

Wild Fish Conservancy

N O R T H W E S T

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**Comments on Washington Department of Fish and  
Wildlife State Environmental Protection Act Review  
of Cooke Aquaculture Proposal to Commercially  
Propagate and Harvest *Oncorhynchus mykiss* in  
Puget Sound net pens: SEPA #19056**

Submitted 11/22/19

Drafted and Submitted by:

Wild Fish Conservancy

A handwritten signature in black ink, appearing to read 'Kurt Beardslee', with a long horizontal flourish extending to the right.

Kurt Beardslee, Executive Director

## Overarching Comments:

In addition to and as explained by the detailed technical comments below, Wild Fish Conservancy provides these overarching comments to highlight that the State's mDNS and SEPA process is legally flawed in many respects, including but not limited to the following:

- The State improperly relinquished its SEPA duties by delegating its primary responsibilities for evaluating the environmental impacts of Cooke's proposed net pens farms to Cooke. Cooke is clearly biased in favor of allowing its proposal, and all analysis and documents that Cooke or its consultants prepared are therefore unreliable.
- The net pens will have significant adverse impacts on the environment, and the State failed to prepare an environmental impact statement to fully consider and evaluate reasonably foreseeable consequences from these impacts. For example, and as detailed in these technical comments, escaped steelhead from the net pens will adversely affect wild salmonids by competing for food and forage space with native salmonids and by amplifying and transmitting diseases and parasites. The State did not fully consider this, instead relying on an outdated EIS and a paragraph from Cooke that incorrectly minimizes impacts on wild salmonids without citing any support for its assertion.
- A new EIS is required because there are significant adverse effects that are not addressed in the prior EIS and because there is substantial new information and changed circumstances. For example, the outdated EIS relied upon by the State addressed rearing of a different species—Atlantic salmon—and not the steelhead currently proposed for Puget Sound net pens and was prepared before the listing of various species in Puget Sound under the Endangered Species Act, including Puget Sound steelhead, Puget Sound Chinook, and the Southern Resident Killer Whale. Further, there is an abundance of new science informing the risks net pens pose to the environment since the 1990 EIS. The cursory additional information and analysis

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- is insufficient to update an entirely stale EIS. These comments detail some of the many ways the EIS and checklist fail to consider best available science that has come out in the last 30 years.
- The SEPA documents are neither complete nor accurate, failing to disclose many risks and harms associated with the net pens. Relatedly, the State failed to gather necessary additional information and failed to consider reasonably foreseeable consequences. For example, the State has not supplemented the decision documents with information from the recent Orchard Rocks incident. Regardless of whether the State considers the incident, the State has not provided the public with an evaluation of this incident and an opportunity to comment on the reasonably foreseeable risks posed by pen sinking.
  - The State failed to disclose and consider all direct, indirect, and cumulative impacts of the net pens, and accordingly failed to provide an accurate and complete analysis.
  - The State narrowed the project scope, improperly limiting its effects analysis and failing to consider many impacts posed by net pen farming in the State of Washington.
  - The State failed to articulate and analyze updated objectives or purposes, making it impossible to consider and evaluate reasonable alternatives. The 1990 EIS articulates an objection/purpose of assisting in resolution of conflict by evaluating the environmental impacts of fish farms on the biological and build (human) impacts. This objective/purpose is clearly outdated and based on the political climate at the time. The update in Attachment D does not provide any updated objectives/purposes, but simply states a "proposed action" of permitting steelhead/rainbow farming. This failure to articulate objectives or a purpose makes it impossible for the public to understand what reasonable alternatives are available that the State failed to consider.
  - The State failed to consider and evaluate reasonable, safer alternatives to raising the rainbow trout/steelhead at existing marine net pen sites in Puget Sound. For

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- example, the State should have considered an alternative requiring all salmon farms to be self-contained land-based facilities. As another example, the State should have considered an alternative regulation that restricts the number of steelhead/rainbow that may be farmed in the pens. These alternatives would significantly lessen the risks and impacts of salmon farming on the environment while still allowing Cooke to run a profitable salmon farming business.
- The no action alternative in the 1990 EIS is outdated and does not make sense because the “existing regulations and guidelines,” as well as the laws of the State of Washington related to net pens, that would form the basis for a no action alternative have changed in the last 30 years.
  - The State must prepare an EIS because of the significant negative environmental and health impacts from the net pens, examples of which are detailed in these comments.
  - The mitigation measures included in the decision documents are unenforceable; fail to address all significant adverse impacts on the environment; will not reduce impacts to a nonsignificant level; and otherwise do not comply with SEPA.
  - The regulatory agencies lack sufficient regulatory controls to allow the proposed action to go forward. As demonstrated by disease outbreaks—like the 2012 outbreak of IHNV and the PRV outbreaks—as well as equipment failure—like the 2019 Orchard Rocks incident and the collapse of Cypress Site 2 and its aftermath—the regulatory agencies are ill-equipped to mitigate any adverse impacts.

Under the State Environmental Protection Act (SEPA), this review requires a threshold determination of whether an action is likely to have a “significant adverse environmental impact.” The State’s current threshold determination of Mitigated Determination of Non-Significance (mDNS) is inadequate as an environmental review and fails to address many well-documented risks associated with farming salmonids in these exact pens. Industrial-scale, open-water finfish aquaculture poses significant environmental risks, and the transition from Atlantic salmon aquaculture to rainbow/steelhead trout aquaculture adds significant risks that

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cannot be adequately mitigated. The State has violated SEPA by not preparing a new Environmental Impact Statement (EIS). Below, we detail some but not all of the significant environmental impacts that compel a determination that this proposal poses significant adverse environmental impacts, and reasons why the mitigations proposed are not reasonably certain to address those risks. In evaluating the proposed actions, the State failed to properly consider all available alternatives, or the cumulative impacts of the many risks posed by this proposed action.

The State should withdraw the Mitigated Determination of Non-Significance (mDNS), issue a Determination of Significance, and draft an EIS to assess the full impacts of this transition. Furthermore, that EIS should incorporate into its no-action alternative the cessation of operation of the pens (and cessation of any environmental risk) after the legislative non-native aquaculture phaseout takes effect in 2022.

### The public comment period was flawed

The initial 21-day comment period was too short to allow adequate public comment. That period was first extended by 10 days, and again by 21 days. These extensions were announced near the end of each comment period, meaning that commenters could not budget their time to conduct the depth of analysis and consideration that might have been possible had the comment period been announced at full length to begin with.

When first announced, the comment period ended before the deadline for a legislatively-mandated report from state agencies to the legislature regarding best practices on aquaculture licensing and practices. That report was mandated by HB 2957, the law which also phased out Atlantic salmon aquaculture and mandated stricter regulations of marine net pen aquaculture in general, and was supposed to be filed on November 1. The first extension of this comment period ended on that same day. Unfortunately, that report has still not been filed as we complete these comments, meaning the public has not been able to draw on the guidance of State agencies on how “to eliminate commercial marine net pen escapement and to eliminate

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negative impacts to water quality and native fish, shellfish, and wildlife.” Proceeding with review of this proposal before completing the mandated report to the legislature puts the cart before the horse, and makes it likely that the clear will of the legislature and voters will not be reflected in the State’s response to Cooke’s request.

Even with the extensions the State has granted, there is a great deal for the public to evaluate. The filing covers over 400 pages, including a lengthy bibliography that requires review and in some cases rebuttal, as well as hundreds of references within the text to review. In addition, it references and discusses material developed by two sources who are expert witnesses for Cooke Aquaculture currently preparing to testify in ongoing litigation regarding these net pens. Understanding their statements here requires consideration of expert testimony rebutting their claims from that ongoing litigation. Furthermore, the 1990 EIS (Environmental Impact Statement) on which the State is relying is woefully outdated, and addressing the environmental effects of this policy requires the public to integrate decades of new information regarding Puget Sound, wild salmonids and other native fish in the Sound, its endangered marine mammals, the physics of tides and currents and tsunamis in the Sound, and the effects of net pens and industrial finfish aquaculture on the Sound.

The submission includes a 76-page document authored by Cooke Aquaculture staff and contractors, which purports to serve as a supplement to the 1990 Programmatic EIS. This self-interested document cannot stand on its own as a supplement to the state’s EIS, and the document largely omits discussion of the specific environmental impacts of the net pens on the threatened and endangered species under discussion, including effects on the conspecific Puget Sound steelhead which are listed as threatened under the Endangered Species Act.

That there is so much additional information accumulated in those intervening decades—including multiple new federal and state listings of endangered and threatened species, newly-designated critical habitat, and substantial new evidence of the effects and risks posed by open-water salmonid aquaculture in Puget Sound—is a strong argument of the need for the

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appropriate state agencies to conduct a full EIS. Washington Department of Fish and Wildlife (WDFW) is the appropriate agency that should write such a supplement, and in view of Cooke's active defense in litigation over its ESA and CWA violations and the considerable controversy surrounding Cooke Aquaculture in general, the proposal at issue in particular, and the widespread public consensus supporting the complete elimination of open net pen finfish aquaculture in Puget Sound, WDFW should provide a period for public comment on that EIS once it is issued. Allowing the petitioner to write its own supplement to the 1990 Programmatic EIS rather than having the state to perform its own due diligence and impartial analysis, and offer the public the statutory amount of time for comment, represents a dangerous end run around key environmental protections.

During the comment period, new information became available that the public deserves an opportunity to understand and comment on. This includes the partial sinking of a net pen at the Orchard Rocks site, and Cooke Aquaculture's efforts to intimidate Wild Fish Conservancy and prevent us, our members, and our partners in the Our Sound, Our Salmon coalition from exercising First Amendment rights to comment on this matter of public interest.

### Orchard Rocks, 2019

In the 2019 Orchard Rocks incident, neighbors on shore observed the pen sinking as early as October 15, and reported their concerns to Cooke. Initially, Cooke staff told these neighbors that the apparent sinking was simply a result of normal tidal movement, and neighbors observed no repairs and it appeared that the pen was operating as if nothing was wrong. On October 18, the corner of the pen was fully under water, and emails obtained through public records requests indicate that the initial emergency alert came not from Cooke's personnel, but from state employees visiting family near the pens during their off-hours. In response to these calls from WDFW staff, coordinating with staff at the Department of Natural Resources, the US Coast Guard mounted an emergency response and created a security cordon, while Cooke and DNR divers surveyed the damage and began repairs. According to a DNR spokesperson, fish could have escaped had the sinking pen been stocked at the time.

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Emails obtained through public records requests show that state regulators did not feel Cooke followed the emergency protocols that they had agreed to through previous permits. It is unclear why it took several days to begin repairs, or whether Cooke staff intentionally misled concerned members of the public during that delay. It appears that the public and agency staff initiated the emergency response, not Cooke or its staff. The public and state agencies cannot adequately evaluate Cooke's emergency response—a central component of the risk mitigation proposed in the mDNS—without clarity on those matters, and a clearer understanding of Cooke's monitoring and preventative maintenance. In emails obtained through public records requests, state agencies appear to be planning an internal investigation of this incident, and our records request remains open. Estimated times to complete the records search extend beyond the end of this comment period. As we complete these comments, no results have been announced from the agencies' investigation of this incident.

### Silencing public comment

On October 3, 2019, less than two full days after the public comment period began and the day after Wild Fish Conservancy issued a press release informing the press and public about this comment period, Cooke Aquaculture issued a "cease and desist" notice to WFC. This letter instructed WFC (a group that convened and coordinates the Our Sound, Our Salmon coalition) to "cease and desist" from expressing opinions about the risks posed by Cooke's net pens in Puget Sound, opinions derived in part from and citing an engineering report prepared and submitted as part of ongoing litigation. Cooke's letter warned "If these statements result in delay in issuance of those permits...Cooke will seek recovery of damages against WFC and [WFC executive director] Mr. Beardslee personally, in addition to injunctive relief."

Describing evidence and opinions derived from that evidence, especially as part of a petition to a government agency for redress of grievances, is the epitome of First Amendment-protected free speech. The First Amendment protects the rights of citizens to make such fair comment on matters of public interest and public controversy. Washington State is one of the first states to legislatively shield reports like this from threats like Cooke's, declaring in 1989:



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“The legislature finds that the threat of a civil action for damages can act as a deterrent to citizens who wish to report information to federal, state, or local agencies” (RCW 4.24.500).

Cooke’s letter to WFC, and any similar letters sent to members of Our Sound, Our Salmon and other individuals or advocacy groups, may have chilled or otherwise limited the public’s participation in this important process. To correct any such chilling effect, the State should take measures to ensure that the public should feel no barrier to making their opinions heard. This might include asking the Attorney General to review existing laws and regulations to ensure that the State’s anti-SLAPP laws are sufficient to protect the integrity of the public comment process, and to investigate this incident and its harm to the integrity of the State’s public comment process.

## **Effects of escaped steelhead on wild steelhead genetics**

The mitigated Determination of Non-Significance (mDNS) rightly treats the possibility of escape, both small- and large-scale, as a real and serious threat that must be addressed before planting fish in the net pens. Escaped fish pose a range of risks to endangered wild salmonids, and to the ecology of Puget Sound and its watersheds. The recovery efforts following the 2017 collapse demonstrated inadequacies of the existing escape plan even for non-native species (see comments below regarding inadequacies of the escape plan in the mDNS).

As DFW notes in the mDNS and their exchanges with Cooke in Attachment B, under this proposal, an escape on the scale of 2017 would have released a number of fertile female steelhead that “would have exceeded the number of wild steelhead returning to spawn in many rivers in Puget Sound.” DFW’s exchange with Cooke states that the use of eggs treated to induce triploid sterility “would reduce, but not eliminate the risk.”

We note in the section on failure of triploidy-induction below that monitoring of escapes of farmed Atlantic salmon in Norway (where the salmon are farmed in regions with wild

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conspicuous) demonstrates that escaped farmed salmonids do survive and feed and grow in marine feeding areas at rates similar to wild Atlantic salmon, and survive to mature and return to Norwegian rivers to interbreed in significant numbers with wild Atlantic salmon, with known adverse population level impacts to the affected wild populations (Disreud et al. 2019, Glover et al. 2019, Karlsson et al. 2016, Skilbrei et al. 2015). Importantly, Cooke's existing net pen sites are less than 20 kilometers (12.5 miles) by water from important wild steelhead rivers, including: the Elwha, Dungeness, Samish, Skagit, Stillaguamish, Cedar, and Green rivers (Map).

Table 1 shows the average wild steelhead population abundances in rivers nearest to the existing net pen facilities. State guidelines generally regard the risk of genetic harm as too high when wild fish are less than 95% of the spawners in a stream (5% hatchery-origin). Science would argue for a much lower threshold than 5% when the hatchery fish are as significantly domesticated as those proposed to be used by Cooke. Simulations of escape and survival scenarios (Appendix) indicate high likelihood that an escape on the scale of Cypress 2017 could cause the proportion of fertile farmed rainbow/steelhead trout spawning in streams to exceed 5%, or in some scenarios could exceed the entire wild population in streams.

A full understanding of the genetic risks posed would require more detailed information on the genotypes of the broodstock for the farmed salmon, and reportedly the egg supplier will not supply those data. While WDFW officials have offered assurances that they would require such information before authorizing a finfish transfer permit, the mDNS does not specify what standards would be applied in such a review. WAC 197-11-080 requires a worst case analysis and a discussion of the likelihood of that worst case. Rather a worst case scenario, the mDNS discussion adds a scenario that is less of a worst case than the proposal offered by Cooke.

In 2018, WDFW's fish health specialist—Dr. Ken Warheit—testified before the state legislature that raising native fish in these pens would actually represent “a greater risk to the state's native wild and hatchery salmonid populations, than is Atlantic salmon marine aquaculture.” That risk should be considered through a full EIS.

## **Effects of escaped steelhead on wild salmonids' prey and habitat**

The escape of rainbow/steelhead from any of the Puget Sound aquaculture facilities, whether from small scale leakage or catastrophic facility failure, will pose risks to native salmonids rearing in nearshore marine habitats and rivers due to competition for food and foraging space.

This will be particularly true in the case of triploid individuals because, as noted in the SEPA checklist, they will have appetites that are likely to be considerably greater than rearing wild juvenile salmon and steelhead due to the faster inherent growth rate of these triploid fish.

Diploid individuals that result from the failure of triploid induction will pose a significant risk of becoming sexually mature and interbreeding and/or competing with native rainbow and steelhead on the spawning grounds of native fish. The effects of recurrent, annual low level escapes on wild Atlantic salmon Norway is well documented, and similar impacts on native rainbow and steelhead in Puget Sound are to be expected (Diserud et al. 2019, Glover et al. 2019). Research in escapes of farmed Norwegian Atlantic salmon has also shown that escaped salmon survive to rear in the ocean for one or two years and return as mature fish to spawn in rivers of wild salmon (Olsen et al 2013, Karlson et al. 2016). Further, analysis of monitoring of escapes of farmed Atlantic salmon in Norway has shown that the actual number of escaped farmed salmon is two to four times greater than the officially reported annual number of escapes (Diserud et al. 2019, Skilbei et al. 2015). Of course, these potential risks will be greater the greater the magnitude of an escape and the greater the frequency of small-scale leakage events. But, as is the case for wild Atlantic salmon in Norway and the north Atlantic in general, the risks posed by low level escapes can not be discounted.

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A full EIS would allow for updated analyses that incorporate this and other new research on the effects of salmonid aquaculture, rather than relying on the prospective analysis conducted nearly 30 years ago, in 1990.

### **Effects of escaped steelhead on wild salmonids' predators**

Various operations at the net pens can attract threatened, endangered, and otherwise protected predator species to the vicinity, creating risks that those birds and mammals would be harassed, experience ship strikes, or become dangerously accustomed to human proximity. The process of feeding farmed rainbow/steelhead trout attracts juvenile and adult wild fish (including ESA-listed salmonids), which in turn aggregates predator species. Predators will also be attracted by the outflow of shed skin and other parts from the penned rainbow/steelhead, and could be exposed to diseases and parasites through that proximity. The harvest process results in the release of bycatch fish, blood, and other fish parts from harvested fish, which has been shown to attract marine mammals to close proximity to the pens and boats (as in this video: <https://drive.google.com/file/d/1TWXLMTcdG4s4QEvd3BM65-GpD1IEdaRJ/view?usp=sharing>). A comprehensive EIS should examine the risks to these protected species from raising steelhead/rainbow trout in these net pens, and develop appropriate mitigation measures in consultation with federal, tribal, and international co-managers.

### **Farmed steelhead diseases could harm wild salmonids**

Raising native salmonid species, and rainbow/steelhead trout in particular, in open Puget Sound net pens likely increases the risk of disease transmission from farmed to wild native salmonids and other fish species. Rainbow/steelhead trout are susceptible to native, endemic, Pacific salmon viruses, bacteria and parasites as well as non-native, introduced pathogens

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including piscine orthoreovirus (PRV). Rainbow/steelhead trout are vulnerable to a deadly form of infectious hematopoietic necrosis virus that can spread to and kill wild steelhead. While vaccination and state monitoring can limit this risk, it remains a greater risk than existed with Atlantic salmon.

The experience from a 2012 outbreak of the Atlantic salmon-specific strain of IHN indicates the danger of an outbreak in farmed rainbow/steelhead trout. While response plans call for rapid culling of infected fish to prevent the spread of disease, in 2012 the culling dragged on for months, with the Northwest Indian Fisheries Commission's fish health specialist noting the pen owner "reported increased mortalities starting in April. We now are at end of May and infected fish are still in those pens shedding virus." (<https://nwifc.org/ihn-virus-detected-in-atlantic-salmon-farm-near-bainbridge-island/>) The effect of such a delay if farmed rainbow/steelhead trout were infected with the strain shared with wild steelhead would be catastrophic.

Concentrated populations raised in what are effectively aquatic animal feedlots, face greater risk of disease, parasitic, and viral amplification than free-ranging, especially wild, populations. When viral, bacterial, fungal, or parasitic diseases break out in net pens, the disease-causing organisms are rapidly amplified in number and leaked to the surrounding aquatic environment in large numbers. Because their conspecifics (and other salmonids of concern, including coho salmon, ESA-listed Chinook salmon and bull trout and as required by WAC 197-11-080) will be swimming in close proximity to the pens, there is likely to be a spread of disease to endangered wild steelhead and other salmonids. 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 salmonids (Mordecai et al., 2019).

As with terrestrial feedlots, the diseases that spread in and from net pens are likely to include the spread of antibiotic- and fungicide-resistant pathogens to wild steelhead and hatchery

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steelhead, which poses additional risk to hatcheries and the humans and wild species that feed on steelhead and other Puget Sound salmonids (discussed further below, along with other risks of pollution from net pens). As the *Seattle Times* reported in October: "The risk is low, but consequences could be severe." (<https://www.seattletimes.com/seattle-news/environment/cooke-aquaculture-seeks-to-farm-native-steelhead-in-puget-sound-after-2017-atlantic-salmon-escape/>)

A comprehensive EIS should examine the risks to these protected species from raising biologically-engineered steelhead/rainbow trout in these net pens, and develop appropriate mitigation measures in consultation with federal, tribal, and international co-managers. That analysis should include an assessment of disease transmission to predator species, as well as the effects of these diseases on wild fish, and the potential for transmission of resistant strains to hatcheries.

### **Fertility of steelhead eggs treated for triploid sterility**

The mDNS Summary (and Attachment A to Cooke's SEPA checklist) notes that the induction of triploidy in fertilized eggs at Cooke's hatcheries is imperfect. The likely adverse effects on native rainbow and steelhead from the escape of fertile aquaculture rainbow highlights the importance of providing firm risk-averse quantitative criteria and associated procedures regarding the estimation of the rate of triploid failure in each lot of eggs intended for production of smolts for outplanting to Cooke's marine net pen facilities. WDFW's Summary notes some concerns with the procedure Cooke employs to estimate the triploidy failure rate ("failure rate", Cf. Attachment B, Cooke's response to WDFW question C2, pp. B-25,26). We believe WDFW's concerns are valid but that their recommendations do not go far enough to adequately reduce the risk posed by the presence of diploid (fertile) rainbow/steelhead in net pens in Puget Sound.

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First, we note that the assertion by Cooke on page B-25 that the results of sampling to test triploid induction presented in Attachment A “are additive” is erroneous. The data in Appendix A show results from samples of 60 to 100 fertilized eggs from 36 separate lots sampled between 2013 and 2018. These samples can legitimately be pooled only if all 36 samples were obtained from a single lot (cohort) of eggs. This is clearly not the case. Further, Attachment A contains no data on the total number of eggs in each lot from which each sample was obtained. This missing information is critical to determining the adequacy of the sample sizes for estimating the triploid failure rate of each lot.

A Bayesian assessment of the data in Attachment A (modeling 36 separate draws of the same sizes observed, drawn from a hypergeometric distribution with unknown rate of diploidy) provides a 95% Highest Posterior Density Interval for the rate of diploidy of 0.06%-0.35%, and an 80% HPDI of 0.09%-0.28%. A worst case assessment as required by WAC 197-11-080 should consider not just the average triploidy rate in these samples, but the likely range of scenarios, and should attempt to cap the risk.

We recommend an alternative approach described in the following. The details in the approach we suggest also illustrate a robust general approach to risk assessment, particular in contexts of endangered species.

There are two basic issues in regard to the risk posed by the failure of triploid induction:

1. the failure rate itself (i.e., how many diploids will be reared and released into each net pen per batch of fertilized eggs in the hatchery that have been subjected to the triploid-induction treatment)?
2. The total number of diploids in a pen that would escape either via low level leakage or catastrophic failure.

The first (failure rate) in conjunction with the size (number) of fertile eggs subjected to the triploidy-induction procedure is relevant to determining the minimum sample size of eggs from

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each lot that should be tested for triploid failure in order to assure an appropriate low risk of diploids being released into the pens. The second determines the probability or likelihood that escapes – especially under conditions of a catastrophic failure – would survive in sufficient numbers to pose a significant threat to wild rainbow or steelhead. Here, we assume that ‘significant threat’ is one that would amount to a take of a threatened or endangered salmon, steelhead, and bull trout under the ESA. Determination of this number, therefore, requires an appropriate determination by National Marine Fisheries Service (NMFS) and issuance from NMFS of an appropriate Endangered Species Act (ESA) Incidental Take Statement (ITS).

Determining a risk-averse failure rate (issue 1) is dependent on determining the risk-averse probability that escapes under a catastrophic failure of a net pen would pose a ‘significant threat’ to ESA-listed salmonids from surviving escaped diploid rainbow/steelhead. This, in turn, requires, a determination of the maximum allowable number of diploids per total number of individuals out-planted to each farm facility. We follow WDFW in expressing this number per-million eggs tested.

On page 6 of the Summary, WDFW conducts a rough illustrative exercise estimating the numbers of diploids surviving to potentially interact with wild rainbow or steelhead on the spawning grounds. WDFW provides a lower estimate of 63 mature diploid fertile fish from a catastrophic escape from a pen initially planted with 1,000,000 smolts, given a variety of assumptions about intermediate rates leading from the initial escape to the presence of surviving diploids on the spawning grounds. WDFW calculates that there would be a total of 63 such fertile escaped rainbow/steelhead, under a presumed “low survival” scenario and 316 under a “high survival” scenario.

In order to be very risk-averse (in keeping with the high priority placed on protecting ESA-listed salmon, steelhead, and bull trout), suppose we adopt a maximum of 50 fertile diploid escapees from a total net pen failure of 1,000,000 rainbow/steelhead. Under the assumptions of the WDFW “low survival” scenario 1,000,000 rainbow/steelhead net pen rearing primarily sterile



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triploid fish would have to consist of a maximum of 1560 fish in which triploid-induction had failed (Table 2). 1560 escaped diploids would result in no more than 50 surviving with the potential to reach the spawning grounds of wild steelhead or rainbow, given the assumptions used in WDFW's low-estimate scenario, which we adopt here for the sake of illustration.

In a total population of 1,000,000, 1560 diploids yields a point estimate of the triploid-induction failure rate of 0.00156. To be risk-averse with respect to ESA-listed fish, we argue that the number of fertilized eggs post-triploidy induction sampled and tested for triploid failure should be large enough to assure a probability of 0.95 (95%) or greater that the total number of diploids in the lot of 1,000,000 eggs is no greater than 1560. This requires a sample of approximately 3000 randomly selected eggs (per million eggs). The standard would require a random sample of at least 3000 be tested from each lot of one million fertilized eggs (or hatched fry) and result in no more than 1 triploid failure (figures 1 & 2). A lower-cost alternative protocol with the same effect would be to test consecutive lots of 100 eggs from each batch of 1,000,000 fertilized eggs, and to continue testing lots until either one or more diploids is detected from the current lot or until a total of 3500 eggs has been tested and no more than one diploid has been found. The occurrence of one (or more) diploid eggs in a total number of eggs fewer than 3500 would result in a distribution of the total number of diploids in the one million egg lot being tested in which the 95<sup>th</sup> percentile of the cumulative probability distribution exceeds the critical value of 1560.

It is also of interest that if the total of 2950 samples tested for failure of triploid induction (diploidy) listed in Attachment A of Cooke's SEPA Checklist, of which 5 diploids were found, were obtained from a single lot of 1,000,000 fertile eggs, the mean number of diploid in the entire lot of 1,000,000 eggs would be more than 2000, the median number would be 1900, and there would be a probability of just over 5% that the true number was greater than 3500 (Figure 2). Each of these quantities is clearly greater than the hypothetical maximum of 1560 described above.

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In summary, the risk standard should be stated as a high probability that the outcome of a specified quantitative sampling protocol not exceed a specified quantitative upper bound judged sufficient to assure that an adverse outcome of management concern will not occur. Here, the quantitative upper bound is the number of triploid failures per 3000 random samples tested (here 1), which corresponds to a corresponding high probability that no more than some total number of triploid failures (here 1560) occur per batch of million fertile eggs or fry sampled. The latter maximum number (1560) is in turn derived from an appropriate estimation of the distributions of the quantities (parameters) required to estimate (with appropriately high probability) the total number of fertile escaped diploid farmed rainbow/steelhead that would survive following a catastrophic net pen failure, where the total number of surviving fertile escaped diploids is itself determined on the basis a similar assessment of the risk posed to ESA-listed steelhead by the presence of escaped diploid farmed rainbow/steelhead on the spawning grounds of wild steelhead. The determination of such a risk standard requires that full probability distributions of the relevant quantities of interest be calculated (estimated) so that risk-averse probabilities of attainment of a risk-averse standard can be specified as a probability from the relevant tails of the distributions. Picking a point estimate, such as the mean of a sample, as in the WDFW summary (picking the mean triploidy-failure rate of 0.0017 (0.17%) from Cooke's sampling data (Attachment A to Cooke's SEPA checklist) is inappropriate and very likely to be insufficiently risk averse.

This analysis is necessarily limited given the short comment window. The State must develop and "document...its worst case analysis and the likelihood of occurrence" as required by WAC 197-11-080. A fuller analysis of the genetic risks posed by escaped non-triploid rainbow/steelhead, and measures that might mitigate those risks, would be possible with a longer comment period, and should properly be undertaken as part of a comprehensive EIS.

## **The proposed escape recovery plan is clearly insufficient**

It appears that Cooke's recovery plans are no different from the ones employed to address the catastrophic 2017 net pen failure and escape at Cypress Island. In Appendix B, they state:

Upon receiving authorization from WDFW, the company will commence recovery of escaped fish through one or more of the following actions: (1) use of company skiffs and seine nets; (2) contacting the Northwest Indians Fishery Commission and nearby tribal Natural Resource managers to help facilitate the recapture of escaped fish; (3) contacting and engaging the services of local commercial fishing boat operators to facilitate the recapture escaped fish.

This approach was inadequate in 2017, resulting in substantial unrecovered escapees. It is far less adequate for this proposal. Here, the escaped fish may school with threatened wild salmonids and conspecifics. While non-specialists might reasonably have been expected to make quick distinctions between a recovered Atlantic salmon and a wild salmonid, those distinctions will be much harder in this case. A captured steelhead might be a threatened wild steelhead that must be immediately released, or a hatchery-raised steelhead subject to catch limits, or a farm-raised steelhead that must be retained. This distinction may be difficult for non-specialists to make under emergency conditions. As a result, escapees are likely to be harder to recover than were Atlantic salmon.

A recent comprehensive review of efforts to recapture escaped fish from marine aquaculture (including open net pen farmed Atlantic salmon and rainbow trout) demonstrates that such efforts are largely unsuccessful (Dempster et al. 2018). This review casts considerable doubt that escaped farmed salmon and steelhead that escape during either persistent low-level "leakage" or less frequent catastrophic failures such as the one that occurred at Cypress Island in August 2017 cannot be recaptured in ecologically significant numbers.

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In passing HB 2957, the state legislature tasked state agencies “to eliminate commercial marine net pen escapement.” Using the same escape plan that failed dramatically in 2017 does not fulfill that statutory language, or the high standard that the legislature and the people of Washington demanded of the marine aquaculture industry. WAC 197-11-080 requires an analysis of the worst case scenario and its likelihood, which are not adequately discussed.

A full EIS would allow WDFW and other agencies and co-managers to consider a range of alternatives to better mitigate this risk.

### **The “no-recovery” option for escapes as an unmitigated environmental risk requiring SEPA review**

SEPA review requires a threshold determination of whether an action is likely to have a “significant adverse environmental impact.” As the Department of Ecology SEPA FAQ notes, “An impact may be significant if its chance of occurrence is not great, but the resulting environmental impact would be severe.” The FAQ explains further that an agency may issue a “mitigated DNS in lieu of preparing an EIS when there is assurance that specific enforceable mitigation will successfully reduce impacts to a nonsignificant level.”

In this case, one of the forms of mitigation required by the DNS seems to acknowledge that there are risks that cannot reduce impacts to a nonsignificant level. Regarding escape recovery plans, including scenarios for recovery after a catastrophic failure of the pens, the mDNS states:

It is conceivable that an attempt to recover fish after an escape event may negatively affect native Pacific salmonids more than no attempt to recover fish. Cooke is required to work with WDFW, Ecology, and DNR to include a no-recovery option in the 2020 Fish Escape Prevention, Response, and Reporting Plan, to be finalized December 2019. This option should include when, where, and under what conditions a recovery effort should not be attempted. A no-

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recovery option would be triggered by the state, in consultation with co-managers and federal agencies for the purpose of protecting native Pacific salmonids. A no-recovery option can be triggered by Cooke if the attempted recovery would put the health and safety of its employees at risk.

This scenario exceeds the scope of an mDNS and demonstrates the need for a finding of significance and an environmental impact statement.

The mDNS rightly treats the possibility of escape as a real and serious threat that must be addressed before planting fish in the net pens. Escaped fish pose a range of risks to endangered wild salmonids, and to the ecology of Puget Sound and its watersheds. The recovery efforts following the 2017 collapse demonstrated inadequacies of the existing escape plan even for non-native species. As DFW notes in the mDNS and their exchanges with Cooke in Attachment B, an escape on the scale of 2017 would have released a number of fertile female steelhead that “would have exceeded the number of wild steelhead returning to spawn in many rivers in Puget Sound.” DFW’s exchange with Cooke states that the use of eggs treated to induce triploid sterility “would reduce, but not eliminate the risk.”

To mitigate that risk, DFW requires Cooke to prepare an escape recovery plan. That escape recover plan itself could pose environmental risks. DFW recognizes that significant risk and imposes a further mitigation, one in which no recovery is attempted. This option could be triggered by the state in consultation with federal and tribal partners, but also can be triggered by Cooke based on its assessment of risk to its crew.

This creates a risk that there would be no mitigating effort taken to address the adverse environmental impacts of an escape. DFW’s own arguments in the mDNS lead to the conclusion that this impact cannot be mitigated, and that it is inappropriate to proceed with a mitigated Determination of Non-Significance. To assess the risks of this projects requires a full EIS.

## **The pens' structure is likely to be unsafe for prevailing conditions in Puget Sound**

The joint DFW/DOE/DNR investigation of the Cypress Island net pen collapse of 2017 identified failures of maintenance and engineering which resulted in the collapse of that ten-cage net pen and the release of hundreds of thousands of farmed fish. In the course of ongoing litigation resulting from that collapse, Wild Fish Conservancy contracted an independent marine engineer to provide expert testimony evaluating the collapsed pen and assessing the risks posed by the surviving pens.

Like the state's own investigation, Dr. Tobias Dewhurst's assessment found evidence that the net pen had not been adequately cleaned, and that there had been a persistent failure to confirm the soundness of the pens and their anchoring systems, despite those cleanings and inspections being required by permits and industry best practices prevailing before 2017. In addition, Dr. Dewhurst compared manufacturers' ratings for the surviving pens with conditions at the sites where they are currently deployed, and found "conditions at each of its eight sites exceeded the maximum rated conditions specified by the net pen manufacturer. Based on Cooke's documentation that I have reviewed to date, these issues persist at many of the remaining net pen sites. Thus, the remaining net pen systems may be at risk of partial or catastrophic failure during instances of extreme environmental loading, which could result in fish escapement."

He concluded: "As a result of excessive loads on the net pen system created by:

- currents and net sizes exceeding those specified by the net pen manufacturer,
- biofouling levels potentially exceeding design values, and
- mooring system installations that deviate from manufacturer recommendations and were not approved by a marine engineer, pens and cages operated by Cooke were at risk of complete failure. One pen, Cypress Site 2, did experience a catastrophic failure."

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DFW and its partner agencies should not regard it as sufficient mitigation of risk to permit these pens to transition to rainbow trout/steelhead without new engineering plans in place. The current mitigation proposal would allow these pens to operate without “engineered mooring and anchoring plans and site-specific engineered drawings stamped by a structural engineer” until 2021, and would allow them to operate without a third-party inspection for periods as long as two years.

Given the history of these net pens, the consequences of the mismatch between their manufacturers’ ratings and conditions in Puget Sound, and the inadequate maintenance and inspection preceding the 2017 collapse, these pens should be required to have adequately-engineered structures before transitioning to rainbow trout/steelhead. The engineering plans should be incorporated into a full EIS, allowing independent engineers to review the plans and assess the risks posed by the re-engineered pens and anchoring systems. The analysis should incorporate worst case scenarios and their likelihood, as required by WAC 197-11-080. Without that information, how can DFW and its partner agencies, or the voting public and elected leaders who reacted with outrage to the 2017 collapse, assess the risk and sufficiency of this current proposal?

## **The pens’ structure is unsafe for foreseeable conditions in Puget Sound**

Puget Sound is a seismically active area, with structures facing threats of significant damage from shaking in an earthquake, and from tsunamis caused by local earthquakes and those traveling from more distant quakes up and down the coast. A substantial tsunami is likely to occur during the life of these pens, and much state policy has been directed in recent years to make high-risk structures safe from seismic risks. While the exact time of such a tsunami is not predictable, there is a substantial likelihood of such a tsunami in the foreseeable future, and much attention and policymaking effort has been dedicated to incorporating that risk into planning.

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Unlikely as that risk might be, it is necessary to consider here because, as noted in the Department of Ecology SEPA FAQ: "An impact may be significant if its chance of occurrence is not great, but the resulting environmental impact would be severe." Since there is evidence that the net pens are already operating at or past their engineered limits, and since the people of Washington State have seen the tremendous harm done when these pens fail, understanding low-probability/high-risk events that threaten further collapses is critical in addressing the pens' full environmental impact.

Modeling by Washington's Department of Natural Resources and NOAA recently examined consequences of tsunamis for Puget Sound. Tsunami waves in some ways simply amplify the existing concerns about the structural soundness of the net pens, and add to the likelihood of a partial or complete collapse of one or more pens already considered as part of Dr. Dewhurst's engineering study. The forces generated by tsunami waves may differ in more than just intensity from routine tidal flow, in part due to the intense oscillation and the rebound of waves off of nearby shores. This risk deserves additional concern and scrutiny as part of a comprehensive EIS. A full-blown analysis of these forces is impractical given the limited time available for public comment.

To help understand the consequences of tsunamis, we requested simulated wave amplitudes and current velocities for the net pen sites. The DNR/NOAA simulations show significant added risk to all of the sites in the event of a tsunami within Puget Sound. The Fort Ward and Clam Bay sites see modeled wave heights nearly 20 feet high, as does the Port Angeles site, while the Cypress Island sites would face a wave over 10 feet high. The Skagit Bay site and Fort Ward site would face variable currents, with current speeds as high as 14 knots and rapid changes in direction and intensity. This oscillation in the course of a tsunami seems likely to generate forces outside those in normal engineering assumptions, and call for further consideration of anchoring systems and structural integrity.



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There is no reason that a seismic catastrophe should be allowed to place Puget Sound's wildlife at needless risk due to inadequate planning and preparation. WAC 197-11-080 requires a consideration of worst case scenarios, and state law requires other facilities, such as hazardous waste storage sites, to be evaluated for seismic risks. These aquaculture net pens should be subjected to a full EIS that includes consideration of the seismic risks that they uniquely face as semi-permanent, in-water structures containing farmed fish whose escape would cause significant environmental risks.

## **Water withdrawal and discharge into Puget Sound**

The SEPA checklist states "No surface water withdrawals or diversions are required to implement the species change proposal, or to continue operations at existing floating net pen facilities." This is incorrect, since routine operations—including harvest—entail drawing water out of the pens, extracting the fish on board the harvest ship, and then allowing the water to flow back into the Sound after sluicing across the ship. This process adds pollutants including fish blood, damaged fish parts, and injured bycatch fish to the water before it returns to the Sound. A full EIS would consider the environmental impacts of that removal and addition of water to the Sound.

## **Pollution from the pens would be harmful to the plants and animals in nearby waters, including to endangered and threatened species**

Open water net pens raising salmonids routinely disperse large volumes of feed into public waters within the boundaries of the net pens as sustenance for their farmed fish. Some portion of the feed dispersed may not be consumed by fish in the pens, and thus makes its way into,

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and have an impact upon, the surrounding marine environment. The high-energy tidal zones in which these net pens are located may cause wide dispersal of unconsumed feed. This dispersal of feed into public waters represents a continuous and constant act of "chumming," and attracts native fish species into or near the pens.

Physically small fish species, such as baitfish species and out-migrating and rearing salmonids (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 rainbow trout/steelhead in the pens. The constant dispersal of feed may also cause disruptions in the natural migratory patterns of native salmonids, as the pens provide a constant and unnatural food source that may cause salmonids to occupy a single location for a longer period of time than is typical, and deter rearing or migrating salmonids from developing key feeding strategies which are critical to their early growth and development. This constant source of broadcast feeding, otherwise known as "chumming" is also likely to draw native species (including ESA-listed Chinook and steelhead) from their protective shallow nearshore habitats to net pen locations located in deep water, increasing their exposure to both avian and aquatic predators within and outside the pens.

Additionally, feed dispersed by these rainbow trout/steelhead net pens may have detrimental nutritional impacts on native fish species, as fish competing for survival in the wild may have distinct nutritional requirements from those being grown in an isolated facility.

In order to treat specific diseases or 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 where the U.S. Food and Drug Administration (FDA) requires a 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

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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 waiting period. A full EIS would assess the risks posed to wild fish and their human and non-human consumers by outflows of food or medicine, and from exposures of native fish entering the pens.

An additional concern with antibiotic-treated feed and treatments to fish or water is the facilitation of the development of antibacterial resistant bacteria in the sediments (Heuer et al 2009, Cabello et al. 2013, Hu 2019). This issue needs to be explicitly addressed, including the provision of data pertaining to any monitoring of the sediments below each of the extant net pens in Puget Sound that may be available, if any.

In the SEPA checklist, Cooke refers in passing to the use of unspecified probiotics in net pens. 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, this practice deserves greater scrutiny than is practical in the limited comment period available.

The pens are also subject to, and possibly causes of, lethal algal blooms. On November 15, marine aquaculture net pens in Clayoquot Bay began seeing die-offs due to a bloom of diatomaceous algae (<https://thetyee.ca/News/2019/11/20/Algal-Blooms-Tofino/>). The concentration of fecal material, excess food, and fish flesh near pens may exacerbate these blooms, and the resulting fish deaths then produce additional pollution as they cannot be extracted from the nets quickly enough. Observers near the recent die-offs report that the waters near the pens turned "a dark brown muddy river-like colour," due to the rotting flesh.

These die-offs are likely to be more frequent in the future, since reporters observe these algae and their large blooms "have expanded their range and frequency as climate change has warmed, acidified and robbed coastal waters of normal oxygen levels." As discussed below, the inability to quickly empty the pens in the event of massive deaths or a disease outbreak

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poses significant risks to Puget Sound at large. One such risk is that the weight of the dead fish itself can add stresses to the pens' structure, making a collapse more likely during those emergency operations, and when the contents of the pens pose the greatest risk to the environment.

In passing HB 2957, the state legislature tasked state agencies "to eliminate negative impacts to water quality and native fish, shellfish, and wildlife." Allowing these pens to continue emitting this pollution fails to comply with that statutory language and the high standard that the legislature and the people of Washington demanded of the marine aquaculture industry.

A full EIS would assess all of these risks, including the risks posed by artificial probiotics to the microbial biodiversity of the Sound and its wild denizens, and benthic effects near pens.

### **Bycatch of fish entering pens or in harvesting and escape recovery efforts**

Native fishes—including but not limited to forage fishes such as Pacific herring and potentially migrating or rearing juvenile salmon (including ESA-listed Chinook and chum salmon, steelhead, and bull trout)—may be attracted to the net pens due to the presence of feed and the presence of lower trophic taxa drawn to the feed and waste emanating from the pens..

Native fish that have entered the pens attracted by the large volumes of feed may then be entrained in the suction harvest machinery during the harvest of adult farmed rainbow trout/steelhead. There are (at least) two issues that DFW and its partner agencies must address with regard to this issue in the permits as part of a full EIS:

1. A comprehensive accounting of species composition as well as total numbers of non-target fishes entrained during each net pen harvest period in which adult farmed rainbow trout/steelhead harvest occurs. This is required, among other reasons, in order that any take of ESA-listed salmon and steelhead may be accounted. All harassment injuries and mortalities of all individuals entrained in the vacuum pump harvesting

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equipment—including but not limited to direct mortalities of ESA-listed individuals—must be accurately determined and reported to state agencies and NOAA and available for public review.

2. As documented during Cooke harvesting operations in Puget Sound, all non-target fish entrained (sucked up) by the harvest operations are commonly disposed of by being thrown from the upper deck of the harvester ship back into the water on the outside of the nets. The volume of native fish is often so extensive it requires the harvester staff to use snow shovels to scoop them up from the landing area on board the harvest vessel. Pinnipeds and gulls are routinely observed adjacent to the net pens during the harvest, feeding on the native fish as they are being discarded in violation of state and federal laws prohibiting the feeding of pinnipeds.

It is not surprising that there would be such bycatch, and it is likely that it includes endangered and threatened species. British Columbia requires reporting of bycatch (or what they term “incidental catch”) at aquaculture facilities. A complete record of the species captured since 2011 is available from the Canadian Department of Fisheries and Oceans (<https://open.canada.ca/data/en/dataset/0bf04c4e-d2b0-4188-9053-08dc4a7a2b03>). In that dataset, salmon species are recorded for every year on file. In some cases, hundreds of thousands of fish are recorded as incidental catch as part of a rapid depopulation of the pens to control a disease outbreak. Even excluding those incidents, an average of over 35,000 incidental catches in net pens per year are recorded in British Columbia. It is likely that a proportionate amount of bycatch occurs in Puget Sound, and could have serious effects on the Sound’s sensitive ecology. Because Cooke does not report that bycatch, the state does not monitor their efforts, and independent observers are not able to view the harvest process in detail, we cannot fully measure the harm this bycatch causes.

Surveys of aquatic diversity at sites near these net pens indicate substantial numbers of threatened and endangered juvenile salmonids, and forage fish. State-funded surveys including “West Sound Nearshore Fish Utilization & Assessment (SRFB Grant: 07-1898)” (2010),

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“Cypress Island Aquatic Reserve Pilot Nearshore Fish Use Assessment” (2011), “West Whidbey Nearshore Fish Use Assessment” (2007), and the ongoing “Hood Canal Nearshore Juvenile Fish Use Assessment” find substantial populations of threatened coho, Chinook, pink, and chum salmon in near-shore waters at sites near and similar to those where net pens operate. Those surveys also demonstrate substantial variation in total species diversity and population sizes from site to site (e.g. Figure 3), and between surveys at the same site over time. Salmonid populations could vary by orders of magnitude from month to month, and between years. This highlights the difficulty of monitoring and predicting the potential bycatch that might occur in these pens without active, independent monitoring.

There are three additional issues here that DFW and partner agencies must address as part of a full EIS:

- Indirect predation by net pen steelhead on ESA-listed juvenile Chinook salmon, steelhead, and bull trout (take).
- The illegal feeding of pinnipeds, which provides an additional attraction for the pinnipeds that increases the likelihood of their predating on ESA-listed Chinook salmon, steelhead, and bull trout in the vicinity of the pens.
- The harvester crew and/or net pen operator must obtain a fishing license or permit that would allow them to harvest native fish as described above.

Further, addressing this and other issues concerning potential adverse impacts to public resources from the operations of each net pen requires that WDFW as the primary regulatory agency have the authority to conduct regular and unannounced site visits and to conduct any biological sampling and testing deemed advisable to assure the public that no adverse impacts are occurring. At the very least, mitigation should require the presence of independent observers on-site during each harvest operation to quantify and describe the species and life stages of all by-caught species. A full EIS would allow analysis of the effects of bycatch on Puget Sound ecosystems and recovery plans for ESA-listed species, and the proper regulatory

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frameworks to apply for monitoring and limiting bycatch, and due consideration of various alternatives for mitigation.

### **Air and noise pollution impacts to adjacent lands**

Net de-fouling and cleaning operations have been found to cause fouling of the air and significant noise. Residents on shoreline properties near the Fort Ward facility, for example, cannot conduct normal outdoor activities, particularly during warm months, during net cleaning operations due to the foul smell of the air that directly results from the operations and the loud noises associated with generators, pumps, and other industrial equipment. This air and noise pollution causes severe depression of local residential property values, apart from human respiratory impacts. A full EIS would allow DFW and partner agencies to determine appropriate maximum levels of airborne particulates, odor-causing chemicals, and noise levels, and require facility operations to monitor and maintain appropriate airborne pollutant and sound levels.

As part of a full EIS, DFW and partner agencies should commission an appropriate sociological survey of resident households within one-half mile of the shorelines of the locations of each net pen facility. The survey should interview residents to assess the degree and frequency (times of day, times of year) that normal and desired residential activities (e.g., outdoor family activities and social events such as dinner parties) are disrupted and/or prevented by air and noise pollution.

### **Fish flesh discharge**

Open-air salmonid 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

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conspecific steelhead and other salmonids. Studies have shown that these particles are potential vectors for pathogens.

This fish flesh also serves as an attractant for protected marine mammals and birds, and a full EIS should be undertaken to assess the harm this may do to those protected species.

### **A NMFS-approved Hatchery Genetic Management Plan (HGMP) is required**

In view of the several issues of potential concern to public waters and ESA-listed native salmonids posed by the proposed open water net pen operations, a NMFS-approved Hatchery Genetic Management Plan (HGMP) for each of Cooke's freshwater hatcheries hatching rainbow/steelhead eggs, rearing fry and smolts, and outplanting smolts to open water net pens is required. This is the required ESA Section 4 Incidental Take Permit required of any artificial production facility producing any species of finfish that may have an adverse impact on ESA-listed salmonids. It is clear that open water marine salmonid net pen operations, including those currently operated by Cooke and those proposed to be operated using "triploid" rainbow/steelhead pose risks to native ESA-listed steelhead, Chinook salmon, and bull trout.

Further, since evaluation and approval of an HGMP is clearly a federal action, NEPA likely applies and a NMFS evaluation of any such HGMP would therefore require a full NEPA analysis, including preparation of an EIS.

### **Need for a thorough economic cost-benefit analysis of the proposed action and alternatives**

Regardless of the biological concerns posed by the proposed action, no credible evaluation of the possible benefits of the proposed action can be considered complete without a full cost-



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benefit analysis of the proposed action and reasonable alternative uses of the locations currently leased by Washington Department of Natural Resources (WDNR) to Cooke Aquaculture. The public and the public servants charged with making the decision on the proposed action cannot adequately evaluate the possible benefits of the proposed action in the absence of an understanding of what the presumed benefits to the public from the proposed action are and what benefits from reasonable alternative uses of the locations are or may be. It bears reminding that the locations at which the current net pens are located, including the bottom lands and the water in and surrounding each net pen belong to the public. The public needs to be presented with a complete and clear analysis of the economic costs and benefits of the proposed action and alternative uses of these resources. This can only be achieved by a thorough economic cost-benefit analysis embedded in a bona fide alternatives analysis through a full EIS.

### **The proposed mitigations are inadequate and not reasonably certain to address the risks**

While a full EIS would be a more appropriate way to identify and evaluate methods for mitigating the risks of introducing steelhead into net pens, there are several important mitigations that are absent from the current proposal, or that must be strengthened before the proposal moves forward. As it stands, these mitigations are not reasonably certain to address the risks that the state acknowledges, and thus do not satisfy the requirements of SEPA.

While not comprehensive, these are some suggested changes to the proposed mitigations:

- As discussed above, the harvest process must be monitored by independent observers to assess bycatch and to ensure that blood, fish parts, or other waste is not discharged into public waters.

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- WDFW and other regulators must have clear authority to conduct unannounced visits and inspections of facilities. They must have authority to review maintenance logs and to examine the structures, fish, feed, medicine, mort tanks, and other regulated components of the facility to ensure that Cooke is fulfilling all obligations under its permits and the required mitigations here.
- Independent inspections of the facilities should be required on an annual basis, not biennially.
- Reports from the independent engineer, and all other reports required from Cooke as part of this mitigation, must be clearly recognized as public records and made available to the public immediately through a publicly-accessible website.
- As discussed above, the mitigation should not merely establish a consistent means of estimating triploidy error rate, but should set a maximum acceptable error rate, and a sampling regime sufficient to assure that the error rate is estimated probabilistically and with high precision. A minimum number of total random samples for a specific, fixed number of fertile eggs from each egg cohort should be specified to assure that the total number of diploids in a specific total number of eggs from each cohort does not exceed a specified maximum threshold number  $T$  with high probability  $P$  (95% or greater) The attainment standard would be a probability of less than  $(1-P)$  that the number of diploids is not greater than the threshold number  $T$ . This error rate cap should be derived based on maximum number of fertile females that might escape from a pen.
- All forms of PRV should be reportable. In addition to screening eggs and smolts, WDFW inspectors should inspect the tanks to assess the rate at which net pens are amplifying pathogens, and act to address pathogen levels that might pose significant risks to wild species attracted to the pens' vicinity.
- All farmed fish should be clearly identifiable in the event of an escape. There is no basis for allowing any of these biologically-altered domestic rainbow/steelhead trout to be introduced without a clear and approved plan in place for visually distinguishing them from any other fish in Puget Sound.

## **The proposal is deficient by the standards of the 1990 EIS**

As stated above, we disagree with the choice to rely on the 1990 EIS for analysis of the current SEPA review. Substantial changes in the list of endangered and threatened species in Puget Sound, improved understanding of the risks posed by industrial net pens and industrial aquaculture, and changes in state law all make a compelling demand for a new EIS. But since the EIS relies on that dated document, any failure to implement its guidelines should be ground to refuse to allow the proposed action or to compel a full environmental review of the effects of that deviation.

The 1990 EIS recognizes that aquaculture with native fish (such as the rainbow/steelhead trout at issue here) pose different, and in some cases greater, risks than non-native fish like Atlantic salmon. As such there are some guidelines which were not applied in planning and approving the siting and construction of the existing net pens for use with Atlantic salmon which must now be applied in evaluating the pens' use for rainbow/steelhead trout.

On pages 69-70 of the 1990 EIS, section 5.7.2.2 reads in full:

It is recommended that the following guidelines be used by WDF when reviewing fish farm proposals:

- When Pacific salmon stocks are proposed for farms in areas where WDF determines there is a risk to indigenous species, WDF should only approve those stocks with the greatest similarity to local stocks near the farm site.
- In areas where WDF determines there is a risk of significant interbreeding or establishment of harmful self-sustaining populations, WDF should only approve the farming of sterile or monosexual individuals, or genetically incompatible species.

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- In areas where WDF determines that wild populations could be vulnerable to genetic degradation, WDF should establish a minimum distance of separation between farms and river mouths.

In the following section, “Mitigation Measures and Unavoidable Significant Adverse Impacts,” the EIS states: “WDF and other local experts agree that the potential for significant genetic impacts resulting from farm escapees interbreeding with wild stocks is low. Existing regulations and the use of the guidelines indicated in the Preferred Alternative are adequate to avoid any significant adverse impacts and additional mitigation measures are not necessary.”

Unfortunately, there is no evidence that the guidelines indicated in the Preferred Alternative have been applied. We can locate no record of any policy regulating the distance of net pens to the mouths of rivers, and WDFW staff confirmed that they are also unaware of any policies addressing the distance of net pens to river mouths. This guideline only applied to proposals for native fish aquaculture, so would have been unnecessary under the 1990 EIS until now. WDFW staff queried about this guideline cited the use of monosexual and partially sterile stock in this proposal as adequate mitigation, but the plain language of the 1990 EIS requires both, not one or the other.

This issue is crucial in considering the risks of a farmed domestic fish in waters populated with a threatened wild conspecific, as with wild steelhead and rainbow/steelhead trout. Farmed fish that escape near a river mouth could rapidly migrate upriver and interbreed with wild fish. As noted above, the wild steelhead populations in many rivers could be swamped by the number of fertile females if an escape on the scale of 2017 occurred. But the threatened state of the wild species is so dire that population estimates for some rivers—according to the National Marine Fisheries Service steelhead recovery plan (NMFS 2018)—are as low as 5 individuals in some rivers. Even a single fertile female breeding in such a river could destroy the wild genetics.

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As shown in the attached map, the existing seven net pen farm sites are less than 20 kilometers (12.5 miles) by water from important wild steelhead rivers, including the Elwha, Dungeness, Samish, Skagit, Stillaguamish, Cedar, and Green rivers. Other nations restrict net pen farm sites from being as near as 10 km from river mouths, and distances of under 1 km clearly pose serious risk that escapees could breed before recovery.

It should be noted that even the discussion of risks from escapees on breeding grounds rely on dubious assumptions, discussed in detail above. The analysis ignores the loss of breeding opportunities when wild males attempt to mate with escapees (even if those matings are not successful), and the loss of mating opportunities if escapees are able to outcompete wild females for redd sites. Even if the reproductive fitness for escaped females was exactly zero, those effects mean there would still be harm to fragile wild populations. Furthermore, the analysis of reproductive success considers only a point estimate of reproductive success rate, and doesn't address the full distribution of this or other rates, and thus systematically underestimates the number of offspring that might result from escapes and the long-term harm to wild steelhead genetics. There is no worst case analysis or discussion of that worst case's likelihood, as required by WAC 197-11-080.

In the absence of established guidelines, and with no discussion in the SEPA checklist or associated documents assessing the risk of releasing these potentially-fertile fish in proximity to river mouths, the conditions set by the 1990 EIS have not been fulfilled, and the proposed actions must be deemed to carry too high a risk of environmental harm. The mDNS should be withdrawn and a full EIS should be conducted assessing the risks associated with each of the existing net pen sites and its neighboring rivers.

## **The SEPA analysis failed to account for changes in risk assessment imposed by new law**

After the 2017 collapse, the Washington Legislature acted deliberately and overwhelmingly to limit open-water marine net pen aquaculture, and the Governor signed the new law enthusiastically. In addition to phasing out Atlantic salmon farming by 2022, the new law imposed a series of other requirements, and established its clear intent that future marine net pen aquaculture be subjected to greater scrutiny. Section 1 of the legislation passed by both houses states:

Recent developments have thrown into stark relief the threat that nonnative marine finfish aquaculture may pose to Washington's native salmon populations. But just as evidence has emerged that nonnative marine finfish aquaculture may endanger Washington's native salmon populations, so too has evidence emerged that marine finfish aquaculture in general may pose unacceptable risks not only to Washington's native salmon populations but also to the broader health of Washington's marine environment. Given this evidence, the legislature intends to phase out nonnative finfish aquaculture in Washington's marine waters. Because the state of the science and engineering with regard to marine finfish aquaculture may be evolving, the legislature further intends to study this issue in greater depth, and to revisit the issue of marine finfish aquaculture once additional research becomes available.

This language was vetoed as the Governor signed the law, but demonstrates the legislature's intent. That intent is also shown in Section 5 of the engrossed bill, which requires agencies to "continue the existing effort to update guidance and informational resources to industry and governments for planning and permitting commercial marine net pen aquaculture," and mandating: "The guidance must be designed to eliminate commercial marine net pen

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escapement and to eliminate negative impacts to water quality and native fish, shellfish, and wildlife.”

In finding that “marine finfish aquaculture in general may pose unacceptable risks” and mandating guidance to “eliminate” those risks the legislature overturned the 1990 EIS’s determination that Atlantic salmon aquaculture posed acceptable risks and imposed a stricter standard than existed previously. It is clear that the legislature intended to alter the risk assessment framework used for marine finfish aquaculture in general from the status quo. Relying on the 1990 EIS without acknowledging the significant shift in risk assessment mandated by this law is clearly unwarranted and contrary to the law passed in response to the 2017 catastrophe.

The legislature clearly understood that its actions would not only affect Atlantic salmon farming. In addition to the explicit statement to that effect in Section 1, they heard this testimony from Dr. Ken Warheit, supervisor of WDFW’s fish health program:

We suggest that if the State is going to restrict marine fish aquaculture, it removes authorization also for other nonnative fish. More importantly, it should also remove authorization for native salmonid marine commercial aquaculture which WDFW considers to be a greater risk to the State's native wild and hatchery salmonid populations, than is Atlantic salmon marine aquaculture.

The legislation did not forbid the use of biologically-altered rainbow/steelhead trout, but it did establish that the risks of Atlantic salmon aquaculture are too great, and express concern that the same might be true of all marine finfish aquaculture. It urged further study of that risk and raised the bar for future risk assessment.

Unfortunately, the guidance mandated to eliminate these risks has not been issued, even though a report to the legislature regarding its progress was due during this comment period.

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In light of that change in state law, it is inappropriate to apply the same risk assessment used in 1990 to a proposal today. In evaluating the risk of marine finfish aquaculture proposals not forbidden under HB 2957, state agencies should conduct an EIS on any proposal that is riskier than the best-case scenario for marine Atlantic salmon aquaculture. Since this proposal does not clear even the guidelines laid out in the 1990 EIS (since no assessment of proximity to river mouths was conducted), and since the farmed fish in this proposal could directly interbreed with a federally-listed steelhead species and degrade its genetics, a new EIS is clearly warranted.

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## Tables

River/River system	Population (five year geometric mean, 2010-2014)
Cedar	4
Green	552
Puyallup	277
White	531
Dungeness	141
East Hood Canal Tributaries	60
Sequim/Discovery Bay Tributaries	19
Samish/Bellingham Bay Tributaries	846
Skagit	5123

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Stillaguamish	392
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Table 1. Estimated wild adult steelhead populations (five year geometric mean, 2010-2014) in rivers within a 12 mile radius of the existing net pens. The highly domesticated fertile net-pen-origin females that are predicted to escape during a net pen failure comparable to that of 2017 would comprise a significant proportion of the spawning population in many Puget Sound rivers.

Number of Fish	1000000
Proportion Diploid	0.00156
Number Diploid Outplanted	1560
Probability of Escape	0.82
Number of Diploid Escapes	1279.2
Probability of Non-Recovery	0.77
Number Diploids Not Recovered	985
Proportion Sexually Mature_High Estimate	0.5
Number Mature Diploids_High Estimate	493
Proportion Sexually Mature_Low Estimate	0.1
Number Mature Diploids_LowEstimate	99

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Proportion Fertile Surviving to Spawn	0.5
Number of Mature survivors_High Estimate	247
Number of Mature survivors_Low Estimate	50

Table 2. Estimate of number of the maximum number diploid individuals per million farmed rainbow/steelhead outplanted to a net pen that would result in no more than the number of mature escapees surviving to sexual maturity (bottom row) given the assumptions in WDFW's mDNS Summary, page 6.

## Figures

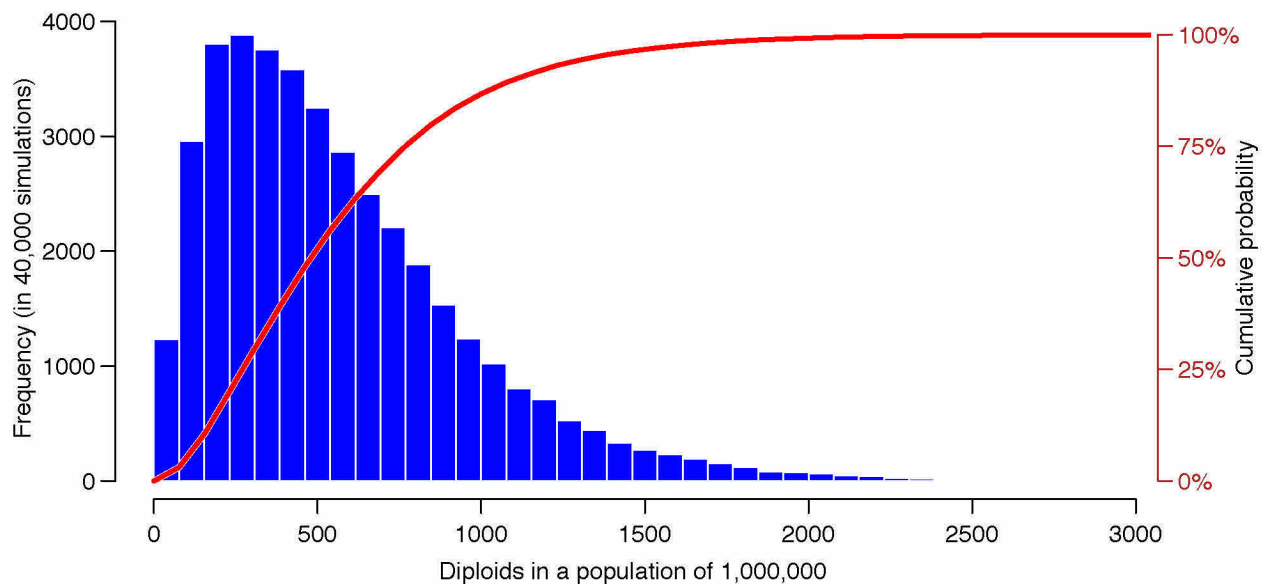


Figure 1. Distribution of the number of diploids (triploid-induction failures) in one million eggs when the number of diploids in a random sample without replacement of 3500 is one. The blue bars show the number of diploids in the interval on the horizontal x-axis (for example, 5000 in the interval between 3000 and 400 shown on the left y-axis). These numbers were computed through a Bayesian analysis that sampled 40,000 probable values (so the probability that the true number of diploids in the population of 1,000,000 is 5,000/40,000 = 0.125 or 12.5%). The

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red curve is the cumulative probability distribution. The shows the probability that a given value on the x-axis is less than or equal to the corresponding value on the right y-axis. For example, 95% of the distribution is less than 1400 and 97.5% is less than 1600, satisfying a risk-averse criteria that 95% of the distribution of possible values be no greater than 1560 diploid per million eggs or fry. About half the distribution (50%) is less than 500.

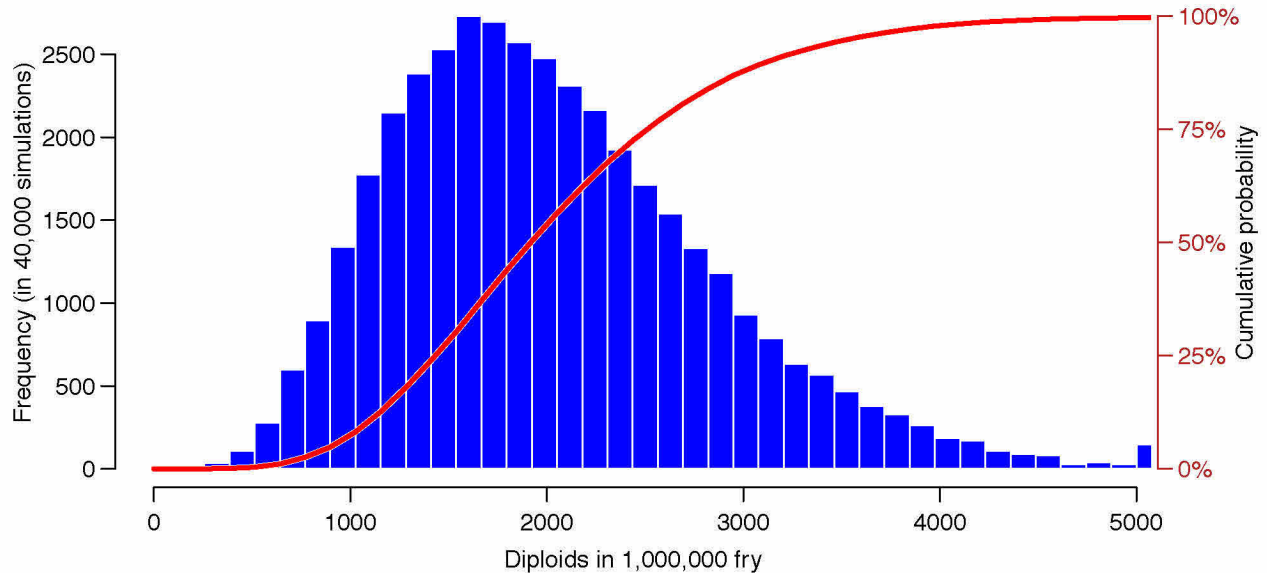


Figure 2. Distribution of the number of diploids (triploid-induction failures) in one million eggs when the number of diploids in a random sample without replacement of 2950 is five (per Attachment A of Cooke’s SEPA Checklist). The mean is 2029, the median is 1900. 95% of the distribution is less than 3600. There is a 5% chance that the true number of diploids is between 3500 and 5000.

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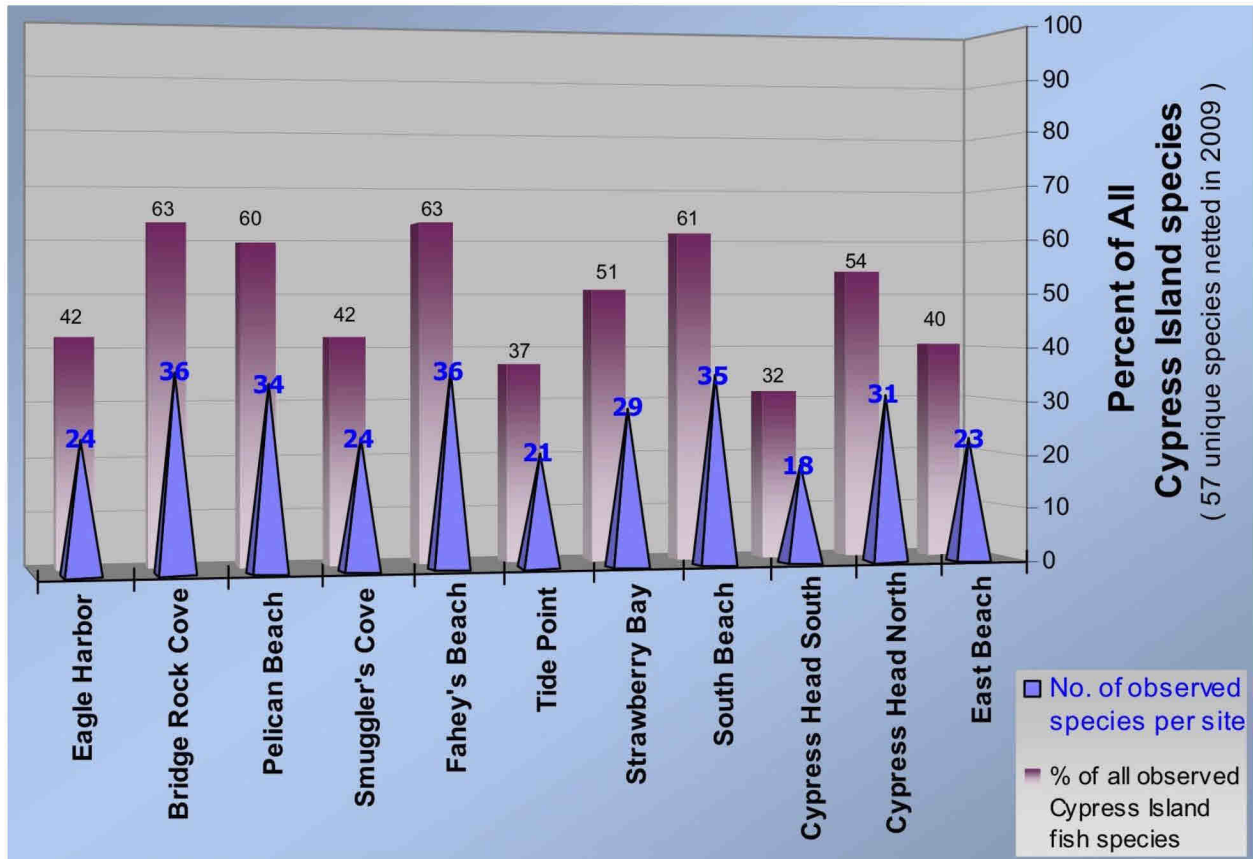
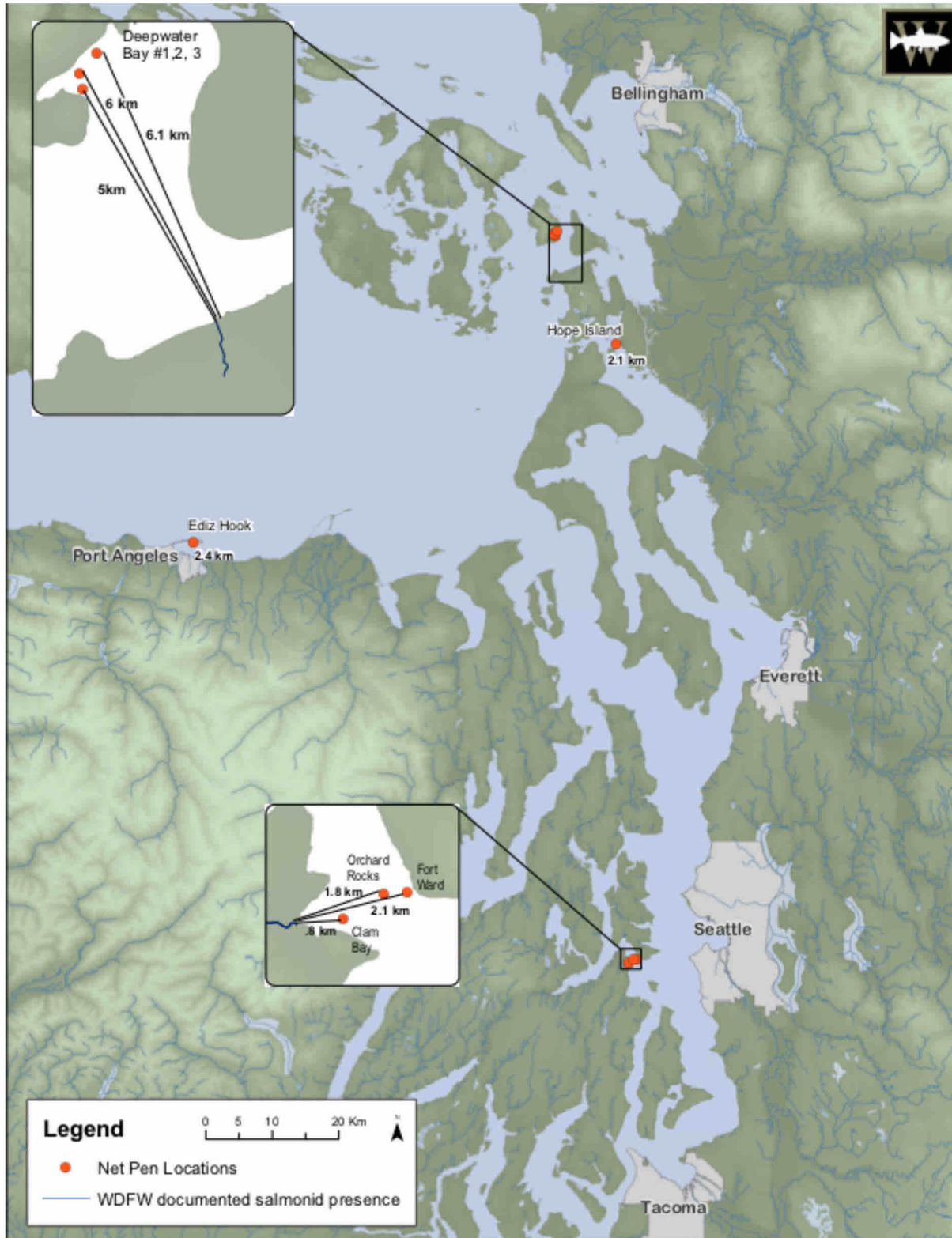


Figure 3. The total number of species encountered at each sample site in a survey of Cypress Island nearshore habitats, as well as the per-site percentage of all species netted from the Cypress nearshore. No single locale had greater than 65% of all species present across the 11 widely dispersed sites. From "Cypress Island Aquatic Reserve Pilot Nearshore Fish Use Assessment" (2011).

# Map



**The Appendix submitted with the original comments has been removed in order to meet the 30 MB file limit on Ecology's NPDES permit comment website. The full document with appendix can be viewed and downloaded online at the following link:**

<https://drive.google.com/file/d/1gt5btZa5-6o7odMLpS-Mu0xPIMVuUjOj/view?usp=sharing>