__ EXPEDITE
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__ Hearing is set:
Date:
Time:

SUPERIOR COURT OF WASHINGTON
IN AND FOR KING COUNTY

WILD FISH CONSERVANCY; CENTER FOR FOOD SAFETY; CENTER FOR BIOLOGICAL DIVERSITY; and FRIENDS OF THE EARTH, Petitioners, v. WASHINGTON DEPARTMENT OF FISH AND WILDLIFE, Respondent.	No. 20-2-03704-4 SEA PETITION FOR JUDICIAL REVIEW OF AGENCY ACTION AND ASSOCIATED ENVIRONMENTAL REVIEW

Following the collapse of a commercial Atlantic salmon farm in 2017 and the resulting spill of around 250,000 farmed fish and myriad debris into Puget Sound, the Washington Legislature, supported by a public outcry, passed legislation phasing out non-native finfish aquaculture. This would have eliminated commercial salmon farming in Puget Sound and the risks posed by such operations because the Washington Department of Fish and Wildlife's ("WDFW") permits only allowed rearing non-native Atlantic salmon. However, WDFW recently issued an aquaculture permit authorizing the production of a native steelhead species, thereby enabling future commercial salmon farming in Puget Sound. WDFW issued the permit without

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first preparing an environmental impact statement to fully evaluate the risks posed by its decision and alternatives thereto, despite extensive concerns raised by the Washington Department of Natural Resources ("DNR"), several Puget Sound Treaty Tribes, and numerous organizations and individuals. WDFW thereby violated the State Environmental Policy Act ("SEPA").

Wild Fish Conservancy, Center for Food Safety, Center for Biological Diversity, and Friends of the Earth (collectively, "Petitioners") hereby petition for judicial review of WDFW's January 21, 2020 permit authorizing Cooke Aquaculture Pacific, LLC ("Cooke") to commercially raise all-female triploid rainbow trout and of WDFW's SEPA process for justifying the issuance of the permit. Petitioners seek review under the Administrative Procedure Act ("APA"), RCW Ch. 34.05. Venue is appropriate in King County Superior Court under RCW 34.05.514 because Petitioner Wild Fish Conservancy's principal place of business is in Duvall, King County, Washington.

I. PETITIONERS

The petitioners are:

Wild Fish Conservancy
P.O. Box 402
15629 Main Street N.E.
Duvall, WA 98019
Tel: (425) 788-1167

Center for Food Safety
2009 N.E. Alberta St., Suite 207
Portland, OR 97211
Tel.: (971) 271-7372

Center for Biological Diversity
2400 NW 80th Street, #146
Seattle, WA 98117
Tel: (206) 900-7953

Friends of the Earth
1101 15th Street, NW
11th Floor
Washington, DC 20005
Tel: (202) 783-7400

II. PETITIONERS' ATTORNEYS

Petitioners are represented by:

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III. IDENTIFICATION OF RESPONDENT AGENCY

Respondent WDFW is an administrative agency of the State of Washington and is responsible by law for approving permits for marine finfish aquaculture. RCW 77.04.012, -.013, -.020, -.055; RCW 77.12.047; WAC 220-370-100. WDFW's address is:

Washington Department of Fish and Wildlife
Natural Resources Building
1111 Washington Street S.E.
Olympia, Washington 98501

P.O. Box 43200
Olympia, Washington 98504-3200

IV. IDENTIFICATION OF AGENCY ACTIONS

The agency actions at issue are WDFW's Marine Finfish Aquaculture Permit to Raise All-female Triploid Rainbow Trout (Steelhead; *Oncorhynchus mykiss*) issued January 21, 2020, excerpts of which are attached hereto as Exhibit A, and the SEPA documents related to that permit, including WDFW's mitigated determination of nonsignificance, a copy of which is attached hereto as Exhibit B, WDFW's January 21, 2020 Justification for the Mitigated

Determination of Non-Significance, a copy of which is attached hereto as Exhibit C, and the SEPA Checklist relied upon by WDFW in issuing the mitigated determination of nonsignificance, excerpts of which are attached hereto as Exhibit D.

V. IDENTIFICATION OF PERSONS WHO WERE PARTIES IN ANY PRIOR ADJUDICATIVE PROCEEDINGS

There are no prior adjudicative proceedings. WDFW's aquaculture permitting regulations provide for an administrative appeal to the Director of WDFW only in the instance of a permit denial. WAC 220-370-100(1).

VI. FACTS AND JURISDICTION

a. *Jurisdiction*

This petition for judicial review under the APA is properly filed in King County Superior Court under RCW 34.05.514.

Petitioners have standing to bring this lawsuit. Petitioners are membership-based 501(c)(3) nonprofit organizations. Petitioners timely submitted comments in opposition to the permit.

Petitioner Wild Fish Conservancy is incorporated in the State of Washington with its principal place of business in Duvall, Washington. The Conservancy is dedicated to the preservation and recovery of Washington's native fish species and the ecosystems upon which those species depend. The Conservancy brings this action on behalf of itself and its approximately 2,400 members. As an environmental watchdog, Wild Fish Conservancy actively informs the public on matters affecting water quality, fish, and fish habitat in the State of Washington through publications, commentary to the press, and sponsorship of educational programs. Wild Fish Conservancy also conducts field research on wild fish populations and has designed and implemented habitat restoration projects. Wild Fish Conservancy staff also

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contribute to the peer-reviewed scientific literature on matters of fisheries and ecosystem management. Wild Fish Conservancy lobbies, advocates, and publicly comments on federal and state actions that affect the region's native fish and ecosystems. Wild Fish Conservancy routinely seeks to compel government agencies to follow the laws designed to protect native fish species, particularly threatened and endangered species.

Petitioner Center for Food Safety ("CFS") is national nonprofit organization with a regional Pacific Northwest office located in Portland, Oregon. CFS's mission is to empower people, support farmers, and protect the environment from harmful industrial agriculture and to promote truly sustainable and regenerative solutions. CFS has over 950,000 members and supporters nationwide, including 18,000 in Washington. CFS uses its expertise in the food system to educate the public and policymakers, engaging on the local, state, and federal levels to build a better food future. CFS has a robust program to address the factory farms of the sea, industrial fish and shellfish farming, both nationally and in Washington State. CFS strives to ensure and improve aquaculture oversight, furthering policy and cultural dialogue with regulatory agencies, consumers, chefs, landowners, and legislators on the critical need to protect public health and the environment from industrial aquaculture and to promote and protect more sustainable alternatives. On behalf of its members who live, work, and recreate on Washington's coastline, including throughout Puget Sound, CFS seeks to protect wild species, including imperiled salmon and orcas, and healthy aquatic ecosystems from industrial aquaculture, including the net-pen rearing of finfish. CFS submitted comments to WDFW on the Cooke Aquaculture permit on behalf of its Washington members.

Petitioner Center for Biological Diversity ("the Center") is a national, nonprofit conservation organization with office throughout the United States, including Washington. The

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Center has 1.7 million members and supporters, over 19,000 of whom live in Washington State. The Center is dedicated to the preservation, protection, and restoration of biodiversity, native species, and ecosystems and has an Ocean program that focuses specifically on conserving marine wildlife and habitat. The Center and its members and supporters have long-standing interest in the waters of the Salish Sea and the health of the region's endangered salmon and orca populations and the ecosystems they depend on.

Petitioner Friends of the Earth ("FoE") is a nonprofit organization with offices in Berkeley, California, and Washington, D.C., and staff located in Seattle, Washington. For fifty years, FoE has championed the causes of a clean and sustainable environment, protection of the nation's public lands and waterways, and the exposure of political malfeasance and corporate greed. Friends of the Earth's Oceans and Vessels Program works to fight industrialization of the ocean in all its forms, and has achieved regional, national and international limits on air, water, and oil pollution – including limits in Puget Sound – from vessels, offshore drilling, marine aquaculture, and other industrial uses of public water. Our industrial ocean fish farming campaign has fought to prevent harmful marine finfish aquaculture practices, including those along Washington's coastline. Friends of the Earth has more than 60,000 members, including 4,221 living in Washington. Friends of the Earth brings this action for itself and as representative of its members.

Petitioners have members and staff who live, work, and regularly recreate in and around the Puget Sound ecosystem, including the waters near Cooke's net pen facilities. These members observe, study, photograph, and appreciate wildlife and wildlife habitat in and around these waters and their tributaries. These members also fish, hike, camp, and swim in and around these waters and their tributaries. Petitioners' members intend to continue to visit these areas on a regular basis, including in the coming months and beyond. Petitioners' members derive scientific, educational, recreational, health, conservation, spiritual, and aesthetic benefit from

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Puget Sound and its tributaries, from the surrounding areas, and from wild native fish species in those waters and from the existence of natural, wild, and healthy ecosystems.

The past, present, and future enjoyment of Petitioners' interests and those of their members have been, are being, and will continue to be harmed by WDFW's violations of the law, by the agency's actions and inactions challenged herein, and by the members' reasonable concerns related to such violations and actions. WDFW's action to approve the Application at issue and its accompanying SEPA analysis allows Cooke to rear steelhead trout at its net pens in Puget Sound, adversely impacting the Puget Sound environment and native species, which in turn harms Petitioners and their members. Petitioners' and their members' interests are among those that WDFW was required to consider when it approved the Application and conducted the accompanying SEPA analysis.

Petitioners have been actively engaged in a variety of scientific, educational, and advocacy efforts to improve wild fish populations and the habitat upon which they depend throughout the Puget Sound basin. Petitioners often review documents produced through SEPA to further their understanding of activities affecting threatened and endangered species. WDFW's failure to issue an EIS and its accompanying analyses has deprived Petitioners of information and analyses required by statute that could further its efforts to protect fish populations and their habitat. This injury is fairly traceable to the actions and inactions complained of and is redressable by this Court.

The APA authorizes the relief sought herein, including an order from the Court directing WDFW to take action required by law, setting aside the permit, remanding the matter to WDFW for further proceedings, and entering declaratory judgment. RCW 34.05.574(1). The Uniform Declaratory Judgments Act, RCW Ch. 7.24, also provides for declaratory relief, and RCW Ch.

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7.40 authorizes injunctive relief. A judgment in favor of Petitioners would substantially redress the prejudice that WDFW's actions and inactions have caused Petitioners and their members.

b. *Legal Background*

SEPA is a procedural statute to ensure that decision makers in the State of Washington properly consider environmental impacts to ensure humankind and the environment continue in harmony. *See* RCW 43.21C.010, -.020. SEPA's implementing regulations direct the first agency receiving an application for a nonexempt proposal to determine the "lead agency" for that proposal. WAC 197-11-924. For private projects requiring licenses from more than one state agency, the regulations establish a priority list for lead agency designation. *See* WAC 197-11-936. Unless all agencies with jurisdiction agree otherwise, the Washington Department of Ecology ("Ecology") has the highest priority for lead agency designation, DNR has the third highest priority, and WDFW has the fourth highest priority. *See* WAC 197-11-936, -.942.

SEPA requires an agency to conduct a "threshold determination" that analyzes whether the project has a probable, significant adverse environmental impact. WAC 197-11-310. If the agency makes a determination of significance, it must prepare an environmental impact statement ("EIS") that includes analysis of reasonable alternatives that achieve similar goals with less environmental impact. Environmental impacts include factors such as impacts to fish and wildlife, plants and animals, surface water quality and runoff, aesthetics, recreation, scenic resources and historical and cultural preservation. WAC 197-11-752; WAC 197-11-44.

The threshold determination is the initial SEPA assessment and "must indicate that the agency has taken a searching, realistic look at the potential hazards and, with reasoned thought and analysis, candidly and methodically addressed those concerns." *Conserv. Nw. v. Okanagon Cty.*, No. 22194-III 2016 Wash. App LEXIS 1410, at *88–89 (Ct. App. June 16, 2016)

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(unpublished decision lacking binding authority); WAC 197-11-335. The "significance" determination "involves context and intensity" and "the context may vary with the setting." WAC 197-11-794. Ultimately, a proposal is "significant" if there is a "reasonable likelihood of more than a moderate adverse impact on environmental quality." *Id.* If a proposal is not significant, the agency may issue a determination of nonsignificance. WAC 197-11-734. The agency may also issue a mitigated determination of nonsignificance that includes mitigation measures to be implemented with the proposal that will minimize the environmental impacts so that the proposal is not significant. *See* WAC 197-11-350, 197-11-766.

c. *Facts*

It is unlawful to commercially rear finfish in Puget Sound without a permit from WDFW. WAC 220-370-100(1). In January 2019, Cooke submitted an application to WDFW for a new 5-year Marine Aquaculture Permit to raise all-female triploid (sterile) steelhead trout (*Oncorhynchus mykiss*) at Cooke's seven existing marine net-pen facilities in Puget Sound. Cooke currently raises Atlantic salmon at its net pens. In March 2019, WDFW informed Cooke that the permit application was subject to the SEPA process to determine the environmental effects of transitioning production from Atlantic salmon to all-female, triploid steelhead trout at the existing facilities.

On July 25, 2019, Cooke submitted a SEPA checklist and supporting documents. The checklist acknowledges that, in addition to the Marine Finfish Aquaculture Permit, Cooke needs additional permits or approvals from Ecology, DNR, and WDFW for its proposed action. On information and belief, WDFW did not comply with its obligations to determine the lead SEPA agency.

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On October 1, 2019, WDFW issued a mitigated determination of nonsignificance ("mDNS") for the proposed action, with a 21-day public comment period that WDFW subsequently extended to 52 days. The SEPA documents accompanying the mDNS include: a SEPA checklist with attachments; a summary of the mitigation measures; a project map; and a programmatic environmental impact statement for fish culture in floating net-pens from January 1990.

Through the public comments, the public voiced significant criticism of WDFW's SEPA analysis and proposed decision. Petitioners timely submitted comments on the SEPA documents and WDFW's proposed decision. Many others provided comments that were critical of WDFW's determination, including other environmental and health organizations, the Department of Natural Resources, the Swinomish Indian Tribal Community, the Skokomish Indian Tribe, the Snoqualmie Indian Tribe, the Samish Indian Nation, and the Lummi Indian Nation. In total, WDFW received over 3,500 comments, the overwhelming majority of which opposed the mDNS and/or permit to rear steelhead.

Despite significant objection, on January 21, 2020, WDFW approved the Application and issued a document entitled Justification for the Mitigated Determination of Non-Significance (MDNS) for Washington Department of Fish and Wildlife SEPA 19-056 and for the Approval of Cooke Aquaculture Pacific's Marine Aquaculture Permit Application.

WDFW's SEPA analysis was deficient in several ways. First, in concluding that the proposed action would not have a significant environmental impact, WDFW limited its review by failing to account for recent developments in Washington State law that would prevent DNR from renewing or extending leases for nonnative marine finfish aquaculture in Puget Sound. *See* RCW 79.105.170. Cooke had eight net pen facilities in Puget Sound before one collapsed in

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2017. Following inspections of the remaining salmon farms, DNR terminated the leases for three facilities. The leases at the other four net pens will expire in 2022. Thus, with the new legislation, Cooke can currently only stock four of its remaining seven net pens with Atlantic salmon, and it *must* stop growing Atlantic salmon in those remaining four net pens by 2022. *See* RCW 79.105.170. The impacts of growing Atlantic salmon in Puget Sound are therefore currently diminished with only four of the seven net pens being stocked. Further, the impacts are time-limited since Cooke must stop growing Atlantic salmon by 2022. By failing to account for the time-limited nature of Cooke's current impacts, WDFW erroneously minimized the impacts of Cooke's proposed action throughout its *entire* impacts analysis.

For example, when considering the impacts of diseases like infectious hematopoietic necrosis virus ("IHNV") and piscine orthoreovirus ("PRV"), WDFW compared the impacts from farmed Atlantic salmon on wild salmonids to farmed all-female triploid steelhead on wild salmonids, found that the transmission rates from steelhead would be the same as or lower than those from Atlantic salmon, and therefore concluded that the risk of the proposed action are the same or lower. This fails to account for the fact that risks from Atlantic salmon diseases currently exist at four of seven net pens and in three years will not exist at *any* of the net pens. The risks from steelhead diseases would exist at all seven net pens for the foreseeable future if the mDNS is upheld.

Second, regardless of WDFW's failure to account for the time-limited nature of Cooke's current impacts, WDFW's failed to account for or adequately analyze other important environmental impacts, including, but not limited to, the following:

a) the impacts of climate change and warming waters, as exacerbated by the proposed action, to native species;

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b) the impacts from net pen pollution to the benthic community, plants, and animals in nearby waters;

c) the impacts from poor escape prevention and net hygiene practices, including the impacts from pen sinking;

d) the impacts from escapements of farm-raised steelhead on wild steelhead genetics, wild salmonids' prey and habitat, and wild salmonids' predators, including the impacts of any recovery efforts or decisions;

e) the impacts from farmed steelhead diseases, pathogens, and parasites on native species;

f) the impacts from chemicals and pharmaceuticals used to rear farmed steelhead on native species and the environment;

g) the impacts from farmed steelhead that are not successfully sterilized to native species;

h) the impacts of seismic catastrophe on the proposed action, and their combined impacts on native species and the environment;

i) the impacts of harvest efforts, including water withdrawals and discharges and bycatch, on native species and the environment; and

j) the air and noise pollution impacts on adjacent lands and landowners.

Rather than conduct a robust, current, and accurate impacts analysis, WDFW largely relied on stale information from a programmatic environmental impact statement for fish culture in net pens from January 1990.

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Third, WDFW failed to provide mitigation measures that adequately minimize significant environmental impacts. The mitigation measures are inadequate for many reasons, including, but not limited to, the following:

a) some mitigation measures are unenforceable and/or unlikely to be followed by Cooke;

b) some mitigation measures are not in place until 2021; and

c) the mitigation measures fail to account for the impacts listed above.

Had the officials responsible for the permit considered the reasonably foreseeable direct, indirect, and cumulative effects of raising steelhead in Puget Sound, and the inadequacies of the mitigation measures, they would have concluded that approving the Application is likely to have significant adverse environmental impact. This would have, in turn, triggered the duty to prepare a full EIS prior to a decision on the permit application, as required by SEPA.

Because of the flaws in WDFW's analysis of impacts and mitigation measures and because the proposed action will have significant adverse effects on the environment, WDFW's approval of Cooke's application is arbitrary and capricious and contrary to its statutory authority.

VII. GROUNDS FOR RELIEF

WDFW's decisions are subject to judicial review under the APA. Under the APA, the Court may grant Petitioners relief if WDFW's actions are unconstitutional, outside the statutory authority of the agency or the authority conferred by a provision of law, arbitrary or capricious, or taken by persons who were not properly constituted as agency officials lawfully entitled to take such action. RCW 34.05.570(4)(c).

WDFW violated SEPA by approving a permit without preparing the required EIS and alternatives analyses based on unlawful and erroneous mDNS, justification for mDNS, and

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SEPA checklist. The SEPA violations include, but are not limited to: failure to properly designate the lead agency, failure to analyze direct and indirect impacts of the proposed actions; failure to analyze cumulative impacts of the action when added to other impacts to the Puget Sound ecosystem and environment; failure to base the threshold determinations on reasonably accurate information; failure to include sufficient mitigation measures; failure to prepare an EIS; and failure to conduct an alternatives analysis. The SEPA violations render WDFW's permit and mDNS arbitrary or capricious and/or outside of the agency's statutory authority.

WDFW violated the Marine Finfish Aquaculture Regulation by approving a permit for an action that poses significant genetic, ecological, and fish health risks on naturally occurring fish and wildlife and their habitat. *See* WAC 200-370-100. As detailed above, the proposed action poses significant adverse impacts to native fish and wildlife, water quality, and overall environmental health of the Puget Sound ecosystem. WDFW's permit approval is therefore arbitrary or capricious and/or outside WDFW's statutory authority.

WDFW violated the Fish and Wildlife Code of the State of Washington by failing to preserve, protect, perpetuate, and manage the wildlife and food fish, game fish, and shellfish in state and offshore waters. *See* RCW 77.04.012. WDFW further violated the Fish and Wildlife Code of the State of Washington by failing to conserve wildlife and food fish, game fish, and shellfish resources in a manner that does not impair the resource. *See* RCW 77.04.012. As detailed above, the proposed action poses significant adverse impacts to native fish and wildlife, water quality, and overall environmental health of the Puget Sound ecosystem. WDFW's permit approval is therefore arbitrary or capricious and/or outside WDFW's statutory authority.

VIII. REQUEST FOR RELIEF

Petitioners respectfully requests that the Court:

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1. Declare unlawful and set aside WDFW's permit authorizing Cooke to rear steelhead and WDFW's mDNS issued for the permit;

2. Enjoin WDFW from reapproving Cooke's application until WDFW has fully complied with SEPA, the Marine Finfish Aquaculture Regulations, and the Fish and Wildlife Code of the State of Washington;

3. Grant an award of litigation expenses under RCW 43.21C.075, or any other applicable provision of law; and

4. Grant such other and further relief as the Court deems just.

DATED this 11th day of February 2020.

KAMPMEIER & KNUTSEN, PLLC

By: ______________________

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Attorneys for Petitioners Wild Fish Conservancy, Center for Food Safety, Center for Biological Diversity & Friends of the Earth

Exhibit A

State of Washington
DEPARTMENT OF FISH AND WILDLIFE
Mailing Address: P.O. Box 43200, Olympia, WA 98504-3200 • (360) 902-2200 • TDD (360) 902-2207
Main Office Location: Natural Resources Building, 1111 Washington Street SE, Olympia, WA

January 21, 2020

Mr. Kevin Bright
Permit Coordinator
Cooke Aquaculture Pacific, LLC
Post Office Box 669
Anacortes, WA 98221

Re: Approval of Cooke Aquaculture Pacific's Application for a Marine Finfish Aquaculture Permit to Raise All-female Triploid Rainbow Trout (Steelhead; *Oncorhynchus mykiss*)

Mr. Kevin Bright:

On January 18, 2019 Washington Department of Fish and Wildlife (WDFW) received from Cooke Aquaculture Pacific LLC (Cooke) a Marine Finfish Aquaculture Permit (Permit) application to raise all-female triploid rainbow trout (steelhead trout; *Oncorhynchus mykiss*) in existing marine net-pen facilities in Puget Sound. Also included in the January 18, 2019 correspondence were a Finfish Aquaculture Permit- Plan of Operation for all-female triploid Rainbow Trout, and updated Fish Escape Prevention, Response, and Reporting Plan and Regulated Finfish Pathogen Reporting Plan. On March 19, 2019 I informed you that your permit application would require State Environmental Policy Act (SEPA) action and that you are to submit, at a minimum, the SEPA Environmental Checklist (WAC 197-11-960). WDFW received from you on July 25, 2019 your completed SEPA Environmental Checklist and supporting documents. On October 1, 2019 WDFW responded to your SEPA Environmental Checklist by issuing at Mitigated Determination of Nonsignificance (MDNS) (SEPA 19-056), which was available for public review until November 22, 2019.

WDFW received a total of 3,581 SEPA comments on your proposed activity, although 2,669 comments were duplicates of existing comments. We have reviewed all comments and are preparing a response to those comments.

Based on the material you have submitted to WDFW, our detailed understanding of the scientific literature relevant to the Permit application (see Attachment 2), consultation with experts within and outside WDFW, tribal consultation with the Swinomish Indian Tribal Community and with consideration of the public comments, **I am approving your application to raise all-female triploid rainbow trout (steelhead trout) in existing marine net-pen facilities in Puget Sound**

where you hold valid aquatic land leases from the Washington Department of Natural Resources. This is a five-year permit and will expire on January 21, 2025.

There are two attachments to this letter. Attachment 1 includes the Permit Conditions. These conditions are the mitigating provisions that are included in our final SEPA determination. Failure to comply with these conditions may be grounds for termination and revocation of the Permit. Upon written notice of a violation, Cooke shall undertake those steps necessary to remedy the violation within the time period identified. Failure to timely and substantially remedy the violation may result in a final termination/revocation notice. You may contest a decision to terminate this Permit by filing a Notice of Appeal with WDFW addressed to the Director in accordance with the provisions of the Administrative Procedures Act (Chapter 34.05 Revised Code of Washington) and as specified in WAC 220-125-050.

Attachment 2 is a lengthy and detailed document, which will be made available to the public, that provides WDFW's justification for the MDNS decision and for the approval of your five-year Marine Aquaculture Permit, and is a response, in part, to pubic comment.

This letter, including the Permit Conditions in Attachment 1, will serve as your Marine Aquaculture Permit.

If you have questions, please contact the Dr. Kenneth Warheit, Supervisor of the WDFW Fish Health and Molecular Genetics Section, at 360-902-2595 (desk), 360-999-7889 (mobile), or kenneth.warheit@dfw.wa.gov.

Sincerely,

Kelly Susewind
Director

Attachments

cc: Amy Windrope
Kelly Cunningham
Eric Kinne
Kenneth Warheit

Exhibit B

State of Washington
DEPARTMENT OF FISH AND WILDLIFE
Mailing Address: P.O. Box 43200, Olympia, WA 98504-3200 • (360) 902-2200 • TDD (360) 902-2207
Main Office Location: Natural Resources Building, 1111 Washington Street SE, Olympia, WA

MITIGATED DETERMINATION OF NONSIGNIFICANCE (MDNS)

Name of Proposal: MDNS 19-056: RAISING STERILE ALL-FEMALE TRIPLOID RAINBOW TROUT/STEELHEAD AT EXISTING MARINE NET PEN SITES IN PUGET SOUND

Description of Proposal:

The Washington Department of Fish and Wildlife (WDFW) proposes to issue a five-year Marine Aquaculture Permit to Cooke Aquaculture Pacific, LLC (Cooke) to culture all-female triploid rainbow trout/steelhead in existing commercial marine net-pens in Puget Sound. Once the five-year Marine Aquaculture Permit is issued, the permitted net-pen facilities are authorized to receive fish through the Finfish Transport Permit process.

Cooke is a Washington company that since June, 2016, operates commercial marine net-pens in Clallam, King, Kitsap and Skagit Counties, and two freshwater hatcheries in Thurston County. The facilities currently owned by Cooke have been commercially raising and harvesting farmed salmon in the Puget Sound region since the 1970s. The net-pen farms initially raised various types of salmonids including Coho Salmon, Chinook Salmon, Donaldson Rainbow Trout and steelhead trout. By the early 1990s, the Washington industry transitioned to raising primarily Atlantic Salmon (*Salmo salar*). Cooke is proposing to change the fish species being cultured from Atlantic Salmon to domesticated stocks of all-female triploid rainbow trout/steelhead (*Oncorhynchus mykiss*). All-female triploid rainbow trout/steelhead have been selected to be raised in the existing net pen facilities because the use of mono-sex and sterile stocks of fish is recognized as means to significantly reduce potential genetic interaction with natural populations.

WDFW proposes to issue a five-year Marine Aquaculture Permit to Cooke to culture all-female triploid rainbow trout/steelhead at existing Fort Ward, Orchard Rocks, and Clam Bay; and Hope Island facilities. In the event that the Department of Natural Resources restores or issues new leases to Cooke for their other existing facilities, WDFW plans to extend the five-year Marine Aquaculture permit to include these facilities.

The proponent shall incorporate the following mitigation measures into the project:

Mitigation measures include Operations; Escape Prevention, Response, and Reporting; Triploidy Error Rate; and Finfish Pathogen Reporting and Biosecurity requirements and provisions, as listed under “Mitigating Provisions” in the attached "Summary – Key Issues" document.

Proponent/Applicant: Cooke Aquaculture Pacific, LLC
Contact: Kevin Bright, Permit Coordinator
PO Box 669
Anacortes, WA 98221
(360) 391-2409

Location of Proposal: Floating commercial marine net pens owned by Cooke Aquaculture Pacific, LLC that are located in the following areas in Washington:

Facilities with valid aquatic lands leases from Department of Natural Resources:

- Fort Ward, Orchard Rocks, and Clam Bay – All three sites are located in Rich Passage in Kitsap County between the south end of Bainbridge Island and Clam Bay near Manchester State Park; Township 24 North, Range 2 East, Section 15.
- Hope Island – Kiket Bay (Skagit Bay) in Skagit County on the northeast side of Hope Island; Township 34N, Range 2 East, Section 28.

Existing facilities without valid aquatic lands leases from Department of Natural Resources, in the event that the leases are restored or new leases issued:

- Cypress Island 1 – Deepwater Bay in Skagit County on the southeast side of Cypress Island; Township 35 North, Range 1 East, Section 4.
- Cypress Island 3 – Deepwater Bay in Skagit County on the southeast side of Cypress Island; Township 36 North, Range 1 East, Section 33.
- Port Angeles – Port Angeles Harbor in Clallam County on the south side of Ediz Hook; Township 31 North, Range 6 West, Section Gov. Out Lot 8 (former federal BLM land without a designated section number).

Lead Agency: Washington Department of Fish and Wildlife (WDFW)

The following document is incorporated by reference:

"Final Programmatic Environmental Impact Statement: Fish Culture in Floating Net-Pens," dated January 1990.

Agency that Prepared Document Being Incorporated: Washington Department of Fisheries

Description of Document (or Portion) Being Incorporated: The entire contents of the Final Programmatic Environmental Impact Statement: Fish Culture in Floating Net-Pens, dated January 1990.

If the Document Being Adopted has been Challenged, Please Describe: N/A

Name of Agency Incorporating the Document: Washington Department of Fish and Wildlife

The Documents are Available to be Read at:

Washington Department of Fish and Wildlife - Natural Resources Building,
1111 Washington Street SE, Olympia, WA, Monday - Friday 8:00 am - 5:00 pm.

These documents are also available for review online at:
https://wdfw.wa.gov/licenses/environmental/sepa/open-comments

WDFW has determined that this proposal will likely not have a significant adverse impact on the environment. Therefore, state law[1] does not require an environmental impact statement (EIS). WDFW made this mitigated determination of nonsignificance (MDNS) after we reviewed the environmental checklist and other information on file with us.

We issued this MDNS according to state rules.[2] We will **not act on this proposal for 21 days** from the date we issued the MDNS. Agencies, affected tribes, and members of the public are invited to comment on this proposal or MDNS. We must receive your comments within 21 days of the date of this letter. The comment period will end at **5:00 pm on October 22, 2019.**

Method of Comment: The following procedures shall govern the method to comment on agency SEPA proposals. Comments received through these procedures are part of the official SEPA record for this proposal.

You can submit your comments any one of the following ways:

- Email to SEPAdesk2@dfw.wa.gov
- Online at the WDFW SEPA website comment link at: https://wdfw.wa.gov/licenses/environmental/sepa/open-comments
- Fax to (360) 902-2946
- Mail to the address below

Responsible Official: Lisa Wood

Position/Title: SEPA/NEPA Coordinator, WDFW Habitat Program, Protection Division

Address: P.O. Box 43200, Olympia, WA 98504-3200

After the comment period closes, applicants may view the updated status of this proposal on the WDFW SEPA website: https://wdfw.wa.gov/licenses/environmental/sepa/closed-final. Once the status is posted as final, applicants and permittees may take action on the proposal. When a proposal is modified or withdrawn, notice will be given in accordance with state law.[1]

If you have questions about this MDNS or the details of the proposal, contact Lisa Wood at the address, e-mail, or fax number above; you can also call her at (360) 902-2260.

DATE OF ISSUE: October 1, 2019 **SIGNATURE:** Lisa Wood

Footnotes

1. RCW 43.21C.030(2)(c)
2. WAC 197-11-350

SEPA Log Number: 19-056.mdns

Exhibit C

Justification for the Mitigated Determination of Non-Significance (MDNS) for Washington Department of Fish and Wildlife SEPA 19-056 and for the Approval of Cooke Aquaculture Pacific's Marine Aquaculture Permit Application

Washington Department of Fish and Wildlife
(contact: Dr. Kenneth I. Warheit; kenneth.warheit@dfw.wa.gov)

January 21, 2020

INTRODUCTION

In January 2019, Cooke Aquaculture Pacific (hereafter termed Cooke) submitted to the Washington Department of Fish and Wildlife (WDFW) two applications: (1) an application to renew an expiring 5-year Marine Aquaculture Permit to continue to culture Atlantic salmon (*Salmo salar*) at Cooke's marine net-pen facilities in Puget Sound; and (2) an application for a new 5-year Marine Aquaculture Permit to transition production from Atlantic salmon to all-female triploid (sterile) steelhead trout (*Oncorhynchus mykiss*) at Cooke's existing marine net-pen facilities in Puget Sound. Included with these applications were Fish Escape, Prevention, Response, and Reporting Plan; Regulated Finfish Pathogen Reporting Plan; Plan of Operation for All-female Triploid Rainbow Trout[1]; and Plan of Operation for Atlantic Salmon Rearing.

In March 2019, WDFW approved and issued to Cooke a renewal of their 5-year Marine Aquaculture Permit for Atlantic salmon, contingent on the requirement specified in EHB 2957 that farming of nonnative marine finfish in Puget Sound is valid only with a current lease of state-owned aquatic lands. At the same time, WDFW responded to Cooke's second application by informing them that before WDFW could decide on their permit application a SEPA process was required to determine the environmental effects of transitioning production from Atlantic salmon to all-female, triploid steelhead trout at their existing facilities. On July 25, 2019 Cooke submitted to WDFW a completed SEPA checklist and a set of supporting documents, including information that would add to or complement the 1990 PEIS for environmental impact of fish culture in floating net-pens located anywhere in Washington State marine waters.

On October 1, 2019 WDFW issued a Mitigated Determination of Nonsignificance (MDNS) for Cooke's proposed action described in their SEPA Checklist and supporting documents. We emphasize here and elsewhere that this determination is specific and limited to Cooke's proposed action: *to transition production from Atlantic salmon to all-female, triploid steelhead trout in existing Puget Sound net-pen facilities*. This SEPA determination is tied to WDFW's substantive decision on the 5-year Marine Aquaculture Permit application for steelhead trout. This SEPA determination anticipates and discusses Cooke's planned transfers of juvenile steelhead trout from its freshwater hatchery to marine net-pens

[1] Rainbow Trout is the standard commercial aquaculture terminology for the species *Oncorhynchus mykiss*, which also includes steelhead trout. In many of their documents, Cooke uses the commercial aquaculture terminology. Since these fish are being reared in salt water, in this document we will refer to the species as steelhead trout.

facilities as part of its regular operations. These transfers would require finfish transfer permits from WDFW. The current SEPA determination therefore is intended to double as the SEPA analysis for all anticipated transfer permits inherently connected to Cooke's operations approved under the 5-year Marine Aquaculture Permit. Each individual Finfish Transport Permit application would still require a fish health and net-pen facility evaluation.

On January 21, 2020, WDFW granted Cooke's application for a 5-year Marine Aquaculture Permit to transition production from Atlantic salmon to all-female, triploid steelhead trout at their existing Puget Sound net-pen facilities where they have valid aquatic lands leases from the Department of Natural Resources (DNR).

This document provides a description of WDFW's deliberative process associated with our SEPA determination and 5-year Marine Aquaculture Permit decision. In an upcoming document WDFW will provide a response summary to the comments we received during the 52-day Public Comment period associated with our October 1, 2019 SEPA determination. However, answers to most public comments can be found within this document.

DELIBERATIVE PROCESS

1. Regulatory Authority

1.1. 2018 law sunsetting non-native finfish marine net-pen aquaculture

EHB 2957: "AN ACT Relating to reducing escape of nonnative finfish from marine finfish aquaculture facilities."

EHB 2957 became 2018 session law June 7, 2018, after passing the Washington Legislative House on February 14, 2018 and Senate on March 2, 2018, and signed by Governor Inslee on March 22, 2018. In signing the bill, Governor Inslee issued a partial veto, deleting Section 1 of the bill from the enacted law. The Governor stated that "[s]ection 1 is unnecessary to implement the bill and [he does] not agree with all the assertions made in this section." Despite the Acts title, the law's intent is three-fold: (1) the elimination of commercial nonnative finfish marine aquaculture; (2) the elimination of escapes of finfish from commercial marine net-pens; and (3) the completion of a guidance document for the planning and permitting of commercial finfish marine net-pen aquaculture. With Governor Inslee's veto of Section 1, the new law does not characterize commercial marine net-pen aquaculture as posing unacceptable risks to native salmon or the marine environment.

The new law, with bipartisan support, and the clear and explicit backing from many tribes and environmental NGOs *unambiguously allows for the continued operation of commercial net-pen aquaculture in Puget Sound, including in areas where current operations currently exist*. The new law imposes only a few constraints related to the continued operations of commercial net-pen aquaculture: (1) Washington Department of Natural Resources (DNR) may not allow the commercial culturing of nonnative finfish as an authorized use under any new state-owned aquatic lands lease, and DNR cannot renew or extend current leases for nonnative finfish aquaculture beyond their current termination date; (2) Washington departments of Ecology (Ecology) and Fish and Wildlife (WDFW) may authorize or permit the commercial culturing of nonnative finfish, or related activities only if these activities are performed under a valid lease of state-owned aquatic lands; (3) approximately every two-years, when net-pens are fallow, each facility must be inspected by an independent marine engineering firm, approved by WDFW, and to receive fish the facility must be considered in good working order; and (4) WDFW is authorized to require the immediate removal of fish from a net-pen, or deny a transport permit if the facility is in “imminent danger of collapse or release of finfish.”

The commercial culturing of native finfish (e.g., all-female triploid steelhead trout) in marine net-pens in Puget Sound is not constrained by this new law. If the commercial aquatic farmer has an aquatic farm registration, valid DNR lease, and appropriate permits from WDFW and Ecology, based on state law, **that farmer (e.g., Cooke) can legally operate native finfish net-pen aquaculture in the marine waters of Washington State**.

1.2. Washington State Regulations

WDFW received from Cooke in January 2019 an application for a new Marine Finfish Aquaculture Permit to raise all-female triploid steelhead trout in existing net-pen facilities in Puget Sound. Along with the permit application itself, Cooke also submitted a “Fish Escape Prevention, Response and Reporting Plan,” “Regulated Finfish Pathogen Reporting Plan,” and a “Plan of Operation for All-female Triploid Rainbow Trout (*Oncorhynchus mykiss*).” In March 2019 WDFW notified Cooke that the Marine Finfish Aquaculture Permit application would require analysis under SEPA (RCW Chapter 43.21C and WAC Chapter 197-11).

1.2.1. WDFW Aquaculture Rules and Regulations

WDFW’s aquaculture rules and regulations are described in RCW Chapters 77.115 and 77.125, and WAC Chapter 220-370. WAC 220-370 was last updated June 6, 2017, roughly two months prior to the collapse of Cooke’s Cypress #2 net-pen facility. WDFW currently is updating this WAC Chapter to be reflect changes in the new law (see Section 1.1 above), as detailed in RCW 77.125.

1.2.1.1. Limitations to WDFW Authority

With respect to commercial marine net-pen finfish aquaculture, WDFW’s authority is constrained by RCWs 77.115 and 77.125, and WAC 220-370. In general, WDFW’s authority is limited to (1) assessing and controlling the transmission of disease; (2) assessing genetic and ecological risk of net-pen operations to native species and their habitat; (3) preventing, reporting, and recapturing finfish released from commercial net-pen facilities; and (4) determining if the structural integrity of net-pen facilities is sufficiently adequate to receive or continue to hold the aquacultural product (e.g., Atlantic salmon or steelhead trout). In administering a disease control program, the Director of WDFW “shall not place constraints on or take enforcement actions in respect to the aquaculture industry that are more rigorous than those placed on the department or other fish-rearing entities” (RCW 77.115.010(6)).

1.2.1.2. Marine Finfish Aquaculture Permit (WAC 220-370-100)

The Marine Finfish Aquaculture Permit is described wholly in WAC 220-370-100. This Section requires that the Marine Finfish Aquaculture Permit applications be accompanied by escape prevention and escape reporting and recapture plans. The Director of WDFW can either approve or deny a permit application, and the reasons for denying an application are explicitly stated as "significant genetic, ecological or fish health risks of the proposed fish rearing program on naturally occurring fish and wildlife, their habitat or other existing fish rearing programs" (WAC 220-370-100(1)). WDFW's aquaculture regulations do not allow the Director to deny a Marine Finfish Aquaculture Permit application based on economics, social, political, or other concerns, nor is the decision subject to a vote of the people. The Director's concerns here are limited to *significant* genetic, ecological, and fish health risks.

A provision in this rule stipulates that "transgenic" fish are prohibited from being used in marine finfish aquaculture. The rule defines transgenic as the "actual transfer of genetic material from *one species to another*" (WAC 220-370-100(1)).

1.2.1.3. Finfish Transport Permit (WAC 220-370-190)

It is unlawful for any person to import into or transport within the state of Washington finfish aquaculture products (e.g., live fish, embryos (fertilized eggs), or gametes) without a Finfish Transport Permit (FTP). An FTP application is complete when all required information is submitted, including laboratory results from disease testing. No FTP application will be approved unless the aquaculture products being transported are free of regulated pathogens (see WAC 220-370-050(20)). In addition, the Director of WDFW can condition an FTP (1) "to ensure the protection of aquaculture products and native finfish from disease when the director concludes that there is a reasonable risk of disease transmission associated with the finfish aquaculture products" (WAC 220-370-190(2)); (2) to ensure the structural integrity of the net-pen facility; (3) and to prevent the captive finfish from escaping (see above Section 1.1).

1.2.1.4. Aquaculture Disease Control (WAC 220-370 -080, -180, -190, -240)

All aquatic farms, including marine net-pens, are subject to inspection by WDFW "for the prevention and suppression of aquaculture diseases, including, but not limited to, taking samples for detection of regulated finfish pathogens and other diseases" (WAC 220-370-080). Aquatic farmers are required to report by the end of the following day the detection of regulated pathogens regardless of whether fish are showing symptoms of disease or appear healthy (WAC 220-370-190(2)). If an outbreak occurs at any aquaculture facility, the aquatic farmer is required to report the outbreak immediately to WDFW (WAC 220-370-180). WDFW has great latitude to order emergency actions if the Director determines that such actions are necessary to protect native stocks from disease that will cause severe mortality. These actions include denial of a transport permit, quarantining the aquaculture products, confiscating or ordering the destruction of the aquaculture products, or requiring that the products be removed from state waters (WACs 220-370-190 and 220-370-240).

When Cooke submitted their completed Marine Finfish Aquaculture Permit application in January 2019, they complied with the requirements of WAC 220-370-100 by submitting with their application an Escape Prevention, Response and Reporting Plan, which includes all elements required by the Escape Prevention plan (WAC 220-370-110) and Escape reporting and recapture plan (WAC 220-370-120). In their Marine Finfish Aquaculture Permit application Cooke proposed a legal activity. WDFW's regulatory authority is limited and applications can be denied only if there are significant genetic, ecological, and fish health risks, or if the net-pen infrastructure is impaired enough to risk the escapement of the aquacultural product. WDFW's regulatory oversight allows for the inspection of the infrastructure, evaluation of the facilities biosecurity, and the testing of finfish for pathogens of concerns.

1.2.2. Washington State SEPA Rules (WAC 197-11)

After receiving an environmental checklist and all supporting documents, the lead agency undertakes a deliberative process and makes a threshold determination (WAC 197-11-797). In making a threshold determination, the lead agency must: (1) review the environmental checklist and all supporting documents; (2) determine if the proposed action is "likely to have a probable significant adverse environmental impact"; (3) consider procedures that may mitigate or minimize environmental impacts (WAC 197-11-768); and (4) determine if the proposed action had been analyzed in a previous environmental document (e.g., a previously prepared EIS), which can be adopted or incorporated by reference; among other elements (see WAC 197-11-330).

A "determination of significance" (DS) is made when the lead agency concludes that the proposed action would have a *probable significant* adverse environmental impact, and a DS would then require an EIS (WAC 197-11-736). It is important to note that an EIS is required *after* a determination of significance is made. SEPA defines "significant" as "a reasonable likelihood of more than a moderate impact on environmental quality" (WAC 197-11-794). SEPA does not define reasonable, likelihood, or moderate, but WDFW considered an action to have significant adverse environmental impact if a review of the scientific literature, including any existing regulatory documents, including prior EISs, supplemented by data analysis and consultation with experts, suggest that the proposed action under consideration will produce a more than moderate adverse effect. A "determination of nonsignificance" (DNS) is the opposite of a DS; that is, the proposed action will not have a significant adverse environmental impact or that the impact is something less than moderate (WAC 197-11-340). A proposed action can lead to a mitigated DNS, if the implementation of the mitigating provisions minimizes environmental impacts that otherwise may have resulted in a DS.

SEPA anticipates an evaluation of an application prior to making a threshold determination, and if based on that evaluation, a DNS or a mitigated DNS is made, an EIS is not required. <u>Since Cooke's proposed action is limited to switching production from Atlantic salmon to all-female triploid (sterile) steelhead trout</u>, WDFW's evaluation of their

application was limited to the genetic and biological risks associated with that action, and to the structural integrity of the net-pen infrastructure, as required by EHB 2957.

1.2.3. Fish Culture in Floating Net-Pens Final Programmatic EIS (January 1990)

At the direction of the Washington State Legislature, the Washington Department of Fisheries (WDF) in 1990 prepared a non-project or programmatic EIS (PEIS), in consultation with the departments of Ecology, Natural Resources, and Agriculture. The purpose of the EIS was two-fold: to assess the adequacy of the existing regulations that affect commercial marine net-pen aquaculture; and to present a Preferred Alternative that identifies governmental actions aimed at reducing or eliminating significant adverse environmental impacts. For each of nine elements of the Natural Environment[2], and the nine elements of the Built Environment[3] the PEIS describes the affected environmental element, impacts from commercial net-pen aquaculture on the affected elements, mitigation measures, and unavoidable significant adverse impacts. The PEIS also considered the cumulative impacts of the number and geographic distribution of fish farms (commercial net-pen facilities) in Puget Sound. This PEIS is foundational to any serious evaluation of the commercial finfish net-pen aquaculture in Washington State. Not only does the PEIS lay out 18 wide-ranging environmental elements that may be impacted by net-pen aquaculture, it provides actions that would mitigate for adverse impacts, discusses unavoidable significant adverse impacts (based on 1990 technology), and includes 22 pages of references. **WDFW is required by SEPA to ascertain if previous environmental documents are relevant to or have already addressed marine net-pen aquaculture in Washington State, and therefore, we incorporated by reference the PEIS in our SEPA determination (see above 1.2.2, first paragraph, #4). The incorporation of the 1990 PEIS in our SEPA determination does not indicate that the document was the only or main source used for our determination.**

2. Tribal Consultation

The Centennial Accord between federally recognized Indian tribes in Washington State and the State of Washington, dated Aug 4, 1989, provides a framework to implement government to government relationships. WDFW recognizes the sovereignty of each federally recognized Indian tribe in Washington and strives to implement government to government coordination to improve communication around Department decisions that may impact treaty resources. As such, WDFW and the Swinomish Indian Tribal Community (SITC) held a government to government consultation on December 17, 2019 to discuss impacts to treaty resources presented by Cooke's proposal to raise all-female triploid steelhead trout. The SITC emphasized that Cooke's Hope Island net-pen was of paramount concern as it lies within the boundaries of their ancestral homelands. In addition, the SITC presented testimony that the presence of the net-pens impedes their fishing treaty rights. The SITC raised additional concerns about disease transmission, genetic introgression, and ecosystem quality, which we address below in Section 4.

[2] Bottom sediments and benthos, water quality, phytoplankton, chemicals, food fish and shellfish, importation of new fish species, genetic issues, disease, and marine mammals and birds.

[3] visual quality, navigations, commercial fishing, human health, recreation, noise, odors, upland and shoreline use, and local services

WDFW appreciates the concerns raised by the SITC regarding the presence of the net-pens and the possible impacts to their fishing rights. As summarized above, *Cooke's proposed action is limited to switching production from Atlantic salmon to all-female triploid steelhead trout*. WDFW's evaluation of Cooke's application is limited by our regulatory authority over the genetic and biological risks associated with Cooke's proposed action, and to the structural integrity of net-pen infrastructure, as required by EHB 2957. WDFW's SEPA review and determination is limited in scope to Cooke's proposed action, which does not include siting issues related to already existing net-pen infrastructure. Therefore, for this SEPA action, WDFW will not review the impact of Cooke's Hope Island net-pen on SITC's fishing treaty rights.

3. Cooke's SEPA Checklist and Supporting Documents

As part of the SEPA process, Cooke submitted the required SEPA Environmental Checklist, with the following supporting documents: (1) Troutlodge Triploid Testing Results (Attachment A); (2) Additional Information: Response to WDFW Questions (Attachment B); (3) Annotated Bibliography, Prepared by Walton Dickoff, Ph.D. and Don Weitkamp, Ph.D (Attachment C); (4) Threatened and Endangered Species: 1990 Programmatic EIS Update (Attachment D); and (5) Curriculum Vitae: Don Weitkamp, Ph.D, and Walton Dickoff, Ph.D. (Attachment E). Also included with the SEPA package was a transmittal letter from Cooke and a map of the net-pen facility locations. Cooke's SEPA submission was filed by WDFW as SEPA #19056 and the entire package can be downloaded from WDFW's SEPA website: https://wdfw.wa.gov/licenses/environmental/sepa/open-comments, while the file remains open, or https://wdfw.wa.gov/licenses/environmental/sepa/closed-final, after the SEPA process closes.

4. WDFW's Environmental Review

4.1. Summary of types of data included

WDFW first began our analysis of Cooke's proposal using the information provided by Cooke in the SEPA Checklist and supporting documents (Section 3). Initially, we considered the 1990 PEIS, and these summary publications: Nash 2001, Waples et al. 2012, Price and Morris 2013, Rust et al. 2014, Hawkins et al. 2019. However, our primary evaluation was based on over 300 publications, including publications as recent as 2020. This document cites nearly 150 documents. In addition to the literature, we consulted with experts within and outside of WDFW, used unpublished data or analyses when required, and considered public comment.

4.2. Disease, Pathogen, and Parasite Control

4.2.1. Introduction

Among the often-stated concerns associated with open net-pen aquaculture, voiced in public comment and in some scientific publications, is that marine aquaculture promotes (1) the introduction of non-native pathogens, (2) amplifies rate of infection and therefore amplifies pathogen abundance, (3) promotes the increase in virulence of existing pathogens or is the nexus for the emergence of new pathogens, and (4) promotes disease in wild finfish. All these elements are thought to add risk to the viability of listed populations.

Disease in an organism is a function of the interaction between the environment (e.g., stress resulting from too high or low temperatures, high densities, lack of food; pollution), the infectious (e.g., pathogen) or non-infectious (e.g., toxin) agent, and the organism itself (e.g., genetics, immune system) (Reno 1998). In aquaculture there is an attempt to manage all three components to control pathogens and parasites, and to prevent disease (McVicar 1997).

Disease management in marine aquaculture of salmonids begins with the source material – the origin and health status of the broodstock, of the embryos, and of juvenile fish reared in freshwater hatcheries. By preventing the introduction of pathogens, especially non-native pathogens, into the cultured environment, the health status of the populations may be maintained. WDFW's regulatory authority is designed to prevent the introduction of specific pathogens by testing fish, gametes, and embryos at their source and preventing their transport if they test positive for these specific pathogens. Best management practices while the fish are cultured in marine waters can reduce stress thereby reducing risk of infection, and disease amplification and transmission. Vaccinations prepare the individual organisms' immune system to combat pathogens, and to reduce the risks of infection, pathogen amplification and transmission, and disease.

4.2.2. Importation of non-native pathogens

There are both Federal (50 CFR 16) and Washington State (see Section 1.2 above) regulations that govern the importation of salmonid gametes, embryos, and live fish into Washington State. Federal rules apply only to international importation, while Washington State rules apply to any gametes, embryos, or live fish that are transported into or through Washington State, regardless of their origin. Both Federal and State rules require that the live fish or the broodstock that produced the gametes or embryos be free of the viruses causing viral hemorrhagic septicemia (VHS), infectious hematopoietic necrosis (IHN), infectious salmon anemia (ISA; WDFW only), and infectious pancreatic necrosis (IPN), and *Oncorhynchus masou* virus, (all five viruses collectively referred to as "regulated viruses"). Rules also apply to the disinfection of the surface of embryos. In addition, since early 2018, WDFW requires that the live fish or the broodstock that produced the gametes or embryos be tested for both piscine orthoreovirus-1 (PRV-1) and PRV-3. Transport permits will be denied if the fish or broodstock test positive for North Atlantic Ocean variants of PRV-1, any variant of PRV-3, or any of the regulated viruses listed above. Lastly, WDFW requires a second round of tests after hatching when the fry's yolk sack is absorbed. If at this time the lot of fish tested positive for regulated pathogens or North Atlantic PRV-1, WDFW would require either destruction of the lot or deny any transport permit application to move live fish out of the freshwater hatchery.

Since the WDFW PRV testing requirements went into effect in 2018, WDFW denied two separate transport permit applications from Cooke because their Atlantic salmon that originated from Iceland tested positive for North Atlantic variants of PRV-1.

In their Marine Aquaculture Permit application Cooke proposes to culture only all-female triploid steelhead trout from Troutlodge, a Washington State company based out of Bonney

Lake. The broodline Cooke will use in their operation was locally derived from Puyallup River (Puget Sound) steelhead trout around 1960. WDFW will verify genetically that each lot is from this locally derived, native population of steelhead trout. **Therefore, by switching from culturing Atlantic salmon, originating from the North Atlantic, to native, locally derived steelhead trout, Cooke will dramatically reduce the risk of importing non-native pathogens.**

4.2.3. Disease Prevention

4.2.3.1. Biosecurity

We define biosecurity as precautions taken to minimize the risk of introducing, establishing, and spreading an infectious disease in an aquatic animal population. This includes, but is not limited to, disinfection of equipment, use of foot baths, limiting personnel movement, fish health monitoring, and general cleaning practices. Biosecurity also includes management activities that are designed to reduce or eliminate stress to the cultured fish. Stress can negatively affect the immune system, which can increase the fish's vulnerability to disease.

"To promote good health in farm stocks, it is in the self-interest of fish farmers to maintain good environmental conditions in their farms and in the surrounding areas" (McVicar 1997:1095). To accomplish this, and as required by WDFW, each year Cooke provides an updated "Regulated Finfish Pathogen Reporting Plan" that is reviewed and requires approval by WDFW. Within this Plan is a biosecurity section entitled "Disease Prevention and Control Measures." This section includes descriptions of specific management activities that "are designed to reduce the risk of disease occurrence at each farming location and help prevent transmission of pathogens" (p. 2 of Plan). The biosecurity activities start at the spawning facility where embryos are disinfected prior to shipping. Fish are tested for Regulated Pathogens at 30 days post swim-up after hatching, and again prior to transport to marine net-pens. Biosecurity measures continue while the fish are reared in the net-pens, and there are routine fish health exams administered by Cooke. WDFW will inspect each facility at least once per year, but more optimally twice per year. During these inspections, fish will be sampled for the presence of Regulated Pathogens and PRV.

Cooke maintains single generation stocking of their net-pens, which is a biosecurity measure that reduces stress and breaks pathogen transmission chains (see Section 4.2.4). Net-pens are also fallowed for at least 42 days after harvest and before restocking. This will allow time for the containment and predator nets to be cleaned and repaired, and contributes to breaking pathogen transmission chains.

4.2.3.2. Vaccination

The purpose of a vaccine is to provide immunological protection against a specific pathogen to prevent the onset of disease. Vaccines work by providing an initial or primary immunization – a response to an antigen (i.e., the vaccine) that results ultimately in the production of antibodies (Newman 1993). Vaccines prime the immune response by creating B-cell lymphocytes (plasma cells) that produce the antibodies that are specific to the antigen presented by the vaccine. When an individual fish encounters the pathogen for which the vaccine was produced, the immune system is already primed to secrete antibodies specific to that pathogen. This can result in a range of responses from the amelioration of clinical signs to a rapid immunological response and the prevention of infection and disease. The efficacy of a vaccine varies depending on the type of vaccine, the immunological response, and the pathogen itself. Not all vaccines are 100% efficacious, and when they are effective, that effectiveness may not last through the life of the individual fish.

Cooke vaccinated each juvenile Atlantic salmon by injection prior to their transport to salt water, targeting Infectious Hematopoetic Necrosis virus (IHNV) and the following bacteria: *Vibrio anguillarum*, *V. ordali*, *Aeromonas salmonicida*, *Tenacibaculum maritimum*, *Piscirickettsia* sp., *Moritella viscosa*, and *Allivibrio wodanis*. Vaccines have not been developed for all pathogens, and which vaccines are administered is based on the experience and knowledge of the veterinarian of record (VOR) who is licensed in Washington and has established a veterinary-client-patient-relationship (VCPR) with Cooke and the fish. Cooke anticipates using a subset of the suite of vaccines used for Atlantic salmon for their production of all-female triploid steelhead trout, focusing initially on IHNV, *V. anguillarum*, *V. ordali*, *A. salmonicida*, *and M. viscosa*.

4.2.4. Pathogen Amplification and Transmission

Net-pen aquaculture can present a variety of disease risks to wild populations (McVicar 1997, Kurath and Winton 2011). Left unmitigated, these risks may have negative effects on these populations. Aquatic farms are monocultures where fish may be handled extensively and are crowded into unnaturally high densities in environments that are not optimal for the fish. These conditions may lead to immune suppression, placing net-pen fish at risk of infection and disease (Murray and Peeler 2005, Kurath and Winton 2011). When fish are moved from the freshwater hatchery environment to the marine net-pens, they are subjected to a new environment that contributes to stress. These fish also are exposed to "wild" pathogens. The monoculture, high densities, suppressed immune systems, and the presence of wild pathogens to which these fish are naïve are conditions that can promote the amplification and transmission of these pathogens among the cultured fish (Kurath and Winton 2011). These conditions can lead to disease outbreaks, placing the farm fish population at risk.

Any disease outbreak is detrimental both to fish farms and to the aquaculture industry. Diseased individuals require treatment and treatment is expensive. Some fish will die, further eroding the business' profit margins. For these reasons the aquaculture industry is motivated to reduce the incidence of disease. For example, in Norway, risk of salmon alphavirus (SAV) and infectious salmon anemia virus (ISAV) transmission was mitigated by coordinating among neighboring farms the stocking, harvesting, and net-pen fallowing. Vaccination and early pathogen detection programs were implemented, as were veterinary prescribed treatments (Jones et al. 2015). As discussed above, Cooke runs their Atlantic salmon net-pens as single generation operations, limiting the number of times fish are handled thereby reducing some stress that may promote infection and disease. Net-pens are fallowed, and nets are cleaned following harvest eliminating potential sources of pathogens and breaking pathogen transmission chains. Fish are vaccinated for a set of pathogens, reducing the risk of infection and disease. At the onset of certain diseases, fish are treated with antibiotics (see Section 4.2.7), and WDFW regulations and Cooke's biosecurity protocols reduce the introduction of certain pathogens into net-pen populations. These mitigating operations reduce the risk of infection and disease within Cooke's Atlantic salmon program, and these same mitigating operations will also be in place for Cooke's steelhead trout program.

Despite these mitigating operations, farm fish will become infected by wild pathogens transmitted from wild populations. If fish farms amplify these pathogens, are individuals from the wild populations at increased risk if the pathogens spill back into the wild environment? Kurath and Winton (2011:73) demonstrated that "viruses move from wild fish reservoirs to infect domestic fish in aquaculture more readily than 'domestic' viruses move across the interface to infect wild stocks." They also showed 15 examples of pathogens moving from wild populations to domestic populations, and only five examples for the reverse transmission. Taranger et al. (2015:1008) state "[f]or most pathogens, clear evidence for transmission from farmed to wild fish is limited . . . . [and that] [m]ost of the diseases that currently cause problems in fish farms are likely enzootic, originating from wild fish stocks." Taranger et al. (2015) focused on four viruses and their associated diseases that result in outbreak conditions in the Atlantic salmon industry in Norway. Included in this study was heart and skeletal muscle inflammation (HSMI) and its etiological agent piscine orthoreovirus (PRV). In each of these four cases, the viruses do occur in the wild populations, to varying degrees, and may have been transmitted from the farm fish back to the wild fish (and from farm population to farm population), but the incidence of disease was either extremely low or non-existent in the wild populations. Overall, although there may be a few documented cases of bacterial or viral transmission from fish culture to wild populations, only a small subset of those involve marine net-pens (Kurath and Winton 2011), and there is limited evidence that these transmissions result in disease in the wild populations, even if the transmission is associated with disease outbreaks in the net-pens (Wallace et al. 2017).

The net-pen environment differs from the wild environment, which affects pathogen transmission, and the incidence of infection and disease. This helps explain why the amplification of wild pathogens by farmed fish does not appear to put wild populations at increased risk of disease. Wild salmonid populations, for example, would be exposed to net-pen pathogens as they migrate from fresh- to marine-water as juveniles and when they return to freshwater as adults. These populations are not subjected to the stress-inducing net-pen environment, as they travel in densities considerably lower than what occur in net-pens (Kennedy et al. 2016). The pathogens themselves do not stay concentrated in halos around net-pens, as water movement diffuses the pathogens (Brooks 2005, Brooks and Stucchi 2006), and solar radiation and microbial activity may further reduce pathogen numbers (Garver et al. 2013). Disease is intermittent within the net-pen environment, and net-pens are not a continual source of pathogens. There is evidence that pathogens can remain in sufficient concentrations to cause infection as they are dispersed from their source net-pen, but the evidence is based only on farm to farm transmission, not farm to wild transmission, and that transmission is limited by distance and time (e.g., Gustafson et al. 2007, Salama and Murray 2011, Murray 2013, Salama and Murray 2013). Compared with farmed fish, wild fish are not immune compromised, and they travel through environments that are not favorable for the transmission of pathogens. Except perhaps in freshwater spawning aggregations, and in freshwater hatcheries, wild fish are exposed to pathogen densities that are lower than that within net-pen facilities, even in wild environments in the vicinity of farms that are experiencing a disease outbreak.

4.2.5. Pathogen Virulence and Emergence of New Pathogens

Similar to the amplification of wild pathogens within aquatic farms discussed above, stocking densities and aquacultural practices can lead to the emergence of new diseases and the increase in virulence of existing pathogens (Murray and Peeler 2005, Mennerat et al. 2010, Pulkkinen et al. 2010, Walker and Winton 2010, Kennedy et al. 2016). Based on the evolution of virulence theory, Kennedy et al. (2016) outlined factors related to aquaculture operations that may lead to the increase in virulence of existing pathogens. These factors include rearing at high densities, compression of the rearing cycle, use of broodstock with limited host genetic diversity, and accepting endemic disease in cultured populations. These factors together can contribute to unbroken pathogen transmission chains, which can lead to increase in virulence or the emergence of new pathogens (e.g., Breyta et al. 2016b). For example, high rearing densities can occur in both WDFW hatchery programs and in healthy wild populations spawning naturally. However, in both cases, the high densities are not sustained and only exist during one part of the life cycle, thereby breaking pathogen transmission chains associated with high densities. In aquatic farms, transmission chains are maintained by immediately stocking after harvest the empty net-pens with new smolts from freshwater hatcheries, resulting in continuous occupancy of the aquatic farm.

As discussed above, Cooke maintains their Atlantic salmon net-pens as single generation operations, net-pens are fallowed for at least 42 days, and nets are cleaned following harvest. This process maintains fish health and breaks pathogen transmission chains. In addition, prior to transport into net-pens, each lot of fish is tested for regulated pathogens and PRV, and fish are vaccinated. While in the net-pens, when necessary, fish are treated with antibiotics to remedy disease and reduce mortality, with a secondary benefit to prevent the transmission of endemic pathogen infections. These processes maintain fish health and break pathogen transmission chains. Cooke will be required to continue these operations when culturing all-female triploid steelhead trout. **Therefore, WDFW considered Cooke's culturing of Atlantic salmon in Puget Sound to be of low risk to promote the evolution of pathogen virulence or of new pathogens and considers there to be <u>no change in that risk</u> when culturing of all-female triploid steelhead trout.**

Mordecai et al. (2019) describe three newly discovered viruses that occur in out-migrating juvenile Chinook and sockeye salmon, and in hatchery and commercial aquaculture production of Chinook salmon in British Columbia. The authors discussed the potential link between salmonid declines and the presence of viruses, and suggested that farmed Pacific salmon "may pose some transmission risk to their wild counterparts" (Mordecai et al. 2019:2). In the paper's abstract, the authors also connect dead or dying farmed fish, the presence of these new viruses in those fish and in wild fish, and the health of wild fish populations. Unfortunately, by suggesting a connection among the occurrence of the new viruses in both farmed and wild fish, disease (e.g., death and dying) in farmed fish, and the health of wild fish populations, the authors opened the door for others to make a causal link among these elements (e.g., Our Sound, Our Salmon[4]). Mordecai et al. (2019) suggest, but do not show, that these viruses are the etiological agent for any disease. Furthermore, only one of these viruses (SPAV-1) was associated with symptoms consistent with disease, and this occurred only in the farmed Chinook salmon, not in wild Chinook or sockeye salmon. Based on the data provided by the authors in a supplemental file associated with their Figure 2[5], prevalence of each virus, summing across species and origin, is 1.63% for SPAV-1, 1.78% for SPAV-2, 2.85% for PsNV, and 0.39% for CAV. CAV occurs only in farmed Chinook salmon, while SPAV-2 effectively occurs only in wild Chinook salmon (one fish each in aquaculture and hatchery, out of a combined total of 5716 fish). As Mordecai et al. (2019) indicate, the transmission of these viruses among aquaculture, hatchery, and wild fish is not known. These viruses are not common, have not been shown to cause disease, and are not associated with outbreaks. Considering all four viruses together, prevalence in wild fish is negatively correlated with prevalence in farmed fish; that is, the higher the virus's occurrence in farm fish the lower its occurrence in wild fish, and *vice versa*. **Mordecai et al. (2019) is a sound scientific publication, but it provides no evidence for either pathogen amplification within farmed fish and disease transmission from farm fish to wild fish; or viral evolution (virulence or new species) associated with net-pen aquaculture.**

4.2.6. Summary Discussion of Three Pathogens: IHNV, PRV, and Sea Lice

4.2.6.1. IHNV

Infectious hematopoietic necrosis virus (IHNV) is part of the Rhabdoviridae family; can cause acute infection, disease, and mortality in salmonids, especially in juvenile fish; affects both cultured and wild fish in fresh- and salt-water; and is endemic throughout the Pacific Northwest from Alaska to California and east to Idaho (Morzunov et al. 1995, Anderson et al. 2000, Kurath et al. 2003). The virus (IHNV) is listed by Washington State as a Regulated Pathogen (WAC 220-370-050(20)(a)(i)), and the disease (IHN) is recognized by the World Organization of Animal Health (OIE) as a Notifiable Disease[6]. WDFW is required by policy[7] to test for IHNV in broodstock for all anadromous salmonids at their hatchery facilities. In addition, embryos or live fish transported by private or commercial entities into or through Washington must be tested for IHNV; Finfish Transport Permit applications will be denied by WDFW for any lot that tests positive for IHNV. Lots of fertilized Atlantic salmon or steelhead trout

[4] https://static1.squarespace.com/static/5898d1b3cd0f689b98657619/t/5ddc152426c4ae3e67cd892b/1574704429197/OSOS_Final_SEPA_Comments.pdf

[5] DOI: https://doi.org/10.7554/eLife.47615.015

[6] https://www.oie.int/animal-health-in-the-world/oie-listed-diseases-2020/

[7] The Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State (July 2006)

embryos transported from a spawning facility to Cooke's freshwater hatchery must be free of IHNV to receive a Finfish Transport Permit from WDFW. Likewise, any lot of Atlantic salmon or steelhead trout smolt transported into Cooke's marine net-pens must be free of IHNV to receive a Finfish Transport Permit from WDFW.

There are three genogroups of IHNV in North America (U, M, and L) based on phylogenetic analyses of the middle portion of the G-gene (mid-G) (Kurath et al. 2003). The genogroups or clades have different primary hosts and different geographic distributions. In Washington, only the U and M clades exist, with the U clade divided into two subgroups (UP and UC) (Breyta et al. 2016a).

The UP clade occurs primarily along the outer coast, Puget Sound, and the Columbia River watershed upriver of the confluence with the Snake River. The UP clade is the dominant group in Puget Sound and the upper Columbia River (i.e., found in at least 75% of detections). Its primary host is sockeye salmon, with approximately 90% of its occurrence, and there is high mortality associated with this subgroup.

The UC clade occurs throughout the Columbia and lower Snake River watersheds and is the dominant group in most of this area, except in the lower and upper Columbia River. The UC clade appears to be a generalist, occurring in both Chinook salmon and steelhead trout, and it has low pathogenicity and is associated with low mortality.

The M clade in Washington is represented by the MD subgroup and throughout its range it is sympatric with either the UP or UC clades. The MD clade is the dominant group only in the lower Columbia River and it occurred briefly on the outer coast in 2007-2013. The primary hosts for the M clade are steelhead and rainbow trout, and as with the UP clade there is high mortality associated with this subgroup (Breyta et al. 2016a).

In Puget Sound only the UP clade currently exists, its primary host is sockeye salmon, and mortality can be high. The UP clade can infect steelhead trout and Chinook salmon, but there are only a few detections (adults) in both species and the virus is not associated with disease in these species (G. Kurath, pers. comm 2019).

Kurath et al. (2016) conducted laboratory challenges with Atlantic salmon, immersing juvenile fish for 1 hour in water containing IHNV. They used different variants of the U, M and L clades, and found that in Atlantic salmon, unlike sockeye and Chinook salmon, or steelhead trout, all variants caused mortality to a varying degree (20-100% for the U clade, 30-63% for the M clade, and 41-81% for the L clade). Similar studies were conducted on sockeye salmon (Garver et al. 2006, Purcell et al. 2009, Penaranda et al. 2011b), Chinook salmon (Hernandez et al. 2016), and steelhead and rainbow trout (Garver et al. 2006, Penaranda et al. 2009, Penaranda et al. 2011b, Breyta et al. 2014), with results consistent with the field observations discussed above: U clade has high virulence in sockeye salmon but low virulence in Chinook salmon, and steelhead and rainbow trout; and M clade has high virulence in steelhead and rainbow trout, low virulence in Chinook and sockeye salmon, but can replicate in sockeye salmon.

As discussed in section 4.2.3.2, Cooke vaccinates their Atlantic salmon for IHNV, and will be vaccinating their all-female triploid steelhead trout for IHNV prior to transport to marine net-pens. Cooke uses a DNA vaccine that encodes the virus's transmembrane glycoprotein (Kurath et al. 2006; H. Mitchell, pers. comm. 2019). This vaccine was derived from IHNV WRAC (039-82) strain from rainbow trout in Southern Idaho (Corbeil et al. 1999, Corbeil et al. 2000). This strain is part of the M clade genogroup (Penaranda et al. 2011a), and the vaccine is highly efficacious in steelhead and rainbow trout (Corbeil et al. 1999, Corbeil et al. 2000, LaPatra et al. 2000, LaPatra et al. 2001, Purcell et al. 2004). The vaccine confers homologous (M clade) and cross-genogroup (U clade) protection (Penaranda et al. 2011a) for up to two years (Kurath et al. 2006). The vaccine also is efficacious when administered to Chinook and sockeye salmon, but with lower relative percent survival values than in steelhead and rainbow trout (Garver et al. 2005). The vaccine appears efficacious in Atlantic salmon where Cooke's Puget Sound net-pens have tested negative since the 2012 IHN outbreak of unvaccinated Atlantic salmon.

Based on the epidemiology of the 2012 IHN outbreak in the Rich Passage net-pens (prior to ownership by Cooke), the virus was transmitted from wild fish to farmed fish (G. Kurath, pers. comm 2019), and there is no evidence that the virus was transmitted back to the wild fish and resulted in disease in wild fish.

In summary, the UP clade is the only IHNV genogroup that occurs in Puget Sound. This genogroup has high virulence in Atlantic and sockeye salmon, but low virulence in Chinook salmon and steelhead trout. Cooke will continue to vaccinate using an M clade DNA vaccine, which is efficacious against both U and M clade IHNV. **Based on the phylogeography and relative virulence of the IHNV genogroups, the risk of viral transmission from the farmed fish back to wild fish, and vaccination status of the farm fish, Cooke's net-pen facilities in Puget Sound present low risk of transmission of IHNV to wild salmonid populations. In addition, since the UP clade is of low virulence in steelhead trout, by switching from Atlantic salmon to all-female triploid steelhead trout Cooke is lowering the already low risk to wild populations.**

4.2.6.2. PRV [8]

Piscine orthoreovirus (PRV), originally named piscine reovirus (Palacios et al. 2010) but renamed by Markussen et al. (2013) to reflect the virus's phylogenetic relationships within the Reoviridae family, is a double stranded RNA virus endemic to the North Atlantic and the North Pacific, but also occurs in Chile. There are three PRV genogroups, defined genetically: PRV-1, PRV-2, and PRV-3 (Palacios et al. 2010, Olsen et al. 2015, Takano et al. 2016). PRV-1 was initially identified in Atlantic salmon farms in Norway (Palacios et al. 2010). It is now known to occur in Atlantic salmon farms throughout the North Atlantic (Garseth et al. 2013, Kibenge et al. 2013, Marty et al. 2015, Adamek et al. 2019; for other references see Table 1 in Polinski and Garver

[8] As part of Fisheries and Oceans Canada's pathogen transfer risk assessment of PRV in British Columbia, Polinski and Garver (2019) provided an excellent summary of the virus. The summary presented below follows Polinski and Garver (2019).

2019), and in Chile (Kibenge et al. 2013, Godoy et al. 2016). Retrospective analyses show that the virus has been commonly present in both the North Atlantic and eastern North Pacific Ocean regions since the mid-1980s or earlier (Marty et al. 2015, Polinski and Garver 2019). PRV-1 also occurs in:

(1) farmed Chinook salmon in British Columbia (Di Cicco et al. 2018),
(2) farmed coho salmon in Chile (Godoy et al. 2016),
(3) wild sockeye, Chinook, coho, pink, and chum salmon, and steelhead, cutthroat, and Dolly Varden trout in the eastern North Pacific (Kibenge et al. 2013, Miller et al. 2014, Morton et al. 2017, Purcell et al. 2018), and
(4) wild Atlantic salmon and sea (brown) trout in the North Atlantic (Garseth et al. 2013, Vendramin et al. 2019).

PRV-2 is known only from coho salmon in Japan, is the etiological agent for erythrocytic inclusion body syndrome (EIBS), and is associated with anemia (Takano et al. 2016).

PRV-3[9] was first discovered in farmed rainbow trout in Norway (Olsen et al. 2015). Later it was found in

(1) farmed rainbow trout throughout the North Atlantic (Dhamotharan et al. 2018, Adamek et al. 2019, Polinski and Garver 2019),
(2) brown trout in Germany (Kuehn et al. 2018), and
(3) coho salmon in Chile (Godoy et al. 2016).

PRV-3 is associated with heart and skeletal muscle inflammation (HSMI)-like disease in rainbow trout (Hauge et al. 2017, Dhamotharan et al. 2018) and proliferative darkening syndrome (PDS) in brown trout in Germany (Kuehn et al. 2018), although Fux et al. (2019) argued that PRV-3 is not associated with PDS.

Kibenge et al. (2013), Siah et al. (2015), and others have showed that there are two different subgroups within PRV-1 (PRV-1a, PRV-1b [Group I in Siah et al. 2015]). PRV-1b is restricted to the North Atlantic and in Chile, while PRV-1a occurs in the North Atlantic, eastern North Pacific, and in Chile. Within PRV-1a, genotypes from the eastern North Pacific are a monophyletic group (bold Group II in Siah et al. 2015), derived from a single ancestral viral strain, and are distinct from PRV-1a from the North Atlantic (Warheit, unpublished data). The earliest record of PRV from the eastern North Pacific is from a wild steelhead trout taken in 1977 (Marty et al. 2015). This, plus the monophyly of the eastern North Pacific PRV-1 indicates that there is a distinct evolutionary lineage of PRV-1a that is endemic to the eastern North Pacific and occurs naturally in Pacific salmon.

The viral kinetics of PRV-1 have been studied in detail in laboratories and involves three phases of infection (Polinski et al. 2019, see also Finstad et al. 2014, Wessel et al. 2015, Garver et al. 2016a, Haatveit et al. 2016, Haatveit et al. 2017, Malik et al. 2019, Wessel et al. 2019). The first or early phase includes host entry, viral replication, and

[9] Originally described as PRV-*Oncorhynchus mykiss* or PRV-*Om* since it was described in rainbow trout

dissemination to erythrocytes (red blood cells). The phase lasts 2-3 weeks, and during this time the host's immune system does not appear to recognize the virus, nor does viral shedding into the environment occur, indicating that transmission of the virus is either weak or not occurring. During the second phase, which also lasts 2-3 weeks, viral replication in the red blood cells reaches its peak, viral inclusions bodies within the red blood cells develop, host viral recognition may occur leading to an immune response, and viral shedding and therefore viral transmission occur. Throughout the last or persistent phase, which can go on indefinitely, high viral loads can be maintained but virus replication is reduced, there is no apparent host immune response, viral shedding declines, and there is poor viral transmission.

PRV-1 is infectious during that short 2-3-week second phase when the virus can be transmitted to other fish. If farm fish become infected while in the net-pens, then PRV-1 can amplify resulting in widespread transmission within the farm and most-likely among farms in relatively close proximity, as the virus is robust and can survive in adverse environmental conditions (Aldrin et al. 2010, Lovoll et al. 2012). As such, PRV-1 is ubiquitous among Atlantic salmon farms in Norway (Lovoll et al. 2012), and is pervasive within and among Atlantic salmon farms in British Columbia (Polinski and Garver 2019). During this time the virus can be transmitted to wild populations. If farm fish become infected while in the freshwater hatchery, there is a good chance that these fish enter the marine net-pens when they are already in the third or persistent phase when viral shedding and transmission is low.

The infection dynamics differ between Norway and eastern North Pacific PRV-1 strains (Polinski et al. 2019). First, PRV-1 from the eastern North Pacific is not detected in the blood plasma. However, infection by the Norway PRV-1 resulted in high viral loads in the plasma after one week of initial infection, lasting upwards of nearly eight weeks. Second, host recognition (immune response) was 2-10 times greater in the blood and more than 100 times greater in the heart for PRV-1 from Norway than PRV-1 from the eastern North Pacific. Third, heart inflammation from Norway PRV-1 reached high severity 1-2 weeks after peak viral load, thereafter the inflammation diminished. However, heart inflammation associated with eastern North Pacific PRV-1 occurred later, about four weeks after peak viral load and was maintained at high prevalence, but low severity until the end of the experiment, seven weeks later.

Two diseases have been associated with PRV-1: Heart and skeletal muscle inflammation (HSMI), occurring in farmed Atlantic salmon in Norway, and jaundice syndrome, occurring in farmed Chinook salmon in British Columbia (Wessel et al. 2019). PRV-1b has been shown to be the etiological agent of HSMI in farmed Atlantic salmon in Norway (Wessel et al. 2017). HSMI-like disease, also associated with PRV-1, has also been described from Atlantic salmon net-pens in British Columbia (Di Cicco et al. 2017, Di Cicco et al. 2018), Chile (Godoy et al. 2016), and Scotland (Ferguson et al. 2005). Although PRV-1 is ubiquitous in Atlantic salmon net-pen farms in Norway, HSMI does not occur in all fish, and when it does, it is associated with mortality upwards of 20%, and morbidity as high as 100% (Kongtorp et al. 2004, Kongtorp et al. 2006).

The relationship between PRV-1 infection and disease is complex and may be dependent on the PRV-1 strain. Although PRV-1 occurs in wild, hatchery, and net-pen farmed fish, disease is associated only with farmed fish. In Norway, PRV-1 is widespread and HSMI is common and continues to be a significant problem for the Atlantic salmon industry (Hjeltnes et al. 2019). In laboratory experiments involving PRV-1 from Norway, experimental fish were exposed to PRV, and although HSMI did not develop, moderate to severe heart lesions consistent with HSMI did occur (Hauge et al. 2016, Wessel et al. 2017). There also appears to be an association with viral load and HSMI disease in Norway (Lovoll et al. 2012). In British Columbia, Di Cicco and colleagues established an association between PRV-1 and HSMI-like symptoms in Atlantic salmon net-pen farms (Di Cicco et al. 2017, Di Cicco et al. 2018) and PRV-1 and jaundice/anemia in Chinook salmon net-pen farms (Di Cicco et al. 2018). Although PRV-1 may play a role in these diseases (Polinski and Garver 2019), PRV-1 has not been established as the etiological agent of these diseases in these farms. Furthermore, despite the fact that in laboratory experiments naïve fish exposed to PRV-1 from the eastern North Pacific became infected, neither jaundice/anemia (Atlantic, sockeye, and Chinook salmon) nor HSMI (Atlantic and sockeye salmon) developed in these fish (Garver et al. 2016a, Garver et al. 2016b, Polinski and Garver 2019, Polinski et al. 2019). Unlike HSMI in Norway, jaundice/anemia and HSMI-like diseases are rare in British Columbia. Less than 10% of Atlantic and Pacific salmon farmed fish in British Columbia die within the net-pens, and of these less than 0.5% is associated with heart pathologies. Most of these heart pathologies are idiopathic; and only 0.05% are associated with jaundice in Pacific salmon farms (Polinski and Garver 2019). That is, for every 1000 Atlantic or Pacific salmon in net-pen farms, less than five die with associated heart pathologies, and in Pacific salmon, less than one fish is associated with jaundice.

Morton et al. (2017) reported that the incidence of PRV-1 in wild salmonid populations subjected to high exposure to Atlantic salmon net-pens was statistically greater compared with wild populations with low exposure to Atlantic salmon net-pens. These authors concluded that PRV was being transferred from the net-pens to wild populations and therefore infections in the farms influence infections rates in the wild populations. Garseth et al. (2013) concluded based on a phylogenetic analysis of sequences data that transmission of PRV from Atlantic salmon net-pens to wild populations in Norway is likely. These results are consistent with those of Morton et al. (2017). WDFW compared the prevalence of PRV-1 in Chinook, coho, and sockeye salmon from Alaska (no Atlantic salmon net-pens), Columbia River (no Atlantic salmon net-pens), and Puget Sound (Atlantic salmon net-pens present) (Purcell et al. 2018) with British Columbia prevalence data from Marty et al. (2015) and Morton et al. (2017). Considering only the Marty et al. (2015) and Purcell et al. (2018) data, the highest PRV-1 prevalence for Chinook salmon was from Columbia River fish and for coho salmon from Alaska fish, while for both of these species the two geographic areas with Atlantic salmon net-pens, Puget Sound and British Columbia, showed intermediate prevalence. The prevalence in sockeye salmon was zero for Alaska, Columbia River and Puget Sound, and 0.3% from British Columbia. PRV-1 prevalence reported in Morton et al. (2017) was considerably greater in all three species than the prevalence documented by Marty et al. (2015) and Purcell et al. (2018). Compared with the highest prevalence in the Marty et al. (2015) and Purcell et al. (2018) data, PRV-1 prevalence in Morton et al. (2017) was – 3x greater for Chinook, 1.5x greater for coho, and 31x greater for sockeye salmon. Although there could be an association between the incidence of PRV-1 in wild populations and exposure to net-pens in British Columbia, the conclusion from Morton et al. (2017) may be affected by how the authors defined prevalence and how they classified wild populations with respect to exposure to Atlantic salmon net-pens.

Morton et al. (2017) also concluded that the PRV infection may lower the fitness of wild fish by decreasing their capacity to complete a difficult migration from marine waters to freshwater spawning areas, thereby impacting population viability. The authors reached this conclusion by showing that "[f]ewer [PRV] infected adults of any species were detected at higher vs. lower elevations in the Fraser River, as well as tributaries of the Skeena and Nass rivers in northern BC. This association points to a cost of infection from PRV to the fitness of wild Pacific salmon" (Morton et al. 2017:12). However, Zhang et al. (2019) found that high PRV viral load had no effect on the oxygen affinity and carrying capacity of the red blood cells even for individuals with minor heart pathology.

In summary, PRV-1 in the eastern North Pacific is phylogenetically different from PRV-1 from the North Atlantic. Although the virus tends to be ubiquitous in both regions, their infection dynamics differ, and disease is rare and the pathogenicity of the virus is low or non-existent in net-pen aquaculture in the eastern North Pacific. Although the virus may be transmitted from the net-pens to wild populations in the eastern North Pacific, the infectious period is short (but the virus may be long-lived in marine waters) and disease does not develop in wild populations. PRV is common in both farmed and wild Atlantic salmon, but its prevalence in wild steelhead trout is low – 1 out of 375 samples (0.3%; Purcell et al. 2018).[10] However, we anticipate that prevalence among all-female triploid steelhead trout in Puget Sound net-pens may be more similar to the high prevalence of farmed Atlantic salmon than that in wild steelhead trout. **Based on these analyses, we considered PRV-1 transmission from Atlantic salmon net-pens to wild salmonid populations in Puget Sound to be a low risk. We consider PRV-1 transmission from all-female triploid steelhead trout net-pens to wild salmonid populations in Puget Sound to be the same as or possibly a lower risk, compared with Atlantic salmon net-pen aquaculture.**

Finally, the August 2017 Cypress #2 accident in Puget Sound resulted in an estimated release of about 250,000 Atlantic salmon. There is a high likelihood that most or all of these Atlantic salmon were positive with a PRV-1 strain from Iceland (Kibenge et al. 2019). The source of the PRV-1 was most likely from the broodstock in Iceland. This means that fish became infected within the freshwater hatchery and were planted in

[10] Morton et al. (2017) documented 4 out of 14 steelhead trout positive for PRV-1 but see above for concerns on how prevalence is defined in this study.

the net-pens when the virus was probably in its persistent non-infectious phase. In 2018 the WDFW Fish Health Unit implemented a surveillance program for PRV-1 at selected hatcheries in Puget Sound, Washington Coast, and Columbia River. To date, we have analyzed 648 samples from Chinook and coho salmon, and steelhead and rainbow trout. Of these samples 37 (6%) tested as strong-positive, 12 (2%) as positive, 34 (5%) as weak-positive, and 564 (87%) tested negative. We obtained readable sequences for 33 samples (5%) and these sequences represented two known strains, both part of the eastern North Pacific clade. **To date there is no evidence that the 2017 Cypress #2 accident resulted in the transmission of the Icelandic PRV-1 to wild populations in Washington.**

4.2.6.3. Sea Lice

Sea lice are ectoparasitic marine copepod crustaceans that are associated with infestations and economic loss in salmonid aquaculture (reviewed in Boxaspen 2006). The copepods undergo a life cycle that starts with a nauplius larva, a planktonic stage that ultimately molt into a planktonic and infectious copepodids. The distribution, abundance, and viability of sea lice is affected by sea temperature and salinity. Bricknell et al. (2006) showed that the survival and parasitic ability of planktonic *Lepeophtheirus salmonis*, a sea louse common in both the North Atlantic and North Pacific oceans, is severely compromised at salinities less than 29 ppt. Similarly, Crosbie et al. (2019) showed that *L. salmonis* nauplii from Norway completely avoided salinities less than 30 ppt, while copepodids tolerated salinities as low as 16-20 ppt. In the eastern North Pacific there are two predominate species of sea lice that affect salmonids, *L. salmonis* and *Caligus clemensi*. At a commercial Atlantic salmon farm near the Broughton Archipelago, British Columbia, the seasonal abundance of plankton larvae for both species of sea lice varied directly with water salinity, and consistent with the North Atlantic studies, larval abundance dropped when salinities fell below 30 ppt (Byrne et al. 2018).

Farm and wild fish populations in British Columbia have experienced infestations (e.g., Marty et al. 2010, Krkosek et al. 2011), although the link between farm and wild fish infestation is not clear, nor is the link well understood between number of sea lice at farms and wild fish productivity (Morton et al. 2004, Brooks 2005, Beamish et al. 2006, Brooks and Stucchi 2006, Krkosek et al. 2006, Morton et al. 2008, Marty et al. 2010, Krkosek et al. 2011).

Sea lice may be a problem for the salmonid net-pen industry in the North Atlantic and in British Columbia, and sea lice infestations at net-pen facilities in these regions may have a negative effect on wild salmonid populations; however, in Puget Sound, although sea lice do occur in net-pen facilities, and they are monitored; their numbers do not reach a level of concern. Water circulation is complex within Puget Sound, affected by a variety of factors, including the Strait of Juan de Fuca, river discharge, and bathymetry. Nevertheless, on average, through an entire year, surface water salinities with Puget Sound remain at or below 30 ppt (Khangaonkar et al. 2011, Sutherland et al. 2011; see Figure 1 below), which results in high mortality for sea lice pelagic larvae and minimizes the likelihood of significant sea lice infestations. **Cooke's net-pen facilities are not a nexus for the amplification and transmission of sea lice to native salmonids in Puget Sound**.

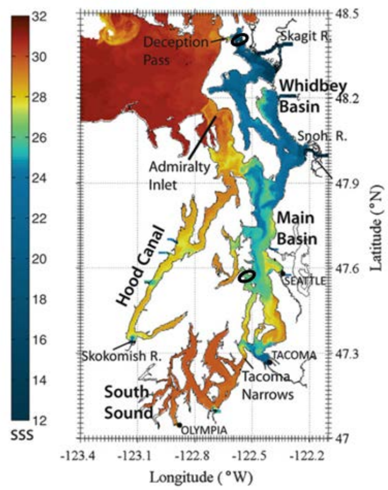

Figure 1. From Sutherland et al. (2011:Figure 1).showing sea surface salinity on 21 June 2006. Two ellipses added showing general location of Cooke's Hope Island and Rich Passage net-pen facilities.

4.2.7. Antibiotics and Medicated Feed

Antibiotics are administered to net-pen fish usually through medicated feed, referred to as Veterinary Feed Directives (VFDs). These are prescriptions written by licensed veterinarians that have established a Veterinary-Client-Patient-Relationship (VCPR) with the aquatic farmer and the fish. A veterinarian with a VCPR is formally recognized as the veterinarian of record (VOR) for a facility. VFDs, VCPRs, VORs, veterinary licenses, and the drugs that can be used for treatment of specific pathogens are all regulated by both Federal and Washington State rules. It is the VOR's obligation to adhere to these rules (i.e., violations of these rules can result in loss of license and livelihood). The "client" (owner of the fish, or the aquatic farmer) has the freedom to refuse treatment, but only a licensed veterinarian with a VCPR can order a VFD. It is the licensed veterinarian's and the VOR's license that are at risk if VFDs or other chemicals used on the fish are applied improperly or illegally, even if it is without the knowledge of the veterinarian. It is also the veterinarian's responsibility to adhere to the U.S. Food and Drug Administration's (FDA) Judicious Use of Antimicrobials policy.[11]

The most common pathogens (and their associated diseases) of the cultured Atlantic salmon in Puget Sound are: *Tenacibaculum maritimum* (yellowmouth); *Aeromonas salmonicida* (furunculosis); *Vibrio anguillarum* (vibriosis); *Piscirickettsia salmonis* (salmon rickettsia syndrome, SRS); and *Moritella viscosa* (winter ulcer) (J. Parsons, pers. comm 2020)[12]. Farm fish are particularly vulnerable to *T. maritimum* when they first enter salt water and are frequently given antibiotics to treat for yellowmouth. In fact, yellowmouth is the most

[11] See https://www.fda.gov/animal-veterinary/antimicrobial-resistance/judicious-use-antimicrobials

[12] Infectious hematopoietic necrosis virus (IHNV) is also a common pathogen of concern, but IHNV is managed through testing and a vaccine. The last outbreak of IHN in marine net-pens in Puget Sound was in 2012, prior to vaccination.

common disease for which antibiotics are applied to Atlantic salmon in Puget Sound. Experimental trials with culturing triploid steelhead trout in Puget Sound in 2012 showed that steelhead trout are more resistant to yellowmouth than are Atlantic salmon (J. Parson, pers. comm 2020), suggesting that Cooke's proposal to switch from Atlantic salmon to all-female triploid steelhead trout may result in less disease and fewer applications of antibiotics. Each of these bacteria, except for *A. salmonicida* and *P. salmonis,* are obligate marine or brackish water pathogens, and the fish become infected by these "wild" pathogens only after they enter the marine environment.

Love et al. (2020) provided a comparison of antibiotic use rates in Atlantic salmon net-pen in Norway, Scotland, Atlantic Canada, Maine, British Columbia, Washington, and Chile. Overall, from 2013 through 2017, a period prior to Cooke's ownership of the net-pens, antibiotic use based on kilogram of fish was highest in Washington followed closely by Chile. This publication does a good job documenting the relative amounts and trends of antibiotic use; however, the publication does not document the prevalence of specific pathogens in farm, freshwater hatchery, or ambient environments, and the therapeutic need for antibiotics. For example, in their risk assessment of environmental impact of Atlantic salmon farms in Norway Taranger et al. (2015) lists four viruses and sea lice, but no bacterial pathogens. Viral pathogens affect Atlantic salmon fish farms more than bacterial pathogens (see also Johansen et al. 2011), and there is a greater need in Norway to prevent viral outbreaks by using vaccines and biosecurity then there is treating bacterial outbreaks with antibiotics. Washington presents nearly the exact opposite situation than what is encountered in Norway. In the Puget Sound environment, bacterial pathogens are the dominant pathogens of concern, and therefore, we would expect greater use of antibiotics in Washington than in Norway. WDFW provides fish health services at 84 hatchery facilities and approximately 150 salmonid hatchery programs. In maintaining fish health for these programs, we emphasize biosecurity first, but VFDs are an essential part of our toolbox to treat and mitigate bacterial disease outbreaks.

In overall summary, there would be minimal differences between rearing Atlantic salmon and all-female triploid steelhead trout in Puget Sound net-pens in (1) the contraction, amplification, or transmission of pathogens; (2) their development of disease or their promotion of disease in wild finfish; or (3) their involvement in the increase virulence of existing pathogens or in the development of new pathogens. Furthermore, we consider the overall risk of these hazards to be relatively low.

4.3. Fish Escapes

Large-scale escapes (>10,000 individuals) resulting from infrastructure failure, such as the 2017 accident at Cooke Aquaculture's Cypress #2 facility (Clark et al. 2018), have happened wherever the farming of fish in open net pens is practiced. However, these events are relatively uncommon, accounting for only 19% of the fish escape incidents reported in Norway from 2001 to 2009 (Jensen et al. 2010). Across all species these large-scale incidents have been caused most frequently by mooring failure (e.g., Cypress #2), breakdown and sinking of steel floats, or major tears in the nets (Jensen et al. 2010). In December 2019 a fire destroyed part of a plastic float system in a pen in British Columbia and nearly all the 21,000 ready-for-harvest Atlantic salmon escaped (https://globalnews.ca/news/6328416/bc-fish-farm-fire-salmon/). There have been four large-scale Atlantic salmon net-pen escape events recorded in Washington; three events in four years, 1996 (107,000 salmon escaped), 1997 (369,000 fish), 1999 (115,000 fish); then no events for 18 years until the accident at Cooke's Cypress #2 net-pen in 2017 (250,000 fish) (Amos and Appleby 1999, Clark et al. 2018).

Other, often small-scale escapes, termed leakage, may occur due to errors during transfer of fish, maintenance errors, or small holes in nets caused by predators, floating debris, or vandalism (Jensen et al. 2010). Leakage of salmon from farms is typically undetectable (Britton et al. 2011, Fisher et al. 2014). There is a growing understanding that more gradual, low-level leakage of fertile fish can have a greater negative demographic and genetic impact on native species than the rarer, large-scale escape events (Baskett et al. 2013, Yang et al. 2019).

4.3.1. Structural Integrity of Net-Pen Infrastructure

Most large-scale escapes from salmon marine net-pens are a result of failures in the net-pen infrastructure (Jensen et al. 2010). The collapse of Cooke's Cypress #2 net-pen facility in 2017 that released an estimated 250,000 Atlantic salmon resulted from a failure of the mooring system and structural members of the raft's framing structure (Clark et al. 2018). Excessive biofouling by mussels and other marine organisms increased the drag force on the net-pen array, which likely resulted in the infrastructure failure. Following the Cypress #2 accident, management actions were taken that will lower the risk of net-pen infrastructure failure, compared with the risk that existed prior to the Cypress #2 accident.

- "In early in 2018, DNR and Cooke cooperatively developed a net hygiene monitoring protocol to improve net hygiene and document full compliance with the DNR Aquatic Land Leases. Since June 2018, Cooke has implemented the protocol at the Rich Passage and Hope Island facilities. [Cooke also implemented this protocol at Port Angeles until mid-2019, when rearing operations there concluded.] The protocol requires Cooke to score the cleanliness of each stock net containing fish at each farm on a weekly basis and submit those scores to DNR. Cooke substantiates the reported scores with video footage taken by Cooke divers of two stock nets per array randomly selected by DNR. DNR provides the numbers of the stock nets to be filmed the day before the filming must occur and the video is submitted to DNR within several days of being shot. The video dive footage follows a prescribed path that provides a representative view of biofouling. This video footage is required once per month during the peak vegetation growing season from May to October and every other month from November to April, when there is less vegetative biofouling. DNR's aquatic land manager, usually with a supervisor for a second set of eyes, reviews all video footage and cross checks biofouling observed with the net cleanliness scores submitted the preceding week. To date, the video verification has corroborated the net cleanliness scores reported by Cooke." (Dennis Clark, DNR; pers. communication October 2019).

- EHB 2957 requires that approximately every two-years, when net-pens are fallow, each of Cooke's facilities must be inspected by an independent marine engineering firm, approved by WDFW, and to receive fish the facility must be considered in good working order. In December 2019, a Consent Decree was reached between Cooke and Wild Fish Conservancy, where both parties agreed that before Cooke restocks any of their net-pen facilities, they are required to conduct a load analysis of the mooring and cage systems using environmental condition data that are consistent with the Norwegian aquaculture standard NS 9415. As part of the inspections mandated by EHB 2957, WDFW will require that Cooke provide an engineering analysis certifying that the net-pens conform to the parameters derived from the NS 9415 standard. Each net-pen facility will be evaluated independently as conformity to parameters derived from the NS 9415 standards require evaluation of the environmental conditions (e.g., currents, winds, waves, depth) specific to that net-pen facility. In Norway, the number of escaped Atlantic salmon declined from >600,000 fish per year (2001-2006) to <200,000 fish per year (2007-2009) after enactment of the NS 9415 standards in 2004 (Jensen et al. 2010).

4.3.2. Survival of escaped fish

The ability of escaped Atlantic salmon from fish farms in Norway to switch from pelleted feed to wild prey appears to depend upon their life stage at escape. Older, larger fish that escape often do not switch to live feed and survive poorly to sexual maturation (e.g., Skilbrei et al. 2015). Fish from the 2017 Cypress #2 event, that were harvest size at about ten pounds when the incident occurred, were found not to feed in the wild (e.g., only one of 71 fish examined (1.4%) had eaten possibly a small forage fish; WDFW, unpublished data). In contrast, fish that escape at early life stages appear to have a higher likelihood of adapting, feeding, and migrating to return as maturing adults. Jensen et al. (2013) captured Atlantic salmon, that had escaped early in the post-smolt stage, migrating and dispersing through the Arctic Ocean after one winter at sea; the growth and size of the escaped fish were similar to those of wild fish captured at the same time in the same area. Likewise, Skilbrei (2010) and Skilbrei et al. (2015) found that smolt and post-smolt escapees could survive and adopt the marine migratory pattern of their wild conspecifics. Blanchfield et al. (2009) and Patterson and Blanchfield (2013) studied survival of experimentally released diploid rainbow trout from open net-pen aquaculture in freshwater lakes in Ontario, Canada. In both studies annual survival of the released fish was approximately 50%, and although there was movement of fish away from the net-pens, most surviving fish showed continued reliance to the farm site.

Nearly all research on the behavior and survival of escaped farmed fish is based on diploid – fertile Atlantic salmon in Norway. However, in an experimental release of paired diploid and triploid Atlantic salmon from marine net-pens in Ireland, Cotter et al. (2000) and Wilkins et al. (2001) showed that significantly fewer triploid fish returned as adults to the coastal fisheries and to freshwater compared with their diploid siblings. These triploid Atlantic salmon may be less resistant to stressful environmental conditions and have significantly higher occurrence of lens cataracts than the diploid fish (Cotter et al. 2000, Wilkins et al.

2001, Cotter et al. 2002). Wilkins et al. (2001) and others (e.g., Glover et al. 2016) also postulated that the migration behavior of adult female triploid Atlantic salmon to freshwater was reduced by non-normal gonadal development. In the laboratory experiments pairing full-sibling diploid and triploid Atlantic salmon subjected to seawater challenges Leclercq et al. (2011) show that the triploid fish grow a suite of developmental deformities that may compromise their fitness in marine waters, including higher incidence and severity of lens cataracts, jaw malformation, vertebral deformities, and heart deformities possibly related to higher cardiac workloads.

Poorer survival and performance of triploid fish compared with diploid fish are not limited to Atlantic salmon. Scott et al. (2015) compared full-sibling diploid and triploid rainbow trout performance in the laboratory and showed that the triploid trout had significantly poorer hypoxia tolerance than their diploid siblings. The same result was observed in the five different strains of rainbow trout and three different brood years used in the experiment. Similar results were not seen in the adult, lake-reared trout, but Scott et al. (2015) considered that several factors may have confounded the analysis of the adult fish. Johnson et al. (2019) used hatchery rearing of full-sibling diploid and triploid steelhead trout and compared their survivorship and growth in both fresh- and salt-water. After 15 months in saltwater, the survivorship of the triploid fish was only 35% of their starting population, compared with 72% for the diploid fish. Withler et al. (1995) showed results similar to those in Johnson et al. (2019) using coho salmon.

Diploid Atlantic salmon in Norway may not be the best model to predict the survival of escaped all-female triploid steelhead trout from net-pens in Puget Sound. After four large-scale accidental releases and a number of intentional releases of Atlantic salmon in Puget Sound, there is no evidence that these fish survived for any extended period or were successful establishing spawning populations in Puget Sound (Amos and Appleby 1999). The literature on the marine survival of triploid Atlantic salmon and the relative survival of triploid rainbow and steelhead trout, and coho salmon in saltwater experiments suggest that triploid fish do poorly compared with their diploid siblings in marine waters. **We anticipate that in the unlikely event of a large-scale accidental release of all-female triploid steelhead trout from a net-pen in Puget Sound, the relative survival of the steelhead trout would be the same as or less than that previously seen with Atlantic salmon in this region**.

4.3.3. Genetic Issues

The genetic consequences of escaped diploid-fertile native species of farmed fish into open waters is a major concern with marine net-pen aquaculture (Hindar et al. 1991, Amos and Appleby 1999, Bolstad et al. 2017, Forseth et al. 2017, Glover et al. 2017, Yang et al. 2019). It is important to note that a wide variety of outcomes, ranging from no detectable effects (Glover et al. 2012) to substantial genetic introgression and even total displacement of wild populations by escaped farmed fish (Saegrov et al. 1997, Glover et al. 2012), were initially observed following escapes of Atlantic salmon from open net pens in Europe (reviewed in Hindar et al. 1991, Glover et al. 2017).

Escapes of fertile Atlantic salmon from open net pen aquaculture in the North Atlantic have been shown to have damaging impacts on the genetic variability both within and between native populations (Fleming et al. 2000, Houde et al. 2010, Karlsson et al. 2016, Bolstad et al. 2017, Glover et al. 2017). The most comprehensive data originate from Norwegian waters where five decades of farming Atlantic salmon was punctuated with escapes of millions of fish at different life stages (Diserud et al. 2019, Glover et al. 2019). Escaped, fertile and domesticated farm fish interbred with wild Atlantic salmon, thereby reducing fitness and placing more pressure on sometimes already dwindling wild populations (Fleming et al. 2000). Results show that invasions of escaped farm fish reduce reproductive fitness, reduce population productivity, disrupt local adaptations, and reduce the genetic diversity of wild salmon populations (Fleming et al. 2000, Bourret et al. 2011, Karlsson et al. 2016, Bolstad et al. 2017, Glover et al. 2017).

The impacts of escapes may vary depending on the status of the native stocks. In one example, Glover et al. (2012) studied introgression in 21 native populations of Atlantic salmon that had been exposed to large numbers of escaped farm fish and found that some populations were heavily introgressed (one native population was completely replaced with farm fish) while other populations were genetically intact. The authors concluded that healthy stocks of native fish that densely populated streams were resistant to introgression while depleted populations were much more vulnerable (see similar conclusions in Sylvester et al. 2018). This finding suggests that depleted stocks of steelhead trout and Chinook salmon in Puget Sound would be similarly vulnerable to genetic impacts from fertile con-specific farm escapees.

The use of triploid fish is recognized as normal aquaculture procedure that mitigates for the potential risks to the genetic structure and viability of wild populations from escaped farmed fish (e.g., Amos and Appleby 1999, Cotter et al. 2000, Naylor et al. 2005, Waples et al. 2012, Baskett et al. 2013, Rust et al. 2014, Glover et al. 2016, Hawkins et al. 2019). Cooke is proposing to use all female triploid – sterile fish

4.3.4. All female and Triploidy (Sterile) Fish

The most effective strategy to mitigate the risk of aquaculture large- or small-scale (leakage) escapes from open net pens is to limit farms to the use of sterile all-female fish (Thorgaard 1992, Cotter et al. 2000, Baskett et al. 2013, Lerfall et al. 2017). Sterile females are preferred because sterile males in many species may undergo sexual maturation and attempt to spawn even though these males produce no viable offspring (Hindar et al. 1991, Oppedal et al. 2003, Tiwary et al. 2004, Feindel et al. 2010). Such behavior from escaped males could lower the spawning success of native fish. For example, the release of sterile males has been used to reduce reproductive potential of wild populations in order to suppress populations of unwanted pests (Twohey et al. 2003, Bergstedt and Twohey 2007, Siefkes 2017). **Cooke's proposal is to use all-female triploid fish**.

Sterile females will be unable to successfully breed with native males and will eventually senesce and die (Tiwary et al. 2004, Lerfall et al. 2017). Introgression between escaped triploid females and the native populations will no longer be a risk to those native populations. Some results suggest that sterile salmon have a reduced instinct to enter freshwater (Cotter et al. 2000, Wilkins et al. 2001, Glover et al. 2016); thus escaped sterile females will also be less likely to compete for the spawning of wild males or dig up the redds of wild females. **Cooke's proposal is to use all-female triploid – sterile fish**.

Sterile lots of fish are most frequently produced by inducing triploidy--producing fish with three sets of chromosomes rather than the normal two. Biological regulation of chromosome sets is not as rigorously controlled in fish as in other vertebrates (Miller et al. 1994): triploidy is naturally common in some species (Qin et al. 2016, Zhigileva et al. 2017, Wu et al. 2019) and triploidy has been seen at low rates in wild salmonids (Thorgaard et al. 1982). Inducing triploidy, as in done in watermelons or bananas or oysters, for example, renders the organism largely "seedless" – that is, sterile.

The technology for producing triploid lots of fish is simple and easily applied on a commercial scale (Lerfall et al. 2017). Inducing triploidy to produce sterile Pacific salmon was optimized at Washington State University (Thorgaard et al. 1982, Parsons et al. 1986, Seeb et al. 1986, Thorgaard 1992). Triploids were raised in growth trials in net pens by the Squaxin Tribe more than 30 years ago (Seeb et al. 1993).

Triploidy can be induced at rates approaching 100% by shocking newly fertilized eggs with heat or pressure (Benfey and Sutterlin 1984); induced triploidy is practiced by some aquaculturists to reduce product loss due to precocious maturation prior to harvest (Janhunen et al. 2019) and used by management agencies who require sterile fish for sportfish stocking programs (e.g., over 9 million triploid rainbow trout have been stocked in freshwater by WDFW since 1995).

The efficacy of the methods used to create triploid fish is not 100%. This means that in every batch of triploid fish there may be fish that are fertile and can spawn with wild individuals of the same species. **Cooke's proposal is to receive all-female triploid fish from Troutlodge, a Washington State company based out of Bonney Lake. Troutlodge estimates that their average triploidy success rate is 99.83%, or a failure (error) rate of 0.17%. For the purpose of the following exercise, we will use a triploidy error rate = 0.20%**. Section 4.3.5 for discussion of triploid rates

4.3.4.1. Estimating genetic risk to native steelhead from steelhead escaping from Cooke's net-pens following a catastrophic failure of the net-pen infrastructure. To estimate risk of introgression between Cooke's net-pen steelhead and wild steelhead in Puget Sound, we estimated the following parameters and scenarios. These scenarios assume no mortality within the net-pens prior to escape. Mortality within the net-pens would reduce the number of both sterile and fertile fish that would escape.

- **Number of fish in net-pens: 1,000,000** [Clam Bay facility; Cooke Aquaculture Pacific (2019: B-33). Represents the largest facility and therefore the worst-case scenario.]
- **Triploidy error rate: 0.2%** [From above]
- **Proportion of the fish that escape: 0.82** [Based on the proportion of Atlantic salmon that escaped from Cypress #2 net-pen failure (Clark et al. 2018). We consider this to be a near worst-case scenario.]

- **Proportion of the escaped fish that elude recovery efforts: <u>0.77</u>** [Based on the number of Atlantic salmon that were recovered following the Cypress #2 net-pen failure (Clark et al. 2018). Depending on the number of fish that escape, age of fish that escape, when the fish escape, and the behavior of the fish when they escape, this proportion can be much different than what we present here.]
- **Proportion of diploid fish sexually mature at time of escape: <u>10-50% of fertile fish</u>** [50% is an extreme worst-case scenario, presented by Cooke Aquaculture Pacific (2019). Realistically, this proportion should be near zero because the fish will be harvested, on average, at less than two years of age, approximately 1-2 years prior to when they would reach sexually maturity (Cooke Aquaculture Pacific, 2019; J. Parson, pers. comm., 2019). We're using 10% as a low-end estimate, without justification other than it is greater than zero.]
- **Proportion of fish that will survive long enough to attempt to spawn: <u>50% of fertile fish</u>** [Blanchfield et al. (2009) estimated annual mortality of rainbow trout = 50%, while Patterson (2010; see also Patterson and Blanchfield 2013) estimated that 50% of the rainbow trout died within the first three months; however, Patterson and Blanchfield (2013) had unaccounted fish. Both studies consisted of experimental releases of relatively small sample sizes in freshwater. See section 4.3.2 for discussion of survival of escaped fish. We estimated that within a year of the Atlantic salmon release from Cypress #2, most if not all fish had either been recaptured or had died.]

Number of mature diploid-fertile steelhead from Cooke's net-pens that may be present in Puget Sound following an accidental release like that which occurred with Atlantic salmon at Cypress #2 in August 2017:

- 1,000,000 fish x 0.002 = 2,000 diploid-fertile fish in net-pen out of 1 million fish
- 2,000 fish x 0.82 = 1,640 diploid-fertile fish that will escape
- 1,640 x 0.77 = 1,263 diploid-fertile fish that elude recovery efforts
- 1,263 x 0.50 = 632 diploid-fertile fish that are sexually mature (higher estimate)
- 1,263 x 0.10 = 126 diploid-fertile fish that are sexually mature (lower estimate)
- 632 x 0.50 = 316 sexually mature diploid-fertile fish that survived (higher estimate)
- 126 x 0.50 = 63 sexually mature diploid-fertile fish that survived (lower estimate)

Number of mature diploid-fertile steelhead from Cooke's net-pens that may be present in Puget Sound following an accidental release like that which occurred with Atlantic salmon at Cypress #2 in August 2017, <u>but without a recovery attempt (see Section 4.3.6 and Mitigating Provisions)</u>:

- 1,000,000 fish x 0.002 = 2,000 diploid-fertile fish in net-pen
- 2,000 fish x 0.82 = 1,640 diploid-fertile fish that will escape
- ~~1,640 x 0.77 = 1,263 diploid-fertile fish that elude recovery efforts~~
- 1,640 x 0.50 = 820 diploid-fertile fish that are sexually mature (higher estimate)
- 1,640 x 0.10 = 164 diploid-fertile fish that are sexually mature (lower estimate)
- 820 x 0.50 = 410 sexually mature diploid-fertile fish that survived (higher estimate)
- 164 x 0.50 = 82 sexually mature diploid-fertile fish that survived (lower estimate)

We estimate conservatively that there will be 63 – 316 fertile female steelhead that would escape and survive to sexual maturity from Cooke Aquaculture's Clam Bay facility following an accident as described above (82 – 410 fertile female steelhead if a no recovery option was employed, or recovery was unsuccessful). If the accident were to occur at the Fort Ward site, with a total of 300,000 fish, there would be 19 – 95 fertile female steelhead that would escape and survive to sexual maturity (25 – 123) fertile female steelhead if a no recovery option was employed, or recovery was unsuccessful). Since these fish are all females, they will not spawn with each other, and to genetically affect Washington's steelhead populations, these fish would need to spawn with either hatchery- or natural-origin, natural-spawning steelhead. To do so, these domesticated fish would need to migrate into a steelhead spawning river, without homing or cues to enter a specific river, at the correct time of year, dig redds, and attract mates. These estimates are contingent on a catastrophic failure of the net-pen infrastructure, which are relatively uncommon (see Section 4.3). **Considering both the frequency of net-pen infrastructure failure and the low error rate producing triploid fish, we consider the risk to be low that domesticated all-female, triploid steelhead stocks cultured in Puget Sound net-pens will affect adversely the genetic structure of Washington's steelhead populations.**

4.3.5. Triploidy Rates

Appendix A in Cooke Aquaculture Pacific (2019) is a table provided to Cooke by Troutlodge, (the Washington State-based supplier of the all-female triploid eggs) that indicates that Troutlodge's proprietary procedure to create triploid-sterile fish has an error rate (i.e., rate of diploidy, and therefore rate of fertile fish) of 0.17%. This means that out of a lot of 1 million fish processed, there will be 998,300 triploid-sterile fish and 1,700 diploid-fertile fish. Troutlodges's table (Cooke 2019: Appendix A) shows 36 different lots of fish, each of unspecified size, that were subjected as eggs to the Troutlodge's triploidy procedure, one procedure per lot, from August 2013 through April 2018. The table includes the number of fish tested (N = 43 – 100), the number diploid results, number of triploid results, and the percent triploidy for each individual lot. Instead of treating each triploidy procedure as independent events Troutlodge treated the 36 triploidy procedures as a single continuous process, and therefore summed the total number of diploid results (five; one each in five lots) and divided that sum by the sum of all fish tested, across all 36 lots (2955), to produce an estimate of the error or diploidy rate of 0.17%. Cooke (2019: B-25) has adopted this error rate and justified Troutlodge's analysis stating that the "results in Appendix A are additive." We agree with Cooke Aquaculture that the procedure used by Troutlodge to generate triploid fish has a low error rate; perhaps as low as 0.17%. However, we disagree that the 36 lots, each containing an undisclosed number of eggs, subjected to Troutlodge's triploidy procedure over a 56-month period can be treated a single continuous process. The estimate is particularly problematic since potential variables in the procedure that may affect the procedure's efficacy were not provided (e.g., lot size; time between fertilization, water-hardening, and pressure treatment; duration and amount of high-pressure hydrostatic shock). In other words, we disagree with the method Cooke provided to estimate triploidy error rate.

Troutlodge used sample sizes ranging from 43 to 100 fish (mean = 82) per lot to calculate the triploidy error rate (Cooke 2019; Appendix A). Cooke suggested that for future lots to be transported into Puget Sound net-pen facilities, sampling rate be 100 fish per lot, reducing that sample size down to 60 if results appeared consistent with the data in Appendix A

(Cooke Aquaculture 2019; B-26). If the rate of diploidy (i.e., triploidy error rate) is indeed 0.0017 (0.17%) then the probability of drawing at least one diploid fish from a lot of 1,000,000 fish is 0.10 (n = 60 fish sampled) or 0.16 (n = 100 fish)[13]. That is, given an unbiased draw from the lot, there is a low expectation that a diploid fish will be selected using sample sizes of 60 or 100, even when there are diploid fish present in that lot. These sample sizes might underestimate the triploidy error rate, thereby underestimating the number of diploid or fertile fish in the lot. To achieve high confidence that at least one diploid fish is selected (probability > 0.90), a sample equal to 1500 is required[14]. Sample sizes of 60-100 are more appropriate for rate of diploidy equal to 5% rather than 0.17%.

Troutlodge effectively achieves a high sample size by pooling the results from all 36 lots in Cooke (2019:Appendix A) (n = 2955). To test the efficacy of this method, we modeled the procedure used by Troutlodge. That is, we assumed an actual rate of diploidy = 0.17%; drew from a hypergeometric distribution; sampled cumulatively from 36 independent lots, each with a total of 1 million eggs; and used sample sizes to test for triploidy success equal to 60, 150, 600, and 1500. We modeled each sample size 100,000 times to generate frequency distributions of calculated rates of diploidy (Figure 2). The mean rate of diploidy from 100,000 separate cumulative samples from 36 lots, for each sample size was unsurprisingly 0.17%; however, the rate of diploidy ranged from 0% to nearly 0.7% for the sample size = 60, with a large overall variance (Figure 2). That is, with a sample size of 60 for each of the 36 lots, there is a reasonable probability of calculating a rate of diploidy = 0.09%, 0.12%, or 0.19%, all close to 0.17%, and all quite low, but none equal to 0.17% (Figure 2). As we increased sample size from 150 to 1500, the precision of our estimate of the rate of diploidy increased.

If the probability of selecting one or more diploid fish from a pool of 1 million fish, with a triploidy error rate = 0.17% and a sample size = 100 is 0.16 (see above), then we would expect to draw at least one diploid fish from 16 lots out of 100 lots, or 5.8 lots out of 36 lots. Troutlodge's data showed one diploid fish from 5 lots out of 36 lots, with an average sample size per lot = 82. These results are what would be expected if the triploidy error rate was indeed close to 0.17%, as calculated by Troutlodge. We used the same modeling framework described above for Figure 2 to determine the percentage of times the calculated rate of diploidy from a cumulative sample from 36 lots was less than 0.2% out of 100,000 iterations, using a sample of only 60 fish, and actual rates of diploidy equal to 0.02%, 0.17%, 0.2% and 0.5%[15]. The calculated rates of diploidy were less than 0.2% (0.002) 100% of the time for actual rates of diploidy = 0.02%, 69% of the time for actual rates of diploidy = 0.17% (Troutlodge's estimate), and 57% of the time for actual rates of diploidy = 0.2%. The percentage of times the calculated rate of diploidy was less than 0.2% dropped dramatically to 2% for an actual rate of diploidy = 0.5%. **This suggests that the rate of diploidy for the Troutlodge triploidy procedure averages less than 0.5% and is probably close to 0.2%, essentially the same as the 0.17% provided by Cooke. However, drawing sample sizes of**

[13] Based on a hypergeometric distribution, which is equivalent to a binomial (e.g., triploid v. diploid) distribution, but sampling is without replacement, changing the probability after each trial.

[14] Unless you are sampling the entire population, you need to draw at least one diploid fish to assess triploidy error rate.

[15] Less than 0.2% is equal to the five left-most bars in Figure 2A.

60 or 100 from a lot of one million fish will not produce a precise measure of the triplody error rate. WDFW will require Cooke to have each individual lot they receive from Troutlodge tested for triploidy error rates using a sample size appropriate for the number of eggs in the lot. See Mitigating Provisions.

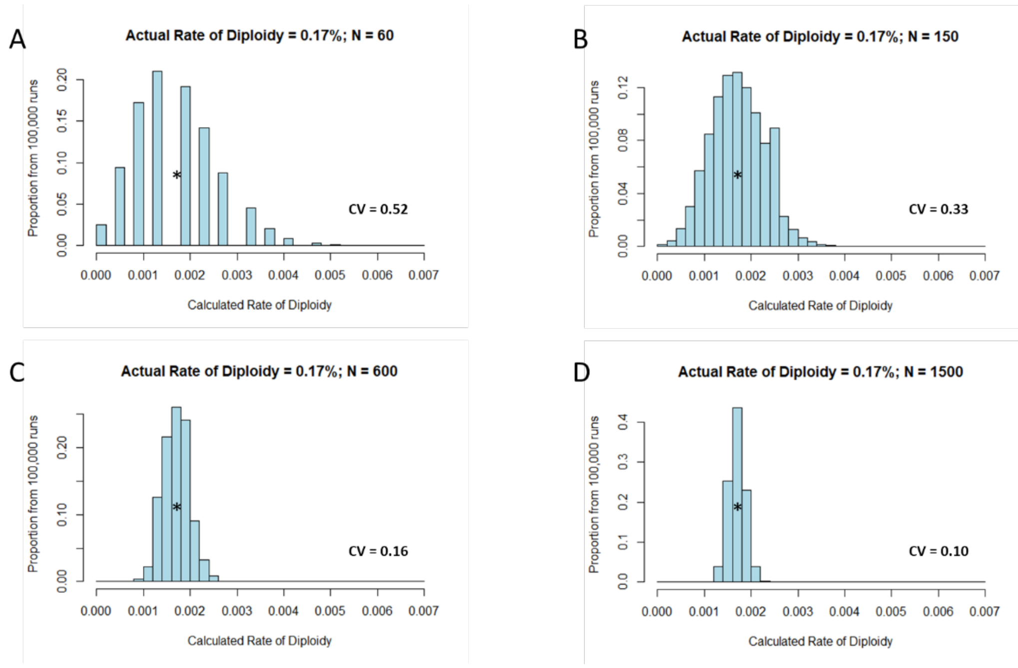

Figure 2. Frequency distributions of calculated rates of diploidy, across 100,000 iterations of the model for each of four samples sizes. Asterisk in each plot shows the frequency distribution category for 0.17%. As sample sizes increase there is an increase in the precision of the estimate for rate of diploidy, providing greater confidence that that estimate is accurate.

4.3.6. Recapture Efficacy of Escaped Fish

Recapture of fish that escape from net pens has been shown to be relatively ineffective in marine habitats, with rare exception (Dempster et al. 2018). Results show that recapture efforts must be immediate and widespread for best results, but recovery percentages are often still low (Skilbrei and Jorgensen 2010, Chittenden et al. 2011, Dempster et al. 2018). Suggestions that widespread and intense recapture efforts may show some success (Skilbrei and Jorgensen 2010) must be weighed against the risk of bycatch of native non-farm fish. Depending on the method, recapture may cause unacceptable harm in situations where ESA-listed stocks are present. The most effective and least destructive method for recapture is the use of live traps (Chittenden et al. 2011). Recapture efforts after escaped fish disperse, which could occur within hours, days or weeks, are not likely to be effective (Chittenden et al. 2011, Dempster et al. 2018), although the behavior of all-female triploid steelhead trout may differ from those species discussed in the referenced papers. However, the recapture of farmed fish within targeted rivers may provide some mitigation to prevent introgression when fertile fish escape from marine net pens (Glover et al. 2019).

4.4. Ecological effects of Net-Pen operations

4.4.1. Ecological Interactions

The published literature on the relative risks to wild populations from open net-pen aquaculture emphasizes mostly pathogen and parasite transmission and the effects from escaped farmed fish. The discussions concerning escaped farmed fish focuses on the genetic effects to wild populations, rather than ecological interactions between escaped and wild fish (see discussions above). For example, Forseth et al. (2017) developed a two-dimensional classification system of different anthropogenic factors to assess their relative risk to wild Atlantic salmon populations in Norway. The authors used 15 factors ranging from habitat alteration and hydropower to overpopulation and climate change. Included among the 15 factors were three aquaculture-related factors: sea lice, infections related to fish farming, and escaped farmed fish. The escaped farmed fish factor description was limited to the genetic risk to wild populations (Forseth et al. 2017).

Naylor et al. (2005) attempted a comprehensive assessment of the risks of escaped farmed fish to wild populations, including ecological, genetic, and socioeconomic concerns. Among the ecological risks were competition and predation. However, most of the discussion about competition and predation concerned interactions in the freshwater among juvenile fish, involving escapes from freshwater facilities or offspring from escapes. Naylor et al. (2005) stated that little is known about the competitive interactions between escaped farmed and wild fish in the marine environment, but then speculated that competition may exist since the fish show similar feeding patterns.

Two potential ecological risks to wild populations from net-pen aquaculture that have received limited attention in the literature are (1) the attraction of wild populations to the net-pen facilities, and (2) the potential entrapment and inadvertent harvest of wild fish with the net-pen cages.

Callier et al. (2018) provided a comprehensive review of the relationships between finfish and shellfish aquaculture structures and activities with the attraction (or repulsion) of wild populations. The authors indicated that these relationships are complicated and vary spatially and at several temporal scales. Many of the effects depend on fishery regulations and practices. That is, are the areas around net-pen facilities protected from fisheries, or deliberately avoided by or attract fishing activities? Callier et al. (2018) concluded that there may be effects to wild fish from finfish aquaculture structures and activities related their condition, growth, and reproductive success, and to their population's overall biomass and migratory patterns. However, these factors are poorly understood and the overall effect to population viability is unknown. Callier et al. (2018) reviewed 21 publications involving the aquaculture of eight finfish species, including Atlantic salmon and steelhead trout. The overall conclusions by these authors were consistent among the different farmed fish species. The interaction between Puget Sound net-pen facilities and aquaculture practices and the behavior of wild fish populations have not been studied, but we assume that such interactions occur. We also assume that the interactions in Puget Sound may be similar to those described by Callier et al. (2018), **and that there would be no difference in those**

interactions between the farming of Atlantic salmon and all-female triploid steelhead trout at Cooke's existing facilities.

Fish smaller than the mesh size of the net-pen cages can enter and pass through the cages. While in the cages the fish may forage and grow. Fjelldal et al. 2018 document the entrapment of eight wild species within seven Atlantic salmon net-pen facilities in Norway. The seven net-pens held a total of 4,182 Atlantic salmon, and 3,154 entrapped wild fish. The authors did not investigate if this was a normal occurrence in Atlantic salmon farms in Norway, or if there was a negative ecological effect of this bycatch. There exists the possibility that wild fish can become entrapped in Cooke's net-pen facilities in Puget Sound, and become bycatch mortalities when the farmed fish are harvested. The Canadian Government compiles and makes available the incidental finfish bycatch within British Columbia's marine finfish aquaculture farms[16]. From 2011 through September 2019 there were 1256 bycatch incidents reported by the Canadian Government that involved a total of 708,574 fish. However, two of these incidents were the deliberate depopulation of the net-pens to control the spread of IHNV outbreaks. These two incidents involved a single species (Pacific herring) and 406,366 fish, or 57% of the nine-year total. Overall, Pacific herring accounted for 638,950 (90%) of the total bycatch. The median number of fish caught as bycatch was eight fish per incident. A total of 308 Pacific salmon were caught in 87 incidents (median = 9 fish per incident), and no steelhead trout were caught. The population-level effects of this bycatch are not known, but the number of fish caught per incident is small absolutely, and small relative to their population sizes. WDFW will attempt to observe the harvest of fish from Cooke' net-pen facilities (see Section 6, Mitigating Provisions), but **there is no reason to assume that the bycatch, if any, would differ between the farming of Atlantic salmon and the farming all-female triploid steelhead trout at these facilities**.

4.4.2. Water Quality and the Benthic Environment

Washington Department of Ecology has the state's regulatory authority to protect water and sediment quality. The U.S. Environmental Protection Agency (EPA) authorized Ecology to administer the Federal Clean Water Act in Washington through National Pollutant Discharge Elimination System (NPDES) permits. RCW Chapter 90.48 defines Ecology's authority and obligations in administering the wastewater discharge permit program. On July 11, 2019, Ecology issued updated NPDES permits for the rearing of Atlantic salmon at four of Cooke's net-pen facilities, Hope Island, Clam Bay, Orchard Rocks, and Fort Ward. These updated permits require increased routine monitoring, inspections, and spill response planning and reporting.

WDFW has consulted with Ecology in making its SEPA determination and issuing to Cooke a Marine Finfish Aquaculture Permit to raise all-female triploid steelhead trout. Once Cooke has submitted to Ecology completed NPDES permit applications to raise all-female triploid steelhead trout at its existing net-pen facilities in Puget Sound, Ecology will begin a multi-step evaluation process with several opportunities for public comment. Ecology will evaluate if changing culture from Atlantic salmon to all-female triploid steelhead trout will

[16] https://open.canada.ca/data/en/dataset/0bf04c4e-d2b0-4188-9053-08dc4a7a2b03

change the character and degree of impact to water and sediment quality. WDFW defers to Ecology on their evaluation of the risk to the water and sediment from Cooke's proposed action. **As a mitigating provision (see Section 6), Cooke's Marine Finfish Aquaculture Permit to raise all-female triploid steelhead trout is contingent on receiving NPDES authorization from Ecology for this activity**.

5. NOAA Recovery Plan

The National Marine Fisheries Service (NMFS) published the final ESA Recovery Plan for Puget Sound steelhead trout on December 20, 2019. In the section describing pressures associated with ecological and genetic interactions between hatchery and natural-origin fish, NMFS included a paragraph on "Net pen Operations." The paragraph describes only the net-pen culturing of Atlantic salmon, although the paragraph ends with the mention of the potential replacement of Atlantic salmon with steelhead trout. The paragraph and a bulleted item on page 140 contain unreferenced statements about pollution and pathogen transmission risks from net-pen aquaculture. We have addressed in Section 4 of this document all the net-pen related risks discussed by NMFS in their ESA Recovery Plan.

6. Mitigating Provisions

Operations, including future finfish transport permits:

1. This Permit is for the marine cultivation of all-female triploid steelhead trout (*Oncorhynchus mykiss*) from embryos originating from Troutlodge, Bonney Lake, Washington.
2. Transgenic fish, as defined in WAC 220-370-100, are not permitted
3. In accordance with Washington State Law (2018 c 179 § 3; RCW 77.175.050) this permit is valid for existing marine net-pen facilities with valid leases of state-owned aquatic lands (Fort Ward, Orchard Rocks, Clam Bay, and Hope Island facilities). This permit will become valid for existing facilities without leases of state-owned aquatic lands (Cypress 1, Cypress 2, and Port Angeles) if these leases are restored, or new leases issued.
4. In accordance with WAC 220-370-100, this permit is valid for a maximum of five years, starting from the date of this correspondence and ending January 21, 2025 or on the date of termination of leases of state-owned aquatic lands, whichever is sooner (RCW 77.175.050).
5. Cooke must receive from the Washington Department of Ecology NPDES authorization to raise all-female triploid steelhead trout in their net-pen facilities in Puget Sound before Cooke can stock facilities with steelhead trout. All requirements and provisions stipulated by Ecology on NPDES permits must be followed.
6. All activities described in Cooke Aquaculture's Plan of Operation – All-female Triploid Rainbow Trout; Fish Escape Prevention, Response, and Report Plan; and Regulated Finfish Pathogen Report Plan must be followed as written, unless otherwise specified below. All plans must be updated annually and in consultation with WDFW Fish Health and Hatchery programs, with final drafts submitted to WDFW for approval no later than November 30 of the calendar year. The Fish Escape Prevention, Response, and Report Plan must be drafted in consultation with DNR, Ecology, WDFW, and effected treaty tribes.

7. All fish transported into net-pens must contain one or more visual marks, other than the shape of each fish, that *unambiguously* identifies each fish as commercial aquaculture fish, as opposed to hatchery- or natural-origin free ranging fish of Washington State. WDFW considers that commercial aquaculture steelhead marked with adipose fin clip only presents a risk of confusion with the state's hatchery-origin steelhead. Before July 2020 Cooke must implement an alternate method, approved by WDFW, to visually identify their fish.
8. For each lot of fish to be transported into marine net-pen facilities, Cooke must provide to WDFW a sample of tissue from 150 fish appropriate for genetic analyses, if the lot is derived from a single brood line. If the lot is composed of more than one brood line, Cooke must provide to WDFW samples of tissue from 150 fish from each brood line. The fish tissue can be from live or lethal sampling. WDFW will genotype samples using their baseline assay of SNP markers and will use the information only to determine if steelhead samples from hatchery- or natural-spawning fish are commercial aquaculture fish or F1 offspring of commercial aquaculture fish.
9. Prior to stocking net pens, Cooke must provide WDFW, DNR, and Ecology the approximate dates for stocking. Within one month after stocking is completed Cooke must provide to WDFW, DNR, and Ecology a report documenting the facility stocked, dates in which stocking occurred, the total number of fish stocked per day, and any complications that may have occurred during stocking. Cooke must report immediately if fish escaped during stocking. If requested by WDFW, DNR, or Ecology, Cooke must allow appropriately trained personnel from these agencies to monitor the stocking activities.
10. Prior to harvest, Cooke must provide WDFW, DNR, and Ecology the approximate dates for harvest. Within one month after harvesting is completed Cooke must provide to WDFW, DNR, and Ecology a report documenting the facility harvested, dates in which harvesting occurred, the total number of fish harvested per day, and any complications that may have occurred during harvesting. Cooke must report immediately if any live fish escaped during harvesting, or if any fish carcass, parts, or offal were discarded into the Puget Sound waters. The discard of carcasses, fish parts, or offal is also a violation of Cooke's NPDES permit. Cooke also must report the number and species of bycatch caught during harvesting. If requested by WDFW, DNR, or Ecology, Cooke must allow appropriately trained personnel from these agencies to monitor the harvesting activities.
11. The following monitoring data needs to be reported to WDFW, DNR, and Ecology as part of an expanded Monthly Feed, Biomass, and Disease Control Chemical Use Report, or as separate monthly report(s): (1) the feed conversion rates at each facility, (2) the estimated number of live individuals at each facility, and (3) the number of dead fish collected or observed (the greater of these two numbers) at each facility during the period since the prior reporting month.
12. For each of their facilities, Cooke must continue the net hygiene monitoring protocol developed cooperatively by Cooke and DNR (see Section 4.3.1 above).
13. WDFW Finfish Transport Permits are required when moving fish from freshwater facilities to marine net pens, or between aquatic farm sites.

Escape Prevention, Response, and Reporting:

1. In accordance with Washington State Law (2018 c 179 § 12; RCW 77.175.060) for each net-pen facility, Cooke must hire, at their own expense, a marine engineering firm approved by WDFW to

conduct inspections. Inspections must occur approximately every two years, when net pens are fallow, and must include topside and mooring assessments related to escapement potential, structural integrity, permit compliance, and operations. Analyses of the mooring and cage systems of each net-pen facility must use environmental condition data that are consistent with the Norwegian aquaculture standard NS 9415 (see Section 4.3.1 above).

2. Cooke must report to WDFW Fish Health Supervisor, Lead Veterinarian, or Aquaculture Coordinator within 24 hours of discovery of any fish that has been observed to have escaped from any net-pen facility or during transfer into or out of a net-pen facility, regardless of numbers of fish involved (i.e., the minimum reporting number is one).
3. It is conceivable that an attempt to recover fish after an escape event might negatively affect native Pacific salmonids more than no attempt to recover fish. Cooke is required to work with WDFW, Ecology, DNR, effected treaty tribes, and NOAA to include a no-recovery option in the 2021 Fish Escape Prevention, Response, and Reporting Plan, to be finalized December 2020. This option should include when, where, and under what conditions a recovery effort should not be attempted. A no-recovery option would be triggered by the state, in consultation with co-managers and federal agencies for the purpose of protecting native Pacific salmonids.
4. Both the Washington Department of Health and WDFW need to be notified if escaped fish were on medicated feed at the time of their escape or are within the required withdrawal period for the medicated feed used.
5. Before January 1, 2021, Cooke must have engineered mooring and anchoring plans and site-specific engineered drawings stamped by a structural engineer, for each net-pen facility.

Triploidy error rate

1. Cooke is to work with Troutlodge and WDFW to develop or implement an alternative method or employ a different sampling and statistical design to estimate the triploidy error rate. This method will be implemented on each lot of fish to be transported into marine net-pen facilities and provide the state with an estimated number of diploid-fertile fish in that lot. This alternative method or design must be implemented no later than July 2020, unless stated otherwise by WDFW. In the absence of the alternative method Cooke will be required to sample 600 fish from each lot to determine triploidy error rate (see Section 4.3.5 above)

Finfish Pathogen Reporting and Biosecurity:

1. Cooke must ensure that all state and federal Veterinary-Client-Patient-Relationship (VCPR), Veterinarian of Record (VOR), and Veterinary Feed Directive (VFD) rules and laws are followed (e.g., WAC 246-933-200, 21 CFR 514, 21 CFR 558).
2. In accordance with WAC 220-370-080 and 220-370-130 authorized WDFW employees shall have access to freshwater hatchery facilities and marine net-pen facilities to conduct inspections, to collect samples for disease surveillance, and to inspect net-pen infrastructure.
3. Net-pen facilities must remain fallow for 42 days after the last fish are harvested and the last containment net is removed for cleaning and repair. This number can be increased per determination of WDFW veterinarian due to disease prevalence just prior to or at the time of harvest.
4. Net-pen facilities must be managed as single-generation stocking.

5. Broodstock (parents) of embryos or fish going to Cooke Aquaculture freshwater rearing facilities will be sampled and tested at a certified lab for Washington Regulated Pathogens (see Table 1 below) at the 2% APPL annually within three months of transfer from Troutlodge to Cooke's freshwater facility.
6. Lots of pre-marine smolts prior to transfer from Cooke's freshwater faculties to marine net-pens will be sampled and tested at a certified testing lab for Washington State Regulated and Reportable pathogens (see #2 above) at the 2% APPL.
7. Cooke's freshwater and marine facilities are subject to inspections by WDFW to ensure proper biosecurity, fish health, and pathogen sampling. Sampling levels can be modified by WDFW in response to pathogen findings.
8. Under no conditions should fish carcasses be removed from the net-pens and returned into waters of Puget Sound. The discard of carcasses is also a violation of Cooke's NPDES permit.
9. All disease outbreaks, unexplained mortality, regulated, reportable, or exotic pathogen findings must be reported to the WDFW Fish Health Supervisor, Lead Veterinarian, or Aquaculture Coordinator within 24 hours.
10. A fish health evaluation report written by a certified fish health inspector must be submitted to WDFW each year, no later than January 31, summarizing fish health inspections, laboratory tests, and the presence of pathogens, for the previous calendar year, at each net-pen facility (one report that includes all net-pen facilities).

Table 1. Regulated and Reportable pathogens described in WAC 220-370 and in The Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State.

a. Regulated Pathogens:
    i. Infectious hematopoietic necrosis virus (IHNV)
    ii. Infectious pancreatic necrosis virus (IPNV)
    iii. Infectious salmon anemia virus (ISAV)
    iv. *Oncorhynchus masou* virus (OMV)
    v. Viral hemorrhagic septicemia virus (VHSV)
    vi. *Myxobolus cerebralis* (whirling disease only known in fresh water)

b. Reportable Pathogen:
    i. All viral replicating agents other than those listed as Regulated pathogens that are found on cell culture using procedures outlined in the AFS-USFWS Specific Procedures for Aquatic Animal Health Inspections or OIE Aquatic Code.
    ii. Strains of pathogenic bacteria resistant to antimicrobial agents approved for use in fish or used through an extra-label prescription or INAD permit.
    iii. *Piscirickettsia salmonis*
    iv. *Nucleospora salmonis*
    v. North Atlantic variants of PRV 1, and all variants of PRV 3

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Exhibit D

SEPA ENVIRONMENTAL CHECKLIST

Purpose of checklist:

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

A. Background

1. Name of proposed project, if applicable:

Conversion from Raising Atlantic Salmon to Raising Sterile All-Female Triploid Rainbow Trout/steelhead at Existing Marine Net Pen Sites in Puget Sound, Washington

2. Name of applicant:

Cooke Aquaculture Pacific, LLC

3. Address and phone number of applicant and contact person:

P.O. Box 669, Anacortes WA 98221
Kevin Bright, Permit Coordinator (360) 391.2409

4. Date checklist prepared: Revised July 23, 2019

A draft SEPA Checklist was submitted to WDFW on April 25, 2019. After review and comment by WDFW, this revised SEPA Checklist, dated July 23, 2019, was prepared and submitted to WDFW, WDOE and WDNR along with the SEPA Additional Information documents, a Threatened and Endangered Species Effects Analysis, and other permit application supporting information.
See Attachments A through E, identified in the list of environmental information prepared for the application (Section A.8 below).

5. Agency requesting checklist:

Washington Department of Fish and Wildlife

6. Proposed timing or schedule (including phasing, if applicable):

Permit approvals are sought by September 1, 2019 in order to transfer smolts currently growing at the Cooke Aquaculture hatchery in Thurston County to one or more of the marine net pen sites.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

No. Cooke Aquaculture has no plans for future additions or expansion of existing operations at its existing Puget Sound marine net pen sites.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

Finfish Aquaculture Plan of Operations, All-Female Triploid Rainbow Trout (*Oncorhynchus mykiss*). Cooke Aquaculture Pacific, LLC (updated January 18, 2019).

Fish Escape Prevention, Response & Reporting Plan. Cooke Aquaculture Pacific, LLC (updated October 12, 2018).

Regulated Finfish Pathogen Reporting Plan, Cooke Aquaculture Pacific, LLC (updated January 25, 2017).

SEPA Checklist Attachment A: Troutlodge Triploid Testing Results (2018).

SEPA Checklist Attachment B: Additional Information: Response to WDFW Questions (July 23, 2019).

SEPA Checklist Attachment C: Rainbow Trout Net Pen Aquaculture Annotated Bibliography (July 23, 2019).

SEPA Checklist Attachment D: Threatened and Endangered Species: 1990 PEIS Update (July 23, 2019).

SEPA Checklist Attachment E: Curriculum Vitae for Don Weitkamp, Ph.D. and Walton Dickhoff, Ph.D., Technical Experts who Prepared the Annotated Bibliography, Contributed to the Additional Information Document (SEPA Checklist Attachment B), and Prepared the Threatened and Endangered Species Effects Analysis (July 23, 2019).

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

No. There are no applications pending for governmental approvals of other proposals directly affecting the existing Cooke Aquaculture marine net pen sites.

10. List any government approvals or permits that will be needed for your proposal, if known.

Permit or Approval Required	Agency
Marine Finfish Aquaculture Permit Reapproval of existing permit (March 19, 2019) to change species cultured from Atlantic Salmon to all-female triploid (sterile) Rainbow Trout/steelhead	WDFW
NPDES Permit Modification for change of use to include alternate species such as sterile Rainbow Trout/steelhead and other possible native fish species at existing marine net pen sites[1]	Ecology
State-owned Aquatic Land Lease amendment to include culturing native fish species (all-female sterile Rainbow Trout/steelhead) at existing marine net pen sites	WDNR
Fish Transfer Permits to transport fish from the Cooke Aquaculture hatcheries to the marine net pen sites	WDFW

1 Existing NPDES permits for the Fort Ward, Orchard Rocks, Clam Bay and Hope Island net pen facilities were renewed by the Washington Department of Ecology on July 11, 2019. Copies of the new NPDES permits are included by reference.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page.

Cooke Aquaculture Pacific, LLC (Cooke) is a Washington company that operates commercial marine net pens in Clallam, King, Kitsap and Skagit Counties, and two freshwater hatcheries in Thurston County. The company's facilities have been commercially raising and harvesting farmed salmon in the Puget Sound region since the 1970s. The net pen farms initially raised various types of salmonids including Coho Salmon, Chinook Salmon, Donaldson Rainbow Trout and steelhead trout. By the early 1990s, the Washington industry transitioned to raising primarily Atlantic Salmon. Cooke is proposing to change the fish species being cultured from Atlantic Salmon (*Salmo salar*) to domesticated stocks of all-female triploid Rainbow Trout/steelhead (*Oncorhynchus mykiss*).[2] While the common names Rainbow Trout and steelhead are often used interchangeably, this environmental review document and permit applications will refer to Rainbow Trout/steelhead, which is the single official common name given to this species by the American Fisheries Society several years ago. All-female triploid Rainbow Trout/steelhead have been selected to be raised in the existing net pen facilities because the use of mono-sex and sterile stocks of fish is recognized as means to significantly reduce potential genetic interaction with natural populations.

The Cooke Puget Sound marine net pen sites have all required State agency permits, and existing operations have been raising almost exclusively[3] only Atlantic Salmon for the past 30 years. A recent change in Washington law (RCW 77.125.050), however, requires phasing out the farming of non-native finfish in marine net pen aquaculture. This change means that commercial marine net pen production in Washington will need to find a commercially viable native species of fish to grow in order stay in the business of growing seafood for human consumption. Rainbow Trout/steelhead are a native species to the Pacific Northwest region and have been commercially raised in Washington, primarily in freshwater facilities, for over 80 years if not even longer. Cooke is requesting a re-approval of their Marine Finfish Aquaculture Permit (WAC 220-370-100) from the Washington Department of Fish and Wildlife (WDFW) that will allow the company to start growing domesticated stocks of a mono-sex (all-female) sterile (triploid) Rainbow trout/steelhead (*Oncorhynchus mykiss*) at their marine farms. Cooke received the renewal of their Marine Finfish Permit from WDFW on March 19, 2019 to continue raising Atlantic salmon at the four farm sites with a valid Aquatic Use Permit from WDNR (Clam Bay, Fort Ward, Orchard Rocks and Hope Island). Other than transitioning to the commercial cultivation of a different species of fish, the company is not planning any alteration to the existing fish pen physical structures, locations, supporting equipment, or general current practices, methods, maintenance and cultivation techniques currently used for growing Atlantic Salmon in net pens. Domesticated stocks of triploid Rainbow Trout/steelhead have very similar physiological and metabolic requirements to those of domesticated stocks of Atlantic Salmon. The basic difference is that all-female triploid Rainbow trout/steelhead are known to be reproductively sterile, and thus convert their energy almost entirely to growth. By comparison, diploid populations of Rainbow trout/steelhead and Atlantic salmon will reach a certain age and begin to expend growth energy toward the production of gametes and secondary sexual characteristics (sexual maturation).

Raising native-stock fish species in marine net pens is consistent with the recommendations of the *Final Programmatic Environmental Impact Statement: Fish Culture in Floating Net-Pens* (Washington Department of Fisheries, January 1990). The Preferred Alternative in the Programmatic EIS (PEIS)

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[2] Genetically, Rainbow Trout and steelhead are the same species (*Oncorhynchus mykiss*), but they represent two separate life strategies. Rainbow Trout are the resident form that stay in freshwater. Steelhead trout are the anadromous form that migrates to the ocean and back to natal rivers and streams to spawn.

[3] Other species of salmonids such as Coho and Chinook Salmon, and steelhead trout have also been raised at some of these marine net pens and other facilities in Puget Sound in the past.

concludes that *"In areas where WDF determines there is a risk of significant interbreeding (with indigenous species) or establishment of harmful self-sustaining populations, the agency should only approve the farming of sterile* ***or*** *monosexual individuals, or genetically incompatible species."* By farming a monosex (all-female) and sterile (triploid) stock of Rainbow Trout/steelhead, Cooke's proposed change of species incorporates both methods of reducing the risks of genetic interference to indigenous populations or from escaped farmed fish establishing self-sustaining feral populations. WDFW has requested that a SEPA Checklist be prepared, along with Additional Information (e.g., response to the Department's specific questions) for the Department's consideration during their review of the Cooke Aquaculture application for re-approval of the Marine Finfish Aquaculture permit to authorize the species conversion. The additional information provided in SEPA Checklist Attachments A though E update the 1990 Programmatic EIS, and provide specific detailed information regarding potential change in environmental impacts that may occur as a result of the Cooke Aquaculture species conversion proposal.

The 1990 *Final Programmatic Environmental Impact Statement: Fish Culture in Floating Net-Pens* is adopted herein by reference, in accordance with WAC 197-11-630. The SEPA Additional Information document (Attachment B), supported by an Annotated Bibliography (Attachment C), addresses the potential environmental effects of the species change proposal on the subjects of escapement, competition, potential genetic interactions, and minor operational differences. The current status of Federally-listed species under the Endangered Species Act since the 1990 PEIS was issued, as well as State-listed species, is described in Attachment D, along with an effects analysis for both Atlantic Salmon culture (which has occurred throughout the years since the 1990 PEIS was issued), and an effects analysis for the proposed species conversion to rear all-female, triploid Rainbow Trout/steelhead. These documents update the 1990 PEIS.

Because the existing Cooke Aquaculture net pens have previously obtained the facility construction permits as well as Marine Finfish Aquaculture Permits, Clean Water Act Section 402 NPDES Waste Discharge Permits, and State-owned Aquatic Land Leases, there is no site selection or construction required to implement the species conversion proposal. There will be only minor operational differences to farm all-female triploid Rainbow Trout/steelhead rather than farming Atlantic salmon, with insignificant impacts to elements of the Natural Environment, and no change in impact to elements of the Built Environment as a result of implementing the species conversion proposal.

The company will use local stocks of Rainbow Trout/steelhead produced by Troutlodge hatcheries in Pierce County. Brood stock are cultivated in Washington specifically for the production of ova to supply both private and public aquaculture operations. Troutlodge, a Washington-based company, has been producing Rainbow Trout/steelhead eggs for sale to farms and public enhancement hatcheries throughout the world since 1945. Brood fish are raised in regulated pathogen-free conditions for their entire life cycle. The company utilizes a comprehensive health testing and disease-free certification program that exceeds World Organization of Animal Health (OIE) standards at their Washington facilities, allowing them to export live salmonid eggs throughout the world.

Troutlodge has been producing mono-sex (all-female) populations of Rainbow Trout/steelhead eggs since the mid-1990s. The all-female (XX only) ova are subsequently fertilized with X-only mono-milt. Triploidy is induced by mechanical pressure shock. For a short period of time, a high-pressure hydrostatic shock is applied to the newly fertilized eggs at a specified time point post-fertilization. The post-fertilization pressure treatment forces the fertilized egg to retain the third set of chromosomes that is normally ejected at this time. Pressure is then released and the triploid (3N) eggs are allowed to continue development. Ploidy is confirmed using a fluorescent nucleic acid label on either embryo or blood tissue using a flow cytometer at the Washington State University School of Veterinary Medicine. Testing results of Troutlodge triploid fish and eggs over a period of five (5) years (from 2013 to 2018) demonstrate a high rate of success in triploid induction (99.83% – 2,950 of 2,955 fish and/or eggs sampled (see Attachment A).

Cooke operates two freshwater hatcheries in the Scatter Creek area of Thurston County. The hatcheries raise and produce the juvenile fish that are eventually transferred to the marine net pens for final cultivation to the desired harvest size. Eyed all-female triploid Rainbow Trout/steelhead eggs would be supplied to the Cooke hatcheries from the Troutlodge hatchery under a WDFW Fin Fish Transport permit. The eggs would be hatched and cultured to a certain size in the Cooke hatcheries, and then transferred to the marine net pens after undergoing the necessary fish pathogen screening protocols, subject to review and approval by WDFW. Thereafter, a Fin Fish Transport Permit would be required from WDFW for each specified lot of fish to be transferred from Cooke hatcheries to the marine net pens.

Marine net pen cultivation and production protocols for Rainbow Trout/steelhead are basically the same as those used for Atlantic Salmon. Maximum cage density levels are expected to be managed at the same levels (approximately 0.9 to 1.2 lb/ft^3 or 15 – 20 kg/m^3), resulting in comparable maximum biomass levels that have historically been attained at each of the existing Cooke Aquaculture sites. Depending upon fish size at harvest (targeted mean weights of approximately 7 to 9 lbs or 3.5 to 4.2 kg), the fish population sizes at each marine net pen site are expected to be similar to stocking levels for Atlantic Salmon. The fish feed composition for marine-reared trout diets will be the same or similar to the currently-used marine salmon diets. Modern salmon and trout feeds are composed of highly digestible ingredients that are specifically formulated for optimal growth and feed conversion rates. No differences in water quality or sediment quality are expected to result from this change in species or the accompanying Rainbow Trout/steelhead-specific feeds that would be used. Additional information on feed composition, expected feed conversion rates, projected growth rates, projected pen densities and production cycles is provided in Section D of the SEPA Additional Information document (Attachment B).

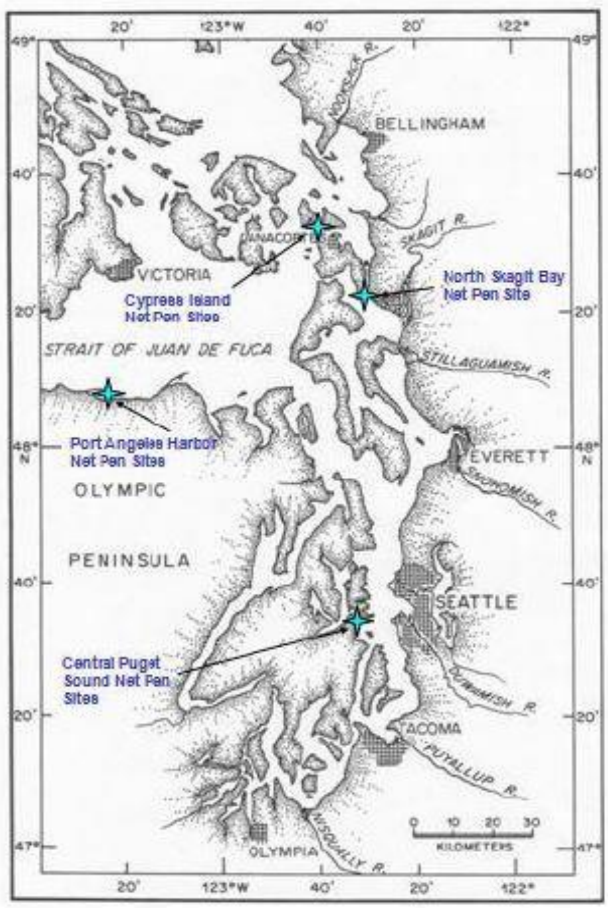
Equipment and all net pen support structures, stock nets, and predator exclusion nets will be the same or similar to what has been used for the cultivation and production of Atlantic Salmon. If the species conversion proposal is approved, the Rainbow Trout/steelhead produced in marine net pens will be harvested, processed, packaged and shipped fresh to seafood customers throughout the United States. Cooke is dedicated to producing a high-quality seafood in a sustainable and environmentally sound manner.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

Floating commercial marine net pens owned by Cooke Aquaculture Pacific, LLC are located in the following areas:

Fort Ward, Orchard Rocks and Clam Bay – Rich Passage in Kitsap County on the south end of Bainbridge Island, WA.

Hope Island – Skagit Bay in Skagit County on the northeast side of Hope Island, WA.[4]



Vicinity Map

[4] Cooke Aquaculture Pacific is working with the Department of Natural Resources to resolve State-owned Aquatic Land Lease issues with the Cypress Island net pen and the Port Angeles net pen facilities. If the situation is resolved, these net pen sites would also be transitioned to native species aquaculture.

B. Environmental Elements

1. *Earth*

a. General description of the site:
(circle one): Flat, rolling, hilly, steep slopes, mountainous, other

Not applicable.

b. What is the steepest slope on the site (approximate percent slope)?

Not applicable.

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

Not applicable.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

There have been no indications of unstable soils at the existing marine net pen sites.

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

No new construction is proposed; therefore, there would be no fill, excavation, or grading at the existing marine net pen sites..

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

Not applicable. No new construction is proposed.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

The "impervious surfaces" question is not applicable to the existing floating marine net pens, or to the change in species proposal.

h. **Proposed measures to reduce or control erosion, or other impacts to the earth, if any**:

Since no erosion or other impacts to earth would occur, no measures to reduce or control such impacts are proposed.

2. Air

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

Diesel-powered electrical generators (gensets) are used on the net pen sites to supply power to the feeding equipment. There is typically one genset for each net pen site. Typical hours of operation are from 7:00 AM to 5:00 PM. The generators may run continuously during that time or may be turned off during times when they are not in use. This represents no change from existing conditions, and would not be altered by the change in species proposal.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

No.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

The proposal to change the species of fish reared at existing marine net pen sites would cause no air quality impacts; therefore, no measures are proposed to reduce or control such impacts.

The diesel generators that are used are new models that use EPA Tier IV type engines and run on clean fuels. Gensets are periodically shut off when they are not in use. This represents no change from existing conditions and would not be altered by the change in species proposal.

3. Water

a. Surface Water:

1) **Is there any surface water body on or in the immediate vicinity of the site (including year-around and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into**.

Cooke Aquaculture existing floating net pens are located in the marine waters of Rich Passage in Kitsap County, Skagit Bay in Skagit County, Deepwater Bay in Skagit County and Port Angeles Harbor in Clallam County (see Vicinity Map in Section A.12, above).

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

The proposed project involves changing the species of finfish being reared at existing Cooke Aquaculture Puget Sound marine net pen facilities from Atlantic Salmon to an all-female sterile stock of Rainbow Trout/steelhead. These fish will be grown in the same existing net pen facilities that the Atlantic Salmon were grown in, using the same feeding and fish culturing practices that are currently employed at these facilities. There will be no in-water work or over-water work to construct or modify existing floating marine net pens.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

None. No new construction is proposed.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

No surface water withdrawals or diversions are required to implement the species change proposal, or to continue operations at existing floating net pen facilities.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

No, not applicable.

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

Existing permitted marine net pens will be used to rear all-female triploid Rainbow Trout/steelhead following the transition from Atlantic Salmon culture. Marine finfish rearing facilities in Washington State operate under the regulations and conditions of a National Pollutant Discharge Elimination System (NPDES) permit issued by the Washington Department of Ecology (Ecology). The Clean Water Act Section 402 NPDES Waste Discharge Permit establishes the basis for effluent limitations, water quality criteria, sediment management standards, and the technology-based standards for allowable discharges from the fish rearing facilities. Ecology issued updated the Cooke Aquaculture NPDES permits on July 11, 2019 for the Hope Island, Fort Ward, Orchard Rocks and Clam Bay net pen facilities. The permits set forth additional monitoring, reporting and recording keeping requirements for the protection of public and environmental health, *"This proposed permit (NPDES) includes all statutory requirements for Ecology to authorize a wastewater discharge. The permit includes limits and conditions to protect human health and aquatic life, and the beneficial uses of waters of the state of Washington."* Clam Bay NPDES Permit WA-0031526 Fact Sheet (dated July 11, 2019).[5]

Net pen operators manage nutrient waste with farm practices, efficient feeds and feeding practices, optimal pen configurations and farm orientation in order to optimize fish growth, waste distribution, and nutrient assimilation by the food web (Rust et al., November 2014). Impacts to water quality at salmon farm sites, including increased nitrogen, phosphorus, lipids, and turbidity or oxygen depletion have lessened significantly over the last 20 years as a result of a better understanding of siting requirements, improved feeding, better feed formulation, and better farm management practices (Soto and Norambuena 2004 in Rust et al., November 2014; McKinnon et al 2008 in Rust et al., November 2014; and Price and Morris 2013). Benthic impacts from U.S. net pens have been dramatically reduced over the last few decades, due to improved siting and better management practices (Rust et al., November 2014).

The primary discharge from marine salmonid net pen facilities, which includes Rainbow Trout/steelhead farms, is organic nutrients produced by the cultivated populations of fish that are being reared at the facility. These metabolic waste products are primarily composed of organic carbon, nitrogen and trace amounts of phosphorus. Switching from growing one species of salmonid (Atlantic Salmon) to a different closely-related species of salmonid (Rainbow Trout/steelhead) is not expected to result in changes to the composition or volume of waste discharge. Commercial salmon and trout diets contain the same or similar feed ingredients. Some commercial trout feeds tend to have slightly lower lipid- (fat) to-protein amounts in comparison to some salmon feeds. Cooke anticipates using the same commercial salmon feed for the all-female triploid Rainbow Trout/steelhead diets that

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5 The NPDES Fact Sheets issued for all four locations with existing valid State-owned Aquatic Land Leases contain this same statement. The Fact Sheets are included by reference.

it is currently using to grow Atlantic Salmon at their marine net pen sites. Projected production cycles, the time from first fish in to last fish out (all harvesting completed), are anticipated to be less by several months compared to current Atlantic Salmon operations. This will be the result of both the expected growth rates for all-female triploid Rainbow Trout/steelhead being higher (faster growing compared to Atlantic Salmon), and the average harvest weight for Rainbow Trout/steelhead being smaller (approximately an 8-pound average weight for Rainbow Trout/steelhead compared to the approximately 11-pound average weight for Atlantic salmon). The overall amount of feed used during a production cycle and the period of peak biomass are anticipated to be less than with current Atlantic Salmon farming operations. In addition, because of the shortened production cycle for raising Rainbow Trout/steelhead, the frequency and number of fallowings will be increased over a given time period in comparison to the current Atlantic Salmon farming operations. Anticipated volumes of discharge from the marine net pens are therefore expected to be no more than and likely less than current peak levels. Additional information on feed composition, expected feed conversion rates, projected growth rates, projected pen densities and production cycles is provided in the SEPA Additional Information document (Attachment B, in the response to Information Request D.2).

b. Ground Water:

1) **Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known**.

No groundwater is used and no water will be discharged to groundwater as a result of the species change proposal.

2) **Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve**.

No waste materials will be discharged into the ground.

c. Water runoff (including stormwater):

1) **Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe**.

Marine net pen structures are a grid constructed of steel support structures from which the nets are suspended in which the fish are grown. Approximately 75% of the structure is open, unencumbered surface area. The steel walkway structures are composed of permeable surfaces (open steel grating for the walkway grid). There is no stormwater collection at the marine net pen sites, and none required for the species change proposal.

2) Could waste materials enter ground or surface waters? If so, generally describe.

See the response to SEPA Checklist Questions B.3.a.6 above, and B.7.a below.

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

No drainage patterns would be affected by the proposed action.

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

Equipment used on the floating marine net pens has secondary containment provisions. Spill prevention, control and response procedures are posted at all sites. Spill kits are located on each site and employees are given instruction on spill response procedures.

Computerized feeding systems will be used to accurately keep track of how much the fish population is expected to eat, and how much feed is being fed (delivered) to the fish population in each pen. Fish feeding technicians will monitor each fish pen using both surface visual cues and underwater video cameras that allow them to ensure fish are being fed properly, without excess pellets sinking past the captive stocks and being lost into the environment. Fish feed is one of the most expensive costs in raising salmon. For this reason, the industry has researched and developed improved fish feeds, feed monitoring equipment, feed distribution equipment, computerized biomass growth programs, expected feed conversion rates, specific feed delivery rates, and several other tools and methods to maximize feed utilization for the growth of the fish stocks, while minimizing the chance of uneaten feed entering the environment. There would be no change to existing feed delivery systems or feed monitoring practices to implement this species change proposal.

4. Plants

a. Check the types of vegetation found on the site:

____ deciduous tree: alder, maple, aspen, other
____ evergreen tree: fir, cedar, pine, other
____ shrubs
____ grass
____ pasture
____ crop or grain
____ orchards, vineyards or other permanent crops
____ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
____ water plants: water lily, eelgrass, milfoil, other
X other types of vegetation: Marine algae grows on the net pen structures such as floats, netting and anchor lines. This includes primarily green and brown algae species.

b. What kind and amount of vegetation will be removed or altered?

None.

c. List threatened and endangered species known to be on or near the site.

There are no threatened or endangered plant species on the existing marine net pen sites.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

Since there will be no impacts to plants or marine algae that grows on net pen structures as a result of the species change proposal, no measures are proposed to preserve or enhance vegetation on the existing marine net pen sites.

e. List all noxious weeds and invasive species known to be on or near the site.

None.

5. Animals

a. <u>List</u> any birds and <u>other</u> animals which have been observed on or near the site or are known to be on or near the site. Examples include:

birds: hawk, <u>heron</u>, <u>eagle</u>, songbirds, <u>other</u>: <u>waterfowl, shorebirds</u>
mammals: deer, bear, elk, beaver, <u>other</u>: <u>marine mammals (see below)</u>
fish: bass, <u>salmon</u>, <u>trout</u>, <u>herring</u>, <u>shellfish</u>, <u>other</u>: <u>(see below)</u>

Marine mammals, fish, birds and invertebrates can occur around existing marine net pen areas. These primarily include: whales, porpoise, seals, sea lions; several species of salmonids, baitfish, and ground fish; bald eagles, shorebirds and waterfowl. The occurrence of these animals will not be altered by the species change proposal.

b. List any threatened and endangered species known to be on or near the site.

Common Name	Federal Species Status	State Species Status
Humpback Whale	Endangered	Endangered
Southern Resident Killer Whale	Endangered	Endangered
Northern Sea Otter	None[6]	Endangered
Eastern Pacific Stellar Sea Lion	None[7]	None
Bald Eagle	None[8]	None
Marbled Murrelet	Threatened	Threatened
Chinook Salmon (Puget Sound ESU)	Threatened	Candidate
Chum Salmon (Hood Canal Summer-run)	Threatened	Candidate
Chum Salmon (Puget Sound/Strait of Georgia ESU)	None[9]	Candidate
Coho Salmon	Species of concern	None
Steelhead	Threatened	Candidate
Bull Trout	Threatened	Candidate
Eulachon	Threatened	Candidate
Flathead Sole	Species of concern	None
Green Sturgeon	Threatened	None
Pacific Cod	Species of concern	Candidate
Pacific Hake	Species of concern	Candidate
Pacific Lamprey	None	None

[6] Northern Sea Otter presently have no Federal listing status. They are protected under the Marine Mammal Protection Act (https://www.fws.gov/wafwo/articles.cfm?id=149489657).

[7] Eastern Pacific Stellar Sea Lion presently have no Federal or State listing status. They are protected under the Marine Mammal Protection Act (WDFW, August 2008 [updated January 2019]: Priority habitats and species list).

[8] Bald Eagle presently have no Federal or State listing status. They are protected under the Bald and Golden Eagle Protection Act (WDFW, August 2008 [updated January 2019]: Priority habitats and species list).

[9] WDFW, August 2008 (updated January 2019).

Common Name	Federal Species Status	State Species Status
River Lamprey	None	Candidate
Canary Rockfish	None[10]	Candidate
Bocaccio Rockfish	Endangered	Candidate
Yelloweye Rockfish	Threatened	Candidate
Pinto Abalone	Species of concern	Candidate
Pacific Harbor Porpoise	None	Candidate
Gray Whale	None	Sensitive
Pacific Herring	None	Candidate
Black Rockfish	None	Candidate
Brown Rockfish	None	Candidate
China Rockfish	None	Candidate
Copper Rockfish	None	Candidate
Quillback Rockfish	None	Candidate
Redstripe Rockfish	None	Candidate
Tiger Rockfish	None	Candidate
Yellowtail Rockfish	None	Candidate
Walleye Pollock (South Puget Sound)	None	Candidate
Olympia Oyster	None	Candidate

A narrative description of each of these species is provided in SEPA Checklist Attachment C: *Threatened and Endangered Species: 1990 PEIS Update*, along with an effects analysis for both Atlantic Salmon culture (which has occurred throughout the years since the 1990 PEIS was issued), and an effects analysis for the proposed species conversion to rear all-female, triploid Rainbow Trout/steelhead.

WDFW raised several specific questions about the potential effects of the species conversion proposal on threatened and endangered species (TES). Responses to these questions are provided in SEPA Checklist Attachment B: *Additional Information: Response to WDFW Questions*, supported by an *Annotated Bibliography* (Attachment C). The *Annotated Bibliography* was prepared by technical experts who also assisted with preparing the response to WDFW questions in Attachment B, and who prepared the TES effects analysis in Attachment D. Curriculum vitae for these experts are provided in SEPA Checklist Attachment E.

c. Is the site part of a migration route? If so, explain.

Yes. The existing marine net pens are located in the marine waters of Puget Sound and while not blocking any migration corridors it is likely that marine fish species, marine mammals and other wildlife may pass by in the water adjacent to the net pens.

d. Proposed measures to preserve or enhance wildlife, if any:

The following measures are current practices at Cooke Aquaculture existing marine net pen sites and would continue to be implemented with the species change proposal.

- Monitor for organic enrichment of the substrate beneath the farm. This is required by the Clean Water Act Section 402 NPDES Waste Discharge Permit for the project.
- Implement fallow periods at marine net pen operations to allow for sediment and benthic organism

[10] Genetic information collected by NMFS found that Canary Rockfish in the Puget Sound/Georgia Basin are not distinct from coastal Canary Rockfish, and therefore are not a Distinct Population Segment (DPS). To qualify for Federal ESA protections, a species must be discrete from the remainder of the species (NOAA Fisheries. 2017).

recovery periods from any excess nutrient enrichment. Fallowing for a period of 30 days or longer would occur after each single-stock generation is grown and harvested out. It is anticipated that the frequency of fallowing a site would increase as Rainbow Trout/steelhead grow-out cycles are anticipated to be shorter compared to Atlantic Salmon to reach the targeted market size.

- Use passive predator barrier netting surrounding each marine net pen for both avian and marine mammal deterrence.
- Tightly tension predator barrier nets and fish containment nets using a net weighting system to keep the net walls and floors tight. This minimizes the potential for underwater entanglement of marine mammals or diving birds.
- Efficiently plan vessel trips to minimize vessel traffic to and from marine net pen sites to reduce potential wildlife interactions or disturbance.
- Observe Federal regulations that implement a no-approach zone for killer whales and all other whales, dolphins, and porpoises when operating crew vessels approaching or leaving marine net pen sites.
- Implement the *Plan of Operation: All-Female Triploid Trout* (January 18, 2019), including updating the comprehensive Operational Procedures for Fish Escape Prevention, Reporting and Recapture and Regulated Fish Pathogen Reporting and Bio-security Plans.

e. List any invasive animal species known to be on or near the site.

None known.

6. Energy and Natural Resources

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Electrical energy is supplied to existing marine net pen sites by diesel generators. The diesel generators run periodically during the work day to power feeding equipment or other small appliances. The species change proposal would require no change from these existing conditions.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

Electrical generators are operated only as needed and would be turned off when not in use. The species change proposal would require no change to this practice.

7. Environmental Health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

Yes. All existing facilities utilize diesel fuel to operate various pieces of machinery located on the floating marine net pens and/or on support barges. There is a risk of spill when handling liquid fuels. Fuel is kept inside secondary containment structures and spill kits are kept on each site nearby these areas. Employees are trained in proper fuel handling, spill prevention, and cleanup procedures. The species change proposal would require no change to these practices.

1) **Describe any known or possible contamination at the site from present or past uses.**

None known.

2) **Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.**

None.

3) **Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.**

Primary hazardous chemicals used on the existing marine net pen sites are those contained within or used for the operation of various pieces of gasoline- or diesel-powered engines. These fuels, lubricants and coolants include diesel fuel, gasoline fuel, motor oils, hydraulic oil, antifreeze and other lubricants. Periodic maintenance activities on the cage structures are occasionally performed using paints or solvents. Necessary precautions and preventative measures are taken to keep these materials from entering the water. These materials are not stored on the floating net pens when not in use. The species change proposal would require no change to these current practices.

Medicated feed that contains antibiotics is used to treat specific disease events at the marine net pens. Medicated feed use is infrequent, and the prescribed medicated feed treatments occur in the form of either 5- or 10-day treatments depending upon the type of antibiotic used. There are currently only three types of antibiotics used at the marine net pens: Romet TC, Terramyacin and Aquaflor. Currently, 100% of the fish are vaccinated at the hatchery for common pathogens prior to being transported to the marine net pens which helps to minimize the incidence of disease and the need for antibiotic treatments at the net pens. These practices would continue to be applied to the stocks of Rainbow Trout/steelhead. The amount, frequency or types of medicated feeds are not expected to increase. Annual medicated feed use has trended downward over the past 10 years (from 2008 to 2018).

4) **Describe special emergency services that might be required.**

There is no anticipated need for new or additional emergency services associated with the proposed change of species to be reared at the marine net pens. Employees working at the farm sites are currently trained in first aid and CPR. Emergency communication devices are located at all existing sites and in crew support vessels. First aid equipment, Automatic Electrical

Defibrillators (AEDs), fire suppression and firefighting equipment, sea survival equipment, and emergency oxygen delivery kits are kept at the sites and/or on board the various support vessels. Minor employee injuries are treated on-site. Medical transport, if needed, can be provided by company crew vessels and by coordination with local land-based Emergency Medical Technicians (EMTs). An emergency meeting point at appropriate shore-side facilities can be arranged with local EMTs if needed. In the event of a serious dive accident, the U.S. Coast Guard would likely be called for assistance to provide rapid helicopter transportation directly from a marine net pen facility to a hyperbaric chamber at Harborview Hospital in Seattle.

Emergency spill prevention, response plans and procedures are posted at each of the existing marine net pen facilities along with emergency spill notification telephone numbers for State and Federal agencies. Emergency spill kits are stored and readily available near fueling areas. In the event of an accidental fuel spill, a marine fuel spill response vessel service would be immediately contacted for assistance, and State and Federal notification procedures would be implemented (Washington Department of Ecology and U.S. Coast Guard National Response Center). Certain employees are HAZWOPPER certified and capable of deploying the on-site spill prevention kits and clean-up materials for initial spill containment response. No change to these procedures would be required to implement the species change proposal.

5) **Proposed measures to reduce or control environmental health hazards, if any**:

Cooke Aquaculture has developed a Spill Prevention, Control and Response procedure for the existing marine net pen sites. Employees are trained and familiar with proper spill prevention procedures. Spill kits are located on each of the farm sites, and emergency spill notification contact numbers are posted in numerous locations. Double containment is used for fuel tanks and hazardous materials located on the floating marine net pen sites. None of these conditions would require any change to implement the species change proposal.

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

None.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Gasoline- and diesel-powered engines are the primary sources of noise associated with the operation of the existing marine net pen sites. The diesel generator engines are contained within sound enclosures and are considered the “run quiet” type of systems used for backup generators at hospitals and similar facilities. Hours of operation are typically normal working hours from 7:00 AM to 6:00 PM. None of these existing practices would be altered by the species change proposal.

3) Proposed measures to reduce or control noise impacts, if any:

Since there would be no noise impacts associated with the species change proposal, no measures are proposed to reduce or control such impacts.

Diesel generators associated with existing marine net pen facilities are operated only as needed.

8. Land and Shoreline Use

a. **What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe**.

The proposed change in species to be reared would utilize existing permitted commercial net pen aquaculture facilities that have been in operation since the early 1980s. Adjacent upland properties are typically developed with residential homes. Exceptions include the Clam Bay facility (in existence since the early 1970s), located adjacent to property owned by the U.S. Government; the Port Angeles net pens located near U.S. Government property and within a working harbor area; and the Cypress fish pens located adjacent to State-owned uplands (see the Vicinity Map in Section A.12 of this SEPA Checklist). Residential development along the waterfront and adjacent to the net pens has continued to occur over the past 30 to 40 years in areas where residential development is zoned. The pens are anchored offshore and do not interact with nearby land uses. The species change proposal would be undetectable to adjacent land uses.

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?

The Washington State Legislature has defined aquaculture as agriculture (RCW 15.85.010). As such, the existing marine net pen facilities could be considered working farmlands. The project application is to maintain the existing agricultural production of farmed fish by transitioning to a native sterile stock of fish species (Rainbow Trout/steelhead).

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:

No.

c. Describe any structures on the site.

See attached drawings.

d. Will any structures be demolished? If so, what?

No structures will be demolished.

e. What is the current zoning classification of the site?

The existing net pen sites are all located in navigable waters that are designated Aquatic. Adjacent upland zoning is as follows:

- Hope Island Site: Adjacent upland zoning classification is Rural Residential (Skagit County).
- Fort Ward and Orchard Rocks Sites: Adjacent upland zoning classification is Shoreline Residential (City of Bainbridge Island).
- Clam Bay Site: Adjacent upland zoning classification is Military (Kitsap County).
- Port Angeles Site: Adjacent upland zoning classification is City (Clallam County).

- Cypress Island Site: Adjacent upland zoning classification is Public (Skagit County).

f. What is the current comprehensive plan designation of the site?

Adjacent upland comprehensive plan designations are:

- Hope Island Site: Shoreline of Statewide Significance
- Fort Ward and Orchard Rocks Sites: Shoreline Residential
- Clam Bay Site: Military
- Port Angeles Site: City
- Cypress Island Site: Public Open Space.

g. If applicable, what is the current shoreline master program designation of the site?

- Hope Island Site: Aquatic
- Fort Ward and Orchard Rocks Sites: Shoreline Residential
- Clam Bay Site: Military
- Port Angeles Site: Aquatic
- Cypress Island Site: Aquatic.

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.

Unknown by applicant.

i. Approximately how many people would reside or work in the completed project?

Each net pen site is staffed with approximately 8 full time employees. There would be no change in the number of workers as a result of implementing the species change proposal.

j. Approximately how many people would the completed project displace?

None.

k. Proposed measures to avoid or reduce displacement impacts, if any:

Since there would be no displacement impacts, no measures are proposed to avoid or reduce such impacts.

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

Existing net pens where the change of species is proposed have all necessary land use permits and in-water permits in-hand, having operated at these locations since the mid-1970s and mid-1980s. The proposal does not create new impacts to existing or projected land uses or land use plans.

m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any:

Since there would be no impacts to agricultural or forest land, no measures are proposed to reduce or control such impacts.

9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

None.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

None.

c. Proposed measures to reduce or control housing impacts, if any:

Since there would be no impacts to housing, no measures are proposed to reduce or control such impacts.

10. Aesthetics

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

The Hope Island and Clam Bay net pen sites have an associated feeding barge that is moored to the fish pen structure. The approximate height of the feed barges is 14 feet above sea level. The net pen structures all have a perimeter barrier net that is approximately 6 to 8 feet above the water level. No change to these structures is required to implement the species change proposal.

b. What views in the immediate vicinity would be altered or obstructed?

The existing fish pens are located from approximately 600 feet to 1,500 feet offshore. They do not obstruct views. View obstruction would not be an impact of the species change proposal.

c. Proposed measures to reduce or control aesthetic impacts, if any:

Since there would be no aesthetic impacts associated with the species change proposal, no measures are proposed to reduce or control such impacts.

The net pen structures use dark or grey materials to help minimize visual impacts. The farm sites are kept clean and orderly.

11. Light and Glare

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

Existing marine net pen facilities are required by the U.S. Coast Guard to maintain navigation warning signal lights under a Private Aids to Navigation (PATON) permit. Each site has a small flashing yellow navigation light that is automatically activated by darkness. The light flashes on every 7 seconds and only operates at night. There are no other surface lights used on the fish pens. No change to existing navigation lights would be required to implement the species change proposal.

Underwater lights (visible as a glow in the water above the sea surface were used seasonally in Atlantic Salmon culture to suppress sexual maturation of the winter entry smolts during their second sea-winter in the 18- to 24-month rearing cycle. Underwater lights will not be used with the species change proposal to rear Rainbow Trout/steelhead because the all-female triploid fish do not go into sexual maturation.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

No.

c. What existing off-site sources of light or glare may affect your proposal?

None.

d. Proposed measures to reduce or control light and glare impacts, if any:

The use of lights on support vessels could be minimized if these vessels are used during the evening hours. There would be no change to this practice as a result of implementing the species change proposal.

12. Recreation

a. What designated and informal recreational opportunities are in the immediate vicinity?

Informal recreational opportunities nearby existing net pen facilities include recreational boating, fishing, wildlife viewing and beach combing.

b. Would the proposed project displace any existing recreational uses? If so, describe.

No. The proposal to change the species reared at existing marine net pen facilities would have no effect on existing recreational uses. There will be no change to the size and/or location of existing net pen structures in order to implement the species change proposal; therefore, there would be no change to existing recreational opportunities adjacent to these facilities.

While existing facilities occupy space on the surface of the water, there is a massive amount of water surface area in comparison that is available for navigation and recreational opportunities around the fish pens.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

Since the species change proposal would result in no impacts to recreation, no measures are proposed to reduce or control such impacts.

Potential conflicts between existing marine net pens and aquatic recreation opportunities are minimized by the use of navigation marker lights and the identification of these lights on NOAA navigation charts.

13. Historic and cultural preservation

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers ? If so, specifically describe.

No.

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.

No.

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

There would be no change to existing floating marine net pen sites to implement the species change proposal; therefore, there would be no cause for any impact to cultural or historic resources.

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

Since there would be no impacts to cultural or historic resources as a result of the species change proposal, no measures are proposed to avoid, minimize, or compensate for loss, changes to, or disturbance to such resources.

14. Transportation

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.

Employees use public roads to get to work and meet in the morning at nearby marinas or at a private company dock to access existing fish pens by boat. Young fish (smolts) are transported from existing Cooke hatcheries to a vessel in Olympia Harbor for transport to existing marine net pen sites. These practices will be the same with the species change proposal as they are with existing operations that rear Atlantic Salmon.

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?

No.

c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?

None, not applicable.

d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).

No.

e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

See the response to SEPA Checklist Question B.14. a, above.

f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

The Fort Ward, Orchard Rocks and Clam Bay sites are accessed from both the Bainbridge Island side of Rich Passage as well as the Manchester side of Rich Passage. Approximately 18 vehicle trips per day, 7 days per week occur on the Bainbridge Island side of Rich Passage. The company owns a dock facility located on Bainbridge Island as well as adjacent upland parking. Employees commute to work and park in the company parking lot where they can then be taken out to the Fort Ward, Orchard Rocks and Clam Bay net pens by company work vessels. A smaller number of employees at these facilities arrive via the Manchester side. Approximately 8 vehicle trips per day, 7 days per week occur on the Manchester side. The number of vessel trips to and from the Rich Passage cages each day varies but on average it is estimated to be 5 to 8 round trips per day. Trip generation at these sites would not change with implementation of the species change proposal.

The Hope Island employees arrive and park their vehicles in a parking lot at the Cornet Bay Marina located on the north end of Whidbey Island. The employees then board the company work vessel and are taken out to the Hope Island net pen site. Approximately 8 vehicle trips per day, 7 days per week occur. The number vessel trips to and from the Hope Island farm is estimated to be 2 to 4 round trips per day. Trip generation at this site would not change with implementation of the species change proposal.

The Port Angeles facility is accessed by boat. Employees park their vehicles in a parking lot adjacent to a small public boat launch located on Ediz Hook. A crew boat picks up the employees and takes them to the farm sites located just offshore of Ediz Hook. Trip generation at these sites would not change with implementation of the species change proposal.

The Cypress Island facilities are accessed by boat. Employees park their vehicles in a marina parking lot located in Anacortes. A crew boat picks up the employees and takes them to the farm sites which are located adjacent to Cypress Island. Trip generation at these sites would not change with implementation of the species change proposal.

Normal work hours on the existing marine net pen sites are 7:00 AM to 6:00 PM, seven days per week.

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

No.

h. Proposed measures to reduce or control transportation impacts, if any:

Employees are encouraged to ride share to work in their personal vehicles. Once on the fish pens, the number of vessel trips are used efficiently. Multiple employees ride out to the fish pens at the same time and then return to shore at the same time. The efficient use of the vessels is encouraged. These existing practices will not be altered by the species change proposal.

15. Public Services

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.

No. The existing marine net pen facilities do not require typical land-based public services, and none would be required to implement the species change proposal.

b. Proposed measures to reduce or control direct impacts on public services, if any.

Since there will be no impact on public services as a result of the species change proposal, no measures are proposed to reduce or control such impacts.

16. Utilities

a. Circle utilities currently available at the site:
electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other <u>(See below)</u>.

The existing marine net pen facilities are self-sufficient. There are no public utilities installed on these sites. Port-O-Lets are maintained on the farm sites for sanitary wastes. A work vessel brings the cleaned and serviced Port-O-Lets out to the farms each week and exchanges them with the used ones. The used Port-O-Lets are taken to an upland support facility where they are cleaned and serviced. The work vessel removes all solid waste (garbage) materials from the farm sites and transports it to nearby upland dock facilities. The shore-side facilities are serviced by municipal waste and recycling collection services. Electricity is provided by diesel electric generators. Bottled drinking water is provided on the sites for the employees. None of these existing practices will be altered as a result of the species change proposal.

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

None, not applicable.

C. Signature

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: 

Name of signee: Kevin Bright

Position and Agency/Organization: Permit Coordinator, Cooke Aquaculture Pacific, LLC

Date Submitted: July 24, 2019

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