SIERRA CLUB'S MAINE CHAPTER APPEAL TO THE KINGFISH MAINE MEPDES PERMIT ME00037559 AND WASTE DISCHARGE LICENSE W009238-6F-A-N

July 22, 2021

I. INTRODUCTION

The Sierra Club Maine Chapter respectfully submits an appeal to the Department of Environmental Protection on its decision to approve a MEPDES permit and Waste Discharge License ("permit") for Kingfish Maine to discharge 28.7 million gallons per day ("MGD") of treated wastewater into Chandler Bay in Jonesport, Maine. The Sierra Club specifically takes issue with the 6.5 MGD of fish culture or process water.

As the nation's oldest environmental organization, Sierra Club amplifies the power of over 20,000 Sierra Club members and supporters in Maine along with the 31 Sierra Club members and supporters in Jonesport, Maine. Sierra Club Maine works to protect Maine's wilderness heritage, promote smart growth, and safeguard Maine's clean water and coastline. Sierra Club submits this appeal on the grounds that the 6.5 MGD of fish culture or processed water is harmful to the ecology and economy of Maine's coastline. Along with the effects of the discharge in the immediate area, the decision to permit this discharge affects everyone in Maine, from those who enjoy Maine's waters to Maine's lobster and fishing industry, because of the far reaching implications that the waste discharge could have. Sierra Club Maine requests the Department of Environmental Protection respects the goals and standards set out in *Maine Won't Wait, A Four Year Plan for Climate Action*, recognizes the threat that Kingfish's effluent will have on the ecology and economy of the Maine coastline, and creates a new standard for land-based aquaculture based on the practical technology available to adequately treat effluent.

I. THE FINDINGS AND CONCLUSIONS BELIEVED TO BE IN ERROR

A. Considering the detrimental impact that the effluent will have on eelgrass and other aquatic species, Kingfish's permit does not adequately analyze the cost of the impact of water degradation and the permit does not address the alternative technology available to eliminate harmful effluent.

The Department of Environmental Protection ("the Department") finds that the proposed discharge would consume 64% of the remaining assimilative capacity for nitrogen and would lower water

quality as it pertains to eelgrass[1] but that the "lowering of water quality is necessary to achieve important economic or social benefits to the State".[2] While the Sierra Club remains supportive of sustainable aquaculture in Maine, the Sierra Club objects to the conclusion that the lowering of the water quality is necessary to achieve important economic or social benefits to the State, mainly because of the important role that eelgrass plays in the ecosystem and carbon sequestration, the impact that the effluent will have on other aquatic species, and the fact that alternative technology exists to completely eliminate harmful effluent. This technology was not fully considered in Kingfish Maine's MEPDES application and in the finalized permit.

B. The range of pH discharge from 6.0-9.0 is too permissive and contributes to the growing concern of ocean acidification.

The permit established a pH range is dangerous to marine life and the permit does not list any buffering agents to be applied to effluent prior to discharge and there is no indication from the permit that any buffering would be applied.[3] Even a small change to .01 in pH can have dramatic effects on marine life, particularly on species that play an important role in Maine's coastal economy and on species that are important to carbon sequestration. The permit does not address this concern and the mitigation strategies available to address this concern such as requiring a tighter range for pH discharge or using zero wastewater technology.

C. The permit does not address the Infectious Pancreatic Necrosis Virus risk.

The Kingfish Company states that it does not vaccinate its fish.[4] While the permit includes a general risk assessment of viruses that could be released into the Gulf of Maine in the effluent and concludes that many are not a concern due to poor climate match, lack of hosts, and/or non-exotic status, the permit fails to consider the risk Infectious Pancreatic Necrosis Virus ("IPNV").[5] IPNV is present in

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[1] Maine Pollutant Discharge Elimination System Permit and Waste Discharge License for Kingfish Maine, Final Fact Sheet pg. 20, (2021).
[2] *Id.* at 29.
[3] *Id.* at 43.
[4] *About*, THE KINGFISH COMPANY, https://www.the-kingfish-company.com/about (last visited Jul. 21, 2021).
[5] Maine Pollutant Discharge Elimination System Permit and Waste Discharge License for Kingfish Maine, Final Fact Sheet pg. 42, (2021).

the intake waters of Chandler Bay as it is endemic to Maine's waters.[6] While yellowtail may not succumb to IPNV themselves, yellowtail are carrieres of IPNV and could shed virus through their feces, skin, and urine which could spread back into the waters of Chandler Bay in the effluent after being exposed to IPNV from the intake water. IPNV can cause high mortality in hosts such as Atlantic salmon, eels, herring, halibut, and striped bass[7], all of which are important species to Maine commercially and recreationally. This risk could be mitigated with the application of zero-wastewater technology.

II. BASIS OF OBJECTIONS OR CHALLENGE

A. Approving a permit that diminishes water quality as it relates to eelgrass is in direct conflict of *Maine Won't Wait, A Four Year Plan for Climate Action* and puts threatened and endangered species at risk.

The permit recognizes that water quality will be diminished as it relates to eelgrass but the lowering of water quality is necessary to achieve economic or social benefits. [8] However, allowing for a degradation of water quality as it relates to eelgrass is in direct contention with the goals of the Maine Climate Council, set out in *Maine Won't Wait, A Four-Year Plan for Climate Action* ("*Maine Won't Wait*") which calls for the preservation of eelgrass habitat because of its ability to sequester carbon.[9]

Maine Won't Wait sets out ambitious goals for the next four years, including recognizing how Maine's natural ecosystems are powerful tools against the harmful effects of climate change due to their ability to store carbon.[10] *Maine Won't Wait* has many recognitions and promises, and the people of Maine are looking forward to seeing how the content of *Maine Won't Wait* will be implemented and enforced. Unfortunately, the decision to issue the permit made by the Department does not coincide with the implementation and enforcement of the goals set out in *Maine Won't Wait*. Strategy E of *Maine Won't Wait* is to "promote natural climate solutions and increase carbon sequestration" which includes protecting

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[6] Molloy, Sally D et al. "Experimental transmission of infectious pancreatic necrosis virus from the blue mussel, Mytilus edulis, to cohabitating Atlantic Salmon (Salmo salar) smolts." *Applied and environmental microbiology* vol. 79,19 (2013): 5882-90. doi:10.1128/AEM.01142-13.

[7] *Infectious Pancreatic Necrosis Virus*, SCIENCE DIRECT, https://www.sciencedirect.com/topics/neuroscience/infectious-pancreatic-necrosis-virus (last visited Jul. 21, 2021).

[8] Maine Pollutant Discharge Elimination System Permit and Waste Discharge License for Kingfish Maine, Final Fact Sheet pg. 28, (2021)

[9] Maine Climate Council, Maine Won't Wait: A Four Year Plan for Climate Action, pg 35 (2020).

[10] *Id.* at 8.

coastal areas that sequester carbon.[11] *Maine Won't Wait* specifically calls for the conservation of Maine's coastal eelgrasses due to their ability to absorb and store large amounts of carbon at low cost.[12] Additionally, *Maine Won't Wait* addresses the fact that "Maine's wild fisheries and aquaculture industries will need to be managed in the context of changing ecosystems and a changing climate." [13]

An approval of the permit which recognizes a diminishment of water quality as it relates to eelgrass is in direct conflict with carbon sequestration strategies set out in *Maine Won't Wait.* Additionally, Chander Bay is specifically designated a "Habitat Area of Particular Concern" by NOAA because of its "discrete subsets of essential fish habitat, which provide extremely important ecological functions or are especially vulnerable to degradation." [14] Despite this, the Department does not adequately address the full cost of water quality degradation as it relates to eelgrass. Blue carbon (which are aquatic habitats that store carbon like eelgrass) represents massive profit for Maine because it mitigates climate change, removes carbon dioxide from seawater, and remediates ocean acidification. [15] Eelgrass habitat supports biodiversity, benefits fisheries, improves water quality, acts as a storm barrier, and enhances tourism and recreation in the area.[16] The permit neglects to address all these benefits that eelgrass provides in Chandler Bay, the costs of degrading the water making it more hostile for eelgrass growth, and departs from the goals set out in *Maine Won't Wait.*

The eelgrass beds also serve as important habitats for marine life. The Department erred in not considering the protected and endangered species that are numerous in the areas and are highly impacted by diminishment and degradation of the quality of water column and its impact on eelgrass. The eelgrass beds provide forage and food for the Razorbill and Harlequin Duck, both of whom nest and feed near the discharge location. In fact, the discharge location is adjacent to Ballast Ledge, a prime nesting site for

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[11] *Id.* at 14.
[12] *Id.* at 35.
[13] *Id.* at 70.
[14] *Essential Fish Habitat*, NOAA FISHERIES, https://www.fisheries.noaa.gov/national/habitat-conservation/essential-fish-habitat#essential-fish-habitat-mapper (last visited Jul. 21, 2021)
[15] Susie Arnold, *Coast Offers Climate Mitigation Potential*, ISLAND INSTITUTE (Jun. 19, 2020), https://www.islandinstitute.org/working-waterfront/coast-offers-climate-mitigation-potential/
[16] *Id.*

many seabirds. The eelgrass beds are the nurseries for the small fish that migrating endangered salmon feed on while they grow out over the course of a year or two in these bay areas (Chandler, Englishmans, Machias) before beginning their migration to more open waters. Vast amounts of dollars and years of time have been spent on efforts to maintain and increase these endangered salmon. The permit does not address what this level of degradation will do to either these protected seabirds or endangered salmon populations. It is insufficient to conduct these studies after the fact as there will be no recourse that Kingfish Maine could employ to mitigate this degradation after their facility has been constructed.

B. The Department failed to protect the marine environment in its acceptance of a range of pH discharge from 6.0-9.0 amid growing concerns of ocean acidification.

The permit established a pH range limit of 6.0-9.0 standard units for the effluent.[17] Furthermore, there are no buffering agents listed to be applied to effluent prior to discharge and the response to comments indicated that no buffering would be applied.[18] The Department should not allow such a broad pH range in the absence of plans to deal with potentially highly acidic water. Even a small change to .01 in pH to the ocean water can have dramatic effects on marine life because the pH scale is logarithmic; a discharge of pH 6.0 is 158 times more acidic than the ocean average 8.2 (which has already become more acidic from the previous 8.4 average) and a discharge of 7.5 is five times more acidic than ocean average.[19]

Marine organisms are highly sensitive to small changes in pH.[20] A steady plume of water more acidic than the receiving water can play havoc on the delicate marine environment in this area. Its impacts will be felt on the most commercially important species in Maine. Lobster and other wild shellfish rate of growth and shell development are dependent on the pH of the water they reside in. Shelled animals, including mussels and clams, will have trouble building their shells in more acidic water.[21] However,

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[17] Maine Pollutant Discharge Elimination System Permit and Waste Discharge License for Kingfish Maine, Final Fact Sheet pg. 22, (2021)
[18] *Id.* at 43
[19] *Ocean Acidification*, SMITHSONIAN, https://ocean.si.edu/ocean-life/invertebrates/ocean-acidification (last visited Jul. 21, 2021)
[20] *Id.*
[21] Justin B. Ries, ***Shell-shocked: How different creatures deal with an acidifying ocean***, EARTH MAGAZINE (Jan. 5, 2012), https://www.earthmagazine.org/article/shell-shocked-how-different-creatures-deal-acidifying-ocean

some of the major impacts on these organisms go beyond adult shell-building. Mussels' byssal threads, with which they cling to rocks in the pounding surf, cannot hold as well in acidic water.[22] Acidic seawater severely impacts oysters as well. In their first 48 hours of life, oyster larvae undergo a massive growth spurt, building their shells quickly so that they can start feeding.[23] But acidic seawater eats away their shells before they can fully form; this has already caused massive oyster die-offs in the U.S. Pacific Northwest.[24] Acidic discharge will also affect zooplankton by dissolving their small shells. Not only do zooplankton serve as a foundational species for the food web, they also play an important role in how carbon dioxide is removed from the atmosphere.[25] Fish can also be affected by acidification because more acidic waters will require fish to burn energy to excrete excess acid out of its blood.[26] Even a slight increase reduces the energy a fish has to take care of other tasks, such as digesting food, swimming rapidly to escape predators or catch food, and reproducing.[27]

In coastal areas, ocean acidification is compounded by nutrient pollution. Kingfish has responded to this issue by saying that their effluent is "buoyant" and therefore would not impact wild lobsters or other shellfish on the bottom.[28] However, the Department erred in its acceptance of this argument. Larval and juvenile lobsters, scallops and other shellfish use the upper portions of the water column while they feed, grow and develop sufficient shells prior to sinking to the bottom layers. Moreover, highly migratory shellfish such as scallops regularly, even as adults, feed and forage in mid layers of the water column.

C. The IPNV viral risk is unacceptable and not addressed in the permit.

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[22] Stephanie Paige Ogbur, *Ocean Acidification Weakens Mussels' Grip*, SCIENTIFIC AMERICAN (Mar. 13, 2013), https://www.scientificamerican.com/article/ocean-acidification-weakens-mussels-grip/

[23] Colin Barras, *Acidifying seawater sees oysters in race to grow shells*, NEWSCIENTIST (Jun. 14, 2013), https://www.newscientist.com/article/dn23707-acidifying-seawater-sees-oysters-in-race-to-grow-shells/?ignored=irrelevant

[24] Elizabeth Grossman, *Northwest Oyster Die-Offs Show Ocean Acidification Has Arrived*, YALE ENVIRONMENT 360 (Nov. 21, 2011), https://e360.yale.edu/features/northwest_oyster_die-offs_show_ocean_acidification_has_arrived

[25] *Ocean Acidification*, SMITHSONIAN, https://ocean.si.edu/ocean-life/invertebrates/ocean-acidification (last visited Jul. 21, 2021)

[26] *Id.*

[27] *Id.*

[28] Maine Pollutant Discharge Elimination System Permit and Waste Discharge License for Kingfish Maine, Final Fact Sheet pg. 43, (2021)

The Kingfish Company has publicly stated that they do not vaccinate their yellowtail livestock. While it is noted in the Kingfish application that an autogenous vaccine will be used for Vibriosis bacteria there is no indication they are vaccinating their production fish throughout their entire grow-out period effectively for IPNV. Furthermore, the list of viruses in the permit does not include or identify IPNV as a potential concern.[29] The Department erred in accepting this incomplete list of potential pathogen risk and as a result the Department is putting Maine's wild fin-fish species at risk.

IPNV is carried by yellowtail and will infect wild populations of finfish with over 90% fatality in fry. IPNV is highly contagious in wild and juvenile and adult populations.[30] It spreads rapidly in aquatic environments particularly where mixing of water takes place via upwelling and tidal flows. Almost all wild fin fish populations, including those commercially and recreationally fished, are highly susceptible to IPNV including Endangered Atlantic Salmon, pogy and herring baitfish, halibut, striped bass, and commercially fished eels.[31] Asymptomatic carrier fish serve as reservoirs of infection for IPNV.[32]

The applicant's claims regarding review and compliance with Maine DMR quarantine procedures for import of or transport of their livestock does not address the issue of virus being brought into the production water, infecting the growing livestock and then discharging that production water into the wild environment. Viruses such as IPNV exist in low but infectious amounts in the wild. Once this water containing small amounts of virus is brought into a production tank these livestock fish become a host and amplifier of the virus and virions. While the yellowtail may not fall ill or perish from IPNV in their warm water environment, they become hosts and high viral load vectors.

In regards to effluent sterilization, the Department erred in accepting an incomplete and inadequate flowage and treatment model. There is nothing in the site plans submitted or the very limited flow chart submitted that indicates there is anything in this plan that would accommodate an ozone/UV

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[29] *Id.* at 42
[30] Roy P. E. Yanong & Ruth Francis Floyd, "Viral Diseases in Aquaculture", *Merck Veterinary Manual* (2015)
[31] *Infectious Pancreatic Necrosis Virus*, SCIENCE DIRECT, https://www.sciencedirect.com/topics/neuroscience/infectious-pancreatic-necrosis-virus (last visited Jul. 21, 2021).
[32] Roy P. E. Yanong & Ruth Francis Floyd, "Viral Diseases in Aquaculture", *Merck Veterinary Manual* (2015)

treatment facility that could address IPNV virus. Kingfish's claim of utilizing ozone either alone or in combination with UV treatment is highly questionable. Proper sterilization would require a seperate containment and recycling reservoir of sufficient capacity to employ such sterilization techniques over the full exposure cycle that is required in order to effectively kill all viruses. There are no detailed drawings, or descriptions or locations of such a treatment operation to date.

In regards to effluent spread, the Department erred in accepting only the TUFLOW FV model to protect Maines finfish populations from viral contagion and a coastal waters pandemic spread by inadequately sterilized effluent discharged under pressure. The discharge model presented assumes that the discharge flow is not additive in regard to waters containing viral pathogens. In the arguments presented, Kingfish's model assumes that the waste water discharge is "highly unlikely" to move beyond 3 miles north and 1 mile south during any given tidal cycle. However, the constant pressurized discharge does not cease for seven days while the waters are being diluted. Instead, the discharge continues with an additive buildup. Additionally, in regard to the movement of viruses and virions, the issue created does not cease at a particular far-field discharge limit that is being used to calculate nitrogen effects. Wild fin-fish could swim through the discharge plume and take in high volumes of the water in the plume cloud through their gills. A plume of water under pressurized discharge containing even small amounts of virus or virions, in this case of IPNV, creates an unacceptable and unnecessary risk.

D. The Anti-Degredation policy and implementation analysis does not evaluate the full range of practicable alternatives to prevent or lessen water degradation.

The Anti-Degradation policy and implementation method requires that "[b]efore allowing any lowering of high water quality … [an] analysis of alternatives shall evaluate a range of practicable alternatives that would prevent or lessen the degradation associated with the proposed activity." [33] A full range of practicable alternatives is not addressed in the permit or the application for the permit. The permit relies on the information provided in the application and responses to the Department's questions, which is that according to Kingfish, Kingfish is implementing the highest level of technology that can be

[33] 40 C.F.R. § 131.12(a)(2)

reasonably applied to treat effluent.[34] [35] Kingfish recognizes that alternative strategies exist to treat effluent but states that further development is needed to implement them in a verifiable way and that Kingfish is using the best technology available.[36]

However, technology exists for land-based aquaculture that produces zero effluent into the ocean water.[37] The state of the art technology it is already being used in at least one facility and is expanding to other large scale aquaculture facilities across the world which proves its practablity.[38] A zero effluent facility would address the issues regarding water degradation due to nitrogen, pH levels in the water, and the viral risk. The permit, the application, and the Responses to DEP questions are all missing a meaningful analysis into a zero effluent facility where a full range of practicable alternatives is required by the Anti-Degradation policy and implementation methods.[39] The permit only addresses an alternative discharge point, land application of treated wastewater, and removing or decreasing effluent flow during critical periods.[40] Furthermore, the permit concludes that the cost of water degradation is worth the cost because of the social and economic benefits. However, there is no meaningful analysis of the cost of water degradation on the commercially important marine life in Maine and Maine's climate goals in regards to the disruption to eelgrass and other marine life, the risk of contributing to ocean acidification, and the viral risk.

III. REMEDY SOUGHT

The dangers that the effluent will have to eelgrass and other aquatic species, the issues with the pH of the effluent, and the viral risk need to be addressed. The best way to address all three of these issues is a minor revision in the permit in order to significantly decrease or eliminate an environmental

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[34] Maine Pollutant Discharge Elimination System Permit and Waste Discharge License for Kingfish Maine, Final Fact Sheet pg. 26, (2021)
[35] MEPDES Application Kingfish Maine, Attachment 6 (2021)
[36] Kingfish Technical Information from Preliminary Draft Comments, Responses to Maine DEP's Questions included in email on March 19, 2021
[37] *Capabilities*, BLUETECH SYSTEMS, http://www.bluetechsystems.co.uk/capabilities/ (last visited Jul. 21 2021)
[38] *Id.*
[39] 40 C.F.R. § 131.12(a)(2)
[40] Maine Pollutant Discharge Elimination System Permit and Waste Discharge License for Kingfish Maine, Final Fact Sheet pg. 28, (2021)

impact[41], whereby the applicant would separate the heat transfer water from the production water in order that the production water may be treated with advanced technology to achieve zero effluent discharge. This modification will address not only the degradation due to nitrogen discharge, but will also address the issues raised relating to the pH range of the discharge and discharge of water containing IPNV carried by unvaccinated yellowtail.

Additionally, in regards to the degradation of water quality as it relates to eelgrass, the Sierra Club requests that the Department releases a plan on how it will comply with the eelgrass and coastal conservation goals set out in *Maine Won't Wait*, particularly in the face of decisions that allow the degradation of water quality as it relates to eelgrass and other marine life.

Respectfully,

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Sierra Club Maine

[41] 06-096 C.M.R. ch. 2