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STAFF REPORT AND RECOMMENDATION
COASTAL DEVELOPMENT PERMIT APPLICATION

CDP Application No.:	**E-06-003**
Applicant:	**Coast Seafoods Company**
Project Location:	300 acres of tidelands in various locations in Arcata Bay (northern Humboldt Bay) in the County of Humboldt.
Project Description:	Plant, grow, and harvest off-bottom oyster culture on approximately 255 acres; complete conversion (from bottom culture) and plant, grow, and harvest off-bottom oyster culture on approximately 45 acres; operate a nursery area, FLUPSY, and wet storage floats.
Substantive File Documents:	See Appendix A

SUMMARY

Coast Seafoods Company ("Coast") proposes to plant, culture and harvest oysters on 300 acres in the northern part of Humboldt Bay (hereinafter "Arcata Bay"). Coast currently produces oysters using off-bottom culture techniques (primarily long-line with some rack-and-bag) on 255 acres. Coast is seeking after-the-fact authorization for this activity. Coast also proposes to renew oyster culture operations on an additional 45 acres, in locations previously used for bottom culture. Finally, Coast is seeking after-the-fact authorization for the operation of a nursery area, a Floating Upwell System ("FLUPSY"), and wet storage floats.

In the 1950's, Coast began commercial bottom culture of Pacific oysters in Arcata Bay. Originally a bottom-culture-only operation, in the 1960's and 1970's Coast began employing various off-bottom culture methods that would reduce the environmental impacts of Coast's operations. The last bottom-cultured oysters were harvested in 2001, and currently Coast cultures oysters using only off-bottom methods.

In April 1997 Coast requested authorization for its operations from the Army Corps of Engineers ("Corps") under Nationwide Permit 4. The Corps ultimately decided to address Coast's operations through an individual permit under the Clean Water Act and the Rivers and Harbors Act of 1899. Also during this time, Commission staff engaged in discussions with Coast regarding Coast's permit obligations under the Coastal Act. Between 2001 and 2003, Commission staff: 1) received and began preliminary review of a coastal development permit ("CDP") application, which was withdrawn in 2003, 2) initiated an enforcement investigation, which is currently on hold pending the outcome of the CDP application that is the subject of this report, and 3) received and began preliminary review of a Claim of Vested Right, which was never adjudicated by the Commission.

In 2003, Coast submitted an updated permit application to the Corps, and later agreed to obtain a coastal development permit to satisfy its obligations under the California Coastal Act and the federal Coastal Zone Management Act ("CZMA"). Through submittal of this CDP application, Coast seeks to satisfy its obligations both under the California Coastal Act and the federal CZMA.

Coast's oyster culture operations have the potential to adversely affect marine resources and the biological productivity of coastal waters in Arcata Bay, by potentially causing adverse impacts to eelgrass, Pacific herring, listed salmonids, and essential fish habitat. Coast has consistently held the position that an environmental impact analysis of Coast's current operations should use the condition of the Bay during bottom culture operations as the environmental baseline. Coast's current operations – off-bottom culture on 300 acres – are less environmentally damaging than its historical bottom culture operations. According to Coast, therefore, implementation of the proposed project will result in a net benefit to the environment, as compared to environmental baseline conditions.

Commission staff agrees that Coast's current off-bottom culture operations result in improved environmental conditions as compared to on-bottom culture methods. However, staff does not

agree that historic conditions caused by bottom culture constitute the environmental baseline against which the effects of off-bottom culture should be assessed. The environmental baseline is the condition that would exist if Coast were not conducting oyster culture of any kind in Arcata Bay.

Eelgrass provides a variety of essential ecosystem functions, and is a species of special biological significance under the meaning of Section 30230 of the Coastal Act. As discussed in detail in the Marine Resources section of this report, the proposed project will likely result in a loss of approximately 137 acres of eelgrass in Arcata Bay. In addition, future planting in Coast's East Bay Management Area will cause adverse impacts to 23 acres of key herring spawn habitat. Losses to eelgrass also have the potential to cause adverse impacts to designated critical habitat for listed salmonid species (coho and Chinook salmon, and steelhead), and essential fish habitat for managed fish species.

Discussions with staff from the California Department of Fish and Game indicate that past eelgrass restoration efforts in Humboldt Bay have met with very limited success. Commission staff is therefore recommending that eelgrass restoration is not an appropriate mitigation option for this project. The applicant has proposed several measures that will avoid, reduce, or compensate for adverse impacts caused by the proposed project. Commission staff believes that while these measures will reduce effects, they will not adequately mitigate for adverse impacts. Commission staff is recommending that the Commission require **Special Condition Nos. 1 through 8** (see pages 39 to 43 of this report).

These conditions include:

- <u>Coast transferring 50 acres of the tidelands it owns in Humboldt Bay to an appropriate entity to ensure said transferred tidelands are permanently protected from any development</u>. **Special Condition No. 1** would require that within one year of the issuance of this permit, Coast shall transfer title of 50 acres of its owned tidelands to a public entity with the authority to manage the property in accordance with the public trust. 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.

- <u>A prohibition on future plantings in an area called the East Bay Management Area</u>. **Special Condition No. 2** would require that no future plantings be sited in any known or historic eelgrass habitat within Coast's East Bay Management Area. Prior to planting any oyster culture outside the 255 acres of oyster culture currently in production, Coast shall submit to the Executive Director for review and approval a planting plan that identifies the nature and location of the proposed plantings.

- Payment of $100,000 to the California Coastal Conservancy to be used for salmonid habitat enhancement. The California Coastal Conservancy has dedicated much effort and funding to the protection, enhancement, and restoration of California's coastal salmon populations. **Special Condition No. 3** would require Coast to pay $100,000 to the California Coastal Conservancy, to 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 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. Payment by Coast shall be made in two phases: the first $50,000 payment shall be made prior to issuance of this permit, and the second shall be made within one year of the first payment.

Commission staff believes that Coast's proposed mitigation measures, in combination with the implementation of **Special Condition Nos. 1 through 8**, will reduce impacts to eelgrass, Pacific herring, listed salmonids, and essential fish habitat such that the project can be found consistent with the marine resources policies of the Coastal Act.

Commission staff therefore recommends that the Commission **APPROVE** coastal development permit application E-06-003, as conditioned.

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Click on the link at left to go to the Appendices and Exhibits to the staff report.

Click on this link to see the correspondence associated with this application.

1 STAFF RECOMMENDATION

Approval with Conditions
The staff recommends conditional approval of the permit application.

Motion:

> *I move that the Commission approve Coastal Development Permit E-06-003 subject to conditions set forth in the staff recommendation specified below.*

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

Resolution:

> *The Commission hereby approves the Coastal Development Permit 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.*

2 STANDARD CONDITIONS

This permit is subject to the following standard conditions:

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

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

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

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

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

3 SPECIAL CONDITIONS

This permit is subject to the following special conditions:

1. **Title Transfer**. Within one year of the issuance of this permit, the applicant 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 the applicant is unable to transfer title to one of the three entities listed, the applicant shall apply for an amendment to this permit from the Commission.

2. **Planting Location**. 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, shall be sited in any known or historic eelgrass habitat within Coast's East Bay Management Area (as identified on Exhibit 2). 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), the applicant 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.

3. **Eelgrass Mitigation Funds**. The applicant shall pay to the California Coastal Conservancy the amount of one hundred thousand dollars ($100,000) for the purpose of defraying, in whole or in part, the cost of an anadromous fish habitat enhancement project or projects in the Humboldt Bay watershed. Payment shall be made in two phases: 1) <u>prior to issuance of this permit</u>, 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). The applicant 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 the Conservancy.

4. **Feasibility Study**. The applicant shall conduct on areas within the applicant's 300-acre operational footprint that are at an elevation above +1.5 feet MLLW (i.e., at an elevation

typically considered unsuitable for eelgrass growth) a study to evaluate the feasibility of culturing oysters on such lands in Humboldt Bay. 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), the applicant shall submit to the Executive Director for review and approval a methodology for the performance of such a study/evaluation. If no portion, or an insufficient portion (as determined by the study methodology), of the applicant's 300-acre operational footprint contains areas above +1.5 ft MLLW, the applicant shall within two years of the issuance of this permit apply for a coastal development permit to conduct such a study on other such land owned or leased by the applicant.

5. **Permit Term Limit.** This permit shall expire ten years from the date of permit approval. Extension of the term of the permit shall require a permit amendment from the Commission.

6. **Annual Report**. By December 1 of each year, the applicant shall submit to the Executive Director an annual report describing the status of each bed within the 300-acre operation footprint.

7. **Boat Transit**. During maintenance and harvesting of oysters, boat transit areas shall be limited to areas devoid of eelgrass as much as is practicable. To the extent practicable, the applicant's personnel shall use the same areas to moor their boats in order to minimize the amount of propeller scarring in eelgrass habitat.

8. **Plot Abandonment**. Within 30 days of harvest on any plot that is being abandoned, or taken out of production for one year or more, the applicant shall remove all oyster culture apparatus from that plot, including but not limited to stakes, racks, and pallets.

4 FINDINGS AND DECLARATIONS

The Commission finds and declares as follows:

4.1 Project Background

4.1.1 History[1]

In the 1950's, Coast Seafoods Company ("Coast"), formerly Coast Oyster Company, began commercial bottom culture of the non-native Pacific oyster (*Crassostrea gigas*) in the northern part of Humboldt Bay (hereinafter "Arcata Bay"). Within Arcata Bay, Coast currently owns 560.9 acres of tidelands, and leases 3,384.5 acres from the Humboldt Bay Harbor Recreation and

[1] The historical narrative included in this section is compiled from environmental analysis documents submitted by Coast and other government agencies, including Jones & Stokes (2004), NMFS (2005a), and Jones & Stokes (2006c). As discussed in Section 4.1.3: Vested Right Claim, below, the exact nature and extent of Coast's historical oyster culture operations has not been formally determined by the Commission.

Conservation District ("Harbor District"), the City of Arcata, and the Karamu Corporation. Coast holds a total of 3,945.4 acres in Arcata Bay.

Originally a bottom-culture-only operation, in the 1960's and 1970's Coast began employing various off-bottom culture methods (including stake, rack-and-bag, and long-line culture). Although Coast continued its emphasis on bottom culture until the mid-1990's, Coast has continually cultured the non-native Kumamoto oyster (*C. sikamea*) on long-lines since the 1970's. In approximately 1997, Coast engaged in discussions with various government agencies about operational changes that would reduce the environmental impacts of Coast's operations. The primary change discussed was a transition to off-bottom culture methods, and in accordance with these discussions, Coast began a transition to off-bottom culture in the summer of 1997. The last bottom-cultured oysters were planted in 1999 and harvested in 2001; currently Coast cultures oysters using only off-bottom methods.

As part of Coast's transition to off-bottom culture, the Harbor District conducted a review of Coast's operations under the California Environmental Quality Act. The review resulted in a certified Mitigated Negative Declaration and an operational permit issued in 1999. The Harbor District established a Mariculture Monitoring Committee ("MMC"), to study the effects of oyster culture on the ecology of Humboldt Bay, and advise the Harbor Commission on projects involving aquaculture. Several studies have been conducted since the MMC was established, including a study on potential impacts to shorebirds, salmonids' use of eelgrass meadows, and a study by the Western Regional Aquaculture Center ("WRAC") on the effects of long-line culture on eelgrass (see Section 5.2: Marine Resources.)

Also as part of the transition process, in April 1997 Coast requested authorization for its operations from the Army Corps of Engineers ("Corps") under Nationwide Permit 4. The Corps ultimately decided to address Coast's operations through an individual permit under the Clean Water Act and the Rivers and Harbors Act of 1899. In January of 1998 the National Marine Fisheries Service ("NMFS") submitted comments to the Corps expressing concern over the impacts of bottom culture methods. NMFS also described to the Corps its obligations under the federal Endangered Species Act and the Magnuson-Stevens Fishery Conservation and Management Act. A detailed account of the federal regulatory history is included in Section 4.1.5: Federal Regulatory History and Requirements below.

During this time, Coastal Commission staff was engaged in discussions with Coast regarding Coast's permit obligations under the Coastal Act. Between 2001 and 2003, Commission staff: 1) received and began preliminary review of a coastal development permit application, 2) initiated an enforcement investigation, and 3) received and began preliminary review of a Claim of Vested Right. Each of these efforts is described in more detail in the sections below.

In 2003 Coast submitted an updated permit application to the Corps. NMFS has completed formal consultation on the Corps permit, and the Corps has circulated a draft permit. On January 31, 2006, Coast submitted to the Commission a coastal development permit ("CDP") application (No. E-06-003) for the same development activity as that proposed in Coast's application to the

Corps. As described below, approval of the CDP application will satisfy Coast's obligations both under the California Coastal Act and the federal Coastal Zone Management Act.

4.1.2 Previous Coastal Development Permit Applications

In 1994, Coast applied for a coastal development permit to deposit crushed oyster shell on the bottom of Arcata Bay, to firm up very soft bottom to be used for aquaculture (CDP 1-94-17). This activity is no longer proposed or conducted by Coast. No action was taken by the Commission.

In February, 1996, the Commission granted a coastal development permit waiver (CDP 1-96-002-W) to Coast for development of a clam seed nursery, on the condition that the nursery be removed within one year. Later that year, Coast applied for a CDP to keep the clam seed nursery permanently. The Commission approved this application (CDP 1-96-069) in August, 1997, finding that the clam seed nursery is independent of and not functionally related to Coast's oyster culture operations, and therefore need not be reviewed in conjunction with such operations as part of a single permit application. In April, 2002, the Commission approved an immaterial amendment to CDP 1-96-069, authorizing minor modifications to the clam seed nursery materials and operations (CDP E-02-005-A1).

Currently, Coast has a valid CDP to operate a permanent clam seed nursery consisting of: 1) a series of ten approximately 12-foot-wide by 20-foot-long aluminum rafts, configured in a single row, and 2) a 20-foot-wide by 27-foot-long floating work platform. The clam seed nursery is located in Arcata Bay approximately ¾ of a mile north of the Samoa Bridge along the west side of the channel.

On May 6, 1999, Coast submitted an application for a CDP to install approximately 3000 feet of bat ray fencing to prevent the predation of bottom-cultured oysters by bat rays. No action on this application was taken by the Commission. The installation of bat ray fencing was included in the project description for CDP application No. E-01-024 (see below), however this activity is no longer proposed or conducted by Coast.

On August 23, 2001, Coast submitted a CDP application for oyster aquaculture in Arcata Bay. After lengthy discussions with Commission staff, Coast clarified its project description to include: 1) bottom culture, long-line culture, and rack-and-bag culture on a total of 500 rotating acres in Arcata Bay, 2) a seed nursery, 3) the FLUPSY, and 4) bat ray fencing to prevent depredation of bottom-cultured oysters from bat rays. This application, CDP E-01-024, was never completed, and in a letter dated April 21, 2003, Coast withdrew the application.

In a letter dated December 8, 2001, Coast requested a permit amendment to CDP E-02-005-A1 to authorize the installation and operation of the FLUPSY. The FLUPSY was eventually included in the project description of CDP E-01-024, and no action on the amendment request was taken by the Commission.

4.1.3 Vested Right Claim

On October 9, 2002, Coast also submitted a Claim of Vested Right ("CVR") pursuant to Section 30608 of the Coastal Act, which provides that:

> *No person who has obtained a vested right in a development prior to the effective date of this division… shall be required to secure approval for the development pursuant to this division; provided, however, that no substantial change may be made in any such development without prior approval having been obtained under this division.*

Agency regulations at CCR §13200 *et seq.* govern the procedures by which a vested right claim is adjudicated, and state in part:

> *Any person claiming a vested right in a development and who wishes to be exempt from the permit requirements of the Act pursuant to Public Resources Code Section 30608 must substantiate that claim in a proceeding before the Commission under this subchapter. In such a proceeding the claimant shall assume the burden of proof.*

Commission staff responded to Coast's CVR by letter on October 29, 2002, requesting clarification and further information regarding Coast's vested right claim as specified in that letter. Coast did not respond to staff's information request. In a letter dated April 21, 2003, Coast withdrew CDP application E-01-024, and requested that staff reactivate the CVR. To date, Coast has not provided the information requested by staff in its October 2002 letter – information that is necessary in order to process the CVR pursuant to agency regulations at CCR §13200 *et seq.* The CVR remains incomplete and no action has been taken by the Commission; Coast's vested right claim therefore remains unadjudicated.

Coast submitted the CVR while still in discussions with Commission staff regarding CDP application E-01-024 and the Commission's enforcement investigation (see below). In correspondence with Commission staff[2], Coast indicated that by pursuing a CDP, Coast was in no way abandoning or waiving its claim to a vested right. Coast's request for Commission action on the CDP application that is the subject of this report similarly reserves Coast's right to pursue the CVR at a later date.

4.1.4 Alleged Coastal Act Violation

To date, Coast's ongoing oyster operations have not been reviewed under State law (i.e., the Coastal Act) and have not received authorization from the Commission, either through a vested right claim or through a coastal development permit. Coast's off-bottom culture operations constitute development as defined by the Coastal Act (PRC §30106), and therefore require either: 1) that the Commission find that Coast has a vested right to conduct oyster culture operations pursuant to Coastal Act Section 30608 and CCR §13200, or 2) that Coast obtain a CDP pursuant to Coastal Act Section 30600.

In 2001, Commission staff initiated an enforcement action directed at Coast's ongoing oyster culture operations. On April 11, 2003, Commission staff sent Coast a Notice of Intent ("NOI") to Commence Cease and Desist Order proceedings. Coast responded to the Commission's NOI by letter on April 21, 2003, withdrawing the pending CDP application and "reactivating" the CVR. On June 30, 2003, the Army Corps of Engineers issued a Cease and Desist Order directed

[2] Letter dated December 17, 2002, from Samuel Plauché, Coast's representative, to John Bowers, CCC.

at Coast's ongoing oyster culture operations. Since that time, the Commission's enforcement action has been on hold, pending the outcome of the Corps' permit action and now the CDP application that is the subject of this report.

4.1.5 Federal Regulatory History and Requirements

Coast's oyster culture operations are subject to the jurisdiction of the Army Corps of Engineers pursuant to the provisions of Section 404 of the Clean Water Act (33 USC §1344) and Section 10 of the Rivers and Harbors Act of 1899 (33 USC §403). In 1997, the Corps issued a Public Notice for an individual permit for Coast, to place oyster seed and apparatus used for bottom and off-bottom oyster culture on 500 acres in Arcata Bay, and to harvest the oysters using hydraulic dredging and hand-picking. In January 1998, NMFS submitted a comment letter to the Corps expressing concern over the impacts of bottom culture methods, and making recommendations designed to reduce the impacts of Coast's operations on eelgrass, salmon and steelhead. NMFS indicated that incidental take of threatened SONCC coho salmon and NC steelhead might result from Coast's operations, and recommended that the Corps initiate Section 7 consultation pursuant to the federal Endangered Species Act.

On June 28, 2002, the Corps requested that Coast submit an updated permit application for existing and proposed oyster culture operations, due to changes in the aquaculture operations since 1997. On August 1, 2002, Coast submitted an updated permit application to the Corps. In a November 18, 2002, letter the Corps notified Coast that the revised permit application was complete for purposes of circulating a Public Notice, but that there was no authorization for ongoing bottom or off-bottom oyster culture operations because previous Corps permits had expired.

On June 30, 2003, the Corps issued a Cease and Desist Order ("CDO") prohibiting any new seeding, nursery, harvesting or other related activities from occurring anywhere in Humboldt Bay. On July 14, 2003, the Corps amended the CDO to prohibit expansion of oyster culture into areas not in operation. Coast submitted a revised permit application in August 2003, and on September 24, 2003, the Corps issued a Public Notice for an individual permit to Coast to plant, grow, and harvest Pacific and Kumamoto oysters on approximately 300 acres of Arcata Bay.

The Corps has conducted formal consultation with NMFS during the individual permit process. On November 10, 2005, NMFS transmitted to the Corps final versions of a *Biological Opinion*, analyzing the proposed project under the federal Endangered Species Act, and an *Essential Fish Habitat Consultation*, analyzing the proposed project under the Magnuson-Stevens Fishery Conservation and Management Act. In the final consultation documents, NMFS made several conservation recommendations intended to reduce the impacts of the proposed project on critical habitat and essential fish habitat in Arcata Bay. The Corps has circulated a draft permit dated January 23, 2006, that incorporates some, but not all, of the conservation recommendations proposed by NMFS.

As discussed in more detail below, 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. The Corps' draft permit is for a ten-year term. If that permit is issued, and if Coast applies for a new individual permit from the Corps in ten years, the new Corps permit will be subject to the Commission's federal consistency review authority under the CZMA.

4.1.6 Commission Jurisdiction

Coast's off-bottom culture operations constitute development as defined in Section 30106 of the Coastal Act. Specifically, the placement of pallets and seed bags in the nursery area, polyvinyl chloride ("PVC") stakes for long-line culture, and metal racks for rack-and-bag culture, as well as the anchoring of wet storage floats, constitute "the placement or erection of any solid material or structure." Moreover, oyster culture operations, including long-line culture, rack-and-bag culture, a nursery area, the FLUPSY, and the wet storage floats constitute "a change in the density or intensity of use of land," and "a change in the intensity of use of water."

Coast's ongoing oyster culture operations therefore require either: 1) that the Commission find that Coast has a vested right to conduct oyster culture operations pursuant to Coastal Act Section 30608 and CCR §13200, or 2) that Coast obtain a coastal development permit pursuant to Coastal Act Section 30600. Coast acknowledges both directly in correspondence[3], and indirectly through previous CDP applications, that Coast's CVR, even if granted by the Commission, would not extend to "substantial changes" that Coast has made to its historic operations over the years, such as the FLUPSY. The standard of review for a CDP application is the Chapter 3 resource policies of the Coastal Act (PRC §§30200-30265.5).

As discussed above, Coast's ongoing oyster culture operations also require a federal permit from the Army Corps of Engineers pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. Permits issued pursuant to these two federal laws are "listed" in California's federally-approved Coastal Management Program. Coast's operations are therefore subject to the consistency review requirements of Section 307(c)(3)(A) of the CZMA. Coast's obligations under federal law (i.e., the CZMA), on the one hand, and under State law (i.e., the Coastal Act), on the other, are separate and distinct from one another. The standard of review for federal consistency is the enforceable policies of the California Coastal Management Program, of which the substantive policy component is the Chapter 3 resource policies of the Coastal Act.

The CDP application currently before the Commission therefore serves to address Coast's obligations both under State law, i.e., the permitting requirements of Section 30600 of the Coastal Act, as well as under federal law, i.e., federal consistency certification and concurrence requirements of Section 307(c)(3)(A) of the CZMA. Approval by the Commission does not obviate the need for Coast to obtain other federal, State or local authorizations as required by law.

4.2 Project Description

Coast Seafoods Company proposes to continue its off-bottom culture on approximately 255 acres and complete the conversion of approximately 45 acres from bottom culture to off-bottom

[3] Letter dated April 21, 2003, from Samuel Plauché, Coast's representative, to Abe Doherty, CCC.

culture, for a total fixed operational footprint of 300 acres of its owned and leased tidelands.[4] Off-bottom culture includes both long-line and rack and bag culture methods, as described below and in Exhibit 3: Bed Status Table. Exhibit 2 shows the location of current and proposed beds. Coast Seafoods will also continue to use its nursery area, operate a floating upwell system ("FLUPSY"), and use wet storage floats. Existing clam rafts are permitted under coastal development permit E-02-005-A1. Exhibits 4-7 provide graphics depicting long-line culture, rack and bag culture, the FLUPSY, and wet storage floats. Exhibit 8 provides photographs of various elements of Coast's oyster culture operations.

The proposed 300-acre footprint is subdivided as follows:

- 238.08 acres are currently and will continue to be planted with long-line culture of Pacific (*Crassostrea gigas*) and Kumamoto (*C. sikamea*) oysters. The long lines will be spaced at 2.5 feet.
- 45.49 acres are proposed for conversion of plots previously used for bottom culture (now lying fallow in accordance with the Corps-issued Cease and Desist Order) to off-bottom culture. Exhibit 2 depicts possible locations for these plots, but the precise location will be determined by the Humboldt Bay Recreation and Conservation District ("Harbor District"), based on a recommendation by the Humboldt Bay Mariculture Monitoring Committee.
- 11.23 acres - Rack and bag culture of primarily Kumamoto oysters
- 4.81 acres - Nursery area
- .04 acres - FLUPSY
- .04 acres - Wet storage floats
- .31 acres - Clam rafts (permitted under CDP E-02-005-A1).

4.2.1 Operations

Coast currently employs two types of off-bottom culture: long-line and rack-and-bag. For long-line culture, seed is delivered from the hatchery in Quilcene, Washington to Coast's operations in Humboldt, where it is placed in the intertidal nursery prior to being attached to lines and planted on the long-line beds. For rack-and-bag culture, single seed (i.e., seed not on a cultch) arrives from the hatchery and is placed in the FLUPSY prior to being moved to the rack and bag areas. Additionally, Coast operates wet storage floats and clam rafts.

Nursery

Coast transports oyster seed for long-line culture by truck from Quilcene, Washington, and places bags of seen in the intertidal nursery near Gunther Island. Seed is stacked on pallets and left to mature for approximately two to three months, at which time it is removed from the

[4] Since the Corps' CDO went into effect, Coast has been prohibited from planting any beds outside the 255 acres currently in production. Coast's proposal is, in effect, to plant 45 acres of new long-line culture on beds which have historically been used for oyster culture, but are now lying fallow as a result of the Corps' CDO.

nursery in small batches and brought to the processing plant. At the plant, individual pieces of cultch are braided into the long-line rope, bagged, then transported back to the bay for planting.

Long-Line Oyster Culture

Exhibit 4 presents a graphic depicting long-line culture apparatus. Seeded long-lines are planted on notched PVC stakes that are arranged in rows on the mudflats, suspending the oyster seed approximately one foot above the bay bottom. Long-line spacing 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. Some beds have long-lines spaced 2.5 feet apart over the entire bed. The applicant proposes to use lines at 2.5-foot spacing on all beds, with the exception of the multiple-spaced beds planted at the request of the MMC or as a part of the WRAC study.

A crew of six typically plants the long-lines when the tide is low enough to allow the crew to walk on the bed. Each bed is inspected monthly, and apart from the inspection virtually no activity occurs at the bed until harvest. A bed inspection typically involves one or two people walking the bed at low tide.

Long-line beds are usually harvested at 18 to 36 months, using one of two harvest methods. Hand-picking involves walking the bed and filling 20-bushel tubs by hand at low tide. Harvest with a long-line harvester involves 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 does not come into contact with the bay bottom while harvesting long lines.

Rack and Bag Oyster Culture

Exhibit 5 presents a graphic depicting rack-and-bag culture apparatus. Single-seed oysters are grown in rack-and-bag culture for the shellstock market, and are eventually sold to the consumer as “oysters on the half shell.” Coast also uses rack and bag culture to allow oysters damaged in the production process to repair themselves. After growing to approximately 6mm on the FLUPSY (see below), single-seed oysters are placed in polyethylene mesh bags which are transported to the rack-and-bag beds and attached to a rebar rack by industrial rubber bands.

As the seed grows in the bag, it needs to be graded and thinned by a mechanical grader on the FLUPSY. Approximately three to four times per year, the seed bags are collected from the racks at low tide and placed on a skiff. After grading at the FLUPSY, the seed is rebagged and placed back on the racks at low tide. It takes one to two years for the seed to grow into oysters of market size, at which time the oysters are harvested by hand and brought to the processing plant to be graded and packaged for the market.

FLUPSY (Floating Upwell System)

The FLUPSY is located on the west side of the bay entrance channel, south of the Simpson wood chip loading dock in Fairhaven. It is tied to a dock at the Eureka Boat Yard 200 yards from the shoreline in 20 feet of water. Exhibit 6 presents a graphic depicting the FLUPSY. It is used to nurse single-seed oysters immediately after arrival from the hatchery (approximately 1.4mm) until they are ready to be bagged and planted on racks for rack-and-bag culture (approximately

6mm.) Coast also uses the FLUPSY for clam seed, and to grade single-seed oysters by size, as described above.

Wet Storage Floats

Exhibit 7 presents a graphic depicting the wet storage floats, located in the "cut across" channel between Bird Island and the Mad River. The floats are anchored in approximately 20 feet of water in a series of four 20-foot by 20-foot square wooden frames. Bags of mature oysters, recently harvested and ready for distribution to wholesalers, are temporarily placed in the floats to maintain freshness. Bags of oysters are placed and removed by hand, and transported using a skiff.

4.2.2 Project Parameters

Coast proposes to operate the project in accordance with the follow parameters:

- Coast will submit to the Harbor District by December 1 of each year an annual report describing the status of each bed within the 300-acre operation footprint.
- 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 long-line harvester in such as way as to shade the same area of eelgrass for more than twelve hours.
- Project operations will not take or harass (as defined by the Marine Mammal Protection Act) any marine mammals.
- All oyster culture activities for the plot identified as "Sand Island NK" will remain at least 100 meters from the MHHW line of Sand Island.
- Coast will not discharge feed, pesticides, or chemicals (including antibiotics and hormones) into marine waters.
- Coast will not intentionally deposit shells or any other material on the sea floor. Natural deposition of shells and other materials will be minimized.
- 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 pallasi*) 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 within 24 hours.
- Coast will not engage in any dredging, hydraulic harvesting, "bed cleaning," or other activities with an hydraulic harvester.
- Coast will not conduct on-bottom culture.
- Coast will not use bat ray fencing, and has removed all bat ray fencing previously installed in the Bay.
- 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 lands.

- 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.

4.3 Project Location

Coast's oyster operations are located in the northern part of Humboldt Bay, near the city of Eureka, in Humboldt County. Exhibit 1 shows a vicinity map for the Humboldt Bay area. Exhibit 2: Current and Proposed Oyster Plots provides a map showing beds currently in production, beds that have been abandoned, and beds that are proposed for possible planting. Exhibit 3: Bed Status Table provides a list of all Coast's beds as well as the size and status of each bed. Table 1 below describes the beds Coast currently using for production.

Table 1: Oyster Beds Currently in Production

Bed Name	Acres	Bed Status
Clam Raft	0.31	Clam raft
Flupsy	0.04	Flupsy
BI N k, BI S k, BI W k, EB 4-3, EB 4-3 k, MR 1-3 k, MR 3-2, MR 5-1 k, MR 6-1 k, MR 6-2 k, SI 2-2 k, SI N k	55.94	Kumamoto Beds
AC Nursery, GI Nursery	4.81	Nursery
EB R&B, MR R&B	11.23	Rack and Bag
EB 1-2, EB 2-1, SI 2-1, SI 2-2, BI 1-1, BI 1-2, BI 3-1, BI 3-2, EB 6-1, EB 6-2, EB 6-3, EB 2-3, EB 1-1, GI 1-2, MR 1-1, MR 1-2, MR 6-1, MR Soft 2, AC 1, GI 1-1, MR 3, MR 7-2, MR 8-1	179.99	Pacific Long-Line Beds
EB 2-3	2.15	Pacific Long-Line Bed, WRAC Study Plot
MR Wet Storage	0.04	Wet Storage
Total	**254.51**	

Management Areas: MR – Mad River; SI – Sand Island; BI – Bird Island; GI – Gunther Island; AC – Arcata Channel; EB – East Bay.

In addition to operating on the 254.51 acres described in Table 1 above, Coast is also proposing to complete conversion from bottom culture to off-bottom culture methods on an additional 45.49 acres. Since the Corps' CDO went into effect, Coast has been prohibited from planting any beds outside the 254.51 acres currently in production. Coast's proposal is, in effect, to plant 45.49 acres of new long-line culture on beds which have historically been used for oyster culture but are now lying fallow as a result of the Corps' CDO.

Exhibit 2: Current and Proposed Oyster Plots provides a map showing beds proposed for possible planting. Exhibit 3: Bed Status Table provides a list of the proposed beds, as well as the size and planting priority of each bed. Table 2 below describes the beds that are now lying fallow.

Table 2: Oyster Beds Currently Lying Fallow

Bed Name	Acres	Planting Priority	Bed Name	Acres	Planting Priority
MR 2	6.78	1	SI 4-1	5.49	10
EB 8	5.24	2	EB 3-2	10.69	11
EB 7-2	11.67	3	MR 5-2	6.09	12
EB 7-1	9.86	4	MR 10	7.88	13
MR 11	4.42	5	EB 5-2	6.86	14
MR 9	7.02	6	MR 8-2	6.69	15
SI 3-1	6	7	AC 3	4.64	16
SI 3-2	7.33	8	MR 7-1	10.46	17
EB 5-1	7.14	9	**Total**	**124.26**	

Coast does not propose to complete conversion of all 124.26 available acres; rather, Coast proposes to complete conversion on 45.49 acres and abandon the remaining 78.77 acres. Which beds will be converted and which will be abandoned will be determined by the Harbor District, based on a non-binding recommendation by the MMC.

As shown in Table 2 above, Coast has assigned a planting priority for each bed. If the Harbor District allows Coast to plant according to its planting priority, the following beds will be planted to fill 45.49 acres: MR 2, EB 8, EB 7-2, EB 7-1, MR 11, MR 9, and SI 3-1 (partial).

4.4 Other Approvals

4.4.1 Army Corps of Engineers

As discussed in more detail in Section 4.1.5: Federal Regulatory History and Requirements, Coast's oyster culture operations are subject to the jurisdiction of the Army Corps of Engineers pursuant to the provisions of Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. Coast submitted a permit application to the Corps in August 2003, and on January 23, 2006, the Corps circulated a draft individual permit for Coast's operations. The Corps conducted formal consultation with NMFS during the individual permit process. In the final consultation documents, NMFS made several conservation recommendations intended to reduce the impacts of the proposed project on essential fish habitat in Arcata Bay. The Corps' draft permit incorporates some, but not all, of the conservation recommendations proposed by NMFS.

4.4.2 California Water Quality Control Board

Coast's operations require a certification under Section 401 of the Clean Water Act (33 USC 1341). The North Coast Regional Water Quality Control Board issued a 401 certification on

April 25, 2002, for the project as envisioned in 2001, namely bottom and off-bottom oyster culture operations on 500 floating acres in Arcata Bay. In June 2005, the Regional Water Board confirmed that the current project – off-bottom culture operations on 300 acres – is covered under the 2002 certification order.

4.4.3 California Department of Fish and Game

Coast's aquaculture operations are required to be registered annually with the California Department of Fish and Game. Coast has a valid registration for 2006.

4.4.4 Humboldt Bay Harbor Recreation and Conservation District

Coast's aquaculture operations are subject to the permitting authority of the Humboldt Bay Harbor Recreation and Conservation District ("Harbor District"). On December 2, 1999, the Harbor District issued Permit No. 1998-3, which authorized bottom and off-bottom oyster culture operations on 500 floating acres in Arcata Bay. This permit is current, and valid until December 2, 2006. Coast is in the process of applying for a new permit with Harbor District as a result of modifications Coast has made to its operations since 1999, including reducing the overall operational footprint from 500 to 300 acres, and converting all bottom culture to off-bottom culture techniques. The Harbor District is expected to act on the new permit later in 2006.

5 COASTAL ACT ISSUES

5.1 Aquaculture

Section 30100.2 of the Coastal Act states:

> *"Aquaculture" means a form of agriculture as defined in Section 17 of the Fish and Game Code. Aquaculture products are agricultural products, and aquaculture facilities and land uses shall be treated as agricultural facilities and land uses in all planning and permit-issuing decisions governed by this division.*

Section 30222.5 of the Coastal Act states:

> *Ocean front 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.*

The proposed project is an aquaculture project within the meaning of Section 30100.2 of the Coastal Act. As discussed elsewhere in this report, staff recommends conditional approval of the proposed project, consistent with the "coastal dependent use" requirements of Section 30222.5 of the Coastal Act.

5.2 Marine Resources

Section 30230 of the Coastal Act states:

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

Section 30231 of the Coastal Act states:

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

Coast's oyster culture operations have the potential to adversely affect marine resources and the biological productivity of coastal waters in Arcata Bay, by potentially causing adverse impacts to eelgrass, Pacific herring, listed salmonids, essential fish habitat, marine birds, and marine mammals.

5.2.1 Environmental Baseline

Coast has consistently held the position that any analysis of impacts from off-bottom oyster culture operations must take as its starting point the condition of the Bay during bottom culture operations.[5] Coast states that current off-bottom culture operations take place in areas that have been used for over fifty years for oyster cultivation, primarily bottom culture. Coast therefore argues that the effects of oyster bottom culture should be the baseline condition against which the effects of Coast's current proposal are assessed. As discussed below, Coast's current operations – off-bottom culture on 300 acres – are less environmentally damaging than its historical bottom culture operations. According to Coast, therefore, implementation of the proposed project will result in a net benefit to the environment, as compared to environmental baseline conditions.

The Commission agrees that the reduction in footprint and completion of conversion to off-bottom culture results in improved environmental conditions as compared to on-bottom culture methods. However, the Commission does not agree that historic conditions caused by bottom

[5] Letter dated August 22, 2005 from Chris Cziesla, Jones & Stokes (Coast's consultant), to Lt. Col. Philip Feir, Army Corps of Engineers. See also Jones & Stokes (2006a), Jones & Stokes (2006c), and Jones & Stokes (2005).

culture constitute the environmental baseline against which the effects of off-bottom culture should be assessed.

Coast's historic bottom-culture operations are not relevant to the analysis of potential environmental impacts of the proposed project, including the environmental baseline. For the purposes of the permit requirements of the Coastal Act, if Coast has a vested right to some or all of the proposed activities, then Coast does not need a CDP for those activities, and no environmental analysis under the Coastal Act is required. In these circumstances, the question of the environmental baseline is moot. For those activities for which Coast does not have a vested right, a CDP is required, involving a Chapter 3 analysis of the impacts of those new activities. The environmental baseline under these circumstances would be the condition of the Bay absent those activities, because the activities are new. As discussed in Section 4.1.3: Vested Right Claim above, Coast's vested right claim remains unadjudicated by the Commission.

The discussion in the previous paragraph applies to Coast's permit obligations under Section 30600 of the Coastal Act. As discussed above in Section 4.1.6: Commission Jurisdiction however, Coast's obligations under federal law (i.e., the CZMA), on the one hand, and under State law (i.e., the Coastal Act), on the other, are separate and distinct from one another. Even if the Commission were to determine that Coast had the broadest possible vested right, which included all of Coast's currently proposed operations (Coast does not claim this), because the proposed project also requires one or more permits from the Corps, it would still be subject to the consistency review requirements of the CZMA. Under Section 307(c)(3)(A) of the CZMA, those aspects of the project for which Coast is seeking one or more permits from the Corps, i.e., all the elements of the project proposed in this CDP application, require an environmental analysis under the enforceable policies of the federally approved California Coastal Management Program, i.e., the Chapter 3 resource policies of the Coastal Act. Under these circumstances, the nature and scope of the Commission's review (including the environmental baseline) is governed by the content of the federal permit application.

In the Public Notice[6] issued by the Army Corps for the proposed project, the Corps' environmental analysis discusses the potential for ongoing impacts on mudflat substrate and eelgrass distribution and density. The Corps' analysis does not use bottom culture conditions as the environmental baseline. Similarly, in formal consultation documents NMFS discusses impacts of the proposed project based on "natural conditions," and conditions that would obtain if "the ongoing oyster culture operations… ceased."[7] NMFS also does not use historic bottom culture conditions as the environmental baseline.

The Commission agrees with the position adopted by the federal regulatory agencies. The environmental baseline is the condition that would exist if Coast was not conducting oyster culture of any kind in Arcata Bay.[8]

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[6] US Army Corps of Engineers (2003).

[7] NMFS (2005a), pp. 48 and 49.

[8] This approach is consistent with the Commission's approach in other after-the-fact permit applications.

5.2.2 Eelgrass

Eelgrass (*Zostera marina*) provides a variety of essential ecosystem functions, including primary production, predation refuge, nursery functions, physical structure, and nutrient cycling. 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.

Habitat Value of Eelgrass Beds[9]

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 epizooids, 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 epizooids 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 pallasi*), Pacific sand lace (*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.

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[9] The discussion in the section is based directly on NMFS (2005a), pp. 30 through 35. Full citations for academic studies are listed in the Reference section of the *Biological Opinion*.

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).

Eelgrass in Arcata Bay

The distribution and abundance of eelgrass within Humboldt Bay has been documented at various times in the late 1950's and early 1960's, in 1992 and 1997, and most recently in 2000. Table 3 below provides a summary of the distribution and density of eelgrass in Arcata Bay.

Table 3: Historic Distribution and Density of Eelgrass in Arcata Bay

Year	Upper Limit (MLLW)	Lower Limit (MLLW)	Acres	Density
1959	+1.0 ft	-1.5 ft	840	2.9 turions/ft^2
1961	+1.0 ft	-6.5 ft	1,670	-*
1962	-	-	2,600	-
1963	-	-	1,275	-
1972	-	-	1,075	-
1979	-	-	1,000	-
1992	-	-	1,011	-
1997	-	-	2,589	-
2000	-	-	2,730	-
2000 to 2003	+2.0 ft	-2.0 ft	2,691	58 shoots/m^2
2001 to 2002	-	-	-	68-248 shoots/m^2
2004	-	-	-	2.7-48.7 shoots/m^2

Source: NMFS (2005a), page 34.
* Dash indicates data not available.

Impacts to Eelgrass

Summary

Current oyster culture occurs in areas that could support eelgrass.[10] A recent eelgrass habitat assessment in Humboldt Bay indicates that of the 255 acres currently producing oysters, approximately 230 acres coincide with areas that contain the appropriate physical, chemical and biological features to support eelgrass. The additional 45 acres is also proposed for areas that currently support eelgrass beds of various densities.

There is strong empirical evidence that oyster culture causes adverse impacts to eelgrass beds. At the long-line oyster culture beds operated by Coast, simple observation reveals a greater cover of eelgrass between the culture beds than within them. Quantitative studies conducted in Arcata Bay and elsewhere support this observation.[11] Most relevant to the proposed project, Rumrill and Poulton[12] conducted a study sponsored in part by the Western Regional Aquaculture Center

[10] NMFS (2005a), pp. 39-40.

[11] Rumrill and Poulton (2004), Carlton *et al*. (1991), Thom *et al*. (2003), Washington and Dale (2004), Everett *et al*. (1995), and Wisehart *et al*. (2005). For Rumrill and Poulton (2004), see Appendix A: Substantive File Documents. For other studies, see the Reference section of NMFS (2005a), *Biological Opinion*.

[12] Rumrill and Poulton (2004).

("WRAC"), from September 2001 to August 2003 in various locations in Arcata Bay. Experimental oyster plots were established at line spacing distances of 1.5 feet, 2.5 feet, 5 feet and 10 feet, and eelgrass spatial cover and density were sampled at the experimental plots and at control plots.

The WRAC study found that, "…[E]elgrass spatial cover and shoot density were consistently high within the control (reference areas) and lowest within the 1.5 ft oyster line spacing plot. Eelgrass metrics generally scaled directly with oyster density…" (p. 2). Furthermore, "During 2003, we observed a strong trend toward decreased spatial cover and density [of eelgrass] with decreased distance between suspended oyster long-lines" (p. 11). Exhibit 9, an aerial photograph of the WRAC experimental plots, clearly shows the impact of oyster long-line culture on a recovering eelgrass bed in Arcata Bay.

Based on the information in the WRAC study, the Commission finds that 70 percent or more of the substrate in undisturbed reference areas is covered by eelgrass, whereas only 20 percent or less of the substrate is covered by eelgrass in oyster aquaculture areas. The results of the experimental studies indicate that this difference is caused by the aquaculture activities. This is equivalent to about a 71 percent decrease in the area covered by eelgrass with areas of active aquaculture.[13] Impacts to eelgrass from rack-and-bag culture, nursery activities, the FLUPSY, and the wet storage floats are unknown.

About 238 acres are currently used for long-line aquaculture, of which a maximum of 230 acres is located in areas that support eelgrass. About 45 acres are proposed for renewed oyster culture activities, also in areas that support eelgrass. If these 275 acres were left fallow, one would expect them to support at least 70 percent cover of eelgrass, as do the reference sites. This is equivalent to 192 acres of eelgrass. In the presence of oyster long-lines, one would expect on average no more than 20 percent cover of eelgrass, which is equivalent to 55 acres. Therefore, the 71 percent reduction in eelgrass is equivalent to a loss of 137 acres. As discussed in more detail below, this estimate is rough, is based on certain assumptions, and does not include adverse impacts that may be caused by rack-and-bag culture, or the operation of the nursery, FLUPSY, and the wet storage floats.

A detailed technical discussion of the evidence for an adverse effect, and the nature and extent of that effect, is included in the following two sections.

Evidence for an Adverse Effect

When one visits the long-line oyster culture beds operated by Coast Seafoods Company in Humboldt Bay, it appears to the eye that there is a greater cover of eelgrass between the culture beds than there is within the beds. This impression suggests a negative correlation between this style of oyster aquaculture and eelgrass abundance. A quantitative sampling study was conducted in Willapa Bay, Washington to examine in a methodical way relationships between various aquaculture methods and eelgrass abundance and growth rate.[14] Although there is a lack

[13] Calculated as 100*(reference-impact)/reference, or 100*(70-20)/70 = 71 percent.

[14] Dumbauld, B. Undated.

of detail in the report[15], it is apparent that both the percent ground cover and the turion density of eelgrass were lower in long-line aquaculture beds than in reference areas without aquaculture. Similarly, two measures of eelgrass growth rate were lower in long-line beds than in reference areas.[16] Therefore, the negative correlation between long-line culture and eelgrass abundance that seems apparent in Arcata Bay has been quantitatively documented in Willapa Bay.

In Arcata Bay, the WRAC study was conducted to examine the affects of several oyster aquaculture techniques on the "recovery" of a bottom culture area that had recently been harvested and where eelgrass abundance was low.[17] Four treatments were established in 30-meter by 30-meter plots: long-line spacings of 1.5 ft, 2.5 ft, 5 ft, and 10 ft. In addition, there was an adjacent unmanipulated plot to control for site effects, and plots in each of six eelgrass beds not subject to aquaculture which served as natural reference areas. A survey was conducted in August 2001 to document initial conditions prior to the establishment of the experimental treatments in September 2001. The lines were harvested in June 2003.

At the beginning of the experiment, eelgrass cover in the treatment plots varied from about 13 percent to 29 percent, and the adjacent control plot had about 50 percent cover (Table 4). Based on within-plot sampling, there was no statistically significant difference among the 5 plots (4 treatments and the site control) in the old ground culture area. Eelgrass cover among the natural reference sites averaged about 90 percent.

During the 20-month experimental period[18] there was a 15 percent decline in eelgrass cover at the natural reference sites, but a 16 percent increase in cover at the unmanipulated site control in the old ground culture area (Table 4), suggesting that the direction and magnitude of change may be affected by location or initial abundance or both. The behavior of eelgrass in the site control plot suggests that cover should generally increase in the absence of treatment effects at the old ground culture site. In fact, eelgrass in the 5-ft and 10-ft line-spacing treatments also increased to about the same amount of cover as in the site control plot, suggesting little or no treatment effect.

In contrast, the eelgrass in the two narrower line-spacing treatments declined to very low cover during the same period, suggesting a strong treatment effect. The final eelgrass cover in the

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[15] Sample sizes are not reported; error bars in figures are not identified; there is no key to symbols; and, there is little or no statistical discussion.

[16] There was also a difference in these various metrics between two different locations within the bay. Due to the way the data were presented, one cannot determine whether the negative correlation between eelgrass metrics and long-line culture were similar between sites.

[17] This experiment was conducted with the cooperation of and logistic and financial support from Coast (in addition to support from the Western Regional Aquaculture Center). Representatives of Coast participated in the planning and review of the study and apparently were in agreement that the study design was appropriate.

[18] The experiment ended with the harvest in June 2003, so the May sample should be considered the final sample, not the August sample that was conducted after the disturbance from harvesting.

treatment plots was positively correlated with the distance between oyster lines (Table 4). The final cover of eelgrass in the experimental plots was also very similar to the eelgrass cover observed in commercial culture areas of the same line spacings, indicating that the direction and magnitude of effects observed as a result of the experimental manipulations is probably typical of the effects of these aquaculture techniques on eelgrass within Coast's area of operations in Arcata Bay.

Table 4: Initial Cover, Final Cover, and Percent Change of Eelgrass

Treatment	Approximate Initial Cover August 2001 (percent)	Approximate Final Cover May 2003 (percent)	Percent Change from Initial Conditions[19] [100*(final-initial)/initial]
Natural Reference	91	77	-15
Site Control	50	58	+16
10-ft spacing	29	54	+86
5-ft spacing	13	44	+238
2.5-ft spacing	23	13	-43
1.5-ft spacing	31	1	-97

Source: Rumrill and Poulton (2004), Figure 5A.

Although there are problems in the experimental design (e.g., pseudoreplication[20]) that limit generalizations based on standard statistical tests, such tests are not necessary to draw reasonable biological conclusions in this case. Oyster culture using closely spaced long lines (i.e., 1.5-foot and 2.5-foot spacing) has a negative effect on the abundance of eelgrass in the culture areas.

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[19] In a critique of the WRAC study, Jones & Stokes compared treatment effects using absolute changes in percent cover during the experimental period. Jones & Stokes conclusions drawn from this comparison are not valid. An absolute decrease of 10 percent cover does not have the same biological or statistical significance when the initial cover is 90 percent as it does when the initial cover is, say, 15 percent. See Jones & Stokes (2006a).

[20] Strong experimental design requires experimental treatments to be replicated. However, many field experiments involve treatments that require large areas and, as a result, spatial replication is sometimes not feasible. Because the necessary area of each unique treatment or control is large, estimates of variables of interest (e.g., the abundance of a plant species) will generally be based on replicated samples within each treatment or control area. This may provide an accurate estimate of the mean and variability of the experimental variable within the single plot, but it can not provide information regarding the variability within the unreplicated experimental treatment. Therefore, from the standpoint of experimental design, this is referred to as "pseudoreplication." In these cases, the experimental treatment is confounded with any site effects that may arise from unique environmental characteristics of the particular spatial plot chosen for the treatment. The dangers of misinterpretation are most severe when there is a single treatment and a single control that are relatively far from one another. The chances of site effects generally are less if the treatments are close to one another and randomized spatially. Also, if the results of several treatments differ clearly and quantitatively in a pattern that is predicted from the expected mechanisms, the likelihood of the pattern arising from random site effects is less probable.

NMFS made the same determination in its *Biological Opinion*, based not only on the WRAC study, but also on a survey of other studies in the literature.[21] According to NMFS, Carlton *et al*. (1991) reported that both long-line and rack cultivation practices resulted in a decline in eelgrass abundance in the South Slough National Estuarine Research Reserve, Oregon. Reduced shoot density was observed in long-line culture, and total eelgrass loss was observed underneath and immediately around rack culture. Thom *et al*. (2003) in Willapa Bay, and Washington and Dale (2004) in Arcata Bay observed that the substrate was denuded of eelgrass directly underneath long-lines, but eelgrass grew in between lines. Specifically, Thom *et al*. (2003) estimated an approximate ¼-meter band directly underneath the long-lines that was devoid of eelgrass.

In another oyster aquaculture-related study conducted in the South Slough Estuary, Oregon, Everett *et al*. (1995) found that rack culture had a significant negative effect on eelgrass cover and shoot density. After 18 months of rack culture, eelgrass was absent from the interior of the rack plots. A halo of low shoot density was also found around the rack culture, while the surrounding areas remained a dense eelgrass bed. In addition, after 10 months of long-line culture, eelgrass shoot densities were significantly lower in culture plots than in reference plots.

Based on Thom *et al.* (2003), Washington and Dale (2004), and the WRAC study's results, "NMFS concludes there is a lower density and biomass of eelgrass compared to conditions that would exist if the oyster culture and associated activities were absent."[22] It is clear from the weight of the available evidence that oyster culture has a negative effect on the abundance of eelgrass in the culture areas. Given the constraints of natural resource protection and limited research funds, it is extremely unlikely that feasible additional studies would add new information that would substantially alter the above conclusions regarding the negative effects of closely spaced long-line oyster aquaculture on eelgrass.

Nature and Extent of the Effect

Using the WRAC study to compare the cover of eelgrass in the commercial oyster culture areas with control areas, and comparing eelgrass cover in the narrow spacing treatments with the site control, provides a rough estimate of the likely range of magnitude of these adverse effects. Average eelgrass cover in commercial oyster culture areas appears to be in the range of 5 percent to 20 percent, compared to more than 70 percent in reference areas.[23] Eelgrass cover was approximately 13 percent in the treatment with 2.5-foot spacing, compared to about 58 percent in the control.[24]

The minimum estimate of the magnitude of effect therefore appears to be within the range of a 78 percent reduction in cover (58 percent cover at the control compared to 13 percent cover at

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[21] NMFS (2005a), pp. 40-42. Full citations for academic studies are listed in the Reference section of the *Biological Opinion*.

[22] *Ibid*., p. 42.

[23] Rumrill and Poulton (2004)., p. 12 and Figure 8A.

[24] *Ibid*., Figure 5A. See also Table 4 above.

the impact, as estimated from the experiment) to a 71 percent reduction in cover (a minimum of 70 percent cover at the reference sites compare to a maximum of about 20 percent cover at the aquaculture sites, as estimated from a comparison of commercial plots to reference areas). The maximum estimate, based on comparison of the minimum in commercial plots (5 percent) to the maximum in reference areas (90 percent), would be about a 95 percent reduction in cover.[25] Therefore, based on the results of these various studies and observations, a 71 percent reduction in the area covered by eelgrass is a conservative estimate of the effect of oyster aquaculture.

About 238 acres are currently used for long-line aquaculture, of which a maximum of 230 acres is located in areas that contain the appropriate physical, chemical and biological features to support eelgrass. About 45 acres are proposed for renewed oyster culture activities, also in areas that support eelgrass. If these 275 acres were left fallow, one would expect them to support at least 70 percent cover of eelgrass, as do the reference sites. This is equivalent to 192 acres of eelgrass. In the presence of oyster long-lines, one would expect on average no more than 20 percent cover of eelgrass, which is equivalent to 55 acres. Therefore, the 71 percent reduction in eelgrass is equivalent to a loss of 137 acres.

This calculation assumes that all 275 acres either are or will be completely covered with long-lines spaced at 2.5 feet. As mentioned above, a recent eelgrass habitat assessment indicates that of the 255 acres currently producing oysters, approximately 230 acres coincide with areas that contain the appropriate physical, chemical and biological features to support eelgrass. The 137-acre calculation assumes that all 230 acres are in areas currently planted with long-lines at 2.5-foot spacing, and that the additional 45 acres will be planted in areas that contain the appropriate physical, chemical and biological features to support eelgrass.

The WRAC study did not address impacts to eelgrass from rack-and-bag culture, nursery activities, the FLUPSY, and the wet storage floats. As discussed above, Everett *et al*. (1995) found that rack culture had a significant negative effect on eelgrass cover and shoot density. It is reasonable to assume, as NMFS does[26], that rack-and-bag culture and the nursery area preclude eelgrass within the confined footprint of the structures, and that a halo of low shoot density occurs around the rack-and bag culture. The 137-acre calculation therefore probably underestimates the total adverse impact from the project as a whole.

In order to rigorously estimate the size of the effect of this culture method on eelgrass, one would have to randomly place replicate large treatment plots in undisturbed eelgrass beds. Given the constraints of natural resource protection and limited research funds, this is not likely to occur. However, it is extremely unlikely that feasible additional studies would add new information that would substantially alter the above conclusions regarding the negative effects of closely spaced long-line oyster culture on eelgrass. Therefore, the Commission believes that the conclusions drawn in the previous sections are reasonable given the available information, and are sufficient for management purposes.

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[25] *Ibid*., Figure 8A.

[26] NMFS (2005a), p. 42.

NMFS' analysis

In its *Biological Opinion*, NMFS provides a separate analysis of the impacts to eelgrass, based on Thom *et al*. (2003).[27] According to the latest oyster bed status table provided by Coast, there is an equivalent of 31,586 100-foot sections of lines in Arcata Bay. Assuming that long-line oyster culture cuases an absence of eelgrass along a ¼-meter band, this implies current long-line operations suppress eelgrass presence on about 59 acres. This does not account for reduced eelgrass cover between long-lines, or any adverse impacts from rack-and-bag culture, nursery activities, the FLUPSY, and the wet storage floats.

NMFS believes that this analysis may underestimate the amount of eelgrass that could be supported if Coast's oyster culture operations were absent, because it does not account for the reduced ability of eelgrass between long-lines to withstand storm events or other natural disturbance (Sargent *et al*. 1995), docking boats on eelgrass, and trampling of eelgrass by Coast personnel during oyster bed maintenance. The presence of the long-lines may also affect future seedling recruitment. Newly recruited seedling densities were significantly lower in long-line culture than bottom culture or reference eelgrass site (Wisehart *et al*. 2005). Moreover, forces that intercept eelgrass bed migration, such as the placement of long-line structures, may result in unanticipated and persistent loss of eelgrass habitat (Fonesca *et al*. 1998).[28]

NMFS concludes that the lack of site-specific information prevents NMFS from making quantitative conclusions regarding the effects of Coast's existing oyster culture activities on eelgrass. Because much of the area currently occupied by culture operations contains the physical, chemical and biological features necessary to support eelgrass, NMFS concludes that the existing conditions in the project area most likely support a lower density and biomass of eelgrass compared to conditions that would exist if Coast's oyster culture operations were absent. NMFS further concludes that the exact extent of this impact is unknown, and therefore recommends that the Corps require Coast to implement a scientifically valid impact assessment of the effects of oyster culture on eelgrass habitat.[29]

5.2.3 Pacific Herring

Many studies have documented the importance of eelgrass as spawning substrate for Pacific herring.[30] 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

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[27] *Ibid.*

[28] *Ibid*. Citations for academic studies are provided in the Reference section of the *Biological Opinion*.

[29] NMFS conclusions are discussed on page 42 of the *Biological Opinion* (NMFS 2005a). Conservation Recommendation No. 2, to the Army Corps of Engineers, is listed on page 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.

[30] NMFS (2005a), p. 28.

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.[31] 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 by DFG personnel indicate Pacific herring continue to prefer this region of Arcata Bay; however, spawning occurs throughout Arcata Bay and South Bay.[32] 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.[33]

Because of the importance of the East Bay Management Area to the Pacific herring spawn, 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…[34]

The Corps rejected this conservation recommendation, stating: "Herring spawning data for Humboldt Bay, obtained from the California Department of Fish and Game (through Coast), indicate that herring spawn in different locations of Humboldt Bay from year to year, and that no

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[31] Mello and Ramsey (2004).

[32] Mello, John (2006).

[33] Mello and Ramsey (2004).

[34] 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.

one area appears to be a more important spawning ground than any other."[35] In its draft permit, the Corps allows up to 23 acres of oyster culture in the East Bay Management Area.

In the *Revised Draft Initial Study*[36] prepared for Coast, Jones & Stokes argues that "the existing data on herring spawning do not support the argument that oyster culture negatively affects herring spawning," based on three lines of evidence First, Coast claims that during the period when oyster culture has decreased in East Bay (i.e., after the Corps issued its Cease and Desist Order in 2003), herring spawning also decreased in this area, the opposite of what would be expected to occur if oyster culture was negatively affecting herring spawn. In response to this claim, DFG staff[37] has indicated that the spawning biomass estimate for the 2000-2001 season was the highest estimate recorded for the ten seasons of spawning surveys conducted in Humboldt Bay, and that during the 2000-2001 spawning season, 81 percent of the total spawn biomass for Humboldt Bay occurred on the East Bay Management Area.

Furthermore, the 1997-1998 El Niño was one of the strongest on record, and had a strong negative affect on California's herring stocks. El Niño events are generally characterized by elevated water temperatures and nutrient-depleted water masses, which result in reduced ocean productivity and prey availability. El Niño conditions can result in reduced survival rates, growth rates, and condition of herring. In addition, the warm water temperatures associated with El Niño events can cause the distribution of herring stocks to temporarily shift north of their normal spawning grounds. As a result of the overwhelming effects of these large-scale oceanographic phenomena, any effects of changes in local eelgrass density would be unlikely to be detected.

Second, Coast claims that the 23 acres that are proposed for planting in the East Bay Management Area are above the elevation where herring spawn has typically been observed. DFG staff note, in contrast, that all six of the recent DFG spawn assessment surveys (2001-2001 through 2005-2006) found herring spawn on part or all of the 23 acres proposed for planting.

Finally, Coast claims that the impact from the annual commercial herring harvest in Humboldt Bay would be, "several orders of magnitude larger than any potential impact from oyster culture activities" (p. 3-15). The *Revised Draft Initial Study* provides no support for this claim. DFG staff notes that management of the commercial harvest is based on complex mathematical modeling, and that the impacts of the annual commercial harvest are relatively well-understood. DFG does not have a method for determining the potential impacts of removing 23 acres of key spawning habitat from the Bay (and Coast does not supply one). A study conducted by Hay and McCarter (2006) suggests that it is essential to conserve the spawning areas that have a history of

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[35] Letter dated December 14, 2005, from Lt. Col Philip T Feir, Army Corps of Engineers, to Rodney McInnis, NMFS. p. 2.

[36] Jones & Stokes (2006d), pp. 3-14 to 3-15.

[37] DFG responses to Coast's claims were submitted to Commission staff in a technical memorandum, transmitted as an attachment to an e-mail dated April 10, 2006, from John Mello, DFG, to Audrey McCombs, CCC.

repetitive spawning over time, and that there is little understanding of why some areas (of similar habitat) are used as spawning areas and others are not.[38]

DFG staff believes, and the Commission agrees, that Coast and the Corps misinterpreted the Pacific herring spawn assessment data, thus minimizing the importance of eelgrass in the East Bay Management Area.[39] The importance of the key herring spawning substrate in this area is well-documented by current and historical Pacific herring spawn assessment studies in Humboldt Bay. Exhibit 11 depicts the key herring spawning area identified by DFG staff, and shows the oyster plots (EB 7-1, EB 7-2, and EB 8) Coast proposes to cultivate in the East Bay Management Area that fall within the key herring spawn area.

5.2.4 Listed Salmonids and Managed Fisheries

Listed Salmonids[40]

Three species of listed salmonids occur within the area of Arcata Bay used for oyster cultivation:

- Coho salmon (*Oncorhynchus kisutch*) Southern Oregon/Northern California evolutionary significant unit ("SONCC ESU"), listed as federally threatened and a California state species of special concern;
- Steelhead (*O. mykiss*) Northern California ESU, listed as federally threatened and a California state species of special concern; and
- Chinook salmon (*O. tshawytscha*) Coastal California ESU, listed as federally threatened.

The Arcata Bay estuary is designated critical habitat for all three listed salmonid species. Critical habitat includes geographic areas as well as habitat functions necessary for the recovery of the species. Coho salmon migrate through the Arcata Bay estuary, while steelhead and Chinook salmon use the estuary as a migratory corridor and a rearing area, and Chinook salmon are dependent on the estuary to complete their life cycle.

The essential habitat types of coho salmon critical habitat found in Arcata Bay include: 1) juvenile and adult migration corridors (essential features of these areas include cover from predation), and 2) nearshore marine waters that support growth and development. Coho salmon critical habitat in Humboldt Bay provides a valuable migratory corridor for juveniles and adults as they either migrate to, or return from, the ocean.

For steelhead and Chinook salmon, NMFS designated "primary constituent elements" of the critical habitat, specifically sites and habitat components that support one or more life stages. Humboldt Bay contains primary constituent elements of steelhead and Chinook salmon critical

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[38] See technical memorandum, *ibid.*, for the citation to this study.

[39] Memorandum dated February 22, 2006, from John Mello, DFG, to Audrey McCombs and John Dixon, CCC.

[40] The information in this section is derived from NMFS (2005a), pp. 14-19, p. 24, and pp. 52-54.

habitat for rearing and migration, including estuarine areas free of obstruction and excessive predation, with natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation. Because Humboldt Bay provides migratory connectivity for juveniles and adults between high-value freshwater spawning and rearing habitat and the ocean, NMFS found that Humboldt Bay's critical habitat for these species has a "high conservation value."

Eelgrass in Humboldt Bay contains primary constituent elements for steelhead and Chinook salmon designated critical habitat, and essential habitat types for coho salmon designated critical habitat. Adequate prey species (including Pacific herring) and forage base, as well as adequate cover and marine vegetation have been identified as important elements in estuarine and nearshore habitats for Pacific salmon and adults. The most recent estimate of eelgrass in Arcata Bay was 2,562 acres in 2000; current estuarine and tidal slough rearing habitat in Arcata Bay is less than 20 percent of historic rearing habitat for steelhead and Chinook salmon.

As discussed above, the proposed project will cause adverse impacts to eelgrass beds in Arcata Bay, reducing spatial distribution, biomass, and density of eelgrass on the 300 acres where oysters are cultivated. NMFS concludes that the proposed project will result in a change in cover that will diminish the value of rearing habitat and the migratory corridor for listed salmonid species. Therefore, the project will adversely affect designated critical habitat for coho salmon, steelhead, and Chinook salmon.

Managed Fisheries and Essential Fish Habitat[41]

To ensure that habitat considerations receive increased attention for the conservation and management of fishery resources, Fishery Management Plans describe and identify essential fish habitat for managed fisheries.[42] Essential Fish Habitat ("EFH") is defined as: "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity."[43] The site of the proposed project occurs within the EFH for various managed species in the Pacific Salmon, Pacific Groundfish, and Coastal Pelagics Fishery Management Plans.

Managed species documented in Humboldt Bay are listed in Appendix B. Although Arcata Bay includes a variety of different EFH features, the Commission is primarily concerned about impacts to eelgrass habitat and prey items (e.g., Pacific herring), both considered EFH for various managed species.

Within the Pacific Groundfish Fishery Management Plan, eelgrass is specifically mentioned in the EFH descriptions for lingcod and black rockfish. Eelgrass is also specifically mentioned in the life history descriptions of cabezon, black rockfish, bocaccio, brown rockfish, grass rockfish,

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[41] Information in this section is based on NMFS (2005b).

[42] Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act pf 1996. 16 USC §1801 *et seq.*

[43] 16 USC §1802(10).

quillback rockfish, splitnose rockfish, and English sole. In addition, vegetated areas in estuaries and the nearshore are listed in a number of other groundfish EFH descriptions. Seagrasses are identified by the Pacific Fisheries Management Council as a preliminary preferred alternative for designation as a Habitat Area of Particular Concern. In addition to the information provided in the Fishery Management Plan, there is literature documenting the importance of eelgrass to some species of groundfish.

Adequate cover and marine vegetation in estuarine and nearshore habitats have been identified as important elements in Pacific salmon marine EFH in estuarine and nearshore habitats. Similarly, the Pacific Salmon Fishery Management Plan suggests alterations to eelgrass beds may result in loss of cover from predators, loss of primary productivity, and loss of prey. Loss of eelgrass beds is specifically identified as a habitat concern. Given their importance, the aerial extent of submerged aquatic vegetation is used as a habitat indicator for Pacific Salmon EFH.

Adequate prey base and forage are identified as important elements in Pacific salmon marine EFH in estuarine and nearshore habitats. Herring are identified within the EFH description of juvenile Chinook salmon in Amendment 14 to the Pacific Coast Salmon Plan. As discussed above, the proposed project has the potential to cause adverse impacts to Pacific herring in Arcata Bay, which can in turn reduce the amount of prey available to predators of herring and herring eggs.

Dungeness crab is also an important prey item for various managed species. For example, coho salmon and Chinook salmon have been considered heavy predators of Dungeness crab megalopae. In addition, Dungeness crab megalopae and instars, the stages between postlarval molts, were considered the most important food of copper rockfish in Humboldt Bay. Eelgrass provides important nursery functions for juvenile Dungeness crab. Adverse impacts to eelgrass beds can affect crab populations, which can in turn reduce the amount of prey available to managed species.

Various managed species use eelgrass habitat directly, and indirectly benefit from the ecosystem functions eelgrass provides. Therefore, diminished eelgrass functionality associated with the proposed project will result in both direct and indirect adverse impacts to essential fish habitat.

5.2.5 Mitigation

As discussed above, 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 typically requires that projects avoid impacts to eelgrass, and when avoidance is not feasible, that impacts be minimized and compensatory mitigation be provided by the applicant in accordance with the Southern California Eelgrass Mitigation Policy. This policy, developed by NMFS, the US Fish and Wildlife Service, and the California Department of Fish and Game, requires a project proponent to transplant eelgrass expected to be affected to areas similar to those where the initial impacts occur, at a ratio of 1.2 to 1. That is, for each square meter affected, 1.2 square meters of new, suitable habitat, vegetated with eelgrass, must be created.[44] The use of this ratio is conservative. A larger ratio would be appropriate in

[44] National Marine Fisheries Service, *et. al.* (1991), p. 3.

northern California where eelgrass restoration is much less certain than in the southern California bight.

As discussed above, the estimated magnitude of impacts from the proposed project ranges from approximately 59 acres (from NMFS' analysis) to approximately 137 acres (from the Commission's analysis), where both analyses acknowledge that these estimates are probably low. Applying the 1.2:1 ratio of the Southern California Eelgrass Mitigation Policy in accordance with standard Commission practice, Coast is required to create between 71 and 164 acres of new eelgrass habitat in Arcata Bay.

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.[45] 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.

An alternative approach explored by Commission staff involved calculating the cost of eelgrass restoration, and requiring Coast to pay that amount to fund eelgrass restoration somewhere other than in Humboldt Bay. Restoration generally costs between $1.00 and $1.50 per square foot, if a suitable site is available.[46] If grading is required, however, the cost goes up dramatically; for example, raising a site by three feet using appropriate dredge materials costs approximately $6.75 per square foot. Creating 71 acres of eelgrass therefore would cost a minimum of $3,000,000, while a worst-case cost for 164 acres could exceed $45,000,000. The Commission acknowledges that even the lowest estimate is economically infeasible for Coast.

Applicant-Proposed Mitigation

Coast has committed to implement in the future certain measures that will reduce adverse impacts from its oyster culture activities. These measures include the following:

- 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,

[45] E-mail dated April 11, 2006, from Vicki Frey, DFG, to Audrey McCombs, CCC.

[46] Pers. comm. Keith Merkel. February, 2006.

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.[47]

- 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.[48] 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 long-line harvester in such as 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.

Coast argues that oyster culture itself provides environmental benefits, and that these environmental benefits offset, either wholly or in part, any adverse impacts Coast's operations might cause. For example, the *Draft Initial Study* prepared by Coast's consultants finds that "aquaculture apparatus provides robust habitat value for numerous species."[49] Citing a study conducted by Dealteris *et al* in 2004, the *Draft Initial Study* states:

> The study indicated that aquaculture gear provides habitat for many species throughout the year in contrast to the seasonal nature of eelgrass and that species abundance and

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[47] Jones & Stokes (2006b).

[48] Letter dated November 28, 2005, from Greg Dale, Coast, to Lt. Col. Philip T Feir, Army Corps, pp. 1 and 2. Submitted under a cover letter dated November 30, 2005, from Samuel Plauché, Coast's representative, to Lt. Col. Philip T Feir, Army Corps.

[49] Jones & Stokes (2006c), p. 3-13.

> richness was higher during all times of the year; while species diversity was also higher but not significantly so in aquaculture gear as opposed to eelgrass… The study concluded, "shellfish aquaculture gear has substantially greater habitat value than a shallow nonvegetated seabed, and has habitat value at least equal to and possibly superior to submerged aquatic vegetation [i.e., eelgrass.]"[50]

The Commission recognizes that any hard structure placed in the water will attract marine life. However, the express purpose of Coast's aquaculture apparatus is to grow oysters for a commercial operation, not to provide marine habitat. The Commission considers any benefits to the marine environment caused by structures placed in that environment for purposes other than the creation or enhancement of wildlife habitat (such as Coast's aquaculture apparatus), to be "incidental" to its intended purpose. Therefore, the Commission does not agree that placement of the long-line structures and other gear should be afforded mitigation or habitat "credit." Conversely, the Commission will not require that Coast provide mitigation upon removal of oysters, long-line structures, and other aquaculture apparatus from marine waters.

Coast further asserts that turbidity reduction and net removal of nitrogen are beneficial effects of long-line culture. NMFS acknowledges in its *Biological Opinion*[51] that these mechanisms have been shown to be beneficial, and a significant factor in the maintenance of eelgrass habitat under certain circumstances. However, although oyster culture likely causes a net removal of nitrogen, the value of this removal is uncertain given that Arcata Bay is not characterized by significant eutrophication. The ability of cultured oysters in Arcata Bay to reduce turbidity is also unclear.

Additional Mitigation

The Commission acknowledges that the measures described above will reduce impacts from Coast's operations. Nevertheless, these measures do not fully mitigate for adverse impacts caused by Coast's current and proposed operations to eelgrass, Pacific herring, listed salmonids, and essential fish habitat in Arcata Bay. The Commission is therefore requiring **Special Condition Nos. 1 through 8**.

Special Condition No. 1

As discussed above, Coast is proposing to 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. In California, tidal and submerged lands are subject to the public trust.[52] Implicit in any grant of trust lands are two kinds of property interests.[53] The first is a proprietary interest, susceptible to State conveyance and private ownership. The second, however, is a public trust interest incapable of private ownership. The 560.9 acres of tidelands to which Coast holds proprietary interest, including the 50 acres which it is proposing to donate, are subject to the public trust.

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[50] *Ibid.*

[51] NMFS (2005a), pp. 46.

[52] Manaster, K. and D. Selemi (2005). §2.05.

[53] *Ibid.* §2.03[3].

The public trust doctrine provides that certain natural resources be held by the State in special status. Government may neither alienate those resources nor permit their injury or destruction by private parties. Rather, public officials have an affirmative, ongoing duty to safeguard the long-term preservation of those resources for the benefit of the general public.[54] Entities with responsibility for administering the public trust include the State Lands Commission and certain local governments that have been granted State sovereign lands. In Arcata Bay, the public entities administering State tidelands are the Humboldt Bay Harbor, Recreation and Conservation District, and the City of Arcata.

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. 2

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.[55]

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, shall be sited in any known or historic eelgrass habitat within Coast's East Bay Management Area (as identified on Exhibit 2). 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 the 45.49 acres of future planting 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.

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[54] *Ibid*. §2.02

[55] Humboldt Bay Watershed Advisory Committee and Redwood Community Action Agency (2005).

Special Condition No. 3

The California Coastal Conservancy has dedicated much effort and funding to the protection, enhancement, and restoration of California's coastal salmon populations. Goals Five and Six of the Conservancy's 2003 Strategic Plan direct Conservancy staff to a) protect, restore and enhance biological diversity in coastal areas, and; b) improve water quality, habitat and other coastal resources within coastal watersheds and the ocean. Current areas of effort include acquisitions and easements, enhancement planning efforts, water quality enhancement projects, and fish passage improvement. The Conservancy's program dedicated to improving passage for coastal salmon and steelhead resources includes:

- Conducting an inventory of all known barriers to fish passage in California's coastal watersheds;
- Identifying 175 high- and 120 moderate-priority barrier sites that require immediate attention for modification or removal;
- Funding a number of important fish passage improvement projects, including ten barriers in Humboldt County.

More information on the Conservancy's efforts to improve passage for coastal salmon and steelhead is included in Appendix C.

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) <u>prior to issuance of this permit</u>, 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.

Special Condition No. 4

Based on its analysis in the *Essential Fish Habitat Consultation* (NMFS 2005b), NMFS proposed the following conservation recommendation to the Corps:

> If practicable within Coast's operational footprint, Coast should evaluate the feasibility of culturing oysters at depths typically unsuitable for eelgrass growth (i.e., above +1.5 ft MLLW) in Humboldt Bay. Prior to implementation and siting of additional cultivation plots, the methodology of the study should be approved by the Corps in consultation with NMFS. The results of the study will help guide future conservation recommendations to avoid and/or minimize the effects of oyster culture on eelgrass. If Coast is unable to conduct such a feasibility study under this permit because no portion of its operational footprint contains tidal areas above +1.5 ft MLLW, NMFS recommends that the applicant

> apply for an experimental permit from the Corps to conduct such as study within the next two years.
>
> In Arcata Bay, Glover (1981) observed no significant difference between growth, survival, and quality of intertidal tray cultivation oysters grown at 0 m and +.46 m (1.5 ft) MLLW. Survival rates were also high at .91 m (3 ft), but growth rates were lower. Thus, placement of oyster culture in higher tidal elevations may be practicable, assuming the area is available to Coast. Based upon limited work done at higher elevations, Coast has observed fouling problems with culture placed at higher elevations. However, these observations are inconsistent with general ecological theory that fouling decreases with greater exposure to air (i.e., high tidal elevations). Moreover, fouling problems in Seaback Bay, Washington were lighter when the culture was placed intertidally than when they were constantly submerged. (Michael and Chew, 1976, as cited in Glover, 1981).
>
> Based upon previous discussions with industry personnel, NMFS recognizes that higher elevations may not be the most idea for culture growth, but these elevations do appear to be viable areas that may achieve the general project purpose…[56]

The Commission agrees with NMFS' assessment. 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.

Special Condition Nos. 5 and 6

The Corps' draft permit is for a ten-year term. In ten years' time, the feasibility study required by **Special Condition No. 4**, as well as certain other studies planned by NMFS and Coast will have been completed. Information from these studies will be available to the Commission for future management decisions regarding Coast's oyster culture operations. Therefore, **Special Condition No. 5** states that this permit shall expire ten years from the date of permit approval. Extension of the term of the permit shall require a permit amendment from the Commission.

As discussed in <u>Section 4.2.2: Project Parameters</u> above, Coast proposes to submit to the Harbor District by December 1 of each year, an annual report describing the status of each of its oyster culture beds. **Special Condition No. 6** requires that by December 1 of each year, Coast shall

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[56] Letter dated November 10, 2005, from Rodney McInnis, National Marine Fisheries Service, to Lieutenant Colonel Philip T. Feir, US Army Corps of Engineers.

submit to the Executive Director an annual report describing the status of each bed within the 300-acre operation footprint.

Special Condition Nos. 7 and 8

To reduce impacts to eelgrass from boat transit during planting and harvesting, **Special Condition No. 7** requires that during maintenance and harvesting of oysters, boat transit areas shall be limited to areas devoid of eelgrass as much as is practicable. To the extent practicable, Coast's personnel shall use the same areas to moor their boats in order to minimize the amount of propeller scarring in eelgrass habitat.

Finally, to reduce impacts from oyster culture apparatus, **Special Condition No. 8** requires within 30 days of harvest on any plot that is being abandoned, or taken out of production for one year or more, Coast shall remove all oyster culture apparatus from that plot, including but not limited to stakes, racks, and pallets.

Conclusion

The Commission finds that Coast's applicant-proposed measures to avoid, reduce or compensate for potential impacts to marine resources, in combination with the implementation of **Special Condition Nos. 1 through 8**, will reduce impacts to eelgrass, Pacific herring, listed salmonids, and essential fish habitat such that the proposed project is consistent with the marine resources policies (Sections 30230 and 30231) of the Coastal Act.

5.2.6 Shorebirds

Along the Pacific coast flyway, Humboldt Bay is the largest and most important estuary for wintering shorebirds and waters between San Francisco Bay and the Columbia River, and is designated as a site of international importance to shorebirds by the Western Hemisphere Shorebird Reserve Network.[57] Humboldt Bay has a recorded bird diversity of 251 species, and provides a major wintering area for over 100 species of water birds. The Bay is one of the most important shorebird concentration areas in California, with over 26,000 birds using the Bay during the peak weeks of the spring and fall migration.[58]

Two listed bird species are known to use Humboldt Bay as habitat: the marbled murrelet (*Brachyramphus marmoratus*) and the California brown pelican (*Pelecanus occidentalis californicus*). The marbled murrelet is State-listed as endangered and federally-listed as threatened, is on the Audubon Society's and the United States Bird Conservation watch lists, and is a "sensitive species" as defined by the California Department of Forestry. Marbled murrelets from the Headwaters Forest sub-population rest on or forage in the waters of Humboldt Bay (primarily in the South Bay or Entrance Bay). As part of the review process for the Corps' permit, the US Fish and Wildlife Service conducted preliminary consultation with the Corps regarding this species. The US Fish and Wildlife Service determined that the proposed project was "not likely to adversely affect" the marbled murrelet.[59]

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[57] Connolly Moore (2001), p. 3.

[58] Jones & Stokes (2004), pp. 37-38.

[59] Humboldt Bay Harbor, Recreation and Conservation District (1999b), p. 16.

The California brown pelican is federally- and state-listed as endangered, and is a California fully protected species. Post-breeding brown pelicans forage through Humboldt Bay by dive-plunging for fish. As part of the review process for the Corps' permit, the US Fish and Wildlife Service conducted preliminary consultation with the Corps regarding this species. The US Fish and Wildlife Service determined that the proposed project was "not likely to adversely affect" the brown pelican.[60]

Intertidal mudflats are a principal foraging area for many shorebirds and waders, and oyster cultivation in these areas could adversely affect bird habitat use and foraging. A study conducted in 2001 by Connolly Moore examined the differences in shorebird and wader use of long-line oyster culture plots and tidal mudflat plots in Arcata Bay. This study, like the WRAC study, was completed as part of the Mitigation Program identified in the *Draft Mitigated Negative Declaration* (1999) for Coast's permit with the Harbor District.

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.[61] 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.

Oyster culture operations, specifically on the SI Nk plot, have the potential to disturb nesting Caspian terns (*Sterna caspia*) on Sand Island. Caspian terns are common to very common along the California Coast, and are not included in any special species list.[62] Coast has proposed that all oyster culture activities for the SI Nk plot will remain at least 100 meters from the MHHW line of Sand Island, which will be sufficient to protect this species from adverse impacts.

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[60] *Ibid*., pp. 15-16.

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

[62] California Department of Fish and Game and California Interagency Wildlife Task Group (Undated).

5.2.7 Marine Mammals

Humboldt Bay provides marine mammal habitat for, primarily, a resident population of harbor seals (*Phoca vitulina*), and to a lesser extent porpoises (*Phocoena phocoena*), California sea lions (*Zalophus californianus*), and river otters (*Lutra canadensis brevipilosus*).[63] Harbor seals are much more prevalent in the South Bay, in the tidal flats near the Southport Channel and the Fields Landing Channel. These areas are used for hauling-out as well as breeding and pupping.[64] Two permanent haul-out areas are located in Arcata Bay, and the seals sporadically use other sites throughout the Bay.[65] Oyster culture activities have the potential to adversely affect marine mammals as oyster boats and crews transit the Bay during normal operations. Planting, maintenance, and harvesting of oyster beds could adversely affect harbor seals by disturbing seals hauled-out near the beds.

According to Coast, all oyster beds are located at least one mile from both of the permanent haul-out areas.[66] On rare occasions, under direction from regulatory agencies,[67] Coast personnel will be required to take water samples in the upper reaches of Humboldt Bay, and therefore must motor past these permanent harbor seal haul-out locations. All efforts are made to avoid any disturbance to the seals during these sampling trips. Coast has implemented a Marine Mammal Policy, described below, to avoid or minimize impacts to seals encountered swimming or hauled-out at any location around the Bay.

At monthly staff meetings Coast personnel review vessel procedures, including proper procedures relating to marine mammals. When marine mammals are encountered in Humboldt Bay, Coast personnel is instructed to:

- Reduce speed and remain at least 100 yards from the animal, whether it is on land or in the water.
- Never encircle or trap the animal between the vessel and shore. Always leave an escape route.
- If approached closely by a marine mammal while underway, the operator is instructed to reduce speed, place the vessel in neutral and wait until the animal is observed clear of the vessel before making way.
- Avoid sudden direction changes or changes in speed when near marine mammals.
- Never approach, feed or touch a marine mammal.

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[63] Jones & Stokes (2004), p. 38. Also, Coast (2006a).

[64] Humboldt Bay Harbor, Recreation and Conservation District (1999b), p. 20.

[65] E-mail dated April 13, 2006, from Peter Weiner, Coast's representative, to Audrey McCombs, CCC.

[66] Coast (2006a).

[67] Coast takes water samples in the sloughs near the haul-out sites as requested for special investigations into water quality issues identified by the California Department of Health Services, the City of Arcata, and/or the Humboldt Bay Shellfish Technical Advisory Committee.

- Should Coast's staff observe an injured marine mammal, staff is instructed to immediately contact their supervisor and the California Department of Fish and Game.
- Coast staff is instructed that marine mammals are federally protected and it is a federal crime to harm or harass one.

The Commission finds that with these measures in place, the proposed project will not adversely affect marine mammals.

5.2.8 Conclusion

The Commission finds that the proposed project has the potential to adversely affect eelgrass, Pacific herring, critical habitat for listed salmonids, and essential fish habitat for managed fish species. The Commission finds that applicant-proposed measures to avoid, reduce or compensate for adverse impacts to marine resources, in combination with the implementation of **Special Condition Nos. 1 through 8**, will result in marine resources being maintained, species of special biological significance being given special protection, and uses of the marine environment being 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. 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.

5.3 Fill of Open Coastal Waters

Section 30233 of the Coastal Act states:

> *(a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:*
>
> *(1) New or expanded port, energy, and coastal-dependent industrial facilities, including commercial fishing facilities.*
>
> *(2) Maintaining existing, or restoring previously dredged depths on existing navigational channels, turning basins, vessel berthing and mooring areas, and boat launching ramps.*
>
> *(3) In wetland areas only, entrance channels for new or expanded boating facilities; and in a degraded wetland, identified by the Department of Fish and Game pursuant to subdivision (b) of Section 30411, for boating facilities if, in conjunction with such boating facilities, a substantial portion of the degraded wetland is restored and maintained as a biologically productive wetland. The size of the wetland area used for boating facilities, including berthing space, turning basins, necessary*

navigation channels, and any necessary support service facilities, shall not exceed 25 percent of the degraded wetland.

(4) 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.

(5) 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.

(6) Mineral extraction, including sand for restoring beaches, except in environmentally sensitive areas.

(7) Restoration purposes.

(8) Nature study, aquaculture, or similar resource dependent activities.

Coast proposes to conduct oyster culture activities including long-line culture and rack-and-bag culture, and operate a nursery area, wet storage floats, and a FLUPSY. The placement in the intertidal and subtidal zones of stakes, racks, pallets and oyster seed, and the mooring system for the wet storage floats constitutes "fill" as defined by the Coastal Act. Section 30108.2 of the Coastal Act states:

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

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

5.3.1 Allowable use

Coast proposes to place fill in coastal waters for the purpose of cultivating oysters. As discussed in Section 5.1: Aquaculture above, Coast's proposed project is an aquaculture project, and as such qualifies as an "allowable use" under 30233(a)(8).

5.3.2 Alternatives

The Commission investigated project alternatives that would reduce or eliminate the need for fill. Oyster culture operations require structures to be placed in the water; therefore, eliminating fill is not a feasible alternative for oyster culture operations. Oyster culture methods include bottom culture, and off-bottom culture methods such as long-line and rack-and-bag. Bottom culture involves placing oyster shells directly on the seafloor. Long-line culture, on the other hand, involves placing stakes, while rack-and-bag culture involves the placement of racks. The proposed project uses off-bottom culture techniques, which reduces the amount of fill compared to on-bottom culture techniques. The Commission therefore finds that the proposed project minimizes the amount of fill to the maximum extent feasible.

Given that fill is required, the Commission considered project alternatives that would reduce the environmental impacts of the fill involved in Coast's oyster culture operations. Coast proposes to cultivate oysters in long-lines spaced at 2.5 feet. As discussed above, the WRAC study examined the effects of long-line culture on eelgrass at 1.5-foot, 2.5-foot, 5-foot and 10-foot spacing, and found that impacts to eelgrass scaled directly with oyster density, with the most extensive impacts within the 1.5-foot plot. The WRAC study, however, did not measure impacts to eelgrass on a "pristine" bed, in its natural condition (although eelgrass metrics at a natural reference site were measured). Rather, the study was conducted to examine the affects of oyster aquaculture techniques on the "recovery" of a bottom culture area that had recently been harvested and where eelgrass abundance was low. The study documented "recovery" over a 2-year period.

The WRAC study found that eelgrass metrics on the 1.5-foot spacing plots were consistently lower than the 2.5-foot plots – the most severe effect was measured in May 2003, when both percent cover and density on the 1.5-foot plot approached zero. Changing Coast's operations from 2.5-foot to 1.5-foot spacing would reduce the overall footprint of its operations to 186 acres, with 170 of those acres planted with long-lines. However, eelgrass on those 170 acres would be severely affected, and possibly eliminated completely. The Commission finds that even thought the footprint would be reduced, overall impacts to eelgrass at 1.5-foot spacing would be greater than at 2.5-foot spacing.

The Commission also looked at project alternatives at wider spacing, i.e., at 5-foot and 10-foot spacing. The WRAC study found that 10-foot line-spacing treatments increased to about the same amount of cover as in the site control plot (i.e., the control plot that was located in the area previously used for bottom culture), however, eelgrass in the 10-foot spacing plot was still significantly lower than in the untreated reference area (i.e., the area that had never been disturbed by oyster culture.)[68]

Two years was insufficient time for either the site control plot or the plot with 10-foot spacing to approximate natural reference levels of eelgrass.[69] Therefore, the data does not enable the Commission to conclude that at 10-foot spacing, oyster long-lines do not cause adverse impacts to eelgrass. The project footprint at 10-foot spacing would almost quadruple, to approximately 1150 acres. The Commission does not currently have sufficient information to quantify the extent of impacts to eelgrass under 10-foot spacing; however, the precautionary principle suggests a prudent assumption would be that impacts still occur. At 10-foot spacing, those impacts would occur over an area covering 1150 acres rather than merely 300 acres.

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[68] As described in Table 4 above, at the beginning of the study cover in the 10-foot spacing plot was 29 percent, while at the natural reference area cover was 91 percent. At the end of the study, percent cover was 54 percent at the 10-foot plot and 77 percent at the natural reference area.

[69] This observation is not applicable to eelgrass in the 1.5-foot and 2.5-foot spacing plots, which was consistently lower than both the site-control and natural reference levels of eelgrass. See Rumrill and Poulton (2004), Figure 5.

The Commission therefore finds that limiting the footprint of the project to 300 acres, and thereby limiting the area over which adverse impacts will occur, will be, based on the information currently available, the least environmentally damaging alternative.

5.3.3 Mitigation Measures

The final test of Coastal Act Section 30233(a) requires that feasible mitigation measures have been provided to minimize any adverse effects. In other sections of this report, the Commission has identified feasible mitigation measures that will minimize the project's adverse environmental impacts. With the imposition of the conditions of this permit, in combination with applicant-proposed measures to avoid or reduce any adverse environmental effects, the Commission finds that the third and final test of Coastal Act Section 30233(a) has been met.

5.3.4 Conclusion

Because the three tests have been met, the Commission finds the proposed project consistent with the fill policy (Section 30233) of the Coastal Act.

5.4 Access and 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 30211 of the Coastal Act states:

> *Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.*

Section 30220 of the Coast 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.*

The proposed project has the potential to affect public access and recreation by precluding recreational activities in areas where oysters are cultivated.

Recreation activities in and around Arcata Bay include boating, paddling (e.g., kayaks and canoes), fishing, clamming, birdwatching and nature enjoyment, walking and hiking, beach play (Manila), and enjoyment of scenic views.[70] Hunting is allowed at several locations, including the State-managed area at Fay Slough Wildlife Area. Portions of the US Fish and Wildlife Service Jacoby Creek and Eureka Slough units are open during the State waterfowl hunting season; these locations are designated for boat access only. Boating in Arcata Bay is somewhat limited because of the shallow water and tidal conditions; popular areas include the Mad River Slough area, with ("unofficial") access from the Highway 255 bridge and other locations.

[70] Humboldt Bay Harbor, Recreation and Conservation District (2005), p. 76.

Arcata Bay is generally very shallow, with over half the area exposed at low tides.[71] Because oyster culture operations occur on tidelands, which are exposed at low tides, preclusion of on-water recreational activities only occurs at high tide when the oyster plots are submerged. At high tide, Arcata Bay coves approximately 8,320 acres.[72] The 300 acres covered by Coast's oyster operations is a very small percentage (3.6 percent) of the area available during high tide, and therefore the presence of aquaculture apparatus does not appreciably diminish recreational opportunities in Arcata Bay. Coast's operations do not affect public access to the water.

For these reasons, the Commission finds that the proposed project is consistent with the public access and recreation policies (Sections 30210, 30211, and 30220) of the Coastal Act.

6 CALIFORNIA ENVIRONMENTAL QUALITY ACT

Section 13096 of the Commission's administrative regulations requires Commission approval of coastal development permit applications to be supported by a finding showing the application, as modified by any conditions of approval, to be consistent with any applicable requirements of the California Environmental Quality Act ("CEQA"). Section 21080.5(d)(2)(A) of CEQA prohibits approval of a proposed development if there are feasible alternatives or feasible mitigation measures available that would substantially lessen any significant impacts that the activity may have on the environment. The project as conditioned herein incorporates measures necessary to avoid any significant environmental effects under the Coastal Act, and there are no less environmentally damaging feasible alternatives or mitigation measures. Therefore, the proposed project is consistent with CEQA.

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[71] *Ibid*. p. 73.

[72] *Ibid*.