Bruce Dobson

My comments:
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.

Regardng 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 ifsh 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.

Regarding 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.

Regarding 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.

Regarding 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.

Regardng 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.

Thank you.