State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Marine Region
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Santa Barbara, CA 93109
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

July 6, 2021

Alyssa Suárez, Planner II
Humboldt County Planning & Building Department
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707-445-7541
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SUBJECT: NORDIC AQUAFARMS CALIFORNIA, LLC LAND-BASED AQUACULTURE PROJECT
NOTICE OF PREPARATION
SCH# 2021040532

Dear Ms. Suárez:

The California Department of Fish and Wildlife (Department) received the Notice of Preparation (NOP) for a Draft Environmental Impact Report (EIR) from the Humboldt County Planning & Building Department for the Nordic Aquafarms California, LLC Land-based Aquaculture Project (Project) pursuant to the California Environmental Quality Act (CEQA) and CEQA Guidelines.[1] The Department previously submitted comments in response to the Draft Mitigated Negative Declaration (MND) on May 24, 2021 (attached).

Thank you for the opportunity to provide comments and recommendations regarding those activities involved in the Project that may affect California fish and wildlife resources. Likewise, we appreciate the opportunity to provide comments regarding aspects of the Project that the Department, by law, may be required to carry out or approve through the exercise of its own regulatory authority under the Fish and Game Code (FGC).

DEPARTMENT ROLE

The Department is California's Trustee Agency for fish and wildlife resources and holds those resources in trust by statute for all the people of the state (FGC §711.7, subd. (a) and §1802; Pub. Resources Code §21070; CEQA Guidelines §15386, subd. (a)). The Department, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically

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sustainable populations of those species (*Id.*, §1802). Similarly, for purposes of CEQA, the Department is charged by law to provide, as available, biological expertise during public agency environmental review efforts, focusing specifically on projects and related activities that have the potential to adversely affect fish and wildlife resources. The Department is also responsible for marine biodiversity protection under the Marine Life Protection Act in coastal marine waters of California and ensuring fisheries are sustainably managed under the Marine Life Management Act.

Additionally, the Department oversees and manages aquaculture activities in the State under the authority provided by the FGC (§§15000-15703) and Title 14 of the California Code of Regulations (CCR). All facilities devoted to the propagation, cultivation, maintenance, and harvesting of fish, shellfish, and plants in marine, brackish, and freshwater are required to register annually with the Department (CCR §235). The Department may prohibit an aquaculture operation or the culturing of any species at any location where it is determined it would be detrimental to adjacent native wildlife (FGC §15102). State law also requires an Importation Permit from the Department to import most live aquatic plants and animals, in all forms (CCR §236). Statutory authorities for aquaculture disease and aquatic animal health management are embodied in FGC (§15500 et seq.). Regulations regarding aquaculture disease controls and responses, including a list of diseases and parasites and the aquatic plants and animals they are known to infect or parasitize, are outlined in FGC (§§15500-15516) and CCR (§245).

PROJECT DESCRIPTION SUMMARY

Proponent: Humboldt County Planning & Building Department (County)

Objective: Nordic Aquafarms California, LLC (Nordic) proposes to develop a land-based finfish recirculating aquaculture facility on the Samoa Peninsula and intends to cultivate Atlantic Salmon *(Salmo salar*) subject to Department approval. The proposed aquaculture facility will include operations to grow-out fish from egg to harvestable size. The fish will be contained indoors in separate buildings connected by underground pipes for fish transfer. At full capacity, the facility will have an annual production of approximately 25,000-27,000 metric tons of head-on-gutted fish. The Project will require approximately 2.5 million gallons per day (MGD) of freshwater sourced from the Mad River and 10 MGD of seawater sourced from Humboldt Bay. The impacts associated with the proposed upgrades to the bay water intake system are now included in the Project description and will be evaluated in the Draft EIR. Treated wastewater (12.5 MGD) will be discharged into the Pacific Ocean utilizing the existing Redwood Marine Terminal (RMT) II ocean outfall pipe located 1.5 miles offshore of the Samoa Peninsula. A total of five buildings (intake water treatment, grow out modules, hatchery, fish processing, and wastewater treatment) will be constructed with a combined footprint of 766,530 square feet. The Project will also include ancillary support features such as

paved parking, fire access roads, security fencing, stormwater management features, and a fire suppression water line.

Location: The Project site is situated on the Samoa Peninsula, bounded on the west by dunes and the Pacific Ocean and on the east by Humboldt Bay, and located at the site of the former Samoa Pulp Mill in the unincorporated community of Samoa in Humboldt County (APN 401-112-021).

Timeline: Demolition and construction is anticipated to begin in 2022.

PREVIOUS COMMENTS AND RECOMMENDATIONS

The Department submitted comments on the Project's Draft MND in a letter dated May 24, 2021, which included comments and recommendations regarding special status species, potential for cultured fish to escape, introduction of pathogens, wastewater discharge, seawater intakes, fish waste, dark-eyed gilia mitigation, osprey nest management plan, use of explosives and nesting birds, and cumulative impact analysis (attached). The Department's comments and recommendations identified in the May 24, 2021 comment letter remain applicable to the current Project as described in the NOP. The Department recommends the County fully address the comments and recommendations included in the May 24, 2021 letter from the Department.

ADDITIONAL COMMENTS AND RECOMMENDATIONS

Pursuant to our jurisdiction and authority, the Department offers the following additional comments and recommendations to assist the County in adequately identifying and/or mitigating the Project's significant, or potentially significant, direct and indirect impacts on fish and wildlife resources.

PROJECT IMPACTS

Entrainment from Bay Water Intakes

Comments: The Project will require 10 MGD of seawater sourced from Humboldt Bay for raising fish. However, given that Nordic proposes to use a recirculating system, it is unclear why this rate of seawater is needed on a daily basis. The two bay water intakes are located approximately one-half mile apart along the Samoa Channel at the RMT II Dock and Red Tank Dock. Nordic will be the primary user, but an additional 2 MGD of bay water will be available for other users. The Humboldt Bay Harbor, Conservation and Recreation District (Harbor District) will be responsible for permitting and upgrading the bay water intakes, but the biological impacts associated with the intake system will be evaluated in the County's Draft EIR.

The Department is concerned the bay water intake system may cause impingement and entrainment of juvenile and larval species listed under the California Endangered Species ACT (CESA), including Longfin Smelt and Coho Salmon, in addition to other species of recreational, commercial, and biological importance. Larval, juvenile, and adult Longfin Smelt have been detected throughout Humboldt Bay (Eldridge 1970; Eldridge & Bryan 1972; Garwood 2017). Recent observations confirm the presence of adult Longfin Smelt in the Samoa Channel and larval osmerids (species unknown) in the Entrance Channel (Novotny 2020). Since Longfin Smelt juveniles are smaller and weaker swimmers than juvenile salmonids, often a main driver of intake-screening criteria, more protective fish screening criteria are required by the Department for waters where juvenile Longfin Smelt occur. However, fish screens will not prevent the entrainment of larval life stages.

The Department is also concerned that marine life mortality associated with the intakes could significantly reduce biological productivity and prey availability in Humboldt Bay. The proposed Project appears to be subject to State Water Code §13142.5(b), which "requires that for each new or expanded coastal power plant or other industrial installation using seawater for cooling, heating, or industrial processing, the best available site, design, technology, and mitigation measures feasible shall be used to minimize the intake and mortality of all forms of marine life".

Recommendations:

- The Department recommends the Draft EIR describe the amount of seawater that will be recycled within the facility. The Draft EIR should clarify why 10 MGD of seawater needs to be withdrawn from the Bay daily if the aquaculture facility is designed to be recirculating. The Department recommends the Project include measures to maximize seawater recycling in the facility to minimize the amount of seawater withdrawn from the Bay.
- The Department recommends the Draft EIR include the design specifications of the fish screens that will be implemented on the bay water intakes. To minimize impacts to salmonids and Longfin Smelt, all intakes shall comply with the Department's fish screening standards and protocols (attached). Fish screen design specifications should include a pore size diameter between 1.75 – 2.38 mm depending on the configuration of pores, approach velocity of 0.2 feet per second for self-cleaning screens or 0.05 feet per second for non-self-cleaning screens, and screen porosity of at least 27%. Intakes should be kept in good repair and inspected periodically to ensure they are clean and free of settling invertebrates, accumulated algae, or other debris, which could block portions of the screen surface and increase approach velocities.
- The Department recommends the Draft EIR include an analysis of impacts from entrainment and impingement to CESA-list species (Longfin Smelt, Coho Salmon) in addition to other species of commercial, recreational, and biological importance. The

analysis should also consider impacts to biological productivity and prey availability in Humboldt Bay. The maximum amount of water withdrawn from the Bay should be used for the impact analysis, including additional bay water provided to other users.

- The Department understands that a modeling study has been prepared to assess the potential effects of the proposed bay water intakes on entrainment of certain species (Pacific Herring, Arrow Goby, Bay Goby, and Northern Anchovy) and will be included in the Draft EIR. The Department recommends the Draft EIR also include empirical data on the concentration and composition of larvae in Humboldt Bay source water to validate model assumptions. Empirical data should capture temporal fluctuations in larval abundance.
- Given the potential for entrainment of larval and juvenile Longfin Smelt, the Department strongly recommends an Incidental Take Permit (ITP) is obtained for the seawater intake to address impacts of "take" pursuant to FGC §§2080.1 or 2081(b), and CCR §783 et seq. The ITP application should include a complete project description, as well as other required elements per CCR §783.2. The project description should be sufficient to evaluate the effects of the project on Longfin Smelt and other potential listed species and will be used to evaluate and develop species-specific minimization and mitigation measures. By law, all take of listed species must be mitigated in full and upfront.
- The Department and other regulatory agencies should be involved in the development of appropriate mitigation for any impacts associated with the operation of the two bay water intakes.

Eelgrass Habitat

Comments: Native eelgrass beds, *Zostera marina*, are an important part of the Humboldt Bay ecosystem and are recognized by state and federal statutes as both highly valuable and sensitive habitats. Humboldt Bay holds approximately 31% of the known mapped eelgrass in the state (Merkel & Associates 2017). Eelgrass provides primary production and nutrients to the ecosystem along with spawning, foraging, and nursery habitat for fish and other species. Pursuant to the federal Magnuson-Stevens Fishery Conservation and Management Act, eelgrass is designated as Essential Fish Habitat for various federally managed fish species within the Pacific Coast Groundfish and Pacific Coast Salmon Fisheries Management Plans (FMP). Eelgrass is also considered a habitat area of particular concern for various species within the Pacific Coast Groundfish FMP. Eelgrass habitats are further protected under state and federal "no-net-loss" policies for wetland habitats. Additionally, the importance of eelgrass protection and restoration, as well as the ecological benefits of eelgrass, is identified in the California Public Resources Code (PRC §35630).

Continuous eelgrass habitat exists adjacent to both the RMT II and Red Tank Dock intake structures (mapped in 2009; Merkel & Associates 2017). The Department is

concerned with potential direct or indirect effects to eelgrass that might occur from upgrading and operating the bay water intake systems.

Recommendations:

- The Department recommends the Draft EIR include a description of all construction activities that will be required to upgrade the sea chests, including any proposed in-water work (e.g., dredging), type of equipment, timing of construction, potential impacts to estuarine species or habitat during construction, and mitigation measures that will be implemented to minimize impacts to the environment.
- The Department recommends the Draft EIR analyze the potential impact to eelgrass habitat from direct and indirect Project activities. Impacts to eelgrass should be avoided and minimized to the fullest extent possible. To ensure no net loss, the Department recommends the Draft EIR include the development of an eelgrass monitoring and mitigation plan, as defined in the California Eelgrass Mitigation Policy (CEMP; NMFS, 2014). The plan should include pre- and post-construction surveys to map patchy and continuous eelgrass habitat at both intake docks. Surveys should be conducted by a qualified biologist during the high growth season (May-September) and follow the standards of the CEMP. This plan should include mitigation for any impacts to eelgrass including, but not limited to, impacts from dredging, changes in circulation, and sedimentation.

Ocean Outfall Wastewater Discharge

Comments: The Department is concerned that the Project's discharge could result in adverse impacts to marine species and habitat due to elevated temperature, nutrient pollution, and exposure to contaminants/toxins. Nutrients discharged from anthropogenic sources, including ocean outfalls, have been shown to cause or exacerbate the development of harmful algal blooms (HABs), which can lead to domoic acid contamination, hypoxic conditions, and acidification in nearshore waters (Kessouri et al. 2021; Smith et al. 2021; Booth 2015; Howard et al. 2017; Anderson et al. 2002). Additionally, particles and associated contaminants from the discharge can accumulate in the sediment, potentially degrading sediment quality over time and impacting the benthic organisms that inhabit the vicinity of the ocean outfall discharge location. Benthic organisms are strongly affected by sediment contaminant exposure since they live in direct contact with the sediment-water interface and ingest sediment particles. Bioaccumulation of pollutants and toxins, including HAB-related toxins, can also impact fish, birds, and mammals that feed on benthic organisms (Scott 1989). The NOP does not include information related to receiving water, benthic, or biological monitoring at the ocean outfall location.

Recommendations:

- The Department recommends the Draft EIR analyze the spatial extent of potential nutrient dispersion from the discharge, including potential impacts to water quality within the Samoa State Marine Recreational Area and Humboldt Bay, located approximately 3 miles north and 3.5 miles south of the discharge location, respectively.
- Receiving Water Quality & Benthic Monitoring. The Department recommends the Draft EIR include monitoring at the ocean outfall to measure the effects of the Project's discharge on the receiving ocean water and benthic habitat. Receiving water and benthic monitoring in the vicinity of the ocean outfall should be designed to document conditions within the zone of initial dilution (ZID) boundary, at reference stations, and at areas beyond the ZID where discharge impacts might be reasonably expected. Water quality monitoring should be designed to assess whether the receiving water meets the California Ocean Plan water quality objectives, ensure the discharge is not contributing to HABs, and evaluate the contribution of the Project's discharge to pollution in the receiving water, including impacts from the use of chemicals and pharmaceuticals/antibiotics. The Department recommends water quality conditions, including temperature, depth, salinity, dissolved oxygen, light transmittance, chlorophyll-α, and pH are measured throughout the entire water column. Water quality monitoring should also measure nutrient related impacts to the phytoplankton community. The Department also recommends sediment samples are collected to assess the accumulation of contaminants, including HAB-related toxins, in the benthic environment. The Department recommends receiving water and benthic monitoring is conducted at least semi-annually to capture temporal fluctuations in ocean conditions and sediment characteristics (e.g., summer, winter). Baseline data on water quality, sediment, and algal species composition prior to discharging into the ocean outfall will be necessary to determine impacts from the Project to receiving waters, benthic habitat, and HABs.
- Biological Monitoring. To adequately assess impacts to marine resources, the Department recommends the Draft EIR include biological surveys that evaluate changes in fish and benthic invertebrate community structure in the vicinity of the ocean outfall discharge location. Baseline data collected prior to use of the ocean outfall, in addition to reference sites, will be necessary to determine if there are any impacts from the discharge. Recommended survey methods to characterize community structure include but are not limited to SCUBA surveys, remotely operated vehicles, or trawl surveys. Sediment sample collections should be used to analyze benthic infauna community structure, including species abundance and diversity. The Department also recommends tissue samples from benthic invertebrates in the vicinity of the outfall are collected to test for bioaccumulation of pollutants/contaminants. Biological monitoring should be conducted at-least semi-annually to capture temporal fluctuations in species composition (e.g., summer, winter).

- The Department recommends that receiving water, benthic, and biological monitoring protocols are developed in consultation with the Department and other regulatory agencies. The Department also recommends the Draft EIR include a mitigation plan that will be immediately implemented should biological impacts associated with the Nordic facility's discharge occur. An annual monitoring report should be provided to the Department and other regulatory agencies that discloses the amount of wastewater discharged into the ocean, characteristics of the effluent, and results from the monitoring program.

Freshwater Source

Comments: The Nordic facility proposes to source approximately 2.5 MGD of freshwater from the Mad River for their operations. The Department understands this freshwater will be sourced from the Humboldt Bay Municipal Water District (HBMWD). The Fish and Game Commission recently listed northern California summer steelhead as endangered pursuant to the CESA. The Draft EIR should include an analysis of potential Project-related impacts to listed salmonids and other freshwater species from the diversion of 2.5 MGD of freshwater out of the Mad River.

Recommendations:

- The Department recommends the Draft EIR include an analysis of potential Project-related impacts to listed salmonids and other freshwater species from the diversion of 2.5 MGD of freshwater out of the Mad River.
- The Department further recommends the Draft EIR analyze the impacts from using more than 2.5 MGD of freshwater if Nordic anticipates potential changes in the amount of freshwater used for their operations.

Area of Potential Effects

Comments: With the Project's addition of the bay water intakes and a fire suppression water line, the area of potential effects is now larger compared to the previously proposed Project. However, NOP Figure 2 (Proposed Site Layout) presents an area of potential effects that encompasses only the land-based aquaculture facility location. Additional biological resource impacts may potentially occur within the Project footprint as currently proposed.

Recommendations:

- The Department recommends the Draft EIR analyze an area of potential effects that includes the land-based aquaculture facility as well as the bay water intakes, ocean outfall, fire suppression water line, and other proposed Project elements. The proposed fire suppression water line will cross aquatic habitat north of the

aquaculture facility. The proposed crossing may be subject to FGC §1602 and, as a result, a Lake and Streambed Alteration Notification to the Department may be appropriate.

Project Alternatives

Comments: The NOP states that the Draft EIR will analyze the No Project Alternative, an offsite alternative, and will also identify the environmentally superior alternative.

Recommendations:

- As mentioned in the Department's MND comment letter, the Department strongly recommends that the Draft EIR identify whether environmental impacts can be reduced by farming other species. The analysis should include impacts associated with fish escaping from the facility, including the risk of competition, predation, and establishment, in addition to the introduction of pathogens to native species.
- If Nordic is considering using alternate water source scenarios, such as changes in the ratio of seawater to freshwater for their operations, an alternative analysis should be included in the Draft EIR.

CONCLUSION

The Department appreciates the opportunity to comment on the Nordic Aquafarms California, LLC Land-based Aquaculture Project NOP to assist the County and Nordic in identifying and mitigating Project impacts on biological resources. Questions regarding this letter or further coordination should be directed to Corianna Flannery, Environmental Scientist at 707-499-0354 or Corianna.Flannery@wildlife.ca.gov.

Sincerely,

DocuSigned by:
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Craig Shuman, D. Env.
Marine Regional Manager

Enclosures: CDFW Comment Letter. Draft Mitigated Negative Declaration for the Nordic Aquafarms California, LLC Land-based Aquaculture Project. May 24, 2021.

CDFW Fish Screening Criteria. June 19, 2020.

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May 24, 2021

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SUBJECT: NORDIC AQUAFARMS CALIFORNIA, LLC LAND-BASED AQUACULTURE PROJECT
DRAFT MITIGATED NEGATIVE DECLARATION
SCH# 2021040532

Dear Ms. Suarez,

The California Department of Fish and Wildlife (Department) received the Draft Mitigated Negative Declaration (MND) from the Humboldt County Planning Department for the Nordic Aquafarms California, LLC Land-based Aquaculture Project (Project) pursuant to the California Environmental Quality Act (CEQA) and CEQA Guidelines.[1]

Thank you for the opportunity to provide comments and recommendations regarding those activities involved in the Project that may affect California fish and wildlife resources. Likewise, we appreciate the opportunity to provide comments regarding aspects of the Project that the Department, by law, may be required to carry out or approve through the exercise of its own regulatory authority under the Fish and Game Code.

DEPARTMENT ROLE

The Department is California's Trustee Agency for fish and wildlife resources and holds those resources in trust by statute for all the people of the state (Fish & G. Code, Section 711.7, subd. (a) & 1802; Pub. Resources Code, Section 21070; CEQA Guidelines Section 15386, subd. (a)). The Department, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species (*Id.*, Section 1802). Similarly, for purposes of CEQA, the Department is charged by law to provide, as available, biological expertise during public agency environmental review efforts, focusing specifically on projects and related activities that have the potential to adversely affect fish

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and wildlife resources. The Department is also responsible for marine biodiversity protection under the Marine Life Protection Act in coastal marine waters of California and ensuring fisheries are sustainably managed under the Marine Life Management Act.

Additionally, the Department oversees and manages aquaculture activities in the State under the authority provided by the Fish and Game Code (Fish & G. Code, §§ 15000-15703) and Title 14 of the California Code of Regulations. All facilities devoted to the propagation, cultivation, maintenance, and harvesting of fish, shellfish and plants in marine, brackish, and freshwater are required to register annually with the Department (Cal. Code Regs., tit. 14, §235). State law also requires an Importation Permit from the Department to import most live aquatic plants and animals, in all forms (Cal. Code Regs., tit. 14, §236). Statutory authorities for aquaculture disease and aquatic animal health management are embodied in Fish and Game Code (§15500 et seq.). Regulations regarding aquaculture disease controls and responses, including a list of diseases and parasites and the aquatic plants and animals they are known to infect or parasitize, are outlined in Fish and Game Code (Fish & G. Code, §§ 15500-15516) and Section 245 of Title 14, California Code of Regulations (Cal. Code Regs., tit. 14, §245).

PROJECT DESCRIPTION SUMMARY

Proponent: Humboldt County Planning Department (County)
Objective: Nordic Aquafarms California, LLC (Nordic) proposes to develop a land-based finfish recirculating aquaculture facility on the Samoa Peninsula and intends to cultivate Atlantic Salmon *(Salmo salar*) subject to Department approval. The proposed aquaculture facility will include operations to grow-out fish from egg to harvestable size. The fish will be contained indoors in separate buildings connected by underground pipes for fish transfer. At full capacity, the facility will produce approximately 25,000-27,000 metric tons of whole fish annually. A total of five buildings (intake water treatment, grow out modules, hatchery, fish processing, and wastewater treatment) will be constructed with a combined footprint of 766,530 square feet. The Project will include ancillary support features such as paved parking, fire access roads, security fencing, and stormwater management features. Seawater for raising fish will be supplied from Humboldt Bay by water intake infrastructure operated by the Humboldt Bay Harbor, Recreation and Conservation District (Harbor District). Treated wastewater (12.5 million gallons per day) will be discharged into the Pacific Ocean utilizing the existing Redwood Marine Terminal (RMT) II ocean outfall pipe located 1.5 miles offshore of the Samoa Peninsula.
Location: The Project site is situated on the Samoa Peninsula, bounded on the west by dunes and the Pacific Ocean and on the east by Humboldt Bay, and located at the site of the former Samoa Pulp Mill in the unincorporated community of Samoa in Humboldt County (APN 401-112-021).
Timeline: Demolition and construction is anticipated to begin between the fall of 2021 and the summer of 2022.

BIOLOGICAL SIGNIFICANCE

Humboldt Bay is California's second largest bay, and the largest estuary on the Pacific coast between San Francisco Bay and Oregon's Coos Bay. The marine and estuarine habitats of Humboldt Bay provide refuge and nursery habitat for more than 300 fish and invertebrate species, many with important associated commercial and recreational fisheries. Humboldt Bay and its wetlands and dunes are habitat for at least 20 State- and federally listed species and numerous California Species of Special Concern. Habitat for special status plant species occur within saltmarshes, freshwater wetlands, and areas adjacent to the Project area.

The open coast in the vicinity of Humboldt Bay consists of soft bottom habitat and sandy beaches backed by dunes. This habitat provides fish, invertebrates, seabirds, shorebirds, and mammals with nursery grounds, shelter, and areas to forage and reproduce, supporting the region's coastal economy, including numerous commercial and recreational fisheries.

COMMENTS AND RECOMMENDATIONS

Pursuant to our jurisdiction and authority, the Department offers the following comments and recommendations to assist the County in adequately identifying and/or mitigating the Project's significant, or potentially significant, direct and indirect impacts on fish and wildlife resources.

I. Special Status Species

Special status species and Sensitive Natural Communities (SNC) that are listed under the California Endangered Species Act (CESA), Federal Endangered Species Act, Fish and Game Code as Fully Protected (FP), California Species of Special Concern (SSC) or Watch List (WL), the California Rare Plant Ranking (CRPR) System, or the Vegetation Classification and Mapping Program with sensitive Global (G) / State (S) Heritage Ranks occur in the Project area and may be impacted by direct and/or indirect Project impacts.

Fish

- Coho Salmon (*Oncorhynchus kisutch*), State and federally-threatened (Southern Oregon/Northern California Coast (SONCC) Evolutionarily Significant Unit (ESU));
- Chinook Salmon (*Oncorhynchus tshawytscha*), federally-threatened (California Coastal ESU);
- Coastal cutthroat trout (*Oncorhynchus clarkii clarkii*), State SSC;
- Steelhead trout (*Oncorhynchus mykiss*), federally-threatened (Northern California Distinct Population Segment (DPS)), State-endangered candidate (Northern California Summer Steelhead);
- Longfin smelt (*Spirinchus thaleichthys*), State-threatened;

- Green sturgeon (*Acipenser medirostris*), federally-threatened (southern DPS), State SSC (northern and southern DPS);
- White sturgeon (*Acipenser transmontanus*), State SSC;
- Pacific lamprey (*Entosphenus tridentatus*), State SSC; and
- Western river lamprey (*Lampetra ayresii),* State SSC.

The Draft MND and Marine Resources Biological Evaluation Report (Appendix D) do not include longfin smelt, white sturgeon, coastal cutthroat trout, or western river lamprey under special status species. The Department recommends the Final MND include an analysis of impacts to these species under Section 4.3 (Biological Resources), including Table 4-3 (Sensitive and Special Status Species), and in Appendix D.

Amphibians
- Northern red-legged frog (*Rana aurora*), State SSC.

Mammals
- Townsend's big-eared bat (*Corynorhinus townsendii*), State SSC; and
- Pallid bat (*Antrozous pallidus*), State SSC.

Birds
- Black brant (*Branta bernicla*), State SSC;
- Marbled murrelet (*Brachyramphus marmoratus*), State-endangered, federally-threatened;
- Sharp-shinned hawk (*Accipiter striatus*), State WL;
- Vaux's swift (*Chaetura vauxi*), State SSC;
- Northern harrier (*Circus hudsonius*), State SSC;
- White-tailed kite (*Elanus leucurus*); State FP;
- Bald eagle (*Haliaeetus leucocephalus*), State-endangered;
- Long-billed curlew (*Numenius americanus*), State WL;
- Osprey (*Pandion haliaetus*), State WL;
- Double-crested cormorant (*Phalacrocorax auritus*), State WL;
- California brown pelican (*Pelecanus occidentalis californicus*), State FP; and
- Bank swallow (*Riparia riparia*), State-threatened.

Plants
- Dark-eyed gilia (*Gilia millefoliata*), CRPR 1B.2;

- *Abronia latifolia-Ambrosia chamissonis* alliance (dune mat), SNC G3/S3;
- *Salix hookeriana* alliance (coastal willow thickets), SNC G4/S3; and
- *Rubus ursinus* alliance (coastal brambles), SNC G4/S3.

II. Project Impacts

Potential for Cultured Fish to Escape Project Facilities
Comments: The Department is concerned with the potential for cultured Atlantic Salmon to escape from Nordic's proposed facility into local marine, estuarine, and freshwater environments. Humboldt Bay provides habitat for a number of anadromous fish species, many of which are State- or federally-listed (e.g., Chinook Salmon, Coho Salmon, steelhead trout, longfin smelt, green sturgeon). If fish escape from Nordic's facility, they could compete with, prey upon, and/or transfer pathogens to some of these species (Waknitz et al. 2003; Naylor et al. 2005; Jonsson and Jonsson 2006; Coghlan et al. 2007). For the biological impacts of the Project to be less than significant, the probabilities of escape and/or establishment should be negligible to non-existent.

The Draft MND concludes that the risk of escape from Project facilities is eliminated by multiple physical barriers (e.g., jump screens on tanks, grates in the drainage system, fine screens in the wastewater treatment plant) and by using underground pipes to move fish between buildings. In their outreach (Lost Coast Outpost, Mar. 31, 2021), Nordic has proposed using all-female eggs to make reproduction inviable as an additional biological safeguard against escape risks; however, the Draft MND does not include this proposal.

Given its design and land-based setting, the Department agrees that the risk of fish escaping from the proposed facilities may be low, but not zero. The Project's proposed location is subject to seismic and tsunami hazards and may hold millions of Atlantic Salmon as close as 300 feet to Humboldt Bay at any one time. The Draft MND and associated documents describe some of the structures and practices that will help mitigate this risk. At this time, however, it is not apparent that structural designs are sufficient to conclude that the risk of escape from seismic activity and tsunami inundation are eliminated. In fact, the site-specific seismic study is still underway and has not been presented as part of the Project documents. Additionally, escapes may occur due to human error or defects in barriers. Even well-designed land-based facilities outside of tsunami hazard areas have had unintended releases due to structural or operational failures. During 2010-2018, there were 17 reported incidents of escaped salmon and rainbow trout from land-based facilities in Norway (Føre and Thorvaldsen 2021). Therefore, it is important the Final MND contain a thorough analysis of the risk that escaped Atlantic Salmon (and alternate farmed species) may pose to native species and ecosystems, counter to the applicant's conclusion that the biological impact analysis is not affected by final species selection (Draft MND p 4-55).

Given that few studies have addressed competition between Atlantic Salmon and *Oncorhynchus* spp. (Gibson 1981; Hearn and Kynard 1986; Jones and Stanfield 1993;

Houde et al. 2017), and that no such studies have been carried out under conditions specific to the northern California environment, the risk of competition, predation, and/or establishment remains unclear. However, studies on the impacts of escaped Atlantic Salmon conducted in the Pacific Northwest, where escapes from net-pen facilities have frequently occurred, may lend insight pertinent to California. Past work suggests that farmed Atlantic Salmon have difficulty transitioning from a pellet-fed diet to one requiring the capture of wild prey, but there is evidence of eventual foraging success in novel/natural environments (ADFG 2002; McKinnell and Thomson 1997; McKinnell et al. 2008; Morton and Volpe 2002). Studies from the Pacific Northwest and Europe also suggest there is potential for reproduction to occur following escape events (Volpe et al. 2000; Fisher et al. 2014; Glover et al. 2016), although the ability of Atlantic Salmon to establish strongholds outside of its native range remains unclear, and some studies suggest it may be limited (Arismendi et al. 2014; Nash 2003; Sepulveda et al. 2013). However, monitoring within regions experiencing frequent escapes may not be sufficient to conclude that colonization has not occurred (e.g., Fisher et al. 2014).
Ultimately, the risk of competition with native salmonids in the freshwater, estuarine, or marine environment will depend on the number, size, and condition of fish that escape from the facility, timing of escape, and their ability to adapt to local conditions. The potential for impact may be amplified if escaped Atlantic Salmon can establish local breeding populations. This will largely depend on the number of fish that escape in a single event and their likelihood of surviving to maturity, reaching suitable spawning grounds along with conspecifics, and ultimately repeating this over multiple generations.

Based on the documents provided, the risk of fish escaping from the Nordic facility may be reduced if site-design plans adequately incorporate the engineering recommendations aimed at minimizing risks from seismic activity and tsunami inundation (SHN 2020). Culturing reproductively inviable fish (e.g., all-females, triploids; Benfey 2016) offers a means to effectively minimize the risk of establishment. However, this does not eliminate potential ecological impacts caused by the first generation of escapees.

Recommendations: The Department recommends the Final MND include the following to reduce the risk of escape to a level less than significant:

- Include a mitigation measure that Nordic will work exclusively with non-reproductive fish assemblages, such as all-females or triploids to minimize the risk of escaped fish from reproducing and establishing in the wild. Nordic should include methods that will be used to measure the effectiveness of producing non-reproductively viable fish.
- Include a comprehensive analysis of potential impacts escaped Atlantic Salmon may cause to native species in the worst-case scenario of an unintentional release to Humboldt Bay or the Pacific Ocean.
- Include an analysis of farming alternate fish species to identify potential impacts from other species. The analysis should include impacts associated with fish escaping from the facility, including the risk of competition, predation, establishment, and introduction of pathogens to native species.

- Include final building design criteria provided by engineers (SHN 2020) to minimize the risk of escape from seismic activity and tsunami inundation.
- The Department also recommends the Final MND include an Emergency Escape Response & Recovery Plan. The plan should include immediate reporting (within 12 hours) of escaped fish and the circumstances surrounding the incident to the Department and other appropriate regulatory agencies. The plan should include an established recovery plan for escapees and proposed mitigation measures for any damages to the environment caused by those escaped fish. The Department recommends Nordic consult with the Department and other regulatory agencies in the development and implementation of this plan.

Introduction of Pathogens
Comments: The Department is concerned that pathogens associated with Atlantic Salmon may be introduced to wild salmonid populations, an impact that could persist within native populations even if Atlantic Salmon are unsuccessful at establishing reproductively viable populations. Pathogens of concern include piscine orthoreovirus and infectious salmon anemia virus, among others. The Draft MND proposes to source certified pathogen-free eggs but does not disclose if the entire source facility will be certified pathogen-free.

The Draft MND includes additional measures to reduce the risk of pathogens from entering their cultured population and the natural environment, including disinfecting and quarantining eggs upon arrival, testing samples from each cohort, monitoring fish for disease, treating or disposing of fish that test positive for pathogens, and ultraviolet sterilization of wastewater to neutralize pathogens in facility discharge. The Department appreciates the measures included to minimize the risk of introducing pathogens, however, the potential for pathogens to enter the marine or estuarine environment are difficult to fully eliminate and the Draft MND lacks details on how these measures will be implemented. The Project proposes to grow 20-25 times more fish than Nordic's existing facilities, thus the effectiveness of disease prevention or pathogen outbreaks in Nordic's other facilities provides limited assurance given the vast difference in scale. The Draft MND does not discuss whether pharmaceuticals or therapeutics, such as antibiotics, will be used for disease prevention or treatment. Potential pathways for pathogens to escape the facility include the wastewater discharge (if not effectively treated or due to accidental spills/leaks) at the ocean outfall, through fish that escape from the facility, improper disposal of carcasses, and pathogens carried outside the facility on equipment or personnel.

If the concerns regarding pathogens and fish escape summarized above are not adequately addressed, the proposed Project may have indirect and direct negative impacts on the quality and viability of native fish populations, and recreational and commercial fisheries in the adjacent area. For example, the negative effects of a novel pathogen on northern California's threatened Chinook Salmon and Coho Salmon stocks could result in fishery restrictions and/or closures or further collapse. Low abundance/poor status for Klamath-Trinity Rivers Fall-run and Spring-run Chinook Salmon, for example, has resulted in heavy fishery restrictions for the entirety of the California coast in three (2016, 2017, 2021) of the last six ocean salmon seasons, and has similarly affected fishing opportunity

in river fisheries. Thus, disease management is not only a matter of economic and environmental concern, but most importantly, species preservation.

Recommendations: The Department recommends the Final MND include the following measures to reduce the risk of pathogens to a level less than significant:

- Nordic must source their eggs from Department-approved certified specific pathogen-free production facilities. If listed pathogens of concern are detected at the source hatchery, this information must be provided immediately.
- The Department recommends the Final MND include the development of a Fish Health Monitoring Program that specifies the frequency and number of fish at various life stages that are tested for listed pathogens and identifies which pathogens are being tested for. The program should include immediate reporting (within 24 hours) of listed-pathogen detections to the Department. The program should also include an annual Fish Health Monitoring Report that summarizes measures taken to screen for and minimize the risk of pathogens. The annual report should be provided to the Department and other regulatory agencies.
- The Department also recommends the Final MND include the development and implementation of a monitoring plan to ensure the efficacy of the effluent disinfection system prior to wastewater being discharged.

Wastewater Discharge

Comments: Treated wastewater from the land-based fish farm will be discharged into the RMT II ocean outfall pipe and multiport diffuser, located approximately 1.5 miles offshore at a depth of 80 feet. The total water volume discharged at full operational capacity is estimated at 12.5 million gallons per day (MGD). Nordic's wastewater will pass through fine filtration, biological treatment, and ultraviolet sterilization prior to being discharged. The wastewater system is expected to reduce total suspended solids (TSS), biological oxygen demand (BOD), and phosphorous by 99%, and total nitrogen by 90%. However, the Draft MND does not disclose how the effectiveness of the system will be measured or reported. It is also not clear if the facility will include redundancies in the wastewater treatment filtration/disinfection systems or an emergency contingency system to prevent unwanted discharges in case there are equipment failures.

The temperature of the discharge effluent will range between 68 to 72°F, approximately 20°F above the average ambient temperature of 51.8°F. The discharge will be comprised of 10 MGD seawater sourced from Humboldt Bay and 2.5 MGD freshwater, with an expected salinity of 27 practical salinity units (psu) (compared to ambient salinity of 33.5 psu). Additional sources of wastewater that will be discharged into the RMT II ocean outfall include the DG Fairhaven Power Company and future Samoa sewage treatment plant (Nordic's discharge will comprise 95-97% of the comingled discharge). The dilution study (Appendix E) concludes the risk of enhanced pelagic or benthic productivity from elevated nutrients is 'very low', and there is a 'low' risk of impacting the benthic community from sedimentation. The Marine Resources Biological Evaluation Report (Appendix D) concludes all evaluated special status marine species would have a 'very low' risk of any

potential impact resulting from the discharge, thus no mitigation for impacts to marine species or habitats is proposed.

The Department has reviewed the modeling study of the discharge and notes it relies on data that is not directly at the discharge site. Additionally, no water quality monitoring or biological surveys at the discharge location to validate model predictions or to ensure no adverse impacts to marine resources occur are described within the Draft MND.

Recommendations: The Department recommends the Final MND include the following measures to reduce the risk of adverse impacts from the facilities wastewater discharge to the marine environment:

- Provide a detailed wastewater flow diagram, which specifies all water sources and locations of the filtration/disinfection systems.
- Conduct or require regular inspections and maintenance of the ocean outfall pipe and multiport diffuser to ensure full functionality.
- The Department recommends the Final MND include an analysis of potential impacts to water quality and the marine environment from the use of pharmaceuticals and antibiotics.
- The Department recommends the Final MND contain a Water Quality & Biological Monitoring & Mitigation Plan developed in consultation with the Department, North Coast Regional Water Quality Control Board (NCRWQCB), and other relevant regulatory agencies. The plan should include a description of mitigation measures that will be immediately implemented if biological impacts associated with the wastewater discharge are observed. An annual monitoring report should be provided to the NCRWQCB, Department, and other regulatory agencies that discloses the amount of seawater withdrawn from the Bay, amount of wastewater discharged into the ocean, characteristics of the effluent, and results from the Water Quality & Biological Monitoring & Mitigation Plan.
- The Department also recommends the Final MND include an Operations and Maintenance Plan for the wastewater treatment system that includes redundancies in all the wastewater treatment filtration/disinfection systems and an emergency contingency system preventing unwanted discharges that can be used if the treatment system fails. The Operations and Maintenance Plan should incorporate the ability to detect and immediately respond to system malfunctions and deviations in water quality.

Seawater Intakes

Comments: The Draft MND states that no in-water work in Humboldt Bay is proposed as part of this Project, thus no impacts to special status species or aquatic habitat will occur. However, Nordic's preference is to grow-out fish in seawater, which will be sourced from seawater intakes (referred to as sea chests) located at the RMT II and Red Tank Docks in Humboldt Bay. The sea chests are not currently permitted and will require upgrades, including screens to minimize the risk of impingement and entrainment of juvenile fish and other marine life, before they can be used to withdraw water from the Bay. Even with

implementation of fish screens that meet the Department and National Marine Fisheries Service fish screening criteria, the intake system is anticipated to result in take of larval species, including CESA-listed longfin smelt and other species of biological importance.

The Draft MND does not disclose how much seawater the facility will use, although it is assumed based on the discharge analysis in the Draft MND that Nordic will source at least 10 MGD. The Draft MND does not discuss or analyze the environmental impacts associated with the seawater intake system, and instead cites that the seawater intakes will be analyzed in a future CEQA document (referred to as the Bay Water Intake Project) that will be permitted by the Harbor District. The Department is concerned the Draft MND relies on a future CEQA document to analyze and mitigate for potentially significant biological impacts associated with the seawater intake system, especially since Nordic's facility will rely on those upgrades and be a primary user of the intake system. The Department understands the Harbor District has contracted a consulting firm to develop a model that will assess biological impacts from the intake system. However, the results from this study have not yet been provided, and mitigation measures that reduce the potential impacts of the seawater intake system to a level less than significant have not been identified. Without information about the intake system, the Department cannot assess the cumulative impacts of the proposed Project and whether they are significant and mitigatable. Alternatively, if Nordic seeks to proceed with CEQA and permitting with a proposal that operates on freshwater alone, then the Final MND will need to fully characterize this as an alternative.

Recommendations:

- The Department recommends the Final MND disclose the amount (as well as information on instantaneous flow rates) of seawater that will be supplied daily from the Humboldt Bay seawater intake system to the Nordic facility. The Department recommends the Final MND analyze the potentially significant biological impacts associated with the seawater intake system, including entrainment of CESA-listed species and other species of commercial, recreational, and biological importance.
- To minimize impacts to salmonids and longfin smelt, all intakes utilized for the Nordic facility shall comply with the Department's fish screening criteria.
- If Nordic is considering using only freshwater for their operations, an alternative analysis should be included in the Final MND.

Fish Waste

Comments: Nordic's facility will produce a significant amount of fish waste (8,000 to 12,000 metric tons of annual processing waste), which will require 2 to 4 truckloads per day to remove fish sludge from the facility. Nordic has not identified a disposal location for the waste. Given the significant amount of sludge that will be trucked offsite daily, more information is needed to assess the environmental impacts associated with sludge disposal.

Recommendations: The Department recommends the Final MND include the location(s) of sludge disposal and an analysis of impacts. Impacts may include but not be limited to onsite impacts, disposal site, and potential for spills during transportation.

Dark-eyed Gilia Mitigation

Comments: The Draft MND states approximately 100,000 dark-eyed gilia plants occur within the study area and approximately 0.87 acres of dark-eyed gilia and/or dark-eyed gilia habitat will be impacted during construction and operation of the Project, primarily through direct impacts. Dark-eyed gilia has a California Rare Plant Rank of 1B (plants rare, threatened, or endangered in California and elsewhere) and a State Heritage rank of S2 (imperiled; at high risk of extirpation in the jurisdiction due to restricted, range, few populations or occurrences, steep declines, severe threats, or other factors). The Draft MND Mitigation Measure Bio-1 states dark-eyed gilia habitat shall be mitigated at a ratio of no less than 3:1 based on habitat area. However, the mitigation measure lacks quantitative density-based success criteria, and instead proposes success as the presence of dark-eyed gilia with no minimum population count or density criteria.

Recommendations: Given the high density of dark-eyed gilia within portions of the impacted Project area, quantitative success criteria for mitigation locations should be included in Mitigation Measure Bio-1. Success criteria should include that mitigation areas have produced an estimated number of dark-eyed gilia plants that are equal or greater than the estimated amount impacted. This analysis may be scaled to non-effected dark-eyed gilia reference sites to account for natural annual variations in population sizes.

Osprey Nest Management Plan

Comments: The Draft MND states an Osprey Management Plan is being developed and will include nest site protection measures, nest removal, and creation of new nest sites. Although this pending plan is briefly discussed on Draft MND page 4-68, it is not specifically referenced in Mitigation Measure Bio-5 or other mitigation measure sections.

Recommendations: The Department recommends the Final MND include an Osprey Management Plan as part of Mitigation Measure Bio-5 or as a new, stand-alone mitigation measure. The Osprey Management Plan should include performance criteria such as no-net-loss of osprey nests within the Project parcel.

Use of Explosives and Nesting Birds

Comments: Effects of structure demolition explosives use on nesting birds is addressed in Mitigation Measure Bio-5, with a nesting season avoidance window or a pre-ground disturbance nesting survey within the construction footprint or up to 500 feet from construction activities. However, the Draft MND discloses that sound pressures 800 to 1,100 feet from explosions may result in overpressure levels between 142 to 150 dB, and 141 to 142 dB at distances of 1,300 to 1,500 feet. Given that a single blast noise over 140 dB will likely result in bird ear damage and 93 dB may lead to behavioral and/or

physiological effects (Dooling and Popper 2007), a larger nesting bird survey radius may be needed if explosive use occurs during the nesting season.

Recommendations: The Department recommends the Project avoid use of explosives during the nesting bird season. If explosives will be used during the nesting season, the Final MND should provide further analysis of explosion sound pressures distances that may result in bird hearing damage or nest failure. As a result, pre-ground disturbance nesting surveys may need to occur in excess of 1,500 feet from explosion sites.

Cumulative Impacts Analysis

Comment: The Department is concerned that the Draft MND does not adequately analyze the potentially significant cumulative environmental impacts associated with the proposed Project and foreseeable projects in the area, including the future Bay Water Intake Project and Humboldt Bay Renewable Energy Port Project. The proposed Project relies on the future Bay Water Intake Project for seawater supply, which may result in potentially significant impacts to CESA-listed species, including longfin smelt and Coho Salmon, in addition to other species of biological importance. The Draft MND also does not include a cumulative impact analysis for the Harbor District's Humboldt Bay Renewable Energy Port Project, which proposes to replace the existing Redwood Marine Terminal I with a 7-acre dock directly adjacent to the Nordic facility.

Recommendation: The Department recommends the County consider whether preparing an Environmental Impact Report, rather than a Final MND, is appropriate to assess the potentially significant and cumulative impacts to the environment from the proposed Project, Bay Water Intake Project, and Humboldt Bay Renewable Energy Port Project, in addition to other projects.

ENVIRONMENTAL DATA

CEQA requires that information developed in environmental impact reports and negative declarations be incorporated into a database which may be used to make subsequent or supplemental environmental determinations (Pub. Resources Code, § 21003, subd. (e)). Accordingly, please report any special status species and natural communities detected during Project surveys to the California Natural Diversity Database (CNDDB). The CNNDB field survey form can be found at the following link: https://wildlife.ca.gov/Data/CNDDB/Submitting-Data#44524419-online-field-survey-form. The completed form can be submitted electronically or mailed electronically to CNDDB at the following email address: CNDDB@wildlife.ca.gov.The types of information reported to CNDDB can be found at the following link: https://wildlife.ca.gov/Data/CNDDB/Plants-and-Animals.

FILING FEES

The Project, as proposed, would have an impact on fish and wildlife, and assessment of filing fees is necessary. Fees are payable upon filing of the Notice of Determination by the

Lead Agency and serve to help defray the cost of environmental review by the Department. Payment of the fee is required for the underlying Project approval to be operative, vested, and final (Cal. Code Regs, tit. 14, § 753.5; Fish & G. Code, § 711.4; Pub. Resources Code, § 21089).

CONCLUSION

The Department appreciates the opportunity to comment on the Nordic Aquafarms California, LLC Land-based Aquaculture Project Draft MND to assist the County and Nordic in identifying and mitigating Project impacts on biological resources. Questions regarding this letter or further coordination should be directed to Corianna Flannery, Environmental Scientist at 707-499-0354 or Corianna.Flannery@wildlife.ca.gov.

Sincerely,

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EXHIBIT A
DEPARTMENT OF FISH AND GAME
FISH SCREENING CRITERIA
June 19, 2000

1. STRUCTURE PLACEMENT

A. Streams And Rivers (flowing water): The screen face shall be parallel to the flow and adjacent bankline (water's edge), with the screen face at or streamward of a line defined by the annual low-flow water's edge.

The upstream and downstream transitions to the screen structure shall be designed and constructed to match the bankline, minimizing eddies upstream of, in front of, and downstream of, the screen.

Where feasible, this "on-stream" fish screen structure placement is preferred by the California Department of Fish and Game.

B. In Canals (flowing water): The screen structure shall be located as close to the river source as practical, in an effort to minimize the approach channel length and the fish return bypass length. This "in canal" fish screen location shall only be used where an "on-stream" screen design is not feasible. This situation is most common at existing diversion dams with headgate structures.

The National Marine Fisheries Service - Southwest Region "Fish Screening Criteria for Anadromous Salmonids, January 1997" shall be used for these types of installations.

C. Small Pumped Diversions: Small pumped diversions (less than 40 cubic-feet per second) which are screened using "manufactured, self-contained" screens shall conform to the National Marine Fisheries Service - Southwest Region "Fish Screening Criteria for Anadromous Salmonids, January 1997."

D. Non-Flowing Waters (tidal areas, lakes and reservoirs): The preferred location for the diversion intake structure shall be offshore, in deep water, to minimize fish contact with the diversion. Other configurations will be considered as exceptions to the screening criteria as described in Section 5.F. below.

2. APPROACH VELOCITY (Local velocity component perpendicular to the screen face)

A. Flow Uniformity: The design of the screen shall distribute the approach velocity uniformly across the face of the screen. Provisions shall be made in the design of the screen to allow for adjustment of flow patterns. The intent is to ensure uniform flow distribution through the entire face of the screen as it is constructed and operated.

B. Self-Cleaning Screens:[1]

The U.S. Fish and Wildlife Service has selected a 0.2 feet per second approach velocity for use in waters where the Delta smelt is found. Thus, fish screens in the Sacramento-San Joaquin Delta and San Francisco Estuary should use this criterion for design purposes. In addition:

1. Streams and Rivers (flowing waters) - exposure to the fish screen shall not exceed fifteen minutes.

[1] Approach velocities in the June 19, 2000 Fish Screening Criteria that are inapplicable if delta smelt are present are omitted.

2. In Canals (flowing waters) - a bypass entrance shall be located every one-minute of travel time along the screen face.
3. Non-Flowing Waters (tidal areas, lakes and reservoirs) - The specific screen approach velocity shall be determined for each installation, based on the delta smelt life stage being protected. Velocities which exceed those described above will require a variance to these criteria (see Section 5.F. below).

C. Screens Which Are Not Self-Cleaning: The screens shall be designed with an approach velocity one-fourth that outlined in Section B. above. The screen shall be cleaned before the approach velocity exceeds the criteria described in Section B.

D. Frequency Of Cleaning: Fish screens shall be cleaned as frequently as necessary to prevent flow impedance and violation of the approach velocity criteria. A cleaning cycle once every 5 minutes is deemed to meet this standard.

E. Screen Area Calculation: The required wetted screen area (square feet), excluding the area affected by structural components (i.e., pore space or open area), is calculated by dividing the **maximum** diverted flow (cubic-feet per second) by the allowable approach velocity (feet per second). Example:

1.0 cubic-feet per second / 0.2 feet per second = 5.0 square feet of pore space

Unless otherwise specifically agreed to, this calculation shall be done at the **minimum** stream stage.

3. SWEEPING VELOCITY (Velocity component parallel to screen face)

A. In Streams And Rivers: The sweeping velocity should be at least two times the allowable approach velocity.

B. In Canals: The sweeping velocity shall exceed the allowable approach velocity. Experience has shown that sweeping velocities of 2.0 feet per second (or greater) are preferable.

C. Design Considerations: Screen faces shall be designed flush with any adjacent screen bay piers or walls, to allow an unimpeded flow of water parallel to the screen face.

4. SCREEN OPENINGS

A. Porosity: The screen surface shall have a minimum open area of 27 percent. We recommend the maximum possible open area consistent with the availability of appropriate material, and structural design considerations.

The use of open areas less than 40 percent shall include consideration of increasing the screen surface area, to reduce slot velocities, assisting in both fish protection and screen cleaning.

B. Round Openings: Round openings in the screening shall not exceed 3.96mm (5/32in). In waters where steelhead rainbow trout fry are present, this dimension shall not exceed 2.38mm (3/32in).

C. Square Openings: Square openings in screening shall not exceed 3.96mm (5/32in) measured diagonally. In waters where steelhead rainbow trout fry are present, this dimension shall not exceed 2.38mm (3/32in) measured diagonally.

D. Slotted Openings: Slotted openings shall not exceed 2.38mm (3/32in) in width. In waters where steelhead rainbow trout fry are present, this dimension shall not exceed 1.75mm (0.0689in).

5. SCREEN CONSTRUCTION

A. Material Selection: Screens may be constructed of any rigid material, perforated, woven, or slotted that provides water passage while physically excluding fish. The largest possible screen open area which is consistent with other project requirements should be used. Reducing the screen slot velocity is desirable both to protect fish and to ease cleaning requirements. Care should be taken to avoid the use of materials with sharp edges or projections which could harm fish.

B. Corrosion and Fouling Protection: Stainless steel or other corrosion-resistant material is the screen material recommended to reduce clogging due to corrosion. The use of both active and passive corrosion protection systems should be considered. Consideration should be given to anti-fouling material choices, to reduce biological fouling problems. Care should be taken not to use materials deemed deleterious to fish and other wildlife.

C. Project Review and Approval: Plans and design calculations, which show that all the applicable screening criteria have been met, shall be provided to the Department before written approval can be granted by the Regional Manager, Bay Delta Region.

The approval shall be documented in writing to the project sponsor, with a copy to the Deputy Director, Resource Management and Policy Division. Such approval may include a requirement for post-construction evaluation, monitoring and reporting.

D. Assurances: All fish screens constructed after the effective date of these criteria shall be designed and constructed to satisfy the current criteria. Owners of existing screens, approved by the Department prior to the effective date of these criteria, shall not be required to upgrade their facilities to satisfy the current criteria unless:

1. The controlling screen components deteriorate and require replacement (i.e., change the opening size or opening orientation when the screen panels or rotary drum screen coverings need replacing),

2. Relocation, modification or reconstruction (i.e., a change of screen alignment or an increase in the intake size to satisfy diversion requirements) of the intake facilities, or

3. The owner proposes to increase the rate of diversion which would result in violation of the criteria without additional modifications.

E. Supplemental Criteria: Supplemental criteria may be issued by the Department for a project, to accommodate new fish screening technology or to address species-specific or site-specific circumstances.

F. Variances: Written variances to these criteria may be granted with the approval of the Regional Manager, Bay Delta Region and concurrence from the Deputy Director, Resource Management and Policy Division. At a minimum, the rationale for the variance must be described and justified in the request. Evaluation and monitoring may be required as a condition of any variance, to ensure that the requested variance does not result in a reduced level of protection for the aquatic resources.

EXHIBIT A
DEPARTMENT OF FISH AND GAME
FISH SCREENING CRITERIA
June 19, 2000

It is the responsibility of the project sponsor to obtain the most current version of the appropriate fish screen criteria. Project sponsors should contact the Department of Fish and Game and the U.S. Fish and Wildlife Service (for projects in anadromous and fresh waters) for guidance.

Copies of the current criteria are available from the Department of Fish and Game Bay Delta Region; 7329 Silverado Trail/P.O. Box 46, Yountville, CA 94599, (707) 944-5500.

Technical assistance can be obtained directly from the Habitat Conservation Branch; 1416 Ninth Street, Sacramento, CA 95814 - (916) 653-1070.

The National Marine Fisheries Service Southwest Region "Fish Screening Criteria for Anadromous Salmonids, January 1997" is available at: http://swr.ucsd.edu/hcd/fishscrn.htm and from their Southwest Region, 777 Sonoma Avenue, Room 325, Santa Rosa, CA 95402 - (707) 575-6050.