ATTACHMENT 3

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3188

WATER
DIVISION

May 29, 2020

Dr. Kim Kratz
Assistant Regional Administrator
National Marine Fisheries Service
Oregon & Washington Coastal Area Office
510 Desmond Drive Southeast, Suite 103
Lacey, Washington 98503-1263

Dear Dr. Kratz:

On April 8, 2011, the Environmental Protection Agency and National Marine Fisheries Service completed the Endangered Species Act Section 7 consultation on the Washington State Department of Ecology's Sediment Management Standards (WAC 173-204-412) regarding marine finfish rearing facilities. Following the collapse of a net pen facility near Cypress Island in August 2017, and the following escapement recovery efforts, Wild Fish Conservancy supplemented the existing litigation regarding disease transmission against both agencies. On August 7, 2018, in *Wild Fish Conservancy v. EPA et al*, 331 F. Supp. 3d 1210 (W.D. Wash. 2018), the Court issued an order denying the federal agencies' motion for judgment on the pleadings and addressing the legal duty of both agencies with regard to reinitiation of ESA consultation and the scope of such consultation.

The EPA disagrees with the Court's holding that it retains sufficient discretion over previously approved state water quality standards to reinitiate consultation. However, consistent with the Court's order, the EPA sent NMFS a letter requesting the reinitiation of consultation on October 1, 2018, which NMFS accepted in a response dated October 3, 2018.

Enclosed is the 2020 Biological Evaluation Addendum prepared by the EPA to facilitate the reinitiation of formal consultation with NMFS. The Addendum incorporates the following new information since the 2008 and 2010 BEs:

- Disease transfer from Atlantic salmon net pen fish to Pacific salmon, primarily relying on a letter from NMFS dated January 12, 2016, and accompanying memo.
- An escapement event that occurred on or around August 19, 2017, at Cooke Aquaculture's Site 2 net pen off Cypress Island and the follow up and the associated response actions.
- Updated National Pollutant Discharge Elimination System permitting actions by the Department of Ecology to minimize escapement risk and covers the planned transition at

existing commercial net pens facilities to raise steelhead instead of Atlantic salmon, which must be phased out by 2022 per Washington state law.

- The EPA NPDES general permit which currently covers tribal enhancement net pen facilities and the reissuance of the general permit in late 2020. The EPA plans to expand the scope of the general permit to include federal research facilities and to allow for the marginal expansion of tribal enhancement facilities. The tribal enhancement facilities raise and release native salmonids and the federal research facilities will raise native fish (Pacific salmon, sablefish, etc.).

In accordance with ESA Section 7(a)(2), the EPA is hereby providing our analysis of potential effects on listed species and critical habitat resulting from the EPA's approval of portions of the Sediment Management Standards at the Washington Administrative Code 173-204, including new information since the previous BEs. The EPA's effects determinations for the species under NMFS's purview are presented in Section 8 of the BE Addendum and summarized below.

	Species	**ESU/DPS/Population**	**Species Effects Determination**	**Critical Habitat Designation**	**Critical Habitat Effects Determination**
1	Chinook Salmon (*Oncorhynchus tshawytscha*)	Puget Sound ESU	LAA	Yes	NLAA
2	Chum Salmon (*Oncorhynchus keta*)	Hood Canal summer-run ESU	LAA	Yes	NLAA
3	Steelhead (*Oncorhynchus mykiss*)	Puget Sound, DPS	LAA	Yes	NLAA
4	Bocaccio (*Sebastes paucispinis*)	Puget Sound/Georgia Basin DPS	LAA	Yes	NLAA
5	Yelloweye Rockfish (*Sebastes ruberrimus*)	(Puget Sound/Georgia Basin DPS)	LAA	Yes	NLAA
6	North American Green Sturgeon (*Acipenser medirostris*)	Southern DPS	NLAA	Yes	NLAA
7	Pacific Eulachon (*Thaleichthys pacificus)*	Southern DPS	NLAA	Yes	NLAA
8	Humpback Whale (*Megaptera novaeangliae*)	Pacific Coast, Mexico DPS and Central America DPS	NLAA	No	--
9	Killer Whale (*Orinus orca*)	Southern Resident, DPS	NLAA	Yes	NLAA

LAA – likely to adversely affect
NLAA – may affect, but not likely to adversely affect

We respectfully request your concurrence on the Agency's determinations for the species and critical habitat that are not likely to be adversely affected.

For the species and critical habitat that are likely to be adversely affected by the Agency's proposed action, we request that you notify the EPA of your agreement to reinitiate formal consultation within 30 days from the receipt of this letter. As described in the duration and extension of formal consultation section at 50 CFR 402.14(e), we anticipate receiving the biological opinion from NMFS within 135 days of initiating formal consultation and if an extension is necessary, procedures in this section will be followed.

The EPA appreciates the technical support from your staff, including the ongoing coordination to discuss NMFS's information needs. We remain available to provide any additional assistance and/or clarification of the enclosed Addendum.

If you have any questions or wish to discuss this matter further, please call me at (206) 553-1855 or contact Matthew Szelag, the EPA staff lead, at (907) 271-1208 or szelag.matthew@epa.gov.

Sincerely,

Daniel D. Opalski
Director

Enclosure

cc (e-copy): Jennifer Quan, NMFS
Jeff Vanderpham, NMFS
Caitlin Imaki, NMFS

ADDENDUM TO THE UPDATED BIOLOGICAL EVALUATION DATED DECEMBER 13, 2010

REGARDING THE EPA CLEAN WATER ACT ACTION ON WASHINGTON'S MARINE FINFISH REARING FACILITY PROVISION CONTAINED IN THE SEDIMENT MANAGEMENT STANDARDS AT WASHINGTON ADMINISTRATIVE CODE 173-204-412

PREPARED FOR:
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE

PREPARED BY:
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE, SUITE 155
SEATTLE, WA 98101

May 29, 2020

Table of Contents

Preface

In the Biological Evaluation of April 17, 2008, and supplemented on August 6, 2008 (collectively referred to as the 2008 BE),[1] the EPA concluded that the approval of certain new and revised water quality standards at WAC 173-204, Washington's Sediment Management Standards, were not likely to adversely affect listed fish species or marine mammals or their designated critical habitat areas since the effects of such approval would be insignificant.

The EPA's approval, following the completion of Endangered Species Act consultation in 2008, of Washington's Sediment Management Standards was challenged in court by Wild Fish Conservancy. On April 28, 2010, the U.S. District Court for the Western District of Washington issued an order setting aside the 2008 consultation on Washington's Sediment Management Standards on grounds that the EPA and NMFS had failed to consider two NMFS recovery plans for Puget Sound Salmon and Southern Resident Killer Whales. *Wild Fish Conservancy v. U.S. Envtl. Prot. Agency*, No. C08-156-JCC, 2010 U.S. Dist. LEXIS 41838, pp. 15-16 (Apr. 28, 2010). Following the Court's decision, the EPA reviewed the two NMFS recovery plans along with the data in the original 2008 BE and other updates to information and analysis and issued an Addendum to the 2008 BE on December 13, 2010 (referred to as the 2010 BE).[2]

> 1. National Marine Fisheries Service. 2007. Puget Sound Salmon Recovery Plan. Shared Strategy for Puget Sound adopted by National Marine Fisheries Service. Volumes I and II.[3]
>
> 2. National Marine Fisheries Service. 2008. Recovery Plan for Southern Resident Killer Whales *(Orcinus orca)*. National Marine Fisheries Service, Northwest Region, Seattle, Washington.[4]

Following a review of the information presented in the recovery plans, the EPA determined that although net pen operations in accordance with the provisions at WAC 173-204 may affect ESA listed species or their critical habitat, such effect is not likely to adversely affect (NLAA) the three species of salmonids and the southern resident killer whale. Therefore, the EPA reaffirmed the NLAA and no effect determinations contained in the 2008 BE. The EPA also provided an analysis and a NLAA determination for the three additional listed species of rockfish in Puget Sound: bocaccio, canary, and yelloweye rockfish. ESA consultation was completed on April 8,

---

[1] April 17, 2008. Supplemented August 6, 2008. U.S. EPA Region 10. *Biological Evaluation of Washington's Marine Finfish Rearing Facility Provision Contained in the Sediment Management Standards.* Prepared for U.S. Fish & Wildlife Service and National Marine Fisheries Service.

[2] December 13, 2010. U.S. EPA Region 10. *Update to the Biological Evaluation Submitted April 17 and August 6, 2008, Regarding EPA Action on Washington's Marine Finfish Rearing Facility Provision Contained in the Sediment Management Standards.* Prepared for National Marine Fisheries Service.

[3] Available online at: https://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/puget_sound/puget_sound_chinook_recovery_plan.html

[4] Available online at: https://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/killer_whale/recovery_plan.html

2011,[5] and the EPA re-approved the applicable provisions on April 22, 2011.[6]

On November 4, 2015,[7] Wild Fish Conservancy filed new litigation alleging that the informal consultation concluded in April 2011 was arbitrary, and that the EPA and NMFS had a duty to reinitiate consultation based on new information related to disease outbreak. On December 7, 2017, following the collapse of a commercial net pen and escape of Atlantic salmon, Wild Fish Conservancy filed a second amended complaint supplementing its litigation to claim that the net pen collapse presented additional information requiring both federal agencies to reinitiate consultation.[8] The EPA acknowledged the net pen failure in a letter to NMFS on December 14, 2017.[9] On August 7, 2018, the Court issued an order denying the federal agencies' motion for judgment on the pleadings and addressing the legal duty of both agencies with regard to reinitiation of consultation and the scope of such consultation.[10] *Wild Fish Conservancy v. EPA et al*, 331 F. Supp. 3d 1210 (W.D. Wash. 2018).

The EPA disagrees with the Court's holding that it retains sufficient discretion over previously approved state water quality standards to reinitiate consultation. However, consistent with the Court's order, the EPA sent NMFS a letter requesting the reinitiation of consultation on October 1, 2018,[11] which NMFS accepted in a response dated October 3, 2018.[12]

This 2020 BE Addendum incorporates new information on several different topics. First, additional information regarding disease transfer from Atlantic salmon net pen fish to Pacific

[5] April 8, 2011. Letter from William W. Stelle, Jr., Regional Administrator, NFMS to Jannine Jennings, Water Quality Standards Unit, EPA Region 10, *Re: Endangered Species Act Section 7 Informal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Proposed Approval of Finfish Rearing Facility Provision Contained in the Sediment Management Standards Rule Promulgated by the Washington State Department of Ecology (HUC 17110019, Puget Sound).*

[6] April 22, 2011. U.S. EPA Region 10. Letter from Michael A. Bussell, Director Office of Water and Watersheds, EPA Region 10 to Mr. Kelly Susewind and Mr. Jim Pendowski, Department of Ecology*, Re: EPA's Re-Approval of Washington's Revised Sediment Management Standards (WAC 173-204) including the Marine Finfish Rearing Facility Provision, as submitted on June 3, 1996.*

[7] November 4, 2015. Case 2:15-cv-01731. WFC V. U.S. EPA and NMFS. *Complaint for Declaratory and Injunctive Relief.*

[8] November 22, 2017. Case 2:15-cv-01731-BJR. WFC V. U.S. EPA and NMFS. *Plaintiff's Motions to Supplement Pleadings and Amend Case Schedule.*

[9] December 14, 2017. Letter from Michael Lidgard, Acting Director, Office of Water and Watersheds, EPA Region 10 to Mr. Kim Kratz, Assistant Regional Administrator, NMFS, *Re: August 2017 Puget Sound Net Pen Failure.*

[10] August 7, 2018. Case 2:15-cv-01731-BJR. WFC V. U.S. EPA and NMFS. *Order Denying (1) Federal Defendants' Motion for Judgment on the Pleadings and (2) Cooke Aquaculture's Motion to Dismiss.*

[11] October 1, 2018. Letter from Daniel D. Opalski, Director Office of Water and Watersheds, EPA Region 10 to Mr. Kim Kratz, Assistant Regional Administrator, NMFS *Re: Request to Reinitiate Endangered Species Act Section 7 Consultation on the Environmental Protection Agency's Approval of Washington State Department of Ecology's Sediment Management Standards (WAC 173-204-412) Regarding Marine Finfish Rearing Facilities.*

[12] October 3, 2018. Letter from Barry A. Thom, Regional Administrator, NMFS, to Dan Opalski Director Office of Water and Watersheds, EPA Region 10, *Re: Request to Reinitiate April 8, 2011 Endangered Species Act Section 7 Consultation on the Environmental Protection Agency's Approval of Washington State Department of Ecology's Sediment Management Standards (WAC 173-204-412) Regarding Marine Finfish Rearing Facilities (refer to NMFS No.: NWR-2010-6071).*

salmon has been included, primarily relying on a letter from NFMS dated January 12, 2016,[13] and accompanying memo in response to a request from the EPA on December 16, 2015.[14] Second, further information regarding an escapement event that occurred on or around August 19, 2017, at Cooke Aquaculture's Site 2 net pen off Cypress Island, including the follow up and the associated response has been included in this 2020 BE Addendum. The Addendum incorporates updated National Pollutant Discharge Elimination System (NPDES) permitting actions by the Washington State Department of Ecology (Ecology), to minimize escapement risk and covers the planned transition at commercial net pen facilities to raise steelhead instead of Atlantic salmon which must be phased out by 2022. Lastly, the Addendum discusses facilities covered by the current EPA NPDES general permit (WAG132000),[15] which covers tribal enhancement facilities. In their reissuance of the general permit in late 2020, EPA plans to expand the scope of the general permit to include federal research facilities and to allow for the marginal expansion of tribal enhancement facilities. The tribal enhancement facilities raise and release native salmonids and the federal research facilities will raise native fish (Pacific salmon, sablefish, etc.). Please note that throughout this Addendum, the EPA will refer to both the currently covered tribal enhancement facilities and the soon to be covered federal research facilities broadly as "facilities covered under EPA's NPDES GP." The current EPA general permit cites, but does not necessarily rely on, the Sediment Management Standards at WAC 173-204 for their permitted operations, and the reissued NPDES GP will be similar in this regard.

Given the gap between the 2010 BE and this 2020 Addendum, the EPA is providing updated information to be considered in this ESA consultation. Below is a crosswalk that explains the updates to each section of the 2010 BE that are included in this 2020 Addendum. The updates include:

1. Updates to the **Background** to revise the number of net pen facilities included in the consultation and Ecology's permitting activities and moratorium on Atlantic salmon net pens
2. Minor updates to the **Description of the Agency Action** to reflect changes to the provisions at WAC 173-204
3. Updates to the **Description of the Action Area** to note the net pen facilities included in this consultation

[13] January 12, 2016. Letter from Kim W. Kratz, Ph.D., Assistant Regional Administrator, Oregon Washington Coastal Office, NMFS, to Dan Opalski, Director Office of Water and Watersheds, EPA Region 10 with enclosed memo dated December 17, 2015 from Dr. Dickhoff to Dr. Kratz *Re: Scientific Review of Intent to Sue U.S. Environmental Protection Agency and National Marine Fisheries Service for violations of the Endangered Species Act associated with consultation of Washington State's Revised Sediment Management Standards for Marine Finfish Facilities dated 25 August 2015.*

[14] December 16, 2015. Letter from Daniel D. Opalski, Director Office of Water and Watersheds, EPA Region 10 to Mr. William Stelle, Administrator, West Coast Region, NMFS *Re: Washington's Sediment Management Standards regarding Netpen Facilities.*

[15] September 9, 2015. EPA Region 10. Tribal Marine Net Pen Enhancement Facilities NPDES General Permit for Washington. WAG132000. https://www.epa.gov/sites/production/files/2018-03/documents/r10-npdes-washington-tribal-net-pen-gp-wag132000-final-permit-2015.pdf

4. Updates to the **Species Status and Life History** to include newly listed species of North American Green Sturgeon and Pacific Eulachon along with steelhead, bocaccio and yelloweye rockfish designated critical habitat since 2010
5. The **Environment Baseline** remains largely unchanged except where noted
6. Updates to the **Analysis of Effects** regarding the indirect effects associated with disease transfer, escapement events, permitting activity to minimize escapement risk/additional net pen facilities, and new native species reared
7. The **Cumulative Effects** section remains unchanged
8. New **Summary of Findings** to reflect the EPA's revised determinations
9. The **Sediment Testing Methodology Provisions** section remains largely unchanged except where noted
10. **References**
11. Updated **Maps**

1. Background

In 1991, the EPA approved Washington's Sediment Management Standards (SMS). On June 3, 1996, Ecology submitted revisions to WAC 173-204, which included minor revisions to the sediment testing methodology provisions and a new section for marine finfish rearing facilities at WAC-173-204-412. These revisions were subject to the Alaska Rule[16] since they were adopted by Washington and submitted to the EPA for review prior to May 30, 2000, and the EPA took no action prior to that date. In accordance with 40 CFR 131.21(c)(1), Washington's 1996 sediment management standard revisions went into effect for Clean Water Act purposes as soon as they were effective under state law.

The addition of the marine finfish rearing facility section exempts net pen facilities in Puget Sound from portions of Washington's sediment management standards, underneath and around the immediate area of the net pen. The section also states that sediment quality compliance and monitoring requirements of net pen facilities are addressed through the NPDES permitting program. The section provides for a special sediment impact zone by rule within and including a distance of 100 feet from the outer edge of net pen facility structures; consequently, such facilities and their associated discharges are exempt from marine sediment quality standards, sediment impact zone maximum criteria, and sediment impact zone standards at WAC 173-204-415. The section also allows Ecology to authorize sediment impact zones beyond 100 feet via NPDES permits or administrative actions, subject to increased monitoring. The rule provides no exemptions to compliance with Washington's water quality standards for net pen facilities.

For commercially operated net pens, the Washington State Department of Natural Resources (WDNR) issues a site license for each facility (lease expiration date) and the Washington Department of Fish and Wildlife (WDFW) regulates disease control, fish health and escape management at each facility.

[16] Rule specifying that new and revised standards adopted by States and authorized Tribes on or after May 30, 2000, become "applicable standards for Clean Water Act purposes" only when approved by EPA. https://www.federalregister.gov/documents/2000/04/27/00-8536/epa-review-and-approval-of-state-and-tribal-water-quality-standards

Currently, there are four active commercially operated Atlantic salmon net pen facilities in Puget Sound operated by Cooke Aquaculture. Previously, there were eight active facilities, but due to the collapse of Site #2 off Cypress Island and the closure of the Port Angeles (Ediz Hook) net pen, among others off Cypress Island, the number of facilities has been reduced to four since the 2010 BE. The remaining net pens include one near Hope Island (Skagit Bay) and three in Rich Passage near Bainbridge Island. Although the operator may pursue using some of the previously active net pens in the future, the potential effects from those sites would be similar to the sites evaluated in this BE Addendum.

Ecology reissued NPDES permits for the four active commercially operated net pen facilities on July 11, 2019.[17] The updated NPDES permit requirements allow Ecology to ensure that facilities are meeting water quality standards until the Atlantic salmon net pens are phased out. In 2018, following the collapse of Cooke's net pen facility Cypress Island—Site 2 and the resulting escape of approximately 250,000 Atlantic salmon, the Washington State Legislature passed House Bill 2957, phasing out marine rearing of all Atlantic salmon as the facility aquatic lands leases expire by 2022.[18] More information regarding new permitting activity for these facilities is provided in the Analysis of Effects section of this BE Addendum.

These facilities are expected to be converted to steelhead (all-female triploid rainbow trout) facilities, as indicated in a permit application submitted by Cooke Aquaculture Pacific, LLC, to WDFW on January 18, 2019.[19] On January 21, 2020, WDFW approved Cooke's application after completing the State Environmental Policy Act (SEPA) process.[20] The five-year permit enables Cooke to farm all-female, sterile (triploid) rainbow trout/steelhead in Puget Sound and applies to existing net pens in Puget Sound where Cooke holds valid aquatic land leases with the Washington Department of Natural Resources. This includes four pens currently operating near Rich Passage and Skagit Bay, but may later extend to three additional net pens owned by Cooke. Ecology is currently in the process of revising the NPDES permits authorizing Cooke to transition to rearing steelhead and is accepting public comments until June 8. 2020.[21]

To ensure a complete review and analysis in this 2020 Addendum, the EPA is also including facilities covered under EPA's NPDES GP. There are significant differences (such as the sizes of the facilities and types of operations, species raised such as Coho or sablefish, etc.) between the permittees covered under the EPA NPDES GP and Ecology's permitting of large commercial net

[17] Washington Department of Ecology. Atlantic salmon net pen individual permits. Accessed May 26, 2020. https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-quality-permits/Water-Quality-individual-permits/Net-pens

[18] March 26, 2018. Washington State House Bill 2957. Nonnative Finfish—Marine Aquaculture—Escape. Chapter 179, Laws of 2018.

[19] January 18, 2019. Cooke Aquaculture Pacific, LLC. Fin Fish Aquaculture Permit – Plan of Operation. All-female Triploid Rainbow Trout (Oncorhynchus mykiss).

[20] January 21, 2020. WDFW. 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. https://wdfw.wa.gov/sites/default/files/2020-01/marine_aquaculture_permit_justification-01-31-20.pdf

[21] Washington Department of Ecology. Salmon net pen water quality individual permits. Accessed May 26, 2020. https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-quality-permits/Water-Quality-individual-permits/Net-pens

pen facilities. The permitting regulations distinguish between these two types of net pen facilities found in Puget Sound are discussed in more detail below in the Analysis of Effects.

2. Description of the Agency Action

The following is a list of the SMS provisions which could affect aquatic life and were addressed in the 2008 and 2010 BEs.

- WAC 173-204-200 (13): Definition of "Marine finfish rearing facilities."
- WAC 173-204-315(1)(b)(ii)
- WAC 173-204-315(2)(b)
- WAC 173-204-315 (2)(d)
- WAC 173-204-320 (3)(d)
- WAC 173-204-412 (2): Applicability of marine finfish rearing facilities.
- WAC 173-204-412 (3)(a) and (3)(b): Sediment monitoring requirements of marine finfish rearing facilities.
- WAC 173-204-412 (4), (4)(a), (4)(a)(i), (4)(a)(ii) and (4)(b): Sediment impact zones for marine finfish rearing facilities.
- WAC 173-204-420 (3)(c)(iv)
- WAC 173-204-520 (3)(d)(iv)

This 2020 Addendum updates the following two provisions from the 2010 BE. These changes have no effect on the outcome of the consultations from 2010 and 2008. The remainder of the provisions have not been revised and there are no new additional provisions in the SMS to be included in this consultation.

1. On December 18, 2015, the EPA approved a minor non-substantive edit to the definition of *"marine finfish rearing facilities" at WAC 173-204-200 (13)*.[22] The revisions are reflected below in strikeout. This minor revision has no effect on the updated consultation.

(13) "Marine finfish rearing facilities" ((~~shall~~)) means those private and public facilities located within state waters where finfish are fed, nurtured, held, maintained, or reared to reach the size of release or for market sale.

2. The second provision that was revised is *WAC 173-204-520(3)(d)(iv). Juvenile polychaete Puget Sound marine sediment cleanup screening levels and minimum cleanup level biological criteria.*

The state deleted and substantively replaced this provision as part of its revisions to the SMS in 2013. On December 18, 2015, the EPA rescinded its 2008 approval of this provision because it

[22] December 18, 2015. Letter from Dan Opalski, Director, Office of Water and Watershed, EPA Region 10 to Maia Bellon, Director, Washington Department of Ecology, *Re: EPA's Approval and Decision on Revisions to Washington's Sediment Management Standards (SMS), Chapter 173-3014 WAC* and enclosed Technical Justification.

determined that Part V of the SMS is not a water quality standard. Therefore, this provision is no longer relevant to the consultation and this Addendum.

Note that the revisions outside of WAC 173-204-412 (and the definition of marine finfish rearing facilities) relate to sediment testing methodology. They were originally described in the EPA's August 6, 2008 supplement to the 2008 BE. The EPA reevaluated its conclusions in the August 6, 2008 supplement based upon new information and has not modified these conclusions since the provisions are applicable only to sediment testing methodology. See Section 9 of this Addendum for more information.

3. Description of the Action Area

The action area subject to this consultation on the SMS is the Puget Sound. The definition of Puget Sound has not been revised since the 2008 and 2010 consultation. Puget Sound is defined in the SMS at WAC-173-204-200(20): "Puget Sound basin" or "Puget Sound" means: (a) Puget Sound south of Admiralty Inlet, including Hood Canal and Saratoga Passage; (b) The waters north to the Canadian border, including portions of the Strait of Georgia; (c) The Strait of Juan de Fuca south of the Canadian border; and (d) All the lands draining into these waters as mapped in water resources inventory areas numbers 1 through 19, set forth in water resources management program established pursuant to the Water Resources Act of 1971, chapter 173-500 WAC.

The SMS for marine finfish rearing facilities are applicable to all commercially operated net pen facilities in Puget Sound, regardless of species reared. In this addendum, facilities covered under EPA's NPDES GP are also evaluated. Although the EPA's approval action of the SMS does not apply to, and thus the action area does not include, any waters within Indian Country (i.e., Native American reservations, Indian communities, and trust lands).

The EPA's view of the action area is informed by its understanding of the areas that may be affected directly or indirectly by its approval of the SMS related to marine finfish rearing facilities. Furthermore, the effects of the action – whether direct or indirect – occur within Puget Sound; therefore, the EPA continues to define the Puget Sound as the area that may be affected by this action. However, the EPA understands the concerns associated with escaped fish movement and recovery efforts related to the 2017 net pen collapse. To address such concerns, the EPA has chosen to voluntarily consider the effects of its action on freshwater steelhead critical habitat and freshwater Eulachon habitat and is making a corresponding effects determination in this Addendum.

4. Species Status and Life History of Fish Species Assessed

Subsequent to the 2010 BE and the addition of three rockfish species, two new species have been listed – North American Green Sturgeon and Pacific Eulachon (southern DPS). In addition, steelhead and two species of rockfish critical habitats have been designated for Puget Sound. Effective March 24, 2017, Canary Rockfish were delisted. The species status and life history for these newly listed species and critical habitat has been added below.

Please note the numbering in this section is consistent with the 2010 BE. There are no updates to 4.B.1. Chinook salmon and 4.B.2. Chum Salmon.

4.B.3. Steelhead Puget Sound DPS (Updated Critical Habitat)[23]

Critical Habitat

Critical habitat designation for the Puget Sound steelhead was proposed on January 14, 2013. The areas under consideration include watersheds in Puget Sound and the Strait of Juan de Fuca in Washington.

Critical habitat was designated for the remaining five of Oregon and Washington listed steelhead on September 2, 2005 (70 FR 52630). Indian lands are excluded from critical habitat for these populations.[24]

On February 24, 2016, NMFS issued a final rule designating critical habitat for threatened Puget Sound steelhead (81 FR 9251). The specific areas designated include approximately 2,031 miles (3,269 km) of freshwater and estuarine habitat in Puget Sound, including areas in the upper Elwha River that were not occupied by steelhead at the time of designation but that were determined to be essential for the conservation of the species. In keeping with the ESA and NMFS's past practice, the final designation excludes approximately 70 miles (113 km) of streams in Indian lands, 1,361 miles (2,190 km) of streams associated with approved Habitat Conservation Plans, and 28 miles (45 km) of streams associated with military lands where potential impacts on national security outweigh the benefits of designation as critical habitat. NMFS also excluded all habitat areas in three watersheds (Lake Washington, Lake Sammamish, and Sammamish River watersheds) where the economic impacts were deemed to outweigh the benefits of designation. A critical habitat map for this species is shown in the Maps section and is also available online.[25]

On December 30, 2019, NFMS issued a recovery plan for the Steelhead Puget Sound DPS.[26]

4.B.4. Bocaccio Puget Sound/Georgia Basin DPS

---

[23] This information has been adapted from the EPA's *Revised* Biological Evaluation for the General NPDES Permit for Offshore Seafood Processing Discharge within Federal Waters Off the Coasts of Washington and Oregon Permit No. WAG520000. Revised May 2017. https://www.epa.gov/sites/production/files/2017-06/documents/r10-npdes-offshore-seafood-gp-wa-or-wag520000-biological-evaluation-2017.pdf

[24] Further information from NMFS provided on ESA Critical Habitat for Puget Sound Steelhead website accessed on May 26, 2020. https://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/puget_sound/steelhead_recovery_workshop_2013/stone_habitat.html

[25] NMFS. Map of Designated Critical Habitat for Puget Sound Steelhead. Accessed May 26, 2020. https://www.westcoast.fisheries.noaa.gov/publications/gis_maps/maps/salmon_steelhead/critical_habitat/steelhead/steelhead_ps.pdf

[26] December 20, 2019. NOAA Fisheries. ESA Recovery Plan for the Puget Sound Steelhead Distinct Population Segment (Oncorhynchus mykiss). https://www.fisheries.noaa.gov/resource/document/esa-recovery-plan-puget-sound-steelhead-distinct-population-segment-oncorhynchus

Critical Habitat was designated for Bocaccio on November 13, 2014 (79 FR 68041). Critical habitat is found throughout Puget Sound. The specific areas in the final designation include 590.4 square miles of nearshore habitat and 414.1 square miles of deepwater habitat. A critical habitat map for this species is shown in the Maps section and is also available online.[27]

Species range, critical habitat, life history and ecology, and population trends and risks for Bocaccio Puget Sound/Georgia Basin DPS can be found at https://www.westcoast.fisheries.noaa.gov/publications/protected_species/other/rockfish/final_yelloweye_rockfish_and_bocaccio_recovery_plan_508.pdf

4.B.5. Canary Rockfish Puget Sound/Georgia Basin DPS

Effective March 24, 2017, Canary Rockfish were delisted[28] and therefore are no longer part of this analysis.

4.B.6. Yelloweye Rockfish Puget Sound/Georgia Basin DPS

Critical Habitat was designated for Yelloweye Rockfish on November 13, 2014 (79 FR 68041). Critical habitat is found throughout Puget Sound. The specific areas in the final designation includes 414.1 square miles of deepwater habitat. A critical habitat map for this species is shown in the Maps section and is also available online.[29]

Species range, critical habitat, life history and ecology, and population trends and risks for Yellow Rockfish Puget Sound/Georgia Basin DPS can be found at https://www.westcoast.fisheries.noaa.gov/publications/protected_species/other/rockfish/final_yelloweye_rockfish_and_bocaccio_recovery_plan_508.pdf

4.B.7. North American Green Sturgeon[30]

The North American green sturgeon was officially divided into two Distinct Population Segments by the NMFS on January 29, 2003 (68 FR 4433). The Southern DPS, which includes

---

[27] NMFS. Map of Designated Critical Habitat for Bocaccio, Canary, and Yelloweye Rockfish Distinct Population Segments. Accessed May 26, 2020. https://www.westcoast.fisheries.noaa.gov/publications/gis_maps/maps/other/rockfish/pugetsoundrockfishch8_25_14.pdf

[28] 82 FR 7711. January 23, 2017. Endangered and Threatened Species; Removal of the Puget Sound/Georgia Basin Distinct Population Segment of Canary Rockfish From the Federal List of Threatened and Endangered Species and Removal of Designated Critical Habitat, and Update and Amendment to the Listing Descriptions for the Yelloweye Rockfish DPS and Bocaccio DPS. https://www.federalregister.gov/documents/2017/01/23/2017-00559/endangered-and-threatened-species-removal-of-the-puget-soundgeorgia-basin-distinct-population

[29] NMFS. Map of Designated Critical Habitat for Bocaccio, Canary, and Yelloweye Rockfish Distinct Population Segments. Accessed May 26, 2020. https://www.westcoast.fisheries.noaa.gov/publications/gis_maps/maps/other/rockfish/pugetsoundrockfishch8_25_14.pdf

[30] This information has been adapted from the EPA's *Revised* Biological Evaluation for the General NPDES Permit for Offshore Seafood Processing Discharge within Federal Waters Off the Coasts of Washington and Oregon Permit No. WAG520000. Revised May 2017. https://www.epa.gov/sites/production/files/2017-06/documents/r10-npdes-offshore-seafood-gp-wa-or-wag520000-biological-evaluation-2017.pdf

any coastal or Central Valley, California populations south of the Eel River in California (the only known population being in the Sacramento River), was listed as Threatened on April 7, 2006 (71 FR 17757).[31]

Species Range

Green sturgeon are the most broadly distributed, wide-ranging, and most marine-oriented species of the sturgeon family. The green sturgeon ranges from Mexico to at least Alaska in marine waters, and is observed in bays and estuaries up and down the west coast of North America (Moyle et al., 1995).

Critical Habitat

Critical habitat for the Southern DPS of North American green sturgeon was designated on October 9, 2009 (74 FR 52300). A critical habitat map for this species is shown in the Maps section and is also available online.[32]

All of the freshwater riverine parts of the critical habitat are in California; there are none in Oregon or Washington.

Coastal bays and estuaries included in the critical habitat designation include Coos Bay, Winchester Bay, Yaquina Bay, and Nehalem Bay in Oregon; Willapa Bay and Grays Harbor in Washington; and the Lower Columbia River estuary in both states. Critical habitat in bays and estuaries includes tidally influenced areas as defined by the elevation of mean higher high water. The boundary between coastal marine areas and bays and estuaries are delineated by the COLREGS lines (33 CFR 80).

The marine portion of the critical habitat includes all U.S. coastal marine waters out to the 60 fathom (fm.) (110 m) depth bathymetry line (relative to MLLW) from Monterey Bay, California north and east to include waters in the Strait of Juan de Fuca, Washington. The Strait of Juan de Fuca includes all U.S. marine waters: in Clallam County east of a line connecting Cape Flattery, Tatoosh Island, and Bonilla Point, British Columbia; in Jefferson and Island counties north and west of a line connecting Point Wilson and Partridge Point; and in San Juan and Skagit counties south of lines connecting the U.S.-Canada border and Pile Point, Cattle Point and Davis Point, and Fidalgo Head and Lopez Island. Critical habitat in coastal marine areas is defined by the zone between the 60 (fm.) depth bathymetry line and the line on shore reached by mean lower low water (MLLW), or to the COLREGS lines.

The primary constituent elements of nearshore coastal marine critical habitat areas that are essential for the conservation of the Southern DPS of green sturgeon are:

(i) Migratory corridor: a migratory pathway for the safe and timely passage within marine and between estuarine and marine habitats.

(ii) Water quality: nearshore marine waters with adequate dissolved oxygen levels and acceptably low levels of contaminants (e.g., pesticides, organochlorines, elevated levels

[31] Further information from NMFS provided on Green Sturgeon website accessed on May 26, 2020. https://www.westcoast.fisheries.noaa.gov/protected_species/green_sturgeon/green_sturgeon_pg.html

[32] NMFS. Map of Designated Critical Habitat for Southern DPS of Green Sturgeon. Accessed May 26, 2020. https://www.westcoast.fisheries.noaa.gov/publications/gis_maps/maps/salmon_steelhead/critical_habitat/greensturgeon_ch_maps.pdf

of heavy metals) that may disrupt the normal behavior, growth, and viability of sub-adult and adult green sturgeon.
(iii) Food resources: abundant prey items for sub-adults and adults, which may include benthic invertebrates and fishes.

Certain areas in the Strait of Juan de Fuca and Whidbey Island, Washington that are owned or controlled by the Department of Defense, or designated for its use, are excluded from critical habitat.

All Indian lands of the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw as well as the Coquille Indian Tribe in Oregon; and the Hoh, Jamestown S'Klallam, Lower Elwha, Makah, Quileute, Quinault, and Shoalwater Bay Tribes in Washington are excluded from critical habitat designation.

Life history and ecology

Green sturgeon are long-lived, slow-growing fish. Mature males range from 4.5-6.5 feet (1.4-2 m) in "fork length" and do not mature until they are at least 15 years old (Van Eenennaam, 2002), while mature females range from 5-7 feet (1.6-2.2 m) fork length and do not mature until they are at least 17 years old. Maximum ages of adult green sturgeon are likely to range from 60-70 years (Moyle, 2002).

Green sturgeon are believed to spend the majority of their lives in nearshore oceanic waters, bays, and estuaries. Early life-history stages reside in fresh water, with adults returning to freshwater to spawn when they are more than 15 years of age and more than 4 feet (1.3 m) in size. Spawning is believed to occur every 2-5 years (Moyle, 2002). Adults typically migrate into fresh water beginning in late February; spawning occurs from March-July, with peak activity from April-June (Moyle et al., 1995). Females produce 60,000-140,000 eggs (Moyle et al., 1992). Juvenile green sturgeon spend 1-4 years in fresh and estuarine waters before dispersal to saltwater (Beamsesderfer and Webb, 2002). They disperse widely in the ocean after their out-migration from freshwater (Moyle et al., 1992).

The only available feeding data on adult green sturgeon shows that they eat benthic invertebrates including shrimp, mollusks, amphipods, and even small fish (Moyle et al., 1992).

Population trends and risks

Little data on current population sizes exists and data on population trends is lacking. The principal factor in the decline of the Southern DPS is reduction of the spawning area to a limited section of the Sacramento River. Other threats to the Southern DPS include insufficient freshwater flow rates in spawning areas, contaminants (e.g., pesticides), bycatch of green sturgeon in fisheries, potential poaching (e.g., for caviar), entrainment by water projects, influence of exotic species, small population size, impassable barriers (dams) to spawning grounds, and elevated water temperatures.[33]

[33] Further information from NMFS provided on Green Sturgeon website accessed on May 26, 2020. https://www.westcoast.fisheries.noaa.gov/protected_species/green_sturgeon/green_sturgeon_pg.html

4.B.8. Pacific Eulachon (Southern DPS)[34]

Eulachon (*Thaleichthys pacificus*), commonly called smelt, candlefish, or hooligan, are a small, anadromous fish from the eastern Pacific Ocean. The Southern DPS of the species was listed as threatened on April 13, 2011 (76 FR 20558).[35]

Species range

Eulachon are endemic to the eastern Pacific Ocean, ranging from northern California to southwest Alaska and into the southeastern Bering Sea. In the continental United States, most Eulachon originate in the Columbia River Basin. Other areas in the United States where Eulachon have been documented include the Sacramento River, Russian River, Humboldt Bay and several nearby smaller coastal rivers (e.g., Mad River), and the Klamath River in California; the Rogue River and Umpqua Rivers in Oregon; and infrequently in coastal rivers and tributaries to Puget Sound, Washington. Eulachon occur in nearshore ocean waters and to 1000 feet (300 m) in depth, except for the brief spawning runs into their natal (birth) streams.[36]

Critical habitat

Sixteen specific areas within the states of California, Oregon, and Washington, of which thirteen are in Washington and Oregon, were designated as critical habitat for the southern Distinct Population Segment (DPS) of Pacific Eulachon on October 20, 2011 (76 FR 65324). The designated areas are a combination of freshwater creeks and rivers and their associated estuaries, comprising approximately 539 km (335 mi) of habitat.

Critical habitat for this DPS includes portions of the Umpqua River, Tenmile Creek, and Sandy River in Oregon; Grays River, Skamokawa Creek, Elochoman River, Cowlitz River, Toutle River, Kalama River, Lewis River, Quinault River, and Elwha River in Washington; and Columbia River in both states. Tribal lands of four Indian tribes are excluded from designation.

A critical habitat map for this species is shown in the Maps section and is also available online.[37]

Life history and ecology

Eulachon typically spend 3 to 5 years in saltwater before returning to freshwater to spawn from late winter through mid-spring. Spawning grounds are typically in the lower reaches of larger snowmelt-fed rivers with water temperatures ranging from 39 to 50° F (4-10° C). Spawning occurs over sand or coarse gravel substrates. Eggs are fertilized in the water column. After

---

[34] This information has been adapted from the EPA's *Revised* Biological Evaluation for the General NPDES Permit for Offshore Seafood Processing Discharge within Federal Waters Off the Coasts of Washington and Oregon Permit No. WAG520000. Revised May 2017. https://www.epa.gov/sites/production/files/2017-06/documents/r10-npdes-offshore-seafood-gp-wa-or-wag520000-biological-evaluation-2017.pdf

[35] Further information from NMFS provided on Eulachon website accessed on May 26, 2020. https://www.westcoast.fisheries.noaa.gov/protected_species/eulachon/pacific_eulachon.html

[36] Further information from NMFS provided on Eulachon website accessed on May 26, 2020. https://www.westcoast.fisheries.noaa.gov/protected_species/eulachon/pacific_eulachon.html

[37] NMFS. Map of Designated Critical Habitat for Southern DPS of Eulachon. Accessed May 26, 2020. https://www.westcoast.fisheries.noaa.gov/publications/gis_maps/maps/other/eulachon/eulachon-ch-maps.pdf

fertilization, the eggs sink and adhere to the river bottom. Most Eulachon adults die after spawning. Eulachon eggs hatch in 20 to 40 days. The larvae are then carried downstream and are dispersed by estuarine and ocean currents shortly after hatching. Juvenile Eulachon move from shallow nearshore areas to mid-depth areas. Within the Columbia River Basin, the major and most consistent spawning runs occur in the mainstem of the Columbia River as far upstream as the Bonneville Dam, and in the Cowlitz River.[38]

Population trends and risks

Eulachon abundance exhibits considerable year-to-year variability. However, nearly all spawning runs from California to southeastern Alaska have declined in the past 20 years, especially since the mid-1990s. From 1938 to 1992, the median commercial catch of Eulachon in the Columbia River was approximately 2 million pounds (900,000 kg) but from 1993 to 2006, the median catch had declined to approximately 43,000 pounds (19,500 kg), representing a nearly 98 percent reduction in catch from the prior period. Eulachon returns to British Columbia rivers similarly suffered severe declines in the mid-1990s and, despite increased returns during 2001 to 2003, presently remain at very low levels. The populations in the Klamath River, Mad River, Redwood Creek, and Sacramento River are likely extirpated or nearly so.

Habitat loss and degradation threaten Eulachon, particularly in the Columbia River basin. Hydroelectric dams block access to historical spawning grounds and affect the quality of spawning substrates through flow management, altered delivery of coarse sediments, and siltation. The release of fine sediments from behind a U.S. Army Corps of Engineers sediment retention structure on the Toutle River has been negatively correlated with Cowlitz River Eulachon returns 3 to 4 years later and is thus implicated in harming Eulachon in this river system, though the exact cause of the effect is undetermined. Dredging activities in the Cowlitz and Columbia rivers during spawning runs may entrain and kill fish or otherwise result in decreased spawning success.

Eulachon have been shown to carry high levels of chemical pollutants, and although it has not been demonstrated that high contaminant loads in Eulachon result in increased mortality or reduced reproductive success, such effects have been shown in other fish species. Eulachon harvest has been curtailed significantly in response to population declines. However, existing regulatory mechanisms may be inadequate to recover Eulachon stocks.

Global climate change may threaten Eulachon, particularly in the southern portion of its range where ocean warming trends may be the most pronounced and may alter prey, spawning, and rearing success.[39]

5. Environmental Baseline

The environmental baseline of Puget Sound and the surrounding area is largely unchanged from the previous consultation; however, additional studies and new information are provided

[38] Further information from NMFS provided on Eulachon website accessed on May 26, 2020. https://www.westcoast.fisheries.noaa.gov/protected_species/eulachon/pacific_eulachon.html
[39] Further information from NMFS provided on Eulachon website accessed on May 26, 2020. https://www.westcoast.fisheries.noaa.gov/protected_species/eulachon/pacific_eulachon.html

throughout this Addendum. The human population of the Puget Sound region has continued to grow and as a result the pollution sources have also increased. However, as noted above, the number of commercial Atlantic salmon net pen facilities has been reduced from eight to four and the state of Washington has passed legislation to phase out non-native net pen rearing entirely by 2022. Additionally, it is expected that these four facilities will transition to rearing steelhead prior to the 2022 deadline. The EPA has also incorporated facilities covered under EPA's NPDES GP into this analysis as discussed in more detail below.

Water quality standards enhance the effectiveness of many of the state, local, and federal water quality programs, including point source permit programs, nonpoint source control programs, development of total maximum daily load limitations (TMDLs), and ecological protection efforts. Data acquired during chemical, physical, and biological monitoring studies is utilized in evaluating the quality of the State's waters and designing appropriate water quality controls. Waters identified as "water quality limited" are included on the CWA section 303(d) list, submitted to the EPA biennially. None of the currently permitted net pen facilities operate in areas that are listed as impaired for sediment on Ecology's most recent 303(d) list of impaired waters.

6. Analysis of Effects

The EPA's approval of Washington's revised sediment management standards, and in particular the marine finfish rearing facility provision at WAC 173-204-412, did not directly affect ESA listed or proposed species. However, there are potential indirect effects to ESA listed species and critical habitat through NPDES permitting that includes the revised SMS provisions that the EPA approved in 2008. Therefore, the effects analysis below updates the 2010 BE based on new information for the potential indirect effects from the EPA's prior approval action. This analysis reflects the current number of commercial net pen facilities being reduced from eight to four, the change in species being raised, and includes facilities covered under the EPA's NPDES GP. While the operator may pursue using some of the previously active sites in the future, the potential indirect effect would be similar to those analyzed in this BE Addendum.

The Analysis of Effects in the EPA's 2010 BE, Section 6.A.:

The EPA's 2010 analysis, incorporated herein (in italicized text) and updated in the next section, assumed there would not be an increase in the number of net pen facilities in Puget Sound, that Atlantic salmon would be the fish species reared in those net pen facilities, and that the regulatory structure would remain intact.

The EPA's approval and ESA determinations are based on the following six key findings along with information contained within the recovery plans.

- *The designated uses of Puget Sound are protected.*
- *Net pen facilities have an insignificant impact on aquatic life in Puget Sound.*
- *The existing regulatory framework for net pens provides protection to surrounding habitat and other species.*
- *The effects on the benthic community are accounted for and monitored.*

- *The closure procedures of net pen facilities ensure the aquatic environment is restored to baseline levels.*
- *The indirect effects of net pen facilities carry a low risk.*

These six findings, described in further detail below, are supported by information contained in the following three documents:

1) "Beneficial Environmental Effects of Marine Finfish Mariculture" J.E. Rensel and J.R.M. Forster. July 2007.

This report discusses the findings of a NOAA survey that was conducted from 2004-2006 at a commercial net pen farm in northern Puget Sound. The study found that net pens in Puget Sound provide a beneficial effect since they provide enhanced habitat for diverse populations of invertebrates and seaweeds. Therefore, the biofouling associated with net pens can be considered "beneficial" to species diversity and richly-populated marine food webs. The study also found that vaccines are typically used in place of antibiotics, sea lice problems do not exist due to natural salinity levels and facility siting location accounts for depth and current conditions that distribute net pens wastes over large areas where it may be incorporated into the food web.

2) "Review of Potential Impacts of Atlantic Salmon Culture on Puget Sound Chinook Salmon and Hood Canal Summer-Run Chum Salmon Evolutionarily Significant Units" F. William Waknitz. June 2002.

This NOAA technical memorandum examines the impacts of Atlantic salmon net pens on threatened salmon species found in Puget Sound. The report finds that escaped Atlantic salmon present a low risk to infect wild salmon, a low risk to compete with wild salmon for food or habitat, and a low risk to adversely impact Essential Fish Habitat. The study also finds there to be little risk regarding: hybridization between Atlantic and Pacific salmon; colonization of wild salmon habitat; Atlantic salmon feeding on Pacific salmon; pathogen transmission from Atlantic salmon to wild salmon; and, antibiotic-resistant bacteria development as a result of Atlantic salmon farming.

3) "The Net-pen Salmon Farming Industry in the Pacific Northwest" Colin Nash. September 2001.

This NOAA technical memorandum evaluates the risks associated with salmon net pen farming in the Pacific Northwest. This analysis finds the following issues carry the most risk: the impact of bio-deposits from farm operations on the environment beneath the net pens, the impact on benthic communities by the accumulation of heavy metals, and the impact on non-target organisms by the use of therapeutic compounds. Several of these issues have been addressed by Puget Sound facilities since this report was written in 2001. This memorandum finds several issues which carry a low risk: the physiological effect of low dissolved oxygen levels, the toxic effect of hydrogen sulfide and ammonia from net pen bio-deposits, the toxic effect of algal blooms, changes in the epifaunal community caused by the organic waste accumulation in sediments, the proliferation of human pathogens in the aquatic environment, the proliferation of

fish and shellfish pathogens in the aquatic environment and the increased incidences of disease among wild fish. The technical memorandum also finds the escape of Atlantic salmon and the impact of antibiotic-resistant bacteria on native salmonids to carry very little or no risk.

Update to Section 6.A.6. of the 2010 BE: Indirect Effects of Net Pen Facilities.

This Addendum incorporates new information on the following indirect effects. First, additional information regarding disease transfer from Atlantic salmon net pen fish to Pacific salmon has been included, primarily relying on a letter from NFMS dated January 12, 2016,[40] and accompanying memo. Second, further information regarding an escapement event that occurred on or around August 19, 2017, at Cooke Aquaculture's Site 2 net pen off Cypress Island and the follow-up and the associated response has been included in the Addendum. This Addendum also discusses potential future uses of commercially operated net pen facilities as steelhead rearing facilities instead of Atlantic salmon rearing facilities. Lastly, the Addendum discusses facilities covered by the current EPA NPDES general permit (WAG132000),[41] which covers tribal enhancement facilities. In their reissuance of the general permit in late 2020, EPA plans to expand the scope of the general permit to include federal research facilities and to allow for the marginal expansion of tribal enhancement facilities. The tribal enhancement facilities raise and release native salmonids and the federal research facilities will raise native fish (Pacific salmon, sablefish, etc.). The current EPA general permit cites, but does not necessarily rely on, the Sediment Management Standards at WAC 173-204 for their permitted operations, and the reissued NPDES GP will be similar in this regard. The effects from the EPA NPDES GP are also discussed in the context of disease transmission and escape.

Disease Transmission

The information regarding disease transfer from Atlantic net pen fish to Pacific salmon is summarized below, relying primarily on a letter from NFMS dated January 12, 2016,[42] and accompanying memo dated December 17, 2015.

On August 25, 2015, the EPA requested NOAA Fisheries' views on the allegations raised by Wild Fish Conservancy regarding an outbreak of infectious hematopoietic necrosis virus (IHNV) in 2012 at the Atlantic salmon net pen facilities near Rich Passage off Bainbridge Island. This request was made as a result of Wild Fish Conservancy's notice of intent to sue issued in August

[40] January 12, 2016. Letter from Kim W. Kratz, Ph.D., Assistant Regional Administrator, Oregon Washington Coastal Office, NMFS, to Dan Opalski, Director Office of Water and Watersheds, EPA Region 10 with enclosed memo dated December 17, 2015 from Dr. Dickhoff to Dr. Kratz *Re: Scientific Review of Intent to Sue U.S. Environmental Protection Agency and National Marine Fisheries Service for violations of the Endangered Species Act associated with consultation of Washington State's Revised Sediment Management Standards for Marine Finfish Facilities dated 25 August 2015.*

[41] September 9, 2015. EPA Region 10. Tribal Marine Net Pen Enhancement Facilities NPDES General Permit for Washington. WAG132000. https://www.epa.gov/sites/production/files/2018-03/documents/r10-npdes-washington-tribal-net-pen-gp-wag132000-final-permit-2015.pdf

[42] January 12, 2016. Letter from Kim W. Kratz, Ph.D., Assistant Regional Administrator, Oregon Washington Coastal Office, NMFS, to Dan Opalski, Director Office of Water and Watersheds, EPA Region 10 with enclosed memo dated December 17, 2015 from Dr. Dickhoff to Dr. Kratz *Re: Scientific Review of Intent to Sue U.S. Environmental Protection Agency and National Marine Fisheries Service for violations of the Endangered Species Act associated with consultation of Washington State's Revised Sediment Management Standards for Marine Finfish Facilities dated 25 August 2015.*

2015. On January 12, 2016, NMFS responded via letter and an accompanying memo dated December 17, 2015 from Walton Dickhoff, Ph.D., Director, Environmental and Fisheries Sciences Division, Northwest Fisheries Science Center (NWFSC). That memo outlines scientific opinions on the information provided by Wild Fish Conservancy and concludes that the information provided does not substantiate the claims and that there were substantial errors in the assumptions and analysis of impacts.

In short, NOAA Fisheries' NWFSC's experts concluded that the technical claims in the notice of intent to sue were not supported by the best available scientific and commercial information. After reviewing NWFSC's memo, NMFS concluded that the factual allegations presented by Wild Fish Conservancy do not establish any potential for new or different effects of the commercial salmon farms in Puget Sound from what was already considered in the EPA's consultation with NOAA Fisheries that concluded on April 8, 2011, following the submission of the EPA's 2010 BE.

In addition, on March 5, 2019, NMFS provided additional documents to the EPA regarding disease transfer to be considered in this consultation building on those that have been part of the previous record for this consultation. These are listed in the table below. Although the EPA has reviewed these documents, and is including them in the administrative record, the EPA is relying upon the technical expertise from NMFS in evaluating these studies in detail. The EPA does not have additional technical information beyond what has been supplied by NMFS on this topic.

In the EPA's assessment of the technical information provided by NMFS, the EPA notes the following key findings regarding disease risk and transmission:

- "The 2012 outbreak of IHNV in Atlantic salmon does not represent a new or unexpected event, but is an example of the previously reported observation that diseases in Atlantic salmon farms are caused by local pathogens that they obtain from local Pacific salmon. This is known to occur, and was considered thoroughly in the original report by Nash et al., 2001. The 2012 netpen outbreak conforms to that description and is not a new phenomenon that was not previously considered."… "For any Chinook salmon or steelhead that did become infected, the probability that the infection progressed to cause disease or mortality is extremely unlikely, and not expected to occur." (Gael Kurath, page 6).

- "The ubiquitous nature of piscine orthoreovirus (PRV), its apparent historic presence in wild Pacific salmonid stocks in the Pacific Northwest and the lack of clear association with disease in Pacific salmonids suggest the virus poses a low risk to wild species of Pacific salmonids." (T.R. Meyers, page 2).

- "In response to reported findings of infectious salmon anaemia virus (ISAV) in British Columbia (BC), Canada, in 2011, U.S. national, state and tribal fisheries managers and fish health specialists developed and implemented a collaborative ISAV surveillance plan for the Pacific Northwest region of the United States. …All 4,962 completed tests were negative for ISAV RNA. Results of this surveillance effort provide sound evidence to support the absence of ISAV in represented populations of free-ranging and marine-

farmed salmonids on the northwest coast of the United States." (Gustafson, L.L., Creekmore, L.H., Snekvik, K.R., Ferguson, J.A., Warg, J.V., Blair, M., Meyers, T.R., Stewart, B., Warheit, K.I., Kerwin, J. and Goodwin, A.E, pages 1-2).

- "Our analysis showed evidence of Heart and skeletal muscle inflammation (HSMI) histopathological lesions over an 11-month timespan, with the prevalence of lesions peaking at 80-100% in sampled fish, despite mild clinical signs with no associated elevation in mortalities reported at the farm level." (Di Cicco, E., Ferguson, H.W., Schulze, A.D., Kaukinen, K.H., Li, S., Vanderstichel, R., Wessel, Ø., Rimstad, E., Gardner, I.A., Hammell, K.L. and Miller, K.M., page 1).

- "Viral genome sequencing revealed no consistent differences in (Piscine orthoreovirus Strain) PRV-1 variants intimately involved in the development of both diseases suggesting that migratory chinook salmon may be at more than a minimal risk of disease from exposure to the high levels of PRV occurring in salmon farms." (Di Cicco E, HW Ferguson, KH Kaukinen, AD Schulze, S Li, A Tabata, OP Günther, G Mordecai, CA Suttle, and KM Miller, page 599).

- "We conclude that the longer-term presence of PRV in BC prior to 2001 has not been adequately described and that the evidence that the virus was introduced from Norway is more robust than the hypothesis that PRV is endemic to the eastern Pacific Ocean." (Kibenge, M.J., Wang, Y., Morton, A., Routledge, R. and Kibenge, F.S., page 5).

- "Importantly, infectious salmon anemia virus, salmonid herpesvirus, salmon alphavirus, and infectious pancreatic necrosis virus were not detected. Furthermore, while the agents associated with proliferative gill disease (*D.lep, Ca.B.cys*, and gill chlamydia) were all detected, few fish showed evidence of lesions associated with this multifactorial disease. The majority of agents detected on BC salmon farms were known to be endemic, but new findings include the marine detections of some infectious agents reported to only cause freshwater or hatchery-based diseases (*Flavobacterium psychrophilum and Ichthyophthirius multifiliis*)." (Laurin, E., Jaramillo, D., Vanderstichel, R., Ferguson, H., Kaukinen, K.H., Schulze, A.D., Keith, I.R., Gardner, I.A. and Miller, K.M., page 220).

- "Overall, the assessment concluded that IHNV attributable to Atlantic Salmon farms in the Discovery Islands poses minimal risk to Fraser River Sockeye Salmon abundance and diversity under the current fish health management practices." (Mimeault, C., Wade, J., Foreman, M.G.G., Chandler, P.C., Aubry, P., Garver, K.A., Grant, S.C.H., Holt, C., Jones, S.R.M., Johnson, S.C. and Trudel, M., page v).

- "These results suggest that PRV transfer is occurring from farmed Atlantic salmon to wild Pacific salmon, that infection in farmed salmon may be influencing infection rates in wild salmon, and that this may pose a risk of reduced fitness in wild salmon impacting their survival and reproduction." (Morton, A., Routledge, R., Hrushowy, S., Kibenge, M. and Kibenge, F, page 1).

- "… we tested a subset of these samples for infectious salmon anaemia virus (ISAV) RNA with three additional published molecular assays, as well as for RNA from salmonid alphavirus (SAV), piscine myocarditis virus (PMCV) and piscine orthoreovirus (PRV). All samples (n = 2,252; 121 stock cohorts) tested negative for RNA from ISAV, PMCV, and SAV. In contrast, there were 25 stock cohorts from Washington and Alaska that had one or more individuals test positive for PRV RNA; prevalence within stocks varied and ranged from 2% to 73%. The overall prevalence of PRV RNA-positive individuals across the study was 3.4% (77 of 2,252 fish tested)." (Purcell, M.K., Powers, R.L., Evered, J., Kerwin, J., Meyers, T.R., Stewart, B. and Winton, J.R, page 347).

The EPA has discussed the scientific finding with NMFS and concluded that its analysis of effects for species and critical habitats remains unchanged from the findings in the 2010 BE regarding disease transmission. Further details are available in the December 17, 2015 memo by NWFSC and the documents identified in the table below and the EPA is relying upon the technical expertise from NMFS in evaluating these studies in more detail.

Date	Author(s)	Title/Journal
8/1/17	Gael Kurath, M.S., Ph.D., U.S.G.S. Western Fisheries Research Center, Microbiologist	Scientific Review of the Risk Posed to Endangered Pacific Salmon in Puget Sound, Washington, by an Outbreak of the Salmon Virus, IHNV in Atlantic Salmon Farm Netpens in Puget Sound. RE: Case No. 2:15-CV-01731-MJP, *Wild Fish Conservancy v. United States Environmental Protection Agency and the National Marine Fisheries Service*. USGS. 26 pages.
9/17	T.R. Meyers, Alaska Department of Fish and Game, Juneau Fish Pathology Laboratory	Piscine Orthoreovirus (PRV) in the Pacific Northwest Appears to be of Low Risk to Wild Pacific Salmonids. The Pacific Northwest Fish Health Protection Committee. 6 pages.
8/28/18	Gustafson, L.L., Creekmore, L.H., Snekvik, K.R., Ferguson, J.A., Warg, J.V., Blair, M., Meyers, T.R., Stewart, B., Warheit, K.I., Kerwin, J. and Goodwin, A.E	A systematic surveillance programme for infectious salmon anaemia virus supports its absence in the Pacific Northwest of the United States. Journal of fish diseases, 41(2), pp.337-346.
2/22/17	Di Cicco, E., Ferguson, H.W., Schulze, A.D., Kaukinen, K.H., Li, S., Vanderstichel, R., Wessel, Ø., Rimstad, E., Gardner, I.A., Hammell, K.L. and Miller, K.M.	Heart and skeletal muscle inflammation (HSMI) disease diagnosed on a British Columbia salmon farm through a longitudinal farm study. PLoS One, 12(2), p.e 0171471.
4/23/18	Di Cicco E, HW Ferguson, KH Kaukinen, AD Schulze, S Li, A Tabata, OP Günther, G Mordecai, CA Suttle, and KM Miller.	The same strain of Piscine orthoreovirus (PRV-1) is involved in the development of different, but related, diseases in Atlantic and Pacific Salmon in British Columbia. FACETS 3:599–641.
11/30/17	Kibenge, M.J., Wang, Y., Morton, A., Routledge, R. and Kibenge, F.S.	Formal comment on: Piscine reovirus: Genomic and molecular phylogenetic analysis from farmed and wild salmonids collected on the

		Canada/US Pacific Coast. PloS one, 12(11), p.e 0188690.
8/29/18	Laurin, E., Jaramillo, D., Vanderstichel, R., Ferguson, H., Kaukinen, K.H., Schulze, A.D., Keith, I.R., Gardner, I.A. and Miller, K.M.	Histopathological and novel high-throughput molecular monitoring data from farmed salmon (Salmo salar and Oncorhynchus spp.) in British Columbia, Canada, from 2011–2013. Aquaculture.
12/1/17	Mimeault, C., Wade, J., Foreman, M.G.G., Chandler, P.C., Aubry, P., Garver, K.A., Grant, S.C.H., Holt, C., Jones, S.R.M., Johnson, S.C. and Trudel, M. Fisheries and Oceans Canada (DFO).	Assessment of the Risk to Fraser River Sockeye Salmon Due to Infectious Hematopoietic Necrosis Virus (IHNV) Transfer from Atlantic Salmon Farms in the Discovery Islands, British Columbia. Canadian Science Advisory Secretariat (CSAS).
12/12/17	Morton, A., Routledge, R., Hrushowy, S., Kibenge, M. and Kibenge, F	The effect of exposure to farmed salmon on piscine orthoreovirus infection and fitness in wild Pacific salmon in British Columbia, Canada. PloS one, 12(12), p.e 0188793.
9/6/17	Purcell, M.K., Powers, R.L., Evered, J., Kerwin, J., Meyers, T.R., Stewart, B. and Winton, J.R	Molecular testing of adult Pacific salmon and trout (Oncorhynchus spp.) for several RNA viruses demonstrates widespread distribution of piscine orthoreovirus in Alaska and Washington. Journal of fish diseases, 41(2), pp.347-355.

Additionally, the EPA has discussed the scientific findings on disease transfer with NMFS and understands that similar disease transmission concerns remain relevant between net pen facilities raising native species (Coho, sablefish, future steelhead facilities, etc.) and wild salmon; however, the risks and pathways may vary. The analysis of the net pen facilities in this Addendum addresses the low risk associated with disease transfer between the additional native species and wild salmon.

Escapement

Information regarding an escapement event that occurred on or around August 19, 2017, at Cooke Aquaculture's Site 2 net pen off Cypress Island and the follow up and the associated response is summarized below.

On March 5, 2019, NMFS provided documents to the EPA regarding the 2017 escapement event to be considered in this consultation. These are listed in the table below. Although the EPA has reviewed these documents and is including them in the administrative record, the EPA is relying upon the technical expertise from NMFS in evaluating these studies in more detail and providing analysis. The EPA does not have further technical information beyond what has been supplied by NMFS on this topic.

In the EPA's assessment of the technical information provided by NMFS, the EPA notes the following key findings regarding the escapement event:

- "Cooke reacted to the August 19 failure with substantial resources in an attempt to save the net pen again. When its efforts were unsuccessful, the company then turned to

stabilizing the collapsed structure, extracting the dead fish, and salvaging the pen. Cooke removed the surface portions of the net pen by September 24. Although Cooke stated by letter that it had removed all debris from the bottom of Deepwater Bay, an inspection by DNR on October 27 showed that substantial debris remained. DNR required further cleanup that lasted into January 2018." (D Clark, K Lee, K Murphy, A Windrope, pages 7-8).

- As a result of the 2017 net pen failure and escapement event, 56,810 fish were recovered and between 186,149-205,849 fish were not recovered. 390 fish were recovered through beach seining in Deepwater Bay by Cooke and the smelt fishery caught 2,261 fish in the San Juan Islands through beach seining efforts. (D Clark, K Lee, K Murphy, A Windrope, page 111 and page 97).

- "Recovering fish from Puget Sound required a detailed understanding of co-management, fish regulations, fish science and an existing relationship with the fishing fleets. In the future, it may be more effective for DFW and co-managers to work together to design and implement recovery efforts with input and support from the net pen operator. The combined recovery effort could be tested and refined similar to the preparations for oil spill response." (D Clark, K Lee, K Murphy, A Windrope, page 112).

- "The recovery response plan was not adequately detailed and future response plans need to be tailored to the site such that they reflect site-specific conditions, geography, currents and best approaches for recovery given those specifics. Initial recovery efforts were successful as the fish kept close to shore and were within the immediate area. As the recovery period moved past the first few weeks, however, the fish became widely dispersed or died and recovery became very difficult. In the future, recovery efforts should be immediate and comprehensive prior to dispersal." (D Clark, K Lee, K Murphy, A Windrope, page 112).

- "1) To date, there is no evidence that the escaped Atlantic salmon were eating native fauna nor is there evidence that they were sexually mature. 2) Over time, the fish in the marine system contracted native pathogens and have shown decreasing health status. 3) Atlantic salmon have been found in a limited number of rivers in Puget Sound (Skykomish and Skagit rivers). Atlantic salmon have not been seen at any DFW hatchery despite monitoring. There is no indication that Atlantic salmon have been caught in Nooksack drainage or at Whatcom Creek Hatchery drainage. DFW was present at the chum spawns in late fall at Bellingham Technical College and did not see any Atlantic salmon in Whatcom Creek. 4) The limited numbers of Atlantic salmon found in the freshwater system appear healthy. There is no evidence that they were feeding in the freshwater system nor were they sexually mature. The Atlantic salmon in freshwater may survive for some time." (D Clark, K Lee, K Murphy, A Windrope, page 113).

- "The 2017 Deepwater Bay releases were significant in size but follow a long period of minimal releases in Washington State and British Columbia and do not redefine the declining trend in Washington or B.C." (Rensel, J.E., page 2).

- "No self-sustaining runs of Atlantic salmon have been established in either Washington State or British Columbia, either from repeated intentional plantings by government agencies starting many decades ago or from farmed salmon escapes. It is apparent that the vast majority of these fish do not survive very long outside aquaculture facilities as stomachs of recaptured fish in marine or freshwater are almost always empty. Five hundred fish stomachs were sampled from recovered fish in the 2017 Deepwater Bay releases. All stomachs were empty and that pattern occurs for the vast majority of other releases in the past." (Rensel, J.E., page 2).

- "Cooke agrees with many of the lessons learned, particularly with respect to need for greater and closer coordination with the state, tribes, and the federal government. Cooke has already drafted revisions to its Fish Escape and Response Plan, is evaluating whether other operational changes may be needed and invites continued dialogue with agencies on how to improve regulatory oversight of its operations." (Steding, D.J., page 11)

The EPA has discussed the scientific finding and lessons learned from the 2017 escapement event with NMFS. The EPA has concluded that its analysis of effects for certain species should be modified from the not likely to adversely affect (NLAA) finding in the 2010 BE to likely to adversely affect (LAA) due to the escapement risks and associated response. Although the inbreeding risk between the two species is low as a result of the escapement, adverse effects to listed species and take could occur from the process of collecting escaped fish (and facility debris) and potential bycatch of ESA-listed species. See 6.B., 6.C., and 6.D. below for the analysis of those effects and the EPA's modification of the determinations to species and critical habitat. Further details are available in the documents identified in the table below and the EPA is relying upon the technical expertise from NMFS in evaluating these studies in more detail.

Date	Author(s)	Title/Journal
1/30/18	D Clark, K Lee, K Murphy, A Windrope.	2017 Cypress Island Atlantic Salmon Net Pen Failure: An Investigation and Review. Washington Department of Natural Resources. Olympia, WA. 120 pages.[43]
2018	Rensel, J.E. (Jack)	Escaped Atlantic Salmon in Washington State. Prepared by Rensel Associate Aquatic Sciences for Cooke Aquaculture Pacific, Inc. 59 pages.
1/29/18	Steding, D. J.	Letter to Investigation and Review Panel, RE: Draft of Incident Review Board Report. January 29, 2018.

As noted previously, the EPA has discussed the scientific findings on escapement with NMFS and understands that escapement risks remain relevant between net pen facilities raising native species that are not intended for release (sablefish, future steelhead facilities, etc.) and wild salmon. The proposed steelhead rearing activities would only raise sterile all-female triploid trout; therefore, if escapement were to occur it is the EPA's understanding that the fish would

[43] January 30, 2018. D Clark, K Lee, K Murphy, A Windrope. *2017 Cypress Island Atlantic Salmon Net Pen Failure: An Investigation and Review.* Washington Department of Natural Resources. https://www.dnr.wa.gov/sites/default/files/publications/aqr_cypress_investigation_report.pdf?vdqi7rk

have a low likelihood of reproduction. While the EPA anticipates that steelhead would not prey on other species, the Agency is relying upon the technical expertise from NMFS in evaluating the potential risks of steelhead escapement and any subsequent reproduction and competition for space and resources. The inclusion of these facilities in this Addendum addresses the low risk of escapement and the interaction between the additional native species and wild salmon. Fish from salmon enhancement facilities (like those covered under the EPA's NPDES GP) will be released into the wild at a future date, and their time in the net pens only serves to imprint the fish for purposes of return. Therefore, the inclusion of those facilities in this Addendum does not impact the analysis of effects due to escapement.

NPDES Permitting Actions to Minimize Risk

Lastly, this Addendum incorporates updated NPDES permitting actions by Ecology to minimize escapement risk and the upcoming phase out and moratorium on non-native fish species rearing by 2022, as well as the inclusion of facilities covered under the EPA's NPDES GP. This Addendum also discusses the proposed rearing of steelhead trout in the net pens facilities previously used for Atlantic salmon.

NPDES permitting regulations for net pen facilities are found in the following regulations: 40 CFR Part 451, 40 CFR Part 122.24, and 40 CFR Part 122 appendix C, which together comprise the permitting regulatory requirements for different types of net pen facilities. One main difference is that net pen facilities that produce 100,000 pounds or more per year of aquatic animals, except for facilities rearing native species released after a growing period of no longer than 4 months to supplement commercial and sports fisheries, must follow the Effluent Limitation Guidelines (ELGs) at 40 CFR part 451. Facilities that do not fall under the ELGs may require an NPDES permit to discharge if the facility operates for more than 30 days per year, produces more than 20,000 pounds of harvest or release weight of aquatic animals per year, and feeds more than 5,000 pounds of food during the calendar month of maximum feeding.

<u>Commercially Operated Net Pen Facilities</u>

As indicated in the Background section, currently there are four commercial net pen facilities still in operation in Puget Sound. The 2010 BE evaluated impacts from eight facilities, but due to the collapse of Cooke's net pen facility Cypress Island—Site 2 and the closure of the Port Angeles (Ediz Hook) net pen facility among others off Cypress Island, the number of active facilities has been reduced to four, including three in Rich Passage near Bainbridge Island (Clam Bay, Fort Ward, and Orchard Rocks) and one near Hope Island (Skagit Bay). The locations are shown on the maps included at the end of this Addendum.

Below is a table with information on the four current commercial net pen facilities in Puget Sound permitted by Ecology:

Waterbody	**Rich Passage (Clam Bay)**	**Rich Passage (Fort Ward)**	**Rich Passage (Orchard Rocks)**	**Skagit Bay (Hope Island)**
Facility Owner	Cooke Aquaculture	Cooke Aquaculture	Cooke Aquaculture	Cooke Aquaculture
Permit Number	WA0031526	WA0031534	WA0031542	WA0031593
Latitude	47° 34' 17'' N (47.57139)	47° 34' 30'' N (47.5750)	47° 34' 30'' N (47.5750)	48° 24' 28'' N (48.4078)

Longitude	122° 32' 25'' W (-122.54028)	122° 31' 30'' W (-122.5250)	122° 31' 50'' W (-122.5306)	122° 33' 32'' W (-122.5589)
Net Pen Area (in feet)	1010 x 185	650 x 185	900 x 185	10 pens approximately 80 square feet
Minimum Water Depth at Site ^	65 feet	45 feet	45 feet	Between 113 and 80 feet
Lease Acreage	98.62 total (for all Rich Passage facilities)	98.62 total (for all Rich Passage facilities)	98.62 total (for all Rich Passage facilities)	31.47
Lease Expiration Date[44]	11/10/2022	11/10/2022	11/10/2022	3/31/2022
Current Species	Atlantic Salmon	Atlantic Salmon	Atlantic Salmon	Atlantic Salmon
Future Species	Native species	Native species	Native species	Native species

^ Depths are given at Mean Lower Low Water (MLLW).
Information obtained from WDNR and Ecology draft permits.

In 2018, following the collapse of Cooke's net pen facility Cypress Island—Site 2 and the resulting escape of approximately 250,000 Atlantic salmon, the Washington State Legislature passed House Bill 2957, phasing out marine rearing of Atlantic salmon as the facility aquatic lands leases expire in 2022. Under the provisions of House Bill 2957, Ecology is authorized to renew the NPDES permits for the marine Atlantic salmon net pen facilities until the leases administered by DNR expire. Until Atlantic salmon farming is officially banned from Puget Sound starting in 2022, companies are required to have water quality discharge permits (NPDES permits). The updated permits incorporate lessons learned from the Cypress Island net pen failure and include closure requirements for the phaseout.

Ecology issued new NPDES permits for these four commercial net pen facilities on July 11, 2019.[45] The previous permits for these facilities were issued in 2007 and administratively extended in 2012. The NPDES permits require Best Management Practices (BMPs), monitoring, and reporting to ensure water quality standards are met. These facilities are operated to rear fish for harvest and market sale. Uneaten fish food, fish feces, antibiotics and the accidental release of Atlantic Salmon are the primary pollutants resulting from the operation of these facilities. The requirements in the permits allow Ecology to ensure that facilities are meeting water quality standards.

Additional protective measures in the updated 2019 permits include:

- Increasing underwater video monitoring of net pens.
- Conducting inspections to assess structural integrity of the net pens and submit inspection reports certified by a qualified marine engineer to Ecology.

[44] December 21, 2018. Personal communication with Jeff Vanderpham, NMFS. Information regarding Washington DNR aquatic leases.
[45] Washington Department of Ecology. Atlantic salmon net pen individual permits website. Accessed May 26, 2020. https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-quality-permits/Water-Quality-individual-permits/Net-pens

- Improving net cleaning and maintenance procedures to prevent biofouling and fish escape.
- Requiring the permittee to develop site specific response plans in the event of a fish release, and to conduct and participate in preparedness trainings.
- Requiring improved maintenance of the net pens.
- Maintaining contact information to notify area tribes in the event of a fish release.[46]

The fact sheet for the permits summarizes the updated requirements as follows:

"This permit increases the frequency of sediment sampling from twice per permit cycle to annually between August 15 and September 30, and to conduct additional sediment monitoring within two weeks before or after each fish harvesting. Underwater video survey is also required annually rather than twice per permit cycle. Daily dissolved oxygen (DO) sampling at the edge of the pens in August and September has been added to the permit, to verify that aeration of the pens, a BMP employed to maintain DO levels within the pens, is effective during this critical period. Monitoring of current velocity has been added to this permit, as strong currents contribute to wear on the net pen structures. With this issuance of the permit, the Permittee is required to use the Water Quality Permitting Portal to submit electronic discharge monitoring reports (DMRs) and other required permit submittals and reports.

As part of the required pollution prevention plan, fish escape prevention plan, and fish escape reporting and response plan, this permit adds requirements related to engineering documents, notification of structural issues and repairs, net cleaning to prevent excess biofouling, and staff training in escape prevention and response."[47]

While these NDPES permitting requirements for Atlantic salmon net pen facilities should reduce the risk of escapement and the effects of response efforts related to an escapement event interfering with listed species and their critical habitat, they do not eliminate them. These permitting activities do not affect facilities covered by the EPA's NPDES GP.

As indicated elsewhere in this Addendum, all-female triploid rainbow trout are expected to replace Atlantic salmon at all commercial net pen facilities. On January 21, 2020, WDFW approved an application from Cooke Aquaculture to farm all-female, sterile (triploid) rainbow trout/steelhead in Puget Sound. Ecology is now in the process of revising the NPDES permits to authorize the transition to rearing steelhead and is accepting public comments until June 8, 2020. Those potential indirect effects have been discussed above.

Facilities Covered Under the EPA's NPDES General Permit

Out of an abundance of caution, the EPA is including facilities covered under the EPA's NPDES GP which cites, but does not necessarily rely upon, the SMS at WAC 173-204, in this 2020

[46] Washington Department of Ecology. Atlantic salmon net pen individual permits website. Accessed May 26, 2020. https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-quality-permits/Water-Quality-individual-permits/Net-pens

[47] Washington Department of Ecology. Atlantic salmon net pen individual permits website. Fact Sheets. Accessed May 26, 2020. https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-quality-permits/Water-Quality-individual-permits/Net-pens

Addendum. There are significant differences (including duration, size, operation, etc.) between the permittees covered under the EPA's NPDES GP, which applies to tribal enhancement and federal research facilities, and those covered under Ecology's NPDES permits for large commercial net pen facilities for fish harvest and sale.

The EPA's NPDES GP, which expires October 31, 2020, covers five tribal enhancement facilities[48] and specifically limits coverage to facilities rearing and releasing native fish species. One federal facility does not yet have permit coverage but is expected to be covered by the reissued EPA NPDES GP by the end of 2020. The reissued EPA NPDES GP anticipates including the facilities listed in the table below:

Facilities Covered Under the EPA's NPDES GP

Waterbody	**Agate Pass**	**Elliott Bay**	**Peale Passage**	**Port Gamble**	**Quilcene Bay**	**Clam Bay**
Facility Operator	Suquamish Tribe	Suquamish Tribe	Squaxin Island Tribe	Port Gamble S'Klallam Tribe	Skokomish Tribe	NOAA (Manchester Research Station)
Coverage Status	Covered	Covered	Covered	NOI Submitted	NOI Submitted	Applied – will be covered under new general permit
EPA Permit #	WAG132001	WAG132002	WAG132003	WAG132004	WAG132005	N/A
Latitude	47.7036	47.6222	47.2004	47.8454	47.7893	47.5734
Longitude	-122.5750	-122.3676	-122.9042	-122.5738	-122.8519	-122.5456
lbs of fish	45,000	90,909	47,500	45,850	13,000	58,429
# Months/Year	March-June (4)	March-June (4)	January-June (6)	February – May (4)	January-May (5)	Year-round

[48] September 9, 2015. EPA Region 10. Tribal Marine Net Pen Enhancement Facilities NPDES General Permit for Washington. WAG132000. https://www.epa.gov/sites/production/files/2018-03/documents/r10-npdes-washington-tribal-net-pen-gp-wag132000-final-permit-2015.pdf
April 30, 2015. EPA Region 10. Fact Sheet. Tribal Marine Net Pen Enhancement Facilities NPDES General Permit for Washington. WAG132000. https://www.epa.gov/sites/production/files/2018-03/documents/r10-npdes-washington-tribal-net-pen-gp-wag132000-fact-sheet-2015.pdf

Lease Acreage	5.5	Unknown	20.89	1.62	Unknown	Unknown
Current Species	Coho	Coho	Coho	Coho	Coho	Sablefish
Min Clearance to Seafloor (ft)	15	15	9.7	23		
Mean Low Water Depth (ft)	45	40	24.5	48	30	~36 (unknown tide)
Current (cm/sec)	206 (max)	77	7	82	257	

NOI – notice of intent

In the EPA's NPDES GP, the Total Organic Carbon (TOC) reference value table for sediment characterization directly underneath each net pen facility from the SMS was used. Also, the EPA cited the SMS regulations and net pen provisions in the factsheet in response to Ecology's CWA section 401 certification. However, the EPA did not permit the allowance of a sediment impact zone. The permit already includes language prohibiting anoxic sediments beneath the net pens and dissolved oxygen water column monitoring and evaluation.

In addition, the EPA acknowledges the existence of other net pens in Puget Sound, however, since there are no NPDES permits associated with these facilities, the SMS regulations at WAC-173-204-412 do not apply. Therefore, these facilities are not analyzed in this BE Addendum.

6.B. ANALYSIS OF EFFECTS ON FISH SPECIES

The analyses in this Addendum and the previous BEs with the support of the NOAA technical memorandums, conclude that the marine finfish rearing facility provision is protective of designated uses, including those related to wild salmon in Puget Sound, and net pen facilities carry an insignificant risk of negatively affecting wild salmon. However, due to escapement concerns and effects following the 2017 net pen collapse, the EPA has concluded that its approval of WAC 173-204-412 **is likely to adversely affect** the following listed species:

Oncorhynchus tshawytscha	Chinook Salmon (Puget Sound ESU)
Oncorhynchus keta	Chum Salmon (Hood Canal summer-run ESU)
Oncorhynchus mykiss	Steelhead (Puget Sound, DPS)
Sebastes paucispinis	Bocaccio (Puget Sound/Georgia Basin DPS)
Sebastes ruberrimus	Yelloweye Rockfish (Puget Sound/Georgia Basin DPS)

Note that this determination is a result of the indirect effects of the operation of commercial net pen facilities. There is a low risk of competition between the escaped fish and ESA-listed species. The risk is also low associated with bycatch of ESA-listed species during potential recovery efforts.

The EPA has concluded that its approval of WAC 173-204-412 is unchanged from the 2010 BE as escape from commercial net pens is not likely to create an increased risk to non-salmon species. This analysis has been updated to include North American Green Sturgeon (Southern DPS) and Pacific Eulachon (Southern DPS). Therefore, the EPA has concluded its action **may affect, but is not likely to adversely affect** the following listed species:

Acipenser medirostris	North American Green Sturgeon (Southern DPS)
Thaleichthys pacificus	Pacific Eulachon (Southern DPS)

6.C. ANALYSIS OF EFFECTS ON MARINE MAMMALS

The EPA has concluded that its approval of WAC 173-204-412 is unchanged from the 2010 BE as escape from commercial net pens is not likely to create an increased risk to marine mammals. Therefore, the EPA has concluded its action **may affect, but is not likely to adversely affect** the following listed species:

Megaptera novaeangliae	Humpback Whale (Pacific Coast, Mexico DPS and Central America DPS)
Orinus orca	Killer Whale (Southern Resident, DPS)

6.D. EFFECTS OF THE ACTION ON CRITICAL HABITAT

The listed species with designated critical habitat analyzed in the 2010 BE are Chinook salmon (Puget Sound ESU), Chum salmon (Hood Canal summer-run ESU), and Killer Whale (Southern Resident, DPS). This Addendum has been updated to include critical habitat for Steelhead (Puget Sound, DPS), North American Green Sturgeon (Southern DPS), Pacific Eulachon (Southern DPS), Bocaccio (Puget Sound/Georgia Basin DPS) and Yelloweye Rockfish (Puget Sound/Georgia Basin DPS).

After evaluating escape concerns and effects following the 2017 net pen collapse, the EPA has concluded that its approval of WAC 173-204-412 **may affect, but is not likely to adversely affect** critical habitat for the following listed species. Despite concluding likely to adversely affect due to escapement and response efforts for these species, critical habitat is not implicated in the same manner as the species themselves.

Oncorhynchus tshawytscha	Chinook Salmon (Puget Sound ESU)
Oncorhynchus keta	Chum Salmon (Hood Canal summer-run ESU)
Oncorhynchus mykiss	Steelhead (Puget Sound, DPS)
Sebastes paucispinis	Bocaccio (Puget Sound/Georgia Basin DPS)
Sebastes ruberrimus	Yelloweye Rockfish (Puget Sound/Georgia Basin DPS)

This analysis has been updated to include North American Green Sturgeon (Southern DPS) and Pacific Eulachon (Southern DPS) critical habitat. As with the determination above, the EPA has concluded its action **may affect, but is not likely to adversely affect** the critical habitat for the following listed species:

Acipenser medirostris	North American Green Sturgeon (Southern DPS)
Thaleichthys pacificus	Pacific Eulachon (Southern DPS)

Consistent with the 2010 BE, the EPA is not revising the analysis of effects on critical habitat for the Killer Whale (Southern Resident, DPS) as escapement risk and the EPA's action **may affect, but is not likely to adversely affect** critical habitat for that marine mammal species.

7. Cumulative Effects

The findings for this section are unchanged from the 2010 BE.

8. Summary of Findings

Table 8-1 Species and Critical Habitat that this Consultation May Affect (LAA or NLAA).[49]

	Species	ESU/DPS/Population	Critical Habitat Designation
1	Chinook Salmon (*Oncorhynchus tshawytscha*)	Puget Sound ESU	Yes
2	Chum Salmon (*Oncorhynchus keta*)	Hood Canal summer-run ESU	Yes
3	Steelhead (*Oncorhynchus mykiss*)	Puget Sound, DPS	Yes
4	Bocaccio (*Sebastes paucispinis*)	Puget Sound/Georgia Basin DPS	Yes
5	Yelloweye Rockfish (*Sebastes ruberrimus*)	(Puget Sound/Georgia Basin DPS)	Yes
6	North American Green Sturgeon (*Acipenser medirostris*)	Southern DPS	Yes
7	Pacific Eulachon (*Thaleichthys pacificus)*	Southern DPS	Yes
8	Humpback Whale (*Megaptera novaeangliae*)	Pacific Coast, Mexico DPS and Central America DPS	No
9	Killer Whale (*Orinus orca*)	Southern Resident, DPS	Yes

Table 8-2 summarizes the EPA's determinations, updated from the 2010 BE, for ESA-listed species, under NOAA jurisdiction, analyzed for the EPA's approval of Washington's marine finfish rearing facility provision, WAC 173-204-412.

Table 8-2 LAA Summary of Findings.

Species	ESU/DPS/Population	Effects Determination for the EPA's Approval of WAC 173-204-412
Chinook Salmon (*Oncorhynchus tshawytscha*)	Puget Sound ESU	LAA

[49] March 7, 2019. Personal communication with Jeff Vanderpham, NMFS. Species list/critical habitat for net pen consultation.

Chum Salmon (*Oncorhynchus keta*)	Hood Canal summer-run ESU	LAA
Steelhead (*Oncorhynchus mykiss*)	Puget Sound, DPS	LAA
Bocaccio (Sebastes paucispinis)	Puget Sound/Georgia Basin DPS	LAA
Yelloweye Rockfish (Sebastes ruberrimus)	Puget Sound/Georgia Basin DPS	LAA

LAA – Likely to adversely affect

Table 8-3 summarizes the EPA's determinations, updated from the 2010 BE, for ESA-listed species, under NOAA jurisdiction, analyzed for the EPA's approval of Washington's marine finfish rearing facility provision, WAC 173-204-412.

Table 8-3 NLAA Summary of Findings.

Species	ESU/DPS/Population	Effects Determination for the EPA's Approval of WAC 173-204-412
Humpback Whale (*Megaptera novaeangliae*)	Pacific Coast, Mexico DPS and Central America DPS	NLAA
Killer Whale (*Orinus orca*)	Southern Resident, DPS	NLAA
North American Green Sturgeon (*Acipenser medirostris*)	Southern DPS	NLAA
Pacific Eulachon (*Thaleichthys pacificus*)	Southern DPS	NLAA

NLAA – May affect, but is not likely to adversely affect

Table 8-4 summarizes the EPA's determination of No Effect for ESA-listed species, under NOAA jurisdiction, analyzed for the EPA's approval of Washington's marine finfish rearing facility provision, WAC 173-204-412. These findings are unchanged from the 2010 BE.

Table 8-4 NE Summary of Findings.

Species	ESU/DPS/Population	Effects Determination for the EPA's Approval of WAC 173-204-412
Chinook Salmon *(Oncorhynchus tshawytscha)*	Snake River Fall Run Lower Columbia River Upper Columbia River Spring Run Snake River Spring/Summer Run	NE
Chum Salmon *(Oncorhynchus keta)*	Columbia River	NE
Coho Salmon *(Oncorhynchus kisutch)*	Lower Columbia River	NE
Sockeye Salmon *(Oncorhynchus nerka)*	Ozette Lake	NE

Species	ESU/DPS/Population	Effects Determination for the EPA's Approval of WAC 173-204-412
Steelhead *(Oncorhynchus mykiss)*	Snake River Basin Lower Columbia River Upper Columbia River Basin Middle Columbia River	NE
Southern Sea Otter (*Enhydra lutris neries*)		NE
Green Sea Turtle (*Chelonia mydas*)		NE
Leatherback Sea Turtle (*Dermochelys coriacea*)		NE

NE – No effect

Table 8-5 summarizes the EPA's determinations, updated from the 2010 BE, for critical habitat, under NOAA jurisdiction, analyzed for the EPA's approval of Washington's marine finfish rearing facility provision, WAC 173-204-412.

Table 8-5 Critical Habitat Summary of Findings.

Species	ESU/DPS/Population	Effects Determination for the EPA's Approval of WAC 173-204-412
Chinook Salmon (*Oncorhynchus tshawytscha*)	Puget Sound ESU	NLAA
Chum Salmon (*Oncorhynchus keta*)	Hood Canal summer-run ESU	NLAA
Steelhead (*Oncorhynchus mykiss*)	Puget Sound, DPS	NLAA
Killer Whale (*Orinus orca*)	Southern Resident, DPS	NLAA
Bocaccio (*Sebastes paucispinis*)	Puget Sound/Georgia Basin DPS	NLAA
Yelloweye Rockfish (*Sebastes ruberrimus*)	Puget Sound/Georgia Basin DPS	NLAA
North American Green Sturgeon (*Acipenser medirostris*)	Southern DPS	NLAA
Pacific Eulachon (*Thaleichthys pacificus*)	Southern DPS	NLAA

NLAA – May affect, but is not likely to adversely affect

9. Sediment Testing Methodology Provisions

The EPA is not changing the results of the findings in the 2010 BE for these provisions and the listed species/critical habitat covered in the 2010 BE (with the exception of WAC 173-204-520(3)(d)(iv)). As noted above, *WAC 173-204-520(3)(d)(iv). Juvenile polychaete Puget Sound marine sediment cleanup screening levels and minimum cleanup level biological criteria,* is no longer included in this ESA consultation. The state deleted and substantively replaced this

provision as part of its revisions to the SMS in 2013. On December 18, 2015, the EPA rescinded its 2008 approval of this provision and no longer views Part V of the SMS to be WQS. Therefore, this provision is no longer part of the consultation and this Addendum.

See the 2010 BE for more information and details on the remaining sediment testing methodology provisions. Because these provisions that the EPA included in the 2010 BE are solely focused on the quality of the control and reference sediment samples for juvenile polychaete growth and larval bivalve survivorship that serve to improve the reliability of test results for benthic community protection, the EPA concludes this action **may affect, but is not likely to adversely affect** endangered or threatened species or designated critical habitat for the following new species and critical habitat listed since 2010:

- North American Green Sturgeon, Southern DPS
- Pacific Eulachon, Southern DPS
- Steelhead Puget Sound DPS Critical Habitat
- Bocaccio Puget Sound/Georgia Basin DPS Critical Habitat
- Yelloweye Rockfish Puget Sound/Georgia Basin DPS Critical Habitat

10. References

1. April 17, 2008. Supplemented August 6, 2008. U.S. EPA Region 10. *Biological Evaluation of Washington's Marine Finfish Rearing Facility Provision Contained in the Sediment Management Standards.* Prepared for U.S. Fish & Wildlife Service and National Marine Fisheries Service.

2. December 13, 2010. U.S. EPA Region 10. *Update to the Biological Evaluation Submitted April 17 and August 6, 2008, Regarding EPA Action on Washington's Marine Finfish Rearing Facility Provision Contained in the Sediment Management Standards.* Prepared for National Marine Fisheries Service.

3. National Marine Fisheries Service. 2007. Puget Sound Salmon Recovery Plan. Shared Strategy for Puget Sound adopted by National Marine Fisheries Service. Volumes I and II. https://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/puget_sound/puget_sound_chinook_recovery_plan.html

4. National Marine Fisheries Service. 2008. Recovery Plan for Southern Resident Killer Whales *(Orcinus orca)*. National Marine Fisheries Service, Northwest Region, Seattle, Washington.https://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/killer_whale/recovery_plan.html

5. April 8, 2011. Letter from William W. Stelle, Jr., Regional Administrator, NFMS to Jannine Jennings, Water Quality Standards Unit, EPA Region 10, *Re: Endangered Species Act Section 7 Informal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Proposed Approval of Finfish Rearing Facility Provision Contained in the Sediment Management Standards Rule*

Promulgated by the Washington State Department of Ecology (HUC 17110019, Puget Sound).

6. April 22, 2011. U.S. EPA Region 10. Letter from Michael A. Bussell, Director Office of Water and Watersheds, EPA Region 10 to Mr. Kelly Susewind and Mr. Jim Pendowski, Department of Ecology*, Re: EPA's Re-Approval of Washington's Revised Sediment Management Standards (WAC 173-204) including the Marine Finfish Rearing Facility Provision, as submitted on June 3, 1996.*

7. November 4, 2015. Case 2:15-cv-01731. WFC V. U.S. EPA and NMFS. *Complaint for Declaratory and Injunctive Relief.*

8. November 22, 2017. Case 2:15-cv-01731-BJR. WFC V. U.S. EPA and NMFS. *Plaintiff's Motions to Supplement Pleadings and Amend Case Schedule.*

9. December 14, 2017. Letter from Michael Lidgard, Acting Director, Office of Water and Watersheds, EPA Region 10 to Mr. Kim Kratz, Assistant Regional Administrator, NMFS, *Re: August 2017 Puget Sound Net Pen Failure.*

10. August 7, 2018. Case 2:15-cv-01731-BJR. WFC V. U.S. EPA and NMFS. *Order Denying (1) Federal Defendants' Motion for Judgment on the Pleadings and (2) Cooke Aquaculture's Motion to Dismiss.*

11. October 1, 2018. Letter from Daniel D. Opalski, Director Office of Water and Watersheds, EPA Region 10 to Mr. Kim Kratz, Assistant Regional Administrator, NMFS *Re: Request to Reinitiate Endangered Species Act Section 7 Consultation on the Environmental Protection Agency's Approval of Washington State Department of Ecology's Sediment Management Standards (WAC 173-204-412) Regarding Marine Finfish Rearing Facilities.*

12. October 3, 2018. Letter from Barry A. Thom, Regional Administrator, NMFS, to Dan Opalski Director Office of Water and Watersheds, EPA Region 10, *Re: Request to Reinitiate April 8, 2011 Endangered Species Act Section 7 Consultation on the Environmental Protection Agency's Approval of Washington State Department of Ecology's Sediment Management Standards (WAC 173-204-412) Regarding Marine Finfish Rearing Facilities (refer to NMFS No.: NWR-2010-6071).*

13. January 12, 2016. Letter from Kim W. Kratz, Ph.D., Assistant Regional Administrator, Oregon Washington Coastal Office, NMFS, to Dan Opalski, Director Office of Water and Watersheds, EPA Region 10 with enclosed memo dated December 17, 2015 from Dr. Dickhoff to Dr. Kratz *Re: Scientific Review of Intent to Sue U.S. Environmental Protection Agency and National Marine Fisheries Service for violations of the Endangered Species Act associated with consultation of Washington State's Revised Sediment Management Standards for Marine Finfish Facilities dated 25 August 2015.*

14. December 16, 2015. Letter from Daniel D. Opalski, Director Office of Water and Watersheds, EPA Region 10 to Mr. William Stelle, Administrator, West Coast Region,

NMFS *Re: Washington's Sediment Management Standards regarding Netpen Facilities.*

15. September 9, 2015. EPA Region 10. Tribal Marine Net Pen Enhancement Facilities NPDES General Permit for Washington. WAG132000. https://www.epa.gov/sites/production/files/2018-03/documents/r10-npdes-washington-tribal-net-pen-gp-wag132000-final-permit-2015.pdf

16. Rule specifying that new and revised standards adopted by States and authorized Tribes on or after May 30, 2000, become "applicable standards for Clean Water Act purposes" only when approved by EPA. https://www.federalregister.gov/documents/2000/04/27/00-8536/epa-review-and-approval-of-state-and-tribal-water-quality-standards

17. Washington Department of Ecology. Atlantic salmon net pen individual permits. Accessed May 26, 2020. https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-quality-permits/Water-Quality-individual-permits/Net-pens

18. March 26, 2018. Washington State House Bill 2957. Nonnative Finfish—Marine Aquaculture—Escape. Chapter 179, Laws of 2018.

19. January 18, 2019. Cooke Aquaculture Pacific, LLC. Fin Fish Aquaculture Permit – Plan of Operation. All-female Triploid Rainbow Trout (Oncorhynchus mykiss).

20. January 21, 2020. WDFW. 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. https://wdfw.wa.gov/sites/default/files/2020-01/marine_aquaculture_permit_justification-01-31-20.pdf

21. Washington Department of Ecology. Salmon net pen water quality individual permits. Accessed May 26, 2020. https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-quality-permits/Water-Quality-individual-permits/Net-pens
22. December 18, 2015. Letter from Dan Opalski, Director, Office of Water and Watershed, EPA Region 10 to Maia Bellon, Director, Washington Department of Ecology, *Re: EPA's Approval and Decision on Revisions to Washington's Sediment Management Standards (SMS), Chapter 173-3014 WAC* and enclosed Technical Justification.

23. EPA's *Revised* Biological Evaluation for the General NPDES Permit for Offshore Seafood Processing Discharge within Federal Waters Off the Coasts of Washington and Oregon Permit No. WAG520000. Revised May 2017. https://www.epa.gov/sites/production/files/2017-06/documents/r10-npdes-offshore-seafood-gp-wa-or-wag520000-biological-evaluation-2017.pdf

24. NMFS. ESA Critical Habitat for Puget Sound Steelhead website accessed on May 26, 2020. https://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/puget_sound/steelhead_recovery_workshop_2013/stone_habitat.ht

ml

25. NMFS. Map of Designated Critical Habitat for Puget Sound Steelhead. Accessed May 26, 2020. https://www.westcoast.fisheries.noaa.gov/publications/gis_maps/maps/salmon_steelhead/critical_habitat/steelhead/steelhead_ps.pdf

26. December 20, 2019. NOAA Fisheries. ESA Recovery Plan for the Puget Sound Steelhead Distinct Population Segment (Oncorhynchus mykiss). https://www.fisheries.noaa.gov/resource/document/esa-recovery-plan-puget-sound-steelhead-distinct-population-segment-oncorhynchus

27. NMFS. Map of Designated Critical Habitat for Bocaccio, Canary, and Yelloweye Rockfish Distinct Population Segments. Accessed May 26, 2020. https://www.westcoast.fisheries.noaa.gov/publications/gis_maps/maps/other/rockfish/pugetsoundrockfishch8_25_14.pdf

28. 82 FR 7711. January 23, 2017. Endangered and Threatened Species; Removal of the Puget Sound/Georgia Basin Distinct Population Segment of Canary Rockfish From the Federal List of Threatened and Endangered Species and Removal of Designated Critical Habitat, and Update and Amendment to the Listing Descriptions for the Yelloweye Rockfish DPS and Bocaccio DPS. https://www.federalregister.gov/documents/2017/01/23/2017-00559/endangered-and-threatened-species-removal-of-the-puget-soundgeorgia-basin-distinct-population

29. NMFS. Map of Designated Critical Habitat for Bocaccio, Canary, and Yelloweye Rockfish Distinct Population Segments. Accessed May 26, 2020. https://www.westcoast.fisheries.noaa.gov/publications/gis_maps/maps/other/rockfish/pugetsoundrockfishch8_25_14.pdf

30. EPA's *Revised* Biological Evaluation for the General NPDES Permit for Offshore Seafood Processing Discharge within Federal Waters Off the Coasts of Washington and Oregon Permit No. WAG520000. Revised May 2017. https://www.epa.gov/sites/production/files/2017-06/documents/r10-npdes-offshore-seafood-gp-wa-or-wag520000-biological-evaluation-2017.pdf

31. NMFS. Green Sturgeon website accessed on May 26, 2020. https://www.westcoast.fisheries.noaa.gov/protected_species/green_sturgeon/green_sturgeon_pg.html

32. NMFS. Map of Designated Critical Habitat for Southern DPS of Green Sturgeon. Accessed May 26, 2020. https://www.westcoast.fisheries.noaa.gov/publications/gis_maps/maps/salmon_steelhead/critical_habitat/greensturgeon_ch_maps.pdf

33. NMFS. Green Sturgeon website accessed on May 26, 2020. https://www.westcoast.fisheries.noaa.gov/protected_species/green_sturgeon/green_sturgeon_pg.html

34. EPA's *Revised* Biological Evaluation for the General NPDES Permit for Offshore Seafood Processing Discharge within Federal Waters Off the Coasts of Washington and Oregon Permit No. WAG520000. Revised May 2017. https://www.epa.gov/sites/production/files/2017-06/documents/r10-npdes-offshore-seafood-gp-wa-or-wag520000-biological-evaluation-2017.pdf

35. NMFS. Eulachon website accessed on May 26, 2020. https://www.westcoast.fisheries.noaa.gov/protected_species/eulachon/pacific_eulachon.html

36. NMFS. Eulachon website accessed on May 26, 2020. https://www.westcoast.fisheries.noaa.gov/protected_species/eulachon/pacific_eulachon.html

37. NMFS. Map of Designated Critical Habitat for Southern DPS of Eulachon. Accessed May 26, 2020. https://www.westcoast.fisheries.noaa.gov/publications/gis_maps/maps/other/eulachon/eulachon-ch-maps.pdf

38. NMFS. Eulachon website accessed on May 26, 2020. https://www.westcoast.fisheries.noaa.gov/protected_species/eulachon/pacific_eulachon.html

39. NMFS. Eulachon website accessed on May 26, 2020. https://www.westcoast.fisheries.noaa.gov/protected_species/eulachon/pacific_eulachon.html

40. January 12, 2016. Letter from Kim W. Kratz, Ph.D., Assistant Regional Administrator, Oregon Washington Coastal Office, NMFS, to Dan Opalski, Director Office of Water and Watersheds, EPA Region 10 with enclosed memo dated December 17, 2015 from Dr. Dickhoff to Dr. Kratz *Re: Scientific Review of Intent to Sue U.S. Environmental Protection Agency and National Marine Fisheries Service for violations of the Endangered Species Act associated with consultation of Washington State's Revised Sediment Management Standards for Marine Finfish Facilities dated 25 August 2015.*

41. September 9, 2015. EPA Region 10. Tribal Marine Net Pen Enhancement Facilities NPDES General Permit for Washington. WAG132000. https://www.epa.gov/sites/production/files/2018-03/documents/r10-npdes-washington-tribal-net-pen-gp-wag132000-final-permit-2015.pdf

42. January 12, 2016. Letter from Kim W. Kratz, Ph.D., Assistant Regional Administrator, Oregon Washington Coastal Office, NMFS, to Dan Opalski, Director Office of Water and Watersheds, EPA Region 10 with enclosed memo dated December 17, 2015 from Dr. Dickhoff to Dr. Kratz *Re: Scientific Review of Intent to Sue U.S. Environmental Protection Agency and National Marine Fisheries Service for violations of the Endangered Species Act associated with consultation of Washington State's Revised Sediment Management Standards*

for Marine Finfish Facilities dated 25 August 2015.

43. January 30, 2018. D Clark, K Lee, K Murphy, A Windrope. *2017 Cypress Island Atlantic Salmon Net Pen Failure: An Investigation and Review.* Washington Department of Natural Resources. https://www.dnr.wa.gov/sites/default/files/publications/aqr_cypress_investigation_report.pdf?vdqi7rk

44. December 21, 2018. Personal communication with Jeff Vanderpham, NMFS. Information regarding Washington DNR aquatic leases.

45. Washington Department of Ecology. Atlantic salmon net pen individual permits website. Accessed May 26, 2020. https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-quality-permits/Water-Quality-individual-permits/Net-pens

46. Washington Department of Ecology. Atlantic salmon net pen individual permits website. Accessed May 26, 2020. https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-quality-permits/Water-Quality-individual-permits/Net-pens

47. Washington Department of Ecology. Atlantic salmon net pen individual permits website. Fact Sheets. Accessed May 26, 2020. https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-quality-permits/Water-Quality-individual-permits/Net-pens

48. September 9, 2015. EPA Region 10. Tribal Marine Net Pen Enhancement Facilities NPDES General Permit for Washington. WAG132000. https://www.epa.gov/sites/production/files/2018-03/documents/r10-npdes-washington-tribal-net-pen-gp-wag132000-final-permit-2015.pdf
April 30, 2015. EPA Region 10. Fact Sheet. Tribal Marine Net Pen Enhancement Facilities NPDES General Permit for Washington. WAG132000. https://www.epa.gov/sites/production/files/2018-03/documents/r10-npdes-washington-tribal-net-pen-gp-wag132000-fact-sheet-2015.pdf

49. March 7, 2019. Personal communication with Jeff Vanderpham, NMFS. Species list/critical habitat for net pen consultation.

50. July 2007. "Beneficial Environmental Effects of Marine Finfish Mariculture" J.E. Rensel and J.R.M. Forster.

51. June 2002. "Review of Potential Impacts of Atlantic Salmon Culture on Puget Sound Chinook Salmon and Hood Canal Summer-Run Chum Salmon Evolutionarily Significant Units" F. William Waknitz.

52. September 2001. "The Net-pen Salmon Farming Industry in the Pacific Northwest" Colin Nash.

53. August 1, 2017. Gael Kurath, M.S., Ph.D., U.S.G.S. Western Fisheries Research Center, Microbiologist Scientific Review of the Risk Posed to Endangered Pacific Salmon in Puget Sound, Washington, by an Outbreak of the Salmon Virus, IHNV in Atlantic Salmon Farm Netpens in Puget Sound. RE: Case No. 2:15-CV-01731-MJP, *Wild Fish Conservancy v. United States Environmental Protection Agency and the National Marine Fisheries Service*. USGS.

54. September 2017. T.R. Meyers, Alaska Department of Fish and Game, Juneau Fish Pathology Laboratory. *Piscine Orthoreovirus (PRV) in the Pacific Northwest Appears to be of Low Risk to Wild Pacific Salmonids. The Pacific Northwest Fish Health Protection Committee.*

55. August 28, 2018. Gustafson, L.L., Creekmore, L.H., Snekvik, K.R., Ferguson, J.A., Warg, J.V., Blair, M., Meyers, T.R., Stewart, B., Warheit, K.I., Kerwin, J. and Goodwin, A.E. *A systematic surveillance programme for infectious salmon anaemia virus supports its absence in the Pacific Northwest of the United States.* Journal of fish diseases, 41(2). pp.337-346.

56. February 22, 2017. Di Cicco, E., Ferguson, H.W., Schulze, A.D., Kaukinen, K.H., Li, S., Vanderstichel, R., Wessel, Ø., Rimstad, E., Gardner, I.A., Hammell, K.L. and Miller, K.M. *Heart and skeletal muscle inflammation (HSMI) disease diagnosed on a British Columbia salmon farm through a longitudinal farm study*. PLoS One, 12(2). p.e 0171471.

57. April 23, 2018. Di Cicco E, HW Ferguson, KH Kaukinen, AD Schulze, S Li, A Tabata, OP Günther, G Mordecai, CA Suttle, and KM Miller. *The same strain of Piscine orthoreovirus (PRV-1) is involved in the development of different, but related, diseases in Atlantic and Pacific Salmon in British Columbia. F*ACETS 3:599–641.

58. November 30, 2017. Kibenge, M.J., Wang, Y., Morton, A., Routledge, R. and Kibenge, F.S. Formal comment on: *Piscine reovirus: Genomic and molecular phylogenetic analysis from farmed and wild salmonids collected on the Canada/US Pacific Coast*. PloS one, 12(11), p.e 0188690.

59. August 29, 2018. Laurin, E., Jaramillo, D., Vanderstichel, R., Ferguson, H., Kaukinen, K.H., Schulze, A.D., Keith, I.R., Gardner, I.A. and Miller, K.M. *Histopathological and novel high-throughput molecular monitoring data from farmed salmon (Salmo salar and Oncorhynchus spp.) in British Columbia, Canada, from 2011–2013*. Aquaculture.

60. December 1, 2017. Mimeault, C., Wade, J., Foreman, M.G.G., Chandler, P.C., Aubry, P., Garver, K.A., Grant, S.C.H., Holt, C., Jones, S.R.M., Johnson, S.C. and Trudel, M. Fisheries and Oceans Canada (DFO*). Assessment of the Risk to Fraser River Sockeye Salmon Due to Infectious Hematopoietic Necrosis Virus (IHNV) Transfer from Atlantic Salmon Farms in the Discovery Islands, British Columbia.* Canadian Science Advisory Secretariat (CSAS).

61. December 12, 2017. Morton, A., Routledge, R., Hrushowy, S., Kibenge, M. and Kibenge, F. *The effect of exposure to farmed salmon on piscine orthoreovirus infection and fitness in wild Pacific salmon in British Columbia, Canada.* PloS one, 12(12), p.e 0188793.

62. September 6, 2017. Purcell, M.K., Powers, R.L., Evered, J., Kerwin, J., Meyers, T.R., Stewart, B. and Winton, J.R. *Molecular testing of adult Pacific salmon and trout (Oncorhynchus spp.) for several RNA viruses demonstrates widespread distribution of piscine orthoreovirus in Alaska and Washington.* Journal of fish diseases, 41(2), pp.347-355.

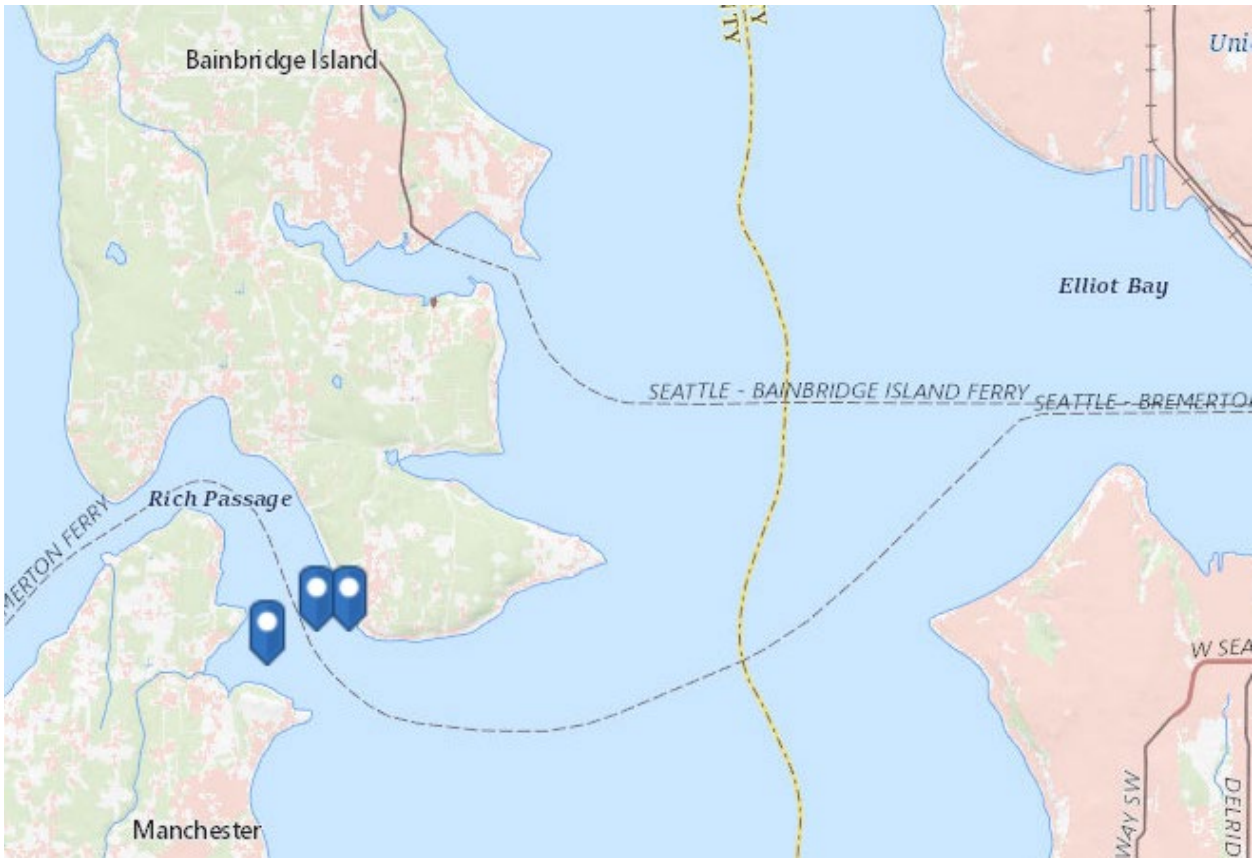
63. 2018. Rensel, J.E. (Jack). *Escaped Atlantic Salmon in Washington State*. Prepared by Rensel Associate Aquatic Sciences for Cooke Aquaculture Pacific, Inc.

64. January 29, 2018. Steding, D. J. *Letter to Investigation and Review Panel, RE: Draft of Incident Review Board Report.* January 29, 2018.

65. October 13, 2017. NMFS. Rockfish Recovery Plan. Puget Sound/Georgia Basin Yelloweye Rockfish (*Sebastes ruberrimus*) and Bocaccio (*Sebastes paucispinis*). https://archive.fisheries.noaa.gov/wcr/publications/protected_species/other/rockfish/final_yelloweye_rockfish_and_bocaccio_recovery_plan_508.pdf

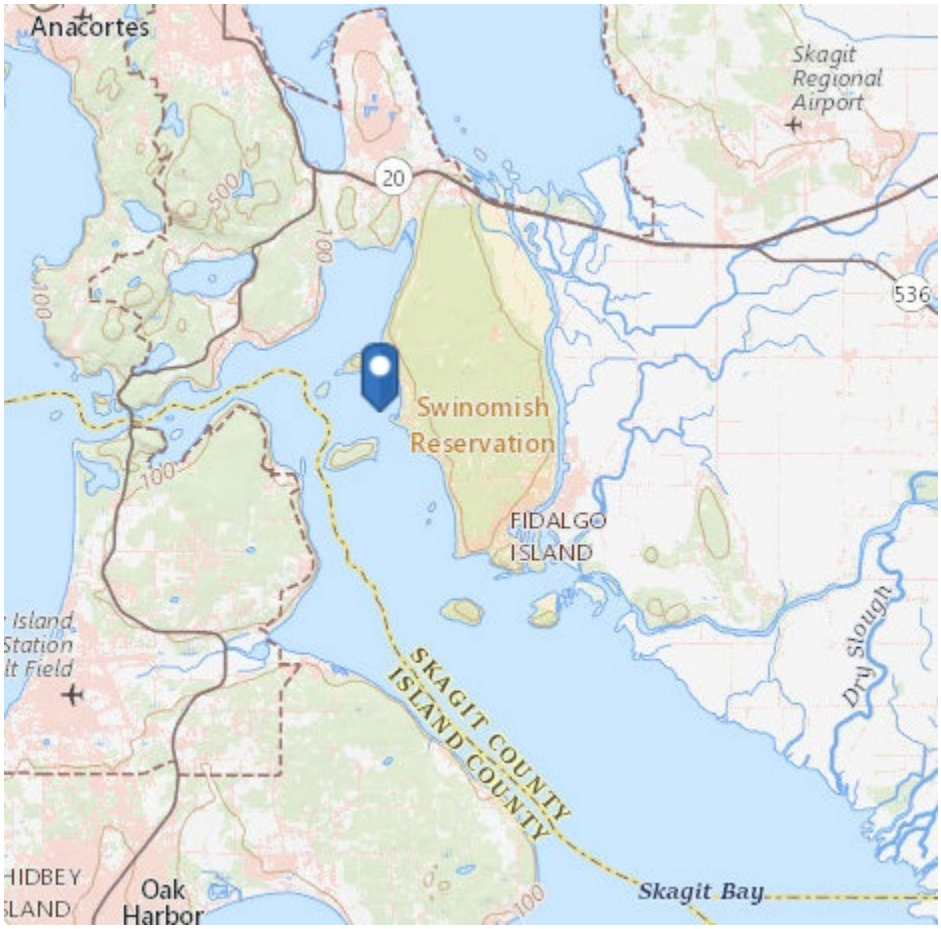
11. Maps

Figure 1. Rich Passage Atlantic Salmon Rearing Facilities



From Ecology (accessed May 26, 2020):
https://ecology.wa.gov/DOE/media/Images/WATER-SHORELINES/Water%20quality/Regs%20Permits/3-netpens.PNG

Figure 2. Hope Island (Skagit Bay) Atlantic Salmon Rearing Facility



From Ecology (accessed May 26, 2020): https://ecology.wa.gov/DOE/media/Images/WATER-SHORELINES/Water%20quality/Regs%20Permits/skagit-netpen.PNG

Figure 3. Facilities Covered Under EPA's General Permit

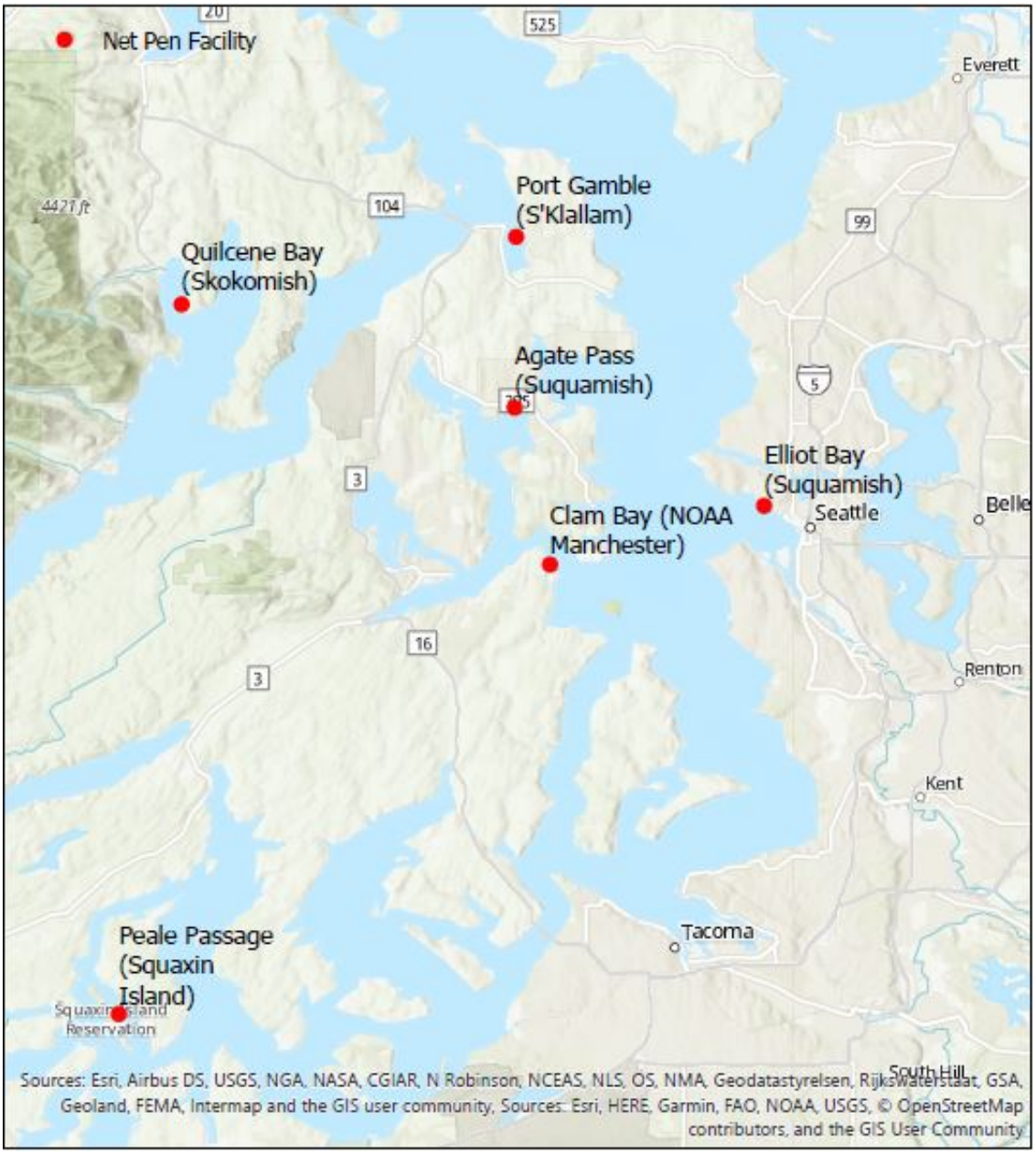
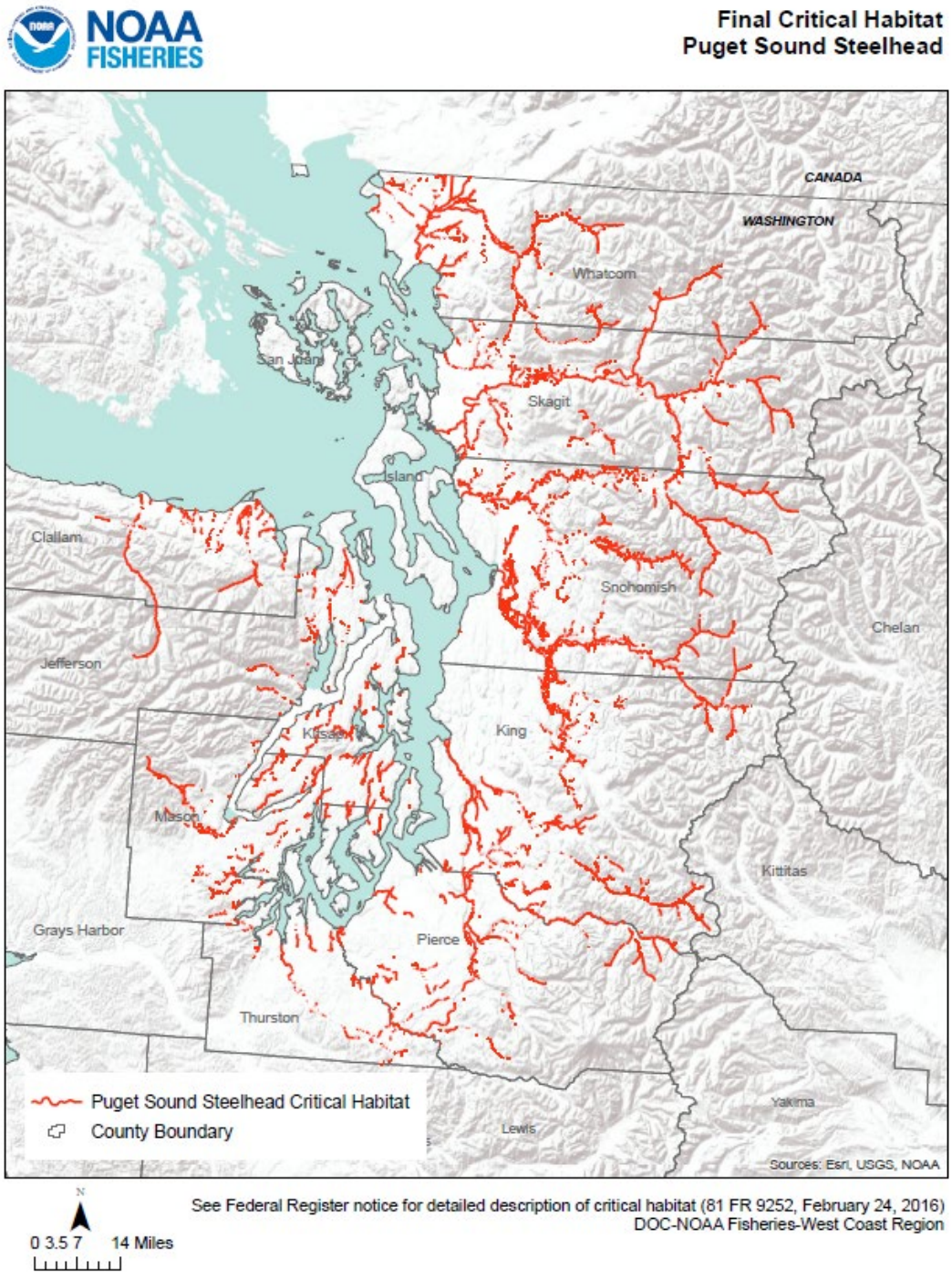
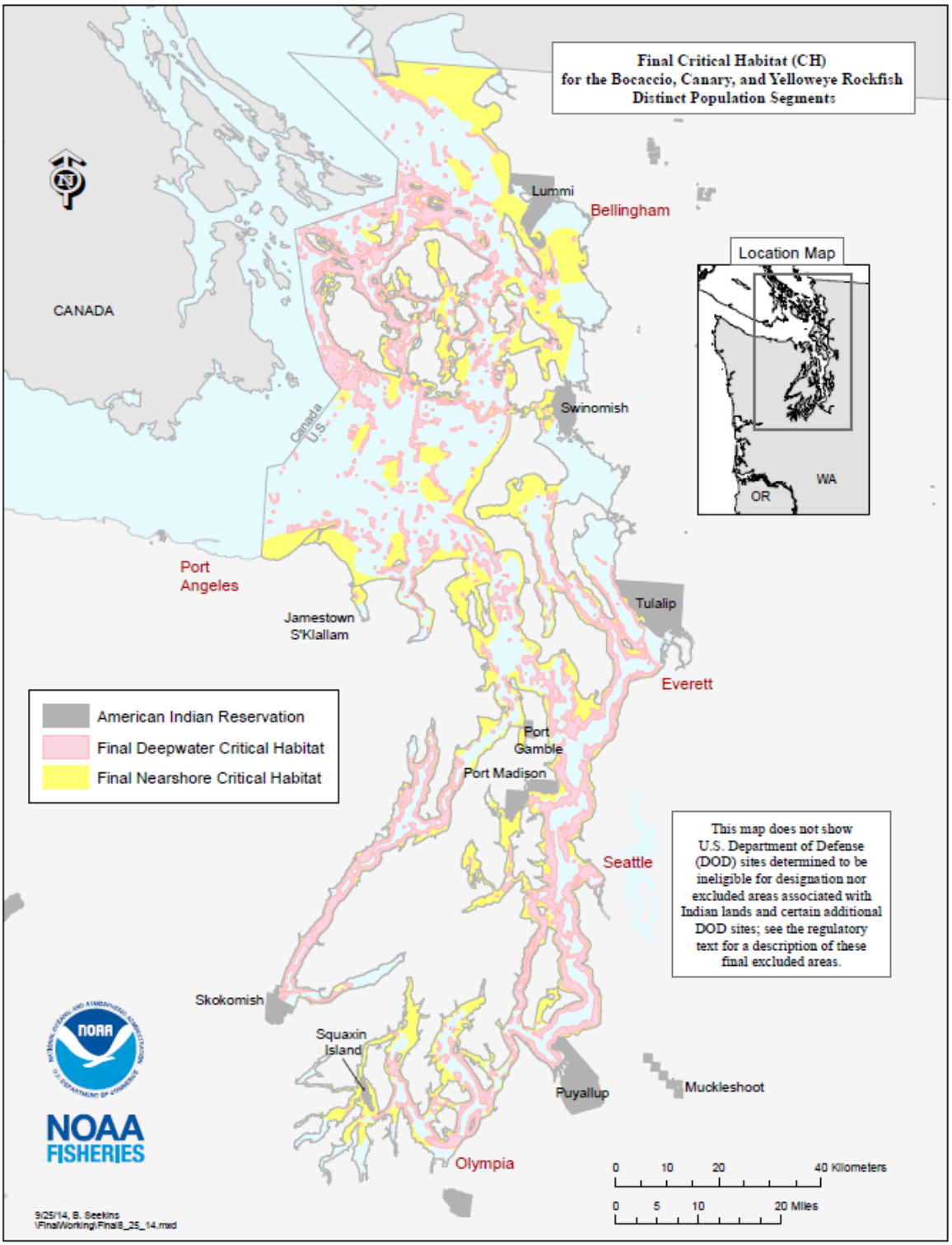


Figure 4. Puget Sound Steelhead Critical Habitat



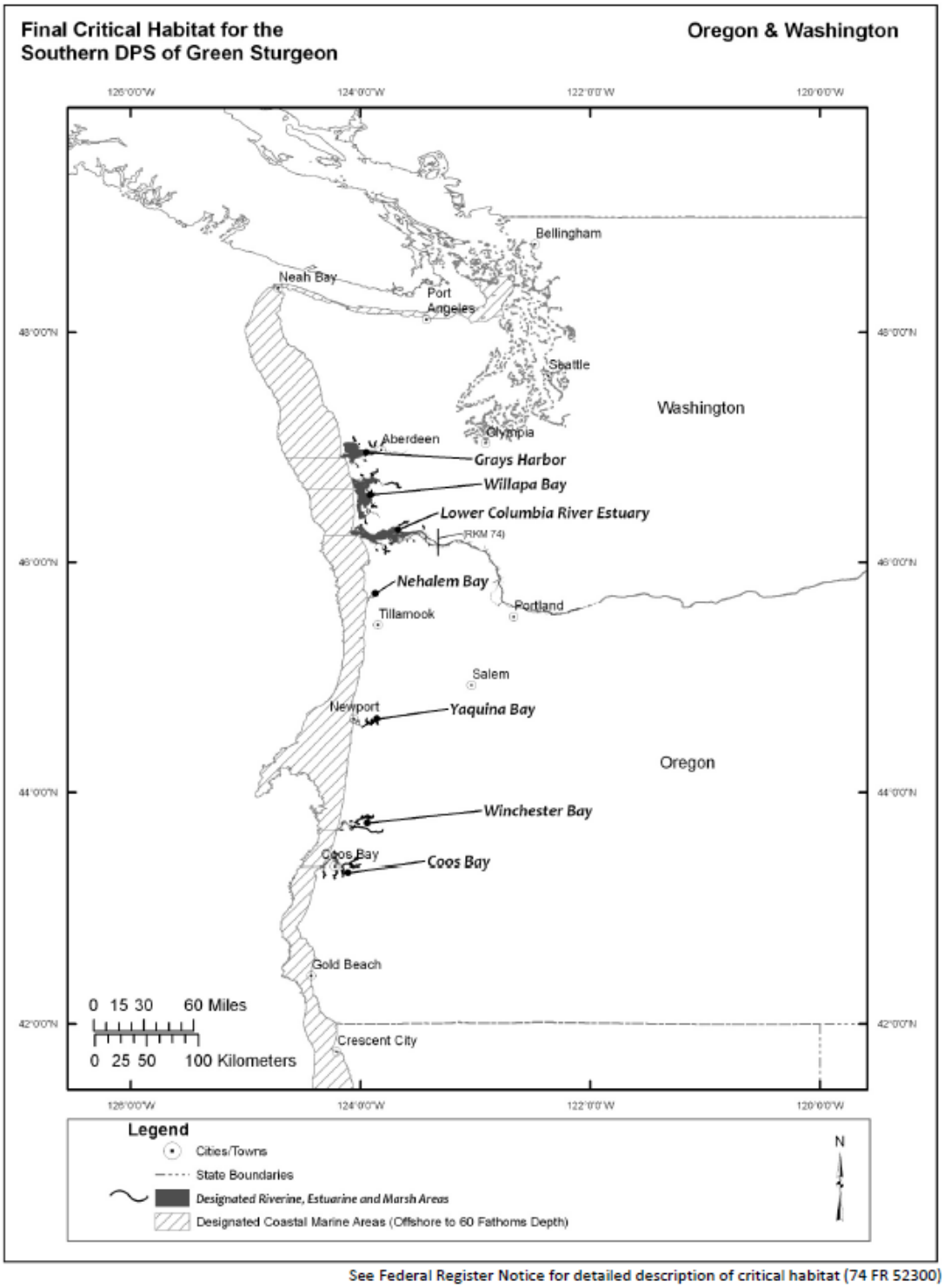
From NOAA Fisheries (accessed May 26, 2020):
https://www.westcoast.fisheries.noaa.gov/publications/gis_maps/maps/salmon_steelhead/critical_habitat/steelhead/steelhead_ps.pdf

Figure 5. Bocaccio and Yelloweye Rockfish Critical Habitat



From NOAA Fisheries (accessed May 26, 2020): https://www.westcoast.fisheries.noaa.gov/publications/gis_maps/maps/other/rockfish/pugetsoundrockfishch8_25_14.pdf **Note:** Effective March 24, 2017, Canary Rockfish were delisted.

Figure 6. Green Sturgeon Critical Habitat



From NOAA Fisheries (accessed May 26, 2020):
https://www.westcoast.fisheries.noaa.gov/publications/gis_maps/maps/salmon_steelhead/critical_habitat/greensturgeon_ch_maps.pdf

Figure 7. Eulachon Critical Habitat

From NOAA Fisheries (accessed May 26, 2020):
https://www.westcoast.fisheries.noaa.gov/publications/gis_maps/maps/other/eulachon/eulachon-ch-maps.pdf