September 16, 2016

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RE: Recirculated Draft EIR for the Proposed Coast Seafoods Company's Shellfish Culture Permit Renewal and Expansion Project, Humboldt County, California

Dear Mr. Crider,

Thank you for considering the following comments on the Recirculated Draft Environmental Impact Report ("RDEIR") for Coast Seafoods Company's ("Coast") proposed Humboldt Bay Shellfish Aquaculture Permit Renewal and Expansion Project in Humboldt Bay, California ("Project"), submitted on behalf of Audubon California, Earthjustice, and Oceana. For the reasons explained below, the RDEIR is wholly inadequate to support approval of the Project.

While the Project presented in the RDEIR reflects some modifications to the proposal in the Draft Environmental Impact Report ("DEIR"), both the Project and its impacts remain enormous. The Project encompasses 622 acres of eelgrass and other sensitive tideland habitats, in addition to Coast's existing 300 acre footprint of operations, much of which also occupies eelgrass habitat. The RDEIR reports that, of the 6,201 acres of subtidal land leased for shellfish aquaculture in California, only12 percent – approximately 744 acres – are actively farmed. Coast's proposed expansion would thus nearly double the footprint of shellfish aquaculture in the state and would do so in some of the state's most sensitive, critical estuarine habitat.

Approximately 594 acres of the proposed expansion would be installed in eelgrass habitat, meaning that the proposed expansion alone (apart from impacts from ongoing operations) would affect about 15 percent of all eelgrass habitat in the North Bay of Humboldt Bay.[1] The majority of the expansion – 409 acres – would take place in continuous eelgrass habitat. This is in addition to ongoing adverse impacts caused by the portion of the Project located within the existing 300 acre footprint. The Project would also cause significant impacts to mudflat habitat used for foraging and resting by shorebirds and cause disturbance near key gritting sites for brant, among other impacts. Overall, the Project would cause significant adverse effects on numerous seabirds, shorebirds, commercially and ecologically important fish species, marine mammals, and other wildlife through habitat loss, disturbance, increased predation, and depletion

[1] Coast Seafoods Company's Recirculated Draft Environmental Impact Report ("RDEIR") Humboldt Bay Shellfish Aquaculture Permit Renewal and Expansion Project in Humboldt Bay, California (July 2016) at 6.5-42, Table 6.5.10.

of food sources. In addition, the Project would harm other uses of the North Bay, such as birdwatching, hunting, and navigation.

None of the project modifications, conservation measures, or mitigation measures set forth in the RDEIR, alone or together, come close to rendering the impacts of this Project less than significant. The revised Project does little to avoid eelgrass habitat or core spawning locations in the East Bay Management Area ("EBMA"). While it decreases overlap with continuous eelgrass habitat by 17 percent compared to the prior proposal, it increases overlap with patchy eelgrass by 58 percent. Contrary to the RDEIR's assertion, the use of 10-ft. longline spacing instead of 5-ft. spacing for the expansion area would still result in significant decreases in eelgrass density and function. The conversion of 100 acres of existing culture to 10-ft. spacing, which Coast offers as mitigation for Phase 1 of the Project, would not come remotely close to mitigating the damage to a less than significant level. And Coast offers no mitigation for adverse effects caused by renewing operations in the existing footprint or for Phase 1 of the expansion.

As detailed below, the RDEIR's analyses and findings rely on numerous factual inaccuracies, invalid applications of relevant studies, flawed modeling assumptions, and unfounded speculation to support its conclusions of less than significant impacts to biological resources, recreation, and navigation. One especially significant example is the RDEIR's fundamentally flawed analysis of impacts to eelgrass habitat. The RDEIR asserts that the Project's use of 10-ft. spacing for longline gear for part of the existing footprint and the expansion area will render the overall Project impacts less than significant. However, the best available information indicates that the proposed Project would result in a loss of eelgrass density on the order of 89-92 percent in the existing footprint (2.5-ft longline spacing) and of 45-67 percent in the expansion areas (10-ft. longline spacing). The RDEIR's invalid eelgrass analysis further undermines the basis for many of the RDEIR's findings of "less than significant" impact for species dependent on eelgrass, including Pacific herring, brant, Dungeness crab, and others. In addition, the RDEIR fails entirely to consider a reasonable range of alternatives to the Project and cumulative impacts of the Project. All in all, the RDEIR dismally fails to satisfy the requirements of the California Environmental Quality Act ("CEQA").

In order to provide a valid CEQA analysis to support project approval, including renewal of authorization for existing operations and the proposed expansion, Coast must substantially revise its proposal and the DEIR analyzing it. A properly revised DEIR must identify and analyze alternatives that avoid any significant impact to eelgrass habitat and fish and wildlife species dependent on it, as well as an alternative that both avoids eelgrass in any expansion areas and removes oyster farming operations from the EBMA, which is critical for Pacific herring spawning, black brant, other waterfowl, and shorebirds. We also recommend that aquaculture activities be discontinued in the EBMA and that Coast provide a 1000-ft. buffer for brant gritting areas and avoid areas with high densities of long-billed curlew territories. The public must then be given an opportunity to comment on the significant new information that this new revised DEIR would contain. We encourage Coast to work collaboratively with the relevant agencies and key stakeholders in a marine spatial planning framework to evaluate a revised project configuration that would meet project objectives while satisfying federal and state policy and law.

## Project Description

The Project description presented in the RDEIR is confusing, with various phases, adaptive management junctures, and mitigation schemes. The Project consists of renewing regulatory approvals for 294.5 acres of Coast's existing shellfish culture, including intertidal cultch- and basket-on-longline culture, intertidal nurseries, subtidal Floating Upweller System ("FLUPSY") rafts, subtidal wet storage floats, and subtidal clam rafts. The Project proposes a two-phase, 622-acre expansion of intertidal shellfish aquaculture in the North Bay, the addition of eight bins to the existing FLUPSY and use of the existing clam rafts to culture Pacific and Kumamoto oysters. In Phase 1 of the expansion, Coast is proposing to culture 150 acres of 10-ft. spaced, double-hung cultch-on-longline, six acres of 10-ft. spaced, single-hung cultch-on-longline, and four acres of rack-and-bag. Coast is also proposing 50 acres of basket-on-longline with alternating spacing of two rows of baskets separated by nine feet, followed by a 16-ft. space. Of these, 20 acres of baskets will be placed above 1.3-ft. mean lower low water ("MLLW") and 30 acres will be placed below 1.3-ft. MLLW. As mitigation for potential eelgrass impacts in Phase 1, Coast is proposing to convert 100 acres of its existing footprint from 2.5-ft. spaced, single-hung cultch-on-longline to 10-ft. spaced, double-hung cultch-on-longline. In Phase 1I, Coast is proposing an additional 412 acres of single-hung cultch-on-longline planted at 10-ft. spacing. In total, the Project would result in 922 acres of intertidal oyster culture.[2]

## Legal Background: California Environmental Quality Act

CEQA is intended to provide for the protection and enhancement of the state's environment and to "ensure that the long-term protection of the environment, consistent with the provision of a decent home and suitable living environment for every Californian, shall be the guiding criterion in public decisions."[3] CEQA accomplishes these goals in part by ensuring that proposed projects are authorized only after their environmental impacts are thoroughly analyzed in an EIR, the public has full opportunity to inform that analysis, and necessary mitigation measures have been adopted.

### A. Analysis of Significant Impacts

CEQA requires that an "EIR must demonstrate that the significant environmental impacts of the proposed project were adequately investigated and discussed and it must permit the significant effects to be considered in the full environmental context."[4] CEQA defines "significant effect on the environment" as "a substantial, or potentially substantial, adverse change in the environment."[5] In addition, an EIR "must include a description of the physical environmental conditions in the vicinity of the project, as they exist at the time the notice of preparation is

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[2] RDEIR at 4-17.

[3] Pub. Res. C. § 21001(a)-(d).

[4] CEQA Guidelines, § 15125(c), (emphasis added).

[5] Pub. Res. C. § 21068.

published…or…at the time the environmental analysis is commenced, from both a local and regional perspective."[6]

Notably, CEQA requires analysis of effects on "ecosystems," the boundaries of which are not defined by state lines.[7] Therefore, the EIR must analyze environmental effects occurring both within California and outside of it. Indeed, as CEQA is "to be interpreted in such manner as to afford the fullest possible protection to the environment within the reasonable scope of the statutory language" the Project's impacts must be analyzed in terms not only of their effects around Humboldt Bay, but throughout the Pacific Flyway and California Current Large Marine Ecosystem.[8] This is particularly important for this project given that many of the species it affects are highly migratory and commercially important.

The EIR's conclusions regarding the project impacts must be based on a full analysis of relevant factors and the best available information. A conclusion regarding the significance of an environmental impact that is not based on an analysis of the relevant facts fails to fulfill CEQA's informational goal.[9] Furthermore, CEQA requires an agency to "use its best efforts to find out and disclose all that it reasonably can."[10]

### B. Analysis of Cumulative Impacts

CEQA requires that an EIR address cumulative impacts "when the project's incremental effect is cumulatively considerable."[11] The EIR must therefore identify all existing and likely future projects that contribute to the same impacts as the proposed project. Cumulative impacts are defined as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts."[12]

The cumulative impact analysis must address the severity of the impacts and their likelihood of occurring. An adequate discussion of significant cumulative impacts must include, among other things, a "summary of the expected environmental effects to be produced by those projects with specific reference to additional information stating where that information is available . . . ."[13] In other words, in deciding whether to approve a project, decision makers need to know what the expected impacts will be on the ground as a result of all of the projects identified as contributing to cumulative impacts.

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[6] CEQA Guideline § 15125(a).

[7] CEQA Guidelines § 15358(a)(2).

[8] *Laurel Height Improvement Ass'n. v. Regents of University of California*, 47 Cal.3d 376, 404 (Cal. 1988).

[9] *Stanislaus Natural Heritage Project v. County of Stanislaus*, (1996) 48 Cal.App.4th 182, 182; *Citizens of Goleta Valley v. Board of Supervisors of Cty of Santa Barbara*, (Cal. 1990) 52 Cal.3d 553, 568.

[10] CEQA Guidelines § 15144; *see also* Guidelines § 15151 (an EIR must disclose what is "reasonably feasible").

[11] CEQA Guidelines § 15130; *see also* CEQA Guidelines § 15355.

[12] CEQA Guidelines § 15355.

[13] CEQA Guidelines § 15130(b)(4).

### C. Analysis of Alternatives

The analysis of alternatives to the proposed project lies at the "core of an EIR."[14] In this analysis, the EIR must consider a reasonable range of alternatives that would avoid or substantially lessen the Project's adverse impacts while feasibly attaining most of the Project's basic objectives.[15] Identifying alternatives to the project is central to meeting CEQA's requirement to avoid or substantially lessen significant environmental damage. Alternatives identified should "offer substantial environmental advantages over the project proposal."[16]

The project proponent may not exclude environmentally preferable alternatives simply because they do not meet all project objectives. The EIR's discussion of alternatives must focus on alternatives to the project that are "capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly."[17]

A "reasonable range" of alternatives includes alternative locations for a project as well as alternatives to the project.[18] In addition, the EIR must analyze a "no project" alternative.[19] If the EIR refuses to consider a reasonable range of alternatives or fails to support its analysis with substantial evidence, the purposes of CEQA are subverted, and the EIR is legally inadequate.[20] If a feasible alternative exists that will meet the project's objectives while reducing or avoiding its significant environmental impacts, the project may not be approved.[21]

### D. Mitigation Measures

CEQA's core substantive component requires that any public agency, including the Harbor District, "*shall* mitigate or avoid the significant effects . . . of projects that it carries out or approves *whenever* it is feasible to do so."[22] CEQA requires agencies to adopt environmentally superior alternatives or feasible mitigation measures to substantially decrease or avoid otherwise significant adverse environmental impacts of the proposed project.[23] To enable that decision making process, the EIR must set forth mitigation measures that can be adopted at the findings stage of the planning process. Those measures should be capable of: (a) "[a]voiding the impact

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[14] *Citizens of Goleta Valley*, 52 Cal. 3d at 564; *see also* Pub. Res. C. § 21002.1(a) ("The purpose of an environmental impact report is . . . . to identify alternatives to the project . . . .").

[15] *See* Pub. Res. C. § 21100(b)(4); CEQA Guidelines § 15126.6(a).

[16] *Citizens of Goleta Valley*, 52 Cal. 3d at 566.

[17] CEQA Guidelines § 15126.6(b).

[18] CEQA Guidelines § 15126.6(a).

[19] CEQA Guidelines § 15126.6(e).

[20] San Joaquin Raptor/Wildlife Rescue Ctr. v. County of Stanislaus (1994) 27 Cal.App.4th 713, 735-38; Kings County Farm Bureau v. City of Hanford (1990) 221 Cal.App.3d 692, 736-37.

[21] Pub. Res. C. § 21002.

[22] Pub. Res. C. § 21002.1(b) (emphasis added).

[23] Pub. Res. C. §§ 21002, 21081(a); CEQA Guidelines §§ 15002(a)(3), 15021(a)(2), 15091(a)(1).

altogether by not taking a certain action or parts of an action"; (b) "[m]inimizing impacts by limiting the degree or magnitude of the action and its implementation"; (c) "[r]ectifying the impact by repairing, rehabilitating, or restoring the impacted environment"; or (d) "[r]educing or eliminating the impact over time by preservation and maintenance operations during the life of the action."[24] The EIR must also include evidence of each mitigation measure's efficacy.[25]

In addition, agencies may review a project proponent's prior shortcomings in analyzing the adequacy of proposed mitigation measures. The Supreme Court has stated that, "[b]ecause an EIR cannot be meaningfully considered in a vacuum devoid of reality, a project proponent's prior environmental record is properly a subject of close consideration in determining the sufficiency of the proponent's promises in an EIR."[26]

In addition to CEQA's mitigation requirements, the California Endangered Species Act ("CESA") requires full mitigation of impacts to state-listed species.[27] In particular, any permit issued to authorize incidental take of such species by the project must provide mitigation for all impacts on the species resulting from the project, meaning that mitigation must address habitat loss as well as direct take.

**The Proposed Project Will Have Significant, Adverse Effects on Eelgrass.**

The RDEIR's analysis of the Project's effects on eelgrass is fundamentally flawed, and the conclusions based on that analysis are wrong. The RDEIR's "less than significant impact" determination rests on a profound misinterpretation of relevant scientific studies and a mistaken theory that aquaculture gear; disturbed, broken-up eelgrass habitat; and "mitigation" provided by increased spacing on longlines in some of the Project area somehow provide habitat value equivalent to 622 acres of unmodified dense and patchy eelgrass habitat and mudflat. Contrary to the RDEIR's statements, the Project would have significant adverse effects on eelgrass and the numerous species that depend on it. The Harbor District must not approve such a significant adverse impact to Humboldt Bay and the many fish and wildlife species that depend on it.

### A. Eelgrass Habitat Is Uniquely Important and Sensitive and Thus Is Subject to Special Protections, and Eelgrass is Declining

Humboldt Bay contains approximately 5,646 acres of eelgrass, which represents between 45- 53 percent of the state's total eelgrass. Though eelgrass is the dominant macrophyte of the shallow subtidal and lower intertidal zones in the bay, it is one of the rarest habitats in California. Just five bays — Humboldt, San Francisco, San Diego, Mission, and Tomales — support more than 80 percent of the known eelgrass in the state.

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[24] CEQA Guidelines § 15370.

[25] *See Save Our Peninsula Committee v. Monterey County Board of Supervisors* (2001) 87 Cal. App. 4th 99, 130.

[26] *Laurel Heights Improvement Assoc. of San Francisco v. Regents of the University of California*, 47 Cal.3d at 420.

[27] Pub. Res. C. § 2081(b)-(c).

Eelgrass has declined in California,[28] making any continuing or additional loss in Humboldt Bay more important from a cumulative impacts standpoint.[29] In a comment letter on the 2015 DEIR, these losses are described in detail by eelgrass experts Jeff Black (Humboldt State University) and David Ward.[30] The letter expresses opposition to any activities that would further harm eelgrass in the bay, and enumerates extensive losses to eelgrass in recent years in San Juan Islands, WA; San Francisco Bay, CA; Morro Bay, CA; Mission Bay, CA; and San Ignacio Lagoon and San Quintin Bay, Baja California. Drivers for these losses include high sea and air temperatures and eelgrass wasting disease. The authors note "[e]elgrass populations along the Pacific coast are currently under stress and it would be imprudent to add additional stresses to this threatened and cherished biotype." The authors further point out in their September 2016 comment letter to the Harbor District on the RDEIR the unique nature of the intertidal eelgrass in the bay. They note that the north bay hosts "…the largest remaining bed of intertidal eelgrass along the Pacific coast between Mexico and Washington…recent eelgrass losses reported above have been greatest for intertidal populations, the eelgrass population that will be potentially most affected by the expansion. San Quintin Bay has lost 45 percent of its intertidal eelgrass (1,046 hectares in 2000 to 433 hectares in 2014), including nearly all of its dense cover of intertidal eelgrass (604 hectares in 2000 to 5 hectares in 2014) over the last decade.[31] Only sparse eelgrass remains. Similarly, Morro Bay has lost virtually all of its intertidal eelgrass beds. Humboldt Bay managers should guard against similar losses in Humboldt Bay."[32]

Notably, between 2009 and 2015, eelgrass declined considerably in Humboldt Bay, mostly at higher elevations. The RDEIR acknowledges that a Pacific Watershed Associates survey that compared eelgrass conditions between 2015 and 2009 found that "there was approximately 20 percent less eelgrass in 2015 than in 2009 (based on a comparison of areas classified as eelgrass in both years)."[33] The 2015 report notes that "large areas of the elevated and unchanneled intertidal mudflats within the study area previously characterized as providing patchy eelgrass habitat, are not capable of supporting eelgrass under current conditions." [34] The microhabitat features include ponds and depressions that provide de facto lower elevation habitat associated with reduced thermal stress and desiccation. This decline is significant and may signal a continuing trend toward further eelgrass loss. Yet the RDEIR fails to include the decline in

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[28] Merkel & Associates. 2014. San Francisco Bay Eelgrass Inventory. Report for the National Marine Fisheries Service. Santa Rosa.

[29] Schlosser, S. and A. Eicher. 2012. The Humboldt Bay and Eel River Estuary Benthic Habitat Project. California Sea Grant Publication T-075.

[30] Black, J, and D. Ward. 2015. Letter to the Humboldt Bay Harbor, Recreation and Conservation District.

[31] Ward. D.H., A. Morton, T.L. Tibbitts, D.C. Douglas and E. Carrera-Gonzalez. 2003. Long-term Change in Eelgrass Distribution at Bahia Quintin, Baja California, Mexico, using Satellite Imagery. Estuaries 26: 1529-1539; Simancas, J.E. 2013. Assessment of the quality eelgrass habitat for black brant, Branta bernicla nigricans, during the non-breeding season of San Quintin, Baja California, Mexico. Master's Thesis. CICESE, Ensenada, Baja California.

[32] Black, J. and D. Ward. 2016. Letter to the Humboldt Bay Harbor, Recreation and Conservation District.

[33] Revised Eelgrass Impacts Analysis. Pg 5.

[34] Pacific Watershed Associates. 2015. Preliminary Eelgrass (*Zostera marina*) Mapping and Habitat Characterization, North Humboldt Bay, California. For: Humboldt Bay Harbor, Recreation, and Conservation District Mariculture Pre-Permitting Project, Eureka, California. Pg. 14.

patchy eelgrass, the current climatic conditions driving these changes, and the high vulnerability of eelgrass at high elevations in the Bay in its evaluation of impacts. A properly revised DEIR must address this significant new information.

Eelgrass is highly productive and is considered to be a foundation or habitat-forming plant species. Eelgrass contributes to ecosystem functions at multiple levels: as a primary and secondary producer, habitat structuring element, substrate for epiphytes and epifauna, a sediment stabilizer, and nutrient cycling facilitator. Eelgrass provides important foraging areas and shelter to young fish and invertebrates, food for migratory waterfowl and sea turtles, and spawning surfaces for invertebrates and fish, such as Pacific herring. Indeed, eelgrass is an essential refuge, foraging, and spawning habitat for many marine species, including such economically valuable species as Pacific salmon, Pacific herring, and Dungeness crab.[35] Dungeness crab adults are found in subtidal or intertidal areas on sand, mud, or associated with eelgrass beds. Bare habitats are infrequently used by juveniles, most likely due to a lack of refuge from predation and decreased food abundance. Vegetated, intertidal estuaries appear to be important nursery habitats for young crabs.[36] Eelgrass also is a source of organic carbon in estuarine and nearshore marine food webs, thus contributing to productivity beyond the eelgrass beds themselves. In addition, eelgrass has the capacity to sequester carbon in the underlying sediments and may help offset carbon emissions.[37]

Many species that depend on eelgrass are highly migratory. If these species are adversely affected by the loss of habitat in Humboldt Bay, the effects will be seen throughout the California coast and beyond. The uneven distribution of eelgrass resources increases the risk to this habitat and contributes to its dynamic nature. Moreover, the narrow depth range within which eelgrass can occur further places this habitat at risk in the face of global climate change and projected sea-level rise.

### B. Eelgrass Is Protected by State and Federal Law and Policy.

The importance of protecting eelgrass is further reflected in state and federal regulations. California regulations prohibit cutting or disturbing eelgrass.[38] Aquaculture leases produced by the California Department of Fish and Wildlife ("DFW") reflect this regulation by including explicit language in lease agreements that eelgrass "may not be cut or disturbed."[39] DFW further requires a 10-foot buffer between the eelgrass and the aquaculture gear.[40] In San Francisco Bay, the Subtidal Goals Project recommends protecting existing, established eelgrass beds by

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[35] Plummer, M., et al. 2013. The Role of Eelgrass in Marine Community Interactions and Ecosystem Services: Results from Ecosystem-Scale Food Web Models. Ecosystems, Volume 16, Issue 2, pp 237-251.

[36] University of Washington. 2015. Encyclopedia of Puget Sound: Dungeness Crab.

[37] Simenstad, C. A., and R. C. Wissmar. 1985. Delta carbon-13 evidence of the origins and fates of organic carbon in estuarine and nearshore food webs. Mar. Ecol. Prog. Ser. 22:141-152.

[38] 14 C.C.R. § 30.10.

[39] DFW. 1985. Lease agreement between Cove Mussel Company and DFW. Sacramento, CA.

[40] Ramey, K. DFW. Pers. Comm. 2015.

establishing eelgrass reserves.[41] The Harbor District's own Humboldt Bay Management Plan also requires that project proponents first avoid impacts altogether, then proceed to minimize those impacts.[42]

The National Marine Fisheries Service ("NMFS") developed a specific policy to protect eelgrass habitat in California. The California Eelgrass Mitigation Policy and Implementing Guidelines ("CEMP") notes that "eelgrass warrants a strong protection strategy because of the important biological, physical, and economic values it provides, as well as its importance to managed species under the Magnuson-Stevens Fishery Conservation and Management Act ("MSA"). Vegetated shallows that support eelgrass are also considered special aquatic sites under the 404(b)(1) guidelines of the Clean Water Act (40 C.F.R. § 230.43)."

Federal fisheries management regulations protect eelgrass habitat due to its vital role in supporting commercially targeted fish populations. The Fishery Management Plan for the Pacific Coast Groundfish Fishery and regulations implementing essential fish habitat ("EFH") designations for this fishery include Humboldt Bay as a Habitat Area of Particular Concern ("HAPC") for Estuaries and for Sea Grass.[43] A HAPC is an area within designated EFH that is "rare, particularly susceptible to human-induced degradation, especially ecologically important, and/or located in an environmentally stressed area. HAPC designations are used to provide additional focus for conservation efforts."[44] In designating sea grass habitat as an HAPC, fishery managers noted that it has great ecological importance and is sensitive to human-induced environmental degradation.

The Pacific Fishery Management Council ("Council") reviewed the DEIR and stated its opposition to the proposed project due to its adverse impacts to EFH for groundfish, salmonids, and coastal pelagic species. The Council specifically supported the Eelgrass Avoidance Alternative, and No Net Loss of Eelgrass. In a draft letter for consideration at the Council's September meeting, the Council's Habitat Committee reiterated its concerns by enclosing its December 2015 letter on the DEIR and noting its continued concern with regard to the Project described in the RDEIR. The Committee expressed particular concern regarding the Project's expected impacts on the eelgrass HAPC, which is designated as Essential Fish Habitat in the groundfish, salmon and coastal pelagic species Fisheries Management Plans.[45]

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[41] San Francisco Bay Subtidal Goals Habitat Project Report. 2011. California Coastal Conservancy.

[42] Humboldt Bay Harbor, Conservation and Recreation District. 2007. Humboldt Bay Management Plan.

[43] Pacific Coast Groundfish Fishery Management Plan. Essential Fish Habitat Designation and Minimization of Adverse Impacts Final Environmental Impact Statement Prepared by National Marine Fisheries Service Northwest Region; 50 C.F.R. §§ 660.395, 660.399.

[44] NOAA Fisheries. 2015. Habitat Areas of Particular Concern. http://www.westcoast.fisheries.noaa.gov/habitat/habitat_types/HAPC.html.

[45] Pacific Fishery Management Council, Habitat Committee. 2016. Draft letter for Council consideration at September meeting. At: http://www.pcouncil.org/wp-content/uploads/2016/08/C1_Att2_Humboldt_Aquaculture_Ltr_SEPT2016BB.pdf

### C. The RDEIR Fails to Meet the "No Net Loss" Standard for Determining Significance of Impact to Eelgrass Habitat and Function

The RDEIR states that it "incorporates … a 'no net loss' threshold of significance for eelgrass impacts" as required under CEQA and the Coastal Act and noted in DEIR comment letters from permitting agencies.[46] The No Net Loss policy is the primary directive of NMFS' CEMP. According to the CEMP, "It is NMFS' policy to recommend no net loss of eelgrass habitat function in California. For all of California, compensatory mitigation should be recommended for the loss of existing eelgrass habitat function, but only after avoidance and minimization of effects to eelgrass have been pursued to the maximum extent practicable."[47] NMFS formulated the CEMP specifically because eelgrass is uniquely ecologically important, productive, and sensitive, and its function cannot be replaced with manmade structures or other habitat types. The CEMP further notes that "while improvements in eelgrass management have occurred overall, the importance of eelgrass both ecologically and economically, coupled with ongoing human pressure and potentially increasing degradation and losses associated with climate change, highlight the need to protect, maintain, and, where feasible, enhance eelgrass habitat."

However, the Project fails to meet the No Net Loss standard. As explained below, actual impacts to eelgrass habitat far exceed those estimated in the RDEIR. Even the RDEIR's own misguided estimate that the Project would result in significantly reduced eelgrass density in 22 to 17.1 acres of the North Bay represents a significant net loss of eelgrass. Moreover, the Project does not propose any mitigation for impacts from renewed operations within the existing 300-acre footprint of operations or for the proposed Phase 2 expansion of 412 acres of 10-ft. longline double-hung longline, and proposes inadequate mitigation for the proposed Phase 1 expansion (150 acres of 10-ft. spaced double-hung longline and 50 acres of 10-ft. spaced basket-on-longline). Overall, the Project would result in a significant net loss of eelgrass habitat for Humboldt Bay and the entire state.

**The RDEIR's Eelgrass Analysis Is Fundamentally Flawed and Conclusions Based on It Are Invalid**

The RDEIR's analysis of impacts to eelgrass habitat suffers from several fundamental flaws that ultimately render its "no significant impact" conclusions entirely invalid. First, the RDEIR's eelgrass analysis continues to rely on an invalid assumption that eelgrass loss only occurs in a narrow zone under and immediately adjacent to longlines. The RDEIR thus vastly underestimates the extent of eelgrass loss throughout the Project site. Second, the RDEIR misinterprets and misapplies relevant study results presented by Rumrill & Poulton (2004)[48] and Rumrill (2015)[49] to suggest that installing oyster longlines at 10-ft. spacing in previously unused

[46] RDEIR at 1-2.

[47] CEMP at 1.

[48] Rumrill, S. and V. Poulton. 2004. Ecological role and potential impacts of molluscan shellfish culture in the estuarine environment of Humboldt Bay, CA. Western Regional Aquaculture Center Annual Report November 2004. 79 p.

[49] "Answers to Questions for Dr. Steve Rumrill regarding Rumrill and Poulton (2004)" Compiled by Korie Schaeffer, NMFS (April 3, 2015) ("Rumrill (2015)").

areas will not cause a significant decrease in eelgrass. Third, the RDEIR does not adequately account for impacts to eelgrass habitat caused by trampling and numerous sublethal effects. Finally, the RDEIR attempts to discount significant impacts to eelgrass habitat and species dependent on it by asserting that aquaculture gear and fragmented eelgrass habitat (which the RDEIR calls a "habitat mosaic") will provide habitat for a different suite of species.

### A. RDEIR Vastly Underestimates Impacts to Eelgrass that Occur Throughout Cultured Plots

The RDEIR's Revised Eelgrass Impact Analysis for its proposed expansion (Phase 1 and Phase 2) continues to rely on the flawed assumption that eelgrass loss only occurs in a narrow zone under and immediately adjacent to longlines. In comments on the DEIR, our organizations, as well as the Department of Fish and Wildlife, California Coastal Commission, and Pacific Fishery Management Council, explained that this assumption and the analytical approach based on it were invalid. Nonetheless, the RDEIR continued to use a slightly modified version of that invalid analysis. As with the DEIR, the RDEIR's flawed assumptions lead to invalid conclusions.

Coast presents five "impact scenarios" that estimate impacts by "accounting for the mechanisms of effect that may extend beyond the footprint of individual culture lines, including stranding, physical abrasion, trampling, and shading by incorporating two-tiered impact zones, with the central tier assumed to result in complete exclusion of eelgrass and a slightly wider zone where eelgrass density is predicted to decrease by a lower amount."[50] As we have explained in our prior comments, this "width of effect" approach is not based on the best available information.

Coast bases its "width of effect" analysis largely on Rumrill & Poulton (2004). However, the samples in the Rumrill & Poulton (2004) were randomly selected along survey transect lines in the *entire plots*, not just under the longlines. In other words, the study measured changes in eelgrass density both under the longlines and between them. In April 2015, the study's lead author, Dr. Steven Rumrill, provided clarification regarding the methods and results of the 2004 study, particularly for the changes the study found in eelgrass density and percent cover within plots in a recently dredged area and in a separate area that had not been recently dredged. In a memorandum to NMFS (Rumrill (2015)), Dr. Rumrill clarified that the changes that the study found in eelgrass turion density and spatial cover represent conditions throughout the entire plot, not just under the longlines.

Coast's erroneous assumption that aquaculture operations primarily cause decreases in eelgrass density within a very narrow zone directly under and adjacent to the longlines, and do not cause decreases between the longlines, renders invalid Coast's analysis of losses in eelgrass density in the proposed expansion area.

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[50] Confluence Environmental Company. 2016. Coast Seafoods Shellfish Aquaculture Humboldt Bay Permit Renewal and Expansion Project Revised Eelgrass Impacts Analysis. 2016.

### B. RDEIR Relies on Misinterpretations of Relevant Studies to Find No Significant Impact to Eelgrass Density and Function

Coast relies on this flawed analytical approach to reach its conclusion that "the best available science indicates that effects to eelgrass at a 10-ft. single longline spacing do not result in an overall loss to eelgrass habitat, and eelgrass habitat associated with shellfish aquaculture can potentially have higher or equivalent densities compared to control or reference plots (Rumrill and Poulton 2004)."[51]

This conclusion is based on a fundamental misinterpretation of Rumrill and Poulton (2004). As Dr. Rumrill clarified in 2015[52], the study compared eelgrass spatial cover and density between control plots and plots that had recently been dredged and then had longlines installed at various spacings. That portion of the study thus looked at how well eelgrass recovered from severe disturbance under different longline spacing regimes. It did not test what the effect of those spacing regimes would be on undisturbed eelgrass areas, like the ones at issue for this Project. For previously dredged areas, the study found that, compared to control areas, areas where longlines were installed with 10-ft spacing had 11 percent lower eelgrass spatial cover and 16 percent lower eelgrass density.

Dr. Rumrill also provided clarification on the component of this study that sampled eelgrass spatial cover and density in large-scale areas in the bay that had not been dredged – like the areas at issue for this Project – before having longlines installed. That sampling revealed that in areas where longlines were installed with 10-ft. spacing, eelgrass spatial cover was reduced by 45-58 percent and density was reduced by 45-67 percent compared with control areas. Importantly, the study author considers this latter set of values to constitute the best estimate of the impact of oyster longline spacing on eelgrass habitat: "[t]he level of loss for eelgrass beneath the large-scale oyster-on-cultch longlines can be estimated from the transect data collected in areas EB 1-1 and EB 6-2 by comparison of the average spatial cover and density values against the eelgrass metrics measured in the adjacent control plots."[53]

Based on its misapplication of Rumrill & Poulton (2004), Coast calculates that impacts to eelgrass from Phase 1 would be a loss of 2.2 to 17.1 acres, depending on the corresponding "impact scenario."[54] For Phase 2, consisting of 412 acres of single-hung, 10-ft spaced longlines, Coast cites Rumrill and Poulton (2004): "eelgrass at this [10-ft.] line spacing was equal to (or exceeded both the control and reference sites by the end of the study period, even with elevation differences between reference sites." Coast then concludes there is unlikely to be any net loss of eelgrass in Phase 2.[55] Even the RDEIR's incorrect analysis fails to support its "no significant impact" conclusion, as losing multiple acres of scarce and important eelgrass habitat is quite

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[51] Eelgrass Impacts Analysis at 32.

[52] Rumrill (2015).

[53] Rumrill (2015) at 15, referring to Tables 6 and 7.

[54] RDEIR at 6.5-49.

[55] RDEIR at 6.5-53.

significant. Had the RDEIR used the study correctly, however, it would have shown that the Project's actual impact is even more significant and, in fact, unacceptable.

### C. RDEIR Fails to Adequately Account for Trampling Impacts and Sublethal Impacts

The RDEIR underestimates likely impacts to eelgrass from trampling. The RDEIR analyzes potential effects of trampling in its Maximum Impact Scenario, which would result in a loss of 17.1 acres of eelgrass spatial cover in the 210-acre Phase 1 expansion area.[56] However, the impacts of trampling are likely to be both greater, and different, than the modeled scenario Coast presents, hence the finding of No Significant Impact from trampling (Impact BIO-4) is invalid.

The RDEIR indicates "culch on longline requires approximately one day per month for each 10-acre area to monitor and repair lines, and 2 days per acre every 18 to 36 months to plant and harvest."[57] The RDEIR then makes the following speculative statements that lack any supporting information: "it assumed that "each footprint results in a trampling area 0.05m$^2$ with a stride length of 0.3 m" and "for proposed aquaculture activities it is likely that recovery would occur within this one month period…" [58] The RDEIR cites a 2004 study from Willapa Bay, WA, where non-native eelgrass "recovered [from trampling] within a 1-month period."[59] The RDEIR does not describe the nature of this trampling nor how it is similar or different from the proposed activities in Humboldt Bay. Figures 1a, 1b, and 1c provided by DFW, were taken June of 2016 and clearly show skiffs hauled onto eelgrass adjacent to farmed areas, and workers knee deep in mud within the farmed areas. The trampling impact analysis, Impact BIO-4, provided in the RDEIR does not acknowledge or discuss the depths to which these Coast workers sink into the mud, or how these observable activities compare with their modeled impact area from trampling.

The impact analysis also fails to consider non-lethal impacts to eelgrass. The impacts from aquaculture to eelgrass and mudflat habitats are well documented in the literature and include impacts from shading, trampling, sedimentation and erosion, anchoring, and boat scarring, as well as biodeposition from psuedofaeces and feces, among others.[60] A study evaluating oyster stake culture in Willapa Bay, WA, found that eelgrass in aquaculture areas had smaller plants (32 percent smaller) and lower production (70 percent lower production) than in uncultivated areas,[61] and these authors note that "most research to date has shown that eelgrass is less dense within aquaculture than at similar tidal elevations outside aquaculture areas." In Coos Bay, OR, oyster stake culture in an intertidal eelgrass meadow reduced eelgrass cover by 75 percent relative to

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[56] RDEIR at 6.5-48 to 6.5-49.

[57] RDEIR at 6.5-54.

[58] RDEIR at 6.5-54.

[59] RDEIR at 6.5-55.

[60] DFW. 2015. Letter to the Humboldt Bay Harbor, Recreation and Conservation District.

[61] Tallis, H., J. Ruesink, B. Dumbauld, S. Hacker, and L. Wisehart. 2009. Oysters and aquaculture practices affect eelgrass density and productivity in a Pacific Northwest Estuary. Journal of Shellfish Research 28(2): 251-261.

nearby control areas.[62] In a subset of beds in Willapa Bay, eelgrass densities were approximately 60 percent lower in both long-line and dredged oyster beds relative to uncultivated areas.[63]

### D. RDEIR Incorrectly Dismisses Significance of Eelgrass Impacts by Asserting that the Project Will Foster a Different Habitat and Species Assemblage

In addition to the invalid finding of no significant impact from IMPACT BIO-3 above, Coast provides inadequate justification for its findings of less than significant impact from IMPACT BIO-2, changes to unstructured habitat from the addition of shellfish aquaculture gear. The RDEIR asserts that "both structured and unstructured habitats are important resources that create a mosaic of habitats and provide edges or transitional zones between two habitat types." The RDEIR uses this rationale to conclude that IMPACT BIO-2 "changes to unstructured habitat and the addition of shellfish aquaculture gear are considered less than significant under CEQA." The RDEIR's suggestion that replacing intact eelgrass habitat with a "mosaic of habitats" that provides equivalent habitat value was also presented repeatedly in the 2015 DEIR and is spurious. Research has found that intact natural habitats function differently and are more resilient than altered, degraded, or fragmented habitats.[64, 65, 66] In addition, estuarine and nearshore artificial habitats have been shown to be "poor surrogates" for natural habitats, as they support different assemblages of fish and invertebrates, facilitate establishment of non-native species, and do not function or provide the equivalent ecological services provided by natural habitat.[67,68] Similarly, the addition of aquaculture gear in eelgrass habitat will alter the vertical and horizontal structure of the habitat. This modification of structure will likely attract a different composition of fish and invertebrate species, while displacing others due to changes in habitat suitability or food availability.[69,70,71] The types of impacts referenced above could directly

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[62] Everett, R., G. Ruiz and J. Carlton. 1995. Effect of oyster mariculture on submerged aquatic vegetation: an

[63] Wisehart, L., B. Dumbauld, J. Ruesink and S. Hacker. 2007. Importance of eelgrass life history stages to respond to oyster aquaculture disturbance. Mar. Ecol. Prog. Ser. 344:71-80.

[64] Harrison, S. & E. Bruna. 1999. Habitat fragmentation and large-scale conservation: what do we know for sure?. Ecography. 22(3): 225-232.

[65] Wilcove, D., McLellan, C. & A. Dobson. 1986. Habitat fragmentation in the temperate zone. Conservation Biology. 6: 237-256.

[66] Wilcox, B. & D. Murphy. 1985. Conservation strategy: the effects of fragmentation on extinction. American Naturalist. 879-887.

[67] Glasby, T., Connell, S., Holloway, M. & C. Hewitt. 2007. Nonindigenous biota on artificial structures: could habitat creation facilitate biological invasions?. Marine Biology. 151(3): 887-895.

[68] Moschella, P., Abbiati, M., Åberg, P., Airoldi, L., Anderson, J., Bacchiocchi, F. & Hawkins. 2005. Low-crested coastal defence structures as artificial habitats for marine life: using ecological criteria in design. Coastal Engineering. 52(10): 1053-1071.

[69] Erbland, P. & G. Ozbay. 2008. A comparison of the macrofaunal communities inhabiting a *Crassostrea virginica* oyster reef and oyster aquaculture gear in Indian River Bay, Delaware. Journal of Shellfish Research. 27(4): 757-768.

[70] Pinnix, W., Shaw, Y., Acker, K. & N. Hetrick. 2005. Fish communities in eelgrass, oyster culture and mudflat habitats of north Humboldt Bay, California, Final Report. US Fish and Wildlife Service, Arcata, California Technical Report Number TR2005-02.

change the habitat and species composition at the altered site but is likely to also have impacts that extend into the adjacent "intact" habitat.[72,73]

In addition, the RDEIR improperly dismisses the significance of impacts to eelgrass habitat by suggesting that the introduction of manmade structures and edge habitat will attract a diverse assemblage of new species even if it harms species that currently depend on existing eelgrass habitat. However, under CEQA, the RDEIR must consider impacts to specific sensitive species and habitats; it is not sufficient to suggest that some other assemblage of species and habitats will take their place, thus providing a supposedly equivalent environmental value. Causing a shift in the habitat and species assemblage in the North Bay is a significant impact on the environment that must be addressed.

**Proposed "Conservation Measures" and Mitigation Measures Do Not Adequately Prevent, Reduce, or Mitigate Adverse Impacts to Eelgrass Habitat**

As means to arrive at a "no significant impact" conclusion, the RDEIR proposes Conservation Measures BIO-1 through 9[74], Mitigation Measure BIO-1[75], and an Adaptive Management and Monitoring Plan.[76] None of these measures, alone or together, suffice to render the Project's impacts on eelgrass less than significant.

It is worth noting at the outset that Coast has done little to avoid eelgrass in its proposed siting, despite applicable legal requirements and multiple requests by trustee, advisory, and permitting agencies to pursue an Eelgrass Avoidance Alternative. As explained further below, Coast's refusal to analyze such an alternative on the basis that it would reduce the size and profitability of operations is inconsistent with CEQA requirements. The conservation and mitigation measures that Coast offers instead of avoiding eelgrass are not nearly adequate to meet CEQA requirements.

The primary eelgrass mitigation proposed in the RDEIR is Mitigation Measure BIO-1, which involves converting 100 acres of Coast's existing culture footprint from 2.5-ft. spaced, single-hung culch-on-longline to double-hung culch-on-longline. The RDEIR assert that this measures, when implemented along with the other Conservation Measures, will mitigate impacts to eelgrass associated with Phase 1 (totaling 210 acres of new oyster culture primarily in eelgrass) to a less than significant level. That assertion is wrong on multiple counts.

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[71] Tallman, J. & G. Forrester. 2007. Oyster grow-out cages function as artificial reefs for temperate fishes. Transactions of the American Fisheries Society. 136(3): 790-799.

[72] Forrest, B. & R. Creese. 2006. Benthic impacts of intertidal oyster culture, with consideration of taxonomic sufficiency. Environmental Monitoring and Assessment. 112(1-3): 159-176.

[73] Tanner, J. 2005. Edge effects on fauna in fragmented seagrass meadows. Austral Ecology. 30(2): 210-218.

[74] RDEIR at 6.5-110-111.

[75] RDEIR at 6.5-111.

[76] RDEIR at 6.5 117.

As described above, 10-ft. spacing has very substantial effects on eelgrass spatial cover and density, even without accounting for potential non-lethal effects to this rare habitat type. The RDEIR's assertion that Phase 1 of the project "is calculated to result in a net neutral or potentially beneficial overall impact to eelgrass density (Table 6.5.14)"[77] is wrong. Mitigation Measure BIO-1 may lead to some recovery from and mitigation for impacts stemming from continued culture operations, but it is not nearly sufficient to offset losses in spatial cover and density of 45 percent or more – the likely level of impacts suggested by Rumrill & Poulton (2004) – across nearly 200 acres of eelgrass habitat. Moreover, the RDEIR's assertions that "eelgrass recovery in areas where eelgrass suppression is removed by increasing line spacing is likely to be rapid and exceed the recovery rates implied in the CEMP" and "this infilling process is expected to be rapid"[78] are not supported by science.

Coast then proceeds to develop a misinterpretation of the CEMP, culminating in the statement "…eelgrass recovery in areas where eelgrass suppression is removed by increasing line spacing is likely to be rapid and exceed the recovery rates implied in the CEMP." [79] The RDEIR's predicted rapid rates of recovery for eelgrass in so-called mitigation areas are wholly unsupported by the CEMP. In contrast to the RDEIR assumptions, the CEMP notes low rates of success in eelgrass restoration efforts in the region, noting that for northern California, "[f]or mitigation activities that occur concurrent to the action resulting in damage to the existing eelgrass habitat, a starting ratio of 4.82 to 1 (transplant area to vegetated cover impact area) should be recommended based on a 75 percent failure rate over the past 25 years (four transplant actions). That is, for each square meter of eelgrass habitat adversely impacted, 4.82 square meters of new habitat with suitable conditions to support eelgrass should be planted with a comparable bottom coverage and eelgrass density as impacted habitat."[80]

The CEMP further notes that "[d]egradation of existing eelgrass habitat that results in a permanent reduction of eelgrass turion density greater than 25 percent, and that is a statistically significant difference from pre-impact density, should be mitigated based on an equivalent area basis. Mitigation for reduction of turion density without change in eelgrass habitat area should be on a one-for-one basis either by augmenting eelgrass density at the impact site or by establishing new eelgrass habitat comparable to the change in density at the impact site. For example, a 25 percent reduction in density of 100-square meters (100 turions/square meter) of eelgrass habitat to 75 turions/square meter should be mitigated by the establishing 25 square meters of new eelgrass habitat with a density at or above the 100 turions/square meter pre-impact density."

In addition, the RDEIR offers no scientific support for its statement that "initial impacts associated with longline placement may result in some initial loss of eelgrass function through

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[77] RDEIR at 6.5-112.

[78] Eelgrass Impact Analysis at 35.

[79] RDEIR at 6.5-114.

[80] CEMP at page 22.

trampling, but recovery for these activities is expected within 1 month, and other potential impacts will occur over a 2-year period."[81]

The RDEIR does not propose any mitigation for Phase 2, comprised of installing 412 acres of single-hung longline at 10-ft. spacing. Rather, Coast incorrectly asserts that "[c]ultch-on-longline spaced at 10-ft. intervals has been shown to result in no net loss of eelgrass (see discussion in Sections 6.5.4 and 6.5.7). This impact assumption will be verified via monitoring of Phase 1 culture (6 acres of 10-ft., single hung cultch will be planted in Phase 1) prior to implementation of Phase 2."[82] As discussed above, Coast's assertion that spacing gear at 10-ft. intervals does not result in any net loss of eelgrass is wrong. Its suggestion that vague, deferred mitigation and monitoring can justify a "no significant effect" finding is also wrong.

Coast suggests that implementation of "adaptive management" and associated "intensive ecological monitoring" will "achieve and maintain no-net-loss of ecological function of eelgrass."[83] Neither the "2016 eelgrass monitoring framework" provided in Appendix H of the RDEIR nor the "decision tree-adaptive management"[84] provide sufficient specificity to guarantee that specific mitigation measures would be implemented or that they would be effective in actually mitigating the harm to eelgrass. As such, they are not sufficient to meet CEQA requirements.[85]

The RDEIR proposes several other measures but fails to provide compelling evidence that they would be effective: Conservation Measures BIO-2, 10-ft. longline spacing for new shellfish culture plots, and alternating 9- and 16-ft. spacing for basket–on-longline as a means to reduce impacts to eelgrass. Yet, as described above, installing new gear in this configuration still would have substantial impacts on eelgrass habitat and species that depend on it.

Conservation Measures BIO 5-7, pertaining to field practices of skiffs, larger work boats, and the longline harvester, would help to minimize impacts if implemented. These conservation measures would require changes in at least some aspects of current practice, as illustrated by the fact that Coast's vessels and workers have been documented to haul up on eelgrass beds, as shown in Figures 1a and 1b.

Finally, the RDEIR fails to adequately evaluate the impact of double-hung versus single-hung longlines for the 250 acres in which this novel approach is proposed, in terms of potential increased worker visits, oyster growing efficiency, and impact to carrying capacity and other biological elements. This concern was also raised by the Habitat Committee of the Council in its

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[81] RDEIR at 6.5-115.

[82] RDEIR 4-17.

[83] RDEIR at 6.5-117.

[84] RDEIR at 6.5-116.

[85] *See, e.g., Sundstrom v. County of Mendocino* (1st Dist. 1988) 202 Cal. App. 3d 296, 308-11 (lead agency may not base no impact finding on presumed success of mitigation measures that have not been fully formulated at time of project approval; future mitigation measures must be specific, enforceable, and clearly adequate to eliminate significant impacts).

September 2016 draft letter pertaining to the RDEIR for Council consideration at its September meeting.

**The RDEIR Fails to Analyze Future Impacts Caused by Continuation of Existing Operations**

The RDEIR unlawfully fails to analyze the future impacts of continuing existing operations to special status species, riparian habitats and sensitive natural communities, wildlife corridors, nursery sites, and federally protected wetlands. The proposed Project includes Coast's request for a renewal of its regulatory approvals for 294.5 acres of existing shellfish culture, including intertidal cultch- and basket-on-longline culture, intertidal nurseries, subtidal FLUPSY rafts, subtidal wet storage floats and subtidal clam rafts. Existing operations are thus part of the Project impacts that must be analyzed. Indeed, Coast does not deny that, if approved, the continuation of these operations will have impacts on eelgrass, birds, fish species, and other components of the environment. An analysis of continued impacts from existing operations is essential to completing an accurate assessment of the cumulative impacts of continued operations, hundreds of acres of proposed expanded operations, and the Harbor District's proposed aquaculture project.

This analysis is particularly essential in light of the fact that existing operations have likely significantly reduced eelgrass structure and function in nearly 300 acres relative to areas not in cultivation. In 2006, the Coastal Commission found that Coast's operations were having and would continue to have significant adverse effects on eelgrass. In its 2006 Finding, the Commission notes:

> [T]here 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 … 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.[86]

Rumrill (2015) also supports the conclusion that existing operations with 2.5 ft. spacing significantly degrade eelgrass density and function. Compared with controls, in both experimental and sampled plots in North Bay, eelgrass spatial cover is reduced 92-93 percent and eelgrass density in the North Bay is reduced by 83 percent to 94 percent.[87] The RDEIR contains no analysis to indicate otherwise.

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[86] California Coastal Commission. 2006. Final Adopted Findings on CDP Application E-06-003, at 26.

[87] Rumrill 2015 at 18-19.

**The Proposed Project Would Have Significant Adverse Impacts on Pacific Herring**

The RDEIR fails to acknowledge significant adverse impacts to Pacific herring. Contrary to the RDEIR's "no significant impact" finding, the Project would cause severe harm to herring by excluding them from half of their core spawning habitat in the North Bay, decreasing egg and larvae survival, degrading eelgrass habitat necessary for spawning, and depleting the planktonic food supply (discussed below). These effects are significant not only for herring, but for the multiple predators that depend on them.

Herring are critically important as prey for salmon and other fish species, cetaceans, pinnipeds, shorebirds, and seabirds. As a result, DFW's statewide herring commercial fishery program requires that management measures "safeguard herring as an important forage species for all living resources of marine and estuarine ecosystems that utilize herring as a food source."82 Recent analyses of predator diets in the California Current System (British Columbia through Baja California) highlight the importance of herring to predators. For 32 predators evaluated in this region, Pacific herring ranks as the fourth most significant prey species out of a total of 27 prey species.[88] Humboldt Bay is the third most important herring spawning site in California, after San Francisco and Tomales Bays.

As the RDEIR notes, the 622-acre expansion area overlaps with approximately 310 out of 1,274 acres that DFW has delineated as essential herring spawning area. Moreover, the Project's existing 300-acre footprint already overlaps with this essential spawning area. The proposed project would thus overlap with and adversely affect roughly half of essential core herring spawning habitat in Humboldt Bay. As discussed below, herring appear to avoid spawning in the existing aquaculture areas. Preventing them from spawning in another 300+ acres of core habitat is clearly a very significant impact.

RDEIR Figure 6.5.24 includes information provided by DFW on the locations of herring spawning events in Humboldt Bay in 2015 and 2016. Herring appear to not have spawned within aquaculture plots. This observation is consistent with the Coastal Commission's 2015 comment on the DEIR that:

> In its authorization of Coast's existing operation in 2006, the Commission included several permit requirements to ensure that adverse impacts to Pacific Herring are avoided and minimized. These measures included limitations in the amount of culture activities occurring within the East Bay Management Area, an area that has historically been shown to support high levels of herring use, and surveys and annual reporting of observed herring spawn on or around aquaculture gear and cultured shellfish. In the nearly 10 years since this permit was issued, Coast has reported no observations of herring spawn on or around aquaculture gear in Humboldt Bay. Although the absence of such observations by Coast is not definitive evidence that

[88] Ainley, D., P. Adams, and J. Jahncke. 2014. Towards ecosystem based-fishery management in the California Current System – Predators and the preyscape: a workshop. Unpublished report to the National Fish and Wildlife Foundation. Point Blue Conservation Science. Petaluma, CA.

> herring would not spawn on aquaculture gear in the future, it appears to be a strong indication that use of aquaculture beds by herring is unlikely. Please revise the discussion of potential impacts to herring spawning to include this information about herring use of existing aquaculture areas in the East Bay Management Area.[89]

The RDEIR fails to respond to this request from the Coastal Commission. The RDEIR notes "there is no evidence to indicate Pacific herring are spawning on gear"[90] but fails to discuss the crucial implication of that finding. Namely, herring avoid spawning on aquaculture gear even when it is located within an otherwise preferred spawning area. If herring will not spawn on aquaculture apparatus, the Project would exclude Pacific herring from half of its most essential spawning grounds in Humboldt Bay. Reducing available spawning grounds could lead to significant decreases in spawning, which could significantly affect the overall herring population. This is clearly a significant impact.

The lack of evidence indicating that herring are spawning on aquaculture gear in the existing operation footprint is consistent with other scientific evidence. While herring will to some extent spawn on hard natural and artificial substrates, such as unsilted gravel and pilings, artificial surfaces do not provide the same quality spawning habitat as eelgrass.[91,92] Indeed, a study in Puget Sound found that "[t]he local disappearance of some eelgrass meadows has led to the cessation of herring spawning activity in particular areas."[93]

In West Coast estuaries, herring spawn preferentially in certain locations with certain areas representing persistent spawning sites.[94] Within spawning habitat, numerous factors, such as environmental variables and fish abundance, influence the locations where spawning occurs in a given year, and this spatial diversity of spawning locations promotes population resiliency and may enable the population to spawn in years with varying environmental conditions: "[t]he locations that support large and repetitive spawnings deserve the most attention and consideration from possible environmental impacts."[95]

The proposed Project's likely significant adverse impacts on herring are all the more serious in light of the reduced abundance of Pacific herring stocks on the West Coast,[93] including in

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[89] California Coastal Commission. 2015. Letter to the Humboldt Bay Harbor, Recreation and Conservation District.

[90] RDEIR at 6.5-88.

[91] Shelton. A., T. Francis, G. Williams, B. Feist, K. Stick and P. Levin. 2014. Habitat limitation and spatial variation in Pacific herring egg survival. Mar. Ecol. Prog. Ser. 514: 231-245.

[92] CDFW. 2014. Pacific herring commercial fishing regulations: Final Supplemental Environmental Document.

[93] Gaeckle, J.L., P. Dowty, H. Berry, and L. Ferrier. 2009. Puget Sound Submerged Vegetation Monitoring Project: 2008 Monitoring Report, Nearshore Habitat Program. Washington State Department of Natural Resources, Olympia, WA.

[94] Haegele, Schweigert, J. 2011. Distribution and Characteristics of Herring Spawning Grounds and Description of Spawning Behavior.

[95] Hay, D. 2013.Herring spawning areas of British Columbia: a review, geographic analysis, and classification. Fisheries and Oceans Canada. Internal Report.

Humboldt Bay. From 1974 to 2007, herring biomass estimates for Humboldt Bay averaged just under 400 tons.[94]

The RDEIR attempts to downplay the seriousness of these impacts by noting that "[t]here were successful detections of herring egg deposition in historical culture areas and areas directly adjacent to actively farmed oyster plots. While this does not provide information on spawning potential in culture areas, it does indicate these culture operations are not impeding spawning behavior."[96] This statement is inaccurate; the fact that no herring spawning has been detected in aquaculture areas since 2007 indicates that culture operations do impede spawning within farmed areas. Moreover, evidence indicates that routine maintenance operations associated with the Project are likely to disturb holding and spawning herring. The Washington Department of Fish and Wildlife notes that "[c]onservation of herring spawning habitat, and *minimizing disturbance in the prespawning holding areas* is key to the preservation of the herring stocks inside Puget Sound."[97] Pacific herring genetics and life history are similar along the West Coast, therefore, the same conservation needs apply in Humboldt Bay.

If herring were to begin to spawn on aquaculture gear, the RDEIR acknowledges that their eggs could be exposed to air more frequently and thus be at greater risk for desiccation.[98] The RDEIR attempts to dismiss this effect by asserting that "[i]ncreased mortality due to desiccation is likely to be offset by reduced predation pressure from invertebrates and fish during high tides."[99] It provides no data to support that assertion. In reality, there is uncertainty about the survivorship of herring eggs deposited on aquaculture gear relative to natural vegetated substrates, as shown by Palsson (1984).[100] This study evaluated egg survivorship on several types of artificial substrate (including: polypropylene and hemp rope, polyethylene netting, tubing and turf mats, and plastic sheeting) deployed within natural eelgrass habitat. Overall, total survival and larval production was significantly lower for the artificial substrates compared to natural eelgrass spawning substrate. Moreover, since herring do not appear to be spawning on aquaculture gear and from 2007-2015 Coast never once contacted DFW to report a spawning event, Mitigation Measure BIO-2 (herring egg monitoring and consultation with CDFW[101]) is unlikely to be applicable, let alone effective.

As explained above, the RDEIR offers little support for its conclusion that the Project would have a less than significant impact on eelgrass habitat, which is crucial for spawning Pacific herring. Because impacts to eelgrass and herring spawning are actually quite serious, we oppose the re-permitting or expansion of oyster farming operations in the East Bay Management Area, the most important herring spawning area in Humboldt Bay and the third most important in the

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[96] RDEIR at 6.5-89.

[97] Washington State Department of Fish and Wildlife. Pacific Herring Information Summary (emphasis added). http://wdfw.wa.gov/conservation/fisheries/PacificHerringInformation_121911.pdf

[98] RDEIR at 6.5-87 and Table at 6.5-69.

[99] RDEIR at 6.5-87.

[100] Palsson, W. 1984. Egg mortality upon natural and artificial substrata within Washington state spawning grounds of Pacific herring (*Clupea harengus pallasi*). MS thesis, University of Washington, Seattle, WA.

[101] RDEIR at 6.5-118.

state of California. Given the very high sensitivity and importance of eelgrass beds in the East Bay Management Area for eelgrass, Pacific herring, and the estuarine ecosystem, we recommend that existing aquaculture operations be removed from the East Bay Management Area entirely.

Finally, the RDEIR also fails to respond to the Coastal Commission's request to provide a full cumulative impacts analysis "to include an estimate of the combined total impact to Pacific herring from potential loss of spawning areas from both existing operations, the proposed project, and future projects in Humboldt Bay including the Harbor District's pre-permitting project."[102]

**The Proposed Project Would Have Significant, Unavoidable Impacts on Pacific Brant, Other Waterfowl, and Shorebirds**

**A. Humboldt Bay Provides Important Habitat for Brant**

According to the U.S. Fish and Wildlife Service's (FWS) 2015 comment on the DEIR: "[b]lack brant are a species of concern in California which are dependent on this ecosystem for survival. Humboldt Bay is the second largest estuary in California, and supports the largest stands of eelgrass between brant wintering grounds in Baja, Mexico and Willapa Bay, Washington. The assertion that there is more than sufficient eelgrass available is an unproven paradigm that unfortunately has been played out with irreversible results for other ecosystems and species in the past."[103] Researchers have noted "the need to conserve large eelgrass habitats along the Pacific Coast, and we suggest this may be exceptionally important for isolated staging areas, such as Humboldt Bay and San Quintin Bay. Since large, alternative feeding locations are not nearby, these remote bays may serve as critical sites for birds to better accumulate nutrient for migration and successful reproduction."[104]

Humboldt Bay is the most important spring staging area for brant in California and one of the most important in the entire Pacific Flyway. Notably, these eelgrass beds host up to 60 percent of the total brant population each year.[105] An estimated 80,000 birds use Humboldt Bay each year. In recent years, brant are increasingly found in the relatively quiet eastern section of the North Bay due to disturbance in the South Bay. FWS has initiated bay-wide surveys providing data confirming this trend, and in the first year of this survey (2015-2016), brant used the North Bay with equal or greater frequency than South Bay from December through February (three

[102] California Coastal Commission. 2015. Comment letter to the Humboldt Bay Harbor, Recreation and Conservation District on the DEIR.

[103] U.S. Fish and Wildlife Service. 2015. Comment to the Humboldt Bay Harbor, Recreation and Conservation District.

[104] Moore, J.E., M.A. Colwell, R.L. Mathis, and J.M. Black. 2004. Staging of Pacific flyway brant in relation to eelgrass abundance and site isolation, with special considerations of Humboldt Bay, California. Biological Conservation 115: 475-486.

[105] Pacific Flyway Council. 2002. Pacific Flyway management plan for Pacific brant. Portland, Oregon: Pacific Flyway Study Committee, U.S. Fish and Wildlife Service.

months) and use the north bay at lower frequency in March and April (two months).[106] Tests of significance were not provided.

We used eBird[107]to gain an increased understanding of recent brant use of the North Bay. We found eBird data show detections throughout the perimeter of the North Bay in 2010-2014 (Figure 2, with the highest numbers of birds reported in the north end of the bay).[108]

### B. The Project Would Have Significant Impacts on Black Brant

The RDEIR acknowledges that brant avoid feeding, walking in, or flying through longline plots at low tides, when they are actively foraging[109] and then incorrectly asserts that impacts to brant would be less than significant because "[b]ay-wide eelgrass available for brant should be reduced by less than 3 percent following the implementation of both phases of the revised plan."[110] As described above, the calculated 3 percent reduction in eelgrass available to brant is based on modeling results that are invalid due to a dramatic underestimate of the loss of eelgrass associated with longline aquaculture. This fundamental error renders invalid the conclusion of no significant impact for IMPACT BIO-25, potential impacts to black brant foraging from the expansion of oyster aquaculture in Humboldt Bay. Mitigation Measure BIO-1, the conversion of 100 acres of existing longline culture to 10-ft. spacing, and Mitigation Measure BIO-4, providing mitigation should monitoring show impacts to eelgrass, are above the Project's Adaptive Management threshold and will not mitigate this significant, unavoidable impact. Mitigation Measure BIO-4 actually defers mitigation and hence does not qualify as mitigation under CEQA.

The existing project includes 57 boat trips totaling 218 hours, per week. The RDEIR fails to evaluate the disturbance to brant from the impacts associated with proposed continued operations on 294.5 acres of oyster culture. The expanded project would add 18 more boat trips totaling 74 additional hours per week. This would bring the total presence of vessels per week to 75 trips and 292 hours.[111] The RDEIR fails to explain why this existing and increased vessel presence in the North Bay would not significantly impact this highly sensitive species. The RDEIR relies heavily on the model developed by Stillman et al.[112] to evaluate whether the Project would reach a 10 percent threshold for disturbance used as a benchmark for significant impacts and concludes this threshold would not be reached. This conclusion is invalid due to Coast's failure to evaluate

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[106] U.S. Fish and Wildlife Service. 2016. Unpublished data provided by E. Nelson.

[107] **eBird** is an online database of bird observations providing scientists, researchers and amateur naturalists with real-time data about bird distribution and abundance. eBird documents the presence or absence of species, as well as bird abundance through checklist data. http://ebird.org/content/ebird/about/

[108] Importantly, eBird observation points are not generated through survey design. Rather, the data reflect the number of birds observers see from accessible vantage points.

[109] RDEIR at 6.5-98.

[110] RDEIR at 6.5-100.

[111] RDEIR at 4-31.

[112] Stillman, R.A., Wood, K. A., Gilkerson, W., Elkinton, E., Black, J. M., Ward, D. H. and Petrie, M. (2015) Predicting effects of environmental change on a migratory herbivore. Ecosphere, 6(7), 114. http://dx.doi.org/10.1890/ES14-00455.1.

disturbance resulting from continued operations on 294.5 acres and the erroneous eelgrass analysis. Furthermore, even if the 10 percent threshold increase in disturbance would not be reached, Stillman, in comments on the DEIR, provided clarification that Coast had not correctly interpreted the key results (italics the author's): "*my interpretation of this figure is that any reduction in eelgrass abundance is predicted to increase stopover duration and reduce rates of mass gain. Doing this, my interpretation of this figure is that any increase in the time lost due to disturbance is predicted to increase stopover duration and reduce rates of mass gain*."[113]

FWS further notes in its comments on the 2015 DEIR: "[o]ur primary concerns involve what we consider a significant underestimation of the 'disturbance' impact that would result from the proposed expansion, as well as the lack of consideration for the impact reduced brant grazing would have on the eelgrass beds themselves, and potential cumulative impacts to brant from this and other proposed aquaculture projects combined with ever increasing incidental disturbance to brant from both recreation and commerce. Recent surveys indicate brant distribution on Humboldt Bay has shifted significantly, with spring of 2015 monitoring showing greater use of North Bay (192,400 bird use days) compared to South Bay (147,930 bird use days). While the exact reason has not been documented, hypotheses include increased disturbance on South Bay and improved eelgrass beds in North Bay, or likely a combination thereof." [114]

Brant are known to change their seasonal use patterns due to disturbance. In Washington, oyster farming activities were correlated with reductions in eelgrass abundance and, in turn, significant decreases in brant use-days.[115] Aquaculture activities, including oyster operations, have specifically been noted to negatively affect brant populations.[116,117] Additionally, persistent human disturbance, such as occurs during aquaculture operations, could reduce the amount of time black brant use Humboldt Bay and prevent populations from returning to historical levels.[118] Reducing winter food availability would decrease the ability of adults to breed and has the potential to decrease the brant population. The dependence of brant on eelgrass and other intertidal habitats leaves them vulnerable to the human activities that increasingly impact shallow

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[113] R. Stillman. 2015. Letter to the Humboldt Bay Harbor, Recreation and Conservation District on the DEIR (emphasis added).

[114] FWS 2015. Comment to the Humboldt Bay Harbor, Recreation and Conservation District.

[115] Wilson, U.W., and J.R. Atkinson. 1995. Black brant and spring-staging use at two Washington coastal areas in relation to eelgrass abundance. Condor 97: 91-98.

[116] Schmidt, P. 1999. Population counts, time budgets, and disturbance factors of black brant (*Branta bernicla nigricans*) at Humboldt Bay, California. Master's Thesis. Humboldt State University. 58pps.

[117] Shuford, W. D. and Gardali, T., editors. 2008. Brant chapter in: California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

[118] Moore, J. and J. Black. 2006. Slave to the tides: spatio-temporal foraging dynamics of spring staging black brant. Condor 108, 661-677.

bays and estuaries along North America's coast, including the large-scale expansion of mariculture.[119]

Regarding the impacts of reduced brant grazing on eelgrass beds, FWS notes in its 2015 letter on the DEIR: "[w]hile numerous other agencies and experts have voiced concerns regarding the impact of aquaculture on eelgrass, there is an additional potential impact on eelgrass as a result of reduced brant grazing. Enhanced production by monocots after moderate grazing has been demonstrated in both terrestrial and marine ecosystems (McNaughton 1983, Moran and Bjorndal 2005, Valentine and Duffy 2006). Ferson (2007) conducted an experiment in Humboldt Bay to mimic the relationship between brant grazing and eelgrass productivity. The results showed that moderate grazing increased the below-ground biomass (rhizomes) and above-ground shoot biomass. There was even an increase (though not statistically significant likely due to sample size) in flowers, for a plant that primarily reproduces asexually. These results exemplify an important symbiosis between graminoid and grazer that exists in other ecosystems as well. Therefore, a significant reduction in brant grazing time is likely to impact the long-term health of eelgrass beds."

### C. Other Waterfowl

Humboldt Bay is very important for many species of waterfowl on the Pacific Flyway, including wigeon, greater and lesser scaup, pintail, canvasback, ruddy duck, surf scoter, and western grebe. Humboldt Bay has been designated by the National Audubon Society and BirdLife International as an Important Bird Area of national and global significance due to its importance to waterfowl and shorebirds. Humboldt Bay tidelands provide critical foraging habitat for waterbirds, especially during winter and migration periods. The RDEIR acknowledges that "boat traffic and the presence of personnel associated with visits to shellfish culture sites could disturb waterfowl and cause birds to flush from foraging areas and reduce temporal and/or spatial access to food."[120] Yet the RDEIR asserts that IMPACT BIO-31, energetic costs to waterfowl from the Project, are less than significant, based on the same unfounded modeling results used for black brant, while failing to account for the impacts of disturbance caused by the existing project. The RDEIR asserts that "waterfowl in the Bay are already somewhat habituated to the current level of human disturbance from boat traffic and other activities… their winter habitat use of the Bay is not particularly influenced by disturbance." [121] These statements are unsubstantiated.

The RDEIR further asserts that IMPACT BIO-32 — potential impacts to waterfowl from the expansion of oyster aquaculture in Humboldt Bay — is less than significant, even though the RDEIR acknowledges that "waterfowl avoid moving among shellfish beds at low tide."[122] The existing 300-acre Project makes wholly or partly unavailable seven percent of waterfowl foraging habitat, and the total Project would make wholly or partly unavailable 28.6 percent of

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[119] Ward, D.H., A. Reed, J.S. Sedings, J.M. Black, D.V. Dirkson, and P.M. Castelli. 2005. North American Brant: effects of changes in habitat and climate on population dynamics. Global Change Biology 11:869-880.

[120] RDEIR at 6.5-106.

[121] RDEIR at 6.5-106.

[122] RDEIR 6.5-107.

waterfowl foraging habitat, mostly in dense and patchy eelgrass.[123] Hence, contrary to the RDEIR's unsupported conclusion that impacts to waterfowl would be less than significant, the proposed project would likely adversely affect numerous waterfowl species by reducing their food supply and increasing disturbance.

Eelgrass has been noted as the most important single food item to waterfowl that winter in Humboldt Bay.[124] Waterfowl, including pintail, mallard, and green-winged and cinnamon teal feed on eelgrass seeds and infaunal bivalves.[125] Kelly & Evens (2013) found that many waterbirds are highly susceptible to disturbance and unlikely to habituate to it. Buffer distances well over 250 m. would be required to protect species including wigeon, greater and lesser scaup, goldeneye, surf scoter, canvasback, ruddy duck, grebes, mergansers, and loons from the negative impacts of motorized vessels.[126]As described above, the expanded project would bring 75 boat trips per week for a total of 292 hours. Yet the RDEIR fails to address the impacts of either existing or increased levels of disturbance to waterfowl.

### D. Shorebirds

The RDEIR notes that several shorebird species that occur in Humboldt Bay are FWS birds of conservation concern (lesser yellowlegs, whimbrel, long-billed curlew, marbled godwit, short-billed dowitcher, and red knot). The mudflats and eelgrass beds of Humboldt Bay have extraordinary importance at local, regional, and hemispheric scales for shorebirds. Large percentages of global populations of shorebirds rely on Humboldt Bay each winter and fall. On the Pacific Flyway, migratory and wintering sites for shorebirds continue to shrink with coastal development, reducing habitat for these birds and increasing the importance of fairly intact existing sites such as the EBMA in Humboldt Bay. Shorebirds are generally in a state of decline. Yet the RDEIR concludes that impacts to shorebirds will be less than significant and provides no mitigation for loss of eelgrass habitat or increased disturbance to shorebirds. The finding of less than significant impact is unsubstantiated, based on numerous factual inaccuracies and false statements, and contradicted by existing science.

**Status of Migratory Shorebirds and Importance of Humboldt Bay**

Migratory birds depend on a series of sites to provide resources and places to rest during physiologically challenging migrations. Threats to unprotected links in these chains of sites are driving rapid population declines of migratory birds around the world. Globally, 91 percent of migratory bird species have inadequate protected area coverage for at least some part of their annual cycle. Shorebirds are a group of migratory birds reliant on estuaries and are experiencing population declines. Loss of habitat due to anthropogenic impacts has been the primary driver of

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[123] RDEIR at 7-6.

[124] Yocum, C. and M. Keller. 1961. Correlation of food habits and abundance of waterfowl, Humboldt Bay, California. Calif. Fish Game 47:41-53.

[125] Schlosser, S., and A. Eicher. 2012. The Humboldt Bay and Eel River Estuary Benthic Habitat Project. California Sea Grant Publication T-075.

[126] Kelley, J., J. Evens, R. Stallcup, and D. Wimpfheiner. 1996. Effects of aquaculture on habitat use by wintering shorebirds in Tomales Bay, California. California Fish and Game 82(4): 160-174.

these losses in the U.S. and worldwide.[127] For the U.S., the 2014 State of the Birds Report[128] found that:

> …shorebirds are declining more than many other species groups. Long-term migration counts for 19 shorebird species show an alarming 50 percent decline since 1974. Declines are particularly strong for long-distance migrants that breed in the Arctic and boreal forest.

Coastal wetlands are among the most productive and ecologically important ecosystems in the world and are under increasing threat globally due to anthropogenic impacts and changing environmental conditions, such as sea-level rise.[129] In the last 100 years, California has lost more than 70 percent of its intertidal wetlands to anthropogenic alterations.[130] Humboldt Bay hosts highly productive intertidal areas: "[i]mpressive populations of vertebrate predators suggest that the secondary production of the mudflats is high,"[131] and "[t]he value and biological productivity of intertidal mudflats cannot be overemphasized. The bulk of the food organisms in Humboldt Bay consumed by fish and birds are produced here."[132] Humboldt Bay wetlands (intertidal areas and marshes) had been reduced by approximately 30 percent as of 1980.[133]

In 1998, Humboldt Bay was designated as a Western Hemisphere Shorebird Reserve Network (WHSRN) site of International Importance for shorebirds, supporting over 100,000 shorebirds annually. Its relatively intact, productive mudflat and eelgrass habitats attract large numbers of shorebirds. In addition to its International Importance, Humboldt Bay likely qualifies as a site of Hemispheric Importance, supporting over 500,000 birds annually, or, which account for more than 30 percent of the biogeographic population for a species (see table below).

Compared with other Pacific coast sites, Humboldt Bay supports a rich shorebird community in terms of species diversity. Forty-six species have been recorded, including approximately 30 encountered regularly.[134] In comparison, 24 species have been recorded at Grays Harbor, Washington, 38 species at San Francisco Bay, and 26 species at the Frazer River Delta in

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[127] Runge, C., J. Watson, S. Butchart, J. Hnason, H. Possingham, and R. Fuller. 2015. Protected areas and global conservation of migratory birds. Science Vol 350:6265

[128] North American Bird Conservation Initiative, U.S. Committee. 2014. The State of the Birds 2014 Report. U.S. Department of Interior, Washington, D.C. 16 pages.

[129] Bildstein, K.L. et al. 1991. Approaches to the conservation of coastal wetlands in the Western Hemisphere. The Wilson Bulletin 103:218-254.

[130] Speth, J. 1979. Conservation and management of coastal wetlands in California. Studies in Avian Biology 2:151–155.

[131] Barnhart, R., Boyd, M., Pequegnat, J. Ecology of Humboldt Bay, California: an estuarine profile. 1992. U.S. Fish and Wildlife Service.

[132] Schlosser, S., and A. Eicher. 2012. The Humboldt Bay and Eel River Estuary Benthic Habitat Project. California Sea Grant Publication T-075. 246 pp.

[133] Colwell, M. 1994. Shorebirds of Humboldt Bay, California: abundance estimates and conservation implications. Western Birds 25:137-145.

[134] Colwell, M. 1994. Shorebirds of Humboldt Bay, California: abundance estimates and conservation implications. Western Birds 25:137-146.

Canada, all designated WHSRN sites of Hemispheric Importance.[135] The reasons for the higher diversity of shorebirds using Humboldt Bay are not fully known but are suggested to be significantly correlated with substrate heterogeneity. This correlation suggests that tidal flats with more microhabitats (as represented by substrate variation) support more taxa.[136] In addition to open mudflat, many shorebirds also forage in the bay's "leopard skin" mudflat characterized by patches of eelgrass in small depressions. Species commonly found in this habitat are black-bellied plover, semipalmated plover, marbled godwit, black turnstone, long-billed curlew, dunlin, whimbrel, willet, long- and short-billed dowitchers, sanderling, and lesser and greater yellowlegs.[137] In sum, a combination of diverse habitats optimally support shorebird diversity as well as abundance in Humboldt Bay.

Within Humboldt Bay, the EBMA is the largest contiguous mudflat and has associated roosting areas at Arcata Marsh and Jacoby Creek in the northwest part of the bay. Wide expanses of mudflat located there provide the unobstructed habitat needed by western sandpiper and dunlin to optimize feeding and energetics (Figure 2). Observations recorded in eBird from 2010-2014 suggest higher shorebird counts in the East Bay Management Area compared to other areas in the north or south bay.[138] However, this is a qualitative assessment that does not control for sampling effort, which is not uniform around the bay. Quantifying the importance of the East Bay Management Area requires further study. Regardless, all unmodified mudflat habitat in the Bay is of essential importance to shorebirds.[139]

**Humboldt Bay Is an Essential Link in the Chain of Migratory Stopover and Wintering Sites for Pacific Flyway Shorebirds**

Migratory shorebirds are dependent on a sequence of sites, a "linked chain of areas essential for completing their annual cycles."[140] Indeed, the system can only function successfully if each link remains strong and the chain unbroken. Use of particular stopover sites is not random.[141] Humboldt Bay is a link in the Pacific Flyway chain for migratory shorebirds. For example, in 1996, 30 percent of western sandpipers fitted with radio tags at San Francisco Bay were relocated at Humboldt Bay on their spring migration north, providing evidence of the chain effect.[142]

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[135] Western Hemisphere Shorebird Reserve Network. 2016.

[136] Colwell, M. 1994.

[137] Schlosser & Eicher. 2012.

[138] Unpublished review of eBird data. 2016. Audubon California.

[139] Colwell. M. 2016. Letter to the Humboldt Bay Harbor, Recreation, and Conservation District.

[140] Myers, J.P. et al. 1987. Conservation Strategy for Migratory Species. American Scientist 75:19-26

[141] Warnock, N., J.Y. Takekawa, and M.A. Bishop. 2004. Migration and stopover strategies of individual dunlin along the Pacific coast of North America. Can. J. Zool. 82: 1687–1697.

[142] Bishop, M.A., Warnock, N. & Takekawa, J.Y. 2006. Spring migration patterns in Western Sandpipers *Calidris mauri*. *Waterbirds around the world*. Eds. G.C. Boere, C.A. Galbraith & D.A. Stroud. The Stationery Office, Edinburgh, UK. pp. 545-550.

Humboldt Bay is one of the three most important estuaries for shorebirds between the U.S.-Mexico border and the Fraser River Delta in Canada. It is the key estuary for shorebirds between San Francisco Bay to the south and Willapa Bay to the north and one of only three International or Hemispheric WHSRN sites between Mexico and Canada. With about 15,000 acres of mudflat at mean low tide, Humboldt Bay contains about half the amount of similar habitat in San Francisco Bay (29,000 acres), and 8-15 times more mudflat than Tomales and Bodega Bays (2000 acres and 900 acres, respectively).[143] As described below, Humboldt Bay is a critical wintering area—likely *the* critical wintering area—for the Beringean subspecies of marbled godwits.

**Selected Species of High Concern**

Table 1. Importance of Humboldt Bay to a subset of shorebird species using the bay primarily during migration (A) or winter (B).

| Species | Count[a] | Estimated Population[d] | Estimated % Population Reliant on Humboldt Bay[e] |
|---|---|---|---|
| *A) migration* | | | |
| Western Sandpiper | 100,000[b] | 3,500,000 | 22.86% |
| Least Sandpiper | 36,046 | 700,000 | 41.20% |
| Dunlin (Pacific breeding subspecies) | 56,115 | 550,000 | 81.62% |
| *B) winter* | | | |
| Marbled Godwit | 17,546 | 170,000 | 10.32% |
| Long-billed Curlew | 609 | 140,000 | 0.435% |

a: from Colwell & Danufsky 2006 unless otherwise noted. Danufsky. T. and M. Colwell. 2003. Winter shorebird communities and tidal flat characteristics at Humboldt Bay, CA. The Condor, 105(1):117-129. 2003
b: Colwell, M. 2015. Letter to Humboldt Bay Harbor, Recreation, and Conservation District.
c: Pacific Flyway Shorebird Survey. 2013. Note: Data are provided simply as north and south bay. Underlying raw data were not available from Pt Blue Conservation Science.
d: Andres, B.A., Smith, P.A., Morrison, R.I.G., Gratto-Trevor, C.L., Brown, S.C. & Friis, C.A. 2012. Population estimates of North American shorebirds, 2012. Wader Study Group Bull. 119(3): 178–194.
e: Assuming 100 percent turnover, twice a week for four weeks, for sandpipers and dunlin only. Godwit and curlew are winter residents and the population estimates are calculated directly from high counts.

**Western Sandpiper (*Calidris mauri*)**

The RDEIR asserts that "many species (e.g. western sandpipers) demonstrate plasticity in selecting stopover sites, thus allowing them to exploit food sources when available and to avoid predators. This is evidenced by large flocks of sandpipers routinely observed foraging on mudflats throughout Humboldt Bay for brief periods during migration. Because sandpipers demonstrate low site fidelity and rely on a very small proportion of the bay during migration, the Project (particularly given its generally low elevation) is unlikely to restrict foraging opportunities."[144] This assertion is unsupported and is contradicted by the best available

[143] Western Hemisphere Shorebird Reserve Network. 2016.

[144] RDEIR at 6.5-10.

information about western sandpipers and their use of Humboldt Bay, as well as by shorebird conservation ecology and status in general. The Project, particularly the 95.5 acres proposed in the EBMA, would have significant impacts to western sandpipers that are not mitigated.

An estimated 22.86 percent of all western sandpipers use Humboldt Bay each winter in their migratory cycle (Table above). This is likely an underestimate, based on more current observations. On April 17, 2012, expert birder David Fix counted 250,000 western sandpipers at one location in the EBMA. This single count represents seven percent of the global population of western sandpipers, 3.5 million.[145] The species is thought to be declining.[146] Habitat loss and degradation and disturbance, may be the most significant threats to western sandpipers.[147]

Three sandpipers—dunlin, least, and western sandpipers—account for 53-87 percent of all shorebirds using Humboldt Bay.[148] All three species, but especially western sandpiper and dunlin, primarily use open habitats, such as mudflats, during migration and winter. Species using open habitats tend to rely on fast flights from the ground to escape aerial predators, which can be a major source of morality in Pacific estuaries.[149,150] Thus, vegetation and topographical features are not perceived as safe but as obstructive cover, allowing undetected approach by aerial predators, and are generally avoided.[151] These species are known to avoid structures including aquaculture.[152,153] The Project includes 184.4 acres of patchy eelgrass that is likely heavily utilized by western sandpiper. This includes 95.5 acres in the East Bay Management Area, where eBird records report the largest flocks.

Western sandpiper and dunlin avoid cultured areas and do not go under structures in Tomales Bay.[154] Further "a net decrease in overall shorebird use of open tidal flats developed for aquaculture" was driven in large part by the avoidance of these areas by western sandpiper and dunlin, the two most abundant shorebirds in the bay.[155] The authors cite other studies showing that small losses in the extent or quality of available shorebird feeding habitat could result in proportionally greater decreases in wintering shorebird populations.

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[145] Fix, D. 2012. April 17. Ebird record from "Arcata Bay" hotspot, 40.8548512,-124.1050386

[146] Fernández, G., N. Warnock, D.B. Lank, and J.B. Buchanan. 2010. Conservation Plan for the Western Sandpiper (Calidris mauri). Version 1.1. Manomet Center for Conservation Sciences, Manomet, Massachusetts.

[147] Fernandez et al. 2010.

[148] Colwell, M. 1994.

[149] Page, G. & Whitacre., D. F. 1975 Raptor predation on wintering shorebirds. *Condor* 77, 73–83.

[150] Burns, J. G. and Ydenberg, R. C. 2002. The effects of wing loading and gender on the escape flights of least sandpipers (*Calidris minutilla*) and western sandpipers (*Calidris mauri* ). – Behav. Ecol. Sociobiol. 52: 128–136.

[151] Piet J. van den Hout,a Kimberley J. Mathot,b Leo R.M. Maas,c and Theunis Piersm. 2009. Predator escape tactics in birds: linking ecology and aerodynamics Behavioral Ecology doi:10.1093/beheco/arp146

[152] Kelley, J., J. Evens, R. Stallcup, and D. Wimpfheiner. 1996. Effects of aquaculture on habitat use by wintering shorebirds in Tomales Bay, California. California Fish and Game 82(4): 160-174.

[153] Fernandez et al. 2010.

[154] Kelley, J. 2016. Personal Communication.

[155] Kelley, J., et al. 1996.

**Dunlin (Calidris alpina)**

The RDEIR fails to evaluate the impacts of the existing operations of the Project on dunlin, even though an estimated 81.62 percent of the western Alaska breeding subspecies (*C. a. pacifica*)—the majority of the total population of dunlin rely on Humboldt Bay in the winter. This subspecies, numbering about 550,000, uses the Pacific Flyway exclusively and largely winters on the North Pacific coast from Baja to southern British Columbia.[156] The one-day high count for one site at Humboldt Bay reported in eBird by bird guide author David Fix, is 40,000 birds[157], more than seven percent of the total western subspecies and almost three percent of the total North American breeding population comprising three subspecies. Dunlin avoid structured natural and artificial habitats including aquaculture areas,[158,159] making the unmodified mudflat and patchy eelgrass of Humboldt Bay critically important to this species. As noted above, the 184.4 acres of patchy eelgrass and mudflat are essential foraging habitat for dunlin.

**Marbled Godwit (*Limosa fedoa*)**

The RDEIR barely mentions and fails to evaluate the impacts of the Project or existing operations to the marbled godwit, a species on the 2016 State of the Birds Watchlist, despite the fact that 10.32 percent of its global population winters on the bay (table above). Marbled godwit is among the species most at risk of extinction without significant conservation action.[160] The RDEIR states that "shorebirds are unlikely to forage in the 409 acres of the Project proposed in dense eelgrass beds; those areas experience frequent inundation and are of lower value to shorebirds compared to unvegetated mudflats, where shorebirds typically forage… in general, the elevation of the Project footprint is low in the tidal frame." [161] These statements are largely false. Marbled godwits forage on mudflats and in continuous and patchy eelgrass; in fact, marbled godwit correlates positively with eelgrass cover.[162] That Humboldt Bay is of substantial importance to the marbled godwit is evidenced by the choice of this species as the mascot of the biannual "Godwit Days" shorebird festival focused on the bay.

Further, the RDEIR unlawfully fails to mention or evaluate impacts to the Beringian subspecies of marbled godwit (*Limosa fedoa beringea*). Humboldt Bay is especially vital for this rare bird. Numbering only about 2,000 individuals, this species breeds only in a discrete area in southwest Alaska and winters from Washington to California, relying heavily on Humboldt Bay in the winter. This subspecies has a larger body and shorter beak than other marbled godwits and

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[156] Andres, B. et al. 2012.

[157] Fix, D. 2012. eBird observation at "Arcata Bay" hotspot: 40.8548512,-124.1050386.

[158] Kelley, J., J. Evens, R. Stallcup, and D. Wimpfheiner. 1996. Effects of aquaculture on habitat use by wintering shorebirds in Tomales Bay, California. California Fish and Game 82(4): 160-174.

[159] Kelly, J. 2016. Personal communication.

[160] State of the Birds Watchlist 2016.

[161] RDEIR at 6.5-108.

[162] Connolly, L. M., and M. A. Colwell. 2005. Comparative use of longline oysterbeds and adjacent tidal flats by waterbirds. Bird Conservation International 15:237–255.

represents an important part of the genetic diversity in the world population of this vulnerable species.[163]

**Long-billed curlew (*Numenius americanus*)**

Long-billed curlew, classified as "highly imperiled" and declining,[164] is considered one of the highest priorities for monitoring and conservation among the shorebird species breeding in the temperate region.[165] This highlights the importance of protecting wintering habitats such as Humboldt Bay, which supports a winter population of approximately 609 curlews equaling 0.435 percent of the global population of 140,000. The RDEIR falsely presents far lower curlew numbers using the bay (300 individuals), and higher global population estimates (161,000 individuals) than in available data sets and literature that represent the best available information, as shown in the table above.[166]

Humboldt Bay was thoroughly surveyed for curlews from 1998-2002, which were distributed patchily with aggregations in certain areas (Figure 3). "Territoriality has been reported for approximately 25 percent of shorebird species, but few taxa defend food resources within territories as large and for as long as curlews… the patchy distribution of the curlew suggests that protection of high-quality foraging habitats (e.g., Elk River estuary) may be warranted, especially where areas of high human use are nearby"[167] The Project footprint overlaps with a number of documented curlew territories in the EBMA, on the west side of Bird Island, and around Sand Island. The impacts of existing and proposed aquaculture to these and other curlew territories is unknown.[168]

Curlews are likely to feed in patchy eelgrass and mudflat and, to a lesser extent, dense eelgrass. The Project footprint includes 184.4 acres of patchy eelgrass and, together with the existing footprint, may overlap with half or more of curlew territories in the Bay. Coast did not present an analysis of the number of curlew territories overlapping with its existing and proposed operations, which could be done with the raw data from the Mathis et al. 2006 study. Therefore, the RDEIR fails to adequately describe the impacts of the Project and existing operations on this species.

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[163] Gibson. D and B. Kessel. Geographic variation in the marbled godwit and description of an Alaskan subspecies. The Condor 91:436-443.

[164] U.S. Shorebird Conservation Plan. 2004. High priority shorebirds – 2004. U.S. Department of Interior, Fish and Wildlife Service, Arlington, Virginia.

[165] Fellows, S. D., and S. L. Jones. 2009. Status assessment and conservation action plan for the Long-billed Curlew (*Numenius americanus)*. U.S. Department of Interior, Fish and Wildlife Service, Biological Technical Publication, FWS/BTP-R6012- 2009, Washington, D.C.

[166] RDEIR at 6.5-109.

[167] Mathis, R, M. Colwell, L. Leeman, and T. Leeman. 2006. Long-billed curlew distributions in intertidal habitats: scale-dependent patterns. Western Birds 37:156-168.

[168] Mathis et al 2006.

The RDEIR acknowledges that "[c]urlews maintain winter foraging territories in North Bay, particularly along channel edges, and it is possible that some curlews may be displaced from newly developed aquaculture areas… their territoriality on mudflats during low tide suggest those areas represent important foraging areas for meeting their energetic needs for migration and reproduction."[169] Yet the RDEIR finds no significant impact to curlews based on Conservation Measures BIO-10 and -12. This finding is unsubstantiated and contradicted by the best available information discussed above. Conservation Measure BIO-10 pertains to marine mammals and is irrelevant. It is unclear why this measure is offered for curlews. Conservation Measure BIO-12 — "Coast will not intentionally approach or harass migratory birds that are actively feeding or resting" — does not require measures to actively avoid birds.

**Impacts of Climate Change on Shorebirds in Humboldt Bay**

The RDEIR fails to evaluate the impacts of its Project on shorebirds relative to sea level rise and underlying geological processes in Humboldt Bay. This information is readily available: the California State Coastal Conservancy found that Humboldt Bay will be more impacted by sea level rise than other areas on the west coast, due to underlying geological processes[170]:

> The higher relative sea level rise rates observed in Humboldt Bay … indicate that a global rise in sea levels will affect Humboldt Bay faster than other parts of U.S. west coast; and within the bay the southern end will be affected sooner than the northern portions of the bay. Humboldt Bay water levels have increased approximately 0.5 m over the last 100 years due to a high [relative sea level] rise rate.

The report recommends "[c]onduct[ing] a detailed assessment of tidal wetland [sea level rise] vulnerability." Climate change is impacting shorebirds in predicted as well as unanticipated ways. Sea level rise is predicted to inundate 23-40 percent of shorebird intertidal habitats in the East Asian-Australasian Flyway.[171] At least one shorebird, the red knot (*Calidris canutus canutus*) has experienced reductions in body size linked to Arctic warming. Reduced body size has reduced individual fitness in this subspecies and may be a driver for recent steep population declines. Reduced body size and other morphological changes due to climate change may be impacting other Arctic shorebird migrants.[172]

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[169] RDEIR at 6.5-109.

[170] Humboldt Bay: Sea Level Rise, Hydrodynamic Modeling, and Inundation Vulnerability Mapping. 2015. Prepared for State Coastal Conservancy, and Coastal Ecosystems Institute of Northern California. Northern Hydrology and Engineering.

[171] Iwamura T, Possingham HP, Chade`s I, Minton C, Murray NJ, Rogers DI, Treml EA, Fuller RA. 2013. Migratory connectivity magnifies the consequences of habitat loss from sea-level rise for shorebird populations. Proc R Soc B 280: 20130325. http://dx.doi.org/10.1098/rspb.2013.0325

[172] Gils, J. S. Lisovski, T. Lok, W. Meissner, A. Ozarkowska, J. de Fouw, E. Rakhimberdiev, M. Soloviev, T. Piersma, and M. Klaassen. 2016. Body shrinkage due to Arctic warming reduced erd know fitness in tropical wintering range. Science 352:6287.

Shorebirds are likely to experience significant reductions in the availability and quality of intertidal and other coastal habitats as a result of sea-level rise, and this loss of quality habitat will likely result in smaller shorebird populations. For example:

> Shorebird risk factors include lengthy, energetically expensive migrations where they may be vulnerable to changes in wind patterns, dependence upon coastal migration stopover sites that are vulnerable to sea level rise, and dependence upon ecological synchronicities that may disrupted by a changing climate. … assessments of vulnerability to climate change often ignore problems associated with a migratory life history, causing them to underestimate vulnerabilities. Shorebirds are already in a vulnerable condition and climate change may exacerbate this. Reductions have been seen in virtually all shorebird flyways…[173]

Habitat loss from sea level rise at migratory bottleneck sites such as Humboldt Bay could disproportionally impact population persistence. In the East Asian-Australasian Flyway, models predicted that "sea level rise will inundate 23.4 percent of [shorebirds] intertidal habitat, and cause a reduction in population flow up to 72 percent across taxa."[174] There has been no comprehensive analysis of shorebird habitat loss to sea level rise along the Pacific Flyway, yet this is an identified need.

**Impacts of Aquaculture Infrastructure on Shorebirds**

The 2003 Southern Pacific Shorebird Conservation Plan sets forth priority conservation actions for Humboldt Bay that include prohibiting "further alteration of tidal flats for oyster culture."[175] Shorebird species that forage in Humboldt Bay eelgrass beds include black-bellied plover, semipalmated plover, marbled godwit, black turnstone, long-billed curlew, dunlin whimbrel, willet, long-billed and short-billed dowitchers, sanderling, and lesser and greater yellowlegs.

The RDEIR points to a Humboldt Bay study showing that certain shorebird species have demonstrated preference for feeding in aquaculture plots in Humboldt Bay, while other species avoid these plots, with a greater overall abundance of shorebirds in longline plots vs. control plots.[176] However, this study does not demonstrate that the project would not have significant adverse impacts on some species, nor that its overall effects would be beneficial for any species. Marbled godwit and dowitchers correlate positively with eelgrass cover, and black-bellied plover avoids aquaculture plots.[177] The study's authors note that "temporary benefits to birds may be

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[173] Galbraith H, DesRochers DW, Brown S, Reed JM (2014) Predicting Vulnerabilities of North American Shorebirds to Climate Change. PLoS ONE 9(9): e108899. doi:10.1371/journal.pone.0108899

[174] Iwamura et al. 2016.

[175] Hickey, C., W.D. Shuford, G.W. Page, and S. Warnock. 2003. Version 1.1. The Southern Pacific Shorebird Conservation Plan: A strategy for supporting California's Central Valley and coastal shorebird populations. PRBO Conservation Science, Stinson Beach, CA.

[176] RDEIR at 6.5-107 to 6.5-108.

[177] Connolly, L. M., and M. A. Colwell. 2005. Comparative use of longline oysterbeds and adjacent tidal flats by waterbirds. Bird Conservation International 15:237–255.

compromised by long term habitat impacts, such as increased sedimentation or loss of native mudflat fauna." Further, one author, Mark Colwell, a Humboldt State University shorebird ecologist with 25 years of experience in the North Bay notes in a 2015 comment letter to the Harbor District that:

> To claim that loss and degradation of tidal flats (of whatever amount of area) would have less than significant' impact on shorebirds and other waterbirds that rely on this habitat is, at best, premature and, at worst, a misrepresentation of current knowledge on the subject. 7 percent of the bay is already in aquaculture production with unknown impacts on shorebirds. Mounting evidence indicates that, worldwide, populations of most shorebirds are in decline. Reasons for the decline are many but principal among them is the loss and degradation of habitats[178]

The RDEIR fails to cite a key study from Tomales Bay, which also found some shorebirds fed preferentially within aquaculture areas in Tomales Bay, yet the net effect was "a net decrease in overall shorebird use of open tidal flats developed for aquaculture" driven in large part by the avoidance of these areas by western sandpiper and dunlin, the two most abundant shorebirds in the bay.[179] The authors cite other studies showing that small losses in the extent or quality of available feeding habitat for shorebirds could result in proportionally greater decreases in wintering shorebird populations. Other studies have found that, during migration, turnover times in shorebirds are often rapid and there is little time for habituation during a phase of heightened energy demand for the migrants.[180]

The RDEIR fails to evaluate the impacts of disturbance to shorebirds other than long-billed curlew and black-bellied plover, particularly in the 184.4 acres of patchy eelgrass that provides essential intertidal foraging habitat for shorebirds. The Project Operation and Maintenance section fails to include a description of current vessel activity in the bay. According to the previous DEIR, the existing project includes 57 trips amounting to 218 hours/week.[181] The proposed Project would add 18 trips amounting to 74 hours/week. The total vessel activity would be 75 trips at 292 hours/week. This level of activity in the North Bay would clearly have a significant impact on shorebirds, a statement supported by the literature. In one study on the effects of human activity on shorebirds and waterbirds at a coastal refuge, birds were absent or disturbed 80 percent of the time in the presence of "men working."[182] When winter weather is

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[178] Colwell, M. 2015. Letter to the Humboldt Bay Harbor, Recreation and Conservation District.

[179] Kelley, J., J. Evens, R. Stallcup, and D. Wimpfheiner. 1996. Effects of aquaculture on habitat use by wintering shorebirds in Tomales Bay, California. California Fish and Game 82(4): 160-174.

[180] Myers, J.P. et al. 1987. Conservation Strategy for Migratory Species. American Scientist 75:19-26.

[181] RDEIR at 4-17.

[182] Burger, J. 1981. The effect of human activity on birds at a coastal bay. Biol. Conserv. 21:231-241

severe and feeding conditions are poor, frequent disturbance of feeding birds can lead to starvation and death.[183]

Overall, the high rate of disturbance caused by workers attending the mariculture areas would negatively impact birds and other wildlife through the energetic costs of flushing, loss of key foraging habitats, and loss of time in key foraging habitat. The RDEIR utterly fails to adequately evaluate the impact of these disturbances to shorebirds. The RDEIR's evaluation of the impacts of disturbance on long-billed curlew are entirely inadequate. The EIR must be revised again to include full and accurate information about the Project's effects on Humboldt Bay's shorebirds and recirculated for further public comment.

**The Proposed Project Would Have Significant Adverse Impacts on Salmonids**

The RDEIR's assertion that the Project would have no significant impact on salmonids lacks any sound scientific basis. The RDEIR asserts that "ecological functions provided by oyster longline (e.g. prey resources) show similarities to those of eelgrass…."[184] However, as the Pacific Fishery Management Council has noted, "[t]he Project may significantly impact salmonid populations by reducing and altering EFH eelgrass habitat that provides foraging and refugia."[185] Humboldt Bay and its tributaries support coho salmon, Chinook salmon, steelhead trout and sea-run coastal cutthroat trout, a fact reflected in its designation as Essential Fish Habitat for salmonids under the federal Pacific salmon fishery management plan. The population of coho salmon protected under the federal and state Endangered Species Acts within the Humboldt Bay area is considered a "core" population for the Southern Oregon/Northern California Evolutionarily Significant Unit. These populations have also been declining, making further impacts to their health and productivity all the more significant.[186] Juvenile salmon and steelhead use eelgrass as a refuge from predators and to feed on epibenthic and epiphytic zooplankton, including copepods and amphipods that in turn feed on the bacteria from decaying eelgrass. Eelgrass also provides habitat for sand lance, surf smelt, and Pacific herring, all of which are important food items for juvenile and adult salmon.[187] The proposed project may significantly impact the salmon and trout populations of Humboldt Bay by potentially reducing and altering eelgrass habitat that provides foraging and refuge areas. Changes in habitat structure caused by the addition of aquaculture gear may alter fish community assemblages which could increase direct predation on outmigrating smolts.[188]

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[183] Goss-Custart, J.D., P. Triplett, F. Sueur, and A.D. West. 2006. Critical thresholds of disturbance by people and raptors in foraging wading birds. Biological Conservation 127:88-94.

[184] RDEIR at 6.5-83.

[185] PFMC 2015.

[186] NOAA Fisheries, West Coast Region. 2014. Southern Oregon/Northern California Coho Salmon Recovery Plan.

[187] PFMC. 2015.

[188] Department of Fish and Wildlife. 2015. Letter to the Humboldt Bayh Harbor, Recreation and Conservation District.

**The Project Would Have Significant Adverse Impacts on Dungeness Crab**

The RDEIR asserts that the Project will not have a significant adverse effect on Dungeness crab based on two incorrect assumptions: (1) the Project will not cause a significant loss of eelgrass habitat, and (2) "the project is not significantly affecting the mosaic of habitats present in North Bay. Oyster longlines can provide similar prey resources as eelgrass…." [189] As explained above, the Project would in fact cause serious reductions in eelgrass habitat.

This substantial loss of eelgrass function and structure would have a significant impact on Dungeness crab. Furthermore, aquaculture gear does not provide equivalent habitat function. Dungeness crabs have a complex life history that includes movement to and from estuaries and coastal areas. Vegetated, intertidal estuaries are important nursery habitats for young crabs.137 Bare habitats are infrequently used by juveniles, most likely due to a lack of refuge from predation and decreased food abundance. After molting, "juvenile crabs are found in shallow coastal waters and estuaries, and large numbers live in beds of eelgrass or other aquatic vegetation that provide protection and substrate and harbor food organisms for early instars."[190] Estuarine areas such as Humboldt Bay are important nursery areas for young Dungeness crabs.[191]

**The Proposed Project Would Likely Have Significant Effects on Planktonic Food Sources**

The RDEIR acknowledges that the proposed Project and the Harbor District's Pre-Permitting Project would add substantially to the biomass of filter feeding organisms relying on planktonic food in Humboldt Bay. Many other species in Humboldt Bay also rely on plankton for survival, including herring and Dungeness crab. While the DEIR admits that "the existing and proposed culture would have some cumulative effect on Humboldt Bay food resources," it fails to look further at how significant that cumulative effect might be.[192] Instead, the RDEIR dismisses the effect, stating that "there is an abundance of food available and cultured species will not significantly affect the food resources in the bay. Therefore, impacts to food resources for other filter feeding organisms are considered less than significant under CEQA."[193] This circular reasoning does not justify its conclusion. If current and proposed operations cumulatively result in a significant reduction of a once-abundant abundant planktonic food source, that reduction could significantly and adversely affect other planktivores in Humboldt Bay. Moreover, the RDEIR does not present any evidence that these planktonic food sources, however abundant, are not already being fully utilized. We agree with the concerns regarding the carrying capacity analysis that DFW expressed in its Feb. 27, 2015 letter regarding Coast's Initial Study. The letter noted that the analysis used by Coast shows greater than 10 percent of the available daily average phytoplankton is already being consumed by current aquaculture activities. The level of consumption could be even higher if the model is re-run as the Department recommended,

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[189] RDEIR at 6.5-73.

[190] U.S. Fish and Wildlife Service. 1989. Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (Pacific Southwest). Biological Report 82(11.121). December.

[191] California's Living Marine Resources: Dungeness Crab. 2001. California Department of Fish and Game.

[192] RDEIR at 6.5-43.

[193] RDEIR at 6.5-63 to 6.5-64.

utilizing a value of phytoplankton abundance calculated by taking the "7 day average" of phytoplankton minima over a 10-year period in Humboldt Bay. Neither the RDEIR nor the October 2015 Carrying Capacity analysis provided as Appendix G appears to address these concerns. Furthermore, the Appendix G analysis indicates that the cumulative impact of the proposed culture operations could filter as much as 77 percent of available water in Humboldt Bay, thus approaching the flushing rate of the entire bay. The report attempts to dismiss the effects on planktonic resources by instead relying on alternative methods that contain untested assumptions that show less impact.[194] Coast dismisses the unfavorable results of its own modeling, which indicate that the Project could indeed deplete planktonic food sources, by suggesting that the model has shortcomings that render its results unreliable. Yet given that the RDEIR fails to provide any sound data or scientific evidence to affirmatively dispel these concerns, it cannot simply dismiss the significance of the Project's effects on plankton.

**The Proposed Project Would Have Significant Adverse Impacts on Recreational Activities**

The RDEIR entirely fails to address impacts to birdwatching, a very important recreational use in Humboldt Bay. For example, the Godwit Days festival is hosted twice a year and each event attracts 400-600 birders from all over the country. Such impacts would likely result from disturbance of godwits, brant and other birds, and reductions in numbers of some bird species due to degradation of habitat and food sources. In addition, dozens of commenters on the 2015 DEIR and the RDEIR have raised concerns regarding the Project's impacts on hunting, particularly with respect to brant.[195] While the RDEIR introduces Conservation Measure REC-1 to minimize disturbance due to active aquaculture activities on days open to brant hunting, it does not address impacts to the overall brant population (discussed above). These impacts to recreational uses must be fully analyzed in any revised EIR.

In addition, the RDEIR does not adequately address impacts to recreational watercraft use. As the RDEIR acknowledges, many people use small watercraft for recreational use of the bay for paddling, hunting, clamming, and other purposes.[196] Coast's existing operations are spread throughout the North Bay. The presence of aquaculture gear in this area already increases the difficulty of navigating safely, especially in poor weather or low lighting. At least nine individual comment letters on the 2015 DEIR, and two agency comment letters (County of Humboldt Planning Agency and Department of Fish and Wildlife), noted the hazards presented by the existing oyster farming gear. Figures 4a and 4b show these hazards to small watercraft. Any increase in the areal extent of operations could increase these hazards. As Figure 5 shows, Coast has failed to remove at least some of its discontinued apparatus, despite existing requirements to do so, per Special Condition No. 9 in the 2006 Coastal Development Permit requiring Coast to remove such apparatus within 30 days.[197] While the Project includes an intent to remove such

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[194] RDEIR, App. G at 13.

[195] *See, e.g.*, Mark Hennelley, California Waterfowl, 2016, pers. comm. ("The only other significant brant hunting area (Morro Bay) has lost almost all of its eelgrass habitat in recent years despite restoration efforts. Thus Humboldt Bay is by far the most significant area left to hunt brant in California. If we lose Humboldt, we really lose the brant hunting culture itself.").

[196] RDEIR at 6.11-1.

[197] California Coastal Commission. 2006. Final Adopted Findings on CDP Application E-06-003.

apparatus (Mitigation Measures HAZ 2-4), the failure of Coast to adequately comply with this 2006 permit requirement calls into question the company's ability to do so for the Project.

Due to the importance of Humboldt Bay for brant hunting, Coast received numerous comments on the 2015 DEIR opposing proposed continued and expanded aquaculture in the North Bay. Comments from the FWS, DFW, the Coastal Commission, California Waterfowl Association, and numerous residents who enjoy hunting in the Bay describe the essential need to protect eelgrass beds and gritting areas from degradation and disturbance. The traditional skull boat (Figure 6) was developed in the area and is an important part of the hunting culture of the Bay. The Project described in the RDEIR does little to meaningfully address those uses or concerns or provide adequate mitigation for impacts to brant feeding, resting, and gritting.

**The DEIR Fails to Analyze a Reasonable Range of Alternatives**

The RDEIR fails to satisfy CEQA's core requirement to analyze a range of alternatives that would avoid or substantially lessen the proposed project's impacts on the environment. The RDEIR does not consider any alternatives that might offer some environmental improvement over the project proposal—for example, smaller expansions, consolidating operations in less sensitive areas or in smaller gaps in currently operated parcels, and altering the location and/or configuration of currently operated acreage. The RDEIR improperly rejects two environmentally superior alternatives, the Eelgrass Avoidance and Avoidance of East Bay Management Area alternatives, as infeasible. Coast provides no evidence to support the contention that these alternatives are actually infeasible. While these alternatives may reduce the profitability of operations, that is not a sufficient basis to reject them as infeasible. Moreover, an alternative that would substantially reduce a significant adverse impact cannot be excluded on the basis of alleged economic infeasibility without "meaningful comparative data" in the EIR and evidence supporting any claim of economic infeasibility. *Ctr. for Biological Diversity v. Cnty. of San Bernardino* (2010) 185 Cal.App.4th 866, 884. The revised DEIR should include a thorough analysis of both of these alternatives, which are viable alternatives for CEQA analysis and may be necessary to comply with California Coastal Zone Management Act permitting requirements.

The RDEIR also fails to identify a valid Environmentally Superior Alternative. The RDEIR's statement that "[b]ecause no significant unavoidable adverse impact has been identified for the Project or any of the proposed Alternatives, there is no alternative that is 'environmentally superior,' as defined by CEQA" is based on a false premise.[198] With the exception of the "No Project" alternative, all of the alternatives presented in the DEIR are likely to have significant adverse impacts on fish, wildlife, and their habitats. The "Alternative 1: 10-Foot Spacing Alternative" that the RDEIR asserts is the Environmentally Superior Alternative does not, in fact, reduce the footprint of aquaculture within eelgrass habitat or any other habitat type. To the contrary, this alternative would *increase* the footprint and the substantial negative impacts associated with these operations.

An adequate revised DEIR must include an alternative that both avoids eelgrass in new expansion areas and removes oyster farming operations from the East Bay Management Area

[198] RDEIR at 5-16.

that is critical for Pacific herring spawning, black brant, other waterfowl, and shorebirds. We specifically recommend that mariculture activities cease in the EBMA, provide a 1000-ft. buffer for brant gritting areas, and avoid areas with high densities of long-billed curlew territories. We encourage Coast to work collaboratively with the relevant agencies and key stakeholders in a marine spatial planning framework to evaluate a revised project configuration that would meet project objectives while satisfying the CEMP, other applicable policies, and federal and state law.

**The RDEIR Fails to Analyze Cumulative Impacts Adequately**

The RDEIR correctly notes the existing project, proposed Project, and Harbor District project would occupy 27.3 percent of eelgrass in North Bay, and 16.3 percent of intertidal habitat in North Bay overall. The DEIR's analysis of cumulative impacts suffers from similar flaws as its analysis of the impacts of the proposed project expansion. The DEIR's gross underestimate of the proposed expansion's impacts to eelgrass habitat and fish and wildlife species and the resulting erroneous "less than significant effect" conclusions fundamentally undermine the cumulative impacts analysis. The RDEIR similarly underestimates the overall impact of the proposed project, other existing aquaculture operations, and the Harbor District's pre-permitting aquaculture project. As discussed above, a rational, science-based examination of current and likely future impacts from aquaculture operations readily demonstrates that the proposed project would have individually and cumulatively significant adverse impacts on multiple biological and ecological resources.

**The RDEIR Fails to Acknowledge Impacts to Other Important Uses**

The "Economic Impact Analysis" provided in Appendix J of the RDEIR addresses factors that are not relevant under CEQA. Specifically, the alleged economic benefit of a proposed project is not a factor that the lead agency may weigh in determining whether the project has a significant effect on the environment or otherwise complies with CEQA. Economic changes in and of themselves are not considered significant effects on the environment; an economic change that stems from a project's physical changes to the environment may only be considered in determining whether the physical change itself is significant.[199] Predicted economic benefits may not be weighed against a proposed project's impacts to the environment.

At the same time that it touts the purported economic benefits of the Project, Coast fails to acknowledge the many negative economic impacts that would result from the adverse physical changes the Project would have on habitats crucial for valuable uses such as ecotourism, birdwatching, paddling, commercial and recreational fisheries for Dungeness crab, salmon, and groundfish, hunting, and clamming. The annual Godwit Days festival generates at least $170,000 per year for local businesses. Dungeness crab alone has generated $45 million in ex-vessel revenue alone for North Coast ports, primarily Eureka. While the RDEIR need not analyze economic impacts under CEQA, to the extent it does so, it should identify the negative economic impacts that would result from the extensive physical changes that the Project would cause in Humboldt Bay.

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[199] CEQA Guidelines, § 15382.

**Coast Has Not Complied with Mitigation Conditions Placed on Current Operations**

Recognizing that Coast's operations (the same operations proposed for renewal here) would have adverse effects on eelgrass that would not be fully mitigated, the Coastal Commission attached a number of Special Conditions to its 2006 Coastal Development Permit. As described below, Coast has failed to meet at least three of those conditions. Coast's failure to comply with permit conditions on its existing operations seriously undermines its contention that it will carry out future monitoring and mitigation.

Special Condition No. 2 requires that "a maximum of 11.5 acres of future plantings be sited in known or historic eelgrass habitat within Coast's EBMA. Future plantings in the EBMA shall be sited in the bed identified on Exhibit 2 as EB 7-2."[200] The majority of the proposed expansion is located mainly in the EBMA, directly violating the Special Condition. The RDEIR states: "[c]ertain comments received on the Draft IS and in response to the DEIR recommended avoiding planting in the EBMA ("East Bay Avoidance Alternative"), noting that the Coastal Commission had requested avoidance of the area as part of CDP No. E-06-003 issued for the existing footprint."[201] The DEIR dismisses this violation of a Special Condition by stating, "[t]he primary reason that the East Bay Avoidance Alternative was screened from further review is that it would not avoid or substantially reduce a significant impact identified in the RDEIR. The primary reason that the East Bay Avoidance Alternative was suggested is that the East Bay provides ground for herring spawn and is used by brant and other shorebirds. As further addressed in Section 6.0, the RDEIR has evaluated those impacts and determined that the Project, including the proposed footprint in the EBMA, would result in a less than significant impact to such species. Moreover, the East Bay has some of the best shellfish growing conditions in North Bay, with excellent water quality, lower wave exposure, and increased upwelling correlated with peaks in phytoplankton abundance. Expanding culture in this area will thus significantly further Project objectives without creating any significant environmental impacts. Therefore, this alternative was screened from further evaluation."[202] As should be abundantly clear from our comments above, the assertion that the project would have no significant impacts in the EBMA is wrong.

Special Condition No. 3 required that in the months of December, January, and February, "Coast shall 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 shall: 1) postpone for two weeks planting and/or harvesting activities on those beds where spawning has occurred, and 2) notify the California Department of Fish and Game (DFG) Eureka Marine Region office of the spawn within 24 hours. Coast shall keep records of when DFG was notified of the spawning event, and those records shall be included with the annual report…" As described earlier in this letter, DFW and the Coastal Commission have noted that Coast *never* contacted DFW in regard to herring spawn, despite confirmation of spawn taking place in December-February in the area of aquaculture operations.

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[200] California Coastal Commission. 2006. Final Adopted Findings on CDP Application E-06-003.

[201] RDEIR at 5-9.

[202] *Id*.

Special Condition No. 7 required that "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." As noted above, Coast's failure to undertake this required remediation has created navigational hazards and impediments to recreation and casts serious doubt on Coast's future compliance with Mitigation Measures related to these hazards, including: Mitigation Measure HAZ-2: Within 30 days of harvest on any area that is being discontinued or taken out of production for one year or more, Coast will remove all shellfish culture apparatus from the area, including but not limited to, stakes, racks, baskets, and pallets; Mitigation Measure HAZ-3: Coast will implement annual employee training regarding marine debris issues and how to identify loose culture gear and proper gear repair and removal methods; and Mitigation Measure HAZ-4: Coast will conduct quarterly bay cleanups in coordination with other interested parties or organizations, which will include walking portions of the bay and shorelines to pick up escaped shellfish gear and other trash (regardless of whether it is generated by the Project). The volume of shellfish gear collected shall be recorded.[203]

**Conclusion**

For the reasons explained above, the RDEIR fails in multiple ways to adequately analyze the effects of Coast's massive proposed expansion of oyster aquaculture operations in Humboldt Bay, as well as the effects of continued operations. A properly revised DEIR must correct these significant failures to observe CEQA's public informational requirements, including identifying alternatives that avoid any significant impact to eelgrass habitat and fish and wildlife species dependent on it. The public must then be given an opportunity to comment on the significant new information that new revised DEIR contains. We recommend that the new revised DEIR include an alternative that both avoids eelgrass in any expansion areas and removes oyster farming operations from the EBMA that is critical for Pacific herring spawning, black brant, other waterfowl, and shorebirds. We also recommend that mariculture activities cease in the East Bay Management Area, provide a 1000-ft. buffer for brant gritting areas, and avoid areas with high densities of long-billed curlew territories. We encourage Coast to work collaboratively with the relevant agencies and key stakeholders in a marine spatial planning framework to evaluate a revised project configuration that would meet project objectives while satisfying the CEMP, other applicable policies, and federal and state law.

Thank you for your consideration of our comments. Please do not hesitate to get in contact with us if you have any questions about any of the issues we raise.

Sincerely,

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[203] RDEIR at 6.10-6.

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**Figures 1a, 1b, and 1c**. Coast workers, June 2015. Photo provided by CDFW.

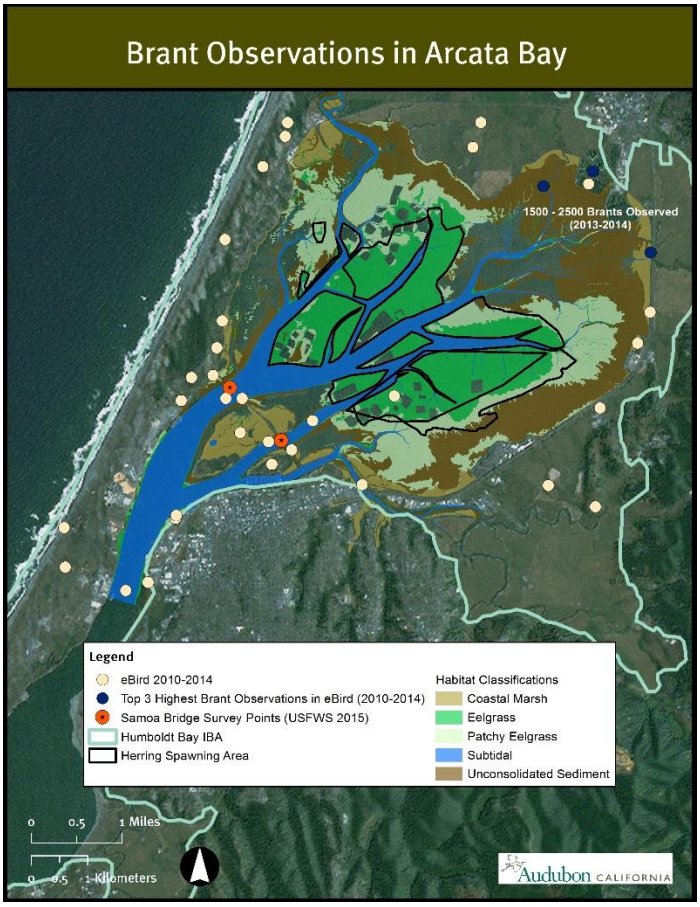


**Figure 2.** Brant observation points in Arcata Bay, 2010-2014. The FWS survey points at Samoa Bridge are in red. The top three highest observations of Brant in eBird, 2010-2014, are in blue.

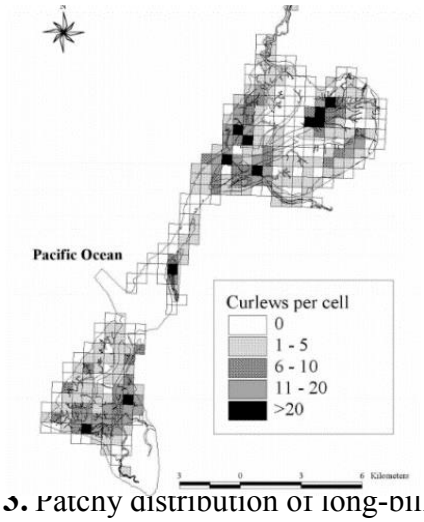


**Figure 3.** Patchy distribution of long-billed curlew territories in Humboldt Bay (from Mathis et al. 2006).

**Figures 4a and 4b**. Photos provided by Ted Romo, local hunter, illustrating hazards to navigation cited in two agency comment letters and nine letters from individuals on the 2015 DEIR.

**Figure 5.** An abandoned, unremediated Coast Seafood oyster culch on longline plot in the East Bay Management Area, 2015.

**Figure 6.** Steve Rosenberg in his brant hunting skull boat.