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**W13a**

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STAFF REPORT: REGULAR CALENDAR

Application No.: 9-15-1931

Applicant: Coast Seafoods Company

Agents: Peter Weiner, Paul Hastings, LLP
 Plauché and Carr, LLP

Location: Intertidal and subtidal lands of Arcata Bay, County of Humboldt.

Project Description: Continue 234 acres of existing oyster aquaculture operations and 30 existing floating clam cultivation rafts and expand by 256 acres of oyster aquaculture operations (a total of 490 acres and 30 rafts).

SUMMARY OF STAFF RECOMMENDATION

In this permit application, Coast Seafoods Company (Coast) proposes to re-permit its existing shellfish aquaculture operations and expand its oyster operations in Arcata Bay. Coast proposes to grow oysters on roughly 1,000 miles of cultivation lines (over 50,000 individual 100-foot lines) within approximately 490 acres of Arcata Bay and to grow clams on 30 floating rafts. It would expand the current footprint of its oyster growing operations by installing growing equipment in 256 acres of new area and would continue the use of 234 acres of its current operation. This would be accomplished through a two phase expansion of oyster cultivation beds carried out over several years and coordinated with monitoring efforts and a two phase removal of nine existing oyster cultivation beds.

Phase I would include installation of 165.2 acres of new cultivation beds and removal of 42 acres of existing beds within five years (a net increase of 123.2 acres). Phase II would include installation of 90.8 acres of new cultivation beds and removal of 22.7 acres of existing beds (a net increase of 68.1

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acres) for a combined total footprint of 490 acres. Coast also proposes to continue using 30 floating clam seed cultivation rafts, a four acre oyster nursery area, and a floating upwelling system (FLUPSY).

Coast proposes to locate shellfish aquaculture activities within roughly 150 acres of the over 500 acres of intertidal lands that it owns within Humboldt Bay. The other 340 acres would be located largely within public trust lands that Coast leases from the City of Eureka and Humboldt Harbor, Recreation, and Conservation District.

The amount and diversity of marine habitats and species it supports makes Humboldt Bay one of the most ecologically important areas on the entire west coast. Humboldt Bay's marine resources include extensive beds of dense eelgrass used as areas for nursery, forage, and refuge by economically important fisheries such as Dungeness crab and Pacific herring and protected wildlife species and habitats including eelgrass, the black brant goose, salmon, and green sturgeon. Additionally, as one of the largest enclosed bays in the state, Humboldt Bay also includes large areas of open intertidal mudflats that attract such significant proportions of migratory shorebird populations that the bay is recognized as a Site of International Significance by the Western Hemisphere Shorebird Reserve Network and an Audubon Society Important Bird Area with global recognition. This ecological richness has also made Humboldt Bay a local and regionally significant recreational resource, supporting a range of water-oriented recreational pursuits from boating, kayaking, and wildlife viewing to hunting and fishing.

Coast's proposed aquaculture operation, particularly given its large scale, raises the potential to affect adversely and significantly Humboldt Bay's marine habitats (especially loss of eelgrass and tidal flat shorebird foraging areas), the species it supports (e.g., green sturgeon, migratory shorebirds and black brant) and cause use conflicts with water-oriented recreational uses, especially waterfowl hunting. Although Coast reduced the scale of its initially proposed project from 917 acres to 490 it continues to raise a variety of concerns under the Coastal Act. The Commission staff has spent a significant amount of time with other local, State and federal resource agency staff and stakeholders such as Tribal members, environmental organizations and waterfowl hunters in assessing this project's impacts and developing proposed project restrictions to minimize its projected adverse effects so that the project can be found consistent with the coastal resource and use protection policies of the Coastal Act.

Commission staff also spent many hours over the past three years working directly with Coast and its legal and consultant teams in an effort to modify Coast's expansion plans to address Coastal Act concerns. While Coast greatly reduced the size of its proposed operations and integrated extensive monitoring efforts into the project, these steps have not been able to resolve all of the Coastal Act concerns raised by the project, there remain some significant Coastal Act concerns.

The Commission staff therefore is recommending a number of Special Conditions that require consolidating Coast's operations within the bay to minimize expansion into eelgrass habitat areas and reduce conflicts with water-oriented recreational users (**Special Conditions 3, 4, and 17**). Staff is also recommending the Commission limit this permit to Coast's proposed Phase 1 only (**Special Condition 2**). This limit and the additional 11.5 acre reduction required in **Special Condition 17** would reduce the size of Coast's proposed operation by only 16% (from 490 acres to 411 acres) but would more substantially reduce the overall level and location of activity in Arcata Bay and therefore limit the project's potential to result in loss, injury, or disturbance to protected habitats and

wildlife species – particularly black brant, a California Species of Special Concern, shorebirds, and eelgrass. Further, this limit would allow for the extensive proposed and required monitoring efforts (used to test those assumptions about the project’s limited impacts) to be carried out with a more reduced scale project so that the consequences would be less severe if those assumptions are proven to be overly optimistic. If the assumptions are upheld, Coast would be provided with eight years to implement and maintain its 111 acres of net expansion and could also apply for a permit amendment to carry out additional expansion. Through this process both Coast and the Commission would be able to make future decisions based on a more comprehensive suite of information about the project’s effects than is currently available.

Additionally, the following Special Conditions would specifically address three of the primary Coastal Act concerns raised by the project – adverse impacts to eelgrass, black brant and water-oriented recreation:

Special Conditions 2 through 8 (in particular, 2, 3, 4, 6, and 8) require Coast to (1) limit its total expansion into eelgrass habitat to no more than 165 acres (for a total intertidal oyster growing operation of no more than 411 acres); (2) consolidate both its existing and proposed operations into three primary areas in the bay and locate at least 40 additional acres of its proposed expansion in areas of reduced eelgrass abundance that continue to have visible impacts from Coast’s historic operations; (3) revise and strengthen its proposed eelgrass monitoring plan so that it is more robust and capable of determining if Coast’s proposed eelgrass mitigation is successful and if losses to eelgrass exceed the expectations upon which that eelgrass mitigation is based; and (4) implement an incremental roll-out of the project that allows sufficient time for eelgrass monitoring results from initial stages to become available and be put to use informing adaptive management measures for later stages.

Special Conditions 2, 3, 7, 8, 9, 17, 19 and 21 require Coast to (1) maintain more consolidated operations that reduce the potential for black brant disturbance through the removal of several existing cultivation beds within the central and far eastern portion of Arcata Bay and expanding operations near areas of existing cultivation beds and areas in that support lower densities of eelgrass – the primary food for brant; (2) limit the scale of its expansion into new areas unless monitoring data demonstrates that brant foraging on eelgrass occurs at the same levels within oyster cultivation beds and outside of them; (3) make consistent use of a vessel management plan that includes transit lanes that avoid areas of consistent brant use and provisions to prevent herding or flushing brant; and (4) establish protective buffers around the primary sites brant use to collect sandy grit to aid in their feeding.

Special Conditions 2, 3, 5, 15, 16, and 17 require Coast to (1) carry out limited on-water daylight operations during the approximately 14 days of the brant hunting season; (2) limit the overall footprint of its cultivation operations to no more than 411 acres; (3) consolidate its operations around the most densely used areas of its existing operations through the removal of existing beds in the central and far eastern portions of Arcata Bay; (4) implement a bed mapping and marking plan to more clearly communicate the location and extent of cultivation beds to recreational users; and to (5) restrict the installation of cultivation gear within ten feet of the three primary tidal channels that pass through its proposed basket on longline cultivation beds within the south eastern portion of Arcata Bay.

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With the inclusion of these Special Conditions and others described in the following report, the Commission staff believes the re-authorization and expansion of Coast's shellfish aquaculture operation in Arcata Bay would be carried out consistent with the Coastal Act. The Commission staff therefore recommends **approval**, as conditioned, of Coast's coastal development permit application.

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EXHIBITS

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Exhibit 2a – Coast Seafoods Existing Operation Area Proposed For Continued Use

Exhibit 2b – Coast Seafoods Proposed Phase I Expansion

Exhibit 2c – Coast Seafoods Proposed Phase II Expansion

Exhibit 3 – Longline, Basket on Longline, and Cultivation Raft Design and Configuration

Exhibit 4 – Sample Photographs of Coast Seafoods Oyster Cultivation Beds

Exhibit 5 – Relocation Area for Cultivation Bed MR 2-3 and Indian Island Rack and Bag

Exhibit 6 – Subtidal Channels to be Avoided

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CORRESPONDENCE

Through May 25, 2017

9-15-1931 (Coast Seafoods Company)

I. MOTION AND RESOLUTION

Motion:

I move that the Commission approve Coastal Development Permit 9-15-1931 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 conditional 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 the Commissioners present.

Resolution:

The Commission hereby approves the Coastal Development Permit 9-15-1931 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 Coast 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 Coast to bind all future owners and possessors of the subject property to the terms and conditions.

II. SPECIAL CONDITIONS

1. **Permit Term Limit.** This coastal development permit shall expire on September 7, 2025. If the term of Coast's submerged lands lease from the Humboldt Bay Harbor, Recreation, and Conservation District - currently also set to expire on September 7, 2025 - is amended or a new submerged lands lease is issued by the Humboldt Bay Harbor, Recreation, and Conservation District, Coast may submit an application for a permit amendment requesting an extension of the permit term.
2. **Operational Footprint.** At no time during the term of this permit shall the combined footprint of all of Coast's intertidal cultivation beds in Arcata Bay exceed 411 acres. This total shall be made up of approximately 245 acres within the area of existing operations and approximately 165 acres of operations expanded into new areas. With the exception of the relocation of (1) the longlines of proposed cultivation bed MR 2-3, consistent with **Special Condition 3**; (2) the proposed Indian Island rack and bag cultivation area, consistent with **Special Condition 22**; and (3) at least half of the initial 82.64 acres of expansion, consistent with **Special Condition 4**, at no time shall Coast carry out intertidal oyster culture outside of the 17 Phase I areas and the existing culture areas shown in **Exhibit 2b**. The timing of the proposed expansion shall be carried out consistent with **Special Condition 3** and shall not exceed the phased implementation schedule established in **Special Condition 4**.
3. **Consolidation of Operations.** DURING OR BEFORE THE INSTALLATION OF CULTIVATION GEAR OR OYSTERS WITHIN ANY OF THE 17 AREAS SHOWN IN **Exhibit 2b** that are proposed for expansion with new cultivation gear in Phase I, Coast shall stop using and remove all cultivation gear from at least 34 acres of existing oyster cultivation beds. This shall be done in addition to the removal of cultivation bed EB 7-2 required through **Special Condition 17**. The cultivation beds shall be removed at or before the time of their next harvest and shall be removed in the following order until the required 34 acres is achieved: cultivation bed SI 2-1, SI 2-2, SI 1-2A, SI-Nk, SI 1-2, SI 1-1. Removal activities shall be carried out consistent with the requirements of **Special Condition 13**. In addition, the consolidation of Coast's operational footprint shall be carried out by eliminating the proposed installation of cultivation gear within cultivation bed MR 2-3 shown in **Exhibit 2b** and instead, relocating the approximately ten acres of proposed expansion proposed for cultivation bed MR 2-3 to within a portion of the roughly 25 acres proposed to be installed during Phase II within the Bird Island cultivation area south of proposed cultivation bed BI 2-1 - as shown by the striped area on **Exhibit 5**.
4. **Phased Implementation.** Between the collection of baseline eelgrass monitoring data in 2017 and the submittal and review of the second year of "post-installation" and "post-removal" eelgrass monitoring data in 2019, Coast shall carry out an incremental installation of the first 114 acres of the 165 acres of expansion areas allowed consistent with **Special Condition 2**. The first stage of this incremental installation shall be carried out during or after the removal activities required in **Special Condition 3** and shall include no more than 82.64 acres of new oyster cultivation equipment prior to the issuance of written confirmation by the Executive Director that it may proceed with additional expansion. These 82.64 acres shall not include more than 14 total acres of baskets on longlines and shall be made up of:

- A. Two acres within and immediately surrounding each of the individual 0.6 acre plots to be used for monitoring the expansion cultivation beds (which shall be selected to be representative of the bed in which they are located); and
- B. Expansion cultivation beds relocated, to the maximum extent feasible, from Coast's proposed expansion areas in undisturbed, high density eelgrass beds to within areas of Coast's historic operations in the Bird Island and Mad River growing areas that retain visual evidence of impacts from historic dredge harvesting of oysters. Examples of the types of areas Coast's expansion should be relocated *out of* are outlined in white in **Exhibit 10** and examples of the types of areas Coast's expansion should be relocated *into* are outlined in red in **Exhibit 10**.

PRIOR TO THE COLLECTION OF BASELINE EELGRASS MONITORING DATA, Coast shall develop and submit, for Executive Director review and written approval, a relocation plan that includes relocation of at least half of its 82.64 acres of expansion cultivation beds from undisturbed, high density eelgrass beds to within areas of Coast's historic operations in the Bird Island and Mad River growing areas that retain visual evidence of impacts from dredge harvesting.

The Executive Director's written confirmation that further expansion may occur shall be based on all of the following information: (A) a review of condition compliance; (B) assessments carried out by academic researchers and resource management agencies of brant monitoring results; (C) eelgrass monitoring results that include baseline data and one additional year of "post-installation" and "post removal" data; (D) a review of design and performance information (durability, susceptibility to breakage and loss, etc.) on basket on longline cultivation gear; and (e) a review of data on debris type and quantity collected during baywide cleanup events. The Executive Director shall consider this information and determine if Coast shall carry out additional expansion, halt expansion until another year of monitoring data is available, or remove cultivation equipment, as described in **Appendix A**.

Upon issuance of the Executive Director's written confirmation that it may proceed with its second round of expansion, Coast may install cultivation equipment and oysters within the approximately 31.64 remaining acres of the approximately 114.54 total acres of expansion cultivation beds Coast is authorized to install via this permit prior to the submittal and review of the second year of "post-installation" and "post-removal" eelgrass monitoring data in 2019.

In addition to the requirements laid out in **Special Condition 8**, to ensure that Coast's total footprint of intertidal cultivation beds does not exceed 411 acres, its expansion into the remaining approximately 50.6 acres of the 165 acres of expansion areas allowed consistent with **Special Condition 2** shall be carried out at the same time or after Coast completely removes all cultivation gear from the 8 remaining acres of the 42 acres of its existing operation proposed to be removed from use. Removal activities within these 8 acres shall be carried out consistent with the requirements of **Special Condition 13**.

- 5. **Access Channels.** Coast shall not install cultivation equipment (including longlines, posts, anchors, or baskets) or otherwise block the area within 15 feet of the edges of the three tidal channels shown on **Exhibit 6** between expansion beds EB 1-3 & EB 1-4, EB 2-2 & EB 2-4, and EB 2-4 & EB 6-4.

- 6. Eelgrass Monitoring Plan.** PRIOR TO PERMIT ISSUANCE COAST SHALL SUBMIT, for Executive Director review and written approval, a revised version of its March 31, 2017 Eelgrass Monitoring Plan (Eelgrass Plan). The Eelgrass Plan shall be focused on documenting eelgrass recovery within areas from which existing cultivation beds are removed as well as quantifying any loss of eelgrass density or percent vegetated cover within newly installed expansion cultivation beds. Upon approval, the Eelgrass Plan shall be implemented by a qualified, independent, third party approved by the Executive Director.

The Eelgrass Plan shall be consistent with the feedback provided by Commission staff and state and federal agency staff (as reflected in the email dated April 28, 2017 from Commission staff to Coast's consultants and the meeting notes from the May 12, 2017 meeting between agency staff and Coast) and include the following:

- A. **Treatments.** Three operational treatments shall be monitored for impacts and recovery relative to reference areas. These include areas where cultivation is:
- i. *Removed*, including the initial 34 acres to be removed between the collection of baseline and year one eelgrass monitoring data as well as the 8 remaining acres of the 42 acres total proposed by Coast to mitigate for its Phase I expansion of operations;
 - ii. *Expanded*, including the initial 82.64 acres to be planted between the collection of baseline and year one eelgrass monitoring data as well as the remaining 82.36 acres of the 165 acres total proposed for Phase I. The initial 82.64 acres shall be made up of two acres within and immediately surrounding each of the individual 0.6 acre plots to be used for monitoring the expansion areas (which shall be selected to be representative of the bed in which they are located) and additional acres located as described in **Special Condition 4**;
 - iii. *Converted from the existing cultivation method to another cultivation method*, including where 18.4 acres in cultivation beds EB 6-1, EB 6-2 and EB 6-3 are proposed to be converted from longlines to baskets on longlines;
- B. **Periods and Duration.** The temporal nature of the monitoring will differ between treatments such that:
- i. For removal treatments, monitoring shall include capture of baseline conditions within the eelgrass growing season for northern California defined in the California Eelgrass Mitigation Policy and Implementing Guidelines (CEMP; NOAA Fisheries 2014). Thereafter, annual monitoring shall be conducted during the eelgrass growing season for five years.
 - ii. For expansion and converted treatments, monitoring shall include capture of baseline conditions within the eelgrass growing season for northern California defined in the CEMP prior to planting of cultivation gear or conversion.
 - iii. Following issuance of the collection of information on baseline conditions, the monitoring shall continue on an annual basis for five years in order to ensure that eelgrass response to treatments has been accurately assessed.
- C. **Key Parameters.** Within all areas from which cultivation equipment is installed, removed or converted from one method to another, monitoring shall include measures of turion density, percent vegetated cover, and spatial extent.
- D. **Methods.** A thorough description of the survey and analysis techniques to be used for measuring the key parameters shall be provided. A combination of monitoring methods may be used, as follows:

- i. *Remote-sensing*, specifically the use of low-altitude aerial imagery captured by UAVs, to census:
 - a. Spatial extent and percent vegetated cover, for all treatments and areas to be monitored;
 - b. Turion density, in removal treatments areas as estimated using bins with 10-turion increments from 0 to >50 (noting an anticipated upper detection limit of the method).

The method should target an accuracy rate of 95% and achieve a minimum accuracy rate of 90% for correctly classifying eelgrass during aerial monitoring.

- ii. *In situ* sampling, to evaluate:
 - a. Turion density, in expansion and conversion treatment areas as counted using 0.25m² quadrats;

The sampling design shall be sufficiently statistically robust to allow an assessment of not only eelgrass response across the whole of Arcata Bay, but also within the expansion beds in at least three sub-regions (Mad River, Bird Island, and East Bay) and with a minimum statistical power of 0.8 when controlling for type I and type II error <0.2.

E. Criteria for Detecting Adverse Impacts and Performance Success. At a minimum, discrete criteria to evaluate adverse impacts in expansion and conversion treatments (subpart 1), and performance success in removal treatments (subpart 2), shall be specified such that for:

- i. *Adverse impacts*, any statistically significant loss of the following relative to appropriate reference sites:
 - a. More than 25% loss in eelgrass turion density (measured as the upper limit of the confidence interval around the mean of replicate density treatments);
 - b. Any percent vegetated cover of eelgrass (measured as the percent of the bed physically occupied by aboveground eelgrass); or
 - c. Any eelgrass spatial extent.
- ii. *Performance success*, measurable recovery and expansion of eelgrass density and/or percent vegetated cover have occurred, relative to appropriate reference sites, by Year 3 and been sustained through Year 5 of monitoring.

Criteria shall be evaluated at the scales of the designated sub-regions as well as across the whole of Arcata Bay.

Should the methods in any cultivation bed(s) or area(s) fail to achieve, in any one year, the minimum accuracy rate (for census) or statistical power required above in Section D of this condition, relevant analyses for those cultivation bed(s) or area(s) shall be considered inconclusive and the monitoring design and/or methods shall be revised in consultation with Commission staff and implemented in the subsequent year to facilitate achievement of the minimum accuracy rate and power in those sites. If in the year the revised design and/or methods are implemented, the required accuracy rate and/or statistical power allow for conclusive analyses, then the inconclusive analyses from the preceding year shall be interpreted as having been the same as for the current year. If in the year such revisions are implemented the analyses of a particular cultivation bed(s) or area(s) continue to prove inconclusive,

then those areas shall be considered to have failed to meet the performance metrics, thus triggering the adaptive management measures described in Subpart A or B (whichever is more relevant) of **Special Condition 8**.

- F. **Impact and Performance Assessments.** Adverse impacts and performance success shall be assessed on an annual basis over the 5-year monitoring term. The determination of any adverse impacts, including two consecutive years of inconclusive results - as defined in Section E of this condition - shall trigger adaptive management measures described in Subpart A or B (whichever is more relevant) of **Special Condition 8**.
 - G. **Reporting.** Annual reporting of monitoring results, including raw sampling data, statistical analysis results, and a complete description of when and where sampling was carried out shall be provided as soon as possible after the completion of data collection efforts;
 - H. **Adaptive Capacity of the Plan.** The Eelgrass Monitoring Plan shall be considered a living document, with the potential to adapt to insight gained over the duration of the permit, with approval of the Executive Director and state and federal agency partners.
- 7. Brant Monitoring Plan.** PRIOR TO INSTALLATION OF CULTIVATION EQUIPMENT WITHIN EXPANSION CULTIVATION BEDS, Coast shall submit, for Executive Director review and written approval, a revised version of the April 21, 2017 brant monitoring plan capable of detecting and visually documenting and recording brant foraging activity on eelgrass beds within expansion cultivation beds (i.e. specifically feeding on eelgrass growing within beds rather than drift feeding) and determining if any such foraging is occurring at the same level as foraging occurring outside cultivation beds. Survey techniques shall primarily rely on the use of remote cameras but may be augmented with other techniques, including field surveys and acoustic detection. The revised brant monitoring plan shall include, at a minimum, surveys carried out during the appropriate seasons at Year 1, 2, and 5 post-installation of cultivation equipment in expansion areas. Coast shall not initiate installation of cultivation equipment within expansion cultivation beds until the brant monitoring plan has been approved in writing by the Executive Director.
- 8. Adaptive Management.** Subsequent to the phased implementation process required through **Special Condition 4** (used to manage expansion activities until baseline and two additional years of eelgrass monitoring results are available), the Executive Director shall review the information provided through Coast's annual reporting and the monitoring carried out in conformance with **Special Conditions 6 and 7** to determine if any of the thresholds for action included below have been met. If the Executive Director determines that a threshold has been met, Coast shall implement the associated adaptive management actions (all removal of cultivation equipment shall be carried out consistent with **Special Condition 13**):
- A. If any loss of eelgrass percent vegetated cover or spatial extent or a loss of eelgrass density greater than 25% occurred beyond pre-project conditions when compared to appropriate reference sites and measured using the upper limit of the confidence interval around the mean of replicate density measurements, those expansion beds or areas will be considered to have exceeded the maximum anticipated impacts and Coast shall remove all cultivation gear within those expansion beds or areas;

- B. If, when compared to appropriate reference sites, measurable recovery and expansion of eelgrass density and/or percent vegetative cover has not occurred within any area from which longlines were removed, that area will be considered to have failed as mitigation and Coast shall remove cultivation equipment from within expansion cultivation beds at a ratio of 4:1 (area of removal:area of failed mitigation). Once recovery or expansion exceeds reference conditions, additional measurable recovery or expansion shall not be required to satisfy this threshold and the threshold shall transition to be that those conditions are maintained for the remainder of the monitoring period;
 - C. If brant monitoring data do not show brant “bed-feeding” on eelgrass occurring within cultivation beds at the same level as foraging occurring outside cultivation beds, those cultivation beds shall be removed;
 - D. If Coast fails to successfully implement and maintain measures to both significantly reduce the loss of aquaculture gear (in particular, cultivation baskets) from its operation and increase the effectiveness of recovery efforts, Coast shall convert all of its basket on longline cultivation beds to ten foot spaced longline beds (adjacent paired longlines separated by 10 feet from the next pair).
- 9. Vessel Management Plan.** PRIOR TO PERMIT ISSUANCE, Coast shall submit, for Executive Director review and written approval, a vessel management plan that includes: (1) a map showing the travel routes and landing or cultivation bed access sites that the Coast’s vessels shall use to access the cultivation areas; (2) use of an active AIS or GPS system on all vessels during operations in Arcata Bay to document consistency of actual travel patterns with mapped routes; (3) submittal of GPS or AIS data with annual report described in **Special Condition 12**; and (4) procedures to limit herding or flushing of black brant or shorebirds within Arcata Bay.
- 10. Intake System Design.** All intake systems used by Coast to supply water from Arcata Bay for maintenance cleaning and clam tray washing 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, 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.
- 11. Herring Spawn.** During the months of December, January and February, Coast shall visually inspect beds prior to planting and/or harvesting, to determine if Pacific herring (*Clupea pallasii*) has spawned on eelgrass, culture materials, or substrate. Visual inspections shall be conducted in accordance with the survey protocols developed by the California Department of Fish and Wildlife (CDFW). In addition, at the beginning of the three month herring spawning period, Coast shall provide staff of the CDFW Eureka Marine Region office a schedule of planting and/or harvesting activities anticipated to occur during the period. Further, Coast shall inform CDFW Eureka office staff with the proposed location of planned planting and/or harvesting activities no less than 48 hours prior to the activities.

If herring spawning has been recently observed by Coast or CDFW staff on or in the immediate vicinity of planned planting and/or harvesting activities, Coast shall: 1) postpone planting and/or harvesting activities on any culture beds in those areas for two weeks, or until CDFW staff confirm herring eggs have hatched, and 2) notify the CDFW Eureka Marine Region office of the spawn within 24 hours. Coast shall keep records of when CDFW was notified of the spawning event, and those records shall be included with the annual report described in **Special Condition 12**.

12. Annual Report. By December 31 of each year, Coast shall submit to the Executive Director an annual report describing the status of each bed (including harvest date and planting date) within the operation footprint. The annual report shall also include information regarding the results of quarterly cleanup events carried out as described in **Special Condition 13**.

13. Plot Abandonment or Fallow. Within 30 days of harvest on any cultivation bed or plot that is being discontinued, abandoned, removed, fallowed, or taken out of production for six months or more, Coast shall notify the Executive Director and remove all piles of oysters and oyster shells, and all culture apparatus from that plot, including but not limited to stakes, racks, baskets, floats, rope, ties, wires, tags and pallets. In addition, Coast shall commission an independent third party, reviewed and approved by the Executive Director, to inspect the cultivation bed or plot and report directly to the Executive Director within 14 days on the status and completeness of the removal work.

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

- A. **Storm Damage and Debris.** As soon as safely possible following storm or severe wind or weather events, Coast shall patrol all active mariculture areas for escaped or damaged mariculture equipment. All equipment that cannot be repaired and placed back into service shall be properly recycled or disposed of at an appropriate onshore facility. In addition, Coast shall retrieve or repair any escaped or damaged mariculture equipment that it encounters while conducting routine daily and/or monthly maintenance activities associated with shellfish culture (e.g. bed inspections, shellfish grading and sorting). If the escaped gear cannot be repaired and replaced on the shellfish bed, it shall be properly recycled or disposed of on land.
- B. **Gear Marking.** Coast shall mark shellfish culture bags, baskets, and basket label tags in an easily identifiable manner with its company name or other identification information. Markings shall be securely attached and robust enough to remain attached and legible after an extended period in the marine environment (e.g. heat transfer, hot stamp, etching, etc.). Existing culture bags, baskets, and basket label tags currently in use in culture beds shall be marked or replaced with marked versions when replanted and all unmarked gear shall be replaced in this way within 24 months. In the event that shellfish culture gear or equipment becomes dislodged from culture beds, it shall be Coast's responsibility to retrieve the material from the shoreline, eelgrass beds, mudflat, or submerged bottom with minimal damage to the resources affected. Such material shall be removed and properly disposed of, recycled, or returned to use.
- C. **Marine Debris Reduction Training.** WITHIN 30 DAYS OF THE ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, Coast shall implement an employee

training regarding marine debris issues, how to identify loose culture gear, proper gear repair methods and how to completely remove gear from out-of-production or fallow cultivation beds. Particular focus shall be placed on management and maintenance practices to reduce the loss of any gear type consistently found during bay cleanup and inspection activities. During trainings, Coast's employees shall be encouraged to consider and implement field and management practices that reduce the amount of small plastic gear (such as zip-ties, tags and fasteners) and non-biodegradable material (such as PVC stakes and nylon or polypropylene rope) used in its operations.

- D. **Cleanup Events.** Coast shall conduct quarterly baywide cleanups in coordination with other interested parties or organizations, which shall include walking different portions of the bay and shorelines to pick up escaped shellfish gear and other trash (regardless of whether it is generated by the Project). The volume and type of shellfish gear collected and the cleanup location (marked on a map) and duration of cleanup activity shall be recorded and documented in the annual report submitted to the Executive Director of the Commission. If consistent discoveries of certain gear types are made during cleanup events by Coast or the public, Coast shall evaluate (and if feasible, implement use of) alternative gear types or practices that would reduce these consistent sources of debris.
 - E. **Ongoing Operations.** Coast shall not leave or temporarily store tools, loose gear, or construction materials on its owned or leased tidelands or surrounding areas. All aquaculture gear installed in active culture beds shall be kept neat and secure and maintained in functional condition. Coast shall carry out regular bed inspections and maintenance activities to help ensure that broken, collapsed, fallen, or buried gear is fixed or removed in a timely manner.
 - F. **Bed Cleaning at Harvest.** At the time of harvest of each cultivation bed, Coast shall carry out a thorough inspection to locate and remove loose or abandoned equipment, tools, and accumulations of oysters from the surrounding substrate.
15. **Cultivation Area Mapping and Marking.** WITHIN 30 DAYS OF THE ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, Coast shall submit for Executive Director review and written approval, an updated version of the Cultivation Bed Mapping and Marking Plan (Cultivation Area Plan) submitted to Commission staff on April 5, 2017. This Cultivation Area Plan shall be revised to include all growing areas and cultivation beds approved by the Commission and include a consistent, standardized method of marking the location of Coast's growing areas and culture beds in a manner that is obvious, identifiable, and understandable by boaters and recreational users not familiar with Coast's operation. Unless a more effective approach can be developed by Coast and approved in writing by the Executive Director, the Cultivation Area Plan shall include the removal of all existing marking stakes and the use of uniform marking stakes or posts that (1) remain visible and above water during maximum tidal heights; (2) are topped with reflective material; (3) identify the side of the stake on which the culture bed is located; and (4) are placed every 200-feet along the outer sides and at each corner of each of Coast's active culture beds. In addition, the Cultivation Area Plan shall include a method for Coast to develop, consistently update, and distribute digital and hard copy maps of Arcata Bay showing the location of its rafts and culture beds. Upon approval of the Cultivation Area Plan by the Executive Director, Coast shall implement the Cultivation Area Plan and complete the removal, replacement, and installation of marking stakes or posts within 90 days from the date of the Cultivation Area Plan's approval by the Executive Director.

- 16. Brant Hunting.** Except for emergency situations, activities to ensure the safety of its operations or operations required for regulatory compliance, such as marine debris cleanup response after storm events, Coast shall avoid on-water operations within its leased and owned areas depicted on **Exhibit 1** from one hour before sunrise until sunset on days between November 15 and December 15 that are designated by the California Department of Fish and Wildlife as brant hunting days, including season opening and closing days (typically brant hunting is limited to Wednesdays, Saturdays, and Sundays).
- 17. East Bay Bed Removal.** Cultivation bed EB 7-2 B, the currently unplanted portion of the culture bed referred to in the December 23, 2016 “Annual Report for CDP E-06-003” submitted to the Executive Director as EB 7-2, shall remain unplanted and all cultivation gear and equipment, including all stakes, posts, lines, ropes, tags, wires, and fasteners, shall be permanently removed. This removal work shall be carried out within 30 days of permit issuance and shall be carried out consistent with the requirements of **Special Condition 13**. Once the growth cycle for oysters is complete on the remainder this culture bed, referred to as EB 7-2 A, that area shall be harvested, not replanted, and all cultivation gear and equipment, including all stakes, posts, lines, ropes, tags, wires, and fasteners, shall be permanently removed. This removal work shall also be carried out consistent with the requirements of **Special Condition 13** and shall be completed no later than March of 2018.
- 18. Sand Island Protection.** Until it is removed, between the months of June and August, Coast shall carry out the minimum possible operations on the culture bed referred to in the December 23, 2016 “Annual Report for CDP E-06-003” submitted to the Executive Director as SI N k, SI-N, or Sand Island-North.
- 19. Protection of Brant Grit Sites.** Between the months of November and June, no vessel transit or cultivation activities shall be carried out within 384 meters of the black brant grit sites shown in **Exhibit 11**.
- 20. Longline Spacing.** During its next harvest, Coast shall convert of all of its cultivation beds with 2.5-foot spacing throughout (including those culture bed referred to in the December 23, 2016 “Annual Report for CDP E-06-003” submitted to the Executive Director as BI N k, BI S k, BI W k, EB 2-3, MR 10, MR 11, MR 2, MR 5-1 k, MR 5-2, MR 8-2, and MR 9) to a configuration that includes a five foot wide channel between each group of five lines and a ten foot wide channel between the end of one 100-foot line and the beginning of the next line, as represented in the diagram included in **Exhibit 3**.
- 21. Wildlife Disturbance.** During vessel transit, harvest, maintenance, inspection, and plating operations, Coast shall avoid approaching, chasing, flushing, or directly disturbing shorebirds, waterfowl, seabirds, or marine mammals.
- 22. Non-native Clam Cultivation.** Coast shall implement management practices during grading and handling of non-native clams to prevent spillage, including by using screens during washing activities to contain all clams regardless of size during and by discarding all culls in appropriate onshore trash containers. All cultivated clams shall be removed from the clam cultivation rafts and bay prior to reaching 12mm shell size, at which size they are not sexually mature.

- 23. Indian Island Shoreline.** Coast shall not install cultivation equipment in the area designated on **Exhibit 2b** as “Rack and Bag or Basket” or use this area for shellfish cultivation activities. The four acres of cultivation beds proposed to be installed in this area may instead be relocated to within a portion of the roughly 25 acres proposed to be installed during Phase II within the Bird Island cultivation area south of proposed cultivation bed BI 2-1 - as shown by the area with stripes on **Exhibit 5**.
- 24. Cultural Resources Point of Contact.** Coast has designated its operational manager, Greg Dale, as its authorized point of contact (Cultural Resources POC) to be used in the event any cultural or archaeological resource, human remains, or Native American grave goods are discovered during its aquaculture operations. If this designated point of contact changes, Coast shall provide the name and contact information for its new Cultural Resources POC to the Executive Director, staff of the Humboldt Bay Harbor, Recreation, and Harbor District (Harbor District), and the Tribal Historic Preservation Officers (THPOs) appointed by the Blue Lake Rancheria, Bear River Band of Rohnerville Rancheria and Wiyot Tribe.
- 25. Cultural Resource Discovery Protocols.** In the event an archaeological resource is discovered during ground-disturbing activities, Coast shall immediately notify the THPOs appointed by the Blue Lake Rancheria, Bear River Band of Rohnerville Rancheria and Wiyot Tribe. As soon as feasible after such a discovery, Coast shall retain a qualified archaeologist with local experience to consult with Commission staff, the Harbor District, the three THPOs, Coast, and other applicable regulatory agencies to employ best practices for assessing the significance of the find, developing and implementing a mitigation plan if avoidance is not feasible, and reporting in accordance with this Special Condition and Harbor District Protocol. If no such discovery is made, no reporting is required. In addition:
- A. Ground-disturbing activities shall be immediately stopped if potentially significant historic or archaeological materials are discovered. Examples include, but are not limited to, concentrations of historic artifacts (e.g., bottles, ceramics) or prehistoric artifacts (chipped chert or obsidian, arrow points, groundstone mortars and pestles), culturally altered ash-stained midden soils associated with pre-contact Native American habitation sites, concentrations of fire-altered rock and/or burned or charred organic materials, and historic structure remains such as stone-lined building foundations, wells or privy pits. Ground-disturbing aquaculture operations may continue in other areas outside the discovery locale.
 - B. As soon as feasible after a discovery, Coast shall establish (e.g., tape off or mark with stakes) an “exclusion zone” where unauthorized equipment and personnel are not permitted around the discovery area and a 100-foot buffer zone.
 - C. Coast shall secure (e.g., provide 24-hour surveillance) the discovery locale if directed to do so by the Harbor District or Executive Director, if either deems it necessary to avoid further disturbances.
 - D. Coast’s plant manager (located at 25 Waterfront Drive in Eureka) or party who made the discovery and initiated these protocols shall be responsible for immediately contacting by telephone the parties listed below to report the find:
 - i. Commission staff;
 - ii. The Harbor District’s authorized point of contact; and
 - iii. Coast’s Cultural Resources POC

- E. Upon learning about a discovery, Coast's Cultural Resources POC shall be responsible for immediately contacting by telephone the POCs listed below to initiate the consultation process for its treatment and disposition:
 - i. THPOs with Blue Lake Rancheria, Bear River Band and Wiyot Tribe; and
 - ii. Other applicable agencies involved in Project permitting (e.g., U.S. Army Corps of Engineers, etc.).
- F. In cases where a known or suspected Native American burial or human remains are uncovered, Coast's Cultural Resources POC shall also immediately notify the Humboldt County Coroner (707-445-7242), along with the property owner of the discovery site. In addition, the protocols established through **Special Condition 26** shall be followed.
- G. Ground-disturbing project operations at the find locality shall be suspended temporarily while the Executive Director, the Harbor District, the three THPOs, a consulting archaeologist and other applicable parties consult about appropriate treatment and disposition of the find. Based on this consultation, Coast shall, within three working days of discovery notification, prepare a Treatment Plan and submit it for review and approval by the Executive Director, the Harbor District, and the three THPOs. Where the Project can be modified to avoid disturbing the discovery site (e.g., through project redesign), the Treatment Plan shall consider this as a preferred option. Should human remains be encountered, the provisions of State laws shall apply and **Special Condition 26** shall be followed. The Treatment Plan shall reference appropriate laws and include provisions for analyses, reporting, and final disposition of data recovery documentation and any collected artifacts or other archaeological constituents. If feasible, the field phase of the Treatment Plan shall be accomplished within five days after its approval (with the understanding that circumstances may require longer periods for data recovery).
- H. Any and all inadvertent discoveries shall be considered strictly confidential, with information about their location and nature being disclosed only to those with a need to know. The Commission's and Harbor District's authorized representatives shall be responsible for coordinating any requests by or contacts to the media about a discovery.
- I. Coast shall immediately communicate these protocols to its field work force (including contractors, employees, officers and agents), and such communications shall be made and documented at safety briefings.
- J. Ground-disturbing work at a discovery locale may not be resumed until authorized in writing by the Executive Director and Harbor District.
- K. The plant manager or party who made the discovery and initiated these protocols, shall make written notes available to the Executive Director and Harbor District describing: the circumstances, date, time, location and nature of the discovery; date and time each point of contact was informed about the discovery; and when and how security measures were implemented.
- L. Treatment Plans and corresponding Data Recovery Reports shall be authored by professionals who meet the Federal criteria for Principal Investigator Archaeologist and reference the Secretary of the Interior's Standards and Guidelines for Archaeological Documentation (48 Fed. Reg. 44734-44737).
- M. Final disposition of all collected archaeological materials shall be documented in a final Data Recovery report and its disposition determined in consultation with Tribal representatives.
- N. Coast shall file Final Data Recovery Reports, along with updated confidential, standard California site record forms (DPR 523 series), at the Northwest Information Center of

the California Historical Resources Information System, with report copies provided to the three identified THPOs.

26. Discovery of Remains. In the event human remains or Native American grave goods are discovered during ground-disturbing activities, work at the discovery locale shall be halted immediately, Commission staff, the Harbor District and County Coroner shall be contacted, and, consistent with State law, the following protocol shall be followed (in addition to the protocol described under **Special Condition 25**).

- A. If human remains are encountered, they shall be treated with dignity and respect. Discovery of Native American remains is a very sensitive issue and serious concern of affiliated Native Americans. Information about such a discovery shall be held in confidence by all Project personnel on a need-to-know basis. The rights of Native Americans to practice ceremonial observances on sites, in labs and around artifacts shall be upheld.
- B. Violators of Section 7050.5 of the California Health and Safety Code may be subject to prosecution to the full extent of applicable law (felony offense).
- C. In addition, the provisions of California law (Section 7050.5 of the California Health and Safety Code and Section 5097.98 of the California Public Resources Code) shall be followed:
 - i. The Coroner has two working days to examine the remains after being notified of the discovery. If the remains are Native American, the Coroner has 24 hours to notify the NAHC in Sacramento at (916) 653-4082.
 - ii. The NAHC is responsible for identifying and immediately notifying the most likely descendant (MLD) of the deceased Native American.
 - iii. Within 48 hours of their notification by the NAHC, the MLD shall be granted permission by the property owner of the discovery locale to inspect the discovery site if the MLD so chooses.
 - iv. Within 48 hours of their notification by the NAHC, the MLD may recommend to the owner of the property (discovery site) the means for treating or disposing, with appropriate dignity, the human remains and any associated grave goods. The recommendation may include the scientific removal and non-destructive or destructive analysis of human remains and items associated with Native American burials. Only those osteological analyses (if any) recommended by the MLD may be considered and carried out.

Whenever the NAHC is unable to identify a MLD, or the MLD identified fails to make a recommendation, or the property owner rejects the recommendation of the MLD and mediation between the parties by NAHC fails to provide measures acceptable to the property owner, Coast shall cause the re-burial of the human remains and associated grave offerings with appropriate dignity on the property in a location not subject to further subsurface disturbance.

27. Indemnification by Permittee. By acceptance of this permit, Coast agrees to reimburse the Coastal Commission in full for all Coastal Commission costs and attorney's fees -- including (1) those charged by the Office of the Attorney General, and (2) any court costs and attorney's fees that the Coastal Commission may be required by a court to pay -- that the

Coastal Commission incurs in connection with the defense of any action brought by a party other than the applicant/permittee against the Coastal Commission, its officers, employees, agents, successors and assigns challenging the approval or issuance of this permit. The Coastal Commission retains complete authority to conduct and direct the defense of any such action against the Coastal Commission. PRIOR TO ISSUANCE OF THIS PERMIT, Coast shall enter into a separate written agreement with the Executive Director agreeing to reimburse the Coastal Commission for all court costs and attorney's fees, consistent with the requirements of this condition.

IV. FINDINGS AND DECLARATIONS

A. BACKGROUND AND PREVIOUS PERMITTING

The proposed project site is located in the north and central parts of Humboldt Bay, California. Humboldt Bay encompasses roughly about 17,759 acres at mean high tide in three geographic segments: South Bay, Entrance Bay, and North Bay/Arcata Bay. Within the 7,354 intertidal acres of Arcata Bay, the project applicant, Coast Seafoods Company (Coast), leases approximately 3,800 acres. Coast's leased area is made up of nearly 3,300 acres of public trust land managed by the City of Eureka or Humboldt Harbor, Recreation, and Conservation District (Harbor District) and over 500 additional acres of privately owned lands primarily held by the Karamu Corporation. In addition, Coast owns an additional 514 acres of intertidal and submerged lands within Arcata Bay. Coast's combined 4,313 acres of owned and leased intertidal land is roughly half of the total intertidal area of Arcata Bay. **Exhibit 1** shows the boundaries of Coast's leased and owned area in Arcata Bay. Within this area, Coast maintains an approximately 300 acre intertidal shellfish aquaculture operation, nearly two-thirds of which is located on public trust land.

Coast has been carrying out oyster aquaculture in Arcata Bay since the 1950's and is currently owned by Pacific Seafood, one of the largest seafood companies in North America. Prior to 2006, Coast's intertidal oyster cultivation operations had occurred without benefit of a coastal development permit, and Coast did not seek and obtain recognition of a vested right. In the late 1990s and early 2000s, both the Commission and U.S. Army Corps of Engineers (Corps) informed Coast that it would need additional state and federal authorization to continue operating. To satisfy these permit requirements, in 2003, Coast submitted a permit application to the Corps and a coastal development permit application to the Commission for an approximately 300 acre oyster aquaculture operation within Arcata Bay. Pursuant to Section 307(c)(3)(A) of the Coastal Zone Management Act (CZMA) the Corps cannot issue an individual permit to Coast until the Commission either concurs or is conclusively presumed to concur in a federal consistency certification. Commission approval of a CDP application also constitutes concurrence under the CZMA.

In May of 2006, the Commission approved Coast's CDP application (E-06-003) and Coast received a permit with conditions allowing it to carry out a maximum of approximately 300 acres of off-bottom oyster cultivation as well as several other related activities. This permit was term-limited and set to expire after ten years - in May of 2016 - consistent with Coast's primary leases. The Corps issued a permit to Coast shortly after. Through a series of permit amendments authorized by the Commission, Coast slightly modified its permitted operations and extended their term until August of 2017 – in part to provide Coast with an opportunity to seek a new longer-term

authorization for its operations in Humboldt Bay. Coast had also previously received another permit from the Commission (CDP No. E-02-005) to install and operate a series of clam cultivation rafts in Arcata Bay.

As Coast's local, state, and federal authorizations approached expiration, it applied for a series of new permits to modify and expand its operations within Arcata Bay. Initially, Coast proposed to more than triple its operational footprint from 300 acres to approximately 917 acres. The scale of its proposed expansion was subsequently reduced to roughly 490 acres by Coast in response to concerns about potential adverse environmental impacts that were raised during the Harbor District's CEQA review process. In February of 2017, the Harbor District certified a Final EIR for the proposed project and found that this roughly 490 acre operation was the environmentally preferred alternative. Although certification of its Final EIR has been challenged through court filings by three organizations (Audubon California, Earthjustice, and the California Waterfowl Association), the Harbor District also approved the issuance of a use permit for Coast's proposed expansion.

Although Coast has been involved in two issues of Coastal Act compliance since 2006 - one resulting from unpermitted development and the other from a failure to comply with permit conditions - in both instances it has been responsive to Commission staff in seeking prompt resolution to them once they were discovered by Commission staff. The first issue was resolved by Coast seeking and receiving an after-the-fact permit amendment (E-06-003-A1) to install and operate a new type of oyster cultivation equipment (baskets on longlines) within an approximately 11 acre section of its operation. The second issue arose more recently – in April of this year – due to Coast's failure to meet a variety of submittal deadlines and to implement equipment maintenance, removal, and marine debris prevention requirements established under its most recent permit amendment (E-06-003-A5). Commission permitting and enforcement staff have been working productively with Coast over the past month to ensure these requirements will be met.

B. PROJECT DESCRIPTION

Coast proposes to carry out oyster cultivation on approximately 490 acres of tidelands within northern Humboldt Bay (also known as Arcata Bay and North Bay) and to continue clam cultivation on 30 floating rafts moored within a subtidal channel. The 490 acres of proposed oyster culture would be made up by installing cultivation gear in 256 acres of unused intertidal habitat and continuing use of approximately 235 acres of the 300 acre operation that Coast was authorized by the Commission to use from May of 2006 until August of 2017 (CDP No. E-06-003 and amendments). Coast operates on these 300 acres today under state and federal permits that are close to expiration and its operation is comprised of roughly 50 separate plots or "cultivation beds" that individually range in size from roughly one acre to 20 acres (as shown on **Exhibit 2a**). For the remainder of this report, Coast's current 300 acre operation and its footprint will be referred to as the "existing operation."

Coast's clam cultivation operations also require new authorization since the CDP that was issued by the Commission in 2002 (CDP No. E-02-005 and amendments) for Coast's 30 floating clam cultivation rafts will expire in August.

Coast's current and proposed oyster cultivation operation is used to plant, grow, and harvest Pacific oysters (*Crassostrea gigas*) and Kumamoto oysters (*Crassostrea sikamea*) for commercial sale to

individuals, restaurants, and seafood suppliers, and its clam operation is used to plant, grow, and harvest juvenile Manila clams (*Venerupis philippinarum*) for sale and transport to other shellfish aquaculture operations elsewhere in the state and west coast.

Clam Cultivation

Coast's proposed clam cultivation operation would continue the use of 30 existing rafts located in a roughly one acre area of submerged tidelands leased from the Humboldt Harbor, Recreation, and Conservation District (Harbor District) along the west side of the entrance to the Mad River Slough Channel opposite Bird Island, approximately ½ mile north of the Samoa/Highway 255 bridges (see **Exhibit 2a**). Each clam raft is approximately 12 feet wide by 20 feet long, constructed from aluminum and using polyethylene encapsulated Styrofoam for floatation (see **Exhibit 3**). The rafts are moored in place with nearly two dozen 250- to 500-pound steel anchors placed in water depths of approximately 20 feet. Each raft has 24 tray wells and each well contains a stack of about 20 suspended plastic trays that would be used for growing clams. The rafts would be stocked with Manila clam seed (small immature clams) of approximately 0.05 inches in size imported from land based hatchery facilities in Washington and Hawaii. These seed would then be grown to approximately 0.14 inches over a period of one to six months in the cultivation trays. Once it reaches the appropriate size, the clam seed would then be harvested by hand, sold, and shipped out of Humboldt Bay to locations such as Willapa Bay, Washington for cultivation to adult harvest size. Coast proposes to grow up to 270 million seed clams per year on each raft for a combined total of up to 8.1 billion seed clams. Also as part of the project, Coast proposes to cultivate Pacific and Kumamoto oyster seed in the existing clam rafts. This would result in no change to the physical structure of the clam rafts.

The 30 rafts are divided into three sets of ten rafts. Each set of ten rafts is linked together in a line, separated and held in place by two 60 foot long steel cables between each raft and with eight anchors to keep the array of ten in place (see **Exhibit 3**). During operation, the clam rafts would be accessed by skiff and scow. Activities at the clam rafts would include regular washing, maintenance, harvest, and planting of clam seed. Washing and maintenance activities would be carried out on a daily basis and include the use of a pressure washer, an onboard water intake pump and hose system on the maintenance vessels. Twice each year the raft anchors and ground tackle would be examined and repaired as necessary by divers using scuba, skiffs and an oyster barge.

Coast holds a lease from the Harbor District for the submerged lands in which the rafts are located. Unless renewed, this lease would expire on September 7, 2025.

Oyster Cultivation

Since the early to mid-1900s, Coast and its predecessors have been commercially growing the non-native Pacific oyster (*Crassostrea gigas*) in Arcata Bay. Historically, these operations were spread across as many as 1,000 acres and used "on-bottom" methods that relied on the placement of loose oysters and shell directly on intertidal mudflats and their subsequent harvest through suction dredging and excavation. This style of aquaculture continued until the late 1990s when Coast began converting to the less destructive "off-bottom" techniques that it currently uses. The three "off-bottom" methods that are used by Coast include rack-and-bag, long-line, and basket culture. Rack-and-bag culture makes use of elevated metal frames that are used to support plastic mesh bags filled with oysters and long-line culture makes use of short notched PVC pipes embedded in rows and used to support 100-ft. long lengths of nylon rope that are seeded every several feet with clusters of oysters. Basket culture makes use of rows of taller, larger diameter PVC posts to support a

monofilament line on which rows of hard plastic enclosed mesh baskets are hung. Each basket is then filled with up to several dozen individual oysters. A detailed description and photographs of these methods are included in **Appendix B** and **Exhibit 4**, respectively.

FLUPSY (Floating Upwell System)

Coast also proposes to continue using a FLUPSY facility located on the west side of the bay entrance channel, south of the Simpson wood chip loading dock in Fairhaven. The FLUPSY is tied to a dock at the Eureka Boat Yard 200 yards from the shoreline in 20 feet of water. **Exhibit 7** presents a graphic depicting the FLUPSY. It would be used to nurse single-seed oysters immediately after arrival from the hatchery (approximately 1.4 mm) until they would be ready to be bagged and planted on racks for rack-and-bag culture (approximately 6 mm.) Coast also proposes to use the FLUPSY for clam seed, and to grade single-seed oysters by size. As part of Phase I of its project, Coast also proposes to add eight upwell bins the FLUPSY, resulting in a slight increase in the volume of water it occupies. Each bin would be three feet long by three feet wide by three feet deep.

Storage Floats

Coast also proposes to use four 20-foot wide by 20-foot long wooden floats or rafts anchored in a channel with an average depth of roughly 20-feet. Bags and baskets of recently harvested oysters would be placed on these floats and held in a submerged area for short durations until they would be ready for transport by boat to Coast's onshore base of operations. Coast estimates that approximately 0.04 acres are occupied by these storage floats.

Nursery Area

As part of its project, Coast proposes to continue using approximately 4.8 acres as an "oyster nursery" split between two areas. Within these areas Coast would stack oyster shell upon which young oyster larvae or "seed" have settled. The shell would be consolidated in mesh bags and placed on wooden pallets in order to prevent the bottom of the stacks from becoming silted in. A photograph of this operation is provided in **Exhibit 4**.

After a period of time, which varies due to seasonal conditions (usually 2-3 months) the seeded shell would be removed from the nursery in small batches daily and brought to Coast's onshore processing plant. At the plant, individual pieces of shell would be braided into long-line ropes and rebagged. Once the shell has been braided into the rope and bagged it would be put into the bay and placed on either a bed or on the Arcata Channel nursery area (shown in **Exhibit 4**) to await planting.

The seed shell would be transported by boat to nursery areas located in Humboldt Bay on mudflats north of Gunther Island and along Arcata Channel. At these nursery areas the seed would be allowed to grow to a less fragile size and age. This process, called beach hardening, is needed to allow the seed to gain size and strength prior to planting. The seed would be allowed to beach harden for 3 to 8 months depending on time of year, growth and condition of the seed.

Vessel Operations

To support its proposed intertidal and subtidal shellfish aquaculture operations, Coast would use a fleet of eight small watercraft and three larger vessels. These vessels would operate between the culture beds and rafts in Arcata Bay and Coast's onshore plant on the shoreline in Eureka. The

9-15-1931 (Coast Seafoods Company)

combined total vessel operations for the proposed project would include an estimated 74 vessel trips and 286 hours per week on Arcata Bay (over ten trips and nearly 41 hours per day). This represents an approximately 30% increase over the operational levels used by Coast for the past 11 years.

Phasing

Coast proposes to implement its project in two phases and would combine the removal of some of its existing operations with expansion into new areas – as shown in the table below. In Phase I Coast would combine an expansion of 165.2 acres (divided between 17 individual cultivation plots) into new areas with the removal of 42 acres of existing cultivation plots (six individual areas) from its existing 298.7 acre operation - for a net increase of 123.2 acres and total operation at the end of Phase I of 421.9 acres. Once the 421.9 acres of Phase I are in use, Coast would begin Phase II and would combine a further expansion of 90.8 acres with removal of an additional 22.7 acres of existing cultivation beds - for a net increase of roughly 68 acres and total operation at the end of Phase II of 490 acres. **Exhibits 2b and 2c** show the proposed configuration of Phase I and II within Arcata Bay and the rationale for Coast’s combined expansion and contraction is provided below in the Marine Resources section of this report.

Phase	Existing	Expansion	Removal	Net Change	Total
I	298.7 acres	+165.2 acres	-42 acres	+123.2 acres	421.9 acres
II	421.9 acres	+90.8 acres	-22.7 acres	+68.1 acres	490 acres

Coast proposes to implement phases one and two over the course of several years. Specifically, for Phase I Coast would install approximately 81 acres of expansion cultivation beds between July of 2017 and May of 2018, approximately 33 additional acres of expansion beds between August of 2018 and May of 2019, and roughly 25 acres each between August of 2019 and May of 2020 and after August of 2020. Phase II would primarily be installed between July of 2022 and May of 2024.

In addition to changing the location and overall footprint of its operations, Coast also proposes to make use of slightly different configurations of oyster growing equipment between its existing operation and expansion areas. However, the cultivation methods would be the same between the two areas.

Within the footprint of its existing operations area during Phase I, Coast proposes to remove 42 acres of existing oyster longlines spaced at 2.5 feet between lines and maintain approximately 234 acres of longlines spaced at 2.5 feet between lines and 10.6 acres of oyster baskets on longlines in groups of three lines spaced three-feet apart and separated from the next group of three lines by a 20 foot wide corridor. Within the existing operations area during Phase I, Coast also proposes to convert up to 18.4 acres from 2.5 foot spaced longlines to baskets on longlines in groups of two lines spaced nine feet apart and separated from the next group of two lines by a 16 foot wide corridor as well as to use four acres for rack-and-bag cultivation or baskets on longlines and roughly 4.8 acres as a “nursery” area where mesh bags of seeded oyster shell would be placed on intertidal mudflats for three to eight months as an initial step in the culture process. Coast also proposes to use 0.4 acres for floating storage baskets and another 0.4 acres for a floating upwelling system

(FLUPSY) raft that would be expanded to include an additional eight culture bins and used for the initial grow out of oyster seed.

Within its proposed expansion area during Phase I, Coast proposes to install 89.2 acres of paired oyster longlines spaced at 10 feet apart and 72 acres of oyster baskets on longlines in groups of two lines spaced nine feet apart and separated from the next group of two lines by a 16 foot wide corridor.

A figure showing the location of all the proposed elements of Phase I is provided in **Exhibit 2b**.

During Phase II, Coast would remove an additional 22.7 acres of 2.5 foot spaced longlines from within its existing operations area and install 90.8 acres with either paired oyster longlines spaced at 10 feet apart or oyster baskets on longlines in groups of two lines spaced nine feet apart and separated from the next group of two lines by a 16 foot wide corridor.

A figure showing the location of all the proposed elements of Phase II is provided in **Exhibit 2c**.

C. OTHER AGENCY APPROVALS AND CONSULTATIONS

Over the approximately three years that have elapsed since Coast's initial proposal to expand its operations in Arcata Bay to over 900 acres, Commission staff have spent several hundred hours in meetings, conference calls, site visits, interagency coordination efforts, and consultations and feedback sessions with Coast, its legal and consulting teams, interested parties, representatives of the Wiyot Tribe, local government staff, and state and federal resource agency staff. At Coast's request, Commission staff have attended at least four formal day long interagency meetings with Coast's representatives and state and federal resource agency staff including those from the California Department of Fish and Wildlife, Regional Water Quality Control Board, U.S. Army Corps of Engineers, National Marine Fisheries Service, U.S. Fish and Wildlife Service, California State Lands Commission, and California Department of Public Health. Commission staff has also met independently with these agency staff and have integrated the concerns, input, suggestions, and technical expertise of these agency staff into this recommendation.

Humboldt Bay Harbor, Recreation, and Conservation District

The majority of Coast's proposed 491 acre operation in Arcata Bay would be carried out on tidelands that are owned and managed by the Humboldt Bay Harbor, Recreation, and Conservation District (Harbor District). In 2015, the Harbor District renewed and restated its lease to Coast for aquaculture operations in Arcata Bay. Unless renewed, this lease is set to expire on September 7, 2025. **Special Condition 1** sets the permit term to this lease expiration date. In addition, the Harbor District is also the lead agency for the project under CEQA and Coast is required to obtain a Use Permit from the Harbor District before proceeding with its project. At a special hearing on February 28, 2017, the Harbor District certified a Final EIR for the project and issued a Use Permit to Coast for its proposed operations in Arcata Bay.

As described in the project EIR and/or required in Harbor District Permit No. 14-03, Coast would carry out its shellfish cultivation operation in accordance with the parameters described in **Exhibit 8**, the Harbor District's Mitigation Monitoring and Reporting Program.

U.S. Army Corps of Engineers

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In 2006, the U.S. Army Corps of Engineers (ACOE) issued Individual Permit No. 2002-26912N to Coast under Section 404 of the Clean Water Act of 1972 and Section 10 of the Rivers and Harbors Act of 1899. This permit authorized Coast to conduct oyster mariculture operations, over a ten year period, on approximately 300 acres in Arcata Bay. In 2016, this permit was modified to extend the expiration date for one year. The permit is now set to expire on June 30, 2017. Coast has applied to the ACOE for a new permit that would authorize its proposed continuation and expansion of shellfish aquaculture within Arcata Bay. The ACOE is currently reviewing this application.

Pursuant to Section 307(c)(3)(A) of the Coastal Zone Management Act (“CZMA”) the Corps cannot issue an individual permit to Coast until the Commission either concurs or is conclusively presumed to concur in a federal consistency certification. Commission approval of this CDP application constitutes concurrence under the CZMA.

National Marine Fisheries Service

As part of its review of Coast’s permit application, the ACOE is in consultation with the National Marine Fisheries Service (NMFS). In addition, Commission staff worked closely with NMFS during the review of this permit amendment application and the staff recommendation reflects and incorporates technical feedback received from NMFS staff.

California Department of Fish and Wildlife

Coast’s aquaculture operations are required to be registered annually with the California Department of Fish and Wildlife (CDFW). Coast has a valid registration for 2017. In addition, CDFW is a resource agency with trustee responsibility over many of the biological resources of Humboldt Bay, including eelgrass, fisheries, and waterfowl. As such, CDFW staff were deeply engaged throughout the project’s CEQA review in evaluating the project’s potential to adversely affect these resources and they provided the lead agency (the Harbor District) with extensive technical comments, input, and suggestions regarding the project design and evaluation. Commission staff drew on this technical input and have coordinated closely with CDFW during the review of Coast’s permit application. The staff recommendation reflects and incorporates a range of technical feedback received from CDFW staff.

North Coast Regional Water Quality Control Board

The North Coast Regional Water Quality Control Board (Regional Water Board) has permitting jurisdiction over Coast’s aquaculture operation through both Section 401 of the Clean Water Act and the state Porter-Cologne Water Quality Control Act. In 2007, the Regional Water Board issued a section 401 certification to Coast for its aquaculture operation. In 2016, this certification was extended for one year and is now set to expire on June 30, 2017. Coast has applied to the Regional Water Board for a new section 401 certification to authorize its proposed continuation and expansion of shellfish aquaculture within Arcata Bay. The Regional Water Board is currently reviewing this application.

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, Coast proposes to place tens of thousands of PVC posts, longlines, and baskets on longlines, as well as wooden pallets and large mesh bags of oyster shell within intertidal mudflats. In total, Coast’s proposed project would result in the placement of over four acres of fill within Arcata Bay. Installation of this material constitutes “fill” of wetland waters, as that term is defined in the Coastal Act.

The Commission may authorize a project that includes filling of wetland 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 PVC posts and longlines is to support Coast’s aquaculture operations. 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 wetland 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 coastal 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 floating rafts and longline cultivation equipment in Arcata Bay to support oyster and clam aquaculture, Commission staff also considered other shellfish cultivation methods to determine if any of them would require less fill. Among the various techniques considered - placement of loose shell on tidal flats (bottom culture), placement of mesh cultivation bags filled with oysters on the tidal flats, installation of elevated racks, and use of additional floating cultivation rafts or barges – most would involve more fill in coastal waters when compared to the proposed project. Therefore, these alternatives were rejected as no less environmentally damaging. Further, because shellfish cultivation relies on the placement into coastal waters of shellfish and structures to contain or support them, there are no alternatives to it that would not require placement of fill. The Commission therefore agrees with the applicant that there are no alternatives to the proposed cultivation methods that would be feasible or less environmentally damaging when compared to the proposed culvert installation 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 wetland waters may be permitted if feasible mitigation measures have been provided to minimize any adverse environmental impacts. The mitigation measures described in greater detail in the terrestrial biological resources and marine resources and water quality sections of this report will minimize the project’s adverse environmental impacts. In particular those measures that would reduce the project’s potential to result in the release of marine debris (**Special Conditions 4, 8 and 14**); reduce the overall potential for the project to adversely affect the overall biological productivity of Arcata Bay by limiting the project scale (**Special Condition 2**); reduce the project’s potential to disturb sensitive wildlife species and life stages throughout the bay by further consolidating Coast’s operations (**Special Conditions 3 and 19**); and require careful monitoring to assess assumptions about the magnitude and likelihood of the projects adverse impacts to eelgrass and black brant (**Special Conditions 6 and 7**).

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. MARINE RESOURCES

Section 30230 of the Coastal Act states:

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

Coastal Act section 30231 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 project area, Humboldt Bay, is one of the most biologically rich and significant marine ecosystems in California. Humboldt Bay alone supports the majority of the state's total amount of eelgrass habitat, including some of the largest and most dense continuous beds. Eelgrass beds are globally recognized as a rare and critically important marine habitat and are designated for protection by the National Marine Fisheries Service and Pacific Fisheries Management Council as Essential Fish Habitat and a Habitat Area of Particular Concern. The eelgrass beds of Arcata Bay support populations of a wide variety of sensitive and protected marine species including special status species of fish (such as those listed as threatened under the federal Endangered Species Act - green sturgeon, steelhead, and coho and chinook salmon), and migratory shorebirds and waterfowl such as the black brant, a State Species of Special Concern.

The full list of species known to occur within the project area includes the following ten species that are listed as threatened or endangered pursuant to the California Endangered Species Act (CESA) and/or the federal Endangered Species Act (ESA) or designated as a California Species of Special Concern (SSC). The California Department of Fish and Wildlife designates certain species as Species of Special Concern due to declining population levels, limited ranges, and/or continuing threats that have made them vulnerable to extinction:

- Black brant, *Branta bernicla nigricans*, State SSC;
- Chinook salmon, *Oncorhynchus tshawytscha*, ESA-threatened (California Coastal ESU);
- Coastal cutthroat trout, *Oncorhynchus clarki clarki*, State SSC;
- Coho salmon, *Oncorhynchus kisutch*, CESA and ESA-threatened (Southern Oregon/Northern California Coho Evolutionarily Significant Unit (ESU));
- Eulachon, *Thaleichthys pacificus*, ESA-threatened (southern Distinct Population Segment (DPS));
- Green sturgeon, *Acipenser medirostris*, ESA-threatened (southern DPS); State SSC (northern and southern DPS);
- Tidewater goby (*Eucyclogobius newberryi*) CESA-Endangered;
- Longfin smelt, *Spirinchus thaleichthys*, CESA-threatened;

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- Pacific lamprey, *Entosphenus tridentatus*, State SSC;
- Steelhead, *Oncorhynchus mykiss*, ESA-threatened (Northern California ESU); and
- White sturgeon, *Acipenser transmontanus*, State SSC.

Additionally, Humboldt Bay also includes large areas of open intertidal mudflats that attract such significant proportions of overwintering and migratory shorebird populations that the bay is recognized as a Site of International Significance by the Western Hemisphere Shorebird Reserve Network and an Audubon Society Important Bird Area with global recognition. Depending on the season, up to 100,000 shorebirds may reside in Humboldt Bay (Schlosser and Eicher 2012). At least 24 species of shorebirds including American avocets, sandpipers, dowitchers, plovers, godwits and dunlin make use of Humboldt Bay's mudflat habitats for feeding, resting and/or roosting (Danufsky and Colwell 2003; Dodd and Colwell 1998; Evans and Harris 1994; Long and Ralph 2001). Of these shorebirds, two thirds are listed as shorebirds of concern, or on the U.S. Fish and Wildlife Service's Birds of Conservation Concern list¹ (US Fish and Wildlife Service 2008; U.S. Shorebird Conservation Plan Partnership 2015).

As such, Arcata Bay includes both areas and species of special biological and economic significance that are required to be provided with special protection under Section 30230 of the Coastal Act. As discussed below, Coast's proposed oyster culture operations have the potential to adversely affect these species and areas as well as the biological productivity of coastal waters in Arcata Bay.

Pacific Herring

As part of its 2006 analysis and approval of CDP No. E-06-003 for Coast's 300 acre intertidal aquaculture operation, the Commission found that the project had the potential to adversely affect Pacific herring and herring spawning areas and established two special permit conditions to minimize those adverse effects. The findings supporting imposition of these conditions stated:

Many studies have documented the importance of eelgrass as spawning substrate for Pacific herring.² Loss of eelgrass has been suggested as a factor affecting herring populations, which can in turn reduce the amount of prey available to predators of herring and herring eggs. Eggs and larvae of Pacific herring are eaten by walleye pollock, herring, juvenile salmon, invertebrates, and most notably, marine birds. Bird predation is more intense in the intertidal zone when eggs are exposed or in shallow water, while fish predation may be more significant in the subtidal zone.

Within Humboldt Bay, herring appear to spawn almost exclusively on eelgrass beds.³ In 1975 to 1976, 80 percent of all spawning in Humboldt Bay occurred in the Arcata Bay eelgrass beds closest to the freshwater input from Jacoby Creek and Freshwater Slough (i.e., the East Bay Management Area, as depicted in Exhibit 2). More recently, observations

¹ The US Fish and Wildlife Service's Birds of Conservation Concern list is made up of species, subspecies, and populations of migratory birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act of 1973. These species make up the USFWS' highest conservation priorities and their inclusion on the list is intended to stimulate coordinated and proactive conservation actions among the USFWS' Federal, State, Tribal, and private partners.

² NMFS (2005a), p. 28.

³ Mello and Ramsey (2004).

by DFG personnel indicate Pacific herring continue to heavily use this region of Arcata Bay; however, spawning occurs throughout Arcata Bay and South Bay.⁴ DFG reported that 70 percent of spawning occurred in Arcata Bay, and 48 percent of the total spawn occurred in the eelgrass beds of the East Bay Management Area.⁵ DFG staff notes that in recent spawning events in East Bay, higher-density spawn has occurred at lower elevations, specifically in areas near the channel immediately south of the Arcata Channel, sometimes known as the Bracut Channel.⁶

Because of the importance of the East Bay Management Area to the Pacific herring spawn, in its 2006 review NMFS recommended the following conservation measure be included as a condition of the Corps' permit:

The proposed conversion of 45 acres from historic oyster bottom culture to off-bottom culture should not be sited in any known or historic eelgrass habitat within Coast's East Bay Management Area unless this area is needed for spacing assessment purposes. Based upon historic and ongoing herring spawn surveys, the California Department of Fish and Game has identified much of the East Bay Management Area as a key herring spawning area... By siting additional culture outside this area, direct impacts to eelgrass habitat and indirect impacts to Pacific herring would be minimized in the East Bay Management Area.

Based on previous discussions with industry personnel, NMFS recognizes that areas outside Coast's East Bay Management Area may not have the same suite of ideal conditions for oyster growth, but areas outside the East Bay Management Area do achieve the general project purpose as demonstrated by the numerous culture sites elsewhere in Arcata Bay...⁷

...

As discussed above, the East Bay Management Area provides key herring spawn habitat. In addition, Jacoby and Freshwater Creeks drain near the East Bay Management Area. Jacoby and Freshwater Creeks are anadromous fish streams providing habitat for coho and Chinook salmon as well as steelhead, and are the two major watersheds that drain into Arcata bay.⁸ Also as discussed above, DFG staff notes that in recent spawning events in East Bay, higher-density spawn has occurred at lower elevations, specifically in areas near the channel immediately south of the Arcata Channel, sometimes known as the Bracut Channel. The East Bay plot furthest from the channel is EB 7-2.

Special Condition No. 2 requires that no activity authorized by this permit, except for oyster culture activities located at the plots identified on Exhibit 2 as EB 1-1, EB 1-2, EB 2-1, EB 2-3, EB 2-3 Cont., EB R&B, EB 4-3, EB 6-1, EB 6-2 and EB 6-3, as well as EB 7-2 as

⁴ Mello, John (2006).

⁵ Mello and Ramsey (2004).

⁶ Mello, John. Pers comm. May 4, 2006.

⁷ Conservation Recommendation No. 1, included on pages 3 to 4 of the cover letter transmitting the BO and EFH assessment, dated November 10, 2005, from Rodney McInnis, NMFS, to Lt. Col. Philip T. Feir, Army Corps of Engineers. See [Appendix A: Substantive File Documents](#).

⁸ Humboldt Bay Watershed Advisory Committee and Redwood Community Action Agency (2005).

specified below, shall be sited in any known or historic eelgrass habitat within Coast's East Bay Management Area (as identified on Exhibit 2). Future plantings in plot EB 7-2 shall not exceed a total of 11.5 acres. Prior to planting any oyster culture outside those areas actually in production as of the date of submittal of this permit application (January 31, 2006), Coast shall submit to the Executive Director for review and approval a planting plan that identifies the nature (i.e, rack-and-bag or long-line) and the location (identified by plot name) of the proposed plantings.

Because of its distance from key herring spawn habitat and from anadromous fish streams, impacts from the proposed project would be minimized in the Mad River Management Area. For this reason, the Commission finds that future planting outside the 11.5 acres in East Bay should be located in the Mad River Management Area preferentially, and if additional acreage outside the Mad River Management Area is required to fill the 45.49 acres, the additional acreage should be located in the Sand Island area.

*As discussed in Section 4.2.2: Project Parameters above, Coast proposes that during the months of December, January and February, Coast will visually inspect beds prior to planting and/or harvesting, to determine if Pacific herring (*Clupea pallasii*) has spawned on eelgrass, culture materials, or substrate. If herring spawning is observed, Coast will: 1) postpone for two weeks planting and/or harvesting activities on those beds where spawning has occurred, and 2) notify the California Department of Fish and Game ("DFG") Eureka Marine Region office of the spawn within 24 hours. Special Condition No. 3 requires that Coast comply with this proposed measure, and further requires that Coast keep records of when DFG was notified of the spawning event. Those records shall be included with the annual report described below in Special Condition No. 7.*

In January of 2017, as part of its review of Coast's request to extend by six months the expiration date of its coastal development permit, Commission staff considered newly collected information on Pacific herring spawning and the efficacy of the Special Conditions 2 and 3 of CDP No. E-06-003. This newly collected information included the results of Pacific herring spawning surveys carried out in 2014-2015 and 2015-2016 by CDFW staff. These survey results (shown graphically on **Exhibit 9**) indicate that although spawning can occur in several locations across Arcata Bay, the eastern portion of Arcata Bay - in particular the section known as the East Bay Management Area - continues to support consistently high levels of spawning activity. The recent surveys support the previous data, which indicates that east bay, on average, has a much higher frequency of use and density of eggs at spawn sites than other areas and often accounts for the majority of spawn in Arcata Bay. Commission staff also considered the discussion included in the Recirculated Draft Environmental Impact Report regarding the herring monitoring and reporting requirement of Special Condition 3 from CDP No. E-06-003 and consulted with CDFW staff regarding potential modifications to improve the condition's intended effect – to help ensure that herring spawn is not lost or removed during oyster harvest activities.

Although Coast has not reported any observations of herring spawn since Special Condition 3 of CDP No. E-06-003 was established in 2006, a variety of anecdotal reports collected over the past several years indicate that herring spawning has been occurring on and around Coast's cultivation gear in the East Bay Management Area. Commission staff therefor considered a variety of potential explanations for Coast's lack of reporting. Among these are: (1) the limited planting and harvest activities carried out by Coast in the eastern portion of Arcata Bay during the winter months (when

herring spawn); (2) a potential absence of herring eggs on aquaculture gear targeted for planting or harvest by Coast during this time; and/or (3) a potential inability for Coast's field personnel to effectively observe or identify herring eggs - particularly when focused on completing difficult and time consuming harvest or planting activities within the limited wintertime work windows. To address this latter issue, Special Condition 3 of CDP No. E-06-003 would be modified for Coast's proposed re-authorization and expansion and carried forward as **Special Condition 11** which requires Coast to make use of survey protocols developed by CDFW to aid in identification of herring eggs. Additionally, **Special Condition 11** would also facilitate greater communication and coordination between Coast and CDFW staff by requiring Coast to share its planting and harvesting scheduling with CDFW during herring season. This would allow information on spawning locations collected by trained CDFW scientists to be considered by Coast in planning its operations and would increase the likelihood that it would avoid activities in known or likely spawning areas.

However, despite the protective measures provided through **Special Condition 11** to limit the removal or harvest of culture gear that may have herring eggs on it and the associated disturbance of adjacent or nearby eelgrass that herring may also have spawned on, the issue would remain of herring spawning on the artificial substrate of culture gear instead of their intended target - eelgrass. As noted by CDFW in several of its letters to the Harbor District on the proposed project, herring eggs on oyster longlines are not likely to survive and persist as effectively as eggs laid on eelgrass due to the different amounts of sun and air exposure between the two and the increased potential for desiccation and predation. As such, limiting the number and size of cultivation beds within areas of high use by herring - such as the eelgrass beds in the East Bay Management Area - is expected to provide an additional benefit for herring. CDFW acknowledged this in its discussion and recommendation regarding the East Bay Management Area included in its December 31, 2015 letter to the Harbor District:

While there is eelgrass available outside of this area, herring do not use it the majority of the time (CDFW data). The reasons for herring spawning site fidelity are not known; however, it is assumed that long term use of a site reflects selection of highly suitable environmental criteria. Given the lack of substantive information provided regarding possible long term impacts to herring in the core spawning area of Humboldt Bay, and the importance of this species as food for a variety of species from marine mammals to salmonids to birds (Bayer 1980; Hunt et al. 1999; Lassuy 1989; Lok et al. 2012; Moffitt 1933; Moffitt 1939; Willson and Womble 2006), the Department recommends that the Project avoid this area.

This avoidance concept was also reflected in the Commission's action in 2006 through the requirement in Special Condition 2 of CDP No. E-06-003 that Coast limit the total footprint of its operations within the East Bay Management Area to the use of only eleven culture beds of limited size. The Commission also called out particular concern for one of these beds, referred to as EB 7-2, and specifically required that the scale of operations on that bed be restricted. A review of the location and configuration of Coast's existing operation (**Exhibit 2a**) shows that this cultivation bed is isolated from Coast's other operations and located near the center of one of the largest and most dense continuous eelgrass beds within Arcata Bay and the East Bay Management Area. As discussed in subsequent sections of this report, this bed would be required to be removed through **Special Condition 17** due to adverse impacts its presence causes to the public recreational use of Arcata Bay and foraging by black brant, a California Species of Special Concern. In addition to benefitting these coastal resources, removal of bed EB 7-2 would also provide a direct benefit to

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Pacific herring by removing over 11.6 acres of densely planted cultivation gear from one of the critical herring spawning areas within the bay. The removal of the bed would not only eliminate the risk to herring from spawning on the densely planted aquaculture gear within this area but is also expected to result in a significant natural recovery and expansion of eelgrass within the bed, thus providing additional suitable spawning habitat.

Green and White Sturgeon

Since the Commission first considered Coast's intertidal shellfish aquaculture operations, two rare and imperiled fish species known to be present within Arcata Bay have been provided with special status designations, the green sturgeon (*Acipenser medirostris*) and white sturgeon (*Acipenser transmontanus*). The green sturgeon is listed as threatened under the federal Endangered Species Act and both species are also designated as Species of Special Concern in California. Additionally, in 2009 the National Marine Fisheries Service (NMFS) designated Humboldt Bay as critical habitat for the southern distinct population segment of green sturgeon. Although the Commission's authorization of Coast's approximately 300 acre operation in 2006 did not evaluate potential adverse impacts to these species, the presence of these species in Humboldt Bay was poorly understood at that time and their federal protected status had not been established. In the intervening years, however, a substantial amount of additional information has become available demonstrating both their presence, numbers, and use patterns in Humboldt Bay and their potential to be adversely affected by Coast's proposed intertidal operations.

The project's Final EIR includes a description of both species and their use of Humboldt Bay:

The green sturgeon is a long-lived, slow-growing fish species, listed as threatened under the Federal ESA (NMFS 2016a) and as a CDFW species of special concern (CDFW 2016b). Mature males range from 4.5 ft to 6.5 ft and they do not reach sexual maturity until about 15 years, while mature females range from 5 ft to 7 ft and do not mature until they are 20 to 25 years (Kelly et al. 2007). Maximum ages of adult green sturgeon can range from 60 to 70 years. The southern distinct population segment (DPS) green sturgeon generally occur from Graves Harbor, Alaska to Monterey, California (Moser and Lindley 2007).

Green sturgeon are considered the most marine-oriented of all the sturgeon species in North America (Moser and Lindley 2007). Juveniles enter bays and estuaries after only a year in freshwater and remain in marine waters until they return as adults to spawn. While green sturgeon are not expected to spawn in any of the Humboldt Bay tributaries, adults and sub-adults use the bay for foraging habitat. Green sturgeon typically access non-spawning estuaries in the summer and early fall months, and sturgeon have been documented in Humboldt Bay between April and October (Pinnix, pers. comm., 2015). Adults and sub-adults are regularly observed in deeper channels of Humboldt Bay, channel margins and mudflats when the tideflats are inundated during high tide, and around Sand Island in North Bay. Foraging sturgeon tend to frequent areas less than 33 ft deep, moving on and off mudflats with tidal fluctuations (Kelly et al. 2007)...

Like the green sturgeon, white sturgeon is a long-lived, slow-growing anadromous fish species. It is a CDFW species of special concern (CDFW 2016b). Mature males range from 2.5 ft to 3.5 ft and they do not reach sexual maturity until about 10 to 12 years, while mature females range from 3 ft to 4.5 ft and do not sexually mature until they are 12 to 16 years (CDFW 2016b). Maximum ages of adult white sturgeon have been known to be nearly 100

years, although more commonly, fish collected in California are no more than 27 years (CDFW 2016b). White sturgeon generally occur from Cook Inlet, Alaska to Ensenada, Mexico (PSMFC 1996).

White sturgeon spend most of their lives in nearshore oceanic waters, bays (including Humboldt Bay), and estuaries, although they prefer estuaries of large rivers (PSFMC 1996). The only known self-sustaining spawning population in California is in the Sacramento River, although spawning is believed to also occur in the San Joaquin, Klamath, and Eel rivers (Israel et al. 2009). While white sturgeon are not expected to spawn in any of the Humboldt Bay tributaries, adults and sub-adults likely use the bay for foraging habitat. Similar to green sturgeon, burrowing shrimp are a key prey item for white sturgeon. Juvenile white sturgeon have been shown to prefer water greater than 12.5 meters (m) in the Columbia River (McCabe and Tracy 1994). Juvenile and adult white sturgeon prefer deeper water, although they are occasionally found foraging in shallower habitats (Israel et al. 2009, CDFW 2016b).

Due to their large size and the limited depth of the upper reaches of Arcata Bay – particularly those areas above tidal flats that become submerged at high tide and provide foraging habitat for sturgeon - both green and white sturgeon may be susceptible to entanglement in densely planted longline gear. Additionally, the presence of cultivation gear may also exclude these species from foraging within areas that would otherwise provide appropriate foraging habitat or negatively affect their ability to successfully forage (for example, by providing the sturgeon’s target prey with refuge areas). These potential impacts are discussed in the comment letter submitted by NMFS to the Harbor District in response to its publication of the project’s Recirculated Draft EIR (because the white sturgeon does not have federal protective status, this letter focuses solely on green sturgeon):

The District should evaluate potential harm, injuries, and stranding potential for individual green sturgeon caused by encounters or entanglement with suspended longlines and sharp oyster cultch adjacent to areas known to be frequently occupied by green sturgeon. Dense line spacing (2.5ft longline spacing) creates a high likelihood for harm, entanglement, and stranding as sturgeon are known to become stranded on mudflats even in the absence of longlines (Dumbauld et al. 2008). The statement in the R-DEIR that “...green sturgeon do not typically frequent shallow habitat where shellfish aquaculture is located” is not supported by the available scientific literature. Numerous publications and personal observations document green sturgeon use of shallow areas, as well as areas with shellfish aquaculture (Patten and Norelius 2016; Moser et al. in press; Pinnix, personal communication, 2016; Dumbauld et al. 2008; Kelly et al. 2007). NMFS designated critical habitat for green sturgeon in 2009 (74 FR 52300), which includes a primary constituent element, or physical biological feature (PBF), of estuary critical habitat [such as Arcata Bay] to be ‘water depth.’ The ‘water depth’ PBF indicates that a diversity of depths is important to support different life stages and habitat uses for green sturgeon within estuarine areas. Subadult and adult green sturgeon occupy a diversity of depths within bays and estuaries for feeding and migration (74 FR 52300). Tagged adults and subadults within the San Francisco Bay estuary primarily occupy waters over shallow depths of less than 10m, either swimming near the surface or foraging along the bottom (Kelly et al. 2007).

...

The R-DEIR suggests that green sturgeon will avoid structured habitat, but there is no analyses of habitat lost to green sturgeon resulting from structured habitat (shellfish

aquaculture) in Humboldt Bay. The existing and expanded project (~900 acres) represents a significant loss of habitat for green sturgeon if the assertion made in the R-DEIR is valid regarding sturgeon avoidance of structured habitat. The existing and expanded project either represents a significant loss of habitat for green sturgeon, or represents an increased likelihood of harm, injury, or mortality due to contact or entanglement with longline gear depending on whether sturgeon will avoid or utilize these areas.

Commission staff has coordinated closely with NMFS staff to understand the issues raised in this letter and their relevance to Coast's currently proposed re-authorization and expansion project (the project evaluated in the Recirculated Draft EIR included approximately 620 acres of intertidal aquaculture, substantially more than Coast's current proposal for 490 acres). Commission staff now understands that, as noted by NMFS staff and discussed above, the highest potential for adverse impacts to sturgeon from the proposed project is associated with cultivation operations in or around areas of particularly high use by sturgeon and cultivation beds planted at the highest density. With the proposed project, those high density areas are the approximately 14 longline cultivation beds that include 100-foot longlines placed every 2.5-feet across a bed. At this density, nearly three and a third miles of nylon ropes and PVC stakes would be concentrated within each acre of the cultivation bed (an example of which is provided in **Exhibit 4**).

High Use Area

As discussed in the Commission's findings for CDP Amendment No. E-06-003-A5, information collected in recent years from acoustically tagged green sturgeon indicate the presence of a potential high use area for green sturgeon in the upper reaches of the Arcata Channel near Sand Island. Specifically, approximately 30 individual tagged fish per year were observed in this area during fish surveys carried out in 2006 and 2007. Additional survey data from 2008 demonstrate a similar use pattern and field observations by researchers and NMFS staff in the late summer of 2016 indicates that high use of this area by green sturgeon continues. Although the great majority of Coast's existing operation is located to the south, north, or east of this area, the 11 acre SI-Nk culture bed is located a short distance from the channel in which many of the observations in this area were concentrated. During its summer 2016 survey of this area, green sturgeon use of the area within the immediate vicinity of this cultivation bed was observed, as recorded in the Field Note produced as a result of the survey:

At 1010 and 1016, tagged green sturgeon individuals were detected by the USFWS directional receiver inside the small channel adjacent to an existing aquaculture bed (detections made from the R/V while at the GS2 location on the map- see Table 2). While it is unclear if these individuals were within the aquaculture beds or immediately adjacent to the beds, it is clear that these individuals were using the smaller channel for migration and feeding. Based on the data received and the direction of the detections, it is possible these individuals were within the aquaculture beds. Sturgeon have limited access to higher elevation areas, as these areas can be dry during low tides and accessible during only higher tides. Because access to these higher elevations of the intertidal zone is temporally limited, sturgeon access must be opportunistic and quick.

At 1017, the individual that was observed in the smaller channel at 1016 had swam past the boat and turned in a northerly direction and swam up into the smaller western channel (GS5). In a short amount of time (1-minute), a tagged individual moved from a smaller channel adjacent to an existing aquaculture bed and into the main Arcata Channel and then

swam up the Arcata Channel and into a smaller tributary channel (GS5 area). It appears that green sturgeon are using higher elevation areas of the intertidal zone as evidenced by these observations. Furthermore, it is clear the movements can occur quickly, as one individual passed through three different channels in ~1-minute of time.

Based on observations of Northern anchovies fleeing onto higher elevations (and into eelgrass habitat) as the tide was rising, it appears green sturgeon might be pursuing anchovies into areas of higher elevation from the deeper channels as the tidal elevations provide enough depth for their access. If green sturgeon are predominantly feeding on anchovies in Humboldt Bay during portions of the summer, it is likely that sturgeon would follow anchovies as they seek cover from predation in eelgrass habitats or within the structure provided by shellfish aquaculture beds.

This strong indication of sturgeon use and potential foraging behavior in the immediate vicinity of the SI-Nk cultivation bed emphasizes the concerns regarding potential habitat exclusion, reduced foraging effectiveness, entanglement, and injury raised by NMFS in its comment letter to the Harbor District and suggests that the location of this densely planted cultivation bed may be resulting in or potentially leading to adverse impacts to green sturgeon. Because it is the only cultivation bed known to be located in such close proximity to an area of consistently observed high use by green sturgeon, and because it may preclude or limit sturgeon movement and foraging in a portion of the high use area or potentially contribute to injury or entanglement of this species of special biological significance, the Commission adopted through Special Condition 13 of CDP Amendment No. E-06-003-A5 a requirement for Coast to phase out use of this bed and remove it completely at the time of its next harvest (estimated as Fall of 2017). While at the time Coast disagreed with the need for this bed to be removed in order to provide additional protection for green sturgeon and points to the absence of documentation of green sturgeon entanglement or injury in the bed - or exclusion from it in support of this position – Coast has nevertheless included removal of the bed as part of its proposed expansion project and does not object to the requirements of Special Condition 13 of CDP Amendment No. E-06-003-A5. Although direct evidence of harm to green sturgeon from this cultivation bed has not been collected, there is adequate information to establish the risk to sturgeon that the placement and use of aquaculture gear in this area presents. Given the protected status provided to green sturgeon as a threatened species under the federal Endangered Species Act and a California Species of Special Concern, it is also recognized under Section 30230 of the Coastal Act as a species of special biological significance. As such, it must be provided with special protection. As it relates to the proposed project, this means that removal of the existing Sand Island cultivation beds near this high use area (cultivation beds SI 2-1, SI 2-2, SI 1-2A, SI-Nk, SI 1-2, SI 1-1) should be required. This is consistent with feedback provided to Coast during the planning stages of the project that cultivation equipment and activities be limited within an approximately one-mile radius of the high use area. Coast integrated this feedback into the proposed project by selecting the majority of these cultivation beds for removal during Phase I of its proposal. The Commission therefore establishes **Special Conditions 3 and 13** to memorialize this aspect of Coast's proposal and to assure the complete and timely removal of existing cultivation equipment from 34 acres of these cultivation beds.

Densely Planted Cultivation Beds

Based on the Annual Report for CDP E-06-003 Coast submitted to Commission staff in December 2016, 14 of Coast's 48 existing cultivation beds are densely planted with longlines spaced every 2.5-feet. The remaining $\frac{3}{4}$ of the operation makes use of a spacing configuration that includes

periodic access corridors and channels between groups of lines. Specifically, these areas have five foot channels running parallel between each group of five lines, and ten foot channels running perpendicular between the end of one set of 100-foot lines and the beginning of the next set. In contrast to the more densely configured beds that are structured more as a solid, contiguous network of lines, these beds with a mix of five and ten foot channels provide a variety of opportunities for larger marine wildlife species, such as green and white sturgeon, to more safely pass among and through them. As such, the Commission adopted Special Condition 14 of CDP Amendment No. E-06-003-A5 to require Coast to develop and implement a plan for the conversion of its 14 longline beds with 2.5-foot spacing to the same configuration of its remaining beds that include five and ten foot wide access channels. As with the requirement of the previous condition, this removal activity has yet to be carried out by Coast. Therefore, **Special Condition 20** would carry forward this requirement. In combination with the requirement in **Special Condition 3** for the removal of the cultivation beds located nearest to the area of high use by green sturgeon, this measure would help ensure that sturgeon movement, foraging, and health in other potentially lower use areas of Arcata Bay would not be adversely affected.

Conclusion

With implementation of **Special Conditions 3, 13 and 20** the Commission finds that potential adverse impacts to green and white sturgeon from Coast's existing operation would be minimized.

Marine Debris

Coast's proposed shellfish aquaculture operation includes the placement and maintenance of several hundred thousand individual pieces of plastic and PVC in Arcata Bay associated with roughly 1,000 miles of nylon rope and monofilament line (up to 55,000 longlines and 3,100 basket lines of 100-foot long each) and up to 256,000 two foot long by one foot wide mesh plastic cultivation baskets (up to 6,400 basket lines with 40 baskets per line). As discussed in the RDEIR excerpt below, some of this material can disperse into the environment as debris:

The [Coast operation] may result in accidental loss of mariculture gear or other debris into Humboldt Bay. Because the equipment is placed in intertidal areas, it is subject to various natural forces including tide, wind, waves and ultraviolet radiation. As a result, there is potential for equipment to become loose, wash away or otherwise escape into the environment. Escaped mariculture gear may pose a hazard to biological resources and to other users of the bay, including boaters (kayakers, stand-up paddle boarders, canoers, wind surfers) and scuba divers. When encountered, marine debris associated with mariculture equipment may damage boat bottoms or engines, snag on trailing lines or otherwise impair navigation. Recreational users of the bay may encounter escaped mariculture equipment in shallow intertidal areas, which may make transit of these areas more hazardous, particularly if escaped equipment is wholly or partially buried in the substrate and thus hidden from view.

Longline oyster culture involves installation of PVC tubes in the substrate, which are strung with monofilament line and hung with oysters or oyster baskets (polyethylene sleeves). Coast inspects cultch-on-longlines during monthly maintenance work and during harvest. Any pipes disturbed during the harvest are re-secured or removed if damaged. Any identified loose pipes or debris are removed from the culture area. During replanting, pipes are straightened out and replaced as needed. Basket-on-longlines are inspected and maintained

each time the oysters are inspected for grading. Baskets are lashed in bins during transport to prevent loss.

Rack-and-bag culture utilizes 3' x 12' rebar frames on which are placed polyethylene mesh bags full of oysters. The bags are attached to the racks using industrial rubber bands. Worn, strained, or damaged rubber bands are routinely replaced during daily inspection and maintenance of the rack and-bags. Any debris is removed during inspections. Coast also performs a monthly inspection of its owned and leased area for marine debris at both low and high tide and picks up any identified debris, regardless of the source of the identified items.

As noted above, Coast has a long history of carrying out marine and shoreline debris collection and removal events and other environmental stewardship activities aimed at addressing the impacts to Arcata Bay of its operation and other current and historic practices (for example, by helping to improve water quality in the bay and fund waste and hazardous material collection and removal efforts). However, information submitted to Commission staff over the past several years by Coast and others indicates that Coast's operation nevertheless continues to be a known and potential source of marine debris. Coast's use of new culture practices and equipment (such as baskets on longlines) as well as traditional practices (such as cutting longline ropes into many small pieces during hand harvest) appear to continually generate plastic debris that escapes into Arcata Bay and can disperse throughout Humboldt Bay and beyond. Although Coast has not traditionally recorded or tracked the type and amount of gear and debris lost into the marine environment, it did provide Commission staff with limited data from one year of clean-up activity (10 dates between November of 2015 and November of 2016). This information indicates that during this period, an average of at least 18 baskets and three other pieces of gear were being lost per month from Coast's approximately 11 acres of basket on longline operations (which contain 493 basket lines and 19,680 baskets as authorized by CDP No. E-06-003-A1). This is likely a significant underestimation of the total amount of loss because it was not a consistent practice of Coast's to document all the loose aquaculture gear and debris it recovered and reports from third parties have shown that Coast does not successfully recover all of the baskets that escape from its operation. Although Coast is working to reduce this loss by working with the basket manufacturer on improvements to the design of the plastic clasp used to attach baskets to their longlines, the loss of baskets is likely to continue to occur due to the relative newness of this cultivation technique and gear and the stress that the marine environment places on materials.

If the current rate of basket loss continues, Coast's proposed addition of up to 163 acres of basket longlines (containing roughly 5,800 individual lines and 234,000 individual plastic baskets) to the roughly 490 lines and 19,000 baskets in its existing operation may result in over 200 additional plastic baskets per month released into Humboldt Bay. Assuming that each basket weighs two pounds, that would be nearly two and a half tons of plastic debris released into the ocean each year from Coast's proposed operation. Although this estimate of plastic debris appears high, it represents an annual loss of barely 1% (2400 baskets out of 253,000 total) of the baskets proposed to be placed in the bay at full build out (and as noted above, this loss rate is based solely on the

number of bags recovered during cleanup events and therefore is likely to underestimate the current true rate of loss because it does not include baskets that escape detection and recovery⁹).

Plastic in the ocean is increasingly understood to pose a threat to a wide range of marine organisms as it slowly breaks into smaller and smaller pieces over time. At each step in this process, plastic debris can be ingested by, entrap, or entangle marine wildlife from whales, dolphins, and seals down to sea turtles, seabirds, and fish. Because it often relies on the placement of large quantities and numbers of plastic equipment pieces in the dynamic, challenging, and powerful marine environment, shellfish aquaculture operations are acknowledged in some locations as primary contributors to marine debris. While Coast's current operation in Arcata Bay is not an example of such an operation, the fact remains that it generates waste that eludes the existing waste prevention, management, and response measures that Coast has in place.

To address the ongoing and potential release and distribution of marine debris resulting from Coast's existing aquaculture operations in Arcata Bay, the Commission adopted Special Condition 9 of CDP No. E-06-003-A5 to require the immediate collection and removal of cultivation gear that has been out of use on culture bed GI 1-2 for at least the past several years. This gear (in particular, PVC stakes) appeared not to have been subject to inspection and maintenance activities during this time and had fallen into disarray and was being lost and dispersed into the marine environment. To prevent similar situations from arising in the future, Special Condition 9 of CDP No. E-06-003-A5 was also modified by the Commission to require the removal of cultivation gear from any bed taken out of service for six months or more. Through a prior permit, the Commission had previously set this removal threshold at 12 months; however subsequent review of the efficacy of this condition at preventing the release of marine debris and the absence or reduction in inspection and maintenance activities in out of service beds indicated that a shorter time period was needed to ensure consistency with the Coastal Act. This six month removal requirement would be carried forward as **Special Condition 13** of this current action and it would be further strengthened to require third-party independent confirmation and reporting to the Executive Director that removal activities have been carried out. This addition is based on a recent experience with Coast's removal of cultivation gear from culture bed GI 1-2 in which Coast was required to "report when removal was complete" and provide confirmation photographs to Commission staff. Although Coast did submit such photographs and confirmed that the work was completed, a compliance inspection by Commission staff revealed a significant amount of debris and cultivation gear had been left behind. This addition of third-party reporting to **Special Condition 13** would help prevent this type of situation in the future by facilitating Commission staff's ability to evaluate condition compliance.

Special Condition 10 of CDP No. E-06-003-A5 was also required by the Commission to address the prevention, response, and management of marine debris by requiring Coast to implement a variety of best practices, including those focused on inspections following storm events; debris reduction trainings for field employees; quarterly baywide cleanup events; gear marking; and field storage of tools and construction materials. These requirements would also be carried forward through **Special Condition 14** of Coast's new permit and would be modified slightly to add an additional requirement that comprehensive debris cleaning and removal activities be carried out on each bed at

⁹ Considering that Coast's is the only operation in the state to use oyster cultivation baskets and at least one has been found on an open coastal beach over 30 miles from Arcata Bay, a significant number of baskets may be escaping Coast's detection.

the time of its harvest. This addition would reduce the long-term accumulation of debris within cultivation beds.

However, as described above, the significant proposed expansion of Coast's use of plastic cultivation baskets (over 13 times the current level) and the gear loss rates that Coast has reported with its limited use of this technique in recent years indicates that unless significant corrective action is taken, the volume of marine debris that would potentially result from its proposed expansion is likely to dwarf the amount of reduction that can reasonably be expected through implementation of the requirements in **Special Conditions 13 and 14**. Given the challenging weather and marine conditions in Arcata Bay that may break or damage lines and lead to the loss of gear – as well as the potential for additional loss to occur through damage caused to lines from accidental contact with recreational boats or through vandalism – even the strictest adherence to Coast's voluntary best management practices and those in **Special Condition 14** would not prevent gear loss from occurring. The magnitude of this loss is expected to directly correlate to the amount of gear that is available to be lost (in other words, a 1% loss rate would result in a greater volume of marine debris if there were 100,000 baskets in the bay rather than 200,000). As such, the Commission is requiring in **Special Condition 2** that Coast limit the total size of its operation in Arcata Bay and only proceed with Phase I of its proposed expansion. This would eliminate the proposed installation of 62 miles of baskets on longlines and the use of over 131,000 plastic cultivation baskets within 91 acres of Arcata Bay and therefore significantly reduce the amount of marine debris that the operation could generate.

In addition, **Special Condition 4** would also limit Coast's installation of new basket on longline areas to no more than 14 total acres until the Executive Director has determined, based on a review of information that would include data collected during bay-wide cleanup events, that Coast has successfully implemented measures to both reduce the loss of aquaculture gear (in particular, cultivation baskets) from its operation and increase the effectiveness of recovery efforts. Such measures may include the use of more robust basket clasps, devices to prevent baskets from escaping broken lines, enhanced methods for tracking gear, a reward system to increase public participation in gear recovery and clean-up events, etc.

Although Commission staff also considered an initial limit that was less than 14 acres, this would prevent Coast from installing cultivation equipment in and directly adjacent to half of its proposed eelgrass monitoring sample sites and therefore negatively affect the data collection efforts needed to verify Coast's assumptions about the lack of impacts to eelgrass associated with its proposed spacing and configuration of longlines. Additionally, through installation of baskets on longlines within 14 additional acres, Coast would have a total of 25 acres in use with this cultivation method within three distinct regions of Arcata Bay. This would provide an opportunity for a more complete and realistic evaluation of Coast's ability to reduce and recover lost gear.

Finally, **Special Condition 8** would provide an opportunity for adaptive management throughout the term of Coast's permit by requiring Coast to convert its basket on longline cultivation areas to ten foot spaced longlines (two adjacent paired lines with a ten foot gap before the next pair) if it is not able to successfully implement and maintain measures to both reduce the loss of basket gear from its operation and increase the effectiveness of recovery efforts.

Migratory and Wintering Shorebirds

Along the Pacific coast flyway, Humboldt Bay is the largest and most important estuary for wintering shorebirds and waterfowl between San Francisco Bay and the Columbia River. In its report, “The Importance of Humboldt Bay to Shorebirds,” Audubon California notes that:

In 1998, Humboldt Bay was designated as a Western Hemisphere Shorebird Reserve Network (WHSRN) site of International Importance for shorebirds and supports over 100,000 shorebirds annually. The relatively intact, productive intertidal mudflat and eelgrass habitats in Humboldt Bay attract large numbers of shorebirds (Figure 1). While currently classified as a site of International Importance, Humboldt Bay likely qualifies as a site of Hemispheric Importance, supporting over 500,000 birds annually and which account for more than 30% of the biogeographic population for a species.

Compared with other Pacific coast sites, Humboldt Bay supports a rich shorebird community in terms of species diversity. Forty-six species have been recorded, including approximately 30 that may be encountered regularly.¹⁰ In comparison, 24 species have been recorded at Grays Harbor; 38 species at San Francisco Bay; and 26 species at the Frazer River Delta in Canada. All three are designated as WHSRN sites of Hemispheric Importance.¹¹ The reasons for the higher diversity of shorebirds using Humboldt Bay are not well known, but suggested to be significantly correlated with substrate heterogeneity. This positive correlation suggests that tidal flats with more microhabitats (as represented by variation in substrate) support more taxa.¹² In addition to open mudflat, many shorebirds also forage in the bay’s “leopard skin” mudflat characterized by patches of eelgrass in small depressions. Species commonly found in this habitat are black-bellied plover, semipalmated plover, marbled godwit, black turnstone, long-billed curlew, dunlin, whimbrel, willet, long- and short-billed dowitchers, sanderling, and lesser and greater yellowlegs.¹³ In sum, a combination of diverse habitats optimally support shorebird diversity as well as abundance in Humboldt Bay.

In its recent, April 20, 2017, comment letter to the Army Corps of Engineers on the proposed project, Audubon California provides the results of a comprehensive analysis of existing scientific literature and survey results it carried out to estimate the population-level importance that Humboldt Bay provides for several shorebird species. This analysis suggests that during the winter, spring and fall, Humboldt Bay supports at least 23% of the global population of western sandpiper, 43% of the Pacific subspecies of dunlin, 10% of the global population of marbled godwit, and over 600 critically imperiled long-billed curlew.

While not all shorebird species that use Humboldt Bay are represented in the same levels of proportional abundance as the four noted above, at least 20 other species of shorebirds also rely on Humboldt Bay’s mudflat habitats for feeding, resting and/or roosting (Danufsky and Colwell 2003; Dodd and Colwell 1998; Evans and Harris 1994; Long and Ralph 2001). Of these shorebirds, two-thirds are listed as shorebirds of concern, or on the U.S. Fish and Wildlife Service’s Birds of Conservation Concern list¹⁰ (US Fish and Wildlife Service 2008; .U.S. Shorebird Conservation Plan Partnership 2015).

¹⁰ The US Fish and Wildlife Service’s Birds of Conservation Concern list is made up of species, subspecies, and populations of migratory birds that, without additional conservation actions, are likely to become candidates for listing

Although the importance and value of Humboldt Bay's intertidal habitats to shorebirds is unquestionable, the threat posed to these habitats from intertidal aquaculture, such as that proposed by Coast, is less clear. Unlike development that involves dredging, filling, or installation of massive structures that would result in a long-term or permanent loss of habitat, Coast's proposed installation and use of longline cultivation gear (as shown in **Exhibit 4**) would leave much of the underlying habitat intact. As a result, the impact mechanisms associated with the conversion of open tidal flats to cultivation beds are primarily ones that would result in a reduction of overall use or high-efficiency use rather than a complete loss of use. Such impact mechanisms may include altering the type or abundance of available prey for shorebirds and increasing their susceptibility to flushing. Although the consequences of these types of more incremental impacts are not as obvious as those from complete loss of habitat, they are no less important to consider. For example, changes in prey populations may negatively affect feeding efficiency and increased likelihood of flushing (particularly if it results in flight) would increase energy expenditure, both of which would likely cause shorebirds to need to forage longer, more frequently, or in less optimal - potentially dangerous - locations. Not only would these affect the health and fitness of the affected birds, but they would also run against some of their highest priorities for survival during the life stages (migration, overwintering) that bring them to Humboldt Bay - energy storage and conservation.

While few direct studies have been carried out to estimate the magnitude of the threat to shorebirds that intertidal aquaculture poses or to determine if some specific species with the suite of species generally referred to as shorebirds are more susceptible to adverse impacts than others, there is some scientific research to draw upon. Although sparse, existing research and analysis on the use of shellfish cultivation areas by shorebirds does indicate that adverse impacts to some species may occur as a result of the conversion of open tidal flats to areas with networks of cultivation structures. For example, work carried out by Kelly et al. (1996) in Tomales Bay comparing shorebird use of mudflats with oyster cultivation equipment and nearby areas of undeveloped mudflat indicated a significant decrease in total shorebird use in areas used for oyster culture, due largely to the absence of two common species from culture areas. Dr. John Kelly, lead author of the study, discussed his conclusions regarding the potential cause of this avoidance in his recent comment letter to the Harbor District:

Our observations strongly suggested that shorebirds avoid foraging near or under any structural features on the tide flats that interfere with their visibility of the surrounding area. As stated in Kelly et al. (1996), such interference is likely to delay their detection of approaching predators and disrupt associated antipredator flocking behavior. If so, oyster growing structures in Humboldt Bay are also likely to interfere with the escape behavior of cohesive, mobile shorebird flocks, forcing them to avoid oyster growing areas. With the occasional exception of Least Sandpipers, shorebirds did not generally forage on substrates immediately near or beneath artificial structures.

However, application of these results to Coast's operation in Arcata Bay is made difficult by differences in the type of cultivation gear used in the two areas and differences in the presence of

under the Endangered Species Act of 1973. These species make up the USFWS' highest conservation priorities and their inclusion on the list is intended to stimulate coordinated and proactive conservation actions among the USFWS' Federal, State, Tribal, and private partners.

eelgrass within and adjacent to cultivation beds between Tomales Bay and Humboldt Bay. Specifically, shellfish cultivation in Tomales Bay primarily relies on the use of low-profile mesh bags that are filled with shellfish and laid flat across mudflats whereas Coast's proposed operation would make use of much higher-profile networks of PVC posts installed vertically to support lengths of nylon lines hung with plastic baskets or clusters of oyster shell cultch (as shown in the photographs provided in **Exhibit 4**). These differences in the volume, configuration, and visual profile of cultivation equipment used in the two bays limits the relevance of study results from one bay to the other.

Although a variety of researchers have echoed Dr. Kelly's point above about shorebird avoidance of vertically structured areas on tidal flats, potentially due to the reduced ability to detect predators that birds would have in such areas, surveys carried out in Arcata Bay that evaluated shorebird use inside and outside several of Coast's cultivation beds provide mixed results. Specifically, as discussed in the RDEIR, the results of the study carried out by Connolly and Colwell (2005):

...indicated greater shorebird species diversity on cultch-on-longline oyster plots relative to control tidal flats lacking oyster culture. In addition, five taxonomic groups (willet, whimbrel, dowitchers, small sandpipers and black turnstone) were more abundant on the longline plots than control plots during the study (whereas black-bellied plovers were more abundant on control plots)... Connolly and Colwell conclude "Overall, birds did not appear to avoid longline areas compared with adjacent tidal flats. Rather, many species were more abundant and diversity was greater on longline plots."

This study derived from previous work by Connolly-Moore (2001) that is described in the Adopted Findings for CDP No. E-06-003. This study examined the differences in shorebird and wader use of long-line oyster culture plots and tidal mudflat plots in Arcata Bay:

*The study found that shorebird use of long-line plots increased for species with more generalized diets and varied foraging methods, whereas black-bellied plovers (*Pluvialis squatarola*) were exclusively more abundant on control plots. Foraging by plovers may have been impeded by long-lines because of interference, obstruction of visual foraging cues, or an altered prey base. Waders also responded to long-line presence, and may have foraged by different means or upon different prey when on long-line plots.*

The study concludes that, overall, birds did not appear to avoid long-line areas in favor of control mudflats. Instead, many species were more abundant and overall species diversity was greater on long-line plots. Although the mechanisms for these effects are not understood, the study concludes that any effects are transitory because the lines are removed every 18 to 36 months. In addition, the study concludes that benefits to birds may be compromised by long-term habitat impacts, such as increased sedimentation or loss of traditional mudflat infauna. The author of the paper cautions that the study represents only a small facet of how shorebirds might be affected by aquaculture.¹¹ It does not, for instance, look at intake rates for birds on long-line plots. Although the results should be interpreted with caution, the study does not identify any negative effect on the suite of birds examined, except perhaps black-bellied plovers.

¹¹ E-mail dated April 12, 2006, from Mark Colwell, Humboldt State University, to Audrey McCombs, CCC.

In comments submitted to the Harbor District regarding an early iteration of Coast's proposed expansion project, Dr. Mark Colwell, one of the two principal researchers and lead authors of the 2005 study, emphasized these final points about the high level of uncertainty that exists on shorebird use of Arcata Bay and the underlying drivers for their behavior and took issue with the use of his study's findings to support a conclusion that converting areas from undeveloped tidal flats to shellfish cultivation beds would not have a significant impact on shorebird. He instead emphasized the need to carefully consider the importance of Humboldt Bay for migratory shorebirds:

The point is that we know very little about the abundance and availability of invertebrate populations that provide the essential resources to sustain wintering and migrating birds on the bay. To claim that loss and degradation of tidal flats (of whatever amount of area) would have "less than significant" impact on shorebirds and other waterbirds that rely on this habitat is, at best, premature and, at worst, a misrepresentation of current knowledge on the subject.

...

Lastly, the section on cumulative impacts misses the point. As I understand it, 7% of the bay is already in aquaculture production with unknown impacts on shorebirds. Mounting evidence indicates that, worldwide, populations of most shorebirds are in decline. Reasons for the decline are many but principal among them is the loss and degradation of habitats. Years ago, prominent ecologists (Myers et al. 1987. American Scientist 75:19-26) likened the annual cycle of shorebirds to an annual chain of events. The individual links in the chain were estuaries (like Humboldt Bay) where large numbers of individuals refueled for their next leg of their journey between arctic breeding and wintering sites that span hemispheres. The populations were vulnerable to the weakest link in the chain! Humboldt Bay is a relatively pristine estuary compared to others worldwide and it is likely a critical link in the chain for many species of shorebird because it provides essential food resources for millions of birds. Ironically, the DEIR mentions the 3.3 days in which spring migrating Western Sandpipers make use of the bay. A simple, back-of-the-napkin calculation¹ during the Spring period of peak passage of Western Sandpipers yields an estimated total population at Humboldt Bay that likely approaches a million birds – and this is for just 1 of 20+ species that are common migrants at that time of year! These sorts of numbers suggest that the value of Humboldt Bay and its tidal flats are unappreciated and certainly worthy of greater consideration in conservation decisions.

These comments from one of the leading experts on shorebird use of Humboldt Bay are a strong indication of the importance of the bay's habitats and the need to manage them cautiously. Given the heavy reliance on Humboldt Bay's tidal flats by a wide diversity of shorebird species and significant proportions of several populations, Dr. Colwell and other commenters to the Harbor District during its CEQA process have been quick to draw attention to the sparse and inconclusive research that is available to support a conclusion that adverse impacts to shorebirds from the proposed project will not occur or will be insignificant.

The California Department of Fish and Wildlife (CDFW) is one of those to have repeatedly echoed these concerns through its comments letters to the Harbor District during the CEQA process as well. CDFW's December 31, 2015 letter provides the following succinct summary of the more detailed discussion of this issue included in its previous letters:

Human disturbance and habitat destruction, specifically from oyster and shellfish farming, have been noted to have impacts to shorebird populations (Connolly and Colwell 2005; Hickey et al. 2003; Kelly et al. 1996; Pierce and Kerr 2004). Further, shellfish farming has been identified as a conservation issue for shorebirds in Humboldt Bay, and prohibiting further alteration of mudflats for oyster culture has been identified as a priority shorebird conservation goal for Humboldt Bay (Hickey et al. 2003).

As noted by CDFW, available research indicates that the proposed project has the potential to adversely affect shorebirds in two primary ways – by increasing the number and duration of disturbance events and by altering critical important tidal flat habitats in a way that may preclude or modify shorebird use patterns, foraging behavior, and foraging success.

Although the Commission’s recent findings in support of Coast’s latest permit amendment (CDP Amendment No. E-06-003-A5 – six month permit term extension) noted that at its existing levels, there was no indication that Coast’s aquaculture operation is resulting in significant adverse impacts to shorebirds, the proposed project represents a substantial increase over those existing levels. Additionally, the Commission’s previous finding was based primarily on the fact that Arcata Bay remains an incredibly important area for shorebirds – and, as described above, supports very high levels of use – even with Coast’s existing 300 acre operation in place rather than based on a conclusion that this existing operation was not affecting shorebirds. This distinction is relevant because if the existing operation is adversely affecting shorebirds – for example, if Arcata Bay would support more shorebird use if the operation were not in place – the expansion could compound those impacts. Because the Commission is reviewing, through this permit application, both the proposed continuation of Coast’s existing operation and its proposed expansion, this is an important consideration.

Through its proposed expansion, Coast is proposing to increase the footprint of its operations by nearly 2/3 (from 298 acres to 490 acres). While a portion of this expansion is proposed to be located adjacent to its existing footprint of operations (as shown in **Exhibit 2c**), a substantial amount would also be placed in new areas that are more isolated and removed from the existing operations. The effect of this would be to not only convert an additional 190 acres of tidal flats – both eelgrass beds and open mudflats – to cultivation beds but also to increase the overall level of Coast’s activities on the bay (vessel operations, planting, harvest, and maintenance activities on tidal flats, pedestrian and vessel transit) and to disperse them into new areas. Additionally, Coast is proposing to significantly increase its use of the basket on longline cultivation technique, a technique that requires the installation and maintenance of larger, taller, more substantial gear on tidal flats as well as more frequent inspections and maintenance visits. Although some of these visits may occur during higher tides when some or all of the tidal flats are submerged and shorebirds would be less likely to be present and foraging, Coast has not committed to limiting its activities to these times. Similarly, while Coast’s analysis suggests that the increased spacing between longlines that would be used within the 256 acres of open tidal flats it proposes to convert to cultivation beds would reduce avoidance by shorebirds that may be occurring in more densely planted cultivation beds, this has not been demonstrated. In combination then, the increased scale of operations and increased level of activity means that the proposed project represents a significant change over existing conditions and the potential for it to result in adverse impacts to shorebirds is much larger.

Unfortunately, however, there is no reliable way to conclusively determine the scale of operations or level of activity on the bay that would not begin to have negative consequences on shorebird survivorship, health and use of the bay. As alluded to in several of the comments above from resource management entities and shorebird experts, some would argue that any level of expansion presents an unacceptable risk, particularly in light of the unknown effect that Coast's existing operations are having on shorebirds and the cumulative stress that many species and populations are already subjected to through habitat loss and degradation elsewhere on their migratory pathways. Others, however, take the approach reflected in the Final EIR and argue for a lack of impact, pointing to evidence – though limited - of shorebird foraging activity and use of cultivation beds as well as the abundance of undisturbed tidal flats outside of cultivation beds and the limited scale of Coast's existing and proposed operation relative to the area of tidal flats within Arcata Bay (490 acres out of approximately 4,500). To evaluate the proposed project's consistency with the Coastal Act, however, one must consider the standards established by the relevant policies. In this case, Section 30230 requires both that "Marine resources shall be maintained, enhanced, and where feasible, restored" and that "Special protection shall be given to areas and species of special biological or economic significance."

As noted in the introduction to the marine resources section of this report, due to a variety of factors, including the critical importance of Arcata Bay for shorebirds and the vast numbers of species and individual birds that rely on it for survival, it is clear that Arcata Bay is an area of special biological significance under Section 30230 of the Coastal Act. As such, it is an area that must be provided with special protection to ensure that it continues to retain this significance and remains able to support the natural biological productivity it shows today. The relevant questions then become, would the proposed project maintain, enhance, and where feasible, restore marine resources (including shorebirds)? And further, would it provide special protection for Arcata Bay?

As currently proposed - over 1,000 miles and over 50,000 longlines spread across 490 acres of eelgrass and mudflat habitats – the project would not meet the standards of Section 30230. However, with the modifications established through **Special Conditions 1 through 22**, the project would be able to provide special protection for areas of special biological significance – including shorebird habitat - and maintain, enhance, and restore marine resources.

While not going as far as the recommendation in the Point Reyes Bird Observatory's 2003 "Southern Pacific Shorebird Conservation Plan" to "prohibit further alteration of tidal flats for oyster culture," **Special Conditions 2 and 3** would both limit the total expansion footprint of Coast's operations and consolidate both its existing operations and expansion. These changes would significantly reduce or eliminate the level of Coast's existing operations in the central and far-eastern portion of Arcata Bay, thus removing from these areas the ongoing source of disturbance for shorebirds associated with both operations on the cultivation beds in these areas and the vessel and personnel transit across the bay that was needed to access them.

Further, the requirements of **Special Conditions 2 and 3** would also concentrate Coast's expansion around the three areas of Arcata Bay in which its existing operations are most densely clustered – Bird Island, Mad River, and the south eastern corner of the bay. While the potential loss of shorebird foraging habitat and potential for disturbance to shorebirds in these areas would increase as the scale and concentration of operations increase, this is expected to be balanced to a degree because Coast would also be required to remove existing operations from other areas – specifically, in the far east and Sand Island area – and may therefore allow shorebird use of these areas to return

or expand. The scale of expansion would still greatly exceed the amount of removal (a net increase of nearly 112 acres of additional cultivation beds), however, about half of this additional acreage would be located within areas that Coast has identified as “continuous eelgrass,” areas that may support a lower level of shorebird foraging activity than unvegetated mudflats or areas with a patchy distribution of eelgrass and mudflats.

The expansion areas would also be configured with a wider spacing of lines than the existing operation – ten feet between adjacent pairs of longlines and nine and 16 feet between basket lines – that may reduce potential avoidance by shorebirds. The likelihood and magnitude of impact reduction from these project design features is very uncertain, however, because there is no available information about how shorebirds may react to these types of gear. On the other hand, the reduction in the overall footprint of Coast’s operations from the proposed 490 acres to the to 411 acres allowed in **Special Condition 2** would significantly reduce the overall proposed level of habitat conversion and operational disturbance within the bay, maintain it more closely around the footprint of existing operations, and therefore provide for a clear reduction in the proposed project’s potential to adversely affect shorebirds.

Further, the requirement in **Special Condition 20** would result in the creation of five and ten foot wide channels at regular intervals within 14 of Coast’s most densely planted existing cultivation beds. The addition of these channels may help address the potential loss of foraging habitat for shorebirds that would occur through conversion of undeveloped tidal flats to cultivation beds by increasing the likelihood that shorebird foraging occurs within more cultivation beds. However, the expected benefit to shorebirds from this change is expected to be minor at most.

Finally, to further help reduce potential adverse impacts to migratory birds from disturbance that may occur as a result of Coast’s vessel transit or aquaculture operations, **Special Condition 21** would prohibit Coast personnel from approaching, flushing, chasing, or otherwise disturbing foraging or resting shorebirds or waterfowl. Although this special condition is included as part of the suite of conditions described above to address impacts to shorebirds from the proposed project, it is expected to provide only a limited ability to reduce disturbance.

This requirement is very similar to mitigation measure BIO-12 included in the project’s Final EIR: “Coast will not intentionally approach or harass migratory birds that are actively feeding or resting within the project area.” As noted in a number of comments submitted to the Harbor District (the CEQA Lead Agency) by CDFW and others, although well intentioned, this requirement should not be relied on as a fundamental part of a strategy to reduce disturbance to shorebirds from Coast’s operational activities:

The Conservation Measure BIO-12 (Coast will not intentionally approach or harass migratory birds that are actively feeding or resting within the Project area) proposed in the RDEIR will not reduce impacts to shorebirds below the threshold of significance because it is unlikely “intentional” disturbance of shorebirds will occur.

In other words, there is no reason to believe that Coast’s field personnel are intentionally approaching, pursuing, chasing or flushing shorebirds or would do so as part of the proposed project. The more likely disturbance is that which would occur without the knowledge or intent of Coast’s field personnel – for example, the dispersal of shorebirds away from tidal flats they are using for foraging or resting as Coast’s field personnel or vessels pass by at distance or begin to

approach before the presence of the birds is observed (several of the species in question are low to the ground, colored to blend in with the landscape, and are difficult to see even by trained observers in good conditions).

Nevertheless, in combination, **Special Conditions 2, 3, 20, and 21** are expected to protect shorebirds from an unacceptable level of potential habitat loss and disturbance that may result from the proposed project.

Longfin Smelt

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 maintenance operations, Coast carries out a variety of washing and cleaning activities including the rinsing of the clam seed and cultivation trays as well as the well structures in which the trays are housed. Rinsing of the clams and cultivation trays would occur on a daily basis in order to remove any accumulated sediment or non-target organisms that may also be growing on the cultivation trays. Such non-target organisms may include native and nonnative algae, bryozoans, hydroids, tunicates, sponges, amphipods, and mysid shrimp that are present in Arcata Bay as adults and larvae. Coast proposes to use both a hose and pressure washer for these daily cleaning activities. Coast proposes to use Arcata Bay as a water source for these activities and initially proposed to use a coarsely screened intake system on its maintenance vessel with an intake capacity of 160 gallons per minute and a velocity of 12 to 16 feet per second. Coast proposes to use this system to collect approximately 10 million gallons of bay water per year for maintenance washing activities.

To protect against the impingement of fish, in particular listed species such as longfin smelt and juvenile salmon, the Commission required in Special Condition 9 of CDP No. E-02-005-A2 (approved in August of 2012) that Coast use intakes designed according to National Marine Fisheries Service and CDFW requirements as protective of fish – in other words, with intake velocities not to exceed 0.33 feet per second and 3/32 inch mesh screening. The Commission 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 9 required that the seawater intake velocity for Coast's maintenance and cleaning wash system not exceed 0.33 feet per second and that the screen openings for the intake point screen remain no larger than 3/32 inch. These screening requirements were primarily developed by the National Marine Fisheries Service (NMFS) based on research on the average size and swimming abilities of juvenile salmon.

However, the presence of state-listed, threatened longfin smelt in Arcata Bay (Cole 2004, Pinnix et al. 2005, CDFW 2009, Merz et al. 2012) means that specific intake limits and criteria that are relevant to this species must also be considered. Input from CDFW technical staff and analysis carried out by the Commission in 2014 (as discussed in the adopted findings for CDP No. 9-13-0500) on the application of the NMFS standards for other fish species, particularly the much smaller, state listed longfin smelt, suggests that a slower intake threshold would be more appropriate. Specifically, because of the more limited swimming abilities of smelt in comparison to salmon, as well as their smaller size, the Commission found that a lower approach velocity of 0.2 feet-per-second would be warranted with active intake screen systems and 0.05 feet-per-second is appropriate for passive systems in areas in which longfin or delta smelt are present. In addition, CDFW fish screening criteria establish 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. Since 2014, the Commission has required these intake specifications in Humboldt Bay and found that these screening criteria reduce the potential impingement and entrainment of juvenile and adult fish, because an intake velocity of 0.2 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. Accordingly, the Commission included Special Condition 9 on CDP No. E-02-005-A6 to reflect these more appropriate screening criteria. Those criteria would be carried forward as **Special Condition 10** of this permit as well.

Carrying Capacity

Coast's proposed project would result in the addition of over a thousand miles of cultivation equipment and several million non-native oysters and clams to Arcata Bay. Because these clams and oysters are filter-feeders that would be sustained by directly removing phytoplankton from the water column, this scale of expansion raises the possibility that Coast's operation may reduce the overall abundance of phytoplankton throughout the bay or around its cultivation beds and thereby negatively affect wild native species that are also filter feeders. This issue has been expressed both as a question of the overall carrying capacity of Arcata Bay as well as a concern specifically about populations of native clams that support recreational harvest activities.

This latter concern was raised on several occasions by the Wiyot Tribe to Commission staff. As noted in the letter sent by the Chair of the Wiyot Tribal Council to the Army Corps of Engineers on May 2, 2017:

Central of the Wiyot Tribe's existence are the native mussels and clams many of which were harvested in the bay. These species include, but may not be limited to, geoduck clams, butter or Washington clams, mussels, and little neck clams. The importance of these species as a food resource can be seen in the volume of shells at most village sites, which are typically referred to as shell mounds or middens. They also serve as an important archeological marker for other archeological locations, such as fish camps or seasonally occupied locations. In addition to the dozens of shell mounds and other sites that encircle, or are within the environs of the bay, the shells were also used to decorate ceremonial regalia, clothing, jewelry, and other cultural items.

They have also been an important protein source for Tribal citizens in the historic era. For example, they served as a readily available source of sustenance during difficult times, such as when Tribal citizens were held against their will at the North Spit Reservation. They

remain a popular source of subsistence gathering, as well as recreational and cultural support for current Tribal citizens.

Although there is no widely established methodology to use for evaluating carrying capacity for filter feeders within an embayment, the project EIR included an analysis (Appendix G of the RDEIR) of this issue and a modeling exercise based on several key variables including the tidal flushing rate for Arcata Bay (how long before the water is replaced), biomass of phytoplankton, filter feeding rates for cultured clams and oysters, and biomass of cultured shellfish. Because of the uncertainty surrounding several of these variables, the analysis used a range of values and provided the results for each step in that range.

However, at the time that this analysis was carried out, October of 2015, Coast was proposing substantially more expansion activities than what is described in its current proposal. The result is that none of the expansion scenarios modeled in the carrying capacity analysis perfectly represents the current project. However, the “Coast Proposed” scenario – which does not include the existing operation - discussed in the analysis provides a rough equivalent to the current project (620 acres vs. 490 acres).

Under this scenario, the most conservative projection – the worst case, using the highest feeding rates and slowest rate of tidal flushing - was that that the oysters in Coast’s operation could filter over 30% of the water in Arcata Bay each day. Assuming the lowest feeding rates and fastest rate of tidal flushing, this fell to 3.5%. As the analysis acknowledges, however, it is not appropriate to assume that this simplistic focus solely on volume of water filtered is an accurate reflection of the biomass of phytoplankton lost to the shellfish in Coast’s operation. For example, oysters are not able to remove 100% of the phytoplankton from the water they filter and their presence and the nutrients they deposit may serve to boost phytoplankton growth as well as reduce it. Nevertheless, these projections do provide an important metric to consider when evaluating the potential overall, cumulative effect of adding the proposed number of additional oysters to Arcata Bay.

Conservatively assuming that the actual loss of phytoplankton biomass in Arcata Bay that would result from the proposed project fell within the middle of the 3.5% to 30% range presented in the analysis, the concern about potential adverse impacts to wild native filter feeding shellfish in Arcata Bay may be justified. Oysters are renowned for their ability to filter water and remove particulate matter from it and Coast’s proposed operation would result in many millions of oysters planted in the bay, some of them in dense aggregations. It is in these areas of dense aggregations that there would most likely be some level of elevated localized phytoplankton removal due to oyster filtration that could begin to affect native shellfish species in that area. This potential localized impact to carrying capacity around the cultivation areas has been emphasized by Coast several times throughout the planning process for this project because it has repeatedly asserted that in some areas of its proposed operation - for example, the Mad River growing area – it was limited to considering the placement of its expansion beds to only areas adjacent to tidal channels where water movement and flushing is greater because of a concern that other areas farther from these channels would not support acceptable growth rates for oysters due to phytoplankton removal and competition for food with oysters in its existing cultivation beds. This is relevant because the same competition for food would affect native shellfish as well.

However, several of the special conditions the Commission is requiring would be expected to reduce the potential for the proposed project to adversely affect native filter feeding shellfish within Arcata Bay. Specifically, the requirement in **Special Condition 2** that Coast limit its

overall project footprint to 411 acres – rather than the 490 proposed - would significantly reduce the number of oysters within the operation and therefore reduce the biomass of phytoplankton they would be able to remove from the bay due to feeding. Because the cultivation beds that would be eliminated from Coast’s proposal include areas within both of its most densely planted existing growing areas – the Mad River and Bird Island areas – this special condition would also help address potential impacts to native shellfish from exceeding carrying capacity on a more localized level as well. Additionally, the requirements in **Special Conditions 3 and 17** that Coast remove some of its isolated existing beds and consolidate its operations would leave more areas of the bay free from the effects of Coast’s proposed operation, including effects it may be having on phytoplankton abundance.

Black Brant

Identified in 2008 by CDFW as a California Bird Species of Special Concern, the black brant (*Branta bernicla nigricans*) is a migratory goose that winters along the eastern Pacific coast from Alaska to Mexico. In California, Humboldt Bay supports the majority of brant in the state, although it is more important for spring staging than for wintering. In fact, Humboldt Bay is the fourth most heavily used staging area in the Pacific Flyway (Moore et al. 2004). Given its reliance on eelgrass as a forage source during wintering and staging, the importance of Humboldt Bay has only grown in recent years with the near total disappearance of eelgrass beds that were once common in Morro Bay (a decline of 96% between 2007 and 2015 – from 340 acres to 12 acres). Since Morro Bay is one of only four large coastal bay/estuary systems known to support black brant, its severely reduced ability to support brant increases their reliance on the other three areas. Peak counts of spring-staging birds totaled 20,000 to 40,000 from 1950 to 1977, declined to 10,000 to 15,000 in the 1980s, then increased to 20,000 to 25,000 in the late 1990s (Pacific Flyway Council 2002) before rising more recently to as many as 60,000 in 2000 and 2001 (Lee et al. 2007).

Potential impacts to black brant from Coast’s operations primarily take three forms: loss of foraging opportunity due to reductions in the amount of eelgrass (the principal food for black brant) within cultivation beds; exclusion of brant from eelgrass beds where cultivation beds are installed due to brant’s avoidance of structure; and disturbance from vessel and pedestrian activity associated with Coast’s proposed planting, harvesting, and maintenance operations.

As described in the RDEIR:

Black brant feed almost exclusively on eelgrass (Ward et al. 1997, 2005; Moore et al. 2004), making them vulnerable to degradation of existing eelgrass habitat (Pacific Flyway 2002; Ward et al. 2005).

...

A large proportion of Pacific Flyway brant uses Humboldt Bay, likely due to its high eelgrass abundance and relative isolation from other suitable spring staging sites (Moore et al. 2004). Eelgrass varies in quantity and quality, and is unavailable to brant during two high tides per day, making the achievement of energy demands challenging for brant (Clausen 2000, Moore and Black 2006b). Brant have been documented repeatedly returning to eelgrass beds that are relatively high in quality (density, biomass, and nutrient content), and have been seen waiting over eelgrass beds until tides recede (Moore and Black 2006b), suggesting brant are making foraging decisions based on prior experience and performance. This observation also suggests that eelgrass quality in Humboldt Bay is

important to the ability of brant to meet energetic demands for migration, and thus a reduction in quality and quantity could result in impacts to the flyway population.

Surveys conducted in Humboldt Bay each February between 1976 and 2000 found a mean number of 5,049 brant in South Bay and 1,322 brant in North Bay. Otherwise stated, approximately 80% of the birds were observed in South Bay during that period (Moore et al. 2004). Based on comparisons with historical data (1931-1941), the relative proportions of brant using South Bay and North Bay have been similarly distributed (Moore et al. 2004). However, the most recent 2015 winter/spring annual surveys conducted by the Humboldt Bay National Wildlife Refuge detected a recent shift in brant population from South Bay to North Bay, estimating a total of 192,400 bird days for North Bay and 147,930 bird days for South Bay (Refuge, unpublished data). For example, an April survey estimated 3,650 birds occupying North Bay and 2,860 birds in South Bay.

To better inform the impact assessment process, H. T. Harvey & Associates conducted surveys for black brant in North Bay in April 2015 (Table 6.5.9), representing the approximate period of peak abundance for the species during the 2015 spring migration period (HTH 2015). A memorandum explaining survey methods and results is attached to this R-DEIR as Appendix F. Surveys were conducted throughout the entire North Bay (as weather allowed) during high and low tides to record the abundance of brant using North Bay. Surveys were also conducted in North Bay to document the number of brant occurring within Coast's existing aquaculture beds and areas that are proposed for aquaculture expansion. Time-lapse camera monitoring was conducted to augment survey efforts with behavioral observations in aquaculture structure. The mean count during low tide in North Bay was 4,164 birds (range 3,120-5,559) and the mean count during high tide was 3,170 birds (range 2,234,340). The observed differences in low and high tide counts reflect observations that brant would congregate in areas away from inundated mudflats during high tides, concentrating in areas including Eureka Slough, areas south of Samoa Bridge (i.e., along Indian Island), or on the lee side of marsh habitats. This occurred presumably because foraging opportunities were more limited during high tides in North Bay when eelgrass was inundated and brant were likely avoiding the windy conditions in the open bay that were more prevalent during afternoon spring high tide surveys.

As these surveys indicate, the extensive eelgrass beds of Arcata Bay (North Bay) support a significant proportion of the population of black brant that winters and stages in Humboldt Bay. This is confirmed by information recently provided to the U.S. Army Corps of Engineers by staff of the U.S. Fish and Wildlife Service in their April 5, 2017 letter:

Humboldt Bay is well documented as a key Pacific Flyway migratory stopover location for brant (and many other species of waterbirds). Wintering and migratory locations for brant by necessity have healthy eelgrass beds as eelgrass makes up 90+% of their diet at these locations. Humboldt Bay supports the largest stands of eelgrass between the brant wintering grounds in Baja, Mexico and Willapa Bay, Washington, making it a crucial stopover site. Brant's reliance on healthy eelgrass beds meant that North Bay was functionally useless as a result of the on-ground aquaculture practices of the past. Brant use of Humboldt Bay has also been shown to be very sensitive to increased disturbance in spring, with steep declines in use due to spring hunting from the 1950's-1980's (Moore and Black 2006a). During this same time period brant distribution on Humboldt Bay was ~80%

on South Bay and 20% on North Bay (Henry 1980, Moore 2004). However, as eelgrass has returned to North Bay, it appears the brant have as well. Recent surveys indicate brant distribution on Humboldt Bay has shifted significantly, with spring of 2015 monitoring showing greater use of North Bay (192,400 bird use days) compared to South Bay (147,930 bird use days). While the exact reason has not been documented, hypotheses include increased disturbance on South Bay and improved eelgrass beds in North Bay, or likely a combination thereof. However, studies on both Willapa and Dungeness Bays in Washington state during the 1980's and early 90's showed that a reduction in eelgrass led to a corresponding reduction in brant use and that on Willapa Bay aquaculture operations were associated with declines in dense eelgrass beds which resulted in a significant reduction in brant use of those areas (Wilson and Atkinson 1995).

A comprehensive evaluation of disturbance to brant must consider more than direct human contact causing birds to flush. Due to brant's dietary specialization, which is exacerbated by tidal restrictions in space and time and the relatively low nutritional value of eelgrass, reduction in foraging time caused by infrastructure and/or human use must be considered a disturbance. More specifically, a reduction in "bed-feeding" could be especially impactful on migrating individuals' ability to acquire sufficient nutrient reserves. While brant will feed on loose, floating pieces of eelgrass (drift-feeding), they show significantly higher intake rates while feeding on eelgrass blades still attached to the turion (bed-feeding; Elkinton 2013). In line with what those knowledgeable about brant behavior might have presumed, H.T. Harvey's report found that brant did not use areas of longline aquaculture once the tide was low enough for infrastructure to be an impediment to swimming (CSF 2015). If we estimate that brant require ~0.5 ft for their feet to clear while swimming, this would mean that brant will abandon areas with cultch-on-longline when the water is 1.5 ft above the substrate and 3.8 ft for areas with basket-on-longline (longlines 1 ft and 3.3 ft above substrate), as shown in figure 1. Currently, operations occur on substrate elevations as high as +3 ft relative to MLLW, with the proposed areas of expansion -2.0 ft to +1.5 ft relative to MLLW (CSF2105). Utilizing a substrate elevation of 0 ft, then accounting for infrastructure height, and foot clearance, brant will not use areas of basket-on-longline when tide height is below 3.8 ft, and cultch-on-longline below 1.5 ft MLLW. Previous researchers have found that brant are able to bed-feed at 2.95 ft (0.9 m MLLW; Moore and Black 2006b, Elkinton 2013), with the majority of the flock bed-feeding when the tide is below 1.64 ft (0.5 m MLLW). Utilizing the eelgrass same shoot length equation as in the IS, turions growing at 0 ft MLLW would extend shoots approximately 1.9 ft (0.59 m). This would render areas with cultch-on-longline unavailable for the majority of the tide window at which bed-feeding occurs, and areas with basket-on-longline would be functionally useless for bed-feeding. Again, for a species as specialized as brant we must consider any human-caused reduction in foraging time a "disturbance". While the direct human contact is addressed in the IS, we believe the impact of disturbance is underestimated when also considering loss of foraging time across all hours of the day and night as a result of infrastructure.

Further emphasis of these points and their potential consequences for brant survival is provided through the concise summary of the relevant issues included in comments submitted to Commission staff on April 20, 2017, from Dr. Richard Todoroff:

Of greater concern in the current matter is their return migration north from January through mid-April, during which they stop (“stage”) at various locations with eelgrass meadows, in order to refuel and acquire fat reserves in order to reproduce. Up to 60% of the entire population of brant stage in Humboldt Bay (Lee 2001, cited in Moore, 2004). Brant are a California State listed Species of Special Concern both during wintering and staging (Shuford and Gardali, 2008).

Humboldt Bay is the fourth-most-utilized body of water in the Pacific Flyway for staging brant, which make disproportionate use of Humboldt versus other bays due to its geographic isolation from other bodies of eelgrass (Moore et al. 2004). Further aggravating this is the substantial loss of eelgrass in California’s bays south of Humboldt Bay (due to human activities).

*Another important staging location, Willapa Bay in Washington, has mariculture covering 30% of its area (almost 50% of the area considered good for oyster mariculture), and is currently undergoing ecological collapse with an invasive form of eelgrass (*Z. japonica*) that is of no nutritional use to brant geese, as well as increasing acidification. Considering this, the need for Humboldt Bay’s eelgrass beds will become even more critical to brant.*

Even at peak “fatness”, the adult females have only about 20% of the calories needed to reproduce when they arrive in the Arctic breeding grounds (Ward 2005), so any disruption of staging brant will have substantial adverse effects on reproduction. This is borne out by a recent model (Stillman et al. 2015), which predicts a decrease in weight gain of about 33% with as little as a 10% reduction in food intake. This suggests that a small reduction in eelgrass amount or access can have a substantial effect on reproductive success. Brant, like many goose species worldwide, are on a nutritional razor’s edge; brant that gain too little weight cannot produce eggs so they cannot breed. Partly because of this, only a small proportion of the migrants actually nest, and of these nest success varies but is usually 10 to 30%. So of 100 breeding pairs, perhaps 10 pairs will nest, hatching around 4 young per clutch; of these forty new birds, perhaps 10 will make it to fly south and continue the cycle. So only about 10 are replaced per 200 adults each year.

Brant feed by tipping down (or standing at very low tides) and clipping leaves of eelgrass. The shorter younger leaves in the center of the plant are highest in protein and the most digestible, so are preferred. Eelgrass bends easily in the water column, so these central leaves are accessible to brant only at tides lower than 0.9 meters (MLLW) and indeed the preferred leaves are only accessible at tides of 0.3 meters or less (Moore and Black 2006) so the duration during which these leaves are available is quite limited. Brant will not effectively feed in areas of cultch or baskets on longline irrespective of their spacing or elevation. There is so much visual and tactile disturbance by the pipes and cultch, even beyond the eelgrass that is trapped beneath them, that effective undisturbed grazing on exposed beds would seem impossible. Indeed, when the oyster lines are exposed, brant will not even fly over them. Hence, the eelgrass in these areas is functionally inaccessible to brant; to a brant, the loss of feeding habitat is more closely described by a polygon around all the polygons mapping Coast’s mariculture.

As the issues raised and cited by these experts indicate, the proposed project presents a significant risk to black brant, through both disturbance and by potentially precluding foraging activity within

9-15-1931 (Coast Seafoods Company)

Coast's proposed 490 acres of cultivation areas. Similar concerns were also raised in the majority of the approximately 40 comment letters recently submitted to the U.S. Army Corps of Engineers during its public comment period for the proposed project as well as in correspondence provided to Commission staff on May 12, 2017, by Audubon California:

For Pacific Black Brant, the best available science indicates that this California Species of Special Concern is functionally excluded from the project footprint and will face a further increase in disturbance in these and other areas of the bay related to aquaculture activities. The California State Lands Commission has expressed concerns about ongoing and increased impacts to the species and associated recreational hunting opportunities.⁵ Independent scientists as well as the U.S. Fish and Wildlife Service (USFWS), Humboldt Bay National Wildlife Refuge have noted the likelihood of increased cumulative impacts to brant and eelgrass through habitat loss and disturbance. The USFWS estimates that areas with cultch-on-longline are unavailable to brant for eelgrass bed-feeding for the majority of the tide window at which bed-feeding occurs, and, areas with basket-on-longline are functionally useless for bed-feeding.

The substance of these concerns however, is refuted in the project's Final EIR. The rationale for this is summarized in its section titled, "Topical Response No 4: Brant Impacts:"

Potential for Aquaculture Operations to Disturb Brant

The R-DEIR included a quantitative assessment of impacts to brant associated with the project's operations based on the expansion of the project's footprint and increases in harvesting and boat activity. Increased disturbances were substantially overestimated in the R-DEIR based on two very conservative assumptions: all boat traffic in Humboldt Bay is attributable to Coast Seafoods, and all of Coast Seafoods' boat activity will disturb brant. Based on these assumptions, the increase in disturbance due to the project represents less than one percent increase over existing conditions. When this is compared to the best available science evaluating the effects of disturbance on brant in Humboldt Bay (Stillman et al. 2015), the increased disturbance is not expected to have a significant adverse impact on brant...

Use of Stillman et al. (2015) Model

The model presented by Stillman et al. (2015) is directly relevant to potential impacts to brant, given that it is a model specifically developed for Humboldt Bay to evaluate impacts to brant from reductions in food availability and human disturbances. The most relevant empirical data for eelgrass and brant available for Humboldt Bay are used as model inputs, and outputs predict the response of brant to reductions in eelgrass biomass and increases in disturbance.

The R-DEIR uses a 10% change in either eelgrass abundance (decrease) or disturbance (increase) as a threshold for significance under CEQA because this is the lowest level that is demonstrated to have a statistically significant effect based on their modeling results. It should be noted that the threshold incorporated into the R-DEIR to evaluate brant impacts is significantly more conservative than the general CEQA Thresholds of Significance adopted by the CEQA Guidelines, which define a significant impact as a reduction in "fish or wildlife populations below self-sustaining levels," a substantial reduction in fish or wildlife habitat, a substantial adverse effect on a listed or special status species, or

substantial interference with migration (see R-DEIR § 6.5.3). The Stillman model assumes that an exceedance of the 10% threshold will result in a measurable effect to brant, without any discussion as to whether it would be a significant effect as that term is used in CEQA. Regardless, the Stillman model is the best science available to assess impacts of the project on brant. Because the R-DEIR uses this conservative threshold for determining significance under CEQA, the analysis presented in the R-DEIR is appropriate and sufficient for evaluating project effects on brant for CEQA purposes.

Impacts to Foraging Opportunities

As discussed in Topical Response 2, the project is anticipated to result in no net loss to eelgrass resources available to brant. The R-DEIR used the Stillman et al. (2015) model discussed above and project-specific modeling to objectively estimate impacts to foraging opportunities (see Impact BIO-25). The R-DEIR acknowledges that impacts to brant foraging will occur due to exposed longline above water levels during low tides, but determined that these impacts will be less than significant. Specifically, the R-DEIR estimated that brant will be excluded from less than three percent of available eelgrass biomass bay-wide, which, when compared to published modeling results of brant foraging in Humboldt Bay (Stillman et al. 2015), does not suggest there would be substantial adverse effects on brant. Several commenters also suggested that brant would be completely excluded from all aquaculture areas, and that this further exacerbated impacts to foraging opportunities. However, the R-DEIR analysis of brant avoidance is based on two sources of empirical observations studying brant avoidance of Coast's existing longlines in Humboldt Bay. Brant surveys in North Bay indicated that brant occur in approximately equal densities in aquaculture areas and in control areas when infrastructure is not exposed above the water's surface (R-DEIR Appendix E), which was confirmed with time-lapse video of aquaculture beds (see Impact BIO-25). Therefore, impacts associated with foraging activities are less than significant.

As indicated by the repeated references to it in the discussion above, the EIR's analysis and conclusion of no impact relies almost entirely on its interpretation of a modeling effort carried out by Stillman et al. (2015). However, the results of this study should be interpreted carefully. While the EIR's interpretation of the study is that any level of impact below a 10% loss in eelgrass abundance would not be significant or adversely affect brant, this gives an inappropriate level of importance to the 10% figure, as it was used in the study (and assumes that all eelgrass habitat has equal value to brant, an untested assumption). Rather than design a study to determine the maximum amount of eelgrass loss that could occur without negatively affecting brant, Stillman et al. instead set out to evaluate the consequences to brant from various arbitrarily selected levels of reductions in eelgrass abundance. The minimum level they chose to evaluate was 10% and they found at this level of reduction, brant would be adversely affected because their rate of weight gain would diminish and would need to delay onward migration and continue feeding in Humboldt Bay for a longer period – potentially reducing survivorship and breeding success. To use this 10% level as a threshold and to conclude that levels of loss below 10% would not result in adverse impacts is entirely inappropriate because such a conclusion is not substantiated by the study's results. The study simply did not evaluate the consequences to brant of lower levels of eelgrass loss and without the modeling results from these lower levels of loss, it would be simply be speculation to conclude that none of them would be associated with adverse impacts to brant.

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This error in the EIR's interpretation of the results of the Stillman et al. (2015) is pointed out in comments submitted to Commission staff on May 1, 2017, from Dr. Jeff Black and David Ward, two leading experts with over 30 years of experience coastal ecosystems, black brant and the intertidal habitats of Humboldt Bay. They are also two of the researchers who carried out the study with Dr. Stillman and are included as contributing authors:

It seems the authors of the [HT] Harvey documents have misapplied statements published in the journal Ecosphere (i.e. Stillman et al. 2015). We were coauthors of the Stillman et al. (2015) publication, which provided information about the geese and eelgrass for the mathematical model described in the paper. It seems that the '10% threshold' attributed to Stillman et al. (2015) was applied inappropriately. Stillman et al. (2015) were not commenting on whether 10% or any % was acceptable. The model did not predict a level of acceptable loss of eelgrass or change in bird behavior.

The various [HT] Harvey documents suggests that the reduction in bay-wide eelgrass biomass would be low (3%) and have insignificant impact to brant foraging. Why is 3% deemed insignificant? Due to the threatened status eelgrass and sensitive nature of black brant, we would consider any additional loss of eelgrass habitat or further reduction of foraging time by brant due to human activity as unacceptable.

Earlier comments made to the authors of the EIR's analysis, H.T. Harvey and Associates, by the primary author, Professor Richard Stillman, Head of Department of Life and Environmental Sciences at Bournemouth University in the United Kingdom provide further confirmation that a 10% loss in eelgrass biomass should not be considered as an impact threshold:

That said, my main point, which also refers to disturbance, is in terms of the interpretation of the graphs in the paper. The graphs are produced by running simulations of the model with fixed amounts of environmental change. For example, we changed biomass in steps of 10%. Figure 6 shows that a 10% reduction in eelgrass abundance was not predicted to effect the percentage of birds emigrating (with current brant population size, and everything else held constant), but was predicted to increase stopover duration and reduce the rate at which the birds can gain the mass required for onward migration. The question is what would be the effect of a reduction in abundance between 0 and 10%? As we did not run these simulations, this needs to be interpreted from the graphs. The way to do this is to look at the predictions for a 10% increase and a 20% decrease as well to see if there is a consistent trend, which there is for both the rate of mass gain and stopover duration. Given this, my interpretation of this figure is that any reduction in eelgrass abundance is predicted to increase stopover duration and reduce rates of mass gain.

These points are further emphasized by USFWS staff in the May 8, 2017, comment letter submitted to the consultants retained by Coast to help understand the proposed project's potential impacts to black brant:

In the proposal you cite Stillman et al. as justification for your thresholds, inferring that they found that less than 10% removal of all available eelgrass habitat in the bay is unlikely to have an impact on brant. This interpretation of the model produced for this work is inappropriate, as it was not designed to make any determination of an acceptable loss of eelgrass habitat. A letter to the Harbor District as well as the Coastal Commission from one

of the co-authors, Dr. Jeff Black, clearly states that this is an inappropriate application of the model results. Beyond the inappropriate rationale, it makes the threshold unobtainable and thus functionally useless. There is approximately 4,760 acres of eelgrass distributed around Humboldt Bay. In order to hit your proposed threshold of 10%, that would mean the functional removal of 476 acres of eelgrass on the bay. Phase I of the project includes 165.2 acres, making it literally impossible to hit your proposed threshold.

In light of brant's protected status and the importance of Humboldt Bay for its continued survival, the Commission finds that a smaller scale and more consolidated project would minimize adverse impacts to brant. The Commission therefore is requiring in **Special Condition 2** that the overall footprint of Coast's operation be limited to 411 acres. In addition to allowing Coast to continue its existing operation, the expansion allowed by this condition would allow Coast to exceed its existing operation by over 100 acres – representing a significant expansion. However, **Special Condition 3** requires that the operation be more consolidated and focused than both Coast's proposed project and existing operation. As such, the activity footprint of Coast's operations in Arcata Bay would be significantly reduced and the likelihood and opportunity for field operations to flush and disturb brant would be reduced.

To reduce this potential still further, **Special Condition 9** requires Coast to develop and implement a vessel management plan that includes consistent vessel lanes and limited use of open areas within the bay as much as possible. This requirement eliminates or reduces vessel use in areas that do not support cultivation gear and concentrate Coast's vessels within a limited number of access routes and channels – at least until they came within close range of their target cultivation beds.

The most critical requirements, however, are those included in **Special Conditions 4, 7 and 8**. These conditions would (1) require Coast to develop and implement a brant monitoring plan to evaluate the question raised above about brant use of cultivation beds for bed feeding (i.e. foraging on eelgrass that is growing within that cultivation bed); (2) establish a limited maximum installation scale and schedule for the first two years of the project; (3) require Coast to relocate approximately 40 acres of its proposed expansion from areas of high density eelgrass to areas with more sparse eelgrass that retain visual evidence of impacts from Coast's historic dredge harvesting activities; (4) impose two check-in points for the Executive Director to evaluate the initial monitoring results so that additional expansion could be halted or removed if brant use was shown to suffer; and (5) establish an adaptive management process for the life of the project that incorporates the results of the brant monitoring and expert input on interpreting the results.

The approach established through these conditions is consistent with the recommendations provided to the Harbor District by staff of the California State Lands Commission in its January 19, 2017, letter. As described below, these recommendations included further consolidation and reduction in the overall envelope of Coast's operations and implementation of vessel management measures to reduce disturbance opportunities:

...staff believes that Project-related human activities and equipment within and adjacent to the revised Project area may pose unacceptably high impacts to black brants' foraging habitat and behavior. This species and other migratory birds heavily rely on this habitat as a food source on their annual migration along the Pacific Flyway (see "Revised Project" in the enclosed letter). Humboldt Bay is a regionally significant habitat foraging area for brant. Thus expanding facilities would affect them even under Alternative 5 because they would tend to avoid the entire

envelope of the facilities and the increased vessel traffic would disrupt their behavior and roosting. Wildlife advocates and recreational users (e.g., hunters) share this continued concern. Stress and disruption of brant on the Bay could be reduced further if the areas proposed for expansion (depicted in Figures 5.8 and 5.9 in the Final EIR) were further consolidated to reduce the overall envelope of activities. The District could also explore, through continued dialogue with the stakeholders, options to alter the amount, timing, and routes taken by facility-related vessels to reduce disruption of brant in certain areas or at certain times of year.

Black Brant Grit Sites

The other key issue that has been raised regarding brant is its use of specialized sites within the bay for the ingestion of sandy grit. As discussed in the Project RDEIR:

Migrating brant feed almost exclusively on eelgrass and thus their ability to forage is restricted by the tidal cycle, but gritting sites are also very important areas that brant need to access to acquire sandy grit (Lee et al. 2004, Moore and Black 2006, Bjerre 2007, Spragens 2013). Gizzard grit is ingested by brant as an aid to mechanically breakdown eelgrass and provides an important source of calcium (Lee et al. 2004, Bjerre 2007). Brant tend to visit grit sites when they become available during retreating tides; grit sites occur relatively high in the intertidal zone and thus are available earlier than eelgrass beds (Lee et al. 2004, Moore and Black 2006). Brant then move from grit sites to eelgrass beds when tidal elevations are low enough for brant to access them (Moore and Black 2006). Although grit sites appear to be abundant in Humboldt Bay, brant have been observed preferentially selecting particular grit sites that provide supplemental calcium and include larger than average particle sizes (Lee et al. 2004, Bjerre 2007). In some cases, brant have been observed staging over the best gritting sites awaiting tides to recede, and brant continue to use gritting sites even when eelgrass (which occurs at lower elevations) was available for foraging (Bjerre 2007). Based on available literature, the primary grit sites in Humboldt Bay occur along the northern portion South Spit of South Bay (Figure 6.5.28). The South Spit is a large sandbar between the South Bay and Pacific Ocean where higher-elevation sandy substrate is available to brant on receding tides before eelgrass at lower elevations is available for foraging.

In addition to these grit sites in South Humboldt Bay, the RDEIR also identifies two grit sites in Arcata Bay – including one at Sand Island.

In its comment letter provided in response to the RDEIR, the California Department of Fish and Wildlife (CDFW) discusses the presence of black brant grit sites in Arcata Bay as well as their importance and susceptibility to human disturbance:

The RDEIR recognizes two grit sites for black brant in North Humboldt Bay, one at Sand Island and one at Indian Island. Grit sites are rare and are a critical part of the feeding process (Lee et al. 2004; Spragens et al. 2013). Given the rarity and limited access to grit sites, anthropogenic disturbance and development of these sites have been cited as further limiting factors for black brant populations, with grit sites recognized as important areas for protection (Lee et al. 2007; Spragens et al. 2013). Black brant are also some of the most sensitive waterfowl to disturbance (Laursen et al. 2005; Pacific Flyway Council 2002).

CDFW's letter also discussed recommendations for augmenting the protection of black brant grit sites in Arcata Bay, including by expanding the existing buffer area around Sand Island. This recommendation is consistent with the conservation measures provided in the account accompanying the designation of brant as a Species of Special Concern. These conservation measures include the need to "protect traditional gritting sites from excessive human disturbance and degradation from development and other causes."

In its response to the CDFW comment above, the Harbor District acknowledges that several researchers suggest the use of much larger buffers for black brant – from 2.5 to nearly 4 times larger:

There are some studies that recommend a greater buffer for human activity from brant and certain species of shorebirds. For example, Mathers et al. (2000) recommends a 250 m buffer from human activity for wigeon, which is identified as a particularly sensitive species. Borgmann (2011) suggests that a 250 m buffer from human disturbance impacts would likely lessen impacts on most sensitive waterfowl species. Laursen et al. (2005) recommends a 384 m buffer from brant; however, the recommended buffer may not be directly applicable given that it discusses a buffer from human approach on foot rather than boats. However, the frequency of disturbance in these studies was much greater than the proposed project; in Mathers et al. (2000), the mean interval of disturbance varied from every 7 to 68 minutes. In Laursen et al. (2005)'s study, observers experimentally approached and disturbed waterbirds over a thousand times (n=1,371) in spring and autumn in 1980-1984, which likely amounted to at least one disturbance per day during the study.

Contrary to the Harbor District response, it is relevant to consider buffers established for on-foot disturbance since many of the maintenance, harvest, and planting activities carried out on a culture bed are done by personnel on-foot. Therefore, buffers established to protect brant grit sites should be based on either of the distances established through research - 250-meters or 384-meters. Given the protected status of brant and the importance of their limited known grit sites within Arcata Bay, the Commission is requiring in **Special Condition 19** that when brant are most likely to be present in Arcata Bay (November to June), a 384 meter buffer be established around the two primary grit sites within Arcata Bay that were identified during the CEQA review process¹² (shown with blue circles in **Exhibit 11**). **Special Condition 19** would prohibit Coast from operating or transiting through these buffer areas.

Eelgrass

Eelgrass (*Zostera marina*) provides a variety of essential ecosystem functions, including primary production, predation refuge, nursery functions, physical structure, nutrient cycling, and forage. Eelgrass is a species of special biological significance under the meaning of Section 30230 of the Coastal Act, and as such the Commission is required to afford it special protection. The Commission's Adopted Findings for Coast's original CDP for its oyster culture operations (CDP No. E-06-003) summarize several of the critical ecological services and roles provided by eelgrass:

¹² Although Audubon California cites anecdotal evidence in its May 12, 2017, letter to Commission staff indicating the presence of an additional grit site near one of Coast's proposed expansion cultivation beds in East Bay (cultivation bed EB 1-3), Commission staff has been unable to confirm the use of this location as a grit site.

Habitat Value of Eelgrass Beds

Eelgrass is a marine vascular plant indigenous to soft-bottom nearshore areas of the Northern Hemisphere, and occurs along the Pacific coast from the Bering Strait to lower Baja California. Morphological characteristics include horizontal rhizome structures within the sediment and at the sediment surface, with erect leafy shoots extending into the water column. Seagrass beds are critical to nearshore food web dynamics. Studies have shown seagrass beds to be one of the most productive ecosystems in the world, and many fishery resources ultimately depend on this high productivity.

The organisms that use eelgrass blades as a substrate contribute a significant amount of biomass to the eelgrass bed, often equaling the standing crop of eelgrass. Epiphytes and epizoids, which are composed of various algae, bacteria, protozoa, and invertebrates (e.g., harpacticoid copepods), comprise approximately 10 to 50 percent of the total production associated with seagrass. Organisms that live on eelgrass blades are a fundamental component of eelgrass beds' nursery functions.

*Eelgrass epiphytes and epizoids are fed upon by larger organisms and are the dominant food of the fish in seagrass systems. Harpacticoid copepods are a unique component of eelgrass epiphyte assemblages in the Pacific Northwest, and serve as important prey items of juvenile salmon, Pacific herring (*Clupea harengus pallasii*), Pacific sand lance (*Ammodytes hexapterus*) and surf smelt (*Hypomesus pretiosus*). As eelgrass blades and their associated organisms slough away, organic matter is exported to other habitats and supports the secondary production of detritus-based food webs. The detritus is also transported outside of the eelgrass areas to the nearshore environment, where it may provide an important energy source for open-water species, including commercially-important fish species, and a source of production for coastal planktonic species.*

Predation Refuge

*Eelgrass provides structural shelter for a variety of marine organisms, reducing predation pressure. The protective value of eelgrass beds may vary with the structure of the bed, and is generally limited to smaller species, juveniles, or cryptic species. Eelgrass is thought to provide shelter for migrating salmonid smolts. When exposed to predators, juvenile Chinook salmon (*Oncorhynchus tshawytscha*) preferentially choose eelgrass habitat over oyster clusters in field experiments in an enclosure, as well as in mesocosm experiments involving exposure to a mock predator.*

Nursery Function

*One of the most notable roles of eelgrass beds is as a nursery for various marine fishes and invertebrates. Eelgrass provides abundant food and shelter, which may improve survival for some species. Eelgrass may also promote settlement and recruitment of planktonic larvae or early life stages of various species. Eelgrass beds also act directly as spawning areas, providing nursery grounds for numerous fish species. The commercially important species, Pacific herring, striped seaperch (*Embiotoca lateralis*), and chum salmon (*Oncorhynchus keta*) are all partially dependent on eelgrass for at least part of their life history.*

Physical Structure

By slowing and retarding current flow and reducing water velocity near the sediment-water interface, eelgrass promotes the deposition of particles and inhibits resuspension of fine particles and organic materials. Eelgrass beds therefore help cleanse the water column of both sediment and water column nutrients. Dissolved nutrients are incorporated by eelgrass blades and their associated epiphytes and macroalgae into plant biomass, which can improve water quality. Sediment stabilization is enhanced by the presence of a root and rhizome mat, which bonds sediment and retards erosion. The sediment stabilization provided by eelgrass has been shown to be an important function for associated fauna; suspended material in the water column can limit the visibility and successful capture of prey by visual feeders.

Nutrient Cycling

In order for an estuary to incorporate oceanic and riverine inputs of carbon and nutrients into the food web, the estuary must have an efficient means of retaining these elements. Eelgrass plays an important role in the cycling of nutrients within estuarine and nearshore systems. Eelgrass and its associated epiphytic algae fix nitrogen, adding to the nutrient pool. Eelgrass also absorbs nutrients from the sediment and releases them into the water column from the leaves, acting as a nutrient pump. Decaying eelgrass also aids in the maintenance of an active sulfur cycle. In the absence of eelgrass, nutrients would accumulate in the sediment and/or be flushed out to sea.

Eelgrass as Habitat for Listed Salmonids

Adequate prey species and adequate cover associated with marine vegetation have been identified as important elements in estuarine and nearshore habitats for Pacific salmon. Phillips (1984) suggested Chinook salmon were “transient” users of eelgrass for feeding and cover. Murphy et al. (2000) however, did not observe a significant association of juvenile salmon with eelgrass. Murphy et al. (2000) reported that salmonid fry and smolts were generally smaller in eelgrass sites than non-eelgrass habitats, but suggested that the presence of salmon fry in eelgrass areas may be related to physical factors such as low exposure to currents, rather than the presence of eelgrass per se. In a study conducted in southeastern Alaska comparing fish use of kelp and eelgrass, the majority of juvenile coho salmon were collected in eelgrass beds (Johnson et al. 2003). Eelgrass drift habitat may also be a critical resource for Chinook salmon and coho salmon (Nightingale and Simenstad 2001). Within Humboldt Bay, coho salmon smolts have been captured under clumps of floating eelgrass (Shaw 2004).

To aid in the understanding of the complex approach that Coast is proposing to use to address adverse impacts to eelgrass that would result from its proposed project, the following discussion starts by dividing the project into two parts - the existing operation and expansion. The impacts to eelgrass associated with each of these will be discussed separately initially and then as a combined discussion that covers the reliance they have on each other in Coast’s proposal.

Impacts to Eelgrass from Existing Operations

Coast’s use of intertidal eelgrass habitat – both occupied and potentially occupied with eelgrass plants – for oyster cultivation was the primary coastal resource concern evaluated by the Commission in its consideration of Coast’s initial CDP for its 300 acre operation (CDP No. E-06-003). Based on extensive analysis and technical review by Commission staff ecologist, Dr. John

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Dixon, the Commission found that Coast's operation would result in the loss of approximately 137 acres of eelgrass habitat. The Commission determined this by finding that areas of eelgrass in which Coast's oyster longlines would be placed would support a lower density and coverage of eelgrass than they would if not used for aquaculture. Combined across the estimated 275 acres of Coast's 300 acre footprint determined to be eelgrass habitat, these reductions in eelgrass cover were found to be the equivalent of 137 acres of eelgrass. The Commission acknowledged that using the typical mitigation approach for eelgrass impacts (which requires impacts to be mitigated at a ratio of 1.2:1, restored area:impacted area) would result in a requirement for Coast to create 164 acres of new eelgrass habitat in Arcata Bay.

However, while the typical eelgrass mitigation approach is the preferred option, the Commission also acknowledged in the Adopted Findings for CDP No. E-06-003 that a restoration effort on the scale required by that approach was unlikely to succeed:

Discussion with staff members from the California Department of Fish and Game indicate that restoring eelgrass in Humboldt Bay has not proved successful in the past, and is most likely not a feasible mitigation measure for the proposed project. In the mid-80's, eelgrass was removed from the east side of the Eureka channel and transplanted to Indian Island. This transplant project failed. More recently, CalTrans also attempted to transplant eelgrass as mitigation for the Samoa Bridge seismic upgrade project; the transplanted eelgrass is not doing well after two years. One somewhat successful project at the Eureka small boat basin created a mudflat inside the marina, where eelgrass was planted. The eelgrass is still growing there, but no quantitative sampling or monitoring was required for that project so it is difficult to know how successful it has been. Last year, eelgrass was transplanted along the Eureka Boardwalk as mitigation for the Fisherman's Terminal project. DFG staff does not yet have any data on how well it is doing – and is concerned that heavy rain this year may affect the success of that project. Given the difficulty that past projects have had in successfully transplanting or restoring eelgrass in Humboldt Bay, the Commission finds that an eelgrass restoration project in Humboldt Bay is not likely to produce adequate mitigation for the proposed project.

In response, a suite of restoration efforts and mitigation measures was developed that, in combination, was found to adequately address the 137 acres of impacts to eelgrass associated with Coast's 300 acre operation. This suite of mitigation measures is discussed in the Commission's Adopted Findings for CDP No. E-06-003 and includes the following primary elements and Special Conditions:

- *Coast will maintain in place its leases with the Harbor District, the City of Eureka, and the Karamu Corporation (approximately 3,645 acres). Coast will exercise its renewal options, and satisfy its payments and other obligations in each of the aforementioned leases to ensure that all three leases remain in effect until at least the year 2015. Aside from the fixed 300-acre operational footprint established pursuant to this permit application, Coast will not conduct oyster harvesting activities on any of its leased or owned lands. This measure protects approximately 3,600 acres of tidelands from development of any kind for the time that the leases are in place.*
- *Coast will transfer fifty acres of the tidelands it owns in Humboldt Bay to an appropriate entity to ensure said transferred tidelands are permanently protected from any development.*

The 50 acres proposed by Coast are in the Mad River area of Coast's holdings, and are depicted in Exhibit 10. The habitat value of the 50 acres is high; however the parcel contains very little eelgrass.

- Coast will continue to work with the City of Arcata, the City of Eureka, the County of Humboldt and the State of California to identify sources of water pollution in Humboldt Bay, and to implement repairs to minimize or eliminate that pollution. Improvements in water quality help Coast commercially, but also benefit the Bay ecosystem.*
- Where feasible, Coast will avoid contact between the long-line harvester vessel and the bay bottom. To avoid potential impacts to eelgrass from shading, Coast will not anchor the longline harvester in such a way as to shade the same area of eelgrass for more than twelve hours.*
- Coast will not intentionally deposit shells or any other material on the sea floor. Natural deposition of shells and other materials will be minimized.*
- Coast will not engage in any dredging, hydraulic harvesting, "bed cleaning," or other activities with an hydraulic harvester.*

...

Special Condition No. 1 requires that within one year of the issuance of this permit, Coast shall transfer title of 50 acres of its owned tidelands, as depicted in Exhibit 10, to the State Lands Commission, the Humboldt Bay Harbor, Recreation and Conservation District, or the City of Arcata. The conveyance document shall be submitted to the Executive Director for review and approval, and shall clearly state that the tidelands so granted shall be protected from development in perpetuity. The conveyance shall be made free of prior liens or encumbrances that the Executive Director and/or the grantee determine may affect the validity and effectiveness of the conveyance. If Coast is unable to transfer title to one of the three entities listed, Coast shall apply for an amendment to this permit from the Commission.

...

Special Condition No. 3 requires the applicant to pay one hundred thousand dollars (\$100,000) to the California Coastal Conservancy. These funds will be used for the purpose of habitat enhancement generally, and fish passage improvement particularly, for federally- and State-listed anadromous fish species within the Humboldt Bay watershed. The Conservancy anticipates that the site of the improvement project or projects will be located on a stream tributary to Humboldt Bay, and that funds will be expended within five years. The Conservancy will submit the project or projects proposed for funding to the Executive Director for review. (See Exhibit 12.) Payment shall be made in two phases: 1) prior to issuance of this permit, the applicant shall pay the Conservancy fifty thousand dollars (\$50,000), and 2) within one year of the first payment, the applicant shall pay the Conservancy the remaining fifty thousand dollars (\$50,000). Coast shall prepare a check (or other appropriate vehicle) made out to "State Coastal Conservancy," and shall send that check to the Executive Director of the Coastal Commission for forwarding to Conservancy staff.

...

In order to determine the feasibility of cultivating oysters at elevations not typically suitable for eelgrass, Special Condition No. 4 requires Coast to evaluate the feasibility of culturing

oysters at depths typically unsuitable for eelgrass growth (i.e., above +1.5 feet MLLW) in Humboldt Bay. Prior to planting any oyster culture outside the 255 acres currently in production, Coast shall submit a study methodology for review and approval by the Executive Director. The Commission does not currently have information regarding the various elevations of oyster plots within Coast's proposed 300-acre footprint. If no portion, or an insufficient portion (as determined by the study methodology), of Coast's proposed 300-acre operational footprint contains areas above +1.5 feet MLLW, Special Condition No. 4 requires that within two years of the issuance of this permit, Coast shall apply for a coastal development permit to conduct the study.

As part of the review it carried out in January of this year of Coast's requests for permit amendments to extend by six months the duration of its operations (from February of 2017 to August of 2017), Commission staff reviewed information included in the RDEIR and its technical appendices on impacts to eelgrass beds in which longline cultivation operations are currently carried out. This information was reviewed in order to evaluate the accuracy of the Commission's 2006 eelgrass impact estimate of 137 acres. Although the RDEIR and its appendices include extensive discussion and analysis of the potential impacts to eelgrass from the proposed expansion project, it includes very little information about the amount of eelgrass within existing cultivation beds. Further, the proposed expansion project involves a slightly different type of impact to eelgrass since it would involve the potential loss of existing eelgrass associated with the placement, use and presence of culture gear in eelgrass beds that are not currently used for aquaculture, whereas the Commission's 2006 analysis of Coast's operation considered limits on the amount of eelgrass that could naturally expand into an area due to its use for cultivation. Therefore, the discussion and analysis in the RDEIR cannot be used to directly quantify the total amount of eelgrass actually affected by the existing operation. However, Coast also provided an analysis included in its Biological Assessment (2016) submitted to the U.S. Army Corps of Engineers, which concluded that Coast's existing footprint suppresses between 19.6 acres and 141.6 acres of eelgrass growth. Additionally, the Biological Assessment also accurately notes that the National Marine Fisheries Service identified a range of potential eelgrass suppression in its 2005 consultation with the Corps of between 59 acres and 230 acres, which NMFS acknowledged was likely too low of an estimate at the lower end and too high of an estimate at the upper end of the range. The conservative end of the range recently estimated by Coast (141 acres) and the middle of the NMFS (2005) range (144 acres) are consistent with the Commission's estimate of 137 acres.

While some eelgrass surveys carried out by Coast's consultants over the past several years do include information about eelgrass in existing cultivation beds, only a small portion of a limited number of beds was sampled and the surveys were not designed to inform the question of how much eelgrass is present across all of Coast's culture beds compared to how much eelgrass would be present in those areas if they were not used for aquaculture. Coast has stated its belief that the actual impacts to eelgrass that occurred were less than those estimated by the Commission in 2006; however, the currently available information does not provide a clear indication that the Commission's 2006 impact estimate is inaccurate. The limited dataset on the amount of eelgrass in areas of existing operations appears to fall within the range estimated by the Commission in 2006. While some areas appear to support more eelgrass than initially estimated, eelgrass in other areas appears to be below the levels anticipated in 2006. Arcata Bay is a dynamic natural system and eelgrass within it experiences a very high level of natural variability and fluctuation between years and areas. Small changes in physical and environmental parameters such as elevation, light levels, tidal inundation, and susceptibility to disturbance and stress play a key role in determining how

eelgrass responds and the interplay of these factors changes over both time and space. As such, it is problematic to make conclusions about large areas based on data collected over limited spatial and temporal scales. In addition, recent trends indicate that eelgrass may be declining throughout Arcata Bay and experiencing additional stress from disease. For example, a recent analysis focused on higher elevation areas within eelgrass beds indicated that a loss of up to 20% had occurred in some areas - primarily areas towards the upper end of the elevation range that eelgrass occupies in Arcata Bay. Ultimately, substantial uncertainty exists about the scale of impacts to eelgrass from Coast's existing operation. The Commission's 2006 estimate of 137 acres acknowledged this uncertainty and was intended as a precautionary approach. Although more information is available at this time, it does not provide a definitive assessment of eelgrass impacts, and the need for a precautionary approach remains.

Commission staff additionally considered the mitigation measures and Special Conditions included in its 2006 findings (excerpted above) to evaluate the benefits they provided and determine whether they met the Commission's expectations. While some elements, such as the restoration work funded by Coast, may not have been implemented as expeditiously as anticipated, Coast met its funding obligations completely and on time. The delay was related more to the challenge of finding an appropriate project to contribute the funding to and to bring the project to fruition. In any event, the project partially funded by Coast, the McDaniel Slough Restoration Project in Arcata, was completed in late 2013 and monitoring results from the past several years have been positive. The other elements of the mitigation suite have also been satisfied or followed by Coast over the past ten years, and there is no evidence suggesting that they fell short of achieving their intended benefits.

This review of the Commission's 2006 eelgrass impact estimate and the mitigation suite does not provide a clear indication of a mitigation deficit or surplus.

Impacts to Eelgrass from Proposed Expansion

In the new cultivation beds that Coast is proposing to install within approximately 256 acres that are currently not part of its existing operations or operational footprint, Coast would rely on a modified version of the cultivation methods it currently employs within its existing operation. Specifically, Coast would install the new cultivation equipment in a less compact, more widely spaced configuration. The reason for this is that, simply stated, Coast has carried out an extensive analysis of how eelgrass may be negatively affected by cultivation equipment and has determined that each individual line only affects a very small area - primarily through shading. Following this reasoning, Coast maintains that as long as a certain minimum width is provided between lines, the small area effects of each line would not blend together and an entire cultivation bed (which may include hundreds of individual lines) may be placed and maintained within eelgrass habitat while having virtually no detectable adverse impact on that habitat. Based on its analysis, Coast has argued that a spacing of ten feet between traditional longlines and a spacing of nine and 16 feet between basket longlines would allow it to achieve its goal of impact avoidance. Coast is also confident that the placement of two traditional longlines directly adjacent to one another but at different heights would also not result in more than negligible impacts. The figures in **Exhibit 3** provide graphical depictions of these various line spacing configurations that Coast has proposed to implement.

A large part of the reason that Coast has gone through this exhaustive effort to attempt to find a way to install and operate shellfish cultivation gear within eelgrass habitat without adversely affecting it is because its targeted operational area, Arcata Bay, contains extensive amounts of eelgrass. By some estimates, Arcata Bay contains over 3,500 acres of eelgrass and as much as 30% of total area

of eelgrass habitat within the entire state. The abundance of eelgrass habitat throughout Arcata Bay (as much as 39% of the total intertidal habitat in the bay), its tendency to grow within the same tidal elevations that Coast prefers for oyster cultivation, and the legal, regulatory and scientific consensus on the need for it to be protected means that one way for Coast to achieve an industrial scale aquaculture operation in Arcata Bay is to find a way to operate within eelgrass habitat without negatively affecting it. This approach is unproven, and Commission and state and federal resource management agency staff have expressed to Coast their concerns about this approach. These agencies have strongly encouraged Coast to instead scale its operations to avoid placement of cultivation beds within eelgrass habitat. Coast has, however, continued to pursue approval of its preferred approach.

Although it continues to express confidence in its analysis, in acknowledgement of the scientific uncertainty that underlies it and as a result of extensive feedback and input from a coordinated team of state and federal agency staff (Coastal Commission, U.S. Army Corps of Engineers, National Marine Fisheries Service, California Department of Fish and Wildlife, Regional Water Quality Control Board, California State Lands Commission), in December of 2016, Coast modified its project and both reduced its scale - from its initial proposal of over 900 total acres to its current proposal of 490 total acres - and integrated into it an approach that included both extensive monitoring and immediate direct mitigation for eelgrass impacts based on a conservative assumption about the amount of impacts to eelgrass that its proposed expansion would result in. This change was also responsive to concerns raised about Coast's previous approach to carry out less certain or out-of-kind mitigation (removal of abandoned pier structures elsewhere in Humboldt Bay, restoration of salt marsh habitat) only after monitoring demonstrated that impacts had occurred.

When evaluating impacts to eelgrass, the typical approach is to consider three types of impacts - loss of density; reduction in percent vegetated cover (the percentage of an area covered in plants); and reduction in spatial extent of a bed (a contraction of the outer edge or limit of an eelgrass patch). Coast's proposal makes an assumption that its installation and use of cultivation equipment (at the wide spacing configuration suggested by its analysis) within new cultivation beds in eelgrass habitat would not reduce eelgrass percent vegetated cover or spatial extent but may result in a loss of eelgrass density (the number of emergent plants or turions per square meter) of up to 25%. More precisely, Coast predicts that its Phase I and Phase II expansion of oyster longlines in eelgrass habitat could have an adverse effect to eelgrass of as much as a 19% - density reductions could add up to represent a cumulative loss of 19% of the area (Confluence 2017a, 2017b). To employ a cautious approach, however, Coast has proposed to implement mitigation for impacts of as high as a 25% loss in eelgrass density within expansion cultivation beds.

Making this assumption that a loss of eelgrass density of no more than 25% would occur within each acre of its expansion areas, Coast then proposed to generally follow the approach for mitigating impacts to eelgrass density described in the National Marine Fisheries Service's "California Eelgrass Management Plan" (CEMP). Since its release in 2010, the Commission has typically relied on the CEMP for guidance on assessing and responding to projects that adversely affect eelgrass. The CEMP outlines the following approach to mitigate for density reduction:

Mitigation for reduction of turion density without change in eelgrass habitat area should be on a one-for-one basis... by establishing new eelgrass habitat comparable to the change in density at the impact site. For example, a 25 percent reduction in density of 100-square

meters (100 turions/square meter) of eelgrass habitat to 75 turions/square meter should be mitigated by the establishing 25 square meters of new eelgrass habitat with a density at or above the 100 turions/square meter pre-impact density.

Therefore, because Coast was proposing to mitigate for a 25% reduction in density, it proposed one acre of eelgrass mitigation area for every four acres that would experience that 25% reduction in density. In other words, for every four acres of its proposed expansion, it proposed one acre of mitigation. Using the actual proposed acreage, Coast proposes to install new cultivation beds in 256 acres and to carry out 64 acres of eelgrass mitigation.

Eelgrass Mitigation

Returning now to the initial discussion about Coast's existing operation, because the Commission has determined (above and in its findings in support of CDP No. E-06-003-A5) that its initial eelgrass impact estimates remain valid and that Coast has appropriately mitigated for those impacts, any reduction in the impacts to eelgrass from the existing operation (i.e. recovery of eelgrass in areas that were assumed to be impacted and for which mitigation was already provided) would represent a net increase in eelgrass. In other words, by reducing the impacts to eelgrass from its existing operation, Coast would be creating eelgrass and thus providing direct mitigation.

Therefore, Coast is proposing that for every four new acres of cultivation gear it installs within eelgrass habitat (areas in which it is assuming a 25% loss in eelgrass density would occur), it would provide the needed one acre of mitigation by removing one acre of existing cultivation gear from within eelgrass habitat. As expressed in terms of the proposed project, Coast proposes to expand its operations by 256 acres and reduce its existing operations by 65 acres (from ~300 to 235) for a net operational footprint of 491 acres.

Whereas a strict adherence to the CEMP's mitigation approach described above would require the mitigation areas to achieve at least the "pre-impact" density measured in the impact areas, Coast selected its mitigation areas (also called "removal areas" because existing cultivation equipment would be removed from them) in consultation with resource agency staff to provide benefits to wildlife (including green sturgeon, brant, shorebirds) and wildlife habitat as well as eelgrass. While eelgrass in the removal areas is expected to measurably recover, some of these areas may not naturally support the same level of eelgrass density as the "pre-impact" conditions of some of the proposed expansion areas. However, due to the range of ecosystem benefits that removal of these existing cultivation beds is expected to provide (for example, by providing open tidal flats for shorebird foraging and allowing for greater consolidation of Coast's operations in Arcata Bay), Coast was nevertheless encouraged to consider prioritizing these areas for removal by state and federal resource agency staff.

Additionally, the phased implementation requirement in **Special Condition 4** directs Coast to further concentrate its proposed expansion efforts away from areas of undisturbed, high density eelgrass and into areas of its historic dredge harvesting footprint that continue to retain visible signs of alteration or "scarring" and support lower densities of eelgrass despite the many years that have elapsed since they last supported aquaculture. This requirement would increase the likelihood that eelgrass density within the removal beds will be able to achieve the same level as the "pre impact" eelgrass density in the expansion beds and therefore help ensure that no net loss of eelgrass occurs as a result of the proposed project.

Assumptions

Although Coast's proposed approach to balancing the impacts to eelgrass from its expansion with benefits to eelgrass from its reduction of existing operations appears simple, underlying it are a number of critical assumptions. The most significant of these are the following (1) that the only impacts to eelgrass that would occur within the expansion areas would be a loss of density (i.e. there would be no loss in percent vegetated cover or spatial extent of eelgrass); (2) that this loss of density would not exceed 25%; and (3) that eelgrass would naturally recover within the former areas of Coast's existing operation once gear is removed.

To evaluate these assumptions, Coast has developed an eelgrass monitoring plan that it proposes to implement. Commission staff have reviewed two versions of this plan over the past several months and expect the next version to be provided soon. To ensure that this next version of the eelgrass monitoring plan incorporates all of the appropriate information and relies on a scientifically robust approach to sampling and analysis, the Commission is requiring in **Special Condition 6** that Coast submit, for Executive Director review and approval, a revised plan that incorporates the input provided to Coast by Commission and state and federal resource agency staff (as reflected in the email dated April 28, 2017 from Commission staff to applicant's consultants the meeting notes from the May 12, 2017 meeting between agency staff and the applicant). This condition would further require that Coast implement this plan as approved.

Although Coast has expressed strong confidence in the assumptions about eelgrass impacts (or the lack thereof) that underlie its mitigation approach, a significant amount of uncertainty exists around these assumptions. No directly applicable studies have been carried out to demonstrate the lack of impacts that are expected in the expansion areas and similarly, no work has been done to demonstrate that eelgrass will recover into the removal areas once the aquaculture gear is removed. On the other hand, an abundance of scientific literature is available that describes the adverse impacts to eelgrass habitat that may result from the placement of shellfish cultivation equipment within eelgrass habitat. A number of these impacts are listed in the comment letter provided to the Harbor District by the California Department of Fish and Game on September 23, 2015:

The Department remains concerned the Project could eliminate or significantly degrade existing eelgrass habitat through harvesting, maintenance and replanting activities. These activities include: trampling, anchoring of boats, placement of aquaculture gear including harvesting baskets, shading by aquaculture gear and related equipment, sedimentation, biodeposition of pseudofaeces and feces, and boat and propeller scaring. These types of impacts from aquaculture operations have been well documented in the literature (Bouchet & Sauriau 2008; Castel et al. 1989; Chandrasekara & Frid 1996; Dealeris et al. 2004; Dubois et al. 2007; Forrest & Creese 2006; Francour et al. 1999; Leguerrier et al. 2004; Milazzo et al. 2004; Nugues et al. 1996; and as reviewed in: Forrest et al. 2009; Rossi et al. 2007; Zieman 1976; and as discussed in: Milazzo et al. 2002). Additional impacts may include: reduction of floating eelgrass rafts used by larval fish and reduction of available beach wrack near the entrance to Humboldt Bay and associated species from local beaches (Castro et al. 2002; Colombini et al. 2003 and citations therein; Dempster & Kingsford 2004; Heck et al 2008; Orr et al. 2005; Thiel & Gutow 2005).

Additionally, in its May 12, 2017, letter to Commission staff, Audubon California also expressed concerns with the assumption that aquaculture equipment within eelgrass beds would only have a limited impact to eelgrass density:

Eelgrass within the existing approximately 300-acre project footprint has been severely impacted by aquaculture operations, which consist primarily of longlines spaced at 2.5 feet apart. The best available science measuring the impact of longlines in previously undredged eelgrass beds in Arcata Bay found that 2.5-foot spaced longlines – the spacing in the existing footprint- resulted in an 89-92% reduction in turion density relative to controls. Ten-foot spaced single hung longlines – the spacing proposed for the expansion - caused a 45-67% reduction in turion density relative to controls.^{2,3} To our knowledge, the effect of double hung longlines, which are intended for use in the proposed longline expansion areas, is unknown. A new meta-analysis of the impacts of aquaculture on eelgrass from the National Marine Fisheries Service, comprised of 14 experimental studies from seven West coast estuaries from Northern California to British Columbia, concluded “eelgrass response metrics to shellfish aquaculture were generally negative, particularly metrics associated with abundance (biomass, density and percent cover)... for oyster aquaculture, density, percent cover and above-ground biomass all displayed negative responses to aquaculture.”⁴

Although the density reduction for ten foot spaced longlines cited in Audubon’s letter – “45-67% reduction in turion density relative to controls” – is not directly applicable to the proposed project because it was from a study carried out to determine differences in eelgrass recovery between areas recently used for dredge harvesting in which longlines were installed and not installed (which is different from Coast’s proposal to evaluate eelgrass loss from installing longlines in areas within and outside historically dredged sites), the key point that Audubon raises is that there is significant uncertainty about how eelgrass would respond to Coast’s project and some indication that impacts may greatly exceed expectations.

This point is also raised by the Pacific Fisheries Management Council in its April 18, 2017, letter to the Army Corps of Engineers in response its public notice for the proposed project:

The Council has reviewed the alternatives discussed within the Public Notice and recommends Alternative 4: Eelgrass Avoidance. The Council is also supportive of the proponents’ proposal to move many current activities within the east bay out of eelgrass areas.

*Alternative 4 is most protective of eelgrass habitat by limiting expansion of intertidal shellfish culture to areas within its existing leased and owned footprint, which do not currently support dense or patchy eelgrass. The California Coastal Commission required that the project conduct a feasibility study to evaluate oyster culture in areas above +1.5 mean low low water (MLLW). The feasibility study demonstrated that oyster cultivation is successful outside the primary depth range of eelgrass in Humboldt Bay (H.T. Harvey and Associates, March 3, 2015). Growing oysters at or above +1.5 MLLW would substantially reduce the Project’s impact on eelgrass resources. The study found that there was no significant difference in oyster growth, biofouling, or quality of oyster between higher and lower elevational study plots (H.T. Harvey and Associates, March 3, 2015). **To reiterate, the Council recommends that oyster plots be located outside of the eelgrass primary depth range and existing eelgrass beds to the extent practicable to minimize eelgrass impacts, while at the same time ensuring that the objective of no net loss of eelgrass habitat is met,***

as recommended by the National Marine Fisheries Service California Eelgrass Mitigation Policy. [emphasis in original]

The Council is also concerned about the use of double-hung longlines [the paired lines with ten foot spaces between pairs that Coast proposes to install in its expansion areas]. As proposed, Phase I consists of 89.5 acres of double-hung lines that will be monitored over three years. Double-hung longlines are untested in Humboldt Bay, and we are unaware of their application in a comparable situation elsewhere. The Council is concerned that they may impact eelgrass habitat in unforeseen ways, and believes the proposed methodology warrants further study. Specifically, the Council recommends a controlled field experiment on limited acreage, as determined by experimental design. Results of the study should be analyzed and used to inform future buildout to 89.5 acres.

In light of these concerns and the high level of uncertainty about the magnitude and likelihood of the project's adverse impacts to eelgrass, Commission and state and federal resource agency staff have encouraged Coast to plan to move forward slowly and cautiously with its proposed expansion so that if greater than expected impacts begin to occur - or a lack of recovery is shown - there would be an opportunity to adjust and adaptively manage its remaining expansion so that additional adverse impacts can be avoided. This is especially important because of the significant expense and challenge associated with the traditional methods of direct eelgrass mitigation (creating new eelgrass beds through transplantation) in Humboldt Bay. These efforts have largely failed and, as the Commission found in its consideration of Coast's CDP in 2006, eelgrass restoration efforts on the scale of dozens to hundreds of acres are not feasible. Accordingly, implementing Coast's proposed expansion and removal efforts in a measured fashion - starting with several dozen acres and progressing further if initial monitoring data confirm that things are progressing as expected - is another way of providing a further backstop or protection against unforeseen undesirable outcomes. While Coast has made a modest effort to integrate this type of approach into its proposal, the latest version of its implementation schedule still called for the vast majority of its Phase I expansion to be installed (between 114 and 144 acres) prior to the availability of a second year of eelgrass monitoring results. Given the natural variability of eelgrass within Humboldt Bay as well as the potential delay that some impacts may have in appearing, two years of eelgrass monitoring would be considered a minimum amount needed to provide an initial indication of how eelgrass is responding in both expansion and removal areas. As such, the Commission is requiring in **Special Condition 4** that Coast carry out a limited expansion of no more than 82.64 acres and that further expansion be contingent on confirmation that the assumptions underlying its approach to eelgrass remain valid.

Special Condition 4 also memorializes Coast's proposal to carry out nearly all of its proposed removal work (34 acres of the 42 total acres Coast has proposed for Phase I) within the first year of the project. This would mean that approximately 83 acres would be installed initially and 34 acres would be removed - a ratio of roughly 2.5:1 (expansion:removal) - and thus provide some additional assurance that even if project impacts to eelgrass greatly exceed expectations, those impacts would not likely exceed the mitigation provided through the removal of existing cultivation beds. Of course, this assumes that natural recovery would occur within the removal areas, something that is also relatively uncertain - particularly when considering that some areas of Coast's historic operating footprint that have been out of use for many years continue to show visible evidence of impacts from past aquaculture activities and have experienced limited natural recovery of eelgrass. To address this uncertainty, **Special Condition 4** also establishes a process

that allows the Executive Director to review initial monitoring results – from both expansion and removal areas – and use those results to guide Coast into the appropriate adaptive management response. For example, if no recovery of eelgrass occurs within the removal areas in the first year, Coast would delay further expansion until an additional year of data was available. If this second year of data continued to show that recovery was not occurring or if either the first or second year of monitoring in any of the expansion areas showed reductions in eelgrass that exceeded the 25% loss in density limit, the newly installed cultivation beds in those areas would be removed.

Once these initial two years of the project pass, **Special Condition 8** provides a clear roadmap of the adaptive management triggers and actions that would come into play as a result of the data collected by the eelgrass management plan in subsequent years. As with the process used for the first two years, if greater than expected impacts to eelgrass begin to manifest, the priority action will be to focus on removing the sources of those impacts before the situation deteriorates further.

Conclusion

With implementation of **Special Conditions 2 through 22** Coast's proposed shellfish aquaculture operation in Arcata Bay would be carried out in a manner that maintains marine resources, provides special protection for species and areas of special biological significance, sustains the biological productivity of coastal waters, and maintains healthy populations of all species of marine organisms. In addition, the proposed project, as conditioned, will maintain the biological productivity of coastal waters appropriate to maintain optimum populations of marine organisms. The Commission therefore finds that the proposed project, as conditioned, is consistent with the marine resource sections (Sections 30230 and 30231) of the Coastal Act.

E. 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.

The majority of Coast's proposed aquaculture operations (both the existing and expansion areas) would be located in intertidal or subtidal areas of Arcata Bay and are not located in areas contiguous with or near dry lands. As such, the operation has little potential to affect terrestrial resources. The exceptions to this are the approximately 24 acres of proposed oyster cultivation beds located on mudflats extending bay-ward from Indian Island/Talawa and another 6.7 acres located near a small

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island in the middle of Arcata Bay. These beds are referred to in Coast's annual reports (submitted to the Executive Director in compliance with the existing Special Condition 7 of CDP No. E-06-003-A4) and project description as beds GI 1-1, GI 1-2, GI Nursery, GI Rack and Bag and SI-Nk, respectively.

As discussed in the previous section on marine debris, the GI 1-2 bed on Indian Island had been out of use for the past several years so the abandoned cultivation gear is required to be removed by Special Condition 9 of Coast's CDP No. E-06-003-A5.

The other cultivation bed located near an upland area, SI-Nk, is roughly 300 feet away from a unique island feature in Arcata Bay, Sand Island. This tiny, low elevation island includes roughly 2000-square feet of unvegetated land that extends above the mean high water line and remains dry during high tides. Isolated, separated from the bayshore, and relatively insulated from most sources of human disturbance and access by land based predators, Sand Island is a unique ecological feature in Arcata Bay and has attracted uses by a variety of wildlife species. These uses include a harbor seal haul out, a source for sandy grit for wintering black brant (as explained in more detail below, brant consume small amounts of sand from certain areas to aid in their digestion of eelgrass), roosting for various seabird species, and nesting for both the double-crested cormorant and Caspian tern. This combination of important ecological functions provided by Sand Island and its rarity as a small isolated island in Arcata Bay resulted in its designation by the Commission as ESHA in CDP No. E-06-003-A5. This value was also previously acknowledged by the Commission, Coast, and the Harbor District in permits from 2005/2006, through which a 100-meter buffer was established between the island and the nearest aquaculture operations. Subsequently, the Commission obtained new information about Sand Island that requires reconsideration of the adequacy of the 100-ft buffer.

Nesting

The Harbor District's RDEIR for Coast's expansion project provides the following information about the seabird nesting colonies on Sand Island:

Caspian terns and double-crested cormorants nesting colonies are present on Sand Island, approximately 320 ft from the northeastern edge of the current oyster culture area (Figure 6.5.13). In 2001-03, 809 double-crested cormorant nests (representing 13% of the statewide total and the largest colony in northern California), and 262 individual Caspian terns, were counted on Sand Island (Capitolo et al. 2004). In 2008, only 103 cormorant nests were counted (Caspian terns were not counted), reflecting a reduction in nests from previous counts; it is possible some birds may have moved to Teal Island in the South Bay where their numbers increased (365 nests in 2003 to 485 nests in 2008) (Adkins and Roby 2010). In 2014, more than 400 cormorant nests were counted and over 300 Caspian tern nests were estimated on Sand Island; the colony was also active in 2015, although numbers are not yet available (P. Capitolo, University of California Santa Cruz, Unpubl. Data). The colony is presumed to still be active.

During its previous review work associated with CDP No. E-06-003-A5, Commission staff consulted the researcher cited by the Harbor District, Dr. Philip Capitolo, for more recent information about the status and trends of these nesting colonies. Dr. Capitolo has been monitoring these colonies for many years as part of west coast-wide double crested-cormorant population assessments. His research in 2004 showed that Sand Island supports the largest nesting colony of

double-crested cormorants in California (Capitolo et al. 2004). However, Dr. Capitolo's research shows that both tern and cormorant nesting colonies on Sand Island experienced sharp declines in 2016, falling from a combined total of over 700 in 2014 to only about 25 during the 2016 nesting season. Dr. Capitolo also indicated that in his experience evaluating numerous such colonies, the Sand Island colony appeared more susceptible than others to these wide swings in nesting use between years. Although it is unclear what has caused this decline, there are a variety of potential explanations for the large interannual variability in nesting use that Sand Island appears prone to, ranging from changes in prey availability, avian predation, disturbance from other wildlife, and disturbance from human activities. In particular, high levels of human activity near nesting areas during the months of April and May when birds are seeking out appropriate nesting habitat and establishing nests can often lead to abandonment of nesting and/or nesting areas. If this is indeed one of the reasons for the sharp decline in tern and cormorant nesting at Sand Island, it could have been caused by many types of human disturbance, such as repeat visits to the island or adjacent areas by kayakers, boaters, fishermen, or recreational users; low-elevation aircraft use; fireworks; or other similar types of human uses that result in elevated sound levels or human presence in the area on foot or in vessels. Increased aquaculture operations in the area is also a potential contributor, as acknowledged by the Harbor District in its RDEIR:

Human disturbance associated with [Coast] operations in the vicinity of Sand Island has the potential to flush nesting Caspian terns and double-crested cormorants. Such disturbances could result in the loss of eggs and/or chicks, and even cause permanent nest or colony abandonment (Ellison and Cleary 1977, Shuford and Craig 2002). However, to avoid impacts to nesting birds on Sand Island, the Harbor District imposed a condition as part of Coast's existing permit to locate its shellfish beds at least 100 m from the mean higher high water (MHHW) line of Sand Island...

However, an evaluation of recent information, including recent nesting colony survey results and its higher than usual inter-annual variability, suggests that this buffer distance may not adequately provide the intended protection. Although there is no direct evidence that Coast's operations contributed to the reduced nesting at Sand Island in 2016, the 2016 annual report Coast submitted to Commission staff indicates that the SI-Nk cultivation bed was planted in May of 2016. Planting and harvesting cultivation beds are two of the operations carried out on cultivation beds that require the most sustained and concentrated levels of activity, involving repeat boat trips and hours of manual labor on foot throughout the cultivation bed by Coast's field crews over the course of days to weeks. Given the size of the SI-Nk cultivation bed, 6.7 acres, and Coast's estimate that its crews can plant a bed (install new longlines seeded with young oysters) at a rate of 2 acres per day, Coast was likely operating on this bed for approximately a week and a half in May of 2016. This level of activity early in the nesting season when birds are most sensitive to disturbance and likely to abandon nests and nesting activity may have contributed to the 96% decrease in nesting activity that Dr. Capitolo recorded in the 2016 nesting season. Although other factors may also have contributed, the fact remains that the colonies are in a poor condition and may benefit from more robust protection to help ensure that potential sources of human disturbance, such as Coast's operations, are less likely to adversely affect the island's resources.

In response to this information, the Commission, in Coast's most recent permit amendment, required in Special Condition 13 (of CDP No. E-06-003-A5) that the cultivation bed near Sand Island be removed. To provide Coast with an opportunity to recover the value of the oysters that had been planted at the bed in May of 2016, however, this removal was not required to occur until

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those oysters were ready for harvest (estimated as Fall of 2017). Therefore, despite the removal condition, the cultivation bed remains in place today. To ensure that use of the bed during this year's cormorant and tern nesting season does not adversely affect these bird colonies, Special Condition 13 also prohibited Coast from carrying out harvest or planting activities during the April to August nesting season for these birds. In its currently proposed project, Coast has included the removal of this cultivation bed as part of its proposal. This removal is memorialized in **Special Condition 3** of this permit. In addition, the seasonal restriction on cultivation activities at bed SI Nk is carried forward through **Special Condition 18**.

Conclusion

With implementation of **Special Conditions 3 and 18**, the continuation of Coast's current shellfish aquaculture operation in Arcata Bay would be carried out in a manner that protects the Sand Island ESHA against any significant disruption of habitat values and helps ensure that only uses dependent on the resources of Sand Island are allowed within that area. The Commission therefore finds the proposed project, as conditioned, consistent with Section 30240 and 30241 of the Coastal Act.

F. CULTURAL RESOURCES

Section 30244 of the Coastal Act states:

Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.

Archaeological resources protected under this Section include sacred lands, traditional cultural places and resources, and archaeological sites. As noted in the July 2016 RDEIR developed by the Harbor District for Coast's proposed expansion project, the cultural significance of Arcata Bay and the Humboldt Bay area is well established:

Humboldt Bay is the ancestral heartland of the Wiyot Indians, whose native language is affiliated with the Algonquian language family and who had occupied the bay area for at least 2,000 years by the time the first European maritime explorers entered the bay and the first American towns were established in 1850. There are hundreds of known and undiscovered archaeological sites around Humboldt Bay that evidence Wiyot history and prehistory. Today, citizens of Wiyot ancestry are affiliated with three federally-recognized tribes located in the ancestral homeland: Blue Lake Rancheria; Bear River Band of the Rohnerville Rancheria; and the Wiyot Tribe at Table Bluff Reservation.

The Wiyot Tribe has used Humboldt Bay for ceremony, gathering and subsistence since time immemorial. The Wiyot Tribe considers Humboldt Bay's extensive eelgrass beds as a cultural landscape, as defined by California Public Resources Code Section 4.21074(a). In addition to being a vital resource to The Wiyot Tribe for subsistence, eelgrass also serves as a habitat for a variety of species of importance to The Tribe, including salmonids, Dungeness crab, Pacific herring, and other aquatic species. Additionally, a variety of tribally important avian species including waterfowl (e.g. ducks, swan, and geese—especially black brant) and shorebirds (e.g. curlew), utilize eelgrass habitat and associated species (e.g. macroinvertebrates).

Eelgrass beds thus form an important contribution to both the historical and contemporary cultural heritage of The Wiyot Tribe. In addition to the value of the eelgrass itself, which was used for cooking, the species it supports are essential to the Wiyot diet. Supported species also support other cultural practices; for example, waterfowl feathers are used to make regalia for ceremony, including the World Renewal Ceremony held on Tuluwat in the middle of Humboldt Bay. Impacts to eelgrass thus also impact The Wiyot Tribe's ability to engage in traditional subsistence hunting and fishing, as well as have an impact on regalia making and The Wiyot Tribe's ability to conduct ceremony.

Based on the long history of Native American use and presence on and around Arcata Bay and the importance of the bay's marine ecosystem – in particular its eelgrass beds - as a valued cultural landscape, the proposed project raises two types of primary issues: (1) issues associated with the disturbance, degradation or loss of biological resources; and (2) issues associated with the degradation or disturbance of historic, archaeological or tribal cultural resources or sites.

Discussion of the proposed project's potential to adversely affect terrestrial and marine biological resources and measures to address those effects is primarily included in previous sections of this report and in the Commission's adopted findings for the previous CDPs and CDP amendments issued to Coast for its oyster and clam cultivation operations. In particular, the above sections and previous findings discuss effects to eelgrass habitat; native shellfish; marine, migratory, and wintering marine birds, shorebirds, and waterfowl; marine mammals; and fish species of special biological and economic significance.

Regarding potential adverse impacts to historic, archaeological and tribal cultural resources or sites, based on the discussion included in the RDEIR developed by the Harbor District for Coast's proposed expansion project, there are no identified or known historic, archaeological, or cultural resources within Coast's proposed project footprint. While such resources are unlikely given the intertidal and subtidal operation areas and the siltation that is continually occurring in these areas, the placement, replacement, and removal of aquaculture equipment such as posts, stakes, anchors, or supports could potentially disturb previously undiscovered or unknown historic, archaeological or tribal cultural resources. Additionally, such resources could be discovered or uncovered by culturists when working in intertidal areas or through vessel scour and wash associated with the use of skiffs and support craft.

To address these potential discoveries and help ensure that cultural resources are appropriately protected through notification and consultation with tribal representatives, **Special Condition 24** would require Coast to maintain an established point of contact to be used in the event any cultural or archaeological resource, human remains, or Native American grave goods are discovered during its aquaculture operations. While a point of contact has already been established, **Special Condition 24** would ensure that if Coast changes this contact, the contact information for this new individual would be provided to agency staff and the Tribal Historic Preservation Officers appointed by the Blue Lake Rancheria, Bear River Band of Rohnerville Rancheria and Wiyot Tribe, thus providing a consistent and established source for communication and coordination work in the event a discovery is made. Further, **Special Conditions 25 and 26** would establish a series of notification, protection, and response protocols to be followed in the event a discovery is made. The process required through implementation of these three special conditions was initially developed by the Harbor District in consultation with representatives of the Wiyot Tribe during the development of the RDEIR. The Tribe's subsequent letter to the Harbor District

acknowledged its support for the condition language. Because this language was modified slightly by Commission staff for application here and because Commission staff was not aware of input from the other two area tribes on the condition language, Commission staff reached out directly to representatives of the Blue Lake Rancheria, Bear River Band of Rohnerville Rancheria, and Wiyot Tribe regarding the conditions and modifications. None of these representatives expressed concern with the inclusion of these special conditions in this recommendation or requested revisions to them.

However, in a letter sent by the Chair of the Wiyot Tribal Council to the Army Corps of Engineers on May 2, 2017 (Wiyot Letter), several additional concerns are raised about the proposed project's potential to adversely affect cultural resources:

The rack and bag area located in mudflats of the northeast portion of Indian Island, and identified during your visit should be removed from consideration for development. Its proximity to Tuluwat suggests that it would have a heightened potential for impact to the archeology of the site. Furthermore, Tuluwat is an active ceremonial location. Oyster cultivation at that location would impact privacy, and thus the ability of tribal members to conduct ceremony and engage in traditional practices at that site.

...

Central of the Wiyot Tribe's existence are the native mussels and clams many of which were harvested in the bay. These species include, but may not be limited to, geoduck clams, butter or Washington clams, mussels, and little neck clams. The importance of these species as a food resource can be seen in the volume of shells at most village sites, which are typically referred to as shell mounds or middens. They also serve as an important archeological marker for other archeological locations, such as fish camps or seasonally occupied locations. In addition to the dozens of shell mounds and other sites that encircle, or are within the environs of the bay, the shells were also used to decorate ceremonial regalia, clothing, jewelry, and other cultural items.

They have also been an important protein source for Tribal citizens in the historic era. For example, they served as a readily available source of sustenance during difficult times, such as when Tribal citizens were held against their will at the North Spit Reservation. They remain a popular source of subsistence gathering, as well as recreational and cultural support for current Tribal citizens.

We were therefore disappointed when the Harbor District did not make the monitoring of such bivalves a requirement of the ad hoc committee. These species are part of the history and ongoing culture of the Wiyot people and the human environment as defined in 40 CFR 1508.14 and are a tribal cultural resource as defined in Section 21074 of the California Public Resources Code. The Tribe understands that there are numerous challenges to ongoing health of native bivalves, including, but not limited to, climate change, ocean acidification, urban development, and pollution. The addition of large numbers of a non-native commercial bivalve into the bay is likely to add pressure to the native bivalve populations.

...

We are also concerned that the use of space has not been optimized in this project. We understand that there are areas that are currently permitted for oyster mariculture, and have the existing infrastructure in place that would allow them to be used. However, we

understand that they are not currently in use. Furthermore, we have been informed by the Coastal Commission that areas that have not been used since the 1990s retain visible impacts associated with historical oyster farming. We have confirmed this with a simple examination of the bay using Google Earth. We understand that both currently permitted areas that are not being used and areas that retain visible impacts to the benthic layer of the bay from previous maricultural practices may not be as useful for current practices. However, we hope that full consideration is given to these spaces before expansion is allowed into unimpacted areas of the bay. We also ask that mariculture infrastructure be removed from unused areas before new areas are open for development.

As noted in the Wiyot letter above, Coast is proposing to install and operate approximately four acres of rack-and-bag cultivation gear on the intertidal mudflats near the northern end of Indian Island. The proposed cultivation area is adjacent to the village of Tuluwat, a culturally significant site owned by the Wiyot Tribe on Indian Island that is designated as a National Historic Landmark (CA-HUM-67). The rack-and-bag cultivation method proposed for this area relies on the use of one to two foot high metal “tables” or racks that are approximately 12 feet long and three feet wide. These structures would be used to support three square foot mesh plastic bags filled with oysters. In addition to the potential for archeological resources that may be present within the proposed rack-and-bag area to be disturbed, degraded or destroyed during the proposed installation and use of cultivation racks, as noted by the Chair of the Wiyot Tribal Council, the proximity of the proposed cultivation site and use area to this cultural and archeological resource would also result in adverse impacts to this site by interfering with its ongoing ceremonial use.

To address this issue, the Commission is requiring in **Special Condition 23** that Coast’s proposed use of the intertidal mudflats adjacent to Indian Island be prohibited and the four acres of proposed cultivation in this area be relocated to an area in the Bird Island growing area that supports several existing and proposed cultivation beds.

The second issue noted in the Wiyot letter, the potential for adverse impacts to occur to populations of native bivalves within Arcata Bay as a result of Coast’s proposed planting of several million non-native oysters and clams, is discussed in more detail in the marine resources section of this report. To help ensure that these effects are less likely to occur and are limited in scale, the Commission is requiring in **Special Conditions 2, 3 and 17** that Coast’s operation be limited to 411 total acres and that it be further consolidated into three primary areas within the bay.

In addition, the Commission is also requiring **Special Condition 22** as an additional assurance against adverse impacts to the bay’s native bivalve populations and infaunal communities. This condition requires Coast to implement precautionary measures to help prevent the accidental release of non-native clams into the bay and to limit its cultivation of non-native clams to only juvenile or immature clams that are not capable of reproducing. Whereas the oyster species that Coast proposes to cultivate are not able to successfully spawn in Arcata Bay due to the low water temperatures, the clam species it cultivates have been shown to be capable of establishing self-sustaining naturalized populations (as discussed in more detail in the Commission’s findings for CDP No. E-02-005 and its associated amendments).

With implementation of **Special Conditions 2, 3, 17, and 22**, the potential for adverse impacts to native bivalve populations would be sufficiently reduced so as to not require additional monitoring.

The final issue raised by the Wiyot letter, Coast's inefficient or incomplete use of its existing permitted operational footprint, would be addressed most directly through **Special Conditions 3 and 4**. These conditions require Coast to further consolidate its operations, including by directing over 40 acres of its proposed expansion into areas with "legacy impacts" from Coast's historic operations and by requiring several of Coast's small isolated cultivation areas to be removed or relocated adjacent to existing cultivation areas within legacy impacted sites. In addition, **Special Condition 13** would help address the abandonment of cultivation gear within beds by requiring all cultivation gear to be removed from any cultivation bed that would be out of use for six or more months and by establishing a more strict and enforceable process for ensuring that removal of cultivation gear is carried out completely.

Conclusion

With implementation of **Special Conditions 2, 3, 17, 22, 23, 24, 25 and 26**, Coast's proposed aquaculture operation in Arcata Bay would include mitigation measures to address potential adverse impacts to archaeological or paleontological resources. The Commission therefore finds the proposed project, as conditioned, consistent with Section 30244 of the Coastal Act.

G. COASTAL ACCESS AND WATER ORIENTED RECREATION

Section 30210 of the Coastal Act states:

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

Section 30220 of the Coastal Act states:

Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.

Section 30222.5 Oceanfront lands; aquaculture facilities; priority

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 30224 of the Coastal Act states:

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

Water-oriented recreation activities in and around Arcata Bay include boating, paddling (e.g., kayaks, canoes, and stand-up paddleboards), fishing, clamming, birdwatching and nature enjoyment, walking and hiking, beach play, and enjoyment of scenic views. Additionally, recreational hunting for waterfowl and wintering black brant also occurs throughout Arcata Bay during the permitted seasons. Hunting is generally conducted using boats, sculling in a low-profile

skiff, walking along levees, and using temporary or permanent blinds along the shoreline. Hunting is allowed during the State of California waterfowl hunting season, which is generally October 10 through January 22 for ducks, and a variable period between October 10 and March 10 for geese, depending on the species. The hunting season for black brant is typically restricted to approximately 14 days (Holidays, Wednesdays, Saturdays and Sundays) between November 15 and December 15. Commonly used public boating access points are limited to three locations in the south-east area of the bay near Eureka and several more in the north-west near the Mad River Slough.

Among the water oriented recreation activities that take place in Arcata Bay, those most susceptible to adverse impacts from Coast's proposed aquaculture operation are boating and navigation, waterfowl hunting, and black brant scull hunting. An excerpt from correspondence provided to Commission staff from a member of the waterfowl hunting community, Mr. Stan Brandenburg, provides a description of the scull boat hunting method and summarizes a variety of conflicts that exist between this type of recreational activity and Coast's existing operations:

Scull boats were developed on Humboldt Bay over 100 years ago and whose design is referred to as the Humboldt Bay Scull Boat design by hunters around the world.

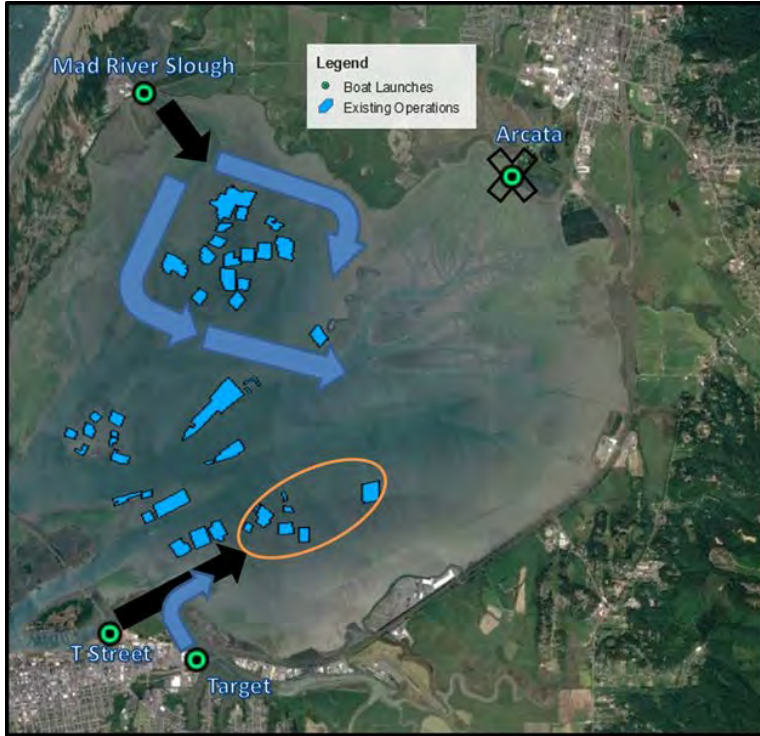
Sculling remains an active and popular sport in north Humboldt Bay. Waterfowl hunting takes place in winter months when conditions can change quickly, and safety is always a first priority. This method uses a scull boat that incorporates some specific defining features necessary to sneak up on birds for hunting. First, the boat must be un-motorized, and be designed to allow a person to row while lying down. Second, the boat is designed to minimize the profile of the watercraft and be as low to the water as possible.

These design features enable hunters to get right up to the ducks and brant they are pursuing, though require constant re-evaluation once in the water regarding tacks and the possibility of deteriorating conditions. For a successful hunt, a hunter must be able to row long distances while lying down, often in low light conditions or in marginal weather, to get from the put in to the area for hunting. Areas hunted on a given day depend on where the birds are located, tides, what the weather and wind is doing, where other hunters are located, and other factors dependent on the conditions of the day. This method of sport also provides a unique and important coastal dependent recreational activity that cannot be provided in inland waters (§ 30220 CA Coastal Act). This recreational activity must be protected from further industrialization of the bay by oyster farms, and our concerns regarding ongoing operations must be addressed to ensure access to public trust resources and ensure the sport can continue in a safe manner.

We believe the concerns from the waterfowl hunting community were not considered during the last round of permitting for Coast Seafoods operations 10 years ago. We have the following concerns and recommendations:

- When Coast Seafood went from on-bottom to off-bottom methods they inadvertently took away one of the most popular and utilized hunting areas in north Humboldt Bay. The oyster farm areas operated by Coast Seafoods in the north-west area of the bay, next to the Mad River Slough channel, were once a great place to hunt. With the addition of extensive off-bottom gear, this area is no longer available to hunters or to recreational boaters and requires a much longer tack to get around the existing gear. This severe decrease in safety and the taking of area from hunters and other recreational users for corporate aquaculture uses was never considered in the previous permitting process. As we don't feel we can*

realistically regain this area back, we ask that you enhance our ability to utilize other frequented areas in North Bay for hunting. Of importance is the area circled in orange in



the attached picture. Removing operations from this area would enhance our safety when utilizing the T-Street and Target boat launches to get to North Bay in general, and would greatly enhance our access to productive hunting grounds from any access point.

- *Coast Seafood operators often disrupt our hunts. We are limited to only certain days per year to hunt Brant and other waterfowl. During those times, Coast Seafood boats have often (seemingly purposefully) flushed birds we were trying to hunt and sometimes even come dangerously close to our scull boats. They have shown blatant disregard for our sport and our safety. We ask that Coast Seafood boats be disallowed in north Humboldt Bay during brant season during daylight*

hours.

- *The current operations should be consolidated as much as possible to allow recreational hunting and boating. We recommend consolidating operations in the west side of the bay to give recreational boaters, kayakers, windsurfers, stand-up paddle boarders, and hunters access to the east side of the bay for use and enjoyment of the bay. No operations should occur east of the Arcata Channel. This would provide much needed access for the people of the state to the public trust resources you protect.*

- *In addition, the view-shed of the bay has been significantly diminished due to the gear visible at low and high tides. When we hunt or otherwise recreate in north bay our use and enjoyment of the area is severely diminished due to the wide-spread PVC pipes and other gear visible at all tides. This severely reduces the beauty of the bay and ruins the scenic vistas that previously existed. To address this we ask that you greatly consolidate operations as described above.*

The footprint of Coast's operations relative to the size of Arcata Bay available for waterfowl hunting and other recreational activities suggests that both types of uses could reasonably be accommodated. However, as the figure included above from Mr. Brandenburg's letter indicates, not all areas of the bay are of equal value and importance to recreational users. For example, access points and routes (noted in the figure with circles and arrows), subtidal channels, deeper intertidal areas, and productive hunting areas are not spread equally and abundantly throughout the bay. Similarly, not all areas present viable options for productive shellfish cultivation. The conflicts that have developed between the recreational community and Coast's operations are a result and indication of the scarcity of some of these features around the bay. At least some of these conflicts have arisen as a result of Coast's conversion to off-bottom culture in the early 2000s – which caused

its culture beds to extend several feet above the substrate, thus presenting an obstacle to safe navigation at a larger range of tidal heights. In authorizing the permit amendments for its existing operation (E-02-005-A5 and E-06-003-A5) last February, the Commission found although Coast's existing operation makes use of a system of marking stakes for its oyster beds and nursery areas, this system appears to have been primarily focused on facilitating internal operations rather than aiding public users of the bay to safely avoid and navigate around the potential hazards posed by the culture beds. The Commission found that a clearer, uniform, systematic and more easily understandable system of markers would likely alleviate some of the navigation and boating conflicts that are occurring with Coast's existing operation. Additionally, the Commission also found conflicts with hunting could be minimized by limiting Coast's operations during the short several week long brant hunting season.

The Commission required, through Special Condition 11 of CDP No. E-06-003-A5, that Coast implement a Mapping and Marking Plan that includes the use of uniform marking stakes or posts that (1) remain visible and above water during maximum tidal heights; (2) are topped with reflective material; (3) identify the side of the stake on which the culture bed is located; and (4) are placed every 200-feet along the outer sides and at each corner of each of Coast's active culture beds. In addition, the plan calls for a method for Coast to develop, consistently update, and distribute digital and hard copy maps of Arcata Bay showing the location of its rafts and culture beds.

In addition, the Commission required the inclusion of Special Condition 12 in CDP No. E-06-003-A5 to require Coast to limit its operations within the areas of the bay with the highest levels of hunting use during the days in which brant hunting is allowed (typically only Wednesdays, Saturdays and Sundays between November 15 and December 15; usually 14 total days).

As reflected in the numerous comments provided over the past several months to Commission staff, the Harbor District, Humboldt County Board of Supervisors, California Department of Fish and Wildlife and the U.S. Army Corps of Engineers, however, significant concerns remain about the proposed project's potential to adversely affect recreational uses on Arcata Bay and the impacts resulting from Coast's existing operation. As described above, the primary issues raised are concerns about navigational safety, disturbance, and lost use of recreational areas due to the installation of cultivation gear.

While the Commission found that Special Conditions 11 and 12 of CDP No. E-06-003-A5 were adequate to address the ongoing conflicts between Coast's existing operation and public recreational uses of Arcata Bay, this finding was opposed by recreational users at that time and additional information provided to Commission staff subsequently has substantiated this opposition. Additionally, Coast's proposal to expand its operations by nearly 2/3 raises additional conflicts and would result in a variety of adverse impacts to water-oriented recreational uses on Arcata Bay, despite the avoidance and minimization measures provided through the two special conditions described above.

Specifically, the proposed project would result in the placement of over 60 acres of new cultivation gear within some of the most heavily used and important recreational access pathways into the central portion of the bay. In particular, the five proposed ~10 acre basket on longline cultivation beds proposed within the south eastern corner of the bay (shown with the red and white checkered pattern in **Exhibit 2b**) and the southernmost bed in the Mad River growing area (labeled in light green as "2-3") proposed in Phase I of Coast's expansion would be placed across two of the three

primary access routes (indicated with the large blue arrows in the figure on the previous page) used by recreational boaters and hunters. Although Coast is also proposing to remove 42 acres of existing cultivation beds during Phase I, these beds would be located in the Sand Island area in the central portion of the bay and their removal would not be expected to provide a benefit to recreational use if access to that area is restricted by cultivation beds around the periphery of the bay. These access impediments would worsen in Phase II of Coast's proposal as a nearly continuous row of cultivation beds would be installed to between the Bird Island and Mad River growing areas (as shown with the green and pink striped areas in **Exhibit 2c**). Based on the extensive concerns expressed by members of the public to the Harbor District, Army Corps of Engineers, and Commission staff over the past several months, the effect that the installation of these cultivation beds would have on recreational use and access to the bay would be severe.

Contributing to the magnitude of this effect would be the type of cultivation gear proposed to be installed within these beds. The majority of these areas are proposed to support basket on longlines. With a line height of approximately three feet and a post height of over five feet, this is the highest type of gear that Coast uses. As noted in the comments from Mr. Brandenburg included above, the height of the cultivation gear directly affects the severity of its impact on navigation because the higher the gear is, the greater the tidal height must be to allow safe passage over or among it. Because Arcata Bay is such a shallow water body, those types of elevated tidal heights are often sporadic and limited in duration. Therefore, in addition to the recreational impacts from the proposed continuation of Coast's existing operation, the proposed installation of over 200 acres of new cultivation beds would be expected to effectively preclude recreational use from occurring in a significant portion the bay. This loss of recreational opportunities and access is in sharp contrast to the provisions in Sections 30210 and 30220 of the Coastal Act that require the protection of coastal areas suited for water-oriented recreational activities and maximum access and recreational opportunities to be provided for all people. This conflict is heightened because the majority of areas within Arcata Bay that Coast would make use of for its operations is held in public trust. As noted by staff of the California State Lands Commission in its January 19, 2017 letter to the Harbor District, this means that additional consideration needs to be made for the project's potential to adversely affect recreational uses:

The proposed Project is located on sovereign lands legislatively granted in trust to the District to operate pursuant to its granting statutes and the common law Public Trust Doctrine... The District may determine a lease is required by public convenience and necessity only if it finds the use is (1) reasonably required to promote area growth and does not adversely affect the environment or ecology of the area to any substantial degree and (2) will not produce an unreasonable burden on the natural resources and aesthetics of the area, on the public health and safety, and on air and water quality in the vicinity, or on parks, recreational or scenic areas, historic sites or buildings, or on archeological sites in the area. (Section 24 (g) of Chapter 1283.)

To address this conflict, the Commission is requiring in Special Condition 2 that Coast be limited to a maximum footprint of 411 acres - made up of the proposed Phase I expansion areas only. This requirement would eliminate the nearly continuous row of basket on longline cultivation beds proposed along the corridor that separates the Bird Island and Mad River growing areas. However, recreational access into the bay would also be adversely affected by roughly 60 acres of the cultivation beds that would be installed in Phase I as well. To address these areas, the Commission is requiring in Special Condition 3 that the cultivation bed at the southern end of the Mad River

growing area - bed MR 2-3 - be relocated to the Bird Island area. Additionally, Special Condition 5 would require that approximately 25 foot wide access channels be provided between several of the proposed east bay beds and that these channels be placed over existing tidal channels that bisect this area. These existing tidal channels are what recreational boaters often use to transit through this area and with the requirement in **Special Condition 15** that Coast develop a revised bed marking and mapping plan (similar to the one described above a part of CDP No. E-06-003-A5 but updated to include the proposed expansion areas) that includes identification and deliberation of these channels, continued use of these channels by recreational boaters is expected to be facilitated.

In addition, to address the concerns raised by the recreational hunting community about disturbance from Coast's on water operations and vessel use, a modified version of the requirement from Special Condition 11 of CDP No. E-06-003-A5 would be carried forward as **Special Condition 16** to limit Coast's operations within the bay during the days in which brant hunting is allowed (typically only Wednesdays, Saturdays and Sundays between November 15 and December 15; usually 14 total days). Although this limitation would severely restrict Coast's operations during this time of the year, the timing and duration of this restriction would be very limited.

As a final measure to ensure that Coast's 411 acres of expanded operations are carried out in a way that adequately protects the bay for water-oriented recreational activities, **Special Conditions 3 and 17** would require the removal of roughly 11 acres of existing cultivation beds from within the far eastern portion of Arcata Bay (the area circled in orange on the figure above) that is one of the highest priority use areas for recreational hunting on Arcata Bay. Based on correspondence submitted to Commission staff, the eastern portion of Arcata Bay from which these cultivation beds would be removed "is of critical importance to recreational hunting because it is where the majority of traditional, historic waterfowling occurs in North Humboldt Bay" and during the hunting season, it is estimated to support a minimum of 50 hunters per day.

Conclusion

Under this coastal development permit, Coast will be able to expand its aquaculture operations to 411 acres, consistent with Coastal Act Section 30222.5. And with implementation of **Special Conditions 2, 3, 4, 15, 16 and 17**, the Commission finds the proposed project consistent with Sections 30210 and 30220 of the Coastal Act.

H. ATTORNEYS COSTS AND FEES

Coastal Act section 30620(c)(1) authorizes the Commission to require applicants to reimburse the Commission for expenses incurred in processing CDP applications. *See also* 14 C.C.R. § 13055(e). Thus, the Commission is authorized to require reimbursement for expenses incurred in defending its action on the pending CDP application. Therefore, consistent with Section 30620(c), the Commission imposes Special Condition 27, requiring reimbursement of any costs and attorneys fees the Commission incurs "in connection with the defense of any action brought by a party other than the Applicant/Permittee ... challenging the approval or issuance of this permit."

I. CALIFORNIA ENVIRONMENTAL QUALITY ACT

Section 13096 of the California Code of Regulations requires Commission approval of a coastal development permit application to be supported by a finding showing the application, as conditioned 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 a

9-15-1931 (Coast Seafoods Company)

proposed development from being approved if there are feasible alternatives or feasible mitigation measures available which would substantially lessen any significant adverse effect which the activity may have on the environment.

As conditioned, there are no feasible alternatives or additional feasible mitigation measures available which would substantially lessen any significant adverse effect which the activity may have on the environment. Therefore, the Commission finds that the proposed project, as conditioned to mitigate the identified impacts, is the least environmentally damaging feasible alternative and complies with the applicable requirements of the Coastal Act to conform to CEQA.

Appendix A – Adaptive Management Scenarios

Between the collection of baseline eelgrass data and the collection of year one post-installation and post-removal eelgrass monitoring data, Coast may install new cultivation equipment on up to 82.64 acres of expansion cultivation beds and, consistent with **Special Conditions 3 and 13**, shall remove existing cultivation equipment from within 34 acres of existing cultivation beds.

One Year of Monitoring Results

Once the results of the first year of post-installation and post-removal eelgrass and brant monitoring data are available, the Executive Director shall consider Coast's condition compliance and marine debris management and determine if Coast shall carry out additional expansion, halt expansion until another year of monitoring data is available, or remove additional cultivation equipment, as described below:

- I. The Executive Director shall provide written confirmation to Coast that further expansion may occur if, based on the information described above, the Executive Director determines that: (1) in all of the expansion beds, no loss of eelgrass vegetated cover and no more than 25% reduction in eelgrass density beyond pre-project conditions occurred when compared to appropriate reference sites and measured using the upper limit of the confidence interval around the mean of replicate density measurements (for example, a reduction in density of $20\% \pm 10\%$ would exceed this threshold because the upper limit would be a 30% reduction and would be greater than the 25% limit); (2) within the areas from which longlines were removed, measurable recovery and expansion of eelgrass density and/or percent vegetative cover has occurred, when compared to appropriate reference sites; (3) brant "bed-foraging" on eelgrass inside cultivation beds occurred at a minimum of the same level as foraging occurred outside cultivation beds; (4) Coast is in compliance with all other special conditions of its coastal development permit; and (5) Coast has successfully implemented measures to both significantly reduce the loss of aquaculture gear (in particular, cultivation baskets) from its operation and increase the effectiveness of recovery efforts.

- II. The Executive Director shall not provide written confirmation and Coast shall not carry out any expansion beyond the installation of oyster cultivation equipment in 82.64 acres of expansion beds prior to the review of the results of a second year of "post-installation" and "post removal" data if, based on the information described above, the Executive Director determines that (1) in the expansion beds, no loss of eelgrass vegetated cover or bed extent occurred but reduction in eelgrass density of between 20% and 25% occurred beyond pre-project conditions when compared to appropriate reference sites and measured using the upper limit of the confidence interval around the mean of replicate density measurements; or (2) within the areas from which longlines were removed, no measurable recovery and expansion of eelgrass density and/or percent vegetative cover occurred, when compared to appropriate reference sites; or (3) brant "bed-foraging" on eelgrass inside cultivation beds occurred but was lower than the level of foraging that occurred outside cultivation beds; or (4) Coast is out of compliance with one or more special conditions of its coastal development permit; or (5) Coast has not successfully

implemented measures to both significantly reduce the loss of aquaculture gear (in particular, cultivation baskets) from its operation and increase the effectiveness of recovery efforts.

- III. If the Executive Director determines that any expansion bed(s) or area(s) experienced (1) no brant “bed-foraging” on eelgrass; or (2) a loss of eelgrass vegetated cover or bed extent or a reduction in eelgrass density of greater than 25% occurred beyond pre-project conditions when compared to appropriate reference sites and measured using the upper limit of the confidence interval around the mean of replicate density measurements, Coast shall remove all cultivation gear within those expansion beds or areas. (3) In addition, Coast shall remove all cultivation gear within expansion beds at a ratio of 2:43:1 (expansion area:removal area) for every acre or fraction of an acre within the areas from which longlines were removed that the Executive Director determines experienced a measurable loss or reduction of eelgrass density and/or percent vegetative cover. This ratio is based on the initial installation:removal ratio represented by 82.64 acres installed to 34 acres removed between the collection of baseline monitoring data and the first year of post-installation results. All removal activities described above shall be carried out consistent with **Special Condition 13** and shall be completed within 30 days.

Under Scenario I, upon issuance of the Executive Director’s written confirmation that Coast may proceed with expansion, Coast may install cultivation equipment and oysters within the approximately 31.9 remaining acres of the approximately 114.54 total acres of expansion cultivation beds Coast is authorized to install prior to the submittal and review of the second year of “post-installation” and “post-removal” eelgrass monitoring data in 2019.

Two Years of Monitoring Results

The Executive Director shall review monitoring results from the second year post-installation and post-removal and shall determine if the project is in either Scenario I or III above and Coast may carry out additional expansion (up to the maximum of 165 acres of expansion allowed per **Special Condition 2**) or be required to remove cultivation equipment from expansion beds or areas. If additional expansion may occur, the Executive Director’s shall provide written confirmation to Coast. All removal activities shall be carried out consistent with the requirements of **Special Condition 13**.

Three or more Years of Monitoring Results

Review of monitoring results and adaptive management in years three and beyond shall be carried out as described in **Special Condition 8**.

Appendix B: Detailed Description of Coast's Oyster Cultivation Methods

Longlines

Coast's oyster longline practice (also known as cultch on longline) would involve the placement of nylon or polypropylene ropes on notched PVC stakes that are arranged in 100-foot long rows on the mudflats. Included at regular intervals on the ropes are clusters of empty oyster shells onto which groups of small oysters are seeded. The rope and shell clusters are suspended approximately one foot above the bay bottom. Long-line spacing within Coast's existing operation area varies from bed to bed, but most beds have five long-lines spaced 2.5 feet apart, with a ten-foot space between each group of five lines. As initially required by the Commission through Special Condition 14 of CDP No. E-06-003-A5 and again required through **Special Condition 20** of this permit, those beds within Coast's existing operation that are more densely planted would be required to be reconfigured to meet this spacing. Within Coast's proposed 265 acres of expanded operations, the spacing of longlines would be less dense and would include sets of two lines directly adjacent to one another at different heights and separated from the next set by a ten-foot wide corridor. **Exhibit 3** presents a graphic showing the design of the long-line culture apparatus and the proposed configuration of lines within cultivation beds in both the existing operation area and expansion area.

A crew of six would typically be used to "plant" or install the long-line ropes when the tide is low enough to allow the crew to walk on the bed. Each bed would then be inspected monthly as part of a maintenance survey but would otherwise remain untouched for roughly 18 to 36 months until the bed is ready for harvest. A bed inspection or maintenance survey would typically involve one or two people walking a small portion of the bed at low tide or floating over it at higher tides to verify that lines are in the stake notches and suspended above the bay bottom. During these inspections, lines that have collapsed would be restored and loose gear or debris would be removed.

Long-line beds are proposed to be harvested by Coast at 18 to 36 months, using one of two harvest methods. Hand-picking would involve walking each longline in the bed at low tide, cutting the line by hand into small lengths around the clumps of oysters and filling 20-bushel tubs with the oysters and lengths of rope. These tubs would be temporarily stored on the mudflat between tidal cycles during harvest. The second method would use a long-line harvester and would involve positioning a scow over the bed at high tide, then pulling the lines into the floating scow either by hand or by means of a hydraulically-operated roller. Whenever feasible, the long-line harvester would not come into contact with the bay bottom while harvesting long lines.

Baskets

For the past several years, Coast has also been cultivating oysters within its existing operation using a basket on longline technique. Coast carried out an unpermitted conversion of several acres of its operation to this technique and later followed Commission staff direction to seek an after-the-fact CDP amendment to authorize its use. The Commission approved this amendment (E-06-003-A1) in 2013 for the use of 492 individual baskets on 10.86 acres. In Phase I of its proposed project, Coast now proposes to significantly expand use of this cultivation method and would implement it in approximately 72 acres of its proposed expansion area as well as in 29 acres of its existing operation (by continuing to use the existing 11 acres and converting an additional 18 acres from traditional longlines to baskets on longlines). Basket on longline culture would involve the use of 100-feet of enclosed monofilament line stretched between metal stake anchors and elevated above the substrate by two-inch diameter PVC pipe posts installed every 10-feet. Plastic mesh baskets (roughly two-feet long by one-foot wide) filled with oysters would be hung from the

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monofilament line with plastic clips and held one-foot above the substrate. Each 100-foot longline would support 40 baskets and the lines would be arranged in one of two configurations (as shown in **Exhibit 3**): (1) groups of three lines spaced three-feet apart and separated from the next group of three lines by a 20-foot wide corridor; or (2) groups of two lines spaced nine feet apart and separated from the next group of two lines by a 16-foot wide corridor. The more dense configuration with groups of three lines would be limited to the 10.6 acres of Coast's existing operation that are currently planted this way. The other 90.4 acres (72 new acres + 18.4 acres converted from 2.5 foot spaced longlines) in which basket culture is proposed to be used would be installed with the more widely spaced two line configuration.

In its proposed Phase II, Coast has proposed to install either longlines or baskets on longlines on 91 additional acres.

Based on Coast's estimates, planting, harvest, inspections, and maintenance activities would be approximately six times more frequent for the basket lines compared to traditional longlines. Coast estimates, however, that many of these visits would be carried out from a boat during higher tides. Roughly every four months, Coast would remove the baskets for sorting and harvest. The lines and stakes would remain in place during harvest.

Appendix C: Substantive File Documents

Coastal Development Permits and Application Materials:

Project File for Coastal Development Permit number E-02-005-A6

Project File for Coastal Development Permit number E-06-003-A5

Project File for Coastal Development Permit number 9-15-1931

Revised Staff Report for Coastal Development Permit number 1-96-69

Notice of Immaterial Permit Amendment for Coastal Development Permit number E-02-005-A1

California Coastal Commission, Final Adopted Findings for Coastal Development Permit number E-06-003, 2006

California Coastal Commission, Final Adopted Findings for Coastal Development Permit Amendment Application number E-06-003-A1

California Coastal Commission, Final Adopted Findings for Coastal Development Permit number E-02-005-A2, 2012

California Coastal Commission, Final Adopted Findings for Coastal Development Permit Amendment Application numbers E-06-003-A5 and E-02-005-A6

Environmental Documents:

Humboldt Bay Harbor, Recreation, and Conservation District, *Final Environmental Impact Report for Coast Seafoods Company Humboldt Bay Shellfish Aquaculture Permit Renewal and Expansion Project Humboldt County, California, February 2017. + Appendices.*

Humboldt Bay Harbor, Recreation, and Conservation District, *Recirculated Draft Environmental Impact Report for Coast Seafoods Company Humboldt Bay Shellfish Aquaculture Permit Renewal and Expansion Project Humboldt County, California, July 2016. + Appendices.*

Confluence Environmental Company and Plauché & Stock, LLP, *Draft Mitigated Negative Declaration and Initial Study for Coast Seafoods Company Clam Raft Expansion Project, December 2011.*

Confluence Environmental Company, *Clam Raft Expansion – Biological Evaluation, April, 5, 2012.*

California Department of Fish and Game, Letter to Humboldt Bay Harbor, Recreation and Conservation re: Recirculated Draft Environmental Impact Report for the Coast Seafoods Company Humboldt Bay Shellfish Aquaculture Permit Renewal and Expansion Project (SCH# 2015082051), September 16, 2016 and enclosure.

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