

Aquatic Life Institute

Public Comment on Revised Water Quality Permits from Washington State Department of Ecology

General Introduction

The following comment is submitted on behalf of a coalition of animal welfare advocates, animal welfare lawyers, and nonprofit organizations. Our signatories are members of the Aquatic Animal Alliance and the Global Aquatic Animal Law & Policy Coalition.

The below comment raises concerns regarding the revised water quality permits in question. Our main concern is aquatic animal welfare (for animals both within and outside such net pens), as we believe animal welfare is both an issue of importance in and of itself and that, in many cases such as this, improved animal welfare (e.g. appropriate stocking density, responsible feeding practices, good fish health) can lead to improved water quality impacts (and vice versa).

We would like to thank the Washington State Department of Ecology for the opportunity to comment on Cooke Aquaculture's NPDES permit application to raise partially sterile, triploid steelhead trout in lieu of Atlantic salmon. This coalition hopes that the Washington State Department of Ecology will adequately consider the existing scientific evidence that these floating feedlots may impact wild, endangered steelhead trout, salmon, and Southern Resident Killer Whales, and may impact surrounding water quality and the overall health of Puget Sound.

The Issue at Hand

We are concerned that rather than conducting a robust, current, and accurate impacts analysis for the issues outlined below, WDFW largely relied on stale information from a decades-old programmatic environmental impact statement for fish culture in net pens from January 1990, which did not provide mitigation measures that adequately minimize significant environmental impacts. Furthermore, the 5th Circuit's recent ruling that aquaculture isn't fishing and can't be regulated as such further supports the idea that a serious SEPA analysis is required for NPDES reviews in this setting.

Washington Department of Fish and Wildlife's (WDFW) decision not to issue an Environmental Impact Statement (EIS) for Cooke Aquaculture (and the "analysis" upon which that decision was based) has deprived the public of information and the opportunity to meaningfully participate, as required by statute. Were WDFW to act in accordance with law, the process could further efforts to protect fish populations, their habitat, and the surrounding water quality. The State Environmental Policy Act (SEPA) is a procedural statute designed to ensure that decision makers in the State of Washington properly consider the environmental impacts of their decisions, to ensure humankind and the environment continue in harmony. SEPA requires an agency to conduct a "threshold determination" that analyzes whether the project has a probable, significant adverse environmental impact. If the agency makes a determination of significance, it must prepare a thorough EIS that includes analysis of reasonable alternatives that achieve similar goals with less environmental impact. Environmental impacts include factors such as impacts to fish and wildlife, plants and animals, surface water quality and runoff, aesthetics, recreation, scenic resources, and historical and cultural preservation.

The threshold determination is the initial SEPA assessment and "must indicate that the agency has

taken a searching, realistic look at the potential hazards and, with reasoned thought and analysis, candidly and methodically addressed those concerns."

Important environmental repercussions include, but are not limited to: the unforeseeable impacts of climate change, warming waters, and their chemical interactions; the impacts from net pen pollution to the benthic community, plants, and animals in nearby waters; the impacts from poor escape prevention and net hygiene practices, including impacts from pen sinking; the impacts from escapements of farm-raised steelhead on wild steelhead genetics, wild salmonids' prey and habitat, and wild salmonids' predators (including the impacts of any recovery efforts or decisions); the impacts of farmed steelhead diseases, pathogens, and parasites on native species; the impacts on native species and the environment of chemicals and pharmaceuticals used to rear farmed steelhead; the impacts on native species of farmed steelhead that are not successfully sterilized; the impacts of harvest efforts, including water withdrawals, discharges and bycatch, on native species and the environment; and the air and noise pollution impacts on adjacent lands and landowners.

Specific Issues of Concern

In the present case, we have identified several concerns that directly relate to water quality degradation and fish welfare including disease, waste, feed, and escapes. Diligent monitoring and reporting is of utmost importance in the following areas:

Disease:

We are concerned about disease outbreaks, both because of welfare concerns impacting animals within and outside the pen(s), and other environmental impacts.

Best welfare management practices (lower stocking density, responsible feed composition, etc.) while fish are cultured in marine waters can reduce stress, thereby reducing risk of infection, disease amplification, and transmission. Traditional vaccinations prepare the individual organisms' immune systems to combat pathogens, and to reduce the risks of infection, pathogen amplification and transmission, and disease. Cooke anticipates using a subset of the suite of vaccines used for Atlantic salmon for their production of all-female triploid steelhead trout.

A May 2020 report from the Fish Welfare Initiative surveying welfare issues in Atlantic salmon aquaculture found that pesticide-resistant sea lice present an existential threat to the salmon farming industry and represent an extinction-level threat to wild salmon populations. We support the careful use of preventative measures to maintain fish health where possible, and careful antibiotic usage only where absolutely necessary, as prescribed by and used under the guidance of an experienced and licensed fish veterinarian.

Cooke Aquaculture claims that they preserve fish health through a warm water sea lice removal system and stock cleaner fish with salmon to minimize impact of sea lice. We are very concerned about the welfare implications of cleaner fish usage. The use of anti-sea lice pesticides must be closely regulated under a NPDES Aquatic Pesticide/Fisheries Resource Management Permit. State and federal law requires coverage under an aquatic pesticide permit for all activities that involve the use of pesticides or nutrient-inactivation products for managing aquatic organisms in waters of the state. All aquatic pesticide permits regulate the amounts and types of pesticide products, as well as when, where, and how these products can be applied. These permits also provide critical details on the specific monitoring, reporting, and public notification requirements for products used.

Therefore, an updated EIS should be required in order to determine if Cooke's pest management activities can continue without causing irreparable harm.

Waste:

As in terrestrial animal agriculture, waste management is a crucial environmental consideration.

Ammonia is the most important waste product from the metabolism of proteins in fish. It is determined as Total Ammonia Nitrogen and expresses the sum of ionised NH_4 and unionized (gas) NH_3 . It is important to stress that unionised ammonia never exists alone but will act in synergy with other contaminants. The distribution of the two forms is highly dependent on pH, temperature, and salinity. NH_3 is one of the most toxic forms due to its high membrane permeability. Concentrations of 25 μg to 300 μg NH_3/L have been reported to cause mortality in salmonid fishes, and 10 μg NH_3/L is known to cause negative gill interaction. Negative effects on plasma cortisone, plasma catecholamine, respiration, osmoregulation, circulation, haematology, and histology of gills, kidney, and liver as a result of higher levels have been observed (Smart 1978; U.S. EPA 1989; Alabaster and Lloyd 1982).

The United States Environmental Protection Agency (EPA) has set a maximum 1 Hr exposure per every third year of wild fish to 5000 μg Total Ammonia Nitrogen/L at a pH of 8.0, and 2500 μg Total Ammonia Nitrogen/L at a pH of 8.5. Toxicity of ammonia increases in hypoxic conditions (Alabaster and Lloyd 1982). Additionally, high pH and increased transformation of NH_4 to NH_3 result in the increased toxicity of NH_3 in seawater (Girard & Payan, 1980).

While it is difficult to give exact upper safe limits for water chemistry parameters since many of the parameters interact in a complicated manner, ammonia poisoning can be avoided by keeping the pH to a safe level, suggested to be in lower limit range (6.2 μ 6.5) and avoid rapid pH rise due to intake of new water volumes with higher pH, in addition to keeping dissolved oxygen close to 100%. However, such exact measurements are very difficult to keep track of in open net pens, and therefore are virtually impossible to regulate and subsequently provide accurate reports in these facilities. It is imperative to understand and adjust the quality of water according to the species-specific needs of the fish in order to protect their welfare, ensure optimal health, and preserve water quality as a result.

Discharges of excess nutrients, particularly nitrogen, into Puget Sound from domestic wastewater treatment plants (WWTPs) are contributing to low oxygen levels in Puget Sound. As these WWTPs are contributing human sources of excess nutrients to Puget Sound, the state must take action to control this pollution. On Jan. 30, 2020, The Dept. of Ecology announced their decision to move forward with developing a draft Nutrients General Permit for Puget Sound. The proposed Nutrients General Permit would apply to all facilities discharging to marine and estuarine waters of Puget Sound. The overall nutrient discharge from such open net aquaculture facilities should also be considered under this new initiative.

Chum:

We are also concerned about the impacts of uneaten feed which could act as "chum".

The information provided by Cooke about fish feed consumption rates and the amount of excess feed spilling out of the net pen facility is unsatisfactory.

Cooke provided an estimate of the monthly fish feed at maximum production (Cooke 2020).

However, a more useful fish feed report should aim to provide an estimate of the amount of feed that goes uneaten. This uneaten fish food that falls through the net pen into surrounding waters is a recurring discharge that attracts native fish as well as predatory birds and pinnipeds. This excess chum is an open invitation to wildlife with deadly consequences, as increased entrapments are bound to occur. Effects of predator control is an ongoing global conservation concern, with potentially significant impacts for several key species and populations. Until the Dept. of Ecology establishes with reasonable certainty the amount of fish feed released from the net pen facility, it

cannot perform an adequate assessment of the adverse impacts to water quality and animal welfare. Cooke has implemented a new feeding system designed to ensure the fish are fed steadily at certain amounts, while also eliminating any feed waste. However, there is no mention about the differing feed conversion rates between Atlantic salmon and steelhead trout. Atlantic salmon are generally more efficient at converting feed to biomass than trout are, with trout being more variable in feed conversion rates and more susceptible to environmental controls (temperature and salinity) on growth (Fry 2018).

The Department of Ecology issues Concentrated Animal Feeding Operation (CAFO) General Permits to operations that confine livestock for long periods of time in pens or barns and discharge pollution to surface or groundwater. This same nature and degree of consideration should extend to net pens due to the fact that their excess feed directly contributes to pollution discharge.

Furthermore, from an aquatic animal welfare perspective and sustainability perspective, we support research efforts to try to reduce the amount of wild-caught fish being used for fish farm feed. ALI has recently estimated that approximately 1.2 trillion fish are reduced to fishmeal/fish oil each year, contributing to ocean degradation, abandoned fishing gear, and death of endangered species .

Escape:

Unfortunately, net pen escapes are well documented worldwide.

After the Cypress net pen collapsed in 2017, research discovered that nearly every fish that escaped was infected with a pathogenic exotic salmon virus that had been undetected and unreported.

There was a structural failure of a net pen facility located in Cypress Island, resulting in the discharge of a quarter-million farmed Atlantic salmon, dead fish carcasses, and massive amounts of debris, among other pollutants. These discharges represent violations of the NPDES permits under which Cooke Aquaculture's Atlantic salmon net pens currently operate, and will continue to operate regardless of the species being reared.

Escapes could increase stress levels among captive fish, pose significant health risks to wild fish, and degrade water quality, which would have a negative effect on all fish welfare.

The fact that the steelhead in question will be partially sterile only mitigates some of the various concerns which have been raised by all too frequent escapes in Washington, the U.S and around the world in recent years. From a welfare perspective, and potentially a health, disease and water quality perspective, we have some concerns about triploid fish. This is an area in which considerable knowledge gaps exist. While more research is needed, Norwegian studies show that these fish appear "more susceptible to temperature stress and have a higher incidence of deformities"

Cooke stated they are going to "update the comprehensive Operational Procedures for Fish Escape Prevention, Reporting and Recapture and Regulated Fish Pathogen Reporting and Biosecurity Plans" on their SEPA environmental checklist. While we commend these efforts, relying on such future promises is inadequate given the high risks at stake when trying to preserve and protect the region and all parties involved.

Conclusions

NPDES permits protect water quality by restricting pollution and requiring monitoring, reporting, and utilization of best management practices. Improved protections and requirements to reduce environmental impacts from net pen operations could include: increasing underwater video monitoring; conducting regular inspections to assess structural integrity of the net pens and submitting inspection reports certified by an objective third party; requiring improved maintenance and cleaning of the net pens, water quality monitoring, and maintenance procedures; requiring transparent reporting if fish mortality rate exceeds 0.5 - 1% (rather than the proposed 5%); refraining from self-reporting and instead relying on a third party to assess and disclose pertinent information; developing site-specific response plans for implementation in the event that fish

escape; conducting and participating in emergency preparedness training; and maintaining contact information to promptly notify area tribes and state agencies in the event of an escape.

In order for the Department of Ecology to perform its duty to ensure that discharges will not endanger water quality, human health, or the environment, the Department should conduct a thorough analysis of Cooke's application and engage in its own SEPA analysis to determine if the NPDES permit should be granted without a new threshold determination.

References:

Alabaster, J.S. and Lloyd. R. 1982. Water quality criteria for freshwater fish. 2nd edition. Butterworth Scientific, London. 361 sider.

Cooke January 2020 NPDES permit application, p. 9.

Fry, J., et al 2018 Environ. Res. Lett. 13 024017

Girard J.P and P. Payan (1980) Ion exchange through respiratory and chloride cells in freshwater and seawater adapted teleosts. Am. J. Physiol. 238, R260-R268.

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U.S. EPA 1990. Ambient water quality criteria for ammonia (saltwater)-1989 EPA 440/5-88-004, Office of Water Regulations and Standards Division, Washington D.C.

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perform an adequate assessment of the adverse impacts to water quality and animal welfare.

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- Furthermore, from an aquatic animal welfare perspective and sustainability perspective, we support research efforts to try to reduce the amount of wild-caught fish being used for fish farm feed. ALI has recently estimated that approximately [1.2 trillion fish](#) are reduced to fishmeal/fish oil each year, contributing to ocean degradation, abandoned fishing gear, and death of endangered species .

Escape:

Unfortunately, net pen escapes are well documented worldwide.¹

- After the Cypress net pen collapsed in 2017, research discovered that nearly every fish that escaped was infected with a pathogenic exotic salmon virus that had been undetected and unreported.
- There was a structural failure of a net pen facility located in Cypress Island, resulting in the [discharge of a quarter-million farmed Atlantic salmon](#), dead fish carcasses, and massive amounts of debris, among other pollutants. These discharges represent violations of the NPDES permits under which Cooke Aquaculture's Atlantic salmon net pens currently operate, and will continue to operate regardless of the species being reared.
- Escapes could increase stress levels among captive fish, pose significant health risks to wild fish, and degrade water quality, which would have a negative effect on all fish welfare.
- The fact that the steelhead in question will be partially **sterile** only mitigates some of the various concerns which have been raised by all too frequent escapes in Washington, the

¹ See for example, this case in the UK in the month of writing (October 2020) <https://www.bbc.com/news/uk-scotland-glasgow-west-54468027>, this case in Norway in 2020: <https://www.intrafish.com/aquaculture/salmon-that-escaped-from-salmars-offshore-aquaculture-operation-had-contagious-disease/2-1-885991>, this case in British Columbia in 2019 <https://globalnews.ca/news/6328416/bc-fish-farm-fire-salmon/>, this case in 2018 in Chile, <https://en.mercopress.com/2020/08/24/chile-slaps-record-fine-of-us-6-million-on-norwegian-salmon-farming-company-for-the-escape-of-700-000-fish> etc.

U.S and around the world in recent years. From a welfare perspective, and potentially a health, disease and water quality perspective, we have some concerns about **triploid** fish. This is an area in which considerable knowledge gaps exist. While more research is needed, Norwegian studies show that these fish appear “more susceptible to temperature stress and have a higher incidence of deformities”²

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- *Cooke January 2020 NPDES permit application, p. 9.*
- *Fry, J., et al 2018 Environ. Res. Lett. 13 024017*

² Thomas W. K. Fraser, Per Gunnar Fjellidal, Tom Hansen & Ian Mayer (2012) Welfare Considerations of Triploid Fish, Reviews in Fisheries Science, 20:4, 192-211, DOI: [10.1080/10641262.2012.704598](https://doi.org/10.1080/10641262.2012.704598)

³ As was raised by the Attorney from the Swinomish Indian Tribal community at the hearing regarding this permit, we would appreciate more information about where this 5% figure came from.

- *Girard J.P and P. Payan (1980) Ion exchange through respiratory and chloride cells in freshwater and seawater adapted teleosts. Am. J. Physiol. 238, R260-R268.*
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