeds 140 dB re 1 μPa² - sec. The marine mammal monitor will be responsible for monitoring this Hazard Zone during pile driving activities. In the event that the monitor determines a marine mammal has entered this zone, the monitor shall have the authority to suspend pile-driving activities until the marine mammal has passed outside of this Hazard Zone or more than 30 minutes have elapsed since the last sighting of the marine mammal within the Hazard Zone.
- (d) An initial ramp-up period shall occur when starting pile-driving activities to avoid potential impacts to marine mammals that may be undetected within the Hazard Zone.
- (e) The pile driver shall be operated at its lowest practicable power setting and shall employ the use of sound dampening techniques and/or devices (such as pile cushions or caps) if such techniques and/or devices can be safely used without interfering with effective operations.

7. Underwater Acoustic Monitoring.

¹ Decibel (dB) references in this report are for underwater sound and use the water (not air) standard (i.e., re 1 μPa).

- (a) Underwater hydroacoustic monitoring shall be carried out during the first two pile driving events to determine the maximum distance from the work site at which the recorded peak sound pressure level (SPL) exceeds 196 dB re 1 μ Pa or the calculated cumulative sound exposure level (SEL) exceeds 140 dB re 1 μ Pa² - sec, the underwater acoustic threshold levels for high frequency cetaceans such as harbor porpoise specified in the National Marine Fisheries Service's July 2016 Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing. These first five piles shall be selected to be representative of the conditions at the site of the eight proposed piles (water depths, substrate types, etc.) and the hydroacoustic monitoring stations shall start as close as practicable to the site of active pile driving and extend outward at increasing distances to the edge of the initial Hazard Zone. Prior to the initiation of pile driving activities for the sixth pile, the results of the hydroacoustic monitoring of the initial five piles and the resulting recommended size of the Hazard Zone shall be provided to the Executive Director for review and approval.
 - (b) To prevent adverse impacts to fish from elevated levels of underwater sound associated with pile driving, an underwater acoustic monitoring device capable of recording both peak and accumulated sound pressure levels shall be placed as close as practicable to the site of active pile driving. The data collected by this device shall be monitored throughout the course of pile driving operations.
 - (c) As specified in the interagency Fisheries Hydroacoustic Working Group June 12, 2008, memorandum, pile driving activity shall immediately cease if at any time: (a) the recorded peak sound pressure level exceeds 206 dB re 1 μ Pa; or (b) the calculated cumulative sound exposure level (SEL) exceeds 183 dB re 1 μ Pa² - sec.
 - (d) If the cumulative sound exposure level threshold is exceeded, pile driving shall cease for as long as possible without risking sediment consolidation and not less than 30 minutes.
 - (e) If the peak sound pressure level threshold is exceeded and/or if the marine mammal monitor observes dead or injured fish in the vicinity of active pile driving operations, the Harbor District shall implement additional feasible power reduction and/or sound dampening measures necessary to reduce the peak sound pressure level below the threshold.
 - (f) Peak sound pressure and cumulative SEL data from the first two of the eight piles shall be compiled and submitted to the Executive Director within 14 days of the completion of pile driving activities on the fifth pile. If this data demonstrates that neither the peak sound pressure nor accumulated SEL thresholds specified in part (c) above were exceeded, the remaining replacement piles may be installed without underwater acoustic monitoring.
8. **Eelgrass Protection.** Prior to the initiation of installation activities for aquaculture gear or mooring piles, the Harbor District shall submit for Executive Director review and approval a plan showing that all such activities and associated structures or infrastructure (including pilings, moorings, anchors, longlines, surface rafts, FLUPSYs) shall remain a minimum of 30-feet away from the outside edge of any eelgrass bed within or adjacent to the three subtidal aquaculture sites. This report shall include a map of all eelgrass within each subtidal site and a 50-foot perimeter outside. The map shall be based on the results of an eelgrass survey carried out consistent with the timing and methodology guidelines of the National Marine Fisheries Service's California Eelgrass Management Program. Areas with

depths greater than twice the minimum expected eelgrass growing depth in Humboldt Bay are exempt from this survey requirement.

9. **Marine Habitat Mitigation.** PRIOR TO PERMIT ISSUANCE, the Harbor District shall submit, for Executive Director review and written approval, a Marine Habitat Mitigation Plan that clarifies the location, and removal method for the 21 derelict piles that are proposed to be removed to create new soft substrate benthic habitat as mitigation for the benthic habitat that would be lost to install the eight project piles and the additional benthic habitat that would be used to support the project anchors and mooring devices.
10. **Clean-up and Abandonment.** Within 90 days of the expiration or revocation of any lease for aquaculture operations within the three subtidal aquaculture sites, the Harbor District shall submit either a report demonstrating that all cultivation gear, equipment, and material associated with that lease has been removed, or a coastal development permit application for the complete collection and removal of all remaining cultivation gear, equipment, and material associated with that lease. Upon issuance of that coastal development permit, the Harbor District shall implement approved removal and collection operations within 90 days.
11. **Marine Debris Prevention and Response.**
 - (a) To the extent practicable, all aquaculture structures and pieces of gear and equipment shall be labeled with the name of the individual or business responsible for its use and installation.
 - (b) All practical efforts shall be made to avoid the loss or displacement of these materials during aquaculture operations and to quickly recover any and all material that becomes lost or displaced. Lost or displaced material that is not recovered shall be documented by the Harbor District during lease inspections along with recommendations on how to avoid similar losses in the future. Continual improvement to gear design and practices shall take place to reduce loss of gear over time.
 - (c) The Harbor District shall carry out lease inspections as soon as practicable after large storm, seismic, tsunami, or wind events and expedite recovery and clean-up operations for storm related losses of equipment and material.
 - (d) The Harbor District shall collect data on where and what kind of loose gear or debris they find during inspections and share it with lessees and interested parties so that clean-up efforts by growers and outside parties can be more effectively carried out and efforts to better design gear to minimize loss can be pursued.
 - (e) All leases in Subtidal Sites 1, 2, and 3 and equipment within them shall be maintained in good working condition.
 - (f) Waste or loose material or equipment shall not be stored onsite, including tools or materials not in active use to grow shellfish, food items or water bottles.
 - (g) Work barges, skiffs, or other vessels servicing the floating or submerged aquaculture structures shall not be stored, anchored, or moored overnight within the subtidal aquaculture sites.
 - (h) No construction activities or maintenance requiring construction activities focused on the floating or submerged aquaculture structures shall occur on the Subtidal Sites 1, 2, or 3 or the lease areas within them.

12. **Compliance and Status Reporting.** By January 31 of each year, the Harbor District shall provide, for Executive Director review and written approval, an Annual Compliance and Status Report (Annual Report) for all active leases. This Annual Report shall include all lease status and lease inspection reports developed or received by the Harbor District during the previous year as well as a summary of the as-built conditions and production levels for each of the three subtidal aquaculture sites that includes, at a minimum, the surface area and volume of aquaculture structures and equipment, the type and size of anchoring or mooring structures, and the biomass of cultured organisms.
13. **Other Agency Review and Approval.** PRIOR TO COMMENCEMENT OF PROJECT CONSTRUCTION AND/OR INSTALLATION ACTIVITIES, the Harbor District 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 North Coast Regional Water Quality Control Board (RWQCB) 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 coastal development permit unless the Executive Director determines that no amendment is legally necessary.

IV. FINDINGS AND DECLARATIONS

A. Project Description

The Humboldt Harbor, Recreation, and Conservation District (Harbor District) proposes to obtain the necessary state and federal authorization for shellfish and macroalgae aquaculture on three areas of submerged lands within Humboldt Bay. Upon issuance of these authorizations, the Harbor District would issue leases to individuals or businesses to carry out the aquaculture activities considered within them. The Harbor District would also carry out the installation of up to eight 12-inch diameter concrete or metal pilings within one of project areas to facilitate mooring.

As shown in [Exhibit 1](#), the three project areas are 6 acres, 6.6 acres and 8.6 acres in size and are proposed to support a maximum of 0.87 acres, 0.96 acres, and 1.25 acres of aquaculture activities, respectively. The three project areas include existing pier or wharf structures and are located within a $\frac{3}{4}$ mile stretch of subtidal waters within Humboldt Bay adjacent to the Samoa Peninsula. All three areas are adjacent to onshore sites used for timber processing, pulping, and transport operations. Timber processing operations were once extensive in this area but currently exist at a much more limited scale. In recent years, several of these onshore areas and former timber operations have been converted to shellfish aquaculture support facilities and existing subtidal shellfish aquaculture operations similar to those proposed by the Harbor District also exist to the north, south, and adjacent to the three proposed project areas. The Commission authorized these onshore and subtidal operations through coastal development permits E-02-005 (Coast Seafoods Co.), E-11-029 (Taylor Mariculture, LLC), 9-13-0500 (Hog Island Oyster Co.), and 9-16-0033 (Coast Seafoods Co.).

Proposed aquaculture activities within each project area would include installation and operation of two types of floating shellfish aquaculture structures and one type of submerged algae

cultivation structure. All of these structures would be constructed offsite and towed to their installation sites for mooring. The shellfish structures would be (1) floating upwelling systems (“FLUPSYs”) for growing young shellfish; and (2) “nursery rafts” for growing small, immature shellfish that would be sold or transferred elsewhere for grow-out to consumer sizes. The algae cultivation structures would be submerged “longlines” held in the water column by anchors on the seafloor and buoys at the surface. A schematic diagram of typical raft, FLUPSY, and longline designs is provided in [Exhibit 2](#). Floating walkways and mooring systems would also be installed and used to facilitate aquaculture operations. A potential layout of cultivation structures within one of the project areas is shown in [Exhibit 3](#). Shellfish species proposed to be cultivated on these structures would be limited to Pacific oysters (*Crassostrea gigas*), Kumamoto oysters (*Crassostrea sikamea*), and Manila clams (*Tapes philippinarum*). Cultivated macroalgae would be limited to native red algae such as *Chondracanthus*, *Gracilaria*, *Palmaria*, and *Porphyra* species.

In order to facilitate project permitting and environmental analysis and also provide individual leaseholders with the flexibility to design, implement, and alter cultivation operations according to their interests, abilities, and successes, the Harbor District proposes to set maximum thresholds for the size and intensity of aquaculture activities within the three project areas rather than provide specific descriptions of how each area would be configured and used. Specifically, each of the three cultivation areas would have a maximum total surface area, volume, benthic footprint, biomass of cultured shellfish, and level of activity that all aquaculture operations within it would need to remain below. This approach is predicated on the idea that as long as an acceptable threshold is established, evaluated and maintained, the individual elements and activities carried out under that threshold do not need to be specified. For example, as long as the total surface area threshold is not exceeded, the number, size, design, and configuration of nursery rafts, FLUPSYs, and cultivation rafts can be changed without triggering a permit amendment or reanalysis of environmental impacts.

For the three project areas, the proposed maximum thresholds per acre would be 6,322 square feet of aquaculture operations; 19,357 cubic feet of aquaculture equipment in the water column; 102 square feet of fill (footprint of piles, anchors and mooring systems); and 216 pounds (dry weight) of cultured shellfish biomass. The maximum threshold for each project area – based on its acreage – is shown in the table below. Daily activity by shellfish growers is expected at each site year-round.

Site Name	Size of Site (acres)	Surface Area of Aquaculture (ft ² /acre)	Volume of Aquaculture (ft ³)	Fill/Mooring Footprint (ft ²)	Biomass of Shellfish (lbs – dry weight)
Subtidal 1	6.6	41,752/0.96	127,756	673	1426
Subtidal 2	8.6	54,370/1.25	166,472	878	1859
Subtidal 3	6.0	37,932/0.87	116,142	612	1296
TOTAL	21.2	134,054/3.08	410,370	2,163	4,581

In addition to these maximum area, volume, fill, and biomass levels, the Harbor District also proposes to include a ten foot wide gap or buffer between each contiguous 10,000 square feet of aquaculture structures.

This approach of establishing and evaluating maximum thresholds instead of specific build-out details and configurations is dependent on the maintenance and enforcement of these thresholds. Because the Harbor District would not be carrying out the development proposed in its application but would instead allow it to be pursued by third-parties, the Harbor District proposes a program of lease inspections and lessee reporting requirements to help ensure compliance with these thresholds – and the other resource protection measures it has developed. This proposed program includes the following steps, as described in the Harbor District’s application:

Step 1. The culture descriptions provided by prospective Lessees will be reviewed by Harbor District staff to ensure that they are consistent with Lease requirements (and therefore with the EIR and other associated regulatory requirements).

Step 2. Before, during and immediately after installation of culture equipment, Harbor District staff will visit the culture sites to assess the proposed culture layouts and further ensure consistency with Lease requirements. Staff from all permitting agencies, agencies commenting on this DEIR, and any other interested agency will be invited to attend the site visits to provide input.

Step 3. If it is determined that the proposed activity is consistent with Lease requirements, and any other Harbor District requirements, then the District will enter into a Lease with the Lessee, and the Lessee may implement their culture activities as proposed. When a lessee proposes a new culture method or an adaptation of the general culture methods, staff from all permitting agencies, agencies commenting on this DEIR, and any other interested agency will be invited to provide input regarding the appropriateness of the method.

Step 4. Harbor District staff will visit the culture sites during and immediately after each site is “planted” and at least annually thereafter to ensure compliance with all Lease requirements. A standard inspection report will be developed and utilized to document these visits.

Step 5. Each Lessee will provide an annual report to the Harbor District. This report will describe the culture site’s current status of operations, production, culture methods and relationship to the thresholds described below and all other lease requirements. The reports will include an assessment of the originally proposed culture operations versus existing (“as built”) conditions (including a description of location, methods, equipment and any other pertinent information). The reports will also document the state of operations and upkeep on the site, including the presence of discarded, broken or abandoned tools, gear or equipment and shell deposition (which will require SCUBA surveys). Reports will also include representative site photographs. As requested, the Harbor District will provide copies of the annual reports to staff from all permitting agencies, agencies commenting on this DEIR, and any other interested agency.

In the event that culture activities are at any point found to be out of compliance with Lease requirements, the Harbor District will require immediate action to achieve compliance with the Lease. The District will reserve the right to revoke the Lease and require the removal of

all cultured organisms and related equipment for any failure to comply with lease terms, regardless of the type or magnitude of the non-compliance action.

FLUPSYs, Nursery Rafts and Macroalgae Longlines

As shown in the example configuration shown in [Exhibit 3](#), the nursery rafts, floating upwelling raft systems (FLUPSYs), and macroalgae longlines are expected to be placed in Humboldt Bay as one or more joined floating structures. The maximum size for each joined structure would be 10,000 square feet and any single or joined structure of that size would have a buffer around it of at least ten feet of open surface water. Walkways may be located between structures but would be limited to no more than three feet in width and would be grated to allow light penetration of at least 50%. To provide its eventual lease holders with the flexibility to adapt their operations to their own needs – for example, to change the number, type, size, and configuration of different floating structures – the Harbor District has not specified the exact number of each type of structure within each project site but has instead proposed a maximum surface area threshold. The total amount of water surface area used by these structures would be 41,752 square feet (0.96 acres) at Subtidal Site 1, 54,370 square feet (1.25 acres) at Subtidal Site 2, and 37,054 square feet (0.87 acres) at Subtidal Site 3 for a combined total of approximately 3.08 acres.

The structures installed under this threshold would be connected to the existing or proposed piling, pier, or wharf within each of the three project areas by way of floating gangways, cables, and chains. Each of these cultivation structures would allow the shellfish or shellfish seed it contains to be submerged in the waters of Humboldt Bay during grow-out. Diagrams with typical designs for these structures are provided in [Exhibit 2](#).

Nursery Rafts

Based on past practices in Humboldt Bay, typical nursery rafts would be about 12 feet wide by 24 feet long and constructed from aluminum with polyethylene encapsulated styrofoam for floatation. The rafts would be held in place with mooring lines and chains attached to pier, wharf, piling or adjacent aquaculture structures or with anchors on the seafloor. The nursery rafts would receive seed (ranging in size from 0.3 to 0.4 millimeters) purchased or transferred from a seed setting facility and hold it until it grows enough to be transferred to the FLUPSYs for further growth.

Nursery rafts are typically designed with grated decking, a holding tank, upwelling tanks, and associated equipment such as intake and circulation pumps. The pumps would draw seawater from below the rafts through a screened intake pipe and feed it to the holding tank, where it would be collected and passed to the upwelling tanks by way of a single pass gravity fed system. Each raft would have about 24 tray wells, which would contain seed nursery trays in stacks of about 8 to 20 suspended in each well.

Nursery rafts would be used to grow Kumamoto oyster, Pacific oyster and Manila clam seed.

Floating Upwelling Systems

Floating Upwelling Systems (FLUPSYs) are also proposed to be installed and operated within each project area. FLUPSYs are used to quickly grow shellfish seed to the size needed for sale offsite to shellfish aquaculture farms where it can be grown to market sizes. A FLUPSY is an in-

water floating structure designed to upwell nutrient rich water through upwelling bins to provide a consistent source of nutrients to growing shellfish.

The FLUPSYs would be moored by chain and line to the existing pier and six 500-pound anchors and would be comprised of aluminum with plastic wrapped floats for floatation and a submerged trough with a paddle wheel or propeller (as shown in [Exhibit 2](#)). The trough would be surrounded by open wells containing upwelling bins with shellfish. The FLUPSY would operate by using the paddle wheel or propeller to move water out of the trough; in order for the trough to refill, water would need to pass through the upwelling bins containing shellfish seed. The bottom of the upwelling bins are a 1.2 to 1.8 mm mesh screen, which allows water to come up through the upwelling bin and exit the bin at the top. Based on typical practices in Humboldt Bay, each FLUPSY would be approximately 25-feet wide, 80-feet long and would extend to about 5 feet below the water surface. Each FLUPSY would hold approximately 30 upwelling bins.

Shellfish seed would be placed in the FLUPSYs from the nursery rafts when it is approximately 2 to 2.8-mm in size and removed when it reaches approximately 7 to 19-mm in size. After removal from the FLUPSYs the seed would be washed at an onshore facility and shipped in a refrigerated truck to various offsite locations for further grow-out. The FLUPSY method is used to grow Kumamoto oyster, Pacific oyster and Manila clam seed.

Typical daily maintenance activities carried out on the FLUPSY rafts would include sorting and grading the shellfish seed with a vibrating screener and pressure washing the upwelling bins with seawater pumped from Humboldt Bay to prevent the establishment of fouling organisms. FLUPSYs would be moored by chain and line to a wharf, pier or adjacent pilings or anchored with concrete or steel anchors. They are constructed of aluminum with poly-encapsulated floats for floatation, and have a submerged trough containing a paddle wheel or propeller. This trough is surrounded by open wells containing the upwelling bins. The paddle wheel or propeller moves the water out of the trough; in order for the trough to refill, water must pass through the upwelling bins containing oyster seed. The bottoms of the upwelling bins are a 1.2-1.8 mm mesh screen, which allows water to come up through the upwelling bin and exit the bin at the top. Alternatively, instead of using a paddle wheel or propeller, water may be pumped to the shellfish seed. The FLUPSYs only contain seed, which is grown to market size using different methods.

Macroalgae Longlines

Longline culture of macroalgae involves an array of single, independent lines (ropes) fixed by removable mooring points or anchors and supported by floats. The algae would be collected locally from drift or by trimming algae no closer than 2 inches from the holdfasts and would be attached to the ropes for culture. Alternatively, spores may be settled onto ropes. A mature culture line would be covered nearly entirely by live holdfast tissue, promoting generation of vegetative growth radiating outward from the live line. Periodically, the line would be raised and run over a star wheel assembly on an open work skiff, and through a cutter assembly, removing the mature algae and leaving the holdfasts intact on the line for further culture. It is expected that algal biomass at harvest density would be approximately two to three pounds per foot of culture line.

Maintenance of the line would include periodic changing of anchors and floats to remove biofouling. Lines would likely be arranged parallel to shore to minimize drag with tidal currents. Lines would be spaced to accommodate service and harvesting by a work skiff, likely with a minimum spacing of 20 feet between lines.

Visits to longline sites may occur as much as weekly during the spring and summer months and closer to monthly in winter months when algae growth rates decline. Deployment or removal of lines would be more intensive but less frequent, on the order of two to three weeks of daily visits at the beginning or end of the growing season. Harvested product would be fresh cut seaweed in net bags.

Pile Driving

To facilitate the mooring of aquaculture structures within Subtidal Site 3, the Harbor District proposes to install up to eight 12-inch diameter steel or concrete piles. These piles would be installed in the deeper waters of this project site and would be configured to provide maximum mooring space. Installation of the piles would be carried out using either vibratory installation methods (using a machine that vibrates the pile at high speeds to liquefy the adjacent substrate while simultaneously applying downward pressure) or a more traditional impact pile driver. To help ensure that piling installation activities do not adversely affect marine wildlife as a result of elevated levels of underwater noise, the Harbor District proposes to use a marine wildlife monitor, to install hydroacoustic monitoring equipment during the first five pile driving events to determine the sound levels being generated and the appropriate monitoring distances, and to implement maximum underwater sound threshold levels for both marine mammals and special status fish species.

B. Other Agency Approvals

As described below, several state and federal authorizations for this project remain outstanding, most notably, those from the U.S. Army Corps of Engineers and North Coast Regional Water Quality Control Board. Although Commission staff has been in consultation with these agencies during the course of its review and will continue these consultations if the Harbor District's coastal development permit (CDP) application is approved, in order to help ensure that project modifications that may come about as a result of these other agency review processes are appropriately reflected in the CDP and remain consistent with the coastal resource protection conditions it may include, [Special Condition 13](#) would require, prior to the commencement of project construction or installation activities, the Harbor District to submit written evidence that all necessary permits have been granted and that any changes to the project are reviewed by the Executive Director to determine if a CDP amendment would be necessary.

Humboldt Bay Harbor, Recreation, and Conservation District

To implement the development proposed in this project, the Humboldt Bay Harbor, Recreation and Conservation District would issue leases to individuals and businesses interested in developing aquaculture operations. The Harbor District has been approached by a number of businesses interested in leases for the subtidal sites but would not issue any leases until after it receives the necessary state and federal authorizations for this project. The Harbor District served as lead agency for this project under the California Environmental Quality Act and on February 25, 2016, certified a Final Environmental Impact Report for the proposed project and

issued Permit No. 13-03 for the proposed activity, subject to the issuance of additional approvals by the Commission, U.S. Army Corps of Engineers, and North Coast Regional Water Quality Control Board. The term of this permit was set at one year, with a possibility of for up nine additional annual extensions at the discretion of the Harbor District.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (ACOE) has regulatory authority over the proposed project under Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 1344) and Section 404 of the Clean Water Act. Section 10 of the Rivers and Harbors Act regulates structures or work in navigable waters of the United States. Section 404 of the Clean Water Act regulates fill or discharge of materials into waters and ocean waters.

Consistent with similar projects in the past, the ACOE is likely to consider authorizing the proposed project pursuant to Nationwide Permit 48 (for installation of aquaculture equipment). Pursuant to Section 307(c)(3)(A) of the Coastal Zone Management Act (CZMA), any applicant for a required federal permit to conduct an activity affecting any land or water use or natural resource in the coastal zone must obtain the Commission's concurrence in a certification to the permitting agency that the project will be conducted consistent with California's approved coastal management program. The subject coastal development permit (9-16-0204) will serve as Commission review of the project under the CZMA.

California Department of Fish and Game

Businesses or individuals pursuing aquaculture operations are required to be registered annually with the California Department of Fish and Game. Prior to initiating aquaculture operations on the Subtidal Site 1, 2, or 3, Harbor District lessees would need to be a registered as an aquaculturist with the California Department of Fish and Game.

California Regional Water Quality Control Board

The North Coast Regional Water Quality Control Board is currently reviewing the Harbor District's application for a certification under Section 401 of the Clean Water Act (33 USC 1341). The Water Board anticipates completing its review of this permit application in early 2017.

National Marine Fisheries Service

The National Marine Fisheries Service (NMFS) may receive a request from the ACOE to initiate informal consultation pursuant to Section 7(a)(2) of the Endangered Species Act and on essential fish habitat for species managed under the Pacific Coast Salmon, Pacific Coast Groundfish, and Coastal Pelagics Fishery Management Plans pursuant to Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act. If requested, NMFS would carry out this consultation during the ACOE's permit review process.

C. Marine Biological Resources and Water Quality

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 pile driving of up to eight 12-inch diameter concrete or metal piles and the installation and operation of approximately three acres of floating shellfish cultivation structures across approximately 21 acres of submerged habitat has the potential to adversely affect marine resources, water quality, and the biological productivity of coastal waters in Humboldt Bay by potentially causing adverse impacts to benthic and water column habitat, longfin smelt, listed salmonids, marine birds, and marine mammals.

Benthic Habitat

Based on information available from nearby sites, the benthic habitat at the three project sites is comprised of fine sands and silts that support a variety of invertebrate species including polychaete worms, mollusks, and crustaceans (Barnhart et al. 1992). While water depths throughout most of the project sites – approximately 20 to 30 feet - are outside of the depth range for eelgrass, some areas on the shoreward side of the sites and within areas of shoaling are known to support eelgrass beds. The proposed project may adversely affect this benthic habitat through shading from structures on the water surface, through the intentional placement of fill from anchors and mooring pilings and through the unintentional placement of fill from accumulated debris, biofouling, or aquaculture materials dislodged from project structures.

Shading

The presence of nursery rafts, FLUPSYs, and longlines, on roughly 14% of the available surface waters at each of the three proposed project sites, may adversely affect benthic habitat by restricting the amount of light that is able to penetrate the water column and reach the bay sediment below the rafts. Such shading could stunt the growth of submerged aquatic vegetation or benthic algae, alter benthic invertebrate community structure, and modify the presence and abundance of bottom fish in the affected area. However, water clarity in the project area is very

limited and sunlight penetration through the water column is naturally restricted by the particulate matter and sediment typically in suspension. Water clarity samples taken in the summer and fall near the proposed project site have measured the maximum depth to which 1% of surface illumination penetrates at less than four feet on average (Barnhart et al. 1992, Lomelli 2011). Because the majority of the three project sites have water depths of approximately 20 to 30 feet below mean lower low water, light does not penetrate to the bay bottom; thus, shading from the rafts, FLUPSYs or longlines in those areas would not result in any adverse effects on benthic habitats. In addition, the design of the proposed walkways and nursery rafts includes areas of grating across portions of the surface of the rafts (see **Exhibit 2**), allowing some light penetration to occur through the structures and reducing the size of each raft's shade footprint.

However, the project sites also include shallower areas that are known to support eelgrass habitat that would be adversely affected by the shadows created from large surface structures. Because of the orientation of the project sites relative to the sun's movement patterns, and the height difference between the eelgrass habitat and water surface, surface structures would pose a shading risk to areas of submerged aquatic vegetation both directly below and in laterally adjacent areas. To ensure that all areas of eelgrass habitat within the three project sites are appropriately protected from these shading impacts, [Special Condition 8](#) would prohibit surface structures such as nursery rafts, FLUPSYs, and longlines and their associated anchoring and mooring infrastructure from being installed within 30 feet of an eelgrass bed. In order to ensure that all eelgrass beds are protected, [Special Condition 8](#) would also require a pre-installation eelgrass survey, carried out consistent with the guidelines and protocols of the National Marine Fisheries Service's California Eelgrass Mitigation Plan, to be completed within the areas of each site that are shallow enough to potentially support eelgrass.

Although the Harbor District has proposed to take similar precautions for eelgrass habitat through implementation of its BIO-4 mitigation measure, this measure does not specify the manner in which eelgrass habitat would be surveyed and only provides for a ten foot buffer distance between the aquaculture structures and eelgrass habitat. Because shadows from surface structures would likely extend more than ten feet away onto the seafloor with the depths at the project sites, a greater buffer distance is appropriate.

The spatial separation or buffer between aquaculture structures and eelgrass habitat provided by this special condition would provide additional protection for the eelgrass habitat by limiting the potential for biofouling material, lost shell, or other material that accidentally becomes dislodged from the aquaculture structures from drifting onto and accumulating within an adjacent eelgrass bed as it sinks. [Special Conditions 2, 10 and 11](#) would further reduce the potential for this type of material to accumulate on the benthos within the project sites - thus smothering or altering benthic habitat and benthic communities - by (1) building on several of the Harbor District's proposed mitigation measures and requiring as many maintenance cleaning operations as possible to be carried out onshore so that the collected biofouling can be disposed of appropriately; (2) requiring the clean-up, collection, and removal of aquaculture equipment and material upon expiration or revocation of a lease; and (3) requiring a series of best management practices to prevent the release of marine debris.

Fill

The installation of the eight proposed 12-inch diameter piles would result in the permanent fill and loss of up to 6.5 feet and installation of anchors and mooring devices for the surface aquaculture structures and longlines would result in the fill and use of an additional approximately 2,150 square feet of soft substrate benthic habitat. While this amount of fill is small relative to the total amount of similar benthic habitat within Humboldt Bay, because of the abundance of sensitive and special status wildlife species that Humboldt Bay supports – including marine mammals, fish species with state and federal protections, seabirds and migratory shorebirds – and the important role that benthic communities and habitats play in ensuring that functional foodwebs exist for these species, the Harbor District has proposed a mitigation plan to address this loss of benthic habitat. This plan involves the collection and removal of 21 derelict pier pilings from nearby locations in Humboldt Bay to balance the amount of proposed fill that would be permanently placed as a result of the eight proposed piles with new benthic habitat. Because this plan is still being developed, [Special Condition 9](#) requires the Harbor District to complete it and submit it for Executive Director review and approval. Once approved, the Harbor District would implement the plan and remove a minimum of 21 derelict piles to create approximately 40 square feet of new benthic habitat.

Water Column Habitat

Overwater structures reduce light penetration through the water column, which can cause a variety of adverse impacts to marine organisms. In addition, these structures can provide substrate for invasive species, alter current flow and aggregate upper level predators, causing unnaturally high pressure on forage fishes. As discussed in detail below, this project has the potential to cause each of these adverse impacts.

Shading

The presence of large floating structures on the surface typically results in lower light transmittance to the water below. For photosynthetic organisms, including phytoplankton, this shading effect can limit growth rates, abundance, and diversity. Reduced size, diversity, and abundance of low trophic level phytoplankton species can have corresponding effects on the abundance and diversity of species farther up the food chain, including fish and invertebrates.

Overwater structures proposed as part of this project could cause some of these shading effects. The proposed location and design of the nursery rafts, FLUPSYs, and longlines, however, would help to minimize the likelihood of such effects occurring. Specifically, the proposed location of the raft structures in the deeper subtidal waters off the shore of the Samoa Peninsula, an area of frequent tidal currents, would enhance water flow beneath the rafts and increase the frequent movement of phytoplankton from partially shaded to un-shaded adjacent waters. This constant movement is expected to reduce the potential for the rafts to adversely affect primary productivity. In addition, the nursery rafts and FLUPSYs would be built with metal grating and mesh bottom wells as a major component of their surface material. These surfaces would allow some sunlight to penetrate through the rafts into the water column below, although some shading would still occur below each raft. However, given the relatively small footprint of the shaded portion of each surface structure as well as the water depth, current flow, and natural turbidity of the bay water, installation of the proposed array of nursery rafts and FLUPSYs would not adversely affect the productivity of Humboldt Bay by significantly reducing the amount of water column habitat available for photosynthetic plankton.

Non-native Species

Based on a February 28, 2002, report to the California Department of Fish and Game titled, *Non-Indigenous Marine Species of Humboldt Bay, California*, over 95 invasive marine species are present in the bay, including numerous species known to present significant economic and ecological risk to both Humboldt Bay and other marine areas along the west coast. Many of these species are known to be “fouling organisms,” species of invertebrates and algae that are known to seek out and colonize artificial hard substrate in the marine environment. Maintenance activities for in-water structures and vessels that involve periodic removal of fouling organisms without proper collection and disposal protocols may result in increased dispersal and propagation opportunities for these species. Such opportunities for dispersion and spread pose a particular risk with some algal species and colonial species such as didemnum that may break apart into many pieces when disturbed, each of which may be capable of surviving, growing, and reproducing on its own.

Each of the proposed nursery rafts would include multiple cultivation wells and each of the proposed FLUPSYs would include a variety of upwelling bins that would extend below the rafts into the water column. While the bins housing the shellfish seed would be periodically removed and dried out as well as pressure washed on a daily basis to prevent the growth of fouling organisms, the structures supporting the bins and the rafts themselves are likely to attract fouling organisms over time and would need to be periodically removed and cleaned. Some of these cleaning activities may involve the use of a pressure washer, hose, or scraping devices and would be carried out annually or every several years on the hulls and floats of the FLUPSYs and nursery rafts themselves, with wash water and removed fouling organisms discharged into the bay. Other types of cleaning would likely be carried out on the FLUPSY bins on a daily to weekly basis to remove biofilms from the bins that could restrict the flow rate of water and contribute to the colonization of fouling organisms. With regards to the of the FLUPSY/nursery raft structures, while the regular daily or weekly cleaning of the FLUPSY bins would not result in the removal or fragmentation of large amounts of viable biofouling material, the more substantial cleaning of the hulls, floats, and submerged infrastructure of the FLUPSYs and nursery rafts may result in the discharge and spread of invasive organisms. To address the potential risk that this latter cleaning activity would have with regard to the spread and dispersion of invasive marine species, in furtherance of the intent of the Harbor District’s BIO-12 mitigation measure, the Commission is requiring in [Special Condition 2](#) that the cleaning of the FLUPSYs, nursery rafts, longlines, and cultivation well infrastructure be carried out in a manner that prevents discharge of biofouling materials and organisms to Humboldt Bay, including requirements to carry out some cleaning activities onshore and the requirement to collect and dispose of all removed biological material and organisms at an upland facility.

The purpose of the nursery rafts and FLUPSYs is to spawn and produce large numbers of immature shellfish of three non-native species, the Manila clam (*Venerupis (Ruditapes) philippinarum*), Pacific oyster (*Crassostrea gigas*), and Kumamoto oyster (*Crassostrea sikamea*). Both the Manila clam and Pacific oyster have demonstrated abilities to establish self-sustaining populations in the wild outside of cultivation in California, and while more limited research is available on the Kumamoto oyster, its biological traits and the results of some initial investigations suggest it may have similar abilities. However, the proposed project would limit

cultivation of these species to immature sizes, and all shellfish seed is proposed to be collected and removed from the nursery rafts and FLUPSYs before the individual shellfish reach maturity and are capable of reproducing and generating larvae.

Although successful reproduction of the Pacific oyster in Humboldt Bay was documented by the California Department of Fish and Wildlife in 1974 (Span 1978), the Department has generally considered the oceanographic conditions (primarily water temperatures and salinity levels) to be outside of the optimal range for this species, thus limiting the reproduction and spread of Pacific oysters in the wild in Humboldt Bay. However, a more persistent population of Manila clams appears to have been established in the wild in Humboldt Bay in recent years (Boyd et al 2002). Similar to Pacific oysters, adult Manila clams can tolerate a wide range of water temperatures from near freezing to tropical, but are able to spawn at lower minimum water temperatures than Pacific oysters - 57 degrees vs 61 degrees – and have larvae that can survive exposure to lower minimum water temperatures as well – roughly 57 degrees vs 65 degrees for Pacific oyster (Gillespie et al 2012). These abilities likely contributed to the establishment of the population of Manila clams in Humboldt Bay and may allow it to successfully reproduce and spread.

With water temperatures ranging from 46 to 65 degrees, the area of Humboldt Bay near Samoa can support the further spread and naturalization of Manila clams in the wild, with potential consequences for native species and habitats. For example, in places such as San Francisco Bay where the Manila clam has naturalized, it has become one of the most common benthic organisms, achieving densities in excess of 2,000 clams per square meter and leading to community and ecosystem level effects (Cohen 2011, Cohen and Carlton 1995). In the Commission's previous approvals of aquaculture development in Humboldt bay, including the shellfish seed production facility for Taylor Mariculture (CDP No. E-11-029) and shellfish cultivation rafts for Coast Seafoods Company (CDP No. E-02-005, E-02-005-A1, and E-02-005-A2), the Commission found that management measures would minimize the potential augmentation of any naturalized populations of Manila clam that may be present in Humboldt Bay by limiting the potential for accidental releases to occur and ensuring that all cultivated clams are removed prior to reaching the size and age necessary to begin reproducing. The Commission is requiring the Harbor District in [Special Condition 5](#) to implement these same measures.

The proposed placement of the nursery rafts and FLUPSYs would still increase the total population of non-native shellfish in Humboldt Bay by an estimated up to several hundred million individual organisms (the estimated annual shellfish seed production based on the Harbor District's proposed biomass threshold level). The filter feeding behavior of this population of non-native shellfish has the potential to adversely affect native shellfish species, communities of native organisms that rely on the same food resources, and the overall biodiversity and productivity of Entrance Bay or Arcata Bay if they affect a large enough volume of water and if they significantly decrease the amount of food resources in that water available for native species. For example, the invasion of the San Francisco Bay-Delta Estuary by the non-native clam *Corbula amurensis* has had an apparent effect on longfin smelt population abundance, presumably through competition and its negative effects on the upper Estuary's planktonic food web (Bay Institute et al 2007, Kimmerer et al 1994).

Based on an analysis carried out in the Project Description and Biological Analysis developed for the Harbor District for this project by its biological consultant, each day, the clam and oyster seed proposed to be cultivated on the nursery rafts and FLUPSYs would have a 14-day clearance efficiency of between 0.022 and 0.042. Clearance efficiency (CE) is a measure of how effectively shellfish can process bay water during feeding compared to the efficiency of tidal flushing. For reference, Gibbs (2007) states that “very low values of this indicator (<0.05) suggests that the culture will not be able to induce significant changes to the pelagic functioning” (i.e., connectivity between an embayment and nearby coastal areas). In contrast, CE values greater than 1.0 indicate that water in the bay is flushing slower than the water is being processed by cultured shellfish. Based on the calculations of CE carried out by the Harbor District’s biological consultant, the shellfish that would be produced by the proposed project would filter a fractional amount of the total volume of water in Arcata Bay at high tide and the volume of water that leaves Arcata Bay at ebb tide each day.

Calculations of several other carrying capacity or sustainability indicators carried out by the Harbor District’s biological consultant provide similar indications that the filtration effect of the shellfish cultured from this project would remain well below the potential carrying capacity of the Humboldt Bay system. If the project is considered cumulatively along with other existing aquaculture operations in Humboldt Bay, the total filtration effect also appears to remain below a level that may adversely affect the biological productivity of non-cultured organisms within the Humboldt Bay ecosystem. However, as future large-scale expansion of shellfish aquaculture in Arcata Bay or Entrance Bay is considered, this combined filtration effect would need to be more closely considered.

Special Status Species

Three species of salmonids that inhabit Humboldt Bay and its tributaries are listed as threatened under the federal Endangered Species Act of 1973. Two of these species are also listed as threatened under the California Endangered Species Act. Coho salmon (*Oncorhynchus kisutch*) is federally and state listed for the Southern Oregon/Northern California Coasts Evolutionarily Significant Unit (ESU), Chinook salmon (*O. tshawytscha*) is federally and state listed for the California Coastal ESU, and steelhead (*O. mykiss*) is federally listed for the Northern California ESU. These salmon species are present in Humboldt Bay both as adults during their migration from the sea into spawning rivers in the fall and winter and as juveniles as they move downstream into the ocean in the spring and early summer. In addition, longfin smelt (*Spirinchus thaleichthys*) is listed as a threatened species under the California Endangered Species Act. Longfin smelt generally spawn in freshwater and move downstream to estuarine conditions to grow. Although once among the most abundant fish species in Humboldt Bay, present in larval, juvenile, and adult life stages, longfin smelt were considered to be possibly extinct there by 1996 (Eldridge and Bryan 1972, U.S. Fish and Wildlife Service 1996). In recent years, however, longfin smelt have again been observed in Humboldt Bay and are thought to be present year-round (Pinnix et al 2005).

Artificial overwater and in-water structures such as docks and rafts can alter surface and mid-water habitat and may affect juvenile salmon (especially ocean-type Chinook and chum) directly and indirectly: (1) directly by disrupting their migratory behavior along shallow-water shoreline habitats and (2) indirectly by reducing carrying capacity because of reduced production of under-

structure habitats and increased predation by other fish, birds, and, marine mammals (Simestad and Nightengale 1999).

Although different than typical overwater structures, such as piers and docks, the additional proposed nursery rafts, FLUPSYs and longlines would result in approximately three acres of new floating structures. While these structures would be located adjacent to existing pier and wharf structures along the Samoa Peninsula in areas characterized by existing overwater structures, docks, and piers that are spread in low density along the shoreline, they would still represent a substantial increase over the existing amount of structures currently located in these areas. As such, the proposed structures could affect migratory behavior of juvenile salmonids or predation rates on them. However, the results of limited hook and line surveys of fish species associated with 30 floating clam rafts in Arcata Bay that were carried out in several seasons suggest that the species most likely to be attracted to overwater aquaculture structures in Humboldt Bay are not those expected to predate on juvenile special status fish species. Based on this information, the installation and maintenance of additional overwater structures is unlikely to attract or encourage predatory fish.

Underwater Sound

The Harbor District proposes to install up to eight 12-inch diameter concrete or steel piles within Subtidal Site 3. These piles would provide a mooring or connection point for overwater aquaculture structures and are proposed to be installed to using either vibratory methods or with an impact driver. Because these activities would be carried out both above and within marine waters, the project has the potential to result in adverse impacts to both marine organisms and the marine environment. Specifically, the proposed pile driving would result in the generation of elevated levels of underwater sound in nearshore waters known to support several species of marine mammals, including harbor seals, California sea lions, and harbor porpoise. Marine mammals in general – and harbor porpoise in particular - are known to be susceptible to disturbance and injury from high levels of human-generated underwater sound. In addition, a variety of fish and invertebrate species are also known to suffer disturbance and injury as a result of elevated underwater sound levels.

The proposed use of pile driving equipment during the installation of up to eight piles at subtidal site 3 has the potential to adversely affect marine mammals due to the elevated underwater sound levels that would occur during this activity. Marine mammals rely on sound to navigate, and find food, mates, and companions. Elevated levels of human generated underwater sound have been shown to interfere with these activities and in some cases to cause internal injury, stranding, and mortality. To prevent and minimize these damaging effects of sound to marine mammals, the Harbor District has proposed to use the smallest diameter piles (12-inch diameter or less) and would implement several protective measures. These include (1) the use of an on-site biological monitor that would evaluate marine wildlife near the site of the pile installation work and halt work if any such wildlife displays avoidance behavior or other negative reactions to the activity; (2) hydroacoustic monitoring of the first five piles in order to determine the underwater sound level and attenuation distances; (3) implementation of a hazard zone around the pile driving activity based on the results of the sound monitoring and the distances at which sound levels attenuate to 160 decibels (if impact pile driving methods are used) and 120 decibels (if vibratory methods are used); and (4) adherence to the threshold sound levels to prevent injury to special

status fish species developed by the multi-agency Fisheries Hydroacoustic Working Group in 2008.

In order to help clarify how these various protective measures would work together and be implemented, achieve consistency with the most recent National Marine Fisheries Service guidelines for protecting marine mammals from underwater sound and help ensure that the protective measures achieve their intended outcome, the Commission finds that [Special Conditions 6 and 7](#) are needed to assure success of the Harbor District's commitments and additionally require (1) the use of an initial incremental ramp-up period during pile-driving activities (during which time sound levels slowly increase); (2) the use of the lowest available power setting on the pile hammer equipment, thus reducing the force of its impact on the steel piles and the resulting sound energy transmitted into the marine environment; (3) the use of feasible sound dampening devices and techniques, such as cushion blocks or caps placed between the pile hammer and steel pile to reduce the energy transmitted from the hammer into the steel pile.

Further, [Special Condition 7](#) would specify the methods to be used to obtain and report the results of the hydroacoustic monitoring and clarify the appropriate decibel units to use in establishing marine mammal hazard zones so that they are consistent with the most current guidance provided by the National Marine Fisheries Service in its July 2016 *Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing* to prevent adverse impacts to the harbor porpoise, the most sensitive species most likely to be found at the project site. Additionally, [Special Condition 6](#) establishes the size of the hazard zone to be used during the initial two pile driving events that will be monitored to establish the zone used for the remaining six piles. Finally, [Special Condition 6](#) would also clarify that the Executive Director-approved marine mammal monitor on site would have the authority to suspend pile driving if a marine mammal passes within the hazard zone. Therefore, although underwater noise from the project could disturb or injure marine mammals known to be occasionally present in the area, the project is conditioned to minimize these potential effects.

The elevated underwater sound levels resulting from pile driving may also result in adverse impacts to fish and invertebrate species. While the current level of scientific understanding of these impacts remains incomplete, several studies carried out in recent years suggest that physical injury to fish may result from both instantaneous exposure to a maximum sound pressure level as well as from accumulated exposure to a lower sound level over a longer period of time. As a result of these studies, in 2008, an interagency working group comprised of representatives of state and federal resource management agencies from California, Oregon, and Washington developed recommendations of peak and accumulated sound levels to be used as thresholds for injury to fish. These thresholds were specifically developed for sounds associated with pile driving activities in fresh and estuarine waters that may support threatened or endangered fish species, in particular, some of the same the suite of special status salmonid species that are known to be present at the site of the proposed pile driving – the Coho and Chinook Salmon and Northern California steelhead, all listed as threatened under the Federal Endangered Species Act, and the coastal cutthroat trout, a State Species of Special Concern. Although the Harbor District has proposed to adhere to these thresholds, the manner in which this would be achieved is unclear. As such, the Commission is requiring in [Special Condition 7](#)

that the Harbor District maintain an underwater acoustic monitoring device at the site of each pile driving event and that this device be monitored to ensure that the peak and accumulated sound levels established by the interagency Fisheries Hydroacoustic Working Group in its June 2008, memorandum are not exceeded. If the accumulated sound exposure level of 183 dB re: 1 μPa^2 is exceeded, [Special Condition 7](#) requires the Harbor District to cease pile driving operations for as long as possible without risking sediment consolidation and not less than 30 minutes to allow any fish exposed to this injurious accumulated sound level to recover. If the peak sound level of 206 dB re: 1 $\mu\text{Pa}_{\text{peak}}$ is exceeded, the Harbor District shall implement additional power reduction and/or sound dampening measures necessary to reduce the peak sound pressure level below the threshold necessary to protect marine fish. [Special Condition 7](#) also requires the Harbor District to submit the compiled peak sound pressure level and accumulated sound exposure level data from the first two of the eight piles to the Executive Director and allows the Harbor District to discontinue the underwater acoustic monitoring for the remaining piles if neither peak sound pressure level nor accumulated sound exposure level is exceeded during these first two pile driving operations (and assuming continued use of any sound dampening approaches or devices that were used during those activities).

Marine Mammal and Seabird Use

The proposed nursery rafts and FLUPSY structures may be colonized by seabirds and marine mammals for use as resting areas. Such use may result in harm, harassment, or injury to this marine wildlife. Such effects on marine wildlife may be unintentional consequences of these animals using the rafts (entanglement or injury on the structures), attempting to prey on cultured shellfish on the rafts, or necessary deterrence activities that may be carried out in order to prevent property loss or damage. The injury, disturbance, or mortality to marine wildlife species that may result from their colonization of the proposed nursery rafts and FLUPSYs could result in adverse impacts to marine biological resources.

In addition to these direct effects, colonization of the proposed clam rafts by marine mammals or seabirds, both of which may prey on special status fish species such as longfin smelt and salmon that are known to be present in the project area, could result in adverse indirect effects by augmenting the local abundance of predators and thereby increasing salmon and smelt predation. Longfin smelt, in particular, are known to be eaten by a variety of predatory fishes, birds and marine mammals and are considered to be a major prey of harbor seals (*Phoca vitulina*) in the Columbia River (Emmett et al. 1991). In addition, numerous studies throughout North America and Europe have demonstrated that avian predators such as cormorants and pelicans can consume large numbers of juvenile salmonids when appropriate conditions occur. In recent years, the Sand Islands in Arcata Bay, located only several miles north of the project site, have been found to support the largest nesting colonies of double-crested cormorants in California (Capitolo et al 2004). The presence of these colonies near the project area and the propensity of this species to roost on man-made overwater structures suggest that colonization or development of roosts on new structures could occur, potentially increasing the amount of avian predation on juvenile salmon and longfin smelt in the project area. To a lesser extent, another piscivorous seabird species known to establish roosts on man-made overwater structures, the brown pelican, also may increase predation on longfin smelt and juvenile salmon in the project area if it is also able to colonize the proposed rafts.

Although existing structures at the project sites provide roosting opportunities for seabirds, current use of the existing pier and wharf structures at the project sites by pelicans, cormorants, herons, loons, and seagulls appears to be limited. Additionally, no marine mammals have been observed to haul out in this area. However, several miles north of the project site, both Coast Seafoods and Taylor Mariculture operate several arrays of shellfish cultivation rafts that are known to support populations of roosting seabirds, including brown pelicans and cormorants.

To address the potential adverse impacts associated with the direct and indirect effects of marine wildlife colonization of the rafts, the Commission is requiring the Harbor District in [Special Condition 3](#) to report to the Executive Director within ten days if marine mammals, cormorants, or pelicans begin establishing a haul-out or roost on its nursery rafts and FLUPSYs for more than two weeks, and within 30 days submit for Executive Director review and approval a plan for the installation of passive marine mammal and/or seabird exclusion devices on the rafts. The Commission believes that implementation of [Special Condition 3](#) will help to limit the potential for the project to increase predation on longfin smelt and juvenile salmon and reduce potential injury or disturbance of marine wildlife.

Seawater Intakes

The removal of seawater through intake structures is known to result in the impingement and entrainment of marine life. The type and quantity of marine life that may be adversely affected in this way is related to the size and velocity of the intake structures. Larger, high-velocity structures can cause the impingement and entrainment of larger organisms that can include adult fish while smaller low-velocity structures can typically only impinge and entrain smaller larval and juvenile organisms. While impingement (capture of fish and marine organisms against an intake screen due to suction) can often result in the injury or mortality of the affected organism, adverse effects of entrainment (capture of fish and marine organisms in the intake stream) vary based on the type of intake system (configuration of pipes, pressure changes, temperatures) and ultimate use of the entrained water.

As part of the proposed operation of nursery raft and FLUPSY systems, a variety of activities would be carried out that require seawater to be extracted from Humboldt Bay. These activities include (1) operation of the nursery rafts; (2) operation of the FLUPSYs; and (3) maintenance cleaning of the rafts and equipment.

Seawater use associated with operation of the nursery rafts and FLUPSYs would be limited to the water drawn-in to upwelling tanks and the paddle-wheel trough and discharged back into the bay and would therefore not include permanent removal, heating, or the pressure changes and mechanical stress that comes with movement through a long series of pipes. Because removal, heating, and mechanical stress are the primary causes of mortality for entrained organisms, the type of proposed water use associated with operation of the nursery rafts and FLUPSYs would not result in entrainment impacts to the larval and planktonic organisms within the water.

In response to concerns raised by staff of the California Department of Fish and Wildlife (DFW) and National Marine Fisheries Service (NMFS) regarding impingement of listed species such as longfin smelt and juvenile salmon during the Commission's review of similar aquaculture development within Humboldt Bay, and due to DFW and NMFS intake system standards, the

Harbor District has proposed to implement its BIO-6 mitigation measure to require that all intakes used for the aquaculture structures limit intake approach velocities to those levels that the best available scientific information indicates would be most protective for the age classes of salmonids and longfin smelt that are likely to be found within the project sites. Specifically, intakes with active intake screen systems would be required to have an approach velocity of 0.2 feet-per-second and passive systems would be required to have an approach velocity of 0.05 feet-per-second. In addition, the mitigation measure also establishes a minimum screen size of five square feet per cubic foot per second of intake for active systems and 20 square feet per cubic foot of intake for passive systems.

To clarify several elements of these intake requirements and memorialize the Harbor District's mitigation measure BIO-6, the Commission is requiring in [Special Condition 4](#) that intake systems used on the project sites do not exceed 0.2 feet per second with a screen size of at least 5 square feet per cubic foot per second if an active system is used and 0.05 feet per second with a screen size of at least 20 square feet per cubic foot per second if a passive system is used. The condition further specifies that the screen openings for the intake point screen remain no larger than 3/32 inch if round or square, and no larger than 1.75 millimeters if slotted or wedge wire is used.

Condition Compliance

Because the project relies on a "pre-permitting" approach that would involve third-party entities carrying out the development activities for which the Harbor District would hold the permits, additional conditions are needed to assure compliance with the terms of this permit and the project's development thresholds. To address this possibility and provide additional assurance that compliance issues are identified and corrected in a timely manner, [Special Condition 12](#) would require the Harbor District to submit an Annual Compliance and Status Report for all of the active leases within the three project sites. This report would include the results of lease inspections, lease status information, and information on the as-built condition of aquaculture structures installed within the leases. Beyond facilitating permit condition compliance, these reports would also provide an opportunity for Commission staff to coordinate with the Harbor District and other relevant agencies on adaptive management to proactively address issues that may arise as a result of aquaculture operations within the leases. [Special Condition 1](#) would build further on this approach to provide additional assurance that compliance issues are addressed by limiting the term of the CDP to approximately ten years, the term of the Harbor District permit for this project. Because this term could be extended through an amendment, the Commission would be provided with an additional adaptive management and assessment opportunity during the review of that CDP amendment.

Conclusion

Although that the proposed project has the potential to adversely impact marine resources and the biological productivity of coastal waters, with implementation of [Special Condition Nos. 1 through 12](#), the Commission finds 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 Commission finds the proposed project, as conditioned, would maintain water quality and the biological productivity of coastal waters

appropriate to maintain optimum populations of marine organisms and human health. The Commission therefore concludes that the proposed project, as conditioned, would be consistent with the marine resource sections (Sections 30230 and 30231) of the Coastal Act.

D. Fill of Open Coastal Waters

Section 30233(a) of the Coastal Act states:

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.*

Coastal Act Section 30108.2 defines “fill” as “earth or any other substance or material ... placed in a submerged area.” As part of its project, the Harbor District proposes to install approximately 2,163 square feet of anchoring and mooring devices on the seafloor of the project sites, including up to eight 12-inch diameter steel or concrete piles. In addition to mooring chains attached to existing pier, wharf, and piling structures in the project sites, these anchors and additional piles would maintain the nursery rafts, longlines, and FLUPSYs in place. Installation of these pilings, anchors, and mooring devices into the submerged nearshore zone constitutes “fill” of estuarine waters, as that term is defined in the Coastal Act.

The Commission may authorize a project that includes filling of estuarine waters if the project meets the three tests of Coastal Act Section 30233. The first test requires that the proposed activity fit within one of seven use categories described in Coastal Act Section 30233(a)(1)-(7).

The second test requires that no feasible less environmentally damaging alternative exists. The third and final test mandates that feasible mitigation measures are provided to minimize any of the project's adverse environmental effects.

Allowable use

The purpose of the anchors is to support rafts, longlines, and floating structures that would be used to cultivate shellfish seed and macroalgae, an aquaculture activity. Aquaculture is described as an allowed use in Coastal Act Section 30233(a)(7). Therefore, the Commission finds that the project meets the allowable use test for fill of estuarine waters under Coastal Act Section 30233(a).

Alternatives

The Commission must further find that there is no feasible less environmentally damaging alternative to placing fill in estuarine waters. Coastal Act Section 30108 defines "feasible" as "...capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social and technological factors."

In addition to the proposed placement of anchors and new pilings on 2,163 square feet of submerged tidelands, the Harbor District also considered alternatives that included no pile driving and alternatives that included the installation of substantially more pilings to replace all proposed anchors and serve as additional mooring posts for the nursery rafts, FLUPSYs, and longlines in the three project sites. However, the installation of additional pilings was rejected because it would involve extensive use of pile driving and result in the generation of elevated levels of underwater sound for long periods of time that could adversely affect marine wildlife. The Harbor District also rejected the use of anchoring devices only because it would result in significantly more benthic fill and a much greater number of mooring lines and anchoring lines in the water column that could pose an entanglement risk to marine wildlife. The Commission agrees with the applicant that on balance, these alternatives would be more environmentally damaging when compared to the proposed combination of limited piling installation and anchor use.

For the reasons described above, the Commission finds that the proposed project is the least environmentally damaging feasible alternative and therefore meets the second test of Coastal Act Section 30233(a).

Mitigation Measures

The final requirement of Coastal Act Section 30233(a) is that filling of coastal waters may be permitted if feasible mitigation measures have been provided to minimize any adverse environmental impacts. As described in greater detail in the marine resources section of this report, the mitigation measures associated with this project consist of: marine wildlife protection measures; non-native species management measures; intake standards; marine debris avoidance measures; and eelgrass protection measures. These feasible mitigation measures will minimize the project's adverse environmental impacts. Thus, with the imposition of the conditions of this permit, the Commission finds 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, consistent with Section 30233 of the Coastal Act.

E. Coastal Dependent Industrial Facilities

Section 30101 of the Coastal Act states:

"Coastal-dependent development or use" means any development or use which requires a site on, or adjacent to, the sea to be able to function at all.

Section 30222.5 of the Coastal Act states:

Oceanfront land that is suitable for coastal dependent aquaculture shall be protected for that use, and proposals for aquaculture facilities located on those sites shall be given priority, except over other coastal dependent developments or uses.

Section 30255 of the Coastal Act states:

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

Section 30260 of the Coastal Act states:

Coastal-dependent industrial facilities shall be encouraged to locate or expand within existing sites and shall be permitted reasonable long-term growth where consistent with this division. However, where new or expanded coastal-dependent industrial facilities cannot feasibly be accommodated consistent with other policies of this division, they may nonetheless be permitted in accordance with this section and Sections 30261 and 30262 if (1) alternative locations are infeasible or more environmentally damaging; (2) to do otherwise would adversely affect the public welfare; and (3) adverse environmental effects are mitigated to the maximum extent feasible.

Although the proposed project does not include any onshore development or activities, the three project sites are located directly offshore and adjacent to land designated and reserved for coastal dependent industrial uses in the Humboldt County Local Coastal Plan. The presence of the approximately three proposed acres of nurse rafts, FLUPSYs and macroalgae longlines spread across the roughly 21 acres of these three sites may impede some types of access to the adjacent onshore lands or conflict with certain types of coastal dependent industrial uses. For example, large commercial shipping vessels may not be able to moor at or carry out loading/offloading activities with the floating aquaculture structures in place and the installation and use of large intake or outfall structures associated with many types of coastal dependent industrial uses may present additional potential conflicts with regard to the space and water quality required in the three project sites for the proposed aquaculture activities included in this project. However, the coastal dependent industrial lands adjacent to the project sites are currently mostly vacant and

underutilized and new or expanded coastal dependent industrial uses do not appear to be on the planning horizon for these areas.

Additionally, under the Humboldt County LCP, aquaculture is included among the principal permitted uses on lands with coastal dependent industrial designations and onshore aquaculture facilities may be more compatible as an adjacent use to the subtidal structures proposed in this project. However, under Section 30222.5 of the Coastal Act, aquaculture uses on oceanfront lands does not have priority over coastal dependent industrial uses. Therefore, to help ensure that the proposed project facilities do not conflict with the potential future use of adjacent onshore lands for coastal dependent industries, [Special Condition 1](#) establishes both a fixed permit term (either February 25, 2026 or the earlier expiration of the Harbor District permit for this project) and a requirement that an application to amend this CDP to extend the permit term be accompanied by a report that includes information regarding the current and projected level of demand for coastal dependent industrial uses along the shoreline of Humboldt Bay and the available land and infrastructure to meet that demand. The information in this report would then be reviewed and an analysis of it provided to the Commission for consideration along with the amendment application. This approach would allow the potential conflict between the proposed project facilities and coastal dependent industrial uses on adjacent lands to be reexamined at a future date if there is a change from the present circumstances where no such conflict exists.

The Commission therefore concludes that the proposed project, as conditioned, would be consistent with the coastal dependent industrial use sections (Sections 30255 and 30260) of the Coastal Act.

F. California Environmental Quality Act

On February 25, 2016, the Humboldt Bay Harbor, Recreation, and Conservation District certified a Final Environmental Impact Report for its development of a three subtidal sites for shellfish and macroalgae aquaculture operations. In addition, Section 13096 of the Commission's administrative regulations requires Commission approval of coastal development permit applications to be supported by a finding showing the application, 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. 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 or mitigation measures. Therefore, the proposed project is consistent with CEQA.

G. Consulted Parties

During the course of its review of this project, Commission staff consulted with staff of the Humboldt Bay Harbor, Recreation, and Conservation District, U.S. Army Corps of Engineers, National Marine Fisheries Service, California Department of Fish and Wildlife, and North Coast Regional Water Quality Control Board. In addition, Commission staff also solicited input from interested parties, including local residents and Audubon.

Appendix A: Substantive File Documents

Coastal Development Permits and Application Materials:

Adopted Findings for Coastal Development Permit No. E-11-029

Adopted Findings for Coastal Development Permit Nos. E-02-005, E-02-005-A1, and E-02-005-A2

Adopted Findings for Coastal Development Permit No. 9-13-0500

Application and Application File for Coastal Development Permit No. 9-16-0204

Environmental Documents:

Humboldt Bay Harbor, Recreation, and Conservation District, *Final Environmental Impact Report for Humboldt Bay Mariculture Pre-permitting Project*, February 2016.

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Appendix B: Harbor District Mitigation Measures

As part of its proposed project, the Harbor District also proposes to implement the following adverse impact avoidance and minimization measures:

MITIGATION BIO-1: Educational meetings. *The District will require farmers to hold annual educational meetings with their personnel (which will be described in annual reports) where the following procedures relating to marine mammals will be described. These meetings will describe that when marine mammals are encountered, personnel shall:*

- Reduce speed and remain at least 100 yards from the animal(s), whether it is on land or in the water.
- Provide a safe path of travel for marine mammals that avoids encirclement or entrapment of the animal(s) between the vessel and the shore.
- If approached closely by a marine mammal while underway, the operator shall reduce speed, place the vessel in neutral and wait until the animal is observed clear of the vessel before making way.
- Avoid sudden direction or speed changes when near marine mammals.
- Never approach, touch or feed a marine mammal.

During these meetings, farmers will also be directed to properly stow any gear and remove any trash or debris from the bay (including on raft structures) so as to avoid potential entanglement of fish or marine mammal species that may be on or near culture equipment.

MITIGATION BIO-2: Shielding of temporary light fixtures. *Only lighting fixtures that are fully shielded and designed to minimize off site glare and reduce on water light spillage will be utilized at night. Motion sensing lighting will be used to the extent feasible to reduce the amount of time lights are on. Where motion sensing lighting is not feasible but lights do not need to be on continuously, timers will be installed to reduce the amount of unnecessary lighting. Permanent light fixtures shall not be installed, lights shall be brought to sites when needed.*

MITIGATION BIO-3: Eelgrass avoidance by boats. *Boat traffic will be routed around eelgrass beds to minimize the potential for damage to eelgrass from propellers and hulls. Site descriptions will be prepared for each culture site and will describe boat routes that shellfish farm workers will use to avoid eelgrass.*

MITIGATION BIO-4: Eelgrass avoidance of culture equipment. *Prior to placement of shellfish culture equipment, eelgrass will be mapped and a 10 ft. buffer will be placed around eelgrass plants. Shellfish culture will not occur within these areas. This is the buffer size recommended by the Ca. Department of Fish and Wildlife for the Project (CDFW 2015). With this buffer, no effects to eelgrass from shading or physical contact with culture equipment are expected.*

MITIGATION BIO-5: Deposition of shells. *Shellfish farm operators will not intentionally deposit shells or any other material on the bay floor. Natural deposition of shells and other materials will be minimized to the maximum extent feasible. Annually, shells deposited on the bay floor will be removed, unless they are fully buried. Annual monitoring described above will determine the need for shell removal.*

MITIGATION BIO-6: Screening criteria. *CDFW has developed screening criteria to protect juvenile longfin smelt in bays and estuaries from impingement or entrainment by water intakes. These criteria also allow for protection of juvenile salmonids, as based on criteria developed by NMFS (2008). These criteria, which all water intakes under the Project will maintain, are as follows:*

- Round or square (measured diagonally) openings in intake screens shall not exceed 2.38 millimeters (mm) (3/ 32 in).
- Slotted opening in the screen shall not exceed 1.75 mm (0.0689 in).

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Approach velocity shall not exceed 0.2 ft per second for self-cleaning screens or 0.05 ft per second for non-self-cleaning screens. Self-cleaning screens must achieve full clearance of the entire screen at least once every five minutes.

Overall screen porosity shall be a minimum of 27%.

With this mitigation measures, the Project is expected to adequately protect fish species from impingement and/or entrainment and this impact is considered less than significant.

MITIGATION BIO-7: Spawning herring avoidance. During the herring spawning season (December, January and February) shellfish farmers will visually inspect shellfish culture equipment to be worked on prior to harvesting, planting or maintenance to determine if herring have spawned. If herring spawning has occurred then the harvesting, planting or maintenance will be postponed for two weeks on the beds where spawning occurred in order to allow for successful reproduction.

With the Mitigations BIO-3–5, the Project is not expected to significantly reduce eelgrass available for spawning herring. Additionally, with Mitigation BIO-7, it is expected that herring will be able to successfully reproduce with eggs deposited on shellfish culture equipment; though the reproductive success rate is unknown. However, particularly due to the small surface area of culture equipment and abundant eelgrass in the bay, this impact is considered less than significant with mitigation.

MITIGATION BIO-8: Discard clam culls outside of bay. During washing of seed and equipment, screens will be used to contain all clams regardless of size and any culls will be discarded in locations where they cannot reach coastal waters.

MITIGATION BIO-9: Remove mature clams from bay. All clam seed will be removed from Humboldt Bay prior to reaching 12 mm shell size, at which size they are not yet sexually mature.

MITIGATION BIO-10: Sound threshold criteria. This mitigation measure will allow for consistency with noise criteria developed by the Fisheries Hydroacoustic Working Group (FHWG 2008) to protect fish from injury. To achieve these criteria, vibratory pile installation, noise attenuation devices, limits on daily activity and other Project components will be used. Criteria to protect fish from injury are as follows, these are the thresholds established for fish injury by the Fisheries Hydroacoustic Working Group (FHWG 2008):

A cumulative sound exposure level of 183 dB re: 1 μ Pa²*sec as measured 10 m from the source shall not be exceeded, and

Peak sound pressure of 206 dB re: 1 μ Pa_{peak} as measured 10 m from the source shall not be exceeded.

MITIGATION BIO-11: Biological monitor. A biological monitor shall be on-site during pile installation to determine if special status bird and/or marine mammal species are displaying avoidance behavior or other signs of being negatively affected by the pile installation activities. If this occurs then pile installation shall cease until the bird or marine mammal species are no longer in close enough proximity to the operations to be effected.

Additionally, to insure injury or harassment does not occur to marine mammals, hydroacoustic monitoring of the first five piles installed will be conducted to determine the distance from pile installation at which underwater sound levels caused by installation reach 120 dB_{rms} (if vibratory installation methods are used) or 160 dB_{rms} (if driving installation methods are used). The five piles chosen for monitoring will represent the spectrum of sound generation by pile installation at the site or will be the five piles expected to have the greatest level of sound generation during installation. These are the thresholds for disturbance to marine mammals established by NMFS (2012). A biological monitor will be onsite and if a marine mammal comes within the distance that would cause disturbance based on these thresholds, then pile installation will cease until the animal moves to a distance where disturbance would not occur.

Also, based on the work of Lucke (2009), harbor porpoises may have higher sensitivity to sound disturbance than other marine mammals. Lucke (2009) suggests that harbor porpoises may swim away from sound at lower levels than the thresholds described above. The implications of moving away from a sound differ depending on site specific information (e.g., location of food sources). For the Project, a precautionary approach will be taken and pile installation activities will not occur while a harbor porpoise is in

the line of sight of the biological monitor. However, further analysis is necessary to determine if this is an appropriate or necessary mitigation measure for other pile installation activities.

With these mitigation measures, any impacts to fish, birds or marine mammals are expected to be minimal and this impact is considered less than significant with mitigation.

MITIGATION BIO-12: Bio-fouling organism removal. *All bio-fouling organism removal operations shall be carried out onshore or on a vessel. All bio-fouling organisms removed during these cleaning operations shall be disposed of at an appropriate upland facility.*

Exhibit 1 – Project Locations



EXHIBIT 1

Project
Location

SITE 1 – 6.6 acres



EXHIBIT 1
Project
Location

SITE 2 – 8.6 acres

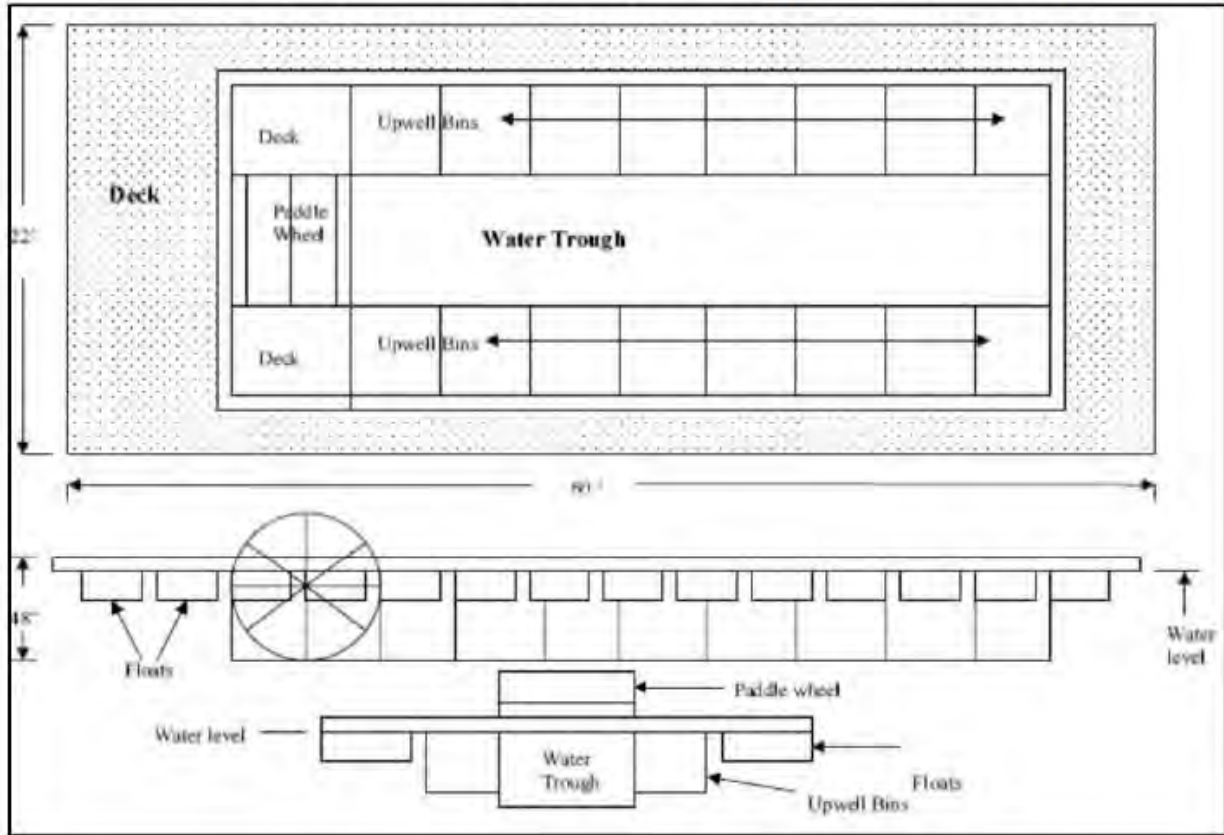


SITE 3 – 6 acres



Exhibit 2 – Nursery Rafts and FLUPSYs

Floating Upwelling System (FLUPSY) (from CSC 2007)



Culture Rafts and a Work Platform (from CSC 2007)

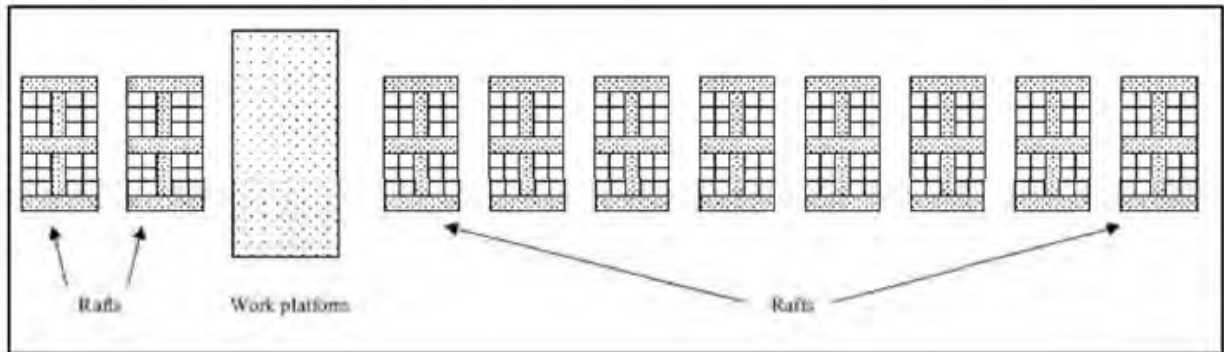


Exhibit 2 – Macroalgae Longline

Macroalgae Longline Culture

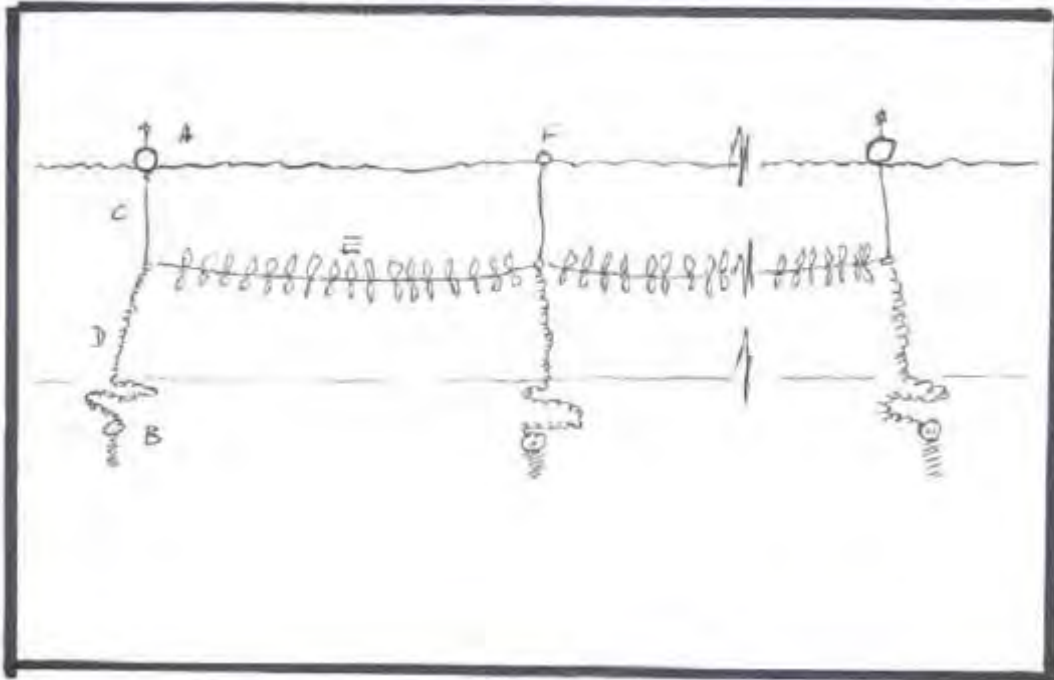


Exhibit 3 – Conceptual Layout of Subtidal Site 3

