CALIFORNIA COASTAL COMMISSION
45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105- 2219
VOICE AND TDD (415) 904- 5200
FAX (415) 904- 5400

Th11a

Filed: 11/27/13
180th Day: 5/26/14
Staff: C. Teufel-SF
Staff Report: 2/21/14
Hearing Date: 3/13/14

STAFF REPORT: REGULAR CALENDAR

Application No.: **9-13-0500**

Applicant: **Hog Island Oyster Company**

Agents: Plauché and Stock LLP and Steelhead Law PLLC

Location: Samoa Peninsula, Humboldt County.

Project Description: Install shellfish nursery rafts, floating upwelling systems (FLUPSYs), and associated equipment on and adjacent to an existing pier and construct and operate an onshore shellfish hatchery, shellfish seed setting facility, office, algae greenhouse, covered work area, and seed washing facility.

Staff Recommendation: Approval with conditions.

SUMMARY OF STAFF RECOMMENDATION

Hog Island Oyster Company (Hog Island) proposes to establish a shellfish hatchery and seed production operation at an existing pier and adjacent 3.5-acre undeveloped upland area on the shores of Humboldt Bay. The pier was formerly associated with a nearby pulp mill and it and the adjacent upland land have been leased from Sequoia X, LLC while the Humboldt Bay tidelands surrounding the pier have been leased from the Humboldt Bay Harbor, Recreation, and Conservation District. The project site is located north of the Eureka Municipal Airport near the town of Samoa to the north of the entrance to Humboldt Bay.

The proposed operation would support shellfish spawning and seed cultivation operations – the process of generating free swimming oyster and clam larvae and growing them to between four and twelve millimeters in size. After reaching this size, the shellfish are known as seed and would be sold and transported to commercial aquaculture operations for further grow-out and harvest offsite. Hog Island proposes to grow up to 40 million Pacific oyster, Manila clam and Kumamoto oyster seeds for sale and to also generate shellfish larvae for use at Hog Island's aquaculture operations in Tomales Bay. The proposed shellfish hatchery and seed operations involve the following project elements: (1) a shellfish hatchery; (2) seed setting facility; (3) three nursery rafts; (4) six floating upwelling systems (FLUPSYs); (5) pier upgrades; (6) a seed wash facility; (7) seawater intake and discharge system; (8) septic system; (9) algae greenhouse; (10) covered work area; (11) an office; and (12) a parking area and access road. The hatchery, seed setting operation, storage tanks and office facility would be housed in a 6,400 to 7,200 square foot mariculture building proposed to be constructed on the 3.5-acre project site. The remaining onshore facilities – the covered work area, algae greenhouse, septic system, shellfish seed wash facility, parking, and access road – would also be constructed on site near the mariculture building, as shown in **Exhibit 1**.

The key Coastal Act issue of concern is the potential 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 1-5**, 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 permit term limit consistent with the current lease term for the project site, giving the Commission the opportunity to re-assess the coastal resource impacts of the operation after it has been functioning for approximately 10 years. 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 the wash water intake system to reflect current standards established to minimize the entrainment and impingement effects.

Commission staff recommends that the Commission **APPROVE** coastal development permit application 9-13-0500, as conditioned.

TABLE OF CONTENTS

APPENDICES

EXHIBITS

I. MOTION AND RESOLUTION

Motion:

I move that the Commission approve Coastal Development Permit 9-13-0500 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 9-13-0500 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 SCE 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 SCE to bind all future owners and possessors of the subject property to the terms and conditions.

III. SPECIAL CONDITIONS

1. **Permit Term Limit.** The permit shall expire on November 1, 2023, which is the date on which the current Humboldt Bay Harbor, Recreation, and Conservation District Lease expires. If this lease is extended or a new lease is issued by the Humboldt Bay Harbor, Recreation, and Conservation District, Hog Island may apply to the Commission for a permit amendment to extend the term of this permit.

2. **Maintenance Cleaning.** All maintenance cleaning operations of the raft hulls, raft floats, and well infrastructure (not including floating upwelling system bins) 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 or FLUPSYs for more than two weeks, Hog Island Oyster Company 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. Hog Island Oyster Company shall install the passive deterrent devices and maintain them as approved by the Executive Director.

4. **Intake System Design.** All intake systems shall be designed with a screened intake with mesh openings of no more than 3/32 inches and a maximum intake water velocity of 0.33 feet per second.

5. **Non-native Species Management.** Hog Island Oyster Company 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; and (3) not discard culled shellfish into Humboldt Bay.

IV. FINDINGS AND DECLARATIONS

A. Project Description

Hog Island Oyster Company (Hog Island) proposes to develop a new shellfish hatchery and seed production operation on and around an existing industrial pier in Humboldt Bay (see **Exhibit 1**). The operation would focus on three non-native shellfish species common to shellfish aquaculture, the Manila clam (*Venerupis (Ruditapes) philippinarum*), Pacific oyster (*Crassostrea gigas*) and Kumamoto oyster (*Crassostrea sikamea*). The project would be located on an undeveloped 3.5-acre parcel and adjacent pier and tidelands on the Samoa Peninsula, near the Eureka Municipal Airport and west of the entrance channel of Humboldt Bay. The pier and adjacent upland area is owned by Sequoia X, LLC and the pier was formerly associated with a pulp mill facility located south of the site. The tidelands around the pier are owned by the Humboldt Bay Harbor, Recreation and Conservation District (District). The District has issued a ten-year lease to Hog Island for use of the tidelands until November of 2023. Sequoia X LLC also issued a ten year lease to Hog Island in 2013 for use of the pier and upland parcel.

A shellfish hatchery is a facility used to breed adult shellfish in order to generate large numbers of larvae that can be grown to larger sizes or transported and sold to aquaculture operations offsite. Shellfish seed production is the process whereby free-swimming shellfish larvae are made to settle out of the water onto small shell fragments and grown into larger juvenile organisms that can then be provided to an aquaculture operation for further cultivation and harvest. Hog Island proposes to both generate free-swimming oyster and clam larvae and grow them to seed of between four and twelve millimeters in size. Both larvae and seed would be collected and prepared for sale and shipping to offsite commercial aquaculture facilities. The proposed shellfish hatchery and seed production operations involve the following project elements: (1) a shellfish hatchery; (2) seed setting facility; (3) three nursery rafts; (4) six floating upwelling systems (FLUPSYs); (5) pier upgrades; (6) a seed wash facility; (7) seawater intake and discharge system; (8) septic system; (9) algae greenhouse; (10) covered work area; (11) an office; and (12) a parking area and access road. The hatchery, seed setting operation, storage tanks and office facility would be housed in a 6,400 to 7,200 square foot mariculture building proposed to be constructed on site. The remaining onshore facilities – covered work area, algae greenhouse, septic system, shellfish seed wash facility, parking area, and access road – would be constructed on the 3.5 acre project site, as shown in **Exhibit 1**.

Mariculture Building

The mariculture building would be a one story structure approximately 6,400 to 7,200-square feet in area and 30 feet in height constructed over a concrete slab and would include the hatchery, seed setting facility, wet storage tanks, and office areas. Installation of the concrete slab would require the excavation of approximately 720 cubic yards of soil. Seawater from Humboldt Bay would be provided to the mariculture building on a continuous basis through a four-inch intake pipe that would be installed on the existing pier and attached to two-six inch screened intake pipes. This water would be heated and supplied to hatchery, seed setting, and storage facilities before being discharged back to Humboldt Bay through a 12-inch discharge line (also attached to the pier). Approximately 23,000-gallons of water per day would be withdrawn from Humboldt Bay and later discharged to service the mariculture building and microalgae

greenhouse. As shown in **Exhibit 1**, the mariculture building would be constructed on a portion of the 3.5-acre undeveloped upland site near the base of the existing pier.

Shellfish Hatchery Facility
The shellfish hatchery would be installed inside the mariculture building and be comprised of a series of tanks, filters, water heaters, pumps, and associated plumbing used to spawn, feed, and grow shellfish larvae. The hatchery would include a microalgae growing area (to be used as food for the shellfish larvae), a broodstock conditioning area for the adult shellfish used to produce larvae, and a larvae culture area for growing the larvae to larger sizes. These areas would be supplied with seawater from Humboldt Bay through the mariculture building's water supply system and used water would be discharged into the bay through a discharge system. The discharged seawater from the shellfish hatchery would contain small amounts of surplus algae, shellfish feces, and pseudofeces. Any bleach (sodium hypochlorite) used during periodic sterilization procedures of hatchery tanks would be pH neutralized using sodium thiosulfate prior to discharge.

Seed Setting Facility
The seed setting facility would also be installed inside the mariculture building and would produce shellfish seed from the free-swimming larvae produced by the shellfish hatchery. Shellfish seed is considered to be set when the larvae settle out of the water and attach themselves to a hard surface for further growth and development. Typically, this attachment surface is "spat" - small pieces of oyster shell approximately 0.2 to 0.3 millimeters in size. Construction of the seed setting facility in the mariculture building would include installation of holding tanks, a water filtration and heating system and water supply lines. Water for the seed setting facility would be provided by the supply line connecting Humboldt Bay to the mariculture building and discharge would occur through the mariculture building's combined discharge line that would terminate in Humboldt Bay.

Wet Storage Tanks
Two to four 800-gallon storage tanks would also be installed in the mariculture building for use in storing adult-sized shellfish for sale and transport offsite. These tanks would be filled with water from Humboldt Bay that would be replaced on approximately one-week intervals when in use. The water would be supplied and discharged through the mariculture building's intake and discharge lines.

Offices
The mariculture building would also be used as an office facility for up to eight employees of Hog Island. In addition to work spaces, a bathroom, break room, and storage areas are also proposed to be constructed.

Algae Greenhouse
In addition to the mariculture building, an approximately 30-foot high, 1,200-square foot greenhouse would also be constructed on the 3.5-acre onshore parcel. This greenhouse would contain a series of tanks totaling about 10,000-gallons that would be used for the cultivation of microalgae (phytoplankton) that would be used as feed for the shellfish and shellfish larvae in the hatchery and seed setting facilities. The greenhouse would be supplied with water from

Humboldt Bay through the same seawater intake system used for the mariculture building and used water would be discharged back into the bay through the discharge system. Six species of microalgae sourced from stocks used at other hatchery facilities on the west coast would be cultivated: *Isochrysis sp., Isochrysis galbana, Pavlova lutheri, Thalassiosira pseudonana, Chaetoceros muelleri* and *Chaetoceros calcitrans*. Cultivation of these species would require small quantities of vitamins, minerals, and metals to be added to the seawater tanks in which they would be grown. While these compounds would be consumed by the algae during growth, trace amounts may be present in the used water after it passes through the microalgae cultivation system. Prior to discharge into Humboldt Bay, this water would pass into a seaweed cultivation system proposed to be used to grow two species of edible seaweed for sale and use in restaurants. These seaweed would be from the genus *Gracilaria* and *Fucus* but specific species have not yet been selected.

Covered Work Area
Adjacent to the mariculture building, a covered concrete slab work area would also be constructed. This area would be approximately 1,500-square feet in size and would be open sided with a roof at a height to approximately 30-feet. The work area would be used for sorting and rinsing shellfish seed and preparing shipments for transport. The work area would include electric powered sorting machines and a seawater rinse system supplied with Humboldt Bay water from the same intake system that would be installed on the existing pier to provide the mariculture building and greenhouse with seawater. The concrete slab would include a drain system that would remove large particulate matter from the waste water prior to its discharge back into Humboldt Bay.

Seed Wash System
A seed wash system would also be constructed onshore near the greenhouse and mariculture building and would be used to clean and disinfect shellfish seed produced at the site to the level necessary to allow for transport out-of-state. The seed wash system would be comprised of a 2,000-gallon freshwater tank and 3,000-gallon capacity sloped slab sump system that would capture the hypochloride treated wash water used in the wash process. This water would be treated to neutralize the hypochlorite solution and would be discharged into an onsite septic system that is also proposed to be constructed on the 3.5–acre onshore parcel. Municipal fresh water would be transported to the site for this process and an average of 4,000 to 6,000-gallons per week would be used and discharged. Installation of the concrete slab sump system and wash area would require approximately 20 cubic yards of excavation.

Septic System
Hog Island proposes to construct and operate a 1,500-gallon per day capacity septic system to process the domestic wastewater generated by the onsite employees and office facility in the mariculture building as well as the wash water produced by the seed wash system. The septic system would include seven 500 to 2,000-gallon underground tanks as well as a leachfield and would be approximately 6,000-square feet in area. The septic tanks would be installed adjacent to the mariculture building and the leachfield would be constructed near the inland boundary of the 3.5-acre project site, approximately 480-feet from the shoreline of Humboldt Bay.

Seawater Intake and Discharge System
Seawater would be removed from Humboldt Bay and provided to the mariculture building, algae greenhouse, and covered work area through two 4 to 6-inch diameter pipes that would be installed on the lower side of the existing pier. These pipes would extend four to five-feet below the water surface and terminate in stainless steel screened intakes with a screen size of 3/32-inch. Two 10-horespower pumps would be used to withdraw seawater from the bay and the maximum intake velocity is proposed to be 0.4 feet-per-second. Approximately 75,000 gallons of water per day would be removed from Humboldt Bay by this system.

Once used in the onshore operations (hatchery, seed setting facility, greenhouse, and covered work area), seawater is proposed to be combined and discharged into settling basins that would be installed in a concrete slab adjacent to the mariculture building. These settling basins would allow sediments and materials in the water to settle out and be collected before the water passes into a 12-inch diameter discharge pipe that would be installed on the underside of the existing pier. This pipe would continue to the end of the pier and extend to a screened discharge point that would be located in the water column approximately four feet from the bottom of the bay. A total of approximately 75,000-gallons of water would be discharged through this system per day.

All intake and discharge pipes would be installed below ground between the mariculture building and pier.

Access Road and Parking
An abandoned dirt road currently exists on the project site that connects the pier to a more established road that crosses parallel to the shoreline near the inland edge of the site. Hog Island proposes to carry out a small amount of grading on this abandoned road and to install gravel on it to bring it back into service. In addition, Hog Island proposes to grade and gravel a six-vehicle parking area adjacent to this road on the inland side of the mariculture building, as shown in **Exhibit 1**. Hog Island estimates that vehicle traffic on the access road and adjoining streets of the Samoa Peninsula would be approximately 96 per week – 88 per week for the eight employees that would work on site and eight per week for shipments and deliveries.

Pier Upgrades
Hog Island proposes to install a gangway and crane on the existing pier to support the shellfish nursery facility that would be placed in the water next to the pier. The gangway would be made from aluminum and would measure 40-feet long by 5-feet wide. This gangway would be attached to the existing pier and supported by floats and installation would not require pile driving or the placement of anchors. The crane would be a 2,000-pound capacity electric powered device and would be attached to the pier decking with bolts and guy-wires. The crane would allow shellfish seed laden totes and baskets to be loaded and unloaded from the nursery rafts. Transport of these baskets and totes to and from the onshore facilities would be carried out with an electric powered forklift.

Nursery Rafts and FLUPSYs
The nursery rafts and floating upwelling raft systems (FLUPSYs) would be placed in Humboldt Bay as a joined floating structure (approximately 16,500 square feet) connected to the existing pier by way of the 40-foot long floating gangway. These rafts would allow the shellfish seed to

be submerged in the waters of Humboldt Bay during grow-out. Diagrams of these structures are provided in **Exhibit 2**.

Three nursery rafts, each 50-feet long by 30-feet wide by 2-feet deep, would be installed adjacent to the pier on the north side and held in place with mooring lines and chains attached to the pier as well as 500-pound anchors. Three anchors would be used for the array of three nursery rafts. The nursery rafts would receive seed (ranging in size from 0.3 to 0.4 millimeters) from the seed setting facility and hold it until it grows enough to be transferred to the FLUPSYs for further growth. Each nursery raft would be 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.

Forty upwelling tanks would be included on each nursery raft and the small oyster and clam seed would be held within each tank in mesh trays. Once seed is set in the seed setting facility located on the pier, it would be transferred to mesh trays and relocated onto the upwelling and nursery rafts for further grow-out.

Hog Island also proposes to install a row of six FLUPSY units adjacent to the nursery rafts. FLUPSYs are used to quickly grow shellfish seed to the size needed for sale offsite to shellfish aquaculture farms. 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. 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 the onshore facility and shipped in a refrigerated truck to various offsite locations for further grow-out.

Hog Island would carry out daily maintenance activities on the FLUPSY rafts, including 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.

B. Other Agency Approvals

Humboldt Bay Harbor, Recreation, and Conservation District
The Humboldt Bay Harbor, Recreation and Conservation District issued a lease to Hog Island for use of the submerged tidelands of Humboldt Bay located adjacent to the existing pier. This lease was issued on October 10, 2013, and will expire on November 1, 2023. The Harbor District served as lead agency under the California Environmental Quality Act and on July 11, 2013, certified a Mitigated Negative Declaration (MND) for the proposed project.

County of Humboldt
Coastal Act Section 30601.3 provides the Commission with the authority to act upon a consolidated permit for proposed projects that require a coastal development permit from both a local government with a certified local coastal program (LCP) and the Commission. This authority is triggered if the applicant, local government and Executive Director (or Commission) consent to consolidate the permit. For the proposed project, certain activities, including construction and operation of onshore facilities, would take place within the jurisdiction of the Humboldt Bay Area Plan portion of the Humboldt County Local Coastal Program. In October of 2013, the County of Humboldt, with the consent of the applicant and Executive Director, agreed to consolidate permit action for aspects of the proposed work that would be carried out in Humboldt County's LCP jurisdiction with aspects that would be carried out within the Commission's retained jurisdiction, consistent with Coastal Act Section 30601.3.

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.

The ACOE is considering 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 (9-13-0500) will serve as Commission review of the project under the CZMA.

California Department of Fish and Game
Hog Island's aquaculture operations are required to be registered annually with the California Department of Fish and Game. Hog Island has a valid registration for 2014. In addition, the California Department of Fish and Game reviewed and provided comments on the draft Mitigated Negative Declaration for the project.

California Regional Water Quality Control Board
The North Coast Regional Water Quality Control Board determined that Hog Island's proposed operations do not require a certification under Section 401 of the Clean Water Act (33 USC

1341). However, Hog Island has submitted an application to the North Coast Regional Water Quality Control Board (Water Board) for a waste discharge permit to authorize the proposed discharge of seed wash water and domestic sewage to the proposed septic system. The Water Board anticipates completing its review of this permit application in early 2014.

National Marine Fisheries Service
The National Marine Fisheries Service (NMFS) received 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. NMFS is currently carrying out this consultation.

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 installation and operation of a 16,500 square foot floating shellfish cultivation structure, operation of an onshore shellfish nursery, seed setting facility, algae greenhouse and onshore shellfish seed washing facility 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 site is expected to be comprised of fine sands and silts that support a variety of invertebrate species including polychaete worms, mollusks, and crustaceans (Barnhart et al. 1992). No eelgrass or other submerged aquatic vegetation is present within the proposed footprint of the nursery rafts and

FLUPSYs and water depths in the proposed footprint area of these structures (20 to 30-feet below mean lower low water) are too great to support eelgrass growth.

The presence of nursery rafts and FLUPSYs, comprising a total surface footprint of approximately 16,500 square feet, 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 rafts would be placed in water depths of approximately minus 20 to 30-feet MLLW, where light penetration to the bay bottom is already not expected to occur, shading from the rafts is not anticipated to result in any adverse effects on benthic habitats. In addition, the design of the proposed 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.

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 and FLUPSYs, however, would help to minimize the likelihood of such effects occurring. Specifically, the proposed location of the raft structures in the deep water 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 raft as well as the water depth, current flow, and natural turbidity of the bay water,

installation of the proposed array of nursery rafts and FLUSPYs 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 40 cultivation wells and each of the proposed FLUPSYs would include 30 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 would be expected 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 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, the Commission is requiring Hog Island in **Special Condition 2** to carry out the cleaning of the FLUPSYs, nursery rafts and cultivation well infrastructure 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.

Shellfish and aquaculture equipment cleaning activities proposed to occur in the onshore covered work area may also involve the removal of invasive fouling organisms. Because seawater from Humboldt Bay is proposed to be used for these cleaning activities and then collected and discharged back into the bay, intact individuals or viable fragments of invasive fouling organisms may also be discharged, resulting in a possible source for the additional spread and

dispersion of invasive marine species into the bay. To address this issue, Hog Island proposes to construct a series of collection raceways and settling basins that would be used to filter the seawater used in the covered work area prior to its discharge to Humboldt Bay. Through the use of this system of baffles, screens, and gravity settling, Hog Island has committed to ensuring that all fouling organisms would be removed from the discharge stream prior to its release into Humboldt Bay. All material captured by this filtration system would be disposed of at an appropriate onshore 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 Hog Island 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 40 million individual organisms (the estimated annual shellfish seed production). 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 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 Mitigated Negative Declaration certified by the Harbor District for this project, each day, the clam and oyster seed proposed to be cultivated on the nursery rafts and FLUPSYs would filter less than 0.25% of the total volume of water in Arcata Bay at high tide and 0.52% of the total tidal prism – the volume of water that leaves Arcata Bay at ebb tide each day. The filtration of this volume of water does not appear overly large when considered in the context of the average tidal exchange of water in this portion of the bay. In Arcata Bay, 44% of the total volume of water is replaced each day and 99% of the total volume of water is replaced every seven days. Accordingly, a portion of the water filtered by the cultivated shellfish seed is expected to exit the bay each day and the remainder would mix thoroughly with new water entering the bay. The population of non-native clams and oysters proposed to be cultivated on the nursery rafts and FLUPSYs is therefore not expected to substantially reduce the amount of available phytoplankton in Arcata Bay and is not anticipated to adversely affect native clam species, communities of native filter feeding organisms, and the overall biodiversity and productivity of Arcata Bay.

A similar analysis was carried out in the Commission's review of Coast Seafood's permit amendment application for its clam raft expansion project (E-02-005-A2) and Taylor Mariculture's permit application for its shellfish seed production facility (E-11-029). The total combined water filtration effect of these two projects was approximately 5% of the total tidal prism and less than 3% of the total high tide volume of water in Arcata Bay. While the same type of analysis of other existing aquaculture activities in Humboldt Bay, such as that associated with other existing aquaculture operations, is not available, the Harbor District recently carried out a different type of analysis that suggests these existing operations cumulatively remove approximately 5% of the total phytoplankton production of Arcata Bay. Considered cumulatively with other existing activities, therefore, the proposed project is estimated to result in only an incremental increase (substantially less than 1%) in the filtration of the tidal prism and the total phytoplankton production of Arcata Bay. This cumulative filtration is not anticipated to adversely affect native clam species, communities of native filter feeding organisms, and the overall biodiversity and productivity of Arcata Bay.

The proposed project would also result in cultivation of phytoplankton and seaweed in the algae greenhouse. Seawater used for these cultivation activities would be withdrawn from Humboldt Bay, circulated through the water tanks of the greenhouse system and directed to the combined discharge line for release back into Humboldt Bay. As such, viable biological material from

these cultivated algae may be released into Humboldt Bay. However, Hog Island has confirmed that all algae species to be cultivated would either be native to the Humboldt Bay area or incapable of surviving and reproducing in the wild.

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 rafts result in approximately 16,500-square feet of new floating raft structures. However, since these raft structures would be located adjacent to an existing pier along the Samoa Peninsula in an area characterized by existing overwater structures, docks, and piers that are spread in low density along the shoreline, the additional rafts would not represent a substantial increase over the existing amount of structures currently located in this area. As such, the proposed rafts would not result in adverse impacts to listed fish species as a result of changes to water column habitat.

Marine Mammal and Seabird Use
The proposed rafts 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) may have 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.

Current use of the existing pier at the project site 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 Hog Island 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 its proposed operations, Hog Island would carry out a variety of activities that would require seawater to be extracted from Humboldt Bay. These activities include (1) operation of the onshore shellfish hatchery, seed setting facility, algae greenhouse, storage tanks, and covered work area – which would require approximately 75,000-gallons of seawater intake per day; (2) operation of the nursery rafts; (3) operation of the FLUPSYs; and (4) 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.

Seawater use associated with the seed setting operation and maintenance cleaning of the rafts and in-water equipment would include mechanical stress and heating, however, and would be likely to cause mortality to at least a portion of the larval and planktonic organisms in the water extracted from the bay for these uses. Total annual seawater use for the seed setting facility would be approximately 27 million gallons, and total annual water use associated with the maintenance cleaning operations, based on the water use of a similar shellfish seed production operation by Taylor Mariculture, would be approximately 10 million gallons. Combined seawater use would therefore be approximately 37 million gallons per year. However, this water would be returned to Humboldt Bay after use and this proposed use would be substantially less intensive than typical industrial uses of seawater, such as once-through-cooling, that have been associated with significant entrainment impacts due to the assumed 100% mortality of entrained planktonic organisms. In addition, because seawater is required for the cultivation of shellfish larvae, seed setting, and the algae greenhouse, alternatives are not available that would avoid entrainment impacts. Therefore, the proposed use of seawater is not expected to result in significant adverse or avoidable entrainment impacts.

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, and due to DFW and NMFS intake system standards, Hog Island has committed in its project description to use intakes designed according to National Marine Fisheries Service requirements as protective of fish. In other words, Hog Island will limit intake velocities so that they will not exceed 0.33 feet per second and will use 3/32 inch mesh screening on its intake structures. The Commission has previously found these standards to reduce the potential impingement and entrainment of juvenile and adult fish because an intake velocity of 0.33 feet per second is not likely to exceed a fish's swimming ability and most juvenile and adult fish exceed 3/32 inch in size. **Special Condition 4** memorializes Hog Island's commitment and requires that the seawater intake velocity for Hog Island's operations and maintenance and cleaning activities not exceed 0.33 feet per second and that the screen openings for the intake point screen remain no larger than 3/32 inch.

Water Quality
Because some of the shellfish seed is proposed to be transported to Washington for grow-out, prior to shipment, the shellfish seed is proposed to be soaked in a 60 parts per million freshwater hypochlorite solution as required by the Washington Department of Fish and Wildlife. Harvested shellfish seed would be placed into totes; and, as needed, transported to the seed washing system from the pier using a small forklift. Each tote will be filled with the hypochlorite solution from the mixing and holding tank, and soaked for at least an hour. After soaking, the totes will be drained into the sump system; and the used wash water will be returned to the mixing tank where the amount of residual chlorine present will be measured. If the water has four parts-per-million of chlorine or less (the drinking water standard), it would be infiltrated into the proposed septic system without further treatment. If the concentration of chlorine is greater, the wash water would be neutralized by adding sodium thiosulfate to the water while it is in the mixing tank prior to disposal. Sodium thiosulfate neutralizes chlorine and would be added until the concentration of chlorine is at or below four parts-per-million.

Because the proposed seed wash operations would be carried out within a concrete pad area with a catchment system and sump, any spill of chlorinated wash solution could be contained within this area. Additionally, as described above, the wash water would be tested and neutralized prior to discharge into the infiltration area when it exceeds drinking water standards. This would ensure that water discharged into the groundwater water table would not be contaminated with chlorine. These two proposed measures would adequately protect the quality of coastal waters.

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. 2** through **5**, 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 the biological productivity of coastal waters appropriate to maintain optimum populations of marine organisms. 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, Hog Island proposes to install 9 two-foot long by three-foot wide Danforth anchors into the nearshore waters adjacent to an existing pier. In addition to mooring chains attached to the pier piling, these anchors would maintain the nursery rafts and FLUPSYs in place. Installation of these 500-pound anchors 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 and floating structures that would be used to cultivate shellfish seed, 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 on 54-square feet of submerged tidelands, Hog Island also considered installing steel piles to serve as additional mooring posts for the nursery rafts and FLUPSYs. However, because this activity would involve pile driving and result in the

generation of elevated levels of underwater sound that could adversely affect marine wildlife, Hog Island rejected this alternative as likely to result in greater environmental impacts. The Commission agrees with the applicant that on balance, this alternative would be more environmentally damaging when compared to the proposed pile replacement activities.

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

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; and intake and discharge standards. 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 consistent with Section 30233 of the Coastal Act.

E. Terrestrial Biological Resources

Coastal Act Section 30240 states that:

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

In addition, Coastal Act Section 30107.5 defines "Environmentally sensitive area" as follows:

> *"Environmentally sensitive area" means any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments.*

Onshore Development Site
The proposed project includes a variety of construction and development activities that would be located on a 3.5-acre parcel located adjacent to the Humboldt Bay shoreline. Specifically, a mariculture building, covered work area, algae greenhouse, parking lot, and shellfish seed wash

area and underground septic system would be constructed on the parcel. Most of this parcel is undeveloped but two existing roads are present, one crossing the eastern edge of the property and one extending along the southern border of the property (as shown in **Exhibit 1**). The remainder of the property is minimally disturbed and supports a variety of ground-level plant species.

The results of a botanical survey carried out on this site in June of 2013 indicate that vegetation within the project disturbance limits is dominated by common non-native grass and forb species. Native dune species were observed on the site but the areas supporting these plants would be outside the proposed disturbance footprint of the proposed development. No special status species of plants were observed on the project site during the botanical survey. In addition, no special status wildlife species were observed on the project site during several site visits carried out by certified biologists and resource agency representatives.

Based on the absence of special status species and habitats within or adjacent to the proposed onshore development and disturbance footprints, the Commission finds the proposed project consistent with Section 30240 of the Coastal Act.

F. California Environmental Quality Act

On July 11, 2013, the Humboldt Bay Harbor, Recreation, and Conservation District certified a Mitigated Negative Declaration for Hog Island's development of a shellfish hatchery and seed production operation. 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.

Appendix A: Substantive File Documents

Coastal Development Permits and Application Materials:

Staff Report for Coastal Development Permit No. 1-10-33
Staff Report for Coastal Development Permit No. E-11-029
Staff Reports for Coastal Development Permit Nos. E-02-005, E-02-005-A1, and E-02-005-A2
Application and Application File for Coastal Development Permit No. 9-13-0500

Environmental Documents:
Humboldt Bay Harbor, Recreation, and Conservation District, *Mitigated Negative Declaration for the Arcata Bay Shellfish Mariculture Facility*, July 2013.

Published Articles and Reports:
Pinnix, W.D., P.A. Nelson, G. Stutzer, K.A. Wright. 2012. Residence time and habitat use of coho salmon in Humboldt Bay, California: an acoustic telemetry study. Environmental Fish Biology. 24 May 2012.

Pinnix, W.D., T.A. Shaw, K.C. Acker, and N.J. Hetrick. 2005. Fish communities in eelgrass, oyster culture, and mudflat habitats of North Humboldt Bay, California – Final Report. U.S. Fish and Wildlife Service, Arcata Fisheries Technical Report Number TR2005-02, Arcata California.

Eldridge, M.B. and C.F. Bryan. 1972. Larval fish survey of Humboldt Bay, California. NOAA Technical Report NMFS SSRF-665.

Simenstad, CA, BJ Nightingale, RM Thom, and DK Shreffler. 1999. Impacts of ferry terminals on juvenile salmon migration along Puget Sound shorelines, phase I: Synthesis of state of knowledge. Research Project T9903, Task A2. Prepared for Washington State Transportation Commission, Olympia, Washington.

Nightingale, B and C Simenstad. 2001. Overwater structures: Marine issues. Aquatic Habitat Guidelines: An integrated approach to marine, freshwater, and riparian habitat protection and restoration. Prepared for Washington Department of Fish and Wildlife, Washington Department of Ecology and Washington State Department of Transportation by University of Washington, Seattle, Washington.

Williams, G. D., J. C. Thomason, D. K. Shreffler, S. L. Southard, L. K. O'Rourke, S. L. Sargeant, V. I. Cullinan, R. A. Moursund, and M. Stamey. 2003. Assessing overwater structure related predation risk on juvenile salmon: field observations and recommended protocols. Pacific Northwest National Laboratory (PNNL-SA-39451).

Castro, J., Santiago, J., and A. Santana-Ortega. 2002. A general theory on fish aggregation to floating objects: An alternative to the meeting point hypothesis. Reviews in Fish Biology and Fisheries. 11:3. 255-277.

Clynick, B.G., C.W. McKindsey, P. Archambault. 2011. Distribution and productivity of fish and macroinvertebrates in mussel aquaculture sites in the Magdalen islands (Quebec, Canada). Aquaculture. 283: 203-210.

Feyrer, F., B. Herbold, S. A. Matern, and P. B. Moyle. 2003. Dietary shifts in a stressed fish assemblage: Consequences of a bivalve invasion in the San Francisco Estuary. Environmental Biology of Fishes 67: 277-288.

U.S. Fish and Wildlife Service. 2008. 12-month finding on a petition to list the San Francisco Bay-Delta population of the longfin smelt as endangered or threatened. FWS-R8-ES-2008-45.

Barnhart, Roger A., Milton J. Boyd, and John E. Pequegnat. 1992. The Ecology of Humboldt Bay, California: An Estuarine Profile. U.S. Fish and Wildlife Service Biological Report 1.121 pp.

The Bay Institute, Center for Biological Diversity, and the Natural Resources Defense Council. 2007. *Petition to the State of California Fish and Game Commission and Supporting Information for Listing the Delta Smelt (Hypomesus Transpacificus) as an Endangered Species Under the California Endangered Species Act*. August 8, 2007. 66 pp.

Kimmerer, W.J., E. Gartside, J.J. Orsi. 1994. Predation by an introduced clam as the likely cause of substantial declines in zooplankton of San Francisco Bay. Marine Ecology Progress Series. 113: 81-93.

Emmett, R.L., S.A. Hinton, S.L. Stone, and M.E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in west coast estuaries, Volume II: Species life history summaries. ELMR Rep. No. 8 NOAA/NOS Strategic Environmental Assessments Division, Rockville, MD, 329 pp

U.S. Fish and Wildlife Service. 1996. Sacramento-San Joaquin Delta native fishes recovery plan. Portland (OR): U.S. Fish and Wildlife Service.

Collis K, D. D. Roby, D. P. Craig, S. Adamany, J. Adkins, and D. E. Lyons. 2002. Colony size and diet composition of piscivorous waterbirds on the lower Columbia River: Implications for losses of juvenile salmonids to avian predation. Transactions of the American Fisheries Society 131:537-550.

Capitolo, P.J., H.R. Carter, R.J. Young, G.J. McChesney, W.R. McIver, R.T. Golightly, and F. Gress. 2004. Changes in breeding population size of Brandt's and Double-crested Cormorants

in California, 1975-2003. Unpublished report, Department of Wildlife, Humboldt State University, Arcata, California.

Cohen, Andrew N. 2011. The Exotics Guide: Non-native Marine Species of the North American Pacific Coast. Center for Research on Aquatic Bioinvasions, Richmond, CA, and San Francisco Estuary Institute, Oakland, CA. Revised September 2011.

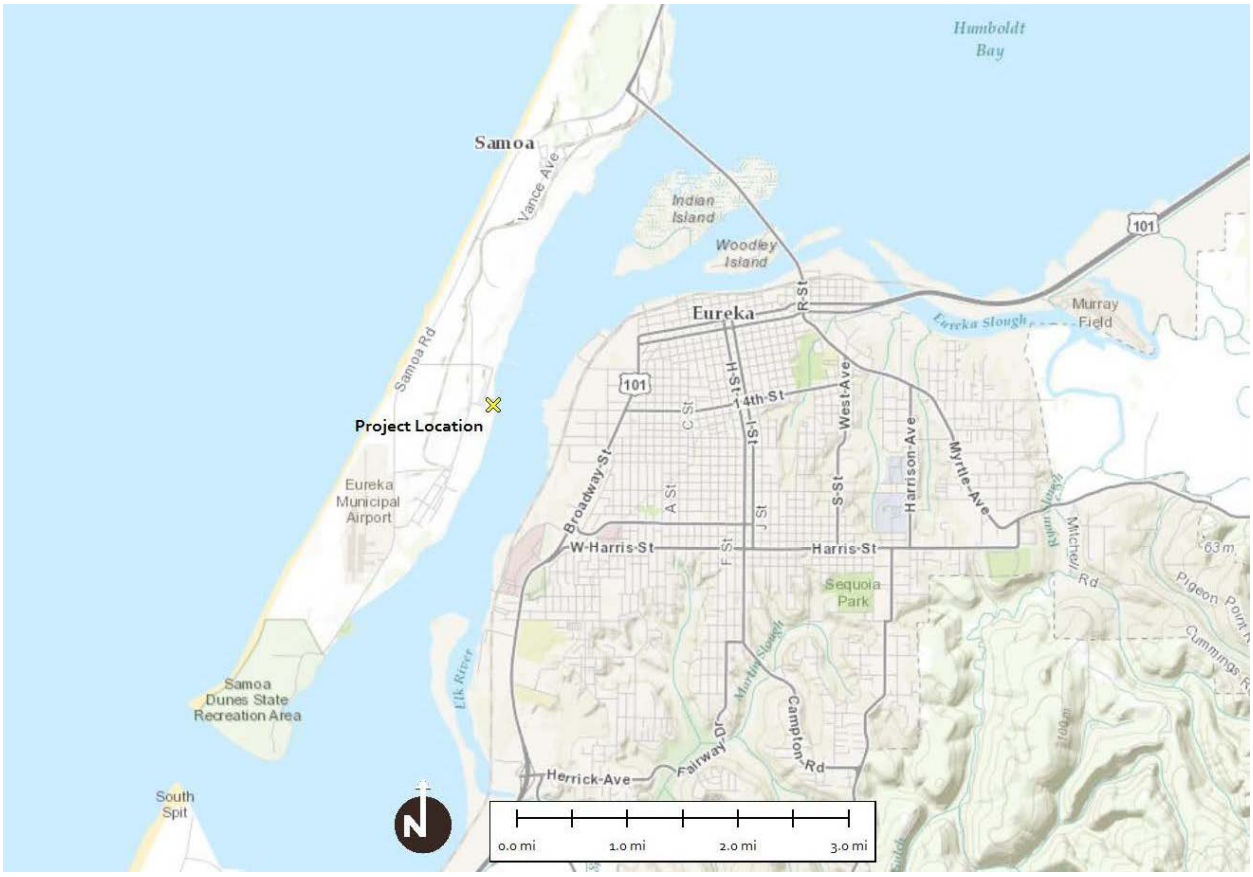
Lyons DE, DD Roby, and K Collis. 2007. Foraging patterns of Caspian terns and double-crested cormorants in the Columbia River estuary. Northwest Science 81: 91-103.

Lomelli, K.C. 2011. Correlations beween fish abundance and physicochemical parameters in Humboldt Bay, California. Humboldt state University, Masters thesis. 146 p.

Cohen, A.N. and J.T. Carlton. 1995. Nonindigenous Aquatic Species in a United States Estuary: A Case Study of the Biological Invasions of the San Francisco Bay and Delta. U.S. Fish and Wildlife Service, Washington, DC (pp. 72-73).

Carlton, J.T. 1979. History, Biogeography, and Ecology of the Introduced Marine and Estuarine Invertebrates of the Pacific Coast of North America. Ph.D. thesis, University of California, Davis, CA (pp. 502-513).

Exhibit 1 – Project Location and Site Configuration



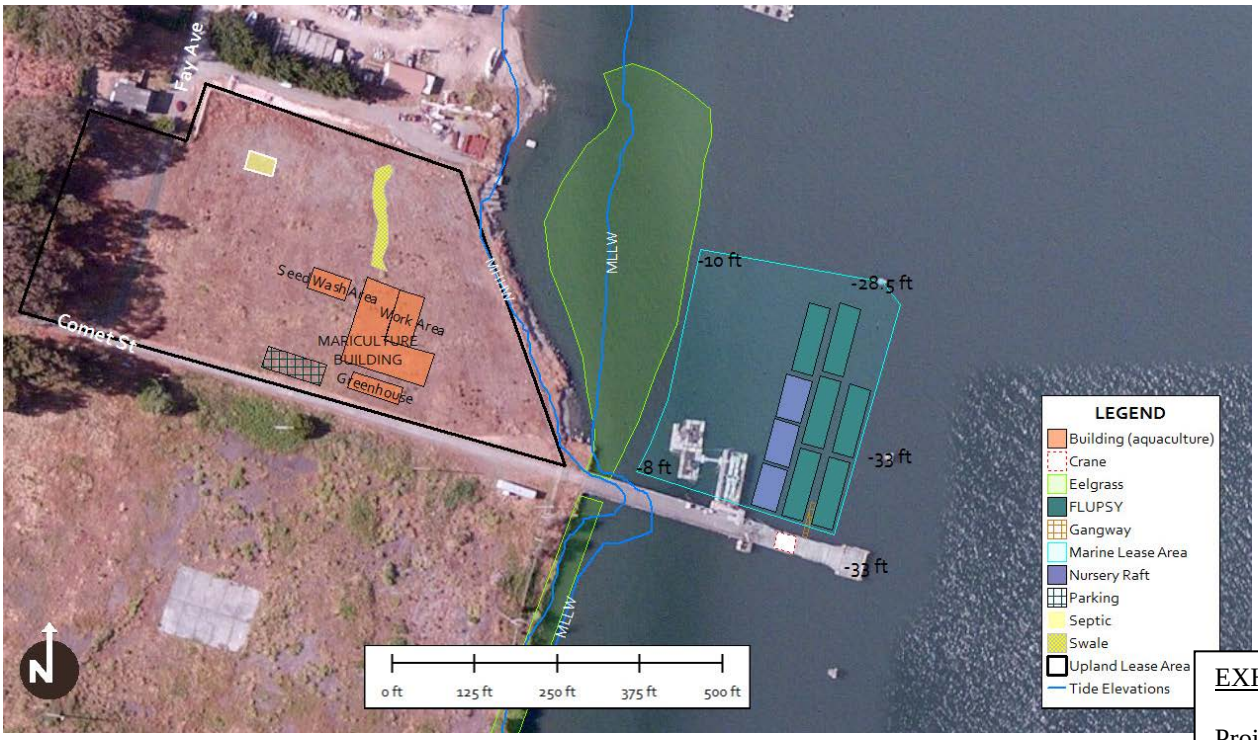


EXHIBIT 1

Project Location

Exhibit 2 – Nursery Rafts and FLUPSYs

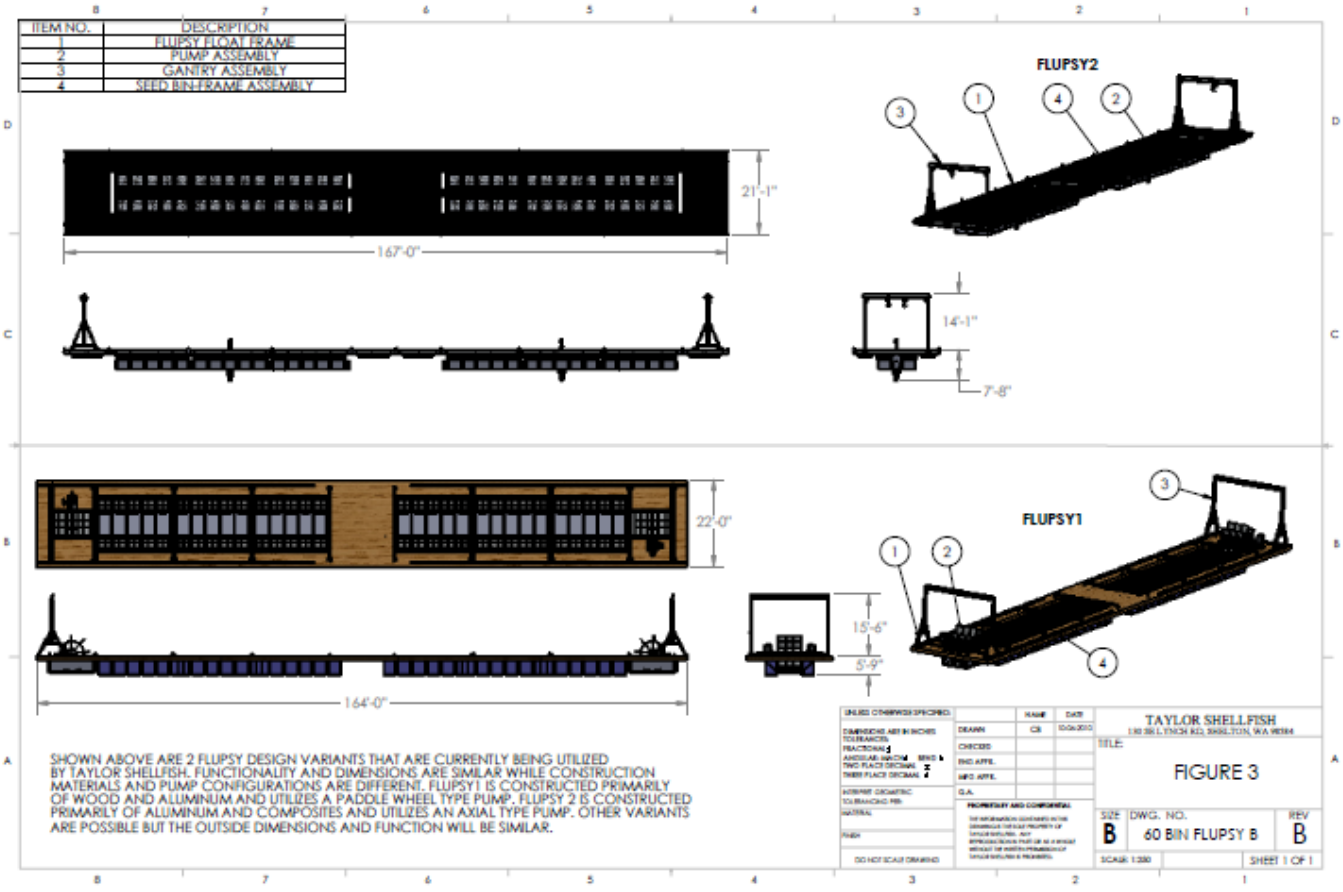


EXHIBIT 2
Nursery Rafts and FLUPSYs

Exhibit 2 – Nursery Rafts and FLUPSYs

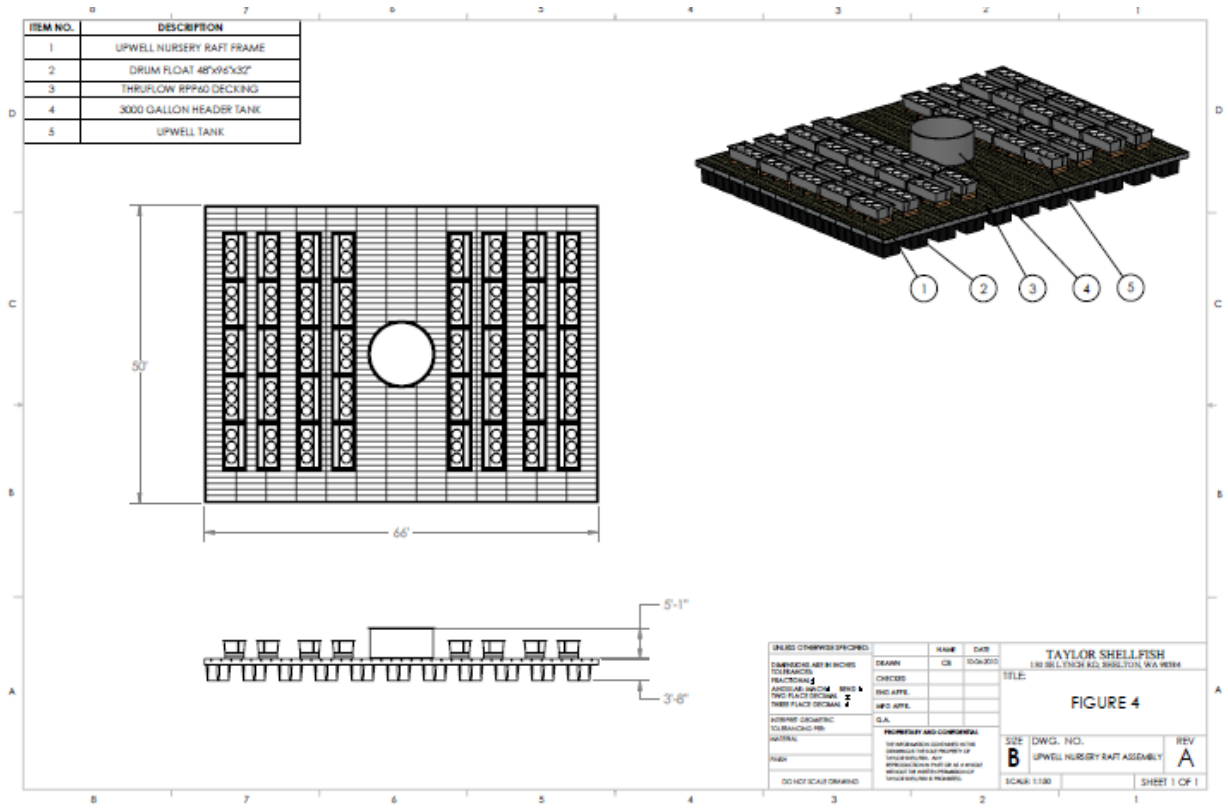


EXHIBIT 2
Nursery Rafts and FLUPSYs