Bill McMillan

I am opposed for many reasons to the Cooke permit application to rear steelhead in net pens. Please find my detailed comments attached. Thank you for the opportunity. Bill McMillan

June 6, 2020

Bill McMillan
40104 Savage Rd
Concrete, WA 98237

Department of Ecology
State of Washington
http://wq.ecology.commentinput.com/?id=BJeUR

RE: Comments regarding Cooke's NPDES permit application and supporting documents submitted to Ecology

As the agency in the State of Washington designated to protect the quality of its waters, and particularly in this case the waters of Puget Sound where stormwater runoff from urban streams, past-and-present industrial effluent (including fish farms), and "treated" human sewage effluent have already resulted in great degradation of Puget Sound waters, it should be apparent that any future consideration of salmon or steelhead (non-native or native) net pen operations can only further contribute to that degradation – biologically and chemically. This has largely been determined already through review and resulting legislation that was intended to curtail future fish farming in Puget Sound to protect its waters and aquatic resources.

The proposed change in fish species for net pen aquaculture does not alter the basic problems related to industrial fish farms operating in Puget Sound beyond a differing problematic level associated with the species being cultivated on its counterpart wild species, *Oncorhynchus mykiss*, and other aquatic species in Puget Sound that reside there or migrate to and from – including several ESA listed species. These biological threats remain, as do the fecal/chemical brew of effluents from industrial fish farm operations in open waters.

There is further the notable failure of Cooke Aquaculture operations to effectively contain the fish cultivated with subsequent large scale escapes into Puget Sound and its related Basin watersheds. As a personal example of this, I live on the Skagit River at river mile 46 (distance from Puget Sound) and at least six Atlantic salmon were caught at this location between Dec. 16, 2017 and Jan. 26, 2018, about 1.5 months. (Just 2-3 miles downstream, tribal fishers caught numerous others as reported in Skagit Herald and Seattle Times news articles.) These fish were among the >300,000 escapees from Cooke's Cypress Island net pen spill in 2017 – that net pen relatively near the mouth of the Skagit River. Other net pen escapees were also likely caught at the Skagit river mile 46 location by passing boat anglers, but were not observed.

I am a retired fisheries field biologist and voluntarily collected the heads and internal organs from five of these six escaped Atlantic salmon and provided them to Wild Fish Conservancy for virus analysis. Four of these were included among ~70 total samples tested with results that 95%+ of the salmon from Cypress Island net pen origin were PRV

infected (Kibenge et al. 2019). The PRV virus strain was found to be similar to that of farmed Atlantic salmon from Iceland, which was the reported source of the salmon at Cooke's net pen that collapsed. PRV is associated with a growing list of pathological conditions including heart and skeletal inflammation.

While the PRV virus strain found in the farmed Atlantic salmon would not likely be present in cultivated steelhead, salmon farms are noted for crowded captive conditions that result in frequent disease epidemics regardless of species. The Skagit River example at my river mile 46 home provides the example of how an aquaculture operation in open waters can be a vector to wild or hatchery populations in relatively distant areas once escaped from farm captivity with deep penetration into river ecosystems. This can impact multiple species with conveyance of disease from net pen operations.

In the case of farmed steelhead, despite the intent to cultivate sterile triploids some proportion will remain fertile. With an escape of 300,000 at one time, it could well result in some that can, and will, subsequently mate with wild steelhead. In the case of Skagit River, for 11 years I have regularly surveyed for steelhead spawning at five near-by tributary streams within two miles either side of river mile 46 on the south side of the Skagit River. In the lower 48 miles of the Skagit River, there are at least 16 known tributary streams where steelhead spawn, as well as the length of the mainstem river. Furthermore, the Atlantic salmon net pen escapees in 2017-18 were caught by sport anglers as far upstream as Skagit RM 67 at Rockport, WA. This is just past the entry of the Sauk River which has many more additional miles of steelhead spawning habitat that net pen escapees may also have penetrated. This is the potential inland range for whatever salmon or steelhead might escape from net pen cultivation in Puget Sound as exemplified by the Sound's largest and most important wild salmon/steelhead river basin. It is also the same range that any disease from net pen cultivation could be transmitted – not only to steelhead, but to Chinook, sockeye, coho, chum, and pink salmon that are all native to the Skagit basin, as well as bull trout, sea-run and resident cutthroat, and the resident form of *O.mykiss*, rainbow trout.

A particularly great threat from escapes of cultivated triploid steelhead from aquaculture operations in Puget Sound is the subsequent predation on rearing and migrating juveniles of all anadromous and forage species. Triploids are noted for rapid growth as a result of voracious feeding characteristics – a benefit for industrialized cultivation to produce a larger product in shorter time. However, if released into the wild this is highly problematic.

An analogous example is that of the predation effects of Puget Sound resident Chinook salmon (similar size range to net pen reared steelhead) that cannibalize out-migrating age-0 Chinook and heavily prey on all ages of Pacific herring. It is estimated that 80% of these resident Chinook (age 1-3) are hatchery origin with estimated predation levels of 49-59% on the younger out-migrating age-0 Chinook. The following are quotes from these predation findings (Beauchamp and Duffy 2011):

These results highlighted the importance of the nearshore-offshore transition and early offshore rearing as critical periods that determine the growth and overall marine survival of Puget Sound Chinook salmon…

A population reconstruction scenario suggested that an abundant size-structured population of several hundred thousand ocean age 1-3 resident Chinook salmon currently exist in Puget Sound for most or all seasons of the year. Predation by resident Chinook salmon was strongly size-selective on age-0 Chinook and age 0-2 herring, but was less evident for sand lance. Bioenergetics model simulations of different predation scenarios suggested that, under a very conservative diet assumption, resident Chinook predation imposed 6% mortality on the total number of hatchery and wild age-0 Chinook entering Puget Sound. Under what was considered a more realistic diet scenario, resident Chinook would consume approximately 62.1 million pink/chum-sized salmon offshore during April-May, and an additional 8.9 million Chinook-sized prey during June-August.

Overall, these results suggest that the early marine rearing in Puget Sound represents a critical period within the life cycle of Puget Sound Chinook salmon. Factors such as food supply and inter-specific competition affect the offshore growth performance needed to achieve a critical size during this critical period. Significant size-selective mortality appears to be operating during this early marine period, and size-selective mortality by resident Chinook salmon can plausibly account for a considerable portion of this mortality.

… The resident forms of Chinook salmon ranged from 325 mm to 650 mm FL, and length frequency distributions conformed to an expected age-size structure of declining abundance with age (Figure 28). The resident Chinook salmon ate fish prey up to 50% of their own body length in both nearshore and offshore habitats; the size of cannibalized Chinook salmon observed in the diets of larger Chinook salmon were 70-130 mm FL (Figure 29)…

Beauchamp (2018) made a further comparison regarding the level of resident Chinook salmon predation on outmigrating juvenile Chinook indicating that the resident Chinook predation is double that of harbor seals:
Predation during early marine life influences survival

- *Harbor seal predation (~20-25% mortality; Nelson et al. in rev)*
- *Predation by resident Chinook (~10-50%?? Beauchamp & Duffy 2011)*

Aquaculture escapes of triploid steelhead into Puget Sound of a magnitude similar to that which occurred with Atlantic salmon in 2017 (>300,000) could be expected to have similar predation effects on age-0 Chinook and herring as that of resident Puget Sound Chinook of ages 1-3. The resident Chinook size range of 325 mm to 650 mm would likely be of a similar range for varied ages at escape of triploid steelhead proposed for Cooke's farming operation. The overall impact on age-0 Chinook and herring, at the level of several hundred thousand triploid steelhead escapees, would not only be the added Puget Sound equivalent of predation to that of resident Chinook. The predation

impact consideration is just part of the overall cumulative effects to eventually be anticipated in Puget Sound with any continued salmon farming operation.

I further refer to the Appendix with a list of critical concerns from "Our Sound, Our Salmon" coalition that follows the references below (related to my prior comments). The OSOS concerns further convey my own regarding Cooke's proposed reinitiation of net pen operations in Puget Sound using triploid steelhead, or anywhere else in Washington's marine waters.

Thank you for the opportunity to comment,
Bill McMillan

References

Beauchamp, D.A., and E.J. Duffy. 2011. Stage-specific growth and survival during early marine life of Puget Sound Chinook salmon in the context of temporal-spatial environmental conditions and trophic interactions. Final Report to the Pacific Salmon Commission. Report # WACFWRU-11-01, U.S. Geological Survey, Washington Cooperative Fish and Wildlife Research Unit, UW School of Aquatic and Fisheries Science, Seattle.

Beauchamp, D.A. 2018. Bottom-up and top-down processes affecting marine survival of Chinook in the Salish Sea. Salish Sea Ecosystem Conference. 487. https://cedar.wwu.edu/ssec/2018ssec/allsessions/487

Kibenge, M.J.T., Y. Wang, N. Gayeski, A. Morton4, K. Beardslee, B. McMillan, and F.S.B. Kibenge. 2019. Piscine orthoreovirus sequences in escaped farmed Atlantic salmon in Washington and British Columbia. Virology Journal, 16:41 https://doi.org/10.1186/s12985-019-1148-2

Appendix

Related Concerns Regarding Cooke's Proposed Triploid Steelhead' Net Pen Operations in Puget Sound from "Our Sound, Our Salmon"

1) Ecology should not authorize Cooke's modified NPDES permits until the ongoing lawsuit challenging the State Environmental Policy Act (SEPA) environmental review process and determination is complete.

The Department of Fish and Wildlife's (WDFW) decision to issue a Mitigated Determination of Nonsignificance (MDNS) granted Cooke key permits and ended the environmental review process under SEPA. This decision is currently being legally challenged in Washington State court by a group of OSOS coalition members. Given the magnitude of scientific evidence WDFW failed to consider during the review, it's

possible the Court could render this determination invalid and require WDFW to reinitiate the SEPA process to conduct additional environmental review such as an environmental impact statement. No permitting or leases should be authorized until the Court reaches a decision in this legal matter, as additional environmental review could unveil new or presently unknown pollution and water quality risks posed by this expansion and extension of net pen aquaculture that would need to be addressed or incorporated into NPDES permits.

2) There is substantial new information that was not considered during the SEPA process.

The SEPA determination issued in January, 2020 (Mitigated Determination of Nonsignificance (MDNS), requires Cooke to prepare and submit a plan for marking steelhead (clipping the adipose fin) in ways that will distinguish fish from their pens from hatchery-raised fish swimming freely in Puget Sound. That plan is not part of this record, and review of the NPDES permit application should await that filing.

The MDNS also requires Cooke to submit a plan for a "no-recovery response" to escapes. That plan is not part of the escape plan submitted in Cooke's application, and it is impossible to assess the adequacy of Cooke's pollution prevention plan until that plan is included in the application.

During the emergency response to the Orchard Rocks partial sinking, Cooke told DNR that they planned to replace some existing net pens in Puget Sound. If indeed that plan is under way, the NPDES review should include engineering data on the new pen structures in order to assess the adequacy of those pens for Puget Sound's dynamic conditions, and the escape risk and other risks the new pens might pose to Puget Sound.

The SEPA review led by the Washington Department of Fish and Wildlife which produced the MDNS is currently being appealed (see #1). Given the potential for a Court ruling requiring additional environmental review under SEPA and this new information described above, Ecology should delay drafting any NPDES permit until the evidentiary record and ruling can be incorporated.

3) Ensuring compliance of rules set by NPDES permits is crucial.

Following the 2017 Cypress Island net pen collapse, Wild Fish Conservancy sued Cooke Aquaculture under the Clean Water Act (CWA). That suit resulted in rulings that the company had violated the terms of its permits, including by failing to conduct required inspections of net pen moorings and anchors, to accurately monitor and report the number of fish escaping from pens, to develop operational plans that include necessary procedures for inspecting cages, storing chemicals, disposing of harvest blood, and to track the number of fish in its cages and lost to predation. Cooke's history of CWA violations is important to consider in this process, if nothing else to ensure that the permits are drafted to ensure that violations are detected before catastrophe ensues.

Incidents like the partial sinking of the Orchard Rocks pen in October, 2019 demonstrate that the risks of additional escapes are very real, given the state of the existing pen structures. The response to that incident was conducted by several Washington State agencies, including Ecology, and the records from that incident and state agencies' documentation of Cooke's inadequate emergency response should be included in this record to ensure that emergency plans incorporate lessons learned, and acknowledge the degraded state of the surviving pens as identified by state inspectors and Cooke's own contractors.

4) Washington's landmark 2018 law, HB2957, created a new and stricter regulatory regime for marine net pen aquaculture.

In 2018, Washington's passed a law, HB 2957, banning Atlantic salmon net pens on the grounds that the practice placed too great a risk on the ecosystem, created a new and stricter regulatory regime for marine net pen aquaculture.

As such, it is not sufficient to say that conditions of the current NPDES application are similar to those of past permits. HB 2957's new standards require re-examining past decisions to hold Cooke Aquaculture to that higher standard of eliminating these risks.

In reviewing Cooke's submissions and other materials submitted through this public process, the standard of review should be specifically on whether the policies in place achieve the state's goal to "**eliminate**…escapement and to **eliminate** negative impacts to water quality and native fish, shellfish, and wildlife."

5) Switching species does NOT reduce the rampant daily pollution and water quality risks posed by open water net pen aquaculture. Ecology should not limit the scope of their review to risks associated with a change of species.

Decades of experience shows real effects on water quality in a plume around the net pens, which the terms of Cooke's current permit application does not eliminate. This NPDES review should re-examine existing data on effluents from industrial products, medicines, feed, fish waste, and dead and rotting fish to assess whether the current plans eliminate all of those risks.

5a. Fish Effluent

> Open water net pens routinely disperse large volumes of feed into public waters within the boundaries of the net pens. Some portion of the feed may not be consumed by penned fish, and thus makes its way into, and have an impact upon, the surrounding marine environment. The high-energy tidal zones in which net pens are located may drive broad dispersal of unconsumed feed and other dietary supplements, including medicines. This dispersal of feed into public waters represents a continuous and constant act of chumming, and attracts native fish species as well as other wildlife **(see #8)**. Divers near net pens have observed large schools of fish swimming in and out of the pens, and reports from British Columbia

on bycatch and incidental take of wild species during harvest operations indicate that many native species enter the pens, likely because of the food attraction.

Small fish species, such as baitfish species and outmigrating and rearing wild salmon and trout (including ESA-listed Chinook and steelhead), may be attracted by net pen feed to the point where they physically enter a net pen facility and are vulnerable to predation from farmed Atlantic salmon in the pens.

The constant dispersal of feed may also cause disruptions in the natural migratory patterns of wild fish, as the pens provide a constant and unnatural food source that may cause wild salmon or trout to occupy a single location for a longer period of time than is typical, and deter rearing or migrating wild fish from developing key feeding strategies which are critical to their early growth and development. This constant source food is also likely to draw native species (including ESA-listed Chinook and steelhead) from their protective shallow nearshore habitats to net pens.

Additionally, feeding and harvesting steelhead from the net pens attracts wildlife to the vicinity of the pens, including birds, sea lions, orcas, seals, and other fish. Cooke's NPDES permits need to consider this additional biomass and waste from these attracted species when setting limits for phosphorous, nitrogen, and other discharge.

Aside from water quality concerns, this attraction increases the chances that orcas and other marine mammals will be harassed, and that endangered wild fish will be accidentally harvested, injured, or preyed upon.

5b. Fish Waste

No matter the species, there is no mechanism to capture waste from open water net pen aquaculture. Fish waste, excess food, dead fish, and tissue sloughed off of live fish, all flow from net pens into surrounding waters. This nutrient imbalance in the vicinity of pens can be harmful to some wild species, and can cause unhealthy growth of other species, including algal blooms. Additional climate change impacts suggest die-offs from algal blooms could be more frequent. Read about an example in BC's Clayquoet Bay.

Unlike highly-regulated land-based agriculture and production where animal manure is collected and composted, waste (feces, urine, medicines, and uneaten feed) from open water is discharged directly into public water. The most prominent organic nutrient waste involved are phosphorus (P) and nitrogen (N). Based on calculations made by Wild Fish Conservancy using a bioenergetics program and data provided by Cooke in their monthly NPDES reports, the estimated amount of untreated N discharged by Atlantic salmon net pens in Puget Sound on a daily basis is roughly equivalent to the amount of N discharged in waste treated by the city of Tacoma. For the same comparison with regards to P, the amount of discharge is roughly equivalent to the cities of Port Angeles, Everett, Bellingham, and Tacoma combined.

The attraction of wildlife including birds, sea lions, orcas, seals, and other fish (described in 5a) concentrates animal waste near the pens, further increasingly levels of phosphorous and nitrogen.

Currently, Ecology only considers the impacts of the nutrients and chemicals discharged on the environment directly below or in close vicinity to the pens. As part of risk assessment and monitoring, Ecology should utilize the Pacific Northwest National Laboratory's Salish Sea Model, a predictive ocean-modeling tool developed by the federal government for coastal estuarine research, restoration planning, water-quality management, and climate change response. This tool could analyze how discharge and pollution from net pens travels through the dynamic, tidal marine environment, therefore allow Ecology to better evaluate the risk the pollution poses and the geographic range the pollution would impact.

5c. Amplification and Discharge of Viruses, Parasites, and Diseases

Rearing concentrated populations in what are effectively aquatic animal feedlots, face greater risk of disease, parasitic, and viral amplification than wild fish populations. When outbreaks break out in net pens, the disease-causing organisms are rapidly amplified in number and discharged to the surrounding aquatic environment in large numbers. Because wild steelhead and other species of concern (i.e. coho salmon, ESA-listed Chinook salmon and bull trout and as required by WAC 197-11-080) swim in close proximity to the pens, there is likely to be a spread of disease from infected farmed fish to these endangered wild populations.

In 2017, a B.C. study documented a strong correlational connection between disease prevalence in net pens and disease transfer to wild fish populations (Morton et al., 2017). Recent research in British Columbia found novel viruses in endangered salmon, and found evidence that these novel viral infections may originate from farmed salmon and trout (Mordecai et al., 2019).

Such pathogens fall within the definition of pollutants, and the NPDES permit review should ensure that Cooke's plans will eliminate the risk of these pollutants harming the integrity of the Sound ecosystem and the biological integrity of its wild species.

Net pens chronically discharge particles of decaying fish flesh that are often consumed by native fish and birds. These particles may be contaminated with pathogens, parasites, pharmaceuticals or chemicals that may be ingested by native fishes, including wild steelhead, salmon, and other trout. Studies have shown that these particles are potential vectors for pathogens. While Cooke now is required to recover dead fish and transport them upland for disposal, there is currently no mandate that those mortalities be submitted to the state for testing before disposal.

5d. Discharge of antibiotics and medical effluent.

In order to treat specific diseases of fungal occurrences or to prevent infection, chemicals and pharmaceuticals are often applied by the industry to the fish, water, or feed in the net pens. Among the potential and likely harmful impacts to designated uses of surrounding water is the use of these chemical or pharmaceuticals for treating infections, parasites or diseases such as "yellow mouth" where the U.S. Food and Drug Administration (FDA) requires a 30 day waiting period before treated fish may be approved for human consumption. Native fishes in the immediate vicinity of the treated pens may also be exposed to or consume the very same chemicals and pharmaceutical treatments (including fish that may enter the pens attracted by the presence of feed and fish odors). These fish may then be caught in recreational or commercial fisheries and unknowingly be consumed by the public within FDA's required 30 day waiting period. This risk to the public and to wild fish must be addressed in the NPDES review.

The SEPA checklist submitted by Cooke Aquaculture and included in this record refers to the use of unspecified probiotic supplements. These unspecified introduced microbes are likely to colonize the microbiome of native fish and the environment near net pens. Given the growing scientific appreciation of the role of the microbiome in health and development of fish and other animals and plants, these supplements should be detailed, and a plan for monitoring surrounding areas and fish populations for colonization or excess growth of these bacteria should be required. This monitoring should also test for growth of antibiotic resistance in nearby areas.

It should also examine new data on antibiotic resistance in protected marine mammals (research discussed in this recent report from High Country News). These risks were discussed in the SEPA comments submitted by the Our Sound, Our Salmon coalition in 2019, and comments to the previous Atlantic salmon NPDES review.

6) The change in species poses new and different risks.

The change in species poses new and different risks, in addition to the harms open water net pen aquaculture has caused for decades. Some policies which may have been permitted for Atlantic salmon under the pre-2017 status quo when, pose additional risks with the proposal to introduce a highly-domesticated and partially-sterile form of steelhead. The differences in this circumstance were considered as far back as 1990, when the last comprehensive Environmental Impact Statement was drafted. The prior permitting for these pens and their operations all addressed risks associated with a non-native species. In dealing with biologically-altered, domesticated steelhead and Puget Sound's federally-listed steelhead population, different risks apply, and standards laid out in the 1990 EIS have not been met for these purposes.

For example:

- The "a minimum distance of separation between farms and river mouths" has never been considered and adopted in state policy, as section 5.7.2.2 of the 1990 EIS would require for aquaculture involving native fish (and as is required in many other nations). Since escapes, and their risks to threatened steelhead and rainbow trout, constitute pollution and are within the scope of Ecology's review, this guidance and an analysis of the proximity of pens to steelhead spawning rivers should be included in Ecology's review of these NPDES permits. In addition, the assessment of risks from pollution (including diseases) should account for the migration corridors in areas like Rich Passage, which may concentrate wild salmon near the pens.
- The behavioral response of wild steelhead to a large aggregation of wild steelhead may be different than it was to Atlantic salmon. If wild schools are attracted to the captive domesticated steelhead in pens, the pollution from the pens may do greater harm to hatchery-reared steelhead and to threatened wild Puget Sound steelhead.
- Despite treatment to render the fish infertile (triploid), many fish in the pens will be capable of reproducing. When a net pen collapses, it will release more fertile female steelhead than exist in many endangered wild steelhead runs. When an escape happens, it will be nearly impossible to manage a recovery effort that removes farmed steelhead and does no harm to endangered wild steelhead and bull trout, endangered and threatened salmon, endangered southern resident killer whales, and other protected wildlife in Puget Sound.
- The escape of steelhead from any of the Puget Sound aquaculture facilities, whether from small scale leakage or catastrophic facility failure, will pose risks to native salmon, steelhead, and rainbow trout rearing in nearshore marine habitats and rivers due to competition for food and foraging space. This will be particularly true in the case of Cooke's proposed triploid (treatment to render the fish infertile) steelhead because as noted in Cooke's materials, triploid fish have appetites that are likely to be considerably greater than wild juvenile salmon and steelhead due to the faster inherent growth rate of these triploid fish. This means escapees may outcompete wild steelhead, or indeed predate upon them.

7) Escape prevention and the adequacy of Cooke's escape prevention and escape response plans must be carefully considered in this permit process.

The steelhead Cooke proposes using in their net pens are highly-domesticated, biologically-altered to be partially-sterile, and genetically dissimilar to wild stocks. Similar to nonnative farmed Atlantic salmon, these fish are considered and regulated as a pollutant under the Clean Water Act if they escape into public waters.

Escape prevention and the adequacy of Cooke's escape prevention and escape response plans must be carefully considered in this permit process. The determination from the SEPA review process requires Cooke to develop a "no-recovery" option to be added to their escape response plan, which is not included in these NPDES application materials. The NPDES review must be based on their full escape plan, not this incomplete record. The SEPA determination also required Cooke to develop a plan for marking their

domesticated stock (clipping the fins) to distinguish them from free-swimming wild and hatchery steelhead. That marking plan is not included in these NPDES materials, but is an important aspect of escape recovery.

Despite treatment to render the fish infertile, many fish in the pens will be capable of reproducing. When a net pen collapses, it will release more fertile female steelhead than exist in many endangered wild steelhead runs. When an escape happens, it will be nearly impossible to manage a recovery effort that removes farmed steelhead and does no harm to endangered wild steelhead and bull trout, endangered and threatened salmon, endangered southern resident killer whales, and other protected wildlife in Puget Sound.

8) Ecology should not issue NPDES permits until Cooke has initiated and received agreement from all local, state, federal, and tribal governments.

Tribal governments have already requested government to government consultation with the State over Cooke's NPDES permit application, and at least seven tribal governments submitted comments during the SEPA process expressing concerns over Cooke's proposal and requesting the Department of Fish and Wildlife withdraw their SEPA determination that ended the environmental review process and require a comprehensive environmental impact statement.

In addition, many counties and municipalities have established new rules since the net pens were installed, which would prohibit the construction of new net pens in their waters. While the existing pens are grandfathered in, these communities and nations should have a full and open opportunity to air their concerns and ensure that the continued operation of net pens in Puget Sound honors the concerns and needs of these communities.