

CALIFORNIA COASTAL COMMISSION

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Th9b

ADDENDUM

November 14, 2023

TO: Coastal Commissioners and Interested Parties

FROM: Cassidy Teufel, Director, Energy, Ocean Resources, Federal Consistency, and Technical Services
Holly Wyer, Senior Environmental Scientist

SUBJECT: Addendum to Staff Report for CDP Application No. 9-20-0488 (Nordic Aquafarms California, LLC)

This addendum provides responses to comments in letters received from Madrone Audubon and Save California Salmon and in a joint letter from California Surfrider Foundation, Humboldt Waterkeeper, Environmental Protection Information Center and Northcoast Environmental Center. These letters are available in the correspondence document posted on the Commission's online agenda¹ and express concerns about pathogens, stormwater, impacts to salmon and crab fisheries, impacts to tribes and environmental justice communities, and include requests for monitoring information to be publicly available. In addition, this addendum provides recommended modifications to the October 26, 2023, staff report, including proposed changes to Special Conditions and to the findings.

Recommended changes to the Special Conditions include requiring Nordic Aquafarms California, LLC ("Nordic") to post publicly on its website the findings of the monitoring programs, reports, and surveys described in the Special Conditions. Other changes to the findings include new information about regulatory oversight of biosecurity in aquaculture operations, additional context on equity and fishing in Humboldt Bay, and additional references regarding plankton ecology.

¹ <https://documents.coastal.ca.gov/reports/2023/11/Th9b/Th9b-11-2023-corresp.pdf>

~~Strikethrough~~ indicates text deleted from the special conditions and findings pursuant to this addendum and **bold underline** indicates text added to the special conditions and findings pursuant to this addendum.

Finally, this addendum includes several attachments, and supporting information for public awareness, as listed below:

1. Nordic Memo to Coastal Commission Staff Titled “Further information regarding “Viruses and Pathogens” section in Staff Report 9-20-0488.
2. Comments from the Wiyot Tribe on the draft environmental impact report for the Nordic Aquafarms project.
3. Nordic Response to Comment Letters.
4. Aquatactics Bimeda memo regarding fish health and biosecurity.
5. HT Harvey and Associates Memo regarding harmful algal blooms.

I. RESPONSE TO COMMENTS AND RECOMMENDED REVISIONS TO FINDINGS AND SPECIAL CONDITIONS

1. Correspondence received from Humboldt Waterkeeper, Surfrider Foundation, Environmental Protection Information Center, and Northcoast Environmental Center included a request for additional reporting in the Special Conditions:

Additionally, we request that these findings [from required monitoring and surveys] be made publicly accessible as they are received, and prior to determination from the Executive Director as to whether the discharge has caused any significant adverse environmental impacts or contributed to the occurrence of harmful algal blooms.

In response to this comment, Special Condition 1, on page 6, has been revised as follows:

1. Permit Reporting

Nordic shall report to the Executive Director by December 31, 2028, with the findings of the monitoring programs, reports, and surveys, described in Special Conditions 2, 3, and 4. **Nordic shall post the findings of the monitoring programs, reports, and surveys on its website when these findings are reported to the Executive Director, including findings or reports developed under Special Conditions 2, 3, and 4.** If the Executive Director determines that the discharge has caused eutrophication, hypoxia, or harmful algal blooms, or caused any other significant adverse environmental impacts, Nordic or its successors shall promptly submit to the Commission a complete application for an amendment to this coastal development permit that includes a plan to address all prior or future significant impacts, including but not limited to modifying the discharge to ensure consistency with the Coastal Act.

2. Correspondence received from Madrone Audubon Society described concerns about aquaculture being similar to factory farming and raised questions regarding pathogens and antimicrobial treatments:

What antibiotics, antimicrobial and other treatments would be administered to the crowded fish in contained tanks, being “cultivated?”

A list of the proposed antibiotics, antimicrobial products, cleaners and other treatments to be used in the proposed facility are available in section 6.3.2.2 of the National Pollutant Discharge Elimination System (NPDES) permit. In response to this comment the findings on paragraph 1 of page 23 have been revised as follows:

As mentioned in the project description, Nordic proposes to cultivate yellowtail at its facility. While native to California’s marine waters, yellowtail are a warmer-water species that is typically found farther south. Water temperatures off the coast of Humboldt County are generally considered too cold to support the presence of yellowtail. Therefore, wild yellowtail would not be likely in coastal waters off of Humboldt County. **Additionally, as part of Nordic’s aquaculture registration, the California Department of Fish and Wildlife (CDFW) reviewed a fish health, welfare, and biosecurity management plan which provides the basis for the CDFW’s ongoing fish health management coordination and oversight of the project. This plan includes biosecurity measures, pre-importation health screenings, fish health monitoring, and facility-wide disease testing. A memo with additional details on fish health management is available in Appendix A.² Finally, the NPDES permit prohibits the discharge of any detectable levels of chemicals used for the treatment and control of disease, other than salt (NaCl). The NPDES permit additionally requires Nordic to perform chronic toxicity testing of its discharge, prior to comingling with the other discharges in the outfall, in order to demonstrate that the discharge does not pose a toxicity risk to marine organisms.** With the wastewater treatment and disinfection provided, **the requirement for chronic toxicity testing, the prohibition of discharge of any detectable levels of chemicals used for the treatment and control of disease,** and the lack of readily available wild species for a pathogen to infect, the proposed discharge is not expected to spread fish viruses or pathogens.

3. Correspondence received from Save California Salmon touched upon several issues including requesting an extension of the comment deadline, requesting access to Nordic’s dilution studies, indicating concerns about impacts to stormwater conveyances, and indicating that three years of monitoring was not enough to address potential impacts of the project.

Commission staff provides the following response to these comments:

- The staff report was provided 21 days prior to the Commission hearing. As noted in the Commission’s posted Meeting Rules & Procedures for its agendas, “[s]taff reports are usually distributed at least 10 days before the meeting.”

² The memo is attached to this addendum, and will be added to Appendix A for the adopted findings.

- The dilution study and its subsequent updates were also provided 21 days prior to the Commission hearing in Appendix A to the staff report. The dilution study is listed under items 3, 4, and 5 in Appendix A.
 - The concerns about impacts to stormwater conveyances from the proposed onshore fish cultivation facility site are outside the scope of this permit and the proposed discharge. This permit focuses solely on the wastewater discharge from the proposed facility, and stormwater from the facility site is not proposed to be discharged through the outfall pipeline.
 - Special conditions 3 and 4 of this permit require five years of monitoring, rather than three, with monitoring reports submitted to the Executive Director annually and at the five-year point. Moreover, as described in the response to Comment #1 above, the findings of the monitoring programs would be posted publicly on Nordic's website at the same time they are provided to the Commission's Executive Director.
4. Correspondence received from Save California Salmon also raised concerns about equity:

The staff report did not analyze racial equity impacts. There is a short section on tribal consultation that says the Bear River Band and Wiyot tribes were reached out to and that comments were received from the Wiyot Tribe, but they aren't posted. So it is unclear if the tribe's concerns were adequately responded to.

Commission staff notes that during tribal consultation, the Wiyot Tribe did not provide additional concerns about the discharge beyond what had already been discussed in their comment letter on the Environmental Impact Report for the project. The comment letter has been attached to this addendum. Discussion addressing the water quality comments previously submitted by the Wiyot Tribe in regard to this project is also included in the staff report on page 15.

The review of this coastal development permit application is focused on the wastewater discharge from an existing outfall. Moreover, although harmful algal blooms are unlikely to occur from the proposed discharges, Commission staff have recommended additional monitoring and surveys additionally to protect coastal fisheries and water-based recreation. Furthermore, the evidence available does not indicate that the proposed discharge would have any effect on clam digging or pier fishing in Humboldt Bay. The findings in paragraph 1 of page 29 have been revised as follows:

Finally, under no scenarios would the discharge plume enter Humboldt Bay, where the recreational clam digging and pier fishing occurs.

II. ADDITIONAL RECOMMENDED REVISIONS TO FINDINGS

The additional recommended revisions to findings below are to provide relevant references.

Page 26, footnote 12:

The four taxa are ~~xx~~ *Acartia longiremis*, *Calanus marshallae*, *Pseudocalanus mimus*, and *Centropages abdominalis*. There are numerous studies regarding the ability of copepods to survive and resist various levels of turbulence - see, for example, Elmi, Dorsa and Donald Webster, Copepod interaction with small-scale, dissipative eddies in turbulence: Comparison among three marine species, In *Limnology and Oceanography*, June 2022; Elmi, Dorsa, Donald Webster, and David Fields, Response of the copepod *Acartia tonsa* to the hydrodynamic cues of small-scale, dissipative eddies in turbulence, *Journal of Experimental Biology*, February 2021; and Saiz, Enric, Albert Calbet, and Elisabetta Broglio, Effects of small-scale turbulence on copepods: The case of *Oithona davisae*, In *Limnology and Oceanography*, 2003. ~~Of those, studies show that xx is able to resist turbulence xx. See xx [cite study].~~

NORDIC AQUAFARMS CALIFORNIA MEMORANDUM

DATE: November 10, 2023

TO: Cassidy Teufel, California Coastal Commission
Holly Wyer, Senior Environmental Scientist, California Coastal Commission

FROM: Nick King, Nordic Aquafarms California
David Noyes, Nordic Aquafarms California

EC: Randy Lovell, State Aquaculture Coordinator, CDFW
Dr. Mark Adkison, State Fish Health Coordinator, CDFW

SUBJECT: Further information regarding ‘Viruses and Pathogens’ section in Staff Report 9-20-0488

Nordic Aquafarms would like to provide further information regarding the actions that the California Department of Fish and Wildlife (CDFW) has taken through the permitting process and on an ongoing basis as the Project develops its operational plan. We believe this is directly relevant to the section of the staff report that discusses potential effects of the proposed discharge through release of viruses and pathogens. It should be noted that all government activities related to aquaculture disease detection, control, and eradication that do not affect human health and safety are the responsibility of CDFW ([FGC §15500](#)).

As the Commission staff accurately points out, NAF received an approved aquaculture registration from CDFW in July 2023. Filing this application for registration with CDFW required that NAF provide a detailed risk assessment for cultivating the species, *Seriola lalandi*, at the Project site (*Evaluation of Risk from Land-based Recirculation Aquaculture Farm – Species Assessment*. Submitted to CDFW May 2023, 35pp).

Specific to disease and pathogens, the following questions were investigated within the CDFW risk assessment report:

- A) What diseases or parasites might the species carry?
- B) Are these diseases already in California?
- C) Could these diseases impact native species?
- D) Can the disease risks be negated by actions and testing?
- E) Risk of escapement
- F) Existing biosecurity at the facility



In addition to reviewing the provided risk assessment, the Department, in compliance with [FGC §15102](#), conducted its own due diligence regarding this species and risk to adjacent native wildlife before approving the aquaculture registration for Nordic Aquafarms.

Comments made by CDFW during the CEQA process in 2022 requested that a Fish Health Monitoring Plan for the farm be developed in cooperation with CDFW. In June 2023, Nordic Aquafarms provided the *Fish Health, Welfare and Farm Biosecurity Management Plan* to CDFW that has since been reviewed favorably by the Statewide Fish Health Coordinator and staff, and provides the basis for CDFW's ongoing fish health management coordination and oversight of the project. The biosecurity measures, pre-importation health screenings, fish health monitoring, and facility wide disease testing that is embedded into the program represent a holistic and robust program that when combined with water treatment both at the intake and outfall further strengthens the Staff conclusion that the proposed discharge is not expected to spread fish viruses or pathogens.

McNamara, Cade

From: Adam Canter <adam@wiyot.us>
Sent: Friday, February 18, 2022 2:41 PM
To: CEQAResponses
Cc: Ford, John; William Matsubu; ted@wiyot.us; michelle@wiyot.us
Subject: Nordic Aquafarms DEIR Comments, Wiyot NRD
Attachments: Nordic_Aquafarms_DEIR_comments_WiyotNRD.pdf

Ha'wa'lou Cade and John, please find our attached comments on the Nordic Aquafarms DEIR. Thank you for your time and consideration. Rra'dutwas (with kindness), Adam

Adam N. Canter
Natural Resources Director
Wiyot Tribe Natural Resources Department
Humboldt State University Sea Level Rise Initiative Co-Chair
Table Bluff Reservation
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February 18, 2022

Planning Director, John Ford
Humboldt County Planning and Building Department
3015 H Street
Eureka, CA 95501
CEQAResponses@co.humboldt.ca.us



Re: Nordic Aquafarms Land-Based Aquaculture Project Draft EIR Comments

Ha'wa'lou (Greetings)

The Wiyot Tribe Natural Resources Department (WNRD) hope this comment letter reaches you in good health and appreciates Nordic Aquafarms (NAF) for their accessibility and willingness to address concerns of Tribal citizens and the general public, who have the potential of being impacted by this large development project. The WNRD note that there will be community and environmental costs and benefits from a food production project of this scale and that as part of the CEQA process NAF is required to fully address potential impacts and plan for their appropriate and scaled mitigations where needed. As stewards of the Wigi (Humboldt Bay) environment since time immemorial it is paramount that the Wiyot continue to protect the water and life that depend upon these exceptional resources that we are willing to share with NAF in their good faith to also protect these waters and resources and it is through efforts such as this that we help to vet and improve the project through our opportunity to comment on the Draft Environmental Impact Report (DEIR). As with many small Native American Tribes, it is difficult to have the capacity take a deep dive into every aspect of the project that has the potential to impact ancestral waters, lands, and species, and we appreciate the information provided by our friends and colleagues from various local environmental organizations, including Humboldt Baykeeper, and encourage NAF to address the environmental coalitions concerns, which mirror many of the Tribe's major concerns in general.

Ambient water quality data more proximate to the discharge point than was employed in the Numeric Modeling Report should be obtained and used to better assess potential impacts of nutrients proposed to be discharged in the project's effluent. The dataset used in the modeling study was collected approximately 3.5 miles south-southeast of the Redwood Marine Terminal II diffuser, rather than in the area that will be affected by the discharge.

The Central & Northern California Ocean Observing System (CeNCOOS), partnered with Humboldt State University and the WNRD, measures hydrographic parameters at Trinidad Pier and several locations within Humboldt Bay and serves these data through the CeNCOOS Data Portal. Comparing CeNCOOS data provides evidence that there are significant differences in water quality conditions in Humboldt Bay (measured at the Humboldt Bay Shoreline Station) compared to open ocean conditions (measured at the Trinidad Pier Station).

Ambient water quality conditions such as temperature, salinity, dissolved oxygen, and chlorophyll levels are considerably different during different seasons in Humboldt Bay compared to the open ocean. These data do not support the assumption in the DEIR that ambient water conditions taken inside Humboldt Bay (Swanson, 2015) are adequate for modeling ambient conditions 1.55 miles offshore at the point of discharge.

Higher temperatures and lower salinity levels can be an attractant, can exacerbate Harmful Algal Blooms, and can encourage the growth of invasive species. For example, *Diplosoma listerianum*, a

colonial tunicate that can outcompete indigenous colonial tunicates and benthic invertebrates for space, was one of several invasive fouling species which showed increased growth (% coverage) at temperatures 3.5 and 4.5°C above the ambient temperature in Bodega Harbor (13.5°C), while a native tunicate, *Distaplia occidentalis*, showed reduced survival.

There is concern over further elevating the water temperature in the region as our oceans are already warming. In 2014 a large Marine Heat Wave (MHW) known as “the blob” was identified as it began dominating the northeast Pacific Ocean. Researchers documented many ecological effects associated with the blob, including unprecedented harmful algal blooms, shifting distributions of marine life, and changes in the marine food web. We expect NAF to monitor how elevated ocean temperatures will affect the surrounding environment and mitigate any harmful effects.

The WNRD would like for NAF to continue to use the best available science and data when modeling the impacts for the outfall discharge but should seek input/validation from local experts, including academics at Cal Poly Humboldt, and local NOAA Oceanographers regarding the local complexities of hydrodynamics. The WNRD also want NAF to ensure transparency regarding the conditions of the discharge water quality.

The estimated discharge of 1484 lbs. of nitrogen per day reinforces the need for baseline ambient water quality assessment at the point of discharge and regular monitoring to accurately assess the impact of increased nutrients, including monitoring for Harmful Algal Blooms (HAB). The coast of Humboldt County has already experienced high levels of *Pseudo-nitzschia australis*, which causes domoic acid and has led to fisheries closures in Humboldt County in 2016 through 2021. *Pseudo-nitzschia* growth and domoic acid production benefit from nitrogen loading in the environment. Given the potential risk to ecosystems and the local economy, it is important that NAF collect appropriate data to accurately conclude that the impacts of increased nitrogen are indeed “less than significant” and that regular monitoring of discharged nitrogen be conducted throughout all phases of production to ensure that it does not contribute to increased HABs. As is previously stated, ambient water quality data from closer to the discharge point than was used in the Numeric Modeling Report should be obtained and used to better assess potential impacts of nutrients proposed to be discharged in the project’s effluent. The potential for the effluent to exacerbate Harmful Algal Blooms, particularly in winter, should be assessed using an upwelling model as suggested by California Sea Grant Advisor Joe Tyburczy: “Simple calculations undertaken using a published model for ocean productivity (BEUTI, Biologically Effective Upwelling Transport Index) suggest that nitrate released by the Nordic facility (roughly 700 kg/day) may be substantial relative to natural, ambient nutrient supply – especially during the winter when upwelling is lower and when alongshore currents and resultant dilution is reduced.”

Baseline and post-project monitoring for toxic algae near the discharge point should be conducted and a threshold that would trigger adaptive management should be established as a condition of the project. Ongoing monitoring should include early detection of toxic algae such as *Alexandrium*, the dinoflagellate that produces PSP toxins, and *Pseudo-nitzschia*, the diatom that produces domoic acid, which caused devastating impacts to the marine ecosystem in 2014-15, including the Dungeness crab fishery, marine mammals, and seabirds from Alaska to Southern California. We cannot let this project increase conditions that make these toxins more prolific.

One primary concern is the impact of pumping 11.9 million gallons of water from the Wigi (Humboldt Bay) to culturally important species, including the endangered longfin smelt (*Spirinchus thaleichthys*). Although the screen size (1mm) and maximum approach velocity (0.2 feet per second) are designed to have minimal impacts, recent studies (Tenera 2022 unpublished) indicated the presence of vulnerable larval longfin smelt. With entrainment and impingement of culturally important and endangered fishes likely unavoidable, the WNRD suggests that Nordic Aquafarms and the Humboldt Bay Harbor District explore other methods to minimize any negative impacts. In addition to more complete studies to understand finer scale spatiotemporal distributions of larval fishes, we suggest continued sampling proximate to the intakes when water diversion volumes are above certain thresholds. WNRD suggests that other options to minimize entrainment could include seasonal or diurnal decreases in water diversions coinciding with the presence of vulnerable larval fishes. The piling removal project proposed as off-site compensation for impacts to spawning longfin smelt is not appropriate, since the subject area is not known to be

spawning habitat for the species. The DEIR states that the potential for entrainment of Longfin Smelt larvae can be mitigated on a 1:1 basis to ensure there would be no loss in number of individual larvae; therefore, the impact is less than significant. However, the DEIR also states that "the removal of pilings does not directly recreate habitat for the life stage of the larvae, but improving habitat will increase the number of Longfin Smelt resulting in an increased number of larvae." It is not clear if or how improving non-spawning habitat will improve spawning. A mitigation measure that directly recreates or restores Longfin Smelt spawning habitat should be developed and incorporated, once the site-specific surveys quantify the extent of impacts on this species.

An adaptive management plan should be adopted that sets thresholds that would trigger action to avert a toxic algae bloom once it is detected. The adoption of appropriate thresholds and implementation plan for adaptive management should include experts in detecting and managing HABS, as well as scientific experts from trustee agencies focused on protecting marine resources, including the California Coastal Commission, California Dept. of Fish & Wildlife's Marine Region, and National Marine Fisheries Service. We also expect plans and control protocols that address the possibility of fish or pathogen escape from NAF facilities.

The substantial energy demands of this proposed facility cannot be overlooked and we stress to NAF that they should increase the size of the on-site solar electricity system, including solarizing parking areas and including an energy storage system, commit to purchasing 100% renewable energy, and have a commitment to purchasing local, carbon free, renewable electricity, whenever it is available and feasible to purchase.

The Wiyot recognize and support the clean-up of the toxic former pulp mill property that is a major benefit from this proposed project. In addition to cleaning up the pulp mill site, other beneficial mitigation is noted, including the removal of creosote-soaked pilings and removal of invasive spartina. We look forward to more thorough assessment of the potential impacts from the outfall discharge and bay water in-takes and the other important considerations to ensure our environment is protected. Thank you for taking the time to consider these concerns and please continue to reach out to us at any time.

Rra'dutwas (with kindness),

A handwritten signature in black ink, appearing to read 'Adam N. Canter', with a long horizontal line extending to the right.

Adam N. Canter, Natural Resources Director
Wiyot Natural Resources Department
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November 14, 2023

Nordic Aquafarms California appreciates the time members of the public have taken to engage with us on this Project since its announcement in 2019. The hundreds of meetings and more than 50 site tours we have conducted have allowed us to work with the public to address their concerns, and make this a better project.

We share the Madrone Audubon Society's concern about the impacts of climate change and we agree that this Project should be viewed looking forward to those challenges. Addressing the challenges of climate change was a core mandate when this company was founded.

Nordic Aquafarms believes that building and operating our farms close to our customers provides multiple benefits. The overwhelming majority of Yellowtail currently available for consumers in the US is imported from the Western Pacific with Japan producing most Yellowtail available in the market with some farming also occurring in Australia. These farms are all net pen farms with fish grown in the Ocean.

The benefit of serving customers in our region does more than simply reduce the impacts of transporting fish from the other side of the globe. By getting our fish to the consumer in hours instead of days or weeks we believe we can reduce food waste. As much as 50% of seafood is discarded before it is consumed.

I would be remiss to not point out that California is highly regarded for having the strictest regulatory process anywhere. Those with concerns about climate change should encourage companies to undertake this high level of scrutiny instead of continuing to rely on imported seafood.

A larger Atlantic salmon Project was analyzed and approved under our terrestrial coastal development permit and our certified EIR. The decision to pursue Yellowtail is a business decision. We recently transitioned our fully operation Atlantic salmon farm, Fredrikstad Seafoods in Norway and refit it as a Yellowtail farm. This transition is now complete with that farm being restocked with Yellowtail this summer.

The Madrone Audubon Society characterized our Project as "inhumane, unsafe and unsanitary". Nordic Aquafarms raises premium fish. To achieve this, we focus intently on providing our fish with optimized conditions based on their specific biology and natural life history with a specific focus on their welfare. Providing our fish with a sanitary, pathogen and parasite free, low stress environment where environmental conditions and nutrition needs are carefully scrutinized and met is important for us and our fish. We take pride in our farms and our employees and have thoughtfully designed our facility with the safety of our employees, our fish and the public in mind. A tangible example of this is the inclusion of a tsunami refuge area on top of our farm that we have committed to making open and available to the public vs the current refuge of climbing the local dunes.

Nordic Aquafarms approach of focusing on land based recirculating aquaculture is our answer to the challenges we see in front of us.

How do you reduce the impacts of fish farming on the ocean? Our answer is to remove the fish from the ocean, reuse and recycle our water to the fullest extent possible and treat our wastewater to the fullest extent possible.

How do we reduce the impacts from food production? Raise fish in farms that are close to the customers. Fish do not spend metabolic energy regulating their body temperature or contending with gravity. This makes them highly efficient converters of feed.

How do you address issues of water scarcity in the face of increased competition for freshwater? We have chosen to focus on raising marine fish that do not require freshwater.

How do we reduce our farms GHG footprint? Our farms are fully electrified, and we have committed to 100% renewable and or non-carbon power for this Project to include an approximately 4 MW rooftop solar array. We site our farm close to our customers to reduce transportation. We sell our fish before we harvest them, and get them to our customers in hours instead of days to reduce food waste. We incorporate heat exchangers and heat recovery technology to reduce energy needs, and provide our workers with multiple incentives to carpool, rideshare, ride bicycles or take the bus in our detailed traffic management plan. Lastly, we are redeveloping a brownfield site that has reusable infrastructure in place to reduce our construction effort to include reuse of the demolished brick and concrete onsite to improve our foundations.

How can you reduce marine competition amongst other users such as fisherman and recreationists? Take the farm out of the ocean and place it on private land.

How do you reduce the use of antibiotics? Treat the incoming water to a very high degree to remove all parasites and inactivate any pathogenic material. Disinfect the water as it recirculates in the farm and before it exits the farm to ensure no pathogens can enter the farm, establish themselves in the farm or exit the farm. Train all of the employees on fish welfare and observation standards. Regularly undertake third party inspections, and vaccinate our fish to strengthen their immune systems. Investigate any mortalities, and work hand in hand with CDFW to keep our Farm Health Management Plan current.

Section 6.3.2.2 of NPDES ORDER NO. R1-2023-0019 provides details of chemicals that may be used at the facility. All cleaning and chemical agents would be used in compliance with the intended use and label instructions. Chemicals and disinfectants used by the Project interact with and are consumed by organic material. Some of the compounds referenced are used to clean and disinfect the seafood processing equipment and areas where food safety requirements are regulated by the USDA. Copper is intentionally excluded at the facility as it is toxic to fish.

All decisions for NAFC operations are made with the health and welfare of our fish in mind. For NAFC to be a success, we will afford our fish the highest standard of care and provide them with the appropriate environmental conditions needed to thrive, grow, and stay healthy in our tanks. The goal of good fish health management is to have healthy and productive fish. However, if fish do become sick, they may require treatment with a therapeutant. NAFC will take a responsible approach to veterinary medicine for the welfare of our fish. In rare cases where medicines are required to remedy infection and prevent amplification of a pathogen on the farm, they are added to the feed per the veterinarian's prescription.

Only medicines approved by FDA-CVM can be used and they must be administered under veterinarian oversight after proper diagnosis, isolation of the agent, and testing sensitivity to the medicine. Under the National Environmental Policy Act 1969 (NEPA), the FDA-CVM is required to assess the environmental impact of a new drug during the registration and approval process.

Regarding concerns raised over impacts from stormwater, this Project will install stormwater treatment features capable of treating the stormwater from a 100 year event. This equates to 6” of rain in a 24 hour period. The state of the current site does not meet current stormwater treatment standards and is likely directly conveying untreated stormwater directly to Humboldt bay from a brownfield site with large amounts of hazardous materials such as lead and asbestos. This Project will only provide improvements over the current conditions around stormwater. This Project will require a stormwater permit from the regional water quality control board who will apply all applicable regulations during that permits consideration.

We remain committed to keeping our door open to the public. We look forward to continuing to work with the public as we move forward with this Project.

Respectfully

David Noyes

SVP US Strategic Projects and Technology





AQUATACTICS
Bimeda

Nov. 14, 2023

To Whom it May Concern:

Re: Fish Health & Biosecurity Concerns for Nordic AquaFarms Proposed Recirculating Seriola Fish Farm in Eureka, CA

As an independent USDA-accredited and California-licensed (#21383) veterinarian who has exclusively practiced fish medicine for almost 35 years, **I am familiar with Nordic's proposal and would like to give** my expert opinion on their overall fish health program, prevention measures, biosecurity, and risk to any coastal fish populations.

Ideally, risk levels should be quantified to aid in making sound policy and regulatory fish health regulations and guidelines. However, information is not always available to form meaningful metrics and subjective risk assessments are the fallback. Perspective then becomes increasingly important in getting a sense of the actual risk. Complex fish health concepts need to be elaborated upon (such as a misunderstanding of the difference between what a pathogen is versus a disease) in order to get a proper sense of the risk.

Pathogens (viruses, bacteria, parasites, etc.) are extremely common in the environment. They get transferred back and forth between local and global regions by other animals, currents, ballast water and even jet streams. Luckily, wild animal populations that are exposed to novel pathogens (which can create pulses of disease) quickly develop a level of herd immunity, and pathogens often become **"endemic"** with little impact over time. New DNA technology is allowing us to discover the DNA of countless pathogens in and around animal populations that we previously **didn't know were there**. The picture of what is present in the environment is expanding exponentially, however the implications of finding this plethora of additional pathogen DNA are also becoming confusing.-Luckily, across the planet, the adage still holds true that, although pathogens are common, progression to disease is rare.

If source seedstock are screened with some rigor, then there can be reasonable confidence that they are pathogen-free and any subsequent chance of exposure will be from pathogens in neighboring wild populations (**called: "endemic pathogens"**) for which they will have developed some level of herd immunity.

So, to summarize the risk reducing factors and measures in place for Nordic's proposed hatchery:

- 1) Initial Seriola seedstock will be fully screened (and past disease history fully assessed), so that any incidental exposure will be to endemic pathogens already in the surrounding California waters.
- 2) Both incoming and outflowing water will be treated to minimize endemic pathogens entering and leaving the facility.
- 3) Fish will be vaccinated for known endemic pathogens, as an added security measure.





AQUATACTICS Bimeda

- 4) Fish will be continually monitored for any infectious diseases through a comprehensive fish health management plan which includes, but is not limited to:
 - a. Any moribund fish will be clinically worked up via an integrated fish health management program involving an internal fish health team and independent external consultants.
 - b. There will be periodic sampling of a sample of healthy fish for a list of notable pathogens by USDA accredited inspectors.
 - c. Production parameters (performance metrics) will be continuously scanned for any performance issues (which can proceed any clinical issues).
- 5) A priori action plans of treatment or culling and disinfection will be put in place in order to minimize further any possible deleterious impact that an unlikely outbreak of endemic pathogens may possibly have.

Farms and wildlife have coexisted for millennia, and although diseases have and will cause disease issues from time to time, there rarely has been an issue for wild populations where there is an endemic disease interacting between domestic and wild animals. The most serious issues are almost all due to when an exotic pathogen or pathogen strain is introduced. This should not be a concern if seedstock are initially heavily screened, or if the lifecycle is closed by having resident broodstock onsite.

The above measures go beyond what any agricultural enterprise would reasonably be required to adopt, recognizing that the danger of disease from endemic pathogens already in the surrounding environment is low, and therefore, risk to wild fish is extremely low. Any suggestion that additional eDNA testing of the **facility's** water in order to further reduce any risk to wild fish is unwarranted. The proposed program, as outlined above, **is more than adequate to protect California's wild fish.** Furthermore, as previously mentioned and commented on, as per **Meyer and Hickey's 2022 paper** (A Perspective: Molecular Detections of New Agents in Finfish – Interpreting Biological Significance for Fish Health Management, J. of Aquatic Animal Health, V.34: 47-52) interpretation of DNA results can be extremely confusing and fraught with challenges in interpretation. This obfuscation is an unnecessary **burden and will not provide any useful information on Nordic's fish health status.**

Nordic Aquafarms venture is an extremely important project that helps conserve our ocean resources, helps the local community benefit from the blue economy, and serves to reduce our enormous National seafood deficit.

Please do not hesitate to contact me (information below) with any questions or comments.

Regards, 

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Technical Memorandum

Agenda Item: Th9b Application No.: 9-20-0488

Project # 4444

November 14, 2023

To: California Coastal Commission

**From: Dr. Sharon Kramer, Principal and Senior Marine Ecologist
Sophie Bernstein, Marine Ecologist
David Noyes, SVP US Strategic Projects and Technology, Nordic Aquafarms**

Subject: Response to Staff Recommendation for Nordic Aquafarms California, LLC CDP

Introduction & Background

Harmful algal blooms (HAB[s]) occur when certain species of algae and phytoplankton proliferate, and according to the International Panel on Climate Change report, they have been increasing in range and frequency in coastal areas (Collins et al. 2019 as cited *in* Trainer et al. 2020). In the U.S., HABs have become more extensive and problematic in marine waters, as there are more toxic species and toxins to monitor, and a wider range of geographically affected areas and impacted resources (Anderson et al. 2021). In California specifically, HABs have been documented almost annually since 1991 (Figure 8 *in* Lewitus et al. 2012). Due to the increasing frequency and intensity of HABs in the California Current System (CCS) in recent years, a considerable amount of research has focused on this topic (e.g., Lewitus et al. 2012, Bowers et al. 2018, Anderson et al. 2021). The purpose of this memo is to 1) provide background information on what drives HABs in the CCS and 2) explain why discharge from the Nordic Aquafarms onshore fish aquaculture facility through the Redwood Marine Terminal II outfall pipe that is 1.55 miles offshore is unlikely to contribute to either small scale, localized or coast-wide regional HABs.

A large portion of HAB events in the broader CCS are concerning because they are associated with *Pseudo-nitzschia* spp., the genus of phytoplankton capable of producing domoic acid (DA) (Lewitus 2012). DA threatens ecosystem health by accumulating in the food web. DA accumulates in the digestive tissue of primary and secondary consumers (e.g., krill, anchovies, sardines, and juvenile fishes) that directly consume toxic algal cells (Scholin et al. 2000, Bargu et al. 2002, Bernstein et al. 2021). DA also enters the food web through benthic

pathways (Vigilant and Silver 2007, Sekula-Wood 2009). The pelagic and benthic pathways of trophic transfer can cause mass marine mammal and seabird mortality (Scholin et al. 2000). In addition, DA is toxic and potentially fatal to human consumers (Bates et al. 1989 as cited in Bernstein et al. 2021) and can cause large-scale commercial and recreational fishery closures of Dungeness crabs and razor clams, anchovies and sardines, among other shellfish and finfish species as a result. This is devastating for coastal economies (Moore et al. 2020, Ritzman et al. 2018).

Drivers of Coastwide HABs

Pseudo-nitzschia spp. blooms and subsequent DA events, as with other HABs, are generally prompted by large-scale oceanographic shifts that create a unique combination of temperature, salinity, and nutrients, including marine heat waves, positive phases of the Pacific Decadal Oscillation, and changes in upwelling and wind (Trainer et al. 2012, McCabe 2016, Ryan et al. 2017, Trainer et al. 2020, Sandoval-Belmar et al. 2023). The conditions that cause HABs are complex in that they are spatially and temporally variable, and not all blooms necessarily produce toxins (Ryan et al. 2014, Bowers et al. 2018). For DA in particular, the species composition of toxin-producing phytoplankton communities determines whether DA is produced, and DA production is largely influenced larger scale processes that determine temperature and nutrient concentrations (Trainer et al. 2020).

The fact that regional HAB events along the U.S. West Coast are driven by large-scale events and resemble a ‘perfect storm’ of conditions that may be spatially and temporally variable is best illustrated by events in 2015-2016. A heat wave that covered the northeast Pacific Ocean between 2014 and 2016 resulted in a sustained, record-setting HAB caused by *Pseudo-nitzschia* spp. (McCabe et al. 2016, Reyan et al. 2017, Trainer et al. 2020). In Monterey Bay, these blooms became toxic when an upwelling event removed warm waters and altered the ambient nutrient ratios, specifically silicate and nitrogen (Ryan et al. 2017). The phytoplankton community in the northern CCS is typically a transition zone and has a different species assemblage. During this time, the northern CCS experienced a poleward migration of marine species in response to the warming event (Sagarin et al. 1999 and Sanford et al. 2019 as cited in Trainer et al. 2020). The intensified upwelling in the area fueled the HAB and spring storms delivered the toxic blooms from offshore waters towards the coastline (McCabe et al. 2016). The northern California coastal region where the outfall pipe is located was a hotspot for DA during this time (Trainer et al. 2020). The reasons that prompted the toxic HABs throughout the entire CCS demonstrate how large-scale events that bring specific biophysical changes are required to create a scenario to support a HAB.

Conditions at the Outfall

The discharge at the outfall is not expected to create a HAB due to the content of the effluent and the nature of its location, which is evident based on our existing understanding of how large-scale oceanographic events contribute to HABs. This part of the coastline is already greatly influenced by wind and upwelling and as a result is nutrient rich (Figure 3 in Musial et al. 2016, Figure 2 in Jacox 2018). Especially when compared to large-scale ecosystem processes and changes in nutrients driven by wind and upwelling, the input of new nutrients from the outfall discharge itself will be minimal. The high-level wastewater treatment removes a large portion of nitrogen

prior to discharge (at least a 90% reduction). This holds true, regardless of the dispersal and dilution rates described in Draft Environmental Impact Report (DEIR) Appendix E. The effluent treated on-site at a wastewater treatment plant prior to discharge is also expected to result in a 99% reduction in suspended solids and biochemical oxygen demand and phosphorous. In addition, salinity levels will reach similar levels as the ambient coastal waters within 6.6 feet of the discharge pipe, the temperature of the discharge will be similar to that of nearby water, and minimal concentrations of ammonia will be released. HABs (including that of *Pseudo-nitzschia*) in Northern California are unlikely to develop because of effluent at the outfall pipe because HABs require significantly larger scale changes in nutrients and in the oceanographic environment.

In addition, HABs are typically found in regions with highly retentive oceanographic features that harbor the previously described conditions, including Monterey Bay, Point Conception, and the Southern California Bight (Trainer et al. 2012). The north coast of California is vastly different. It is highly energetic and has significantly more wind and wave energy, and higher upwelling indices (Figure 3 *in* Musial et al. 2016, Figure 1 *in* Kilcher and Thresher 2016). As described in DEIR Section 3.3.6 starting on page 3.3-27 and 3.3-29 and Section 3.9 starting on page 3.9-23, the highly energetic climate yields strong currents in waters at the diffuser. Since the effluent is dispersed and diluted through space and time at such high rates, it is extremely unlikely that an algal bloom (including, but not limited to *Pseudo-nitzschia* spp.) will develop at the outfall pipe due to the discharge.

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