Select Area Fisheries Enhancement (SAFE) Program

Final Environmental Assessment

February 2026

DOE/EA-2277

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1.0 Purpose and Need

The Bonneville Power Administration (Bonneville) has received a request for funding from three fishery co-managers (Washington Department of Fish and Wildlife (WDFW), Oregon Department of Fish and Wildlife (ODFW), and Clatsop County Fisheries (CCF)) that would finance three hatchery programs involved in acclimation, transport and release of juvenile salmon (spring Chinook and coho smolts), including monitoring and evaluation and Select Area Fisheries Enhancement hatchery facilities and net pen sites (SAFE Facilities) operations and maintenance (O&M).

In meeting the need for action, Bonneville seeks to minimize harm to weak stocks of natural origin ESA-listed salmon and steelhead.

1.1 Introduction

Bonneville has prepared this environmental assessment (EA) pursuant to the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. 4321 *et seq*, and its implementing regulations and procedures which require federal agencies to assess the impacts that their actions may have on the human environment and to make this analysis available to the public.

Bonneville is evaluating proposals from three fishery co-managers (WDFW, ODFW, and CCF) to fund the final stage—and thereby attain full implementation—of three Select Area Hatchery programs (namely, the Oregon SAFE Spring Chinook Program, the Oregon SAFE Coho Salmon Program, and the Deep River SAFE Coho Program) managed by separate entities with funding from multiple sources. Together, these programs (SAFE Program) contribute spring Chinook and coho salmon produced (i.e., collected and reared) at various hatchery facilities in the Lower Columbia River and its tributaries and acclimated and released from SAFE hatchery and net pen sites (SAFE Facilities) in off-channel areas (Select Areas) in the Lower Columbia River estuary (LCRE). Eventually, these fish return to these Select Areas for commercial and recreational harvest (Select Area Fisheries).

From its inception in the early 1990s, the SAFE Program was designed to include three stages of development: research, expansion, and full implementation. Bonneville funded the research and expansion phases (i.e., the Lower Columbia River Terminal Fisheries Research Project and the Youngs Bay Salmon Rearing and Release Program), which aimed to determine the feasibility of increasing protection for weak stocks by moving fisheries off the mainstem Columbia River to select areas where natural origin salmon were less likely to be harvested. The SAFE Program is now approaching maximum production capacity with the benefit of knowledge gained and techniques developed during the research and expansion stages.

1.1.1 Bonneville Power Administration

Bonneville is a federal power marketing administration within the U.S. Department of Energy responsible for marketing and transmitting FCRPS-generated power. Bonneville's operations are governed by several statutes, including the Northwest Power Act, which, among other things, directs Bonneville to protect, mitigate, and enhance fish and wildlife affected by the development and operation of the FCRPS, and to do so in a manner consistent with the Council's Columbia River Basin Fish and Wildlife Program, the Council's Power Plan and the purposes of the statute. *See* 16 U.S.C. § 839b(h)(10)(A).

1.1.2 Northwest Power and Conservation Council's Fish and Wildlife Program

The Northwest Power Act directed the Council to develop a program to protect, mitigate, and enhance fish and wildlife habitat on the Columbia River and its tributaries. Bonneville and the other federal agencies responsible for managing, operating, or regulating hydroelectric facilities located on the Columbia River or its tributaries must take the Council's program into account to the fullest extent practicable, and Bonneville funds fish and wildlife mitigation in a manner consistent with the Council's program, the purposes of the Northwest Power Act, and other laws.

In its 1993 Strategy for Salmon, the Council recommended that terminal fishing sites be identified and developed to harvest abundant fish stocks while minimizing the incidental harvest of weak stocks. The Council recommended that Bonneville "fund a study to evaluate potential terminal fishery sites and opportunities" that would include: general requirements for developing those sites (e.g., construction of acclimation/release facilities for hatchery smolts so that adult salmon would return to the area for harvest); the potential number of harvesters that might be accommodated; type of gear to be used; and other relevant information needed to determine the feasibility and magnitude of the program.

1.1.3 Independent Scientific Review Panel (ISRP)

The current proposal incorporates information from a review by the Independent Scientific Review Panel (ISRP). The Council created the ISRP in response to a 1996 amendment to the Northwest Power Act (*see* 16 U.S.C. 839b(h)(10)(D)(i)), pursuant to which the ISRP now undertakes independent scientific review of Bonneville funding proposals and verifies that they are based on sound scientific principles, benefit fish and wildlife, have clearly defined objectives and outcomes, and contain provisions for monitoring and evaluation of results.

The ISRP provided a preliminary review on September 23, 2021—which conditionally determined that it "meets scientific Review Criteria"—and a final review on February 10, 2022. As part of the final review, the ISRP also considered the proponents' 2017-2019 Annual Report (Baker et al. 2020) and several earlier ISRP and ISRP/Independent Economic Analysis Board reviews. The ISRP's final review gave the project high marks for providing fishery opportunities in the lower river and found that the SAFE Program contributes to lower-river fisheries while monitoring and considering upper river ESA-listed stocks. It also found that the SAFE Program has benefits to fish and fisheries, as well as economic benefits to lower Columbia River communities.

1.2 SAFE Hatchery Program Background

1.2.1 History of SAFE

What follows is a brief history of the entire SAFE program. Bonneville would fund only the portion of the SAFE Program that is proposed in Chapter 2. The SAFE Program began in late 1993 as the Columbia River Terminal Fisheries Research Project, a decade-long Bonneville-funded comprehensive feasibility study based on a recommendation from the Council's predecessor, the Northwest Power Planning Council. The project originally focused on spring Chinook in the Youngs Bay select area but later allowed for the development of other select area fishing sites.

The Columbia River Terminal Fisheries Research Project investigated the feasibility of creating and expanding known-stock terminal fisheries in Youngs Bay and other off-channel areas of the Columbia River in Oregon and Washington to allow harvest of strong anadromous hatchery salmonid stocks while minimizing incidental harvest of weak wild salmon stocks. The study included general requirements for developing net pen sites (e.g., construction of acclimation/release facilities for hatchery smolts so that adult salmon would return to the area for harvest); the potential number of harvesters that might be accommodated; type of gear to be used; and other relevant information needed to determine the feasibility and magnitude of the program.

This project also investigated the development of other select area fishing sites, selecting eight for further study. Following extensive evaluation of various sites, stocks, and rearing and release methods over several years, four SAFE production and fishery projects were established at four sites: Youngs Bay, Blind Slough, and Tongue Point in Oregon, and Deep River in Washington.

Bonneville completed an Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) for the Columbia River Terminal Fisheries Research Project (also known as the Youngs Bay Salmon-Rearing and Release Program) in 1993 (DOE/EA-1040) and issued a Categorical Exclusion the following year in connection with additional research activities aimed at identifying and evaluating potential net pen sites as part of a planned expansion the SAFE Program (Table 1). Bonneville completed an EA in 1995 for anticipated expansion of the SAFE Program to include net pens in these new sites, including Deep River. In 2010, Bonneville completed a follow-up

Supplement Analysis assessing a proposed increase in spring Chinook and coho smolt releases from the Deep River net pen site.

Table 1: Bonneville's Existing NEPA Documentation for Previous Versions of the SAFE Program

1993 Environmental Assessment for Youngs Bay salmon rearing and release program and Lower Columbia River Terminal Fisheries Research Project (DOE/EA-1040)
1994 Categorical Exclusion (research activities to identify an evaluation of potential sites for expansion of SAFE)
1995 Environmental Assessment (expansion of the project to include net pens in new sites, including Deep River)
2010 Supplement Analysis to the 1995 EA/FONSI (for the increase of spring Chinook and coho smolts released)

After settling on successful sites and rearing strategies, the next phase of the SAFE Program focused on transitioning from research and expansion to attaining full-scale, maximized production at proven sites with proven stocks. Operational efficiencies (such as releases per cost) were expected to increase in future years as the program headed towards full implementation rather than being exploratory (TRG 2006).

1.2.2 SAFE Hatchery and Genetic Management Plans (HGMPs)

The SAFE Program consists of activities from three separate HGMPs which are incorporated into this EA by reference. A HGMP is an application submitted to NMFS for ESA coverage by the operator/owner/funder of a hatchery or hatchery program that may affect ESA-listed species under NMFS jurisdiction. HGMPs are technical documents describing the composition and operation of each individual hatchery or program. In doing so, HGMPs comprise the technical framework for the whole SAFE program. A HGMP must contain the information outlined in 50 C.F.R. 223.203(b)(5)(i) and generally follows a standard NMFS-developed outline and template, though the content can vary greatly depending on the hatchery or program. HGMPs are formally submitted to NMFS for review before being made available for public comment.

The aforementioned co-managers submitted revised HGMPs for the three hatchery programs (see Table 2). Since 2005, these keystone program documents—which are currently undergoing NMFS review—have been drafted, revised, and updated with new information and operation plans.

Table 2: Hatchery Programs included in the Proposed Action

Program	HGMP Date	Program Operator(s)	Funding Agencies
Oregon SAFE Coho Salmon Program	May 25, 2021	ODFW, CCF	Bonneville, NMFS, ODFW, CCF
Oregon SAFE Spring Chinook Salmon Program	May 25, 2021	ODFW, CCF	Bonneville, NMFS, USFWS, ODFW, CCF
Deep River SAFE Coho Salmon Program	July 24, 2018	WDFW	Bonneville, NMFS, WDFW

These three hatchery programs are considered isolated programs because they acclimate and release juvenile Chinook and coho salmon from net pens inside channel and backwater areas of the LCRE so that the rearing of juveniles and harvest of returning adults would be isolated from natural origin salmon. Thus, the SAFE Program's overall objectives include minimizing harm to weak stocks of natural origin ESA-listed salmon and steelhead and minimizing negative impact of SAFE fisheries and production on the environment.

1.2.3 Monitoring and Analysis

As explained in the HGMPs, all released SAFE Program fish are marked with an adipose fin clip and/or coded wire tags (CWT). Sampling of local hatchery returns and spawning grounds in local tributaries through CWT recovery data are used to monitor survival, straying, and fishery contributions.

The following protocols would be implemented to monitor and evaluate risks of the SAFE Program:

1. Up to 100% adipose fin clips.
2. Between 2 – 16% CWT of coho salmon in Oregon and 45,000 coho CWT in Washington to evaluate straying rates.
3. Spawning ground surveys along with CWT analysis would be conducted in SAFE drainage streams to determine the extent of natural spawning of program fish.
4. Local area streams would be monitored for natural and hatchery-origin coho escapement based on adipose fin clip identification, and CWT would be collected for evaluation.
5. Hatchery fish will be monitored through standard fish health production monitoring and reporting.

6. Juvenile fish will be monitored monthly by a fish health expert and disposal of affected fish or eggs will be disposed of following Integrated Hatchery Operations Team (IHOT) policy.
7. Available wild fish data will be obtained from juvenile and adult surveys by ODFW and WDFW and other affiliates.

1.2.4 SAFE Program Hatcheries

As described in the HGMPs, several hatcheries perform necessary functions for the SAFE Program. Such as providing eggs, rearing fish to a certain size[2], transferring fish to net pen sites for acclimation and release, and/or releasing fish directly into the Select Area Sites described above.

In most cases these activities receive a mix of state, Mitchell Act (NMFS), county and other funds. Bonneville funding has gone to a subset of these hatchery facilities (i.e., Gnat Creek, Klaskanine River, CCF South Fork Klaskanine River, Beaver Creek, and Grays River) to support operations and maintenance pursuant to the Northwest Power Act. NMFS (2017) and NMFS (2019) ESA biological opinions and corresponding incidental take statements cover the operations of these facilities. In 2017[3] and 2019,[4] NMFS assessed the effects of these hatchery facilities for collecting broodstock, incubating eggs, and rearing juvenile salmon prior to transferring fish to SAFE facilities.

Bonneville does not fund the collection of broodstock for salmon production. NMFS and other responsible agencies fund the collection of broodstock in accordance with ESA Biological Opinions, corresponding Incidental Take Statements (NMFS 2017; NMFS 2019), and NEPA and their implementing regulations. Specifically, the NMFS (2019) Biological Opinion assessed the effects of broodstock collection on ESA-listed salmon and steelhead for spring Chinook salmon releases where broodstock is collected from Upper Willamette hatchery facilities. For coho salmon, NMFS (2017) evaluated the effects of broodstock collection on ESA-listed salmon and steelhead in the Lower Columbia region from fish produced for SAFE releases.

1.2.5 SAFE Funding Sources

The SAFE Program, portions of which Bonneville proposes funding as described in Chapter 2, has evolved to include multiple funding and operating entities, including NMFS, ODFW, WDFW, CCF, and USFWS. Specifically, WDFW is the SAFE Program co-manager overseeing the Washington hatchery program (Deep River SAFE Coho Program) sited at Deep River in Washington, while

2 The spring Chinook and coho smolts released from the net pen sites require initial rearing for almost a year in a hatchery setting (or more than a year in the case of acclimation smolts).

3 ESA Consultation on effects of implementation of the Mitchell Act Final Environmental Impact Statement preferred alternative and administration of Mitchell Act hatchery funding.

4 ESA Consultation on effects of the 2018-2027 U.S. v. Oregon Management Agreement.

ODFW and CCF are co-managers of the Oregon SAFE Coho and Spring Chinook programs sited at the Oregon net pen sites in Youngs Bay, Blind Slough, and Tongue Point.

The approximate total annual cost of operating and maintaining the SAFE Program—excluding the value of volunteer time and donated materials—is approximately $2.4 million, which includes the costs of operating net pens, contributing hatchery smolt production and hauling, and managing the programs. Recently, Bonneville's annual funding contribution has typically amounted to roughly $1.6 million, or two-thirds of annual O&M costs and half of smolt production costs.

1.2.6 SAFE Program Fish

The particular species and stocks of salmon reared and released under the SAFE Program—Chinook (*Oncorhynchus tshawytscha*, hereinafter spring Chinook) and coho salmon (*Oncorhynchus kisutch*, hereinafter coho)—were selected mainly on flesh quality, gamete availability, return timing, homing ability, and overall economic value. Two other salmonid species are produced using these same net pens and supporting hatchery facilities (tule fall Chinook and select area bright [SAB] fall Chinook) but with funding from other sources, meaning they would be produced regardless of Bonneville's funding decision.

SAFE Program fish (smolts) are released over a three-month period from March through May (see Appendix A for juvenile release numbers). Spring Chinook are generally released from Oregon SAFE sites as yearlings in March and April and from Deep River net pens in Washington as sub-yearlings in spring and fall. From March through May, early-run coho are released from Oregon Select Area Sites while late-run coho, historically present in the Grays basin, are released from the Deep River net pens in Washington.

The target release size for all hatchery fish in the SAFE Program is the smolt life stage for both spring Chinook salmon and coho salmon. Depending upon the species, average fork length ranges from seven inches (~170 millimeters, or mm) for spring Chinook salmon and five to seven inches (120-170 mm) for coho salmon. This is smaller than typical hatchery releases.

Fishing on SAFE Program fish allows for greater harvest rates, since adult returns are not needed for broodstock and can be 100 percent harvested (See Appendix B for commercial and recreational harvest rates.). The greater harvest rates on the returning adults also solve some problems that accompany the usual practice of releasing smolts at upriver hatchery location sites. Specifically, too many hatchery-produced fish return to these release sites, requiring handling and disposal of surpluses (i.e., those in excess of what is needed for future generation broods). The value of the hatchery fish caught at the net pen sites is greater because of better fish condition, harvester proximity, and ready markets.

To achieve these goals, the fisheries co-managers propose producing and releasing up to 4.25 million spring Chinook salmon smolts and up to 4.3 million coho salmon smolts annually, as

planned in the three HGMPs (ODFW 2021a; ODFW 2021b; WDFW 2021). Research and monitoring is an integral part of the SAFE Program and results have been used to modify each hatchery program as necessary to ensure that ecological, genetic, and harvest impacts to ESA-listed stocks are as low as possible.

1.2.7 Select Area Fisheries

The SAFE Program produces fish for commercial and recreational harvests which are managed during three periods: fall, winter/spring, and summer seasons, at specific off-channel locations in Youngs Bay, Tongue Point, Blind Slough and Deep River in the LCRE. These fishing locations are known as Select Area Sites and the managed fisheries there are known as Select Area Fisheries.

Select Area Fisheries, also known as terminal fisheries, have been part of the lower Columbia River and Oregon coastal river commercial fishing industry since the 1930s. The fisheries are managed primarily by the Columbia River Compact and regulatory agencies in their respective states (namely, the WDFW and ODFW), which prescribe times and areas for fishery openings, allowable gear types, and monitor fisheries' compliance with catch targets as well as conservation constraints and boundaries. Commercial and recreational seasons at Select Area Fisheries are prescribed by regulations that are based on test fishing results and coded-wire tagging (CWT) analyses that help determine appropriate time, area, and gear parameters for maximizing harvest of target stocks while minimizing impacts to non-local stocks. Historically, fisheries governed by these harvest policies have been managed within winter/spring, summer, and fall season timeframes, or management periods. These management periods are approximate; some fisheries are longer in duration and span multiple management periods.

The Select Area Fisheries have both a commercial and recreational fishery within each of the three management periods. The winter/spring season typically extends from January 1 to June 15, during which fisheries (seven non-treaty and six treaty) in the mainstem Columbia River primarily target spring Chinook salmon stocks returning to the upper Columbia, the Willamette River, and lower Columbia River tributaries.

The summer season typically extends from June 16 to July 31, during which fisheries (five non-treaty and five treaty) target primarily Upper Columbia River (UCR) summer Chinook salmon, which is not ESA-listed, and Upriver Columbia sockeye salmon, which contains ESA-listed Snake River salmon as a subcomponent. The summer season Select Area Fisheries target Spring Chinook and fall Chinook.

Fall season typically begins on August 1 and extends to the end of the calendar year, during which fisheries (nine non-treaty and six treaty) target primarily harvestable hatchery and natural-origin fall Chinook and coho salmon, and steelhead. The fall season Select Area Fisheries target fall Chinook and coho.

At each of these Select Area Sites, the fish (spring Chinook and coho)[5] spend their juvenile life stage in net pens. During this time, the fish imprint to the scent of that area selected for rearing and harvest. After a period of time, the fish are released from the net pens to migrate the short distance to the Pacific Ocean, where they live out their ocean cycle. Coho have a three-year life span, of which half is spent in the ocean. Chinook live three to five years in the ocean of which six to 18 months are spent in freshwater before migrating to the sea. Before their release, the smolts from each group are marked so they can be identified when they return as adults and are harvested. Tiny CWT are inserted into the snout, and the adipose fin is clipped.

When the adult salmon return from the ocean, they "home in" or head for the net pens where they were released and mill around outside. Both commercial and recreational fishermen have the opportunity to catch these fish during managed fisheries. (See Appendix B for Commercial and Recreational Harvest.) The intent is that 100 percent of these fish would be harvested for commercial and recreational fisheries. The release of the fish and the dates of the fishing seasons are timed to minimize competition and any interaction with other ESA-listed Columbia River stocks. These fish are not meant to contribute to any natural population or recovery of the evolutionarily significant unit (ESU); they are purely for harvest.

1.3 Public Involvement

Bonneville solicited public input on the appropriate scope of this environmental review via mailed letters on January 1st, 2024 to tribal and government agencies, and other potentially affected or concerned citizens and interest groups. The mailed correspondence provided information about the proposed SAFE Program and public scoping period, requested comments on issues to be addressed in the environmental review, and provided instructions for submitting comments (via mail, fax, telephone, and Bonneville's website). Bonneville shared the correspondence on a section of its website dedicated to the SAFE Program (www.bpa.gov/nepa/SAFE) and the environmental review process for the general public. The public scoping period ended on February 1st, 2024, four comments were received.

Consistent with the Council on Environmental Quality's (CEQ) November 30, 2022, Memorandum and Guidance for Federal Departments and Agencies on Indigenous Knowledge, Bonneville engaged Tribes and Indigenous Peoples for information and perspectives regarding environmental, cultural, and community impacts. Bonneville determined that four American Indian tribes have a potential interest in the Project: The Confederated Tribes of the Chehalis Reservation, The Confederated Tribes of the Grande Ronde, The Cowlitz Indian Tribe, and The

5 Fall Chinook are also raised in these net pens at different times but fall under the purview of a different hatchery program as well as a different funding source.

Shoalwater Tribe. Bonneville engaged these tribes during the public scoping period through written letters. No comments were received.

Bonneville released the Draft EA for review and comment on September 25, 2024. In addition to distributing the Draft EA to interested parties, the Draft EA and related documents including the Draft EA distribution letter, comment form, and information regarding how to comment, were posted on the Project website. During the public review period, Bonneville accepted comments via email, through the comment form on Bonneville's Project website and by letter. The comment period for the Draft EA ended on October 25, 2024. Bonneville considered all comments received during both review periods in preparing this Final EA. Appendix D, Public Comments and Agency Responses to the Draft EA, includes responses to all substantive comments received.

2.0 Proposed Action and No Action Alternative

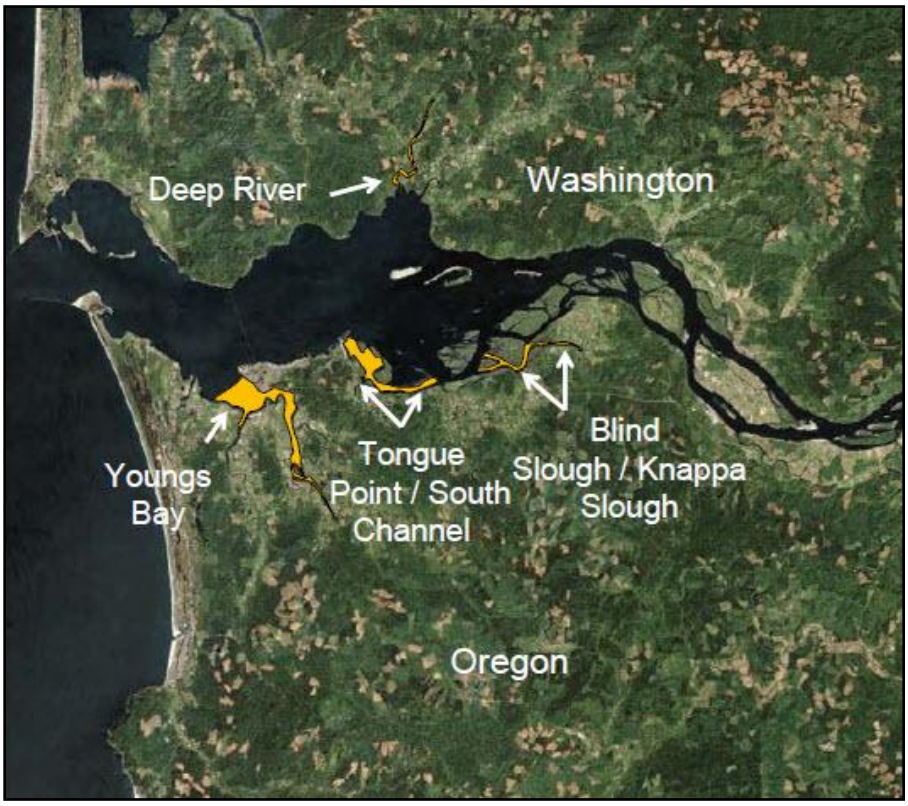
For the Proposed Action, Bonneville would fund hatchery operators and co-managers (CCF, ODFW, and WDFW) to: (1) utilize hatchery facilities to collect and initially rear juvenile Chinook and coho salmon (juveniles); (2) transport a majority of juveniles from these hatchery facilities to net pen sites in the LCRE; (3) acclimate and release juveniles at the various net pen sites and hatchery release site; (4) operate and maintain net pen sites and hatchery facilities; and (5) conduct associated SAFE monitoring and evaluation activities.

These activities represent just a portion of the SAFE Program which was explained in Chapter 1.

2.1 Proposed Action

The Bonneville-funded portion of the SAFE Program would consist of four main project areas in the off-channel areas in the LCRE located between river miles 10.0 and 27.0. At these sites, spring Chinook and coho are reared, acclimated, and released. These net pen sites are situated within fishery boundaries known as Select Area Fisheries where the fisheries are managed during three management periods in winter, spring, and summer (see Figure 1).

Figure 1: SAFE Net Pen Sites and Select Area Fisheries Locations



In the fall or early spring, juvenile salmon are brought to these net pen sites, where they are grown and released under varying management and grow-out regimes, including two-week acclimation, over-wintering, and full-term net pen rearing until release for ocean-bound migration (anywhere from two weeks to six months in the net pens).

Each net pen site is fully constructed and functional, including the net pens, pilings, access roads, access docks, and storage facilities. Ongoing maintenance activities to this infrastructure would occur. Each individual net pen consists of a small-mesh net suspended from a floating frame made of high-density polyethylene pipe that is secured to pilings. These net pens typically have a volume of 91 cubic meters (m^3) and have mesh sizes sufficient to retain the fish without premature escape until smolt stage is reached. Each individual net pen would hold about 20,000 to 25,000 fish. Additional structures may be added or removed at each facility but the fish density within each individual net pen would stay within that range. Net pens are sufficiently sturdy to withstand weather-related accidents. Water system failure or flooding incidents are not possible since the pens and fish are immersed in large water bodies rather than being externally supplied.

2.1.1 Youngs Bay

Of all the net pen sites, Youngs Bay is the most dynamic, with tidal changes providing superior flushing and greater expansion opportunity. A majority of SAFE Program fish are reared, released, and harvested here. Youngs Bay is located in Oregon waters adjacent to the city of Astoria and inland of the Highway 101 Bridge (see Figure 2 and 3) at RM 1.5-1.7 in the LCRE. The upper fishing boundary of the Select Area Fishery lies at the confluence of Youngs and Klaskanine rivers. All waters at this site are under Oregon state jurisdiction, with state-issued landing permits required for participation. Youngs Bay presently has 82 net pen structures used for juvenile rearing and release. The number of net pens would vary (+/- 40 pens) depending on desired density, acclimation and release schedules, and production goals. Spring Chinook and coho juveniles are also released into the Klaskanine River adjacent to the Klaskanine Hatchery and coho juveniles are released into the South Fork Klaskanine River adjacent to the South Fork Klaskanine Hatchery.

Figure 2: Youngs Bay Net Pen Sites and Select Area Fishery

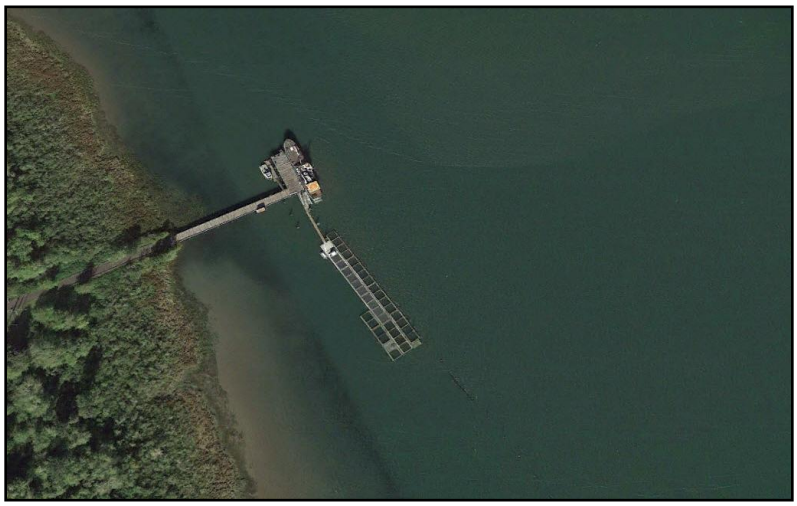
Figure 3: Aerial View of Youngs Bay Net Pen Sites

2.1.2 Tongue Point

Tongue Point Basin is located just east of Astoria, Oregon, in the concurrent Columbia River waters bounded by the Oregon shore and Mott and Lois islands (see Figure 4 and Figure 5) at RM 20 on the LCRE. The terminal fishing area includes waters of South Channel. All waters at this site are under concurrent state jurisdiction. There are currently 37 net pen structures used for rearing and release. The number of net pens would vary (+/- 20 pens) depending on desired density, acclimation and release schedules, and production goals.

Figure 4: Tongue Point Net Pen Site and Select Area Fishery

Figure 5: Tongue Point Net Pen Site



2.1.3 Blind Slough

Blind Slough is located near Brownsmead, Oregon, and includes waters of Gnat Creek and Knappa Slough (see Figure 6 and Figure 7) at RM 27 in the LCRE. The Blind Slough Select Area Fishery is approximately 2.5 miles long with concurrent waters extending downstream of the railroad bridge. Oregon state waters extend upstream of the railroad bridge in Blind Slough. There are currently 15 net pens located in Blind Slough used for rearing and release. The number of net pens would vary (+/- 5 pens) depending on desired density, acclimation and release schedules, and production goals. In addition, there are release sites in Gnat Creek where juvenile spring Chinook are released adjacent to Gnat Creek Hatchery.

Figure 6: Blind Slough Net Pen Site and Select Area Fishery

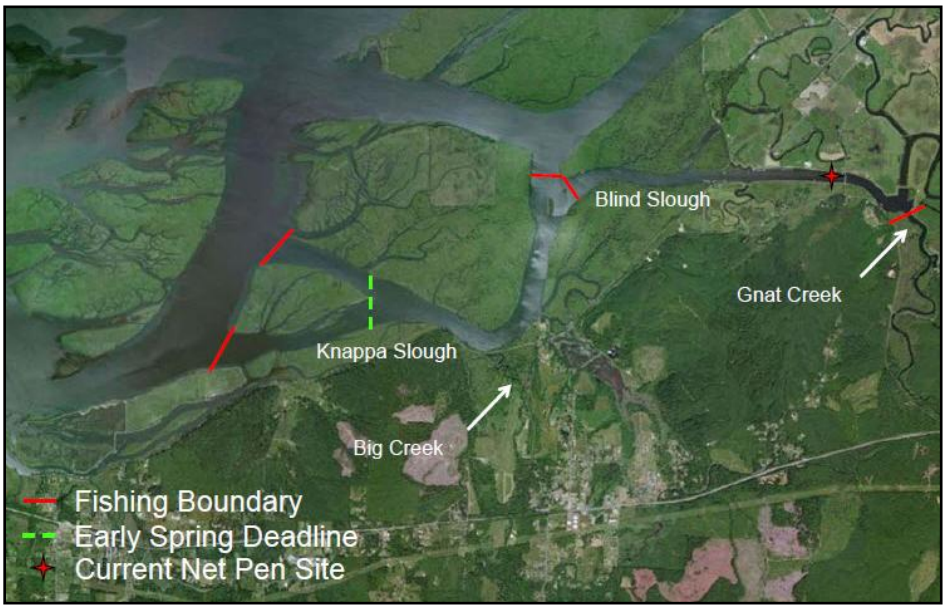


Figure 7: Aerial View of Blind Slough Net Pen Site

2.1.4 Deep River

The Deep River net pen site and Select Area Fishery—located within the lower reaches of Deep River below the town of Deep River, Washington—is the only site located on the Washington side of the Columbia River. It extends downstream approximately three miles to the confluence with the lower Columbia River at Grays Bay (Figure 8 and 9). Washington state waters extend upstream of the Highway 4 bridge and concurrent state waters extend downstream. Deep River net pen site currently has a total of 40 net pen structures used for rearing and release. The

number of net pens would vary (+/- 20 pens) depending on desired density, acclimation and release schedules, and production goals.

Figure 8: Deep River Net Pen Site and Select Area Fishery

Figure 9: Aerial View of Deep River Net Pen Site

2.1.5 Hatchery Support for Proposed Action

The hatcheries listed below would provide direct support for the SAFE Program by providing eggs, rearing fish to a certain size then transferring fish to net pen sites for acclimation and release. In some cases, they would release fish directly into the Select Area Sites as described in Section 2.1.

All SAFE Program fish released from the net pen sites would require initial rearing for almost a year in a hatchery setting (or more than a year in the case of acclimation smolts).

The hatcheries listed below would receive partial Bonneville funding for their operations and maintenance.

Gnat Creek Hatchery (Spring Chinook). This facility would rear all of the SAFE Program spring Chinook fingerlings for the SAFE net pens. Some of the production would be released off-station in adjacent Gnat Creek which is part of the Blind Slough Select Area Fishery, where an annual average of 560,000 spring Chinook have historically been released. The same amount would likely be released into the future.

Klaskanine River Hatchery (Coho & Spring Chinook). This facility would be used primarily for rearing SAFE Program coho and spring Chinook, of which an annual average of 1,161,237 and 280,660, respectively, would be released directly into the Klaskanine River.

CCF South Fork Klaskanine Hatchery (Coho). This hatchery would provide juvenile rearing of coho for SAFE net pens and would directly release coho into the South Fork Klaskanine River (averaging 343,586 coho smolts).

Grays River Hatchery (Coho). This hatchery is located at RM 2.0 on a tributary to the Grays River, a Columbia River tributary in the State of Washington. The hatchery is operated by WDFW, which raises and releases coho smolts at the Deep River net pen site.

2.1.6 Juvenile Production and Release

Full SAFE Program implementation would entail releasing up to 4.25 million spring Chinook salmon smolts and up to 4.3 million coho salmon smolts annually, as described in the three HGMPs (ODFW, ODFW and WDFW). This would constitute the SAFE Program's maximum implementation phase, during which these fish would be released at various SAFE net pen sites and into rivers adjacent to several hatchery facilities (Gnat Creek, South Fork Klaskanine and Klaskanine Hatcheries).

Acclimation schedules for SAFE Program fish are extremely variable. Spring Chinook and coho salmon would typically either rear over winter in the net pens or hatchery sites until being released as juvenile smolts in the spring (from October to March/April) or would acclimate for two to three weeks prior to a spring release (March/April). With the overwintering fish, known numbers of fingerlings would be transferred from source hatcheries by tanker truck and piped directly into the pens at the various sites. The trucks would routinely haul 50,000-60,000 fish per load to achieve target density (usually 0.75 pound/cubic foot at release). With the short acclimation schedule of two to three weeks, each truck would carry about 25,000-30,000 smolts.

For all rearing strategies, fish would be fed recommended levels of pelletized feed throughout the rearing period and released as juvenile smolts according to schedules developed during the research phase of this project (FYs 1993–2006). The actual amount of feed is further refined using a computer model that accounts for the target fish per pound and release date. The fish per pound values are verified weekly or bi-weekly. The feed rates would be roughly two percent of the bodyweight of the fish. The amount of feed provided also is adjusted by season. Less feed is needed in the colder months because the fish are less active and often do not come up to the surface. More feed is typically needed in the warmer months.

All juveniles are released volitionally, typically during high tides in the late evening once they show signs of wanting to leave (i.e., circling the pens) (See Appendix A for more information on juvenile release). After several years in the ocean, a small portion would return as adults to the Select Area Fisheries for commercial and recreational harvest (See Appendix B for more information on adult returns).

2.2 No Action Alternative

Under the No Action alternative, Bonneville would not fund the operators and co-managers' (WDFW, ODFW, and CCF), who could acquire funding from other, non-Bonneville sources and proceed with the contemplated actions. The USFWS provides funding through their Sport Fish Restoration Act (SFR Act, 16 U.S.C. §§ 777 to 777-k), to ODFW, to support the Salmon and Trout Enhancement Program (STEP) grant and other Office of Conservation Investment grants or activities. NMFS provides funding through the Pacific Salmon Treaty. Non-federal funding is also provided by ODFW, WDFW, and CCF.

For the purposes of this EA, it is assumed that portions of the SAFE Program currently being financed by other sources would continue in the event of the No Action alternative, while all Bonneville-funded hatchery production would discontinue. This assumption is bolstered by a TRG (The Research Group) 2006 study that found juvenile production would fall to 2.4 million. Coho operations would likely continue because these fish require less time and financial investment compared to spring Chinook, although this analysis assumes they would also be reduced by half.

For spring Chinook production, the No Action Alternative would eliminate Bonneville funding for all smolt production at Gnat Creek Hatchery and net pen operations at Youngs Bay, which would likely reduce output by 800,000 smolts at Klaskanine Hatchery and 300,000 smolts at Blind Slough Net Pens. For coho production, it would likely halve output at Klaskanine Hatchery (600,000), eliminate it entirely at Youngs Bay, reduce it by 540,00 smolts at Tongue Point, and by 400,000 smolts at Deep River. This would amount to an aggregate halving of spring Chinook and coho production capacity.

These same net pens and supporting hatchery facilities also produce two other salmonids (namely, tule fall Chinook and select area bright [SAB] fall Chinook), but with third-party funding. This analysis assumes some production would continue regardless of Bonneville's funding decision. This analysis similarly assumes that: (1) the SAB broodstock program would continue at the South Fork Klaskanine Hatchery; (2) production at the Cascade and Oxbow hatchery complex and Sandy Creek Hatchery would continue; and (3) the Youngs Bay Net pen Site would likely be discontinued.

To remain within budgetary constraints in the event of the No Action Alternative, the SAFE Program would need to curtail expenditures on fish food, CWTs necessary for run reconstruction, and some operational costs at hatchery facilities. Existing adult collection, holding, and spawning procedures for translocation programs would be maintained, but likely not at full production levels. In the absence of Bonneville funds, the SAFE Program would have to reduce staff time used for analyzing fishery information in-season and accordingly reduce the information used for tracking and modifying fishing regulations and fishing periods. Project staff time that currently conduct analysis (required for monitoring, annual reports, in-season ESA monitoring, monitoring for the effects of project fish production, smolt-to-adult returns (SARs), contribution to fisheries, run reconstructions, percent hatchery origin spawners (pHOS), and run size forecasting) would have to be reduced accordingly.

In addition, the SAFE Program provides partial funding for operations and maintenance of four hatcheries: Gnat Creek and both Klaskanine hatcheries in Oregon, and Grays River Hatchery in Washington. These hatcheries provide support for other programs and receive funding from other entities. While engagement in the SAFE Program may be reduced, these hatcheries would likely remain partially to fully operational.

2.3 Best Management Practices and Mitigation Measures

The following Best Management Practices (BMPs) and mitigation measures are proposed by the fishery co-managers during net pen operations at all SAFE sites. Measures are consistent with Clean Water Act permitting and ESA Section 7 consultations.

1. **Feed Management** – Employ efficient feed management and feeding strategies that limit feed input to the minimum amount reasonably necessary to achieve production goals and sustain targeted rates of growth.
2. **Waste Handling** – Collect, return to shore, and properly dispose of all feed bags, packaging materials, waste rope and netting.
3. **Transport/Harvest Controls** – Minimize discharges (e.g., blood, viscera, carcasses) during fish transport and harvest; dispose offsite.
4. **Carcass Removal** – Remove mortalities promptly and dispose of them to prevent water quality impacts.

5. **Material Storage** – Store chemicals, feed, and equipment to prevent spills; maintain spill containment and cleanup supplies.
6. **Facility Maintenance** – Inspect regularly and repair as needed; keep all systems in working order.
7. **Recordkeeping** – Document feed amounts and estimates of the numbers and weights of aquatic animals to calculate feed conversion ratios, and must keep records of net changes, inspections, and repairs.
8. **Training** – Ensure staff are trained on BMPs, spill response, and pollution prevention.
9. **IHOT Guidelines** - Follow IHOT, Pacific Northwest Fish Health Protection Committee (PNFHPC), and state or tribal guidelines for fish health inspections along with disinfection procedures are implemented during incubation that prevents pathogen transmission between stocks of fish on site.

The following Best Management Practices (BMPs) and mitigation measures are proposed by the fishery co-managers during net pen operations to avoid adverse effects to water quality.

1. **Water Quality Sampling** – Collect upstream/downstream samples for turbidity, dissolved oxygen, and biochemical oxygen demand during rearing periods.
2. **Production Data** – Record monthly feed amounts, fish production (lbs), fish size (fish/lb), and total fish numbers.
3. **Reporting** – Submit discharge monitoring reports (DMRs) as required; immediately report violations.
4. **Solid Waste Control Plan** – Maintain a plan covering collection, storage, and disposal of feed waste, mortalities, and debris.
5. **O&M Manual** – Maintain and review annually to ensure compliance with permit requirements.
6. **Annual Summary** – Provide annual reports summarizing production, monitoring, and BMP implementation.

The following Best Management Practices (BMPs) and mitigation measures are required by NMFS for ESA-listed species protection.

1. **Production Caps** – Do not exceed authorized smolt production levels per species, as authorized by NMFS Biological Opinion.
2. **Juvenile Quality Standards** – Rear high-quality smolts; implement vaccination and health monitoring programs.
3. **Release Timing** – Schedule releases to promote rapid migration and reduce interaction with wild stocks.
4. **Disease Monitoring** – Conduct daily mortality checks, monthly health inspections, and disease diagnostics as needed.
5. **Stray Rate Management** – Monitor and manage hatchery-origin fish through CWT analysis on natural spawning grounds; maintain pHOS at the lowest feasible levels.

6. **Habitat Protection –** Maintain adequate depth, flow, and containment to prevent escapement.
7. **Isolation from Native Populations** - Geographically isolate net pen sites from ESA-listed fish rearing habitat.

3.0 Affected Environment and Environmental Consequences

This chapter describes the environment and resources that the Proposed Action and No Action Alternative could impact—namely, fish, water resources, wildlife, land use and recreation, transportation, socioeconomics, and climate change—as well as the nature and extent of those potential impacts, which are characterized as **high, moderate, low**, or **no impact**. Effects on other areas and resources—such as geology, soils, scenic values, wetlands, vegetation, floodplains, public health and safety, land use, cultural resources, and environmental justice[6]—were considered but are not discussed in detail for the following reasons:

- Each net pen site is intentionally located in the LCRE where the depth and flushing volumes of receiving waters do not allow for sustained deposition and would have no effect on shoreline erosion or sedimentation patterns. Therefore, there would be **no impact** on **geology** or **soil**s.
- Each net pen site has the visual appearance of a boat dock and pier which are typical features in the LCRE. These net pens already have been in existence for decades and there have been no concerns raised about the aesthetics or visual appearance. Therefore, there would be **no impact** on **scenic values**.
- Net pen sites are located in the open water, away from wetlands and upland vegetated areas. The production of organic materials from the net pens is rapidly diluted and absorbed by the environment in the immediate area, does not accumulate and would not be transported into surrounding wetland habitats or nearshore vegetation. Therefore, there would be **no impact** on **wetlands** or **vegetation**.
- Net pen sites are not large enough relative to the surrounding waters to create barriers to water movement and affect hydrology of the floodplain and floodplain habitats. Therefore, there would be **no impact** on **floodplains**.
- Net pen sites are situated near riverbanks outside of navigation channels, and are marked and well-lit to prevent any navigation hazards or collisions with watercraft. Organic materials released from the net pens are rapidly diluted and absorbed into the environment, would not accumulate, thus posing **no impact** to human health. Therefore, there would be **no impact** on **public health and safety**.
- Net pen sites already exist in open waters and do not pose any competing values for adjacent or nearby lands usage or development. The immediate locations are developed and tend to support fisheries and navigation. There are no proposed changes which would

6 The environmental justice analysis contained in the Draft EA, "In Clatsop, Pacific, and Wahkiakum counties, in addition to surrounding areas, there are no communities that meet the definitions of a minority population, nor low income, which is less than or equal to twice the federal poverty level. In addition, no outliers for environmental or demographic indicators were found using US Environmental Protection Agency (EPA) screening tools. The Proposed Action therefore has no impact on environmental justice concerns." was completed prior to the rescission of Executive Order 12898 on January 21, 2025, and Executive Order 14096 on January 20, 2025.

compete with surrounding land use. Therefore, there would be **no impact** on **land use**.

- Net pen sites already exist in open waters and would not require any ground-disturbing activities and accordingly have **no impact** on **cultural resources**.

3.1 Fish

3.1.1 Affected Environment

Flood control and agricultural activities— including construction of levees, dikes, and other structures—have extensively altered the LCRE. Some of these structures merely block fish access to affected habitats, while others entirely de-water them and change their functions from tidal and floodplain wetlands to dike/levee-protected farmlands or pastures. CRS construction and operation, in particular, has greatly altered the natural process of estuary marsh, swamp, and wetland habitat formation by disconnecting key sediment-transport processes, which consequently no longer influence the creation, maintenance, or distribution of estuary habitat used for juvenile salmonid rearing, overwintering, and foraging.

The impacts of these land alterations, habitat exclusions, and tidal flow changes on salmon and steelhead are particularly important, as those fish are heavily dependent on estuarine environments during rearing and outmigration. These changes have reduced and changed the sources of base-level food production, blocked availability and connectivity of habitats within the LCRE, and limited their diversity and complexity.

The table below identifies the current threatened and endangered fish species and their designated critical habitat.

Table 3: ESA-Listed Fish Species in the LCRE and their Listing Status

Species	Listing Regulations	Critical Habitat Status
Chinook salmon (Oncorhynchus tshawytscha)		
Snake River spring/summer	Threatened (70 Federal Register (Fed. Reg.) 37160)	Designated (58 Fed. Reg. 68543)
Snake River fall	Threatened (70 Fed. Reg. 37160)	Designated (58 Fed. Reg. 68543)
Upper Columbia River spring	Endangered (70 Fed. Reg. 37160)	Designated (70 Fed. Reg. 52685)
Lower Columbia River	Threatened (70 Fed. Reg. 37160)	Designated (70 Fed. Reg. 52685)

Species	Listing Regulations	Critical Habitat Status
Upper Willamette River	Threatened (70 Fed. Reg. 37160)	Designated (70 Fed. Reg. 52685)
Steelhead (*O. mykiss*)		
Snake River	Threatened (70 Fed. Reg. 37160)	Designated (70 Fed. Reg. 52685)
Upper Columbia River	Threatened (74 Fed. Reg. 42605)	Designated (70 Fed. Reg. 52685)
Middle Columbia River	Threatened (57 Fed. Reg. 14517)	Designated (70 Fed. Reg. 52685)
Lower Columbia River	Threatened (62 Fed. Reg. 43937)	Designated (70 Fed. Reg. 52685)
Upper Willamette River	Threatened (62 Fed. Reg. 43937)	Designated (70 Fed. Reg. 52685)
Chum Salmon (*O. keta*)		
Columbia River	Threatened (70 Fed. Reg. 37160)	Designated (70 Fed. Reg. 52685)
Sockeye Salmon (*O. nerka*)		
Snake River	Endangered (70 Fed. Reg. 37160)	Designated (58 Fed. Reg. 68543)
Coho Salmon (*O. kisutch*)		
Lower Columbia River	Threatened (70 Fed. Reg. 37160)	Designated (81 Fed. Reg. 9251)
Oregon Coast	Threatened (73 Fed. Reg. 7816)	Designated (73 Fed. Reg. 7816)
Pacific Eulachon (Thaleichthys pacificus)		
Southern Distinct Population Segment (DPS)	Threatened (75 Fed. Reg. 13012)	Designated (76 Fed. Reg. 65324)
Green Sturgeon (Acipenser medirostris)		

Species	Listing Regulations	Critical Habitat Status
Southern DPS	Threatened (71 Fed. Reg. 17757)	Designated (73 Fed. Reg. 52088)
Bull Trout (Salvelinus confluentis)		
Columbia River DPS	Threatened (63 Fed. Reg. 31647)	Designated (75 Fed. Reg. 63898)

All of the species in Table 3 either rear in, and/or migrate through, the LCRE between Bonneville Dam and the Pacific Ocean. Their range is distributed throughout the Columbia River basin and extends inland as far as Idaho.

ESA-listed salmonids likely present in and near the net pen sites include juvenile and returning adults using the LCRE as a migratory corridor. Juveniles are likely to use the project area for foraging, rearing, and migration. The duration of pre-migration estuary residence varies for each of the ESA-listed salmonid ESUs, ranging from a few days to one or two years (NMFS 2000). For ocean-type juvenile salmonids, estuarine habitat (e.g., tidal marsh and swamp) is critical for physiological transition and development of sufficient strength, energy, and reserve capacity to endure the challenges of the marine environment.

The LCRE is also important for adult anadromous fish migrating upstream to spawning areas and juveniles migrating downstream to the ocean, for which it is an important overwintering and foraging area. Juvenile salmonids may rear in shallow-water and nearshore areas for several months before migrating to the ocean (Simenstad et al. 1982, Bottom et al. 2001). These shallow water intertidal floodplains offer critical refugia from high flows, seasonal turbidity, and larger predatory species. Emergent vegetation within these inundated floodplains also provides important feeding and rearing grounds for juvenile fish. These shallow-water and near-shore habitats are crucial for juvenile salmon on their way to sea.

ESA-listed salmon species in the project area primarily include:

Chinook Salmon. Stream-type Chinook salmon, which typically rear in higher elevation tributaries for one year prior to migrating to sea, are most abundant in the LCRE between early April and early June. Large numbers of pre-smolt Chinook salmon rear in the LCRE year-round, and it is likely that many of these are fall Chinook salmon. The fall Chinook salmon migration through the LCRE typically peaks between May and July but, there is typically a pulse of subyearling Chinook salmon entering the LCRE in March from hatchery releases upstream of Bonneville Dam.

Chum Salmon. Chum salmon are present in the LCRE following emergence as early as mid-January through mid-July, with peak abundance occurring between mid-April and mid-May as they migrate seaward. Hatchery and wild chum salmon use the LCRE as a migratory route to the Pacific Ocean and also for rearing in some cases.

***Coho Salmon*.** Rearing coho salmon may be in the LCRE throughout the year, with peak abundance of smolts migrating between April and June. Similar to Chinook salmon, juvenile coho salmon may be found rearing in the LCRE any time of the year.

***Sockeye Salmon*.** Sockeye salmon typically rear in freshwater lakes for one to three years prior to migrating to the ocean and primarily use the LCRE as a migration corridor. The limited information available indicates that sockeye salmon are most abundant in the LCRE in May.

***Steelhead Salmon*.** Steelhead typically rear in freshwater tributary habitats for one to several years prior to seaward migration, although juvenile steelhead may use the LCRE for limited rearing. Juvenile steelhead abundance in the LCRE peaks between late May and mid-June.

The spatial overlap between SAFE spring Chinook and coho salmon released as part of the Proposed Action and these native-rearing salmon and steelhead are confined to the LCRE near the net pens where hatchery fish are released and the short migration route to the ocean. The releases of SAFE Program fish occur in Youngs Bay (Figure 1), Tongue Point (Figure 4), Blind Slough (Figure 6), and Deep River (Figure 8), as well as near certain hatchery facilities in Gnat Creek, Klaskanine River, South Fork Klaskanine River, and Grays River, which are all near the mouth of the Columbia River. All fish are released as smolts that have been acclimated for some time to saltwater while in the net pens. The physiological state of these fish makes them ready to immediately emigrate towards the ocean over a short period of time (i.e., a matter of weeks) upon release.

Another aspect of the interaction between hatchery fish and natural-origin juvenile salmon and steelhead is the period of time affected by the presence of hatchery fish (i.e., temporal overlap). For the Proposed Action, SAFE Program fish are released over a three-month period from March through May. Spring Chinook salmon are released earlier in this window, while coho salmon release extends through May.

3.1.2 Environmental Consequences for Fish – Proposed Action

3.1.2.1 Effects to Salmonid Fish Species

According to NMFS (2025), there are three primary effects of hatchery fish production on natural salmon and steelhead to be considered:

- Competition between hatchery and natural salmon and steelhead.
- Predation by hatchery fish on juvenile salmon and steelhead.

- Transfer of disease pathogens from hatchery fish to juvenile salmon and steelhead.

Evaluating the effects of competition, predation, and disease on juvenile salmon and steelhead requires consideration of spatial and temporal factors. Spatial overlap refers to potential overlap between releases of hatchery fish and co-occurring juvenile natural-origin salmon and steelhead in the same area. Temporal overlap refers to concurrently timed hatchery fish releases from each program, enabling interaction with juvenile natural-origin salmon and steelhead.

The target release size for all hatchery fish in the Proposed Action is the smolt life stage for both spring Chinook and coho salmon. Depending upon the species, average fork length ranges from seven inches (~170 mm) for spring Chinook salmon and five to seven inches (120-170 mm) for coho salmon. Given that hatchery fish are released as smolts in the LCRE, the potential interaction period is expected to be short (less than one week) because the hatchery fish are actively emigrating to the ocean as the physiological condition of the hatchery smolts triggers their desire to emigrate.

Roegner et al. (2016), as cited by NMFS, provide detailed information on the presence of native juvenile salmonids in the LCRE throughout the year. They found all species and life stages may be found in the LCRE from March until May, when SAFE Program fish are released from the net pen sites. Salmonids' use of LCRE habitat differs among life stages, with smolts primarily using the deeper waters of the LCRE and younger life stages using shallower nearshore habitats.

Returning adult SAFE fish may spatially overlap with native ESA-listed salmon and steelhead adults while migrating back to Select Area Fishery Sites throughout the mouth of the LCRE for a period of days during the months of February through June. However, co-occurrence of these species within the Select Area Fishery Sites—where SAFE Program fish travel to and congregate for harvest—is extremely unlikely due to their off-channel location and run timing. The LCRE serves as rearing and saltwater acclimation habitat for juvenile salmon and steelhead and as a migration corridor for adult salmon and steelhead. Specifically, coho and Chinook salmon and steelhead are known to utilize the Youngs Bay Watershed for spawning (Bischoff et. al. 2000), while life history stages of sockeye and chum are most likely using Youngs Bay as part of the larger migratory path and rearing habitat available to them in the LCRE.

In summary, the Proposed Action entails releasing SAFE Program fish over a three-month period from March through May, with Spring Chinook salmon to be released earlier in this window, and coho salmon to be released later. SAFE smolts may spatially overlap with the following fish described in this Section during release and out-migration towards the Pacific Ocean, but the LCRE's size—as the second largest river in the U.S. with a width of nearly 6 miles—makes precise co-occurrence of these species unlikely near the SAFE hatchery and net pen sites, where SAFE adult fish travel and congregate for harvest. This may be due to the lack of desirable habitat or resources at their isolated off-channel location.

SAFE Program fish can be easily distinguished from native ESA-listed stocks through fin-clips and CWTs. The refinement of gear restrictions, fishing periods, and area boundaries open for fishing within Select Areas has further minimized harvest impacts to native ESA-listed salmonids. Consequently, given to the limited overlap in space and time (i.e., from February through June), harvest-related impacts would be **very low.**

***Competition*.** Salmonids compete for resources limited in space or time. Because the Proposed Action occurs in the LCRE, resources such as space, cover, and forage are more abundant, as evidenced by the behavior of juvenile salmonids, which becomes more competitive (e.g., schooling together for protection and defending territories) when they are rearing in off-channel tributary freshwater habitats. Therefore, competition between SAFE Program fish and native ESA-listed salmonids is likely to be **very low**, particularly in the vast estuary environment where salmonids are transitioning from freshwater to the ocean where resources (space, cover, and forage) are less limited.

Predation. Intraspecific predation among salmonids is likely to occur when different life stages spatially and temporally overlap. Older and larger salmon and steelhead are known to prey upon smaller, younger fish. In the LCRE, predation by hatchery fish has been known to occur, typically affecting younger chum and fall Chinook salmon fry that may be present in the LCRE. This predation risk is likely to be low because SAFE Program fish are found primarily in the deeper water habitats (Roegner et al. 2016), and not in shallower, nearshore habitats where smaller, younger native salmon are common. In addition, the temporal overlap with SAFE Program fish released from the net pen sites is limited to less than one week, which minimizes the overall potential for predation to occur from the Proposed Action. Other similar sized smolts are not at risk of predation from SAFE Program fish. Therefore, predation among salmonids would be extremely **low**.

Disease. Disease is a function of the interaction between the organism (including its genetics, immune system, etc.), the environment (e.g., stress resulting from too high or low temperatures, high densities, lack of food, pollution, decreased dissolved oxygen, culture practices), and infectious (e.g., pathogen) or non-infectious (e.g., toxin) agents (Reno 2011).

Net pen aquaculture is a monoculture where fish may be handled extensively and are crowded into unnaturally high densities in environments that are not optimal for the fish. These conditions may lead to immune suppression, increasing the risk of infection and disease (Kurath and Winton 2011). The crowded environment contributes to stress when the fish are moved from the freshwater hatchery environment to the marine net pens. These fish also are exposed to “wild” pathogens. The monoculture, high densities, suppressed immune systems, and presence of wild pathogens can promote amplification and transmission of these pathogens among the cultured fish (Kurath and Winton 2011).

There are situations where SAFE Program fish potentially infected with pathogens are released into the watershed. Sometimes this is intentionally done to contain disease proliferation in a hatchery environment, albeit at the cost of increasing pathogen levels in the natural environment in the event of a confirmed outbreak. This is a rare occurrence and done only when preventative measures fail to mitigate the outbreak. It is important to note, however, that pathogen detection is distinct from observed disease, as the number of pathogenic disease outbreaks in a particular hatchery system (20-30 per year) is much lower than the number of pathogen detections (3,000-4,000 per year), and many of the disease outbreaks are curable using treatments approved for use in fish culture such as formalin, hydrogen peroxide, and various antibiotics.

SAFE Program fish immigrate to the ocean relatively quickly, limiting exposure time and/or pathogen shedding in freshwater. CCF prefer large late-evening high tides for releasing smolts, which Ledgerwood et al. (1997) found emigrated out of Youngs Bay within one tidal cycle. Although a number of pathogens have been detected in the hatchery system over the last few years, these have not included any novel or exotic varieties, nor resulted in any devastating outbreaks in recent years.

The low frequency of disease outbreaks from native pathogens, combined with frequent monitoring and treatment options under current fish health policies, suggests that the effects of pathogen amplification during fish rearing in SAFE Hatchery Facilities on natural-origin salmon and steelhead would be **low**.

3.1.2.2 Other ESA-listed Aquatic Species

Other ESA-listed aquatic species that may be impacted by the Proposed Action include:

Pacific Eulachon. Eulachon spend little time in the LCRE, rapidly traversing it to spawning streams from late Winter till mid-Spring. The larvae spend no time rearing in streams or estuaries and are instead carried downstream into the ocean in late spring and early summer to spend the majority of their lives in the ocean. The LCRE is, however, designated as critical habitat for the Southern DPS of the Pacific eulachon as it serves as the primary migration corridor between the ocean and spawning habitats in tributaries to the Columbia River. Eulachon are present in the Lower Columbia River and some of the larger tributaries. The spatial overlap between eulachon and SAFE Program fish occurs from February through June in the lower Columbia River. During this time, in certain years, eulachon migrate up the lower Columbia River to spawn while the SAFE Program fish emigrate to the ocean as juveniles and upstream as adults.

Potential interactions between eulachon and SAFE Program fish as a result of the Proposed Action would likely be **low** due to differences in habitat use and behavior. Adult eulachon use the lower Columbia River as a migration corridor. These adult migrations occur throughout deeper water in the mainstem channel to the tidally influenced rivers where they spawn. The operation and location of

the net pen sites would have **no to low impacts** on eulachon due to limited spatial and temporal overlap.

***Green Sturgeon*.** Sturgeon occupies the LCRE in large numbers in the summer and fall and migrate to rivers in late spring to spawn. Juveniles spend up to four years rearing in the LCRE before moving into the ocean, where they spend most of their lives. While released SAFE Program fish could potentially contribute to the green sturgeon's prey base (adult and juvenile), it would not be in sufficient amounts to increase the growth and abundance of the green sturgeon population. Negative ecological impacts from the Proposed Action would have **no to low impacts** due to the size of green sturgeon (sub-adult and adult), differential habitat use and limited spatial and temporal overlap.

***Bull Trout*.** Although bull trout designated critical habitat is mapped in the main stem of the Columbia River, their occurrence in the LCRE remains rare. Given the extreme low probability of spatial and temporal overlap, the SAFE Program would have **no to low impacts** on individual bull trout fish.

3.1.2.3 Other Aquatic Species

***Cutthroat trout*.** This species may use the LCRE for seasonal rearing and as a migration corridor, with peak abundance of migratory juveniles occurring between March and May. SAFE coho smolts are small enough that cutthroat trout could potentially be prey upon them, but for such a brief duration (weeks) that they would not make a substantial contribution to the trout's prey base. Given this extremely low incidence of spatial overlap, the SAFE Program would have **no to low impacts** on cutthroat trout.

***Pacific Lamprey*.** Juvenile Pacific lamprey are perennially found in the LCRE while adults seem to traverse it during their upstream migration from late Winter through Spring. The potential for interactions between lamprey and SAFE Program fish is likely to be low due to differences in habitat use and behavior. They are commonly found in deep pools in slow moving water, often near riffles or other areas with high oxygenation. Operating the SAFE net pen sites would have **no impact** on lamprey because the fish are not likely to be present for any extent of time near these off-channel net pen areas.

Aquatic Invertebrates. Aquatic invertebrate biota typical of the LCRE include numerous species of insects (dragonflies/damselflies, mayflies, stoneflies, caddisflies, butterflies, beetles, flies, midges, and true bugs). These macroinvertebrates inhabit most streams and play a key role in processing organic material and nutrient cycling, as well as serving as an important food source for fish, amphibians, and other macroinvertebrates. SAFE Program fish may feed on these insects while emigrating to the ocean, but for such a short duration (weeks) and in such small amounts

that there would be **no to low impacts** on macroinvertebrate populations which are extremely prolific.

As further discussed in the following Section 3.2 Water Resources, the concentration of tens of thousands of fish at the SAFE net pen sites would result in localized deposition of organic matter from uneaten food, fish wastes, and biofouling drop off (i.e., organic debris from organisms growing on the net pens). Some organic waste may provide resources for the benthic community, but excess waste can result in high decomposition rates and reduced oxygen levels in the water. This may affect the benthic environment under the SAFE net pens by changing sediment chemistry (accumulation of nitrogen, carbon, and phosphorus), physical properties, and the biological community. This may happen if the accumulation of organic material exceeds the capacity of the environment to absorb it.

The SAFE Program has monitored the benthic macroinvertebrate community under the net pens since 1994. The project sponsors report that the overall impact has been only a minor change in macroinvertebrate populations during the salmon-rearing period (November-April) but a return to baseline by the beginning of the next rearing season. Compared to samples taken outside the perimeter of the net pens, sampling within the perimeter averaged slightly higher numbers of oligochaetes (aquatic worms) and amphipods. This indicates that the organic material being input to the environment at each net pen site would become absorbed by the environment with a temporary increase of the population, predominantly the Oligochaeta. When the input of organic material ceases, the population would likely decrease to background levels. Therefore, the effects of the Proposed Action on the underlying benthic community would be **low** due to the consistent return to baseline population levels.

3.1.2.4 Research, Monitoring, and Evaluation Activities

All Columbia River Basin hatchery programs conduct periodic research, monitoring, and evaluation (RME) to evaluate program performance, the effects of hatchery fish, and the status of natural-origin populations. These activities primarily involve observation but may also occasionally involve fish collection and sampling. The majority of the expected take of natural-origin salmon and steelhead is non-lethal, where natural-origin fish may be incidentally captured, handled, and then released alive. Any mortality of salmon and steelhead would be inadvertent and accidental, unless the RME specifically needs natural-origin salmon or steelhead (e.g., direct take) for study. Few if any natural-origin salmon and steelhead have been intercepted in previous years. Therefore, there would be a **very low effect** through RME activities on incidentally caught fish and **no effect** to their habitat.

3.1.2.5 Effects on Essential Fish Habitat

The project areas include areas designated as Essential Fish Habitat (EFH) for the Estuarine Composite of Pacific Coast groundfish (PFMC 1998a), coastal pelagic species (PFMC 1998b), various life-history stages of Chinook and coho salmon (PFMC 1999) (see Table 4).

Table 4: Species with Designated EFH in the Estuarine EFH Composite

Groundfish Species

Soupfin Shark	Galeorhinus zyopterus
Spiny Dogfish	Squalus acanthias
California Skate	Raja inornata
Spotted Ratfish	Hydrolagus colliei
Lingcod	Ophiodon elongatus
Cabezon	Scorpaenichthys marmoratus
Kelp Greenling	Hexagrammos decagrammus
Pacific Cod	Gadus macrocephalus
Pacific Whiting (Hake)	Merluccius productus
Black Rockfish	Sebastes maliger
Bocaccio	Sebastes paucispinis
Brown Rockfish	Sebastes auriculatus
Copper Rockfish	Sebastes caurinus
Quillback Rockfish	Sebastes maliger
English Sole	Pleuronectes vetulus
Pacific Sanddab	Citharichthys sordidus
Rex Sole	Glyptocephalus zachirus
Rock Sole	Lepidopsetta bilineata
Starry Flounder	Platichthys stellatus

Coastal Pelagic Species

Pacific Sardine	Sardinops sagax
Pacific (Chub) Mackerel	Scomber japonicus
Northern Anchovy	Engraulis mordax
Jack Mackerel	Trachurus symmetricus
California Market Squid	Loligo opalescens

Pacific Salmon Species

Chinook Salmon	Oncorhyncus tshawytcha
Coho Salmon	Oncorhyncus kisutch

The EFH effects of the Proposed Action evaluated in this EA would be the same as those described in NMFS' 2025 Biological Opinion (NMFS 2025) to be of **no impact** as expressed by NMFS below:

"The Proposed Action has negligible, if any, effects on the major components of EFH. The net pens where hatchery fish are released have been in operation for years and are located in tidal, off-channel backwater areas of the Lower Columbia River. The amount of habitat affected by the placement of net pens is insignificant. Nearshore habitat is not affected as the net pens are in deeper waters and secured by existing piling structures. The proposed hatchery programs include designs to minimize each of these effects."

3.1.3 Environmental Consequences for Fish– No Action

Under the No Action alternative, the SAFE Program would not be funded to achieve the maximum production level but would still continue with partial funding from other sources, reducing the overall impact. The lack of Bonneville funding would likely halve smolt production. Environmental variables such as ocean conditions and estuary smolt predation make it difficult to predict adult returns, but it is reasonable to assume that they would decrease by the same or lower margin. As a result, the overall **low** impact of the SAFE Program on the above-mentioned aquatic species would be further reduced due to the fewer amount of fish being released and the further reduction of spatial and temporal overlap of SAFE Program Hatchery Fish with other fish and aquatic species.

3.2 Water Resources

3.2.1 Affected Environment

The operation of a SAFE net pen facility has the potential to impact localized water quality parameters. This is because the congregation of fish in a small area can lead to the release of excessive nutrients and organic matter from the net pens, which may subsequently affect the surrounding water. This Section describes the water quality parameters that these operations could affect and applicable water quality regulations. Because SAFE net pen sites do not divert or consume water or release effluent, this analysis focuses on water quality rather than quantity.

Prior to the issuance of a National Pollutant Discharge Elimination System (NPDES) permit allowing effluent discharges, Oregon and Washington have the responsibility of certifying under Section 401 of the CWA that the proposed project meets state water quality standards. This certification confirms that the permit would not lead to a violation of these standards or contribute to such a violation.

Net pen operations that hold 20,000 pounds or more of fish or administer 5,000 pounds or more of food in any given month are required to obtain such a permit. The Net Pen sites at Blind Slough and Tongue Point in Oregon operate below these thresholds and therefore do not require a permit. However, permits are necessary for the Youngs Bay and Deep River net pen sites. The SAFE Program has been monitoring the water quality at both sites for years and has not detected any exceedances of parameters, such as temperature, pH, dissolved oxygen, and turbidity.

The EPA is responsible for determining the Total Maximum Daily Load (TMDL) for temperature in the Columbia and Snake rivers. The most recent TMDL shows that state water quality criteria for temperature are frequently exceeded, and the EPA cited climate change and dam impacts as the dominant sources of impairment.

3.2.2 Environmental Consequences for Water Resources – Proposed Action

Feeding operations at the four net pen sites would congregate fish in a small area, resulting in the local deposition of organic matter. According to Sewall and Gray (2004), there are four sources of organic matter from net pen operations. The first results from the presence of the structures within the net pen sites. These provide surface area in the water column for aquatic organisms and debris to attach to. When these structures are disturbed, such as when work is done on the nets or when the fish are released, the attached organisms and organic debris fall to the surface of the underlying sediment. The second source of organic matter is uneaten fish food passing through the bottom of the nets that can accumulate on the bottom beneath the net pens. The third source is the waste produced by the fish. Although much of this waste is in the form of ammonia and is in solution and is quickly diluted by daily flushing tides, solid waste may accumulate under the net pens, adding to organic material of various origins. These waste byproducts contribute

nitrogen, carbon, and phosphorus, and fines into the surrounding water column, potentially affecting ambient water quality parameters. The fourth source of organic matter is deceased fish that are not removed from the net pens and instead sink to the bottom of the nets and decay. These latter three forms of solid organic matter (i.e., dead fish, uneaten food, and feces) have the biggest potential to impact water quality at the SAFE net pens.

As these organic materials decompose, dissolved oxygen is consumed, which when measured is typically referred to as Biological Oxygen Demand (BOD). This measurement is often used to assess the potential reduction of dissolved oxygen caused by effluent discharge into receiving water by permitting agencies. In addition to causing dissolved oxygen consumption, the Proposed Action would also result in releases of additional nutrients (nitrogen and phosphorus) into the environment. Nitrogen can occur in various forms (e.g., nitrate, nitrite, and ammonia), which varies with pH, temperature, and salinity. In areas where excess nutrients result in increased algal and plant growth, pH levels may increase and change the solubility of nutrients, altering dissolved oxygen concentrations and overall water quality. These elevated nutrient levels in the water column may encourage the growth of aquatic plants and change macroinvertebrate (e.g., aquatic insect) communities (species presence and/or abundance), thus altering local habitats.

The actual amount of feed is calculated using a computer model that accounts for the target fish per pound and release date. The fish per pound values are verified weekly or bi-weekly (see Section 2.3). The feed accounts to roughly two percent of the bodyweight of the fish. The amount of feed provided also is adjusted by season. Less feed is needed in the colder months because the fish are less active and often do not come up to the surface. More feed is typically needed in the warmer months. Due to this, the SAFE program production/feed levels, and associated water quality impacts, tend to be small when compared with typical commercial net pen fish production. This is because the fish are not grown to marketable size in the SAFE net pens, and the fish usually occupy the net pens for only a part of the year. Returns are maximized when fish are released during colder months, which means less feed.

The SAFE Program monitored the benthic macroinvertebrates community under the net pens since in 1994. The project sponsors report that the overall impact has been only a minor change in macroinvertebrate populations during the salmon-rearing period (November-April). Compared to samples taken outside the perimeter of the net pens, samples taken inside the perimeter averaged slightly higher numbers of oligochaetes (aquatic worms) and amphipods. As previously stated, most sites showed returns to baseline levels by the beginning of the next rearing season. In addition, core soil samples taken by Clatsop County Staff ensured that organic materials from fish rearing are not accumulating under each individual net pen (2023 Biron et al.). The accumulation of organic material would result in the absence of live animals, hydrogen sulfide odor, and the disappearance of the oxidized layer. The visual inspection of each sample supports the notion that

either the organic material from fish rearing is being absorbed at the rate of which it is produced, or the biproducts are being flushed away at a rate that does not allow accumulation to occur.

The SAFE Program's water quality impact would be confined to the immediate area under the SAFE net pens during periods of fish occupancy. Because the fish are only grown until reaching juvenile life stage (average fork length ranges from seven inches (~170 mm) for spring Chinook salmon and five to seven inches (120-170 mm) for coho salmon), the net pens are occupied for only part of the year. This would allow for a period of recovery (weeks or more) during which the daily tidal cycle would quickly dilute any elevated nutrient or chemical input with the environment absorbing the rest. In addition to this, much of the rearing occurs during times of abundant rainfall and high flows, adding to the cleansing capability of an already turbulent, tidally influenced location. Therefore, the Proposed Action would offer a local short-term benefit to the underlying benthic community but would have no impact relative to the surrounding estuary.

As stated in EPA 2021, temperature conditions in the Columbia River basin area are affected by many factors, including: natural variation in weather and river flow, construction of the dam and reservoir system (the large surface areas of reservoirs and resulting slower river velocities contribute to warmer late summer/fall water temperatures), increased temperatures of tributaries due to water withdrawn for irrigated agriculture, and due to grazing and logging, point-source discharges such as cities and industries and climate change. Given that the net pens would be in operation during the winter and spring high flow periods and given the immense flow volume of the lower Columbia River estuary, discharges from the project would not measurably increase temperature in the surrounding water column.

The overall effects on water quality from the cumulative discharges from the four net pen sites would be extremely localized, rapidly diluted, and recoverable. This is mainly because of the massive dilution volume of the receiving water body (LCRE) during the winter and spring high-flow periods and the capacity of the benthic habitat absorbing materials, in addition to maintaining rearing densities at moderate levels (20,000-25,000 fish per net pen). Therefore, overall effects to water resources from the Proposed Action would be **low**.

3.2.3 Environmental Consequences for Water Resources – No Action

Under the No Action alternative, Bonneville would not fund the SAFE Program to achieve the maximum production level. The SAFE program would continue with partial funding from other sources, leading to a reduction in the number of smolts being raised in each net pen site by approximately half. This reduction would also result in a corresponding decrease in the sources of organic matter (dead fish, uneaten food, and feces) and related water quality effects. As a result, the overall **low** impact on water quality would be further reduced relative to the Proposed Action due to the reduced inputs of organic material into the system from the reduced amount of fish rearing.

3.3 Wildlife

3.3.1 Affected Environment

Urbanization, industrialization, and development (including construction of marinas, docks, and industrial shipping) have degraded the LCRE in the vicinity of the SAFE net pen sites, leaving little to no riparian cover and/or vegetation in these stretches of the river. Urbanization, in particular, has reduced water quality, increased water temperature, altered the timing and quantity of runoff, and decreased riparian cover and wildlife habitat refugia.

Several ESA-listed marine and terrestrial wildlife species are found in Pacific, Wahkiakum, and Clatsop counties under USFWS' jurisdiction (see Table 5).

Table 5: ESA-Listed Wildlife Species in the Lower Columbia River Estuary

Wildlife Species	Designation	Habitat	Range
Amphibians			
Oregon spotted frog (Rana pretiosa) (no known populations in implementation area)	Threatened / Proposed	Large marshes near year-round water	Oregon and Washington
Birds			
Marbled murrelet (Brachyramphus marmoratus)	Threatened / Designated	coastal ocean foraging, large inland tree nesting	Eastern Pacific Ocean coast north of San Francisco
Northern spotted owl (Strix occidentalis caurina)	Threatened/ Designated	Expansive dense forests with large trees	Oregon, Washington, northern California
Streaked horned lark (Eremophila alpestris strigata)	Threatened / Designated	Open grasslands; no shrubs or trees; broad range of conditions including estuaries	Puget lowlands, Estuary, Willamette Valley, Southern Oregon

Wildlife Species	Designation	Habitat	Range
Western snowy plover (Charadrius nivosus ssp. nivosus)	Threatened / Designated	Coastal beaches, sand spits, dune-backed beaches, sparsely vegetated dunes, beaches at creek and river mouths, and salt flats at lagoons and estuaries	Washington to Baja California
Yellow-billed cuckoo (Coccyzus americanus)	Threatened / Proposed	Dense shrubs and deciduous trees	Canada, U.S., Mexico
Mammals			
Columbian white-tailed deer (Odocoileus virginianus leucurus)	Endangered (proposed for down-listing to Threatened) / None	Riparian areas and densely forested swamps covered with tall shrubs	Estuary population only
Reptiles			
Leatherback sea turtle (Dermochelys coriacea)	Endangered / Designated	Open ocean and sandy beaches	Pacific subpopulation forages along Oregon coast

3.3.2 Environmental Consequences for Wildlife – Proposed Action

3.3.2.1 Wildlife Habitat

All project activities would take place in existing net pens submerged in Youngs Bay, Tongue Point, Blind Slough, Deep River, and at hatchery release sites (Gnat Creek, Klaskanine River, South Fork Klaskanine River, and Grays River). At these sites, there are no suitable habitats for any of the species listed in Table 5 and also extremely low chances of co-occurrence with any of them, mainly due to differential habitat preferences within the LCRE (refer to Figures 3, 5, 7 and 9 for aerial imagery).

There would be no habitat or wildlife disturbance from human presence or activity because the SAFE net pens and hatchery release sites are located in surface waters in heavily utilized nearshore areas (piers and boat docks). The wildlife species and numbers living adjacent to the project areas would remain unchanged and the Proposed Action would thus have **no impact** on wildlife habitat.

Priority habitat for migratory birds in the Columbia River estuary includes freshwater and tidal marsh wetlands. None of the net pen sites occur near these areas, with the nature of the work being non-disruptive (little to no noise). For these reasons, there would be **no impact** on migratory bird habitat.

3.3.2.2 Wildlife Predation

There would be windows of opportunity for marine mammals and certain avian species to prey upon spring Chinook and coho smolts upon release from net pen and hatchery release sites and during adult return.

Southern Resident Killer Whales. The occurrence of Southern resident killer whales along the Oregon-Washington coasts likely varies from year to year, but known occurrences near the mouth of the Lower Columbia River span late Fall (Oct-Dec) through early Spring (March-April). When present, killer whales are most likely to be preying upon Chinook salmon stocks originating from an area spanning California to southeast Alaska (Weitkamp 2010).

Marine Mammal Predators. In addition to the Southern resident killer whale, three other marine mammal species—Steller sea lions, California sea lions, and harbor seals—forage on salmon in the LCRE and in the ocean. LCRE river otter is a top predator in a wide variety of aquatic food webs in marine environments. Prey vary seasonally, but the species is heavily dependent on a wide variety of fish, including juvenile salmon, spawning salmon, and salmon carcasses.

Seabirds, Raptors, and other Piscivorous Birds. Numerous seabird species and raptors present within the Select Area Fishery boundaries—including Caspian terns, double-crested cormorants, and several species of gulls—would likely benefit from the proposed SAFE spring Chinook and coho smolt releases (of up to 4.25 million of the former and 4.3 million of the latter) from March to May.

Returning SAFE fish would be larger (spring Chinook average 12-17 pounds while coho average 8-10 pounds). Raptors (bald eagles, turkey vultures, osprey), corvids (crows, ravens), and numerous species of gulls prey on returning adult salmonids, primarily post-spawn adults. However, since all SAFE adults would be harvested at Select Area Fishery locations, there would be no added adult predation opportunities for these raptors resulting from the Proposed Action.

In either case, only a small percentage of the total outmigrating smolts and returning adults would be SAFE Program fish relative to total hatchery production in the Columbia River Basin. Currently, 176 salmon and steelhead hatchery programs operate at 80 hatcheries and associated artificial production facilities in the Columbia River Basin to produce over 150 million smolts on an annual basis (NMFS 2014), with returning adults numbering in the hundreds of thousands. Most fish migrate at once in large numbers during a limited window of time, satiating predators and allowing most fish to escape predation. This would make SAFE Program fish an insignificant amount of prey.

Within the SAFE net pens themselves, thousands of trapped smolts in an enclosed area could potentially become ripe targets for predators, but this risk would be minimized by preventative measures such as electric barriers, high-frequency audio devices, and bird covers affixed to the nets. These are non-lethal measures meant to discourage rather than harm predators. Additional mitigation measures would include use of a below-water feeding method to prevent fish from becoming accustomed to feeding at the surface and releasing the fish under the cover of darkness. These measures would substantially reduce the chance of birds eating the smolts on their way to the ocean.

Although the Proposed Action would increase the amount of target prey, a variety of other marine species would remain available for consumption, such as lingcod, greenling, sole, sablefish, and squid, in addition to hatchery fish from other hatchery programs. SAFE Program fish consumption accordingly would not occur at sufficient levels to affect the growth and abundance of the avian and marine mammal predatory species mentioned above. The overall effect of the Proposed Action on wildlife predators would thus be **low**.

3.3.3 Environmental Consequences for Wildlife – No Action

Under the No Action alternative, Bonneville would not fund the SAFE Program to achieve the maximum production level and the program would instead continue with funding from other sources, resulting in a halving of smolt production. Environmental variables such as ocean conditions and estuary smolt predation make it difficult to predict the precise effect on adult returns, but it is reasonable to assume that they would decrease by the same or greater margin. The wildlife species described above would likely not experience change in prey availability as the numbers of released smolts and returning adults from this and other hatchery programs are likely to satiate predator appetites during that brief window of time. There accordingly would be a **low** effect on wildlife under the No Action Alternative.

3.4 Transportation

3.4.1 Affected Environment

Ground transportation within the LCRE primarily utilizes state and federal highways and roads serving residential, agricultural, and business uses. Dikes and levees are frequently topped with agricultural and recreational access roads. Most affected roads are "local," "minor collector" or "major collector" roads under the Federal Functional Classification. In addition, the LCRE provides a travel corridor for large ships and smaller vessels. Smaller boats also utilize many of the tributaries within the estuary, where most waters are navigable during high tide. SAFE net pens are located in a navigable waterway, and must comply with U.S. Coast Guard (USCG) standards aimed at preventing substantial conflicts with navigation and other water-dependent uses.

3.4.2 Environmental Consequences for Transportation – Proposed Action

The numerous net pen and hatchery facilities involved with the SAFE Program would mass haul and transport eggs, biological samples, smolts, fish feed, and other materials to each other utilizing the local road network. This routine mass hauling of fish and feed is an integral part of the SAFE Program. (See Figures 10 and 11.)

Fish would generally be transported within a 30-mile radius in trucks with specialized equipment and supplemental oxygen. Transportation would primarily occur via state and federal highways, but also to a lesser extent on other roads serving residential, agricultural, and business uses.

Figure 10: Fish Transport Truck Transferring Juveniles into Net Pens

Figure 11: Transferring Juveniles into Net Pens

Not all of the spring Chinook and coho salmon smolts to be produced would be transported, as a portion would be released on-site at their respective hatcheries of origin or transported from hatcheries receiving state or Mitchell Act funds. Production logistics may require that fish be transferred from several different SAFE hatcheries (Big Creek Hatchery, Oxbow Hatchery, Gnat Creek Hatchery, Marion Forks Hatchery, South Santiam Hatchery, Clackamas Hatchery) via truck and piped directly into the net pen sites. Each hatchery has between one and five fish transport trucks of varying in capacities (ranging from 200 to 3,000 gallons) and operate according to Integrated Hatchery Operations Team (IHOT) guidelines with a transit time that ranges from 20 to 90 minutes. The trucks would routinely haul 50,000-60,000 fish per load to achieve target density (usually 0.75 pound/cubic foot at release).

Although the precise number of fish to be transported and the transit routes to be used would depend on various factors—including capacity, priorities among the various entities involved, production goals, and management objectives—it is reasonable to assume that at least half of fish would require transport to SAFE net pens, meaning SAFE operations would increase traffic by approximately 80-100 trucks traveling round trip within 30 miles of the SAFE facilities on an annual basis. The feeding of the fish would require routine transport of fish feed through similar vehicles. As there are only 10-20 trucks available for use, this would not impede traffic at any time, resulting in a **low impact** on land-based transportation from achieving maximum production levels under the SAFE Program.

With regards to water-based transportation, SAFE net pen facility fish-feeding operations are not disruptive to, nor inconsistent with, recreational boating and navigation in the adjacent channel. Achieving maximum production levels under the SAFE Program would accordingly have **no impact** on water-based transportation.

3.4.3 Environmental Consequences for Transportation – No Action

Under the No Action alternative, Bonneville would not fund the SAFE Program to achieve the maximum production level and the program would instead continue with funding from other sources, resulting in a halving of smolt production and reduced overall impact. The No Action Alternative would still require smolts to be transported from Hatchery Facilities to SAFE net pen sites under this scenario, but to a lesser extent than under the Proposed Action. There accordingly would be a **very small beneficial impact** on land-based and water-based transportation under the No Action Alternative due to fewer trucks on the road, however those trucks are likely to be employed elsewhere.

3.5 Socioeconomics

3.5.1 Affected Environment

This Section describes economic values for affected SAFE commercial and recreational fisheries, targeting SAFE Program fish harvested in the four Select Area Fisheries adjacent to SAFE net pen sites in Youngs Bay, Tongue Point, Blind Slough, and Deep River, and the contribution of these fisheries to affected regional economies. This economic analysis evaluated various economic indicators, including ex-vessel values for commercial fisheries, trip-related expenditures by recreational fishermen, and regional economic impacts (jobs and personal income) associated with fishing-related activities (See Appendix C).

This analysis includes consideration of: (1) local economic activity in Clatsop County, Oregon and WaKiaKum and Pacific counties, Washington; and (2) regional economic activity in the Lower Columbia River (Fishery Zones 1 through 5) in the states of Oregon and Washington.

The portion of the LCRE that contains all SAFE facilities and Select Area Fisheries extends from the mouth of the Columbia River to approximately 30 river miles upstream. This stretch of territory includes three low river counties, and several small towns including Astoria, which forms a substantial part of its economic base (government and tourism) (see Figure 12).

Figure 12: Communities near the SAFE Facilities

Table 6 displays the population characteristics of the counties within the LCRE. Clatsop and Pacific counties are the counties most likely to see the majority of the economic benefits from commercial and recreational fisheries resulting from the SAFE Program. Economic data from Clatsop County will be used predominantly in this analysis.

Table 6: Economic Characteristics of SAFE Counties (Bureau of Economic Analysis)[7]

Geographic Area	Population (2020)	Personal Income (Thousands)	Total Earnings (thousands)	Total Employment (2020)	Earnings Per Job[8]
State of Oregon	4,241,507	238,847,065	163,610,934	2,451,970	$66,726
Clatsop County, OR	40,423	1,971,732	1,262,672	23,721	**$53,230[9]**
State of Washington	7,693,612	516,441,099	360,258,117	4,385,827	$82,141
WahKiakum County, WA	4,498	211,526	59,806	1,537	$38,911
Pacific County, WA	22,984	1,005,532	429,217	9,470	$45,324
Gray's Harbor, WA	76,841	3,319,759	1,608,936	21,688	$46,431

Clatsop County. As of the 2020 U.S. Census, there were about 37,000 people in Clatsop County (a population density of 45 people per square mile). The county has a total area of 1,084 square miles, of which 829 square miles is land and 255 square miles (24 percent) is water. The population is 91.2 percent Caucasian, 8.6 percent Latino, 0.9 percent African American, 1.4 percent Native American, and 1.6 percent Asian. Per capita income was $48,777 and the median family income was $54,886 with about 10.5 percent of the population below the national poverty level. About 30 percent of the lands within the county boundaries consist of state-managed forests. Clatsop County's principal industries are manufacturing, travel (primarily tourism), and trade. Fishing and timber are still important but contribute proportionally less to the county's employment and income than previously. Note that the calculated earnings per job value of

7 Bureau of Economic Analysis. May 2022. Table CA05N Personal Income by Major Source and Earnings by NAICS Industry;Table CA25N Total Full-Time and Part-Time Employment by NAICS Industry.

8 The earnings-per-job factors for each region were calculated by dividing total earnings in each region in 2007 by total jobs, as reported by the Bureau of Economic Analysis (BEA).

9 To be used in economic analysis.

$53,230 shall be used in this economic analysis as most of the activities and benefits flow to Clatsop County.

WahKiakum County. As of the 2020 U.S. Census, there were just fewer than 5,000 people in 268-square-mile WahKiakum County (a population density of 15.1 people per square mile), making it the second least populous county in Washington. The population is 91.2 percent Caucasian, 5.7 percent Latino, 0.7 percent African American, 0.2 percent Native American, and 1.8 percent Asian. Per capita income was $47,027 and the median family income was $53,227 with about 10.7 percent of the population below the national poverty level.

Pacific County. Pacific County is centered on Willapa Bay, a region that provides 25 percent of the U.S. oyster harvest, although forestry, fishing, and tourism are also important elements of the county's economy. According to the 2020 U.S. Census, there were just fewer than 24,000 people in 932-square-mile Pacific County (a population density of 22.4 people per square mile). The population is 90 percent Caucasian, 10 percent Latino, 1.1 percent African American, 0.2 percent Native American, and 2.1 percent Asian. Per capita income was $43,749 and the median family income was $46,733 with about 13.6 percent of the population below the national poverty level. Total employment in 2019 was 4,360 jobs with 589 employer establishments.

Local Economies. Clatsop, WahKiakum and Pacific Counties. There are multiple river and ocean fisheries within the three lower-river counties, which host about one half of total licensed Columbia River Basin gillnetters, according to the number and addresses of WDFW- and ODFW-issued gillnet permits. These three lower river counties have less per capita income than the national average of $59,510 and the Washington State average was $67,126. Local businesses and infrastructure (moorage, processing facilities, gear suppliers, etc.) serving the gillnet industry also participate in the ocean and river fisheries. In addition to fish harvesting, commercial fisheries affect seafood product preparation and packing, including the canning and curing of seafood and preparation of fresh or frozen fish or seafood. Seafood processors that purchase the Columbia River salmon catches also receive deliveries from ocean catches. Community profiles of West Coast fishing communities developed by NMFS indicate that many residents in Astoria, for example, participate in the lower Columbia River gillnet fishery, targeting salmon, shad, sturgeon, and eulachon. However, residents of these communities are also involved in fisheries targeting other catches, including Dungeness crab, coastal pelagic species, groundfish, and shrimp.

According to the 2006 TRG Economic Analysis study, total estimated local (Clatsop and Pacific counties) economic contribution made by gillnet permittees is $12.0 million in personal income, which represents about 225 jobs, when divided by Clatsop County earnings per job ($53,230). In comparison, total estimated regional (Oregon and Washington states) economic contribution is $20.6 million which indicates that the gillnet fishery derives primarily from Clatsop and Pacific counties. An average number of 143 vessels fish at off-channel locations on an annual basis. Most

(71 percent) of those that fish at off-channel locations fish in Youngs Bay. The least fished site is Deep River (seven percent). In sum, the gillnet salmon fishery centered in Clatsop and Pacific counties is a large contributor to the regional economy, but not the only one.

***Regional Economies – Lower Columbia River Mainstem*.** For purposes of this analysis, the regional economy consists of commercial fishery economic activity in the Lower Columbia River Mainstem (Fishery Zones 1 through 5). Within this area, commercial harvest for non-tribal fisheries primarily targets Chinook and coho salmon, alongside other species depending on the season. Fisheries occurring above Bonneville Dam generally include significant recreational fisheries, tribal commercial fisheries, and tribal ceremonial and subsistence fisheries, reflecting established tribal treaty rights. Below Bonneville Dam, fisheries typically encompass substantial recreational fishing, diverse non-tribal commercial fisheries targeting various salmon species and other fish.

With an average (2002 through 2009) annual harvest of about 117,290 fish, the coho salmon commercial fishery accounts for 58 percent of the average annual total salmon harvest in the mainstem of the Lower Columbia River (174,735 fish from 2002-2009). (See Table 8). Coho salmon also dominate the non-tribal commercial harvest in the terminal areas (SAFE areas and the Willamette River) of the lower Columbia River region, accounting for 79 percent (61,053 fish) of the annual average salmon harvest in these areas (77,284 fish). Of this amount, and in terms of number of fish, it is reasonable to assume that the SAFE Program fish have and would continue to constitute a majority of this figure, as 2010-2020 average commercial harvest are 9,407 spring Chinook with 45,079 coho harvested in SAFE Select Areas. However, upon applying calculated ex-vessel price per fish found in Appendix A, the total ex-vessel valuation of coho harvests are only a fifth of the total ex-vessel valuation of spring Chinook. Spring Chinook weighs more and has a much higher commercial value.

Table 7: Average Lower Columbia River Commercial Harvest (2002-2009)

	Average Annual Harvest[10]	Ex-Vessel Value
Mainstem (Zones 1 to 5)		
Chinook Salmon	41,213	$3,915,235
Coho Salmon	56,238	$639,988
TOTAL	97,451	$4,555,223
Terminal Areas		
Chinook Salmon	16,231	$1,541,945
Coho Salmon	61,053	$694,783
TOTAL	77,284	$2,236,728
Chinook Salmon	57,445	$5,457,275
Coho Salmon	117,290	$1,334,760
TOTAL	174,735	$6,792,035

Regional Economies – Columbia River Basin. According to a 2017 NMFS economic analysis, harvest and primary processing of salmon caught in tribal and non-tribal commercial fisheries throughout the Columbia River Basin generates an estimated $16.2 million in personal income and 419 full-time equivalent (FTE) jobs[11]. More than two-thirds of this activity would occur in the Mid-Columbia River sub region outside of Select Area Fishery boundaries. Recreational fishing activities targeting salmon and steelhead generate an estimated $27.9 million in personal income and 672 jobs in the Columbia River region.

10 Source: Table 3-13 from 2014 NMFS Mitchel Act Final Environmental Impact Statement

11 Expressed in 2015 dollars, Table 3-25 US v Oregon.

3.5.2 Environmental Consequences for Socioeconomics – Proposed Action

Commercial Fisheries. The SAFE Program supplements commercial fisheries, mainly the gillnet fishery, which is a small contributor to the LCRE fishing industry, representing about seven percent of all harvest revenues delivered in this area. Total estimated local (Clatsop and Pacific counties) economic contribution made by gillnet permittees is $12.0 million in personal income (TRG 2006), which represents the gillnet salmon fishery, other gillnet vessel fisheries, other gillnet permittee vessel West Coast landings, and Alaska fishery participation. The gillnet industry likely includes the harvesting of other anadromous fish, including sockeye salmon, steelhead, fall Chinook, certain white sturgeon populations, American shad, and Pacific eulachon, which are also commercially caught.

The total personal income generated from SAFE commercial harvest is estimated under three scenarios: the no-fund (No Action Alternative), current[12], and maximum (Proposed Action)[13] production scenarios (Appendix A). This could be considered as personal income accruing to households in the local area (Table 8).

Table 8: Commercial Fishery Income and Employment Scenarios

	Commercial Personal Income	**No# Jobs Supported**
No Fund (No Action Alternative) Scenario	$1,996,060	37
Current Scenario	$2,475,728	46
Maximum Production (Proposed Action) Scenario	$3,992,137	75
Total Gillnet Industry[14]	$12,000,000	225

12 The current scenario represents an annual average of the most recent 10 years of available fish production data.

13 This represents the authorized fish production limit as detailed in the 2025 NMFS Biological Opinion.

14 Total estimated local (Clatsop and Pacific counties) economic contribution made by gillnet permittees is $12.0 million in personal income (TRG 2006).

These values are divided by the earnings per job value of Clatsop County ($53,230) as found in Table 6 to estimate a range of employment supported by SAFE commercial fisheries. The number of jobs estimated in this analysis are described as FTE jobs.

As reflected in Table 8, maximum implementation of the SAFE Program would provide a beneficial effect to the local gillnet fishery in terms of personal income and employment. Catch and processing of SAFE Program fish, as well as related service industries that support Select Area fisheries, would provide employment and income to the region. However, the difference in employment numbers between the no-fund (No Action Alternative) scenario and maximum production (Proposed Action) scenario is 38 jobs, which would represent a minor contribution to the overall gillnet industry employment (225) overall.

Many persons engaged in salmon fishing also participate in other fisheries on a seasonal basis. For example, a Columbia River fishing business that participates in the gillnet fishery may be in possession of a portfolio of Oregon and Washington shrimp, crab, razor clam, troll, and Alaska permits. As previously mentioned, other anadromous fish, including sockeye salmon, steelhead, fall Chinook, certain white sturgeon populations, American shad, and Pacific eulachon, are also commercially caught. Therefore, it is reasonable to assume that a portion of these 38 jobs would continue even if the SAFE Program discontinued. Therefore, overall socioeconomic impacts of the SAFE Program on commercial fisheries would be **low to moderate**, but beneficial.

Recreational Fisheries. Recreational fisheries contribute to local and regional economies by acquiring fishing-related goods and supplies and retaining local services, such as outfitter and guiding services. Sectors particularly affected by recreational fishing activities include food services, eating and drinking establishments, lodging, recreation services, and fueling stations. Therefore, expenditures on fishing-related goods and services by fishermen contribute to both local and non-local businesses, which is somewhat insulated to the amount of fish caught, as a majority of fishing expeditions do not result in full catch allowances. This is important to consider as recreational fishing at SAFE net pen sites are comparatively minor harvests compared to the commercial fishery. Average annual commercial harvest for 2011 to 2020 was 55,000 fish and the recreational fishery average was 1,000 fish.

The recreational fisheries that target SAFE fisheries generate economic activity characterized by employment (jobs) and personal income. The average recreational value of recreational anglers harvesting SAFE salmon is calculated in Appendix A. Once SAFE recreational catch was converted to sport angler trips, this value was multiplied by an average cost per trip to estimate the total trip-related expenditures for spring Chinook and coho using 2020 dollars. This regional transfer of money supports payments to labor, and those payments are then re-spent regionally, resulting in a multiplier effect. The resulting total income from SAFE recreational harvest is $1,028,881, which supports 19 jobs using the earnings-to-wage amount found in Table 6.

While this income and employment provides an important contribution to the local and regional economics of the LCRE, it is a minor contribution to the greater whole of recreational fisheries on a local and regional scale. By comparison, recreational fishing activities targeting salmon and steelhead generate an estimated $19.6 million in personal income in the Lower Columbia River region and a further $27.9 million in personal income in the Columbia River region (U.S. v Oregon).

Recreational fishermen are active year-round, shifting from one fishery to another as seasons open and close, while SAFE Fisheries targeting spring Chinook and coho are open from February to June. Therefore, the overall socioeconomic contribution of SAFE Program recreational fishing on both the regional and local scale would have a **low** beneficial impact.

SAFE Hatchery Facilities. The economic impact from construction, operations, and maintenance of net pen sites would be small and temporary when compared to the larger local economy. Therefore, the construction-related impacts on socioeconomics would be considered low due to the minimal amount of goods and services that are expected to be required to construct and maintain the SAFE net pens. SAFE net pens would continue to be in use in the production of smolts, as other salmon stocks from other funding sources would continue and would likely increase due to the increased availability of net pens.

The incremental addition of hatchery operations in support of the SAFE Program may add several permanent employees (Hatchery Managers and Technicians) and provide seasonal employment opportunities for at least 10-20 others. These effects would benefit specific individuals and families but likely have minimal increased benefit to the larger three-county area. The Proposed Action would have a **very low** beneficial impact on employment at hatchery facilities.

3.5.3 Environmental Consequences for Socioeconomics – No Action

Under the No Action alternative, Bonneville would not fund the SAFE Program to achieve the maximum production level, and the program would instead continue with funding from other sources, resulting in a halving of smolt production, which would likely reduce adult returns. Environmental variables such as oceanic conditions and estuary smolt predation make it difficult to predict adult returns but it is reasonable to assume that they would decrease by the same or greater margin.

The difference in employment numbers between the no-fund (No Action Alternative) scenario and maximum production (Proposed Action) scenario is 38 jobs, which would represent a minor contribution to the gillnet industry employment (225) overall. However, most jobs in the commercial and recreational fishing industry are seasonal. Many persons engaged in salmon fishing also participate in other fisheries and/or have other occupations. As previously mentioned, other anadromous fish, including sockeye salmon, steelhead, fall Chinook, certain

white sturgeon populations, American shad, and Pacific eulachon, are also commercially caught. Therefore, it is reasonable to assume that a portion of these 38 jobs would continue even if the SAFE Program discontinues. They would shift to other fishery occupations as the acquired skillsets are readily transferable. Therefore, the overall socioeconomic effect of discontinuing the SAFE Program on commercial fisheries would be **low**.

Recreational fishing on SAFE returning adults would be subject to reductions, which would likely reduce participation in Recreational Select Area fisheries. However, there would still be adult fish available for harvest in adjacent fisheries. As mentioned in Section 1.5, there are multiple overlapping salmon fisheries within each of the three management periods throughout the LCRE and mainstem Columbia River. There are seven non-treaty and six treaty fisheries in the winter/spring season that primarily target spring Chinook salmon stocks returning to the upper Columbia River (UCR), the Willamette River, and lower Columbia River tributaries. The summer season has five treaty and five non-treaty fisheries that target primarily UCR summer Chinook salmon, and Upriver Columbia sockeye salmon. There are also nine non-treaty and six treaty fisheries that target hatchery and natural origin fall Chinook and coho salmon and steelhead. While the average fisherman out of Astoria may not have access to all of these fisheries, it is reasonable to assume that there are many alternatives available throughout the year just for salmon fisheries not to mention other species. These and other recreational fisheries would continue to provide income and employment regardless of Bonneville's funding decision. Therefore, the overall socioeconomic impact of discontinuing Bonneville's SAFE Program funding on both regional and local recreational fisheries would be **low.**

3.6 Greenhouse Gases

3.6.1 Affected Environment

Greenhouse gases (GHGs) are chemical compounds in the Earth's atmosphere that absorb and trap infrared radiation (heat) that is reflected or emitted from the Earth's surface. The trapping and subsequent buildup of heat in the atmosphere creates a greenhouse-like effect that maintains a global temperature warm enough to sustain life. GHGs can be produced either by natural processes or as a result of human activities but the current scientific consensus is that the latter are currently increasing atmospheric GHG concentrations to levels that would raise the Earth's average temperature. The U.S. Global Climate Research Program (USGCRP) found that since the 1970s, average U.S. temperatures and sea levels have risen, and precipitation patterns have changed (USGCRP 2009). The Intergovernmental Panel on Climate Change found similar patterns on a global climate scale (IPCC 2007).

Ongoing global climate change has implications for the current and likely future status of salmon, particularly in the Pacific Northwest, where snow melt in the Columbia River Basin substantially

influences regional hydrology. Recent studies, particularly by the Independent Scientific Advisory Board (ISAB), describe the potential impacts of climate change in the Columbia Basin. These effects may include decreased snowfall, increased early-year runoff, decreased summer and fall flow, and generally increased water temperatures. The ISAB (2007) identified the following likely effects of projected climate changes on salmon species:

***Water temperature increase*.** Systemic rises in water temperatures may result in loss of cold-water habitat (temperatures exceed upper thermal limits for a species). Projected salmon habitat loss would be most severe in Oregon and Idaho, possibly higher than 40 percent by 2090. However, this assumes a high rate of greenhouse gas emissions and used a climate model that projected a 5º C in global temperatures by 2090, a value that is higher than the scenarios considered most likely (ISAB 2007).

Variations in rainfall intensity. With reduced snowpack and greater rainfall intensity, the timing of stream flow would likely change, reducing spring and summer stream flow and increasing peak river flows (ISAB 2007). This reduction in stream flow may impact the quality and quantity of tributary rearing habitat, greatly affecting spring and summer salmon and steelhead runs. However, SAFE areas are located in coastal areas within the lower estuary that include more precipitation falling as rain rather than snow, less snow storage, and—in the estuary—higher peak flows and reduced late-summer/early-fall stream flows (ISAB 2007). This increased rainfall intensity will affect SAFE salmonid populations less than other salmonid populations which depend more on snowpack driven hydrologic systems.

3.6.2 Environmental Consequences for Greenhouse Gases – Proposed Action

GHG emissions associated with the SAFE Program (primarily carbon dioxide, methane, and nitrous oxide) would primarily emanate from fish transport trucks (hauling smolts or other materials and fish feed delivery). However, the small number of fish transport trucks being used coupled with the approximated mileage over the relative timeframe discussed in Section 3.4.2 would not result in long term or significant impacts on greenhouse gases and would not meet the mandatory reporting identified in 40 CFR 98.

Chinook and coho salmon food sources, populations, and behavior may be adversely affected by climate change effects such as decreased reliability of water, increasing global temperatures, and increases in invasive and exotic vegetation and wildlife species (Finch et al. 2021; NAISMA 2021). Climate change could also impact conditions in the Columbia River estuary, and the Pacific Ocean, which could negatively impact survival of the hatchery-produced SAFE Chinook and coho salmon. Food sources in the ocean may be impacted, which could affect distribution of these fish in the eastern Pacific Ocean and their resulting exposure to competition and predation there. Changes in the Columbia River's flow regime could alter the timing of adult returns or the conditioning to fresh water upon their return. Changes to rearing, acclimation, and release practices would be

applied if and when these climate-driven environmental changes and their potential to impact the SAFE programs are realized.

The production of additional harvestable salmon smolts being produced and released each year under the Proposed Action is likely to increase the survivability and fitness of the native Chinook and coho salmon populations by ameliorating harvest pressure. Consequently, the overall impact of the Proposed Action on climate change would be **low**.

3.6.3 Environmental Consequences for Greenhouse Gases – No Action

Under the No Action alternative, Bonneville would not fund the SAFE Program to achieve the maximum production level, and the program would instead continue with funding from other sources, resulting in a halving of smolt production, thus reducing overall impact. The No Action Alternative would not cease the routine hauling of fish in fish transport trucks, but it would likely occur to a lesser degree as production capacity is diminished. The overall effect of the No Action alternative on Climate Change would be **low**.

4.0 Cumulative Effects

Cumulative effects are the incremental effects of an action coupled with those of other past, present, and reasonably foreseeable future actions. This chapter presents information about current environmental conditions and the environmental and socioeconomic consequences of implementing the Proposed Action.

Past actions that have cumulatively contributed to current environmental conditions in the LCRE include agriculture (with water withdrawals), road construction, navigational dredging, bridge maintenance, rural development, grazing, timber cutting, mining, suppression of natural fire regimes, commercial and recreational harvests of fish and wildlife, and fish and wildlife habitat restoration and enhancement.

Present (i.e., ongoing) actions cumulatively contributing to current environmental conditions include the use and maintenance of roads and highways, navigational dredging, ongoing land uses and management actions such as agriculture (with continued water withdrawals), grazing, forest management, wildfire suppression and prescribed fire use, management and harvest of fish and wildlife populations, and additional aquatic and upland restoration and resource preservation actions by public and private entities in the estuary.

Throughout the Lower Columbia River Estuary (LCRE), federal, state, and local agencies, tribes, environmental organizations, and communities support habitat restoration projects. These projects aim to improve general habitat and ecosystem function or achieve species-specific conservation objectives, often overlapping with the goals of ESA recovery plans, such as the NMFS (2011) Columbia River Estuary ESA recovery plan module for salmon and steelhead.

The Columbia River Estuary ESA Recovery Plan Module for Salmon and Steelhead (NMFS 2011) identifies "23 management actions that, together, address the range of threats salmonids in the estuary face, from altered habitat-forming processes to physical structures in the estuary, changes in the food web, and poor water quality." (Chapter 5) If implemented, these actions would reduce the impacts of threats on salmonids during their migration and residency in the estuary and plume. Numerous ongoing restoration and enhancement efforts by federal, state, tribal, and non-profit organizations within the Lower Columbia River address these management actions. Many of the habitat improvement actions funded by Bonneville would support resilient habitats and provide flexibility to adjust to anticipated climate change-induced temperature increases. For example, actions to enhance riparian areas, stream complexity, and stream flow would help ameliorate streamflow and temperature changes from incoming tributary waters to the LCRE.

Numerous actions have also helped restore habitat, improve fish passage, and reduce pollution, though annual funding levels have varied. While the potential benefits of these restoration actions within the basin are difficult to quantify, it is unlikely that substantial benefits would be realized in

the project area in the future, although minor improvements would likely occur over time from local restoration efforts. The SAFE program would support these actions by using hatchery and net pen facilities to mitigate for lost salmon production and reduce harvest pressure on naturally occurring stocks.

However, the EPA found that climate change and nonpoint source dam impacts are the dominant sources of impairment, with impacts that are an order of magnitude higher than point sources, agricultural withdrawals, and tributaries.

The following is a summary of other projects specifically related to the SAFE Program:

ODFW Restoration and Enhancement (R&E): This is an intermittent funding source. ODFW R&E provides substantial funding for South Fork Hatchery and Youngs Bay rearing site infrastructure improvements.

Bonneville Funded Coded Wire-Tag Study: Coded Wire Tag (CWT) recovery by Pacific States Marine Fisheries Commission (PSMFC) is essential for evaluating the impacts and benefits of Select Area projects. Sampling of Select Area fisheries is conducted by CWT Recovery staff. Recovery data are submitted to PSMFC for uploading to the database clearinghouse by SAFE and other agencies. Queries using CWT release groups yield tag estimations by return year and recovery locations, which are used for Stock-Specific Abundance Rate (SAR) analyses.

ODFW Propagation Facility: ODFW has provided funding for the Columbia County Fisheries (CCF) propagation facility (South Klaskanine Fork Hatchery) since 1979. Presently, release goals for South Fork Klaskanine Hatchery to SAFE net pens are 385,000 coho.

Bonneville Funded Avian Predation on Juvenile Salmonids: This project investigates the impacts of piscivorous colonial water birds on the survival of juvenile salmonids in the Lower Columbia River and monitors the effectiveness of tern relocation in reducing predation. Smolts released by SAFE are subject to predation by terns and cormorants in the LCR.

ODFW/WDFW Spawning Ground Surveys: The SAFE Program utilizes and shares data with both new and established survey programs to develop run reconstruction analysis and stray rates.

Reasonably foreseeable future actions include the continuance of the ongoing actions listed above, with some increases in land-use pressures as populations grow.

4.1 Fish and Aquatic Species

In 2010, 176 hatchery programs at 80 hatchery facilities throughout the Columbia River Basin produced approximately 140 million salmon and steelhead (NMFS 2014). Slightly more than a third of Columbia River Basin hatchery programs (62 hatchery programs) receive Mitchell Act funds, while the remainder are primarily funded by Bonneville, the Corps, Reclamation, USFWS,

public utility districts, tribes, and private power companies. These hatcheries are reasonably likely to continue salmon production at these or higher levels for the foreseeable future, with a range of effects as described in Section 3.1.

While a majority of these hatchery programs do not operate near SAFE net pen and hatchery facilities, all hatchery-origin fish (including juveniles and adults) migrate through the LCRE, occasionally overlapping spatially and temporally with emigrating and returning SAFE spring Chinook and coho. When considered cumulatively with the impacts of other past, present, and reasonably foreseeable future hatchery production in the Columbia River Basin, the SAFE Program's production of spring Chinook and coho salmon is not likely to contribute meaningfully to the aggregate effects of hatchery production throughout the basin, including interactions with non-salmonid aquatic species.

Future development, hydropower operations, fisheries, and climate change are expected to continue altering environmental conditions, causing negative impacts on both ESA-listed and non-listed fish by disrupting habitat formation across the basin. However, the overall impacts of the SAFE Program, considered in conjunction with the adverse effects of other past, present, and reasonably foreseeable future actions on fish and their habitat throughout the LCRE, would be **low**.

4.2 Water Resources

The cumulative effects of urbanization in the LCRE, reduction of wetlands, and increased effluent discharges from both point and non-point sources have contributed to regional environmental degradation, resulting in reduced water quality, increased water temperature, altered runoff timing and quantity, and decreased riparian cover and habitat refugia. The Oregon Department of Environmental Quality (ODEQ) lists the LCRE (from river mile 0 to 35.2) as water quality limited for temperature (summer months), dichlorodiphenyltrichloroethane (DDT), polychlorinated biphenyls (PCBs), and arsenic (year-round). The Washington Department of Ecology (DOE) lists the same area as water quality limited for dichlorodiphenyldichloroethylene (DDE), arsenic, bis-phthalate, dieldrin, temperature, dissolved oxygen, PCBs, and fecal coliform

Where the net pens sites are located, Oregon and Washington identified the Columbia River estuary as impaired for temperature pursuant to Clean Water Act §303(d) and the EPA established a TMDL for temperature in the Columbia and Lower Snake River in 2021 (USEPA 2021).

As stated in EPA 2021, temperature conditions in the Columbia River basin area are affected by many factors, including: natural variation in weather and river flow, construction of the dam and reservoir system (the large surface areas of reservoirs and resulting slower river velocities contribute to warmer late summer/fall water temperatures), increased temperatures of

tributaries due to water withdrawn for irrigated agriculture, and due to grazing and logging, point-source discharges such as cities and industries and climate change.

Federal agencies are preparing water quality attainment plans under the Clean Water Act Section 401 certifications related to National Pollutant Discharge Elimination System (NPDES) permits for federal dams in State of Washington's waters on the Columbia and Snake Rivers.

The degraded conditions that lead to these excess contamination levels are basin-wide in scale. While the Proposed Action would slightly impact certain water quality parameters such as dissolved oxygen, nitrogen, and organic matter from fish feed and waste dropped at each SAFE net pen site, these contributions to the cumulative degradation of water quality in the basin, including the degradation caused by past and ongoing activities and the anticipated degradation due to reasonably foreseeable future actions, would be temporary in nature and have **low** overall impacts.

4.3 Wildlife

Human development and activity in the LCRE have caused fragmentation of wildlife habitats near SAFE net pen and hatchery facilities. Except for the Deep River site, each of the SAFE net pen sites lacks vegetation and cover in their respective stretches of the river. Human activities are routine, frequent, and disruptive, but the operation and maintenance of net pen sites, fish feeding, transport, and release are not expected to cause more disruption to wildlife than routine human activity.

As described in Section 3.3, salmonids provide a viable prey base for wildlife. However, the benefits of prey availability would unlikely mitigate the cumulative adverse impacts of past, present, and reasonably foreseeable future actions in the LCRE area, including the effects of human development and climate change. The Proposed Action's effect on marine mammal, avian, and aquatic predators would be indiscernible, as many other hatchery fish would pass through areas where SAFE fish might be preyed upon. Large numbers of smolts emigrate during a short window, which saturates predators and allows a majority to escape to the ocean. Additionally, larger numbers of smolts escaping to the ocean may not always increase adult returns due to unknown oceanic conditions affecting juvenile-to-adult survival. Therefore, the incremental effects of the Proposed Action on wildlife beyond those of past, present, and reasonably foreseeable future actions would be **low.**

4.5 Transportation

The main types of traffic in this area are fishing, residential, and recreational, all of which would continue as the proposed fish hauling/feeding activities commence. The Proposed Action would add an undiscernible amount more traffic to the rural roads throughout the county. Thus, the

cumulative effect on transportation of both the Proposed Action and existing transportation network and traffic amounts would be **low**.

4.6 Socioeconomics

Although the SAFE Program would add few permanent jobs to the LCRE—and thus have low effects on local employment and personal income—the Proposed Action may have socioeconomic benefits, particularly when combined with other Bonneville-funded projects described above. These may include funding for individual restoration projects in the Estuary or the numerous other hatchery programs.

Forecasts of future returns of anadromous salmonids are not possible, so expenditures and income associated with their potential contribution to future recreation cannot be predicted. But increased LCRE salmon returns of reasonably expected to beneficially affect the local and regional economy, which is already profiting from recreational fishing by tourists. Environmental variables such as ocean conditions and estuary smolt predation greatly affect the realized economic returns from SAFE Program investments. If the lowest and highest SARs during the selected 1990s broodstock years are used in a sensitivity analysis, the economic effects vary by a factor of 100 (TRG 2006). Given this extreme variability, the cumulative impacts from the Proposed Action on socioeconomics, when considering past and present economic activities and likely reasonably foreseeable future developments, would be **low**.

4.7 Greenhouse Gases

Locally, vehicular traffic, ranching, agriculture, forestry management, and residential activities have all contributed to current GHG accumulations and will continue to do so. The Proposed Action would marginally increase GHG emissions via exhaust gases emitted from fish and feed transport trucks, although their operation would be fleeting (during a three-month window) and relatively small in scale (involving only a few vehicles at any given time). The effect of these marginal GHG emissions relative to the cumulative effects of other past, present, and reasonably foreseeable future contributions from recreation, residential, and fishing activities in the LCRE, would be **low**.

Rising air and water temperatures are a particular concern for salmonid species, which are important to the recreational fisheries in the Columbia River Basin. Overall, environmental changes are likely to reduce the future abundance of fish and therefore increase the level of effort required to catch most, if not all, salmonid fish species in the Columbia River Basin. This may further affect the personal income that recreational anglers receive from participating in salmon fishing. If fewer fish are available for harvest, and more restrictions are in place (e.g., reduced bag

limits and fishing seasons), fewer recreational fishermen may be willing to pay for the opportunity to fish.

Climate change and future development, hydropower operations, hatchery production, and habitat restoration may gradually reduce the availability of harvestable salmon and correspondingly diminish the income of commercial fishermen regardless of whether the Proposed Action is undertaken or not. Therefore the relative contribution of the SAFE Program to commercial and recreational fisheries relative to the cumulative effects of other past, present, and reasonably foreseeable future actions that affect climate change in the Lower Columbia River would be **low**.

5.0 Coordination, Consultation, and Compliance

5.1 Agency Coordination and Public Involvement

The SAFE Program has been underway since 1993 and involves a collaboration among ODFW, WDFW, and CCF, in addition to Bonneville and NMFS.

5.2 Environmental Review and Coordination

By providing a funding action, Bonneville would comply with federal laws, regulations, and Executive Orders. The following describes how the Proposed Action is in compliance with NEPA, ESA, Cultural Resources Protection, Magnuson-Stevens Act including Essential Fish Habitat, and other relevant federal Executive Orders.

5.2.1 National Environmental Policy Act

The National Environmental Policy Act, as amended, 42 U.S.C. § 4321 et seq, requires federal agencies to assess the impacts that their actions may have on the environment. Bonneville has prepared this EA pursuant to Department of Energy (DOE) regulations and procedures implementing NEPA, which requires federal agencies to assess, consider, and disclose to the public the impacts that their actions may have on the environment before taking major federal actions.

5.2.2 Endangered Species Act

The ESA, 16 U.S.C. 1531 *et seq.*, requires federal agencies to ensure that the actions they authorize, fund, and carry out do not jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat.

Section 7 interagency consultation with NMFS began on July 23, 1998, when Bonneville submitted a Biological Assessment proposing to fund WDFW, ODFW, and CCF to investigate the feasibility of expanding the numbers of terminal fisheries sites in the Lower Columbia River.

The first Section 7 biological opinion was issued in 1998 while five species upriver of the SAFE Program were proposed for listing: Upper Willamette steelhead, Mid-Columbia steelhead, Columbia River chum, Upper Willamette Spring Chinook, and Lower Columbia fall Chinook. The re-initiation of formal consultation of SAFE occurred in 1999 once those species were officially listed (64 C.F.R. 14308). NMFS determined that the description of the SAFE Program activities considered in the original 1998 opinion remained applicable. The opinion evaluated the effects of SAFE Program operations for the first two phases: two years of initial research and investigation of potential sites, salmon stocks, and methodologies (including different net pen rearing regimes and harvest options), followed by roughly eight years of expansion, and data monitoring. The final

phase included the establishment of terminal fisheries operating at full capacity at all acceptable sites; however, this has been constrained by stock availability and funding limitations.

NFMS issued a Section 7 biological opinion in 2021 (WCRO-2020-02145) (2021 Opinion) which was reinitiated and reissued in 2025 (WRCO-2025-00274) (2025 Opinion) evaluating the funding, operation, maintenance, and monitoring of these three SAFE hatchery programs based on technical information found in the latest HGMPs (ODFW 2021a; ODFW 2021b; WDFW 2018). Production and release numbers of juvenile salmonids from the SAFE Program would be constrained by the analysis and incidental take limitations outlined in the 2025 Opinion.

In the 2025 Opinion, NMFS determined that the SAFE Proposed Action is likely to adversely affect the following ESA-listed species and their critical habitat: Lower Columbia River Chinook salmon ESU, Lower Columbia River coho salmon ESU, Lower Columbia River steelhead DPS, Columbia River chum salmon ESU, Upper Willamette River Spring Chinook salmon ESU, and Snake River Spring/Summer Chinook salmon ESU.

In addition, NMFS determined the SAFE Proposed Action is not likely to adversely affect the following ESA-listed species or their critical habitat: Upper Willamette winter steelhead, Middle Columbia steelhead, Upper Columbia Spring Chinook salmon and steelhead, Snake River fall Chinook and sockeye salmon and steelhead, eulachon, Southern green sturgeon, and Southern resident killer whales.

The 2025 NMFS Opinion contained an incidental take statement describing reasonable and prudent measures that NMFS deemed necessary or appropriate to minimize the impact of incidental take associated with the Proposed Action. The take statement set forth nondiscretionary terms and conditions, including reporting requirements, that Bonneville and other action agencies would comply with to carry out the reasonable and prudent measures.

The SAFE Program would have no effect on bull trout (*Salvelinus confluentus*), as all project activities are confined to existing net pens and hatchery facilities. These operations would not impede bull trout migration, directly handle the species, or impact spawning, predation patterns, or water quality outside the net pen environment. Similarly, the project would have no effect on Columbia white-tailed deer (*Odocoileus virginianus leucurus*), marbled murrelet (*Brachyramphus marmoratus*), Western snowy plover (*Charadrius nivosus nivosus*), short-tailed albatross (*Phoebastria albatrus*), Northern spotted owl (*Strix occidentalis caurina*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), Oregon silverspot butterfly (*Speyeria zerene hippolyta*), or Nelson's checkermallow (*Sidalcea nelsoniana*). This is because these species and their suitable habitats are entirely absent within the Program's action area.

5.2.3 Clean Water Act

Clean Water Act implementing regulations (40 C.F.R. 122.24) require the net pen site at Youngs Bay to obtain an ODEQ-issued NPDES permit, which in turn require those sites to maintain 50-foot mixing zone from the outside boundary of the floating net-pens. CCF has finalized the permitting review process and was issued an extension of its existing NPDES Permit that expired November 30, 2023 until ODEQ acts on the renewal application (Federal Permit No. OR0040631).

At Deep River, WDFW holds a NPDES permit (WA0040053) issued by the Department of Ecology. The permit requires the Net Pens to sample and report Turbidity, Dissolved Oxygen, and Biochemical Oxygen Demand (BOD) results monthly when there is fish present in the net pens, in addition to fish production, fish size, the amount of fish, and fish feed.

The production levels Tongue Point and Blind Slough sites are below the threshold that would require NPDES permits. These locations incur minimum impact and undergo routine monitoring to document any environmental changes that may occur under the net pens as compared to a reference condition.

5.2.4 Cultural and Historic Resources Protection

Section 106 of the National Historic Preservation Act, 54 U.S.C. § 306108 et seq., requires federal agencies to consider the effects of their actions on historic properties that are listed or eligible for listing on the National Register of Historic Places.

- Cultural resource-related laws and regulations include the following:
- Antiquities Act of 1906 (16 U.S.C. §§ 431–433),
- Historic Sites Act of 1935 (16 U.S.C. §§ 461–467),
- Section 106 of the NHPA (54 U.S.C. § 300108), as amended,
- Archaeological Data Preservation Act of 1974 (16 U.S.C. § 469 a–c),
- Archaeological Resources Protection Act of 1979 (16 U.S.C. § 470 *et seq*.), as amended,
- Native American Graves Protection and Repatriation Act (25 U.S.C. § 3001 *et seq*.),
- Executive Order 13007 Indian Sacred Sites, and
- American Indian Religious Freedom Act of 1978 (PL 95-341, 92 Stat. 469, 42 U.S.C. §§ 1996, 1996a)

Bonneville concluded that the Proposed Action has no potential to cause effects on historic properties since it would not include any ground-disturbing activities or any activities to affect existing structures.

5.2.5 Magnuson-Stevens Act and Essential Fish Habitat

NMFS is responsible for ensuring compliance with the Magnuson-Stevens Fishery Conservation and Management Act of 1975 (Magnuson-Stevens Act), as amended by the Sustainable Fisheries

Act of 1996, which established new requirements for evaluating and consulting on adverse effects to essential fish habitat (EFH). Under Section 305(b)(4) of the Magnuson-Stevens Act, Bonneville is required to consult with NMFS for actions that adversely affect EFH; in turn, NMFS is required to provide EFH conservation and enhancement recommendations. EFH exists within the LCRE for Pacific Coast salmon, groundfish, and coastal pelagic species.

As discussed in Section 3.2 of the 2025 NMFS Biological Opinion, the Proposed Action has negligible, if any, effects on the major components of EFH. The net pens where hatchery fish are released have been in operation for years and are located in tidal, off-channel backwater areas of the Lower Columbia River. The amount of EFH habitat affected by the placement of net pens is insignificant. Nearshore habitat is not affected as the net pens are in deeper waters and secured by existing piling structures. The proposed hatchery programs include designs to minimize each of these effects.

The PFMC (2003) recognized concerns regarding the "genetic and ecological interactions of hatchery and wild fish . . . [which have] been identified as risk factors for wild populations." SAFE Program fish returning to the Lower Columbia River are expected to be caught at side stream/terminal fisheries and not spawn naturally. SAFE coho salmon are more likely to stray and spawn naturally than SAFE spring Chinook salmon due to their life history differences. The areas where SAFE Program fish are likely to spawn near the SAFE terminal areas are not the core populations needed for recovery of the ESUs and thus, not consequential to salmon recovery.

5.2.6 Migratory Bird Treaty Act and Executive Order 13186

The Migratory Bird Treaty Act (MBTA), 16 U.S.C. § 703 *et seq*., implements various treaties and conventions between the U.S. and other countries, including Canada, Japan, Mexico, and Russia, for the protection of migratory birds. Under the MBTA, taking, killing, or possessing migratory birds, or their eggs or nests, is unlawful. The MBTA classifies most species of birds as migratory, except for upland and nonnative birds.

Executive Order 13186, issued in January 2001, directs each federal agency undertaking actions that may adversely impact migratory bird population to work with USFWS to develop an agreement to conserve those birds. The protocols developed by this consultation are intended to guide future agency regulatory actions and policy decisions; renewal of permits, contracts, or other agreements; and the creation of or revisions to land management plans. This Order also requires that the environmental analysis process include effects of federal actions on migratory birds. On August 26, 2013, USFWS and the U.S. Department of Energy signed a Memorandum of Understanding (MOU) to complement the Executive Order, which expired after five years and remains in the process of being renewed. This MOU addresses how Bonneville and USFWS work cooperatively to address migratory bird conservation.

Priority habitat for migratory birds in the LCRE includes freshwater and tidal marsh wetlands. None of the net pen sites or release sites occur near these areas with the nature of the work being non-disruptive (little to no noise). For these reasons, there would be no effect on migratory bird habitat.

5.3 Distribution and Availability

An electronic copy of this EA is available on the Bonneville website: *www.bpa.gov/nepa/SAFE* .

A printed copy of the EA is available on request from Bonneville's Public Affairs Department by calling the toll-free document request line at 1-800-622-4520.

6.0 References

Bischoff J. M., R. B. Raymond, K. U. Snyder, L. Heigh and S. K. Binder. 2000. Youngs Bay Watershed Assessment. E&S Environmental Chemistry Incorporated and Youngs Bay Watershed Council.

Bottom, D. L., K. K. Jones, C. A. Simenstad, C. L. Smith, and R. Cooper. 2011. Pathways to resilience. Oregon Sea Grant. Pathways to resilience: sustaining salmon ecosystems in a changing world (Vol. 11, No. 1). Oregon Sea Grant.

CEQ. 2023. National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change. January 9, 2023. https://www.federalregister.gov/documents/2023/01/09/2023-00158/national-environmental-policy-act-guidance-on-consideration-of-greenhouse-gas-emissions-and-climate. Accessed February 2023

Duff, C.D, G. Whisler, E. Ollerenshaw, S. Meshke, A. Dietrichs, A. Neys. 2013. Select Area Fishery Enhancement Project, 2010 – 2012 Report to BPA. Oregon Dept. Fish and Wildlife, Clackamas, OR. 96p.

Finch, D. M., Butler, J. L., Runyon, J. B., Fettig, C. J., Kilkenny, F. F., Jose, S., Frankel, S. J., Cushman, S.A., Cobb, R. C., Dukes, J. S., Hicke, J. A., Amelon, S. K. 2021. Effects of Climate Change on Invasive Species. In: Poland, T.M., Patel-Weynand, T., Finch, D.M., Miniat, C.F., Hayes, D.C., Lopez, V.M. (eds) Invasive Species in Forests and Rangelands of the United States. Springer, Cham. Pages 57-83. https://doi.org/10.1007/978-3-030-45367-1_4

Intergovernmental Panel on Climate Change (IPCC) 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.

Independent Science Advisory Board, Mantua, N.J. 2007. Climate Change Impacts on Columbia River Basin Fish and Wildlife. Independent Scientific Advisory Board (ISAB) Climate Change Report ISAB 2007-2, Portland, OR.

Kurath G. and J. Winton. 2011. Complex Dynamics at the Interface between Wild and Domestic Viruses of Finfish. Current Opinion in Virology. Vol. 1. Issue 1. Pg 73-80

Ledgerwood, R. D., E. M. Dawley, B. W. Peterson, R. N. Iwamoto. 1997. Estuarine recovery of PIT-tagged juvenile salmonids from the Lower Granite Dam transportation study, 1996. Report to the U.S. Army Corps of Engineers, Contract E8960100, 54 pgs. plus appendice p.

McVicar A. H. 1997. Disease and Parasite Implications of the Coexistence of Wild and Cultured Salmon Populations. ICES Journal Marine Science., 54: 1093-1103

National Marine Fisheries Service (NMFS). 2000. Biological Opinion. Reinitiation of Consultation on Operation of the Federal Columbia River Power System, Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin.

National Marine Fisheries Service, Northwest Region, Seattle, WA.

National Marine Fisheries Service (NMFS). 2014. Final Environmental Impact Statement to Inform Columbia River Basin Hatchery Operations and the Funding of Mitchell Act Hatchery Programs. Seattle, WA. 2120 p. mitchell_act_hatcheries_feis_final.pdf (noaa.gov)

National Marine Fisheries Service (NMFS). 2014a. Endangered Species Act Section 7(a)(2) Biological Opinion, Section 7(a)(2) Not Likely to Adversely Affect Determination, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Consultation. Sandy River Spring Chinook Salmon, Coho Salmon, Winter Steelhead, and Summer Steelhead Hatchery Programs. August 7, 2014. NMFS Consultation No:. WCR-2014-300. 200p.

National Marine Fisheries Service (NMFS). 2014b. Endangered Species Act Section 7(a)(2) Supplemental Biological Opinion. Consultation in Remand for Operation of the Federal Columbia River Power System. January 17, 2014. NMFS Consultation No.: NWR-2013-9562. 610p.

National Marine Fisheries Service (NMFS). 2017a. Final Environmental Impact Statement. Final Environmental Impact Statement to Analyze Impacts of NOAA's National Marine Fisheries Service joining as a signatory to a new U.S. v. Oregon Management Agreement for the Years 2018-2027. West Coast Region, Lacey, WA.

National Marine Fisheries Service (NMFS). 2017b. Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Consultation. NOAA's National Marine Fisheries Service's implementation of the Mitchell Act Final Environmental Impact Statement preferred alternative and administration of Mitchell Act hatchery funding. January 15, 2017. NMFS Consultation No.: WCR-2014-697. 535p.

National Marine Fisheries Service (NMFS). 2018a. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response Consultation on effects of the 2018-2027 U.S. v. Oregon Management Agreement. NMFS Consultation Number: WCR-2017-7164 NMFS. 2018b. US v Oregon Management Agreement 2018-2027.

National Marine Fisheries Service (NMFS). 2019. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Consultation. Evaluation of Hatchery Programs for Spring Chinook Salmon, Summer Steelhead, and Rainbow Trout in the Upper Willamette River Basin. NMFS Consultation Number: WCR-2018-9781

National Marine Fisheries Service (NMFS). 2021. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Consultation. Select Area Fisheries Enhancement (SAFE) Spring Chinook Salmon and Coho Salmon Programs. NMFS Consultation Number: WCRO-2020-02145.

National Marine Fisheries Service (NMFS). 2025. Endangered Species Act (ESA) Section 7(a)(2) Reinitiated Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Consultation. Select Area Fisheries Enhancement (SAFE) Spring Chinook Salmon and Coho Salmon Programs. NMFS Consultation Number: WCRO-2025-00274.

North American Invasive Species Management Association (NAISMA). 2021. Climate Change and Invasive Species. (https://www.nisaw.org/climatechange/#:~:text=Research%20has%20shown%20that%20under,trees%20and%20more%20abundant%20pests). Accessed October 12, 2022.

Northwest Power and Conservation Council (NPCC). 1992a. Columbia River Basin Fish and Wildlife Program, Strategy for Salmon, Volume I. Report 92-21. Portland, OR. 43p. https://www.nwcouncil.org/sites/default/files/Volume1.pdf

NPCC. 1992b. Columbia River Basin Fish and Wildlife Program, Strategy for Salmon, Volume II. Portland, OR. 98p. https://www.nwcouncil.org/fish-and-wildlife/previous-programs/columbia-river-basin-fish-and-wildlife-programstrategy-for-salmon

ODFW & WDFW. 2022. Joint Staff Report: Stock Status and Fisheries for Spring Chinook, Summer Chinook, Sockeye, Steelhead, and other Species. Joint Columbia River Management Staff. Analyses. ODFW Columbia River Joint Staff Reports (state.or.us)

ODFW & WDFW. 2021 Joint Staff Report: Stock Status and Fisheries for Fall Chinook Salmon, Coho Salmon, Chum Salmon, Summer Steelhead, and White Sturgeon. Joint Columbia River Management Staff. Analyses. ODFW Columbia River Joint Staff Reports (state.or.us)

Pacific Fishery Management Council (PFMC). 2016. Review of 2015 Ocean Salmon Fisheries: Stock Assessment and Fishery Evaluation Document for the Pacific Coast Salmon Fishery Management Plan. (Document prepared for the Council and its advisory entities). , Pacific Fishery Management Council, 7700 NE Ambassador Place, Suite 101, Portland, Oregon 97220-1384.

Pacific Fishery Management Council (PFMC). 1998a. Final Environmental Assessment/ Regulatory Review for Amendment 11 to the Pacific Coast Groundfish Fishery Management Plan. Pacific Fishery Management Council, Portland, Oregon. Accessed at: http://www.pcouncil.org/groundfish/gffmp/gfa11.html

Pacific Fishery Management Council (PFMC). 1998b. The Coastal Pelagic Species Fishery Management Plan: Amendment 8. Pacific Fishery Management Council, Portland, Oregon. Accessed at: http://www.pcouncil.org/cps/cpsfmp.html

Pacific Fishery Management Council (PFMC). 1999. Amendment 14 to the Pacific Coast Salmon Plan. Appendix A: Description and Identification of Essential Fish Habitat, Adverse Impacts and Recommended Conservation Measures for Salmon. Portland, Oregon. Accessed at: http://www.pcouncil.org/salmon/salfmp/a14.html

Pacific Salmon Commission Coded Wire Tag Workgroup. 2008. An action plan in response to Coded Wire Tag (CWT) Expert Panel Recommendations. Pacific Salmon Comm. Tech. Rep.

No. 25: 170 p.

Reno P. W. 2011. Factors Involves in the Dissemination of Disease in Fish Populations. Journal of Aquatic Animal Health. Vol 10: Issue 2, Pg 160-171

Roegner, G.C., L.A. Weitkamp, and D.J. Teel 2016. Comparative Use of Shallow and Deepwater Habitats by Juvenile Pacific Salmon in the Columbia River Estuary Prior to Ocean Entry, Marine and Coastal Fisheries, 8:1, 536-552, DOI: 10.1080/19425120.2016.1227889

Sewall J. E. and S. Gray. 2004. Select Area Fishery Evaluation Project Environmental Monitoring Report. Prepared for Bonneville Power Administration. Washington Department of Fish and Wildlife.

Simenstad C., K. L. Fresh and E. O. Salo. 1982. The Role of Puget Sound and Washington Coastal Estuaries in the Life History of Pacific Salmon: An Unappreciated Function. Estuarine Comparisons (pp. 343-364).

TRG (The Research Group). 2006. Select Area Fishery Evaluation Project, Economic Analysis Study, Final Report. Prepared for Bonneville Power Administration, Washington Department of Fish and Wildlife, and Oregon Department of Fish and Wildlife.

USGCRP. 2009. Global Climate Change Impacts in the United States, Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson, (eds.). Cambridge University Press, 2009. 196p.

EPA. 2022c. Learn about Greenhouse Gas Reporting Program (GHGRP). (https://www.epa.gov/ghgreporting/learn-about-greenhouse-gas-reporting-program-ghgrp).
Accessed September 21, 2022.

Washington State Department of Ecology (WDOE). 1998. Water Quality 303(D) List for 1998. Accessed at: http://www.ecy.wa.gov/programs/wq/wqhome.html

Washington Dept. Fish and Wildlife (WDFW). 2014. Draft Deep River Net Pen (SAFE) Coho Isolated/Segregated, Coho Hatchery Program HGMP. Ridgefield, Washington, 79p. https://www.dfw.state.or.us/fish/HGMP/docs/2006/06-SAFE-Coho.pdf

Weitkamp, L., and K. Neely. 2002. Coho salmon (*Oncorhynchus kisutch*) ocean migration patterns: insight from marine coded-wire tag recoveries. Canadian Bulletin of Fisheries and Aquatic Sciences 59(7):1100–1115

Appendix A: Juvenile Release

Releases of Hatchery Fish

Hatchery fish have been released from net pen sites within the Select Area Fisheries boundaries for decades. Current and past operations (2010-2019) are expressed in the following tables. Releases of spring Chinook in all Select Area Sites combined ranged between 1.5 and 3.7 million smolts during 2012–2021 (brood years 2010–2019) averaging 2,777,000 smolts released per year while releases of coho range from 3.3 to 5.1 million smolts during 2012–2021 (brood years 2010–2019) averaging 4.1 million smolts released per year).

These numbers have steadily been increasing during the expansion phase of the SAFE Program and with the onset of new Columbia River fishery management reform policies. The Proposed Action would entail the maximum production of fish under the SAFE Program although, due to the variability of juvenile releases from the various sites, this number may be slightly over or under exceeded. Due to annual variations in broodstock collection, and egg/juvenile and transport/rearing survival, actual releases could be 95 percent to 105 percent of the program goal.

Table 9: SAFE Spring Chinook Smolt Releases (2010-2017)[15]

CHS Brood Year	Klaskanine Hatchery	Youngs Bay Net Pens	Blind Slough Net Pens	Gnat Creek Hatchery	Tongue Point Net Pens	Total
2010	—	612,330	258,923	—	253,002	1,529,255
2011	—	601,862	326,490	99,190	481,617	1,829,159
2012	—	631,337	370,858	150,834	493,595	1,646,624
2013	—	560,520	437,583	142,959	465,420	1,606,482
2014	275,973	627,857	128,700	380,848	437,585	1,850,963
2015	—	910,343	116,114	379,653	399,621	1,805,731
2016	—	1,159,890	129,830	385,563	459,832	2,135,115
2017	117,495	968,404	130,489	646,836	419,608	2,452,832

15 Source: 2022 Joint Staff Report: Stock Status for Spring Chinook, Summer Chinook, Sockeye, Steelhead, and other Species. Joint Columbia River Management Staff. ODFW & WDFW

2018	235,655	1,264,888	310,114	585,258	409,815	3,067,730
2019	493,518	1,331,398	411,810	630,665	375,927	3,736,384
AVERAGE	280,660	1,048,137	245,278	560,902	410,734	2,776,977

The objective for the proposed 4.2 million spring Chinook smolts would be to produce about 32,000 adult spring Chinook salmon that will return for harvest in ocean/Columbia River/Select Area Commercial fisheries. However, given the variability of recent returns (2010-2019 BY) it is reasonable to assume that an average of 15,500 adult fish would return for harvest under the maximum production scenario. This assumes an average, non-derived SAR ratio of 0.36 percent, which is a reasonable assumption as the average annual SAR survival. SAR rates for Youngs Bay net pens, Blind Slough nets pens, and Tongue Point net pens are 0.74 percent, 0.51 percent, and 0.45 percent, respectively.[16]

Table 10: SAFE Coho Smolt Releases (2010-2017)

COH Brood Year	S Fork Klask-anine Hatchery (CCF)	Klask-anine Hatchery	Youngs Bay Net Pens	Blind Slough Net Pens	Tongue Point Net Pens	Deep River[17] Net Pens	Total
2010	390,610	489,060	757,474	372,265	491,330	800,000	3,300,739
2011	386,668	607,824	769,971	586,277	849,381	600,000	3,800,121
2012	336,856	732,994	774,533	623,649	928,589	725,000	4,121,621
2013	260,289	903,119	684,309	569,921	935,023	654,000	4,006,661
2014	209,923	1,552,458	766,193	574,243	842,341	920,000	4,865,158
2015	209,745	1,487,362	550,062	349,156	747,057	855,000	4,198,382
2016	487,415	1,688,946	761,511	509,235	922,456	723,000	5,092,563
2017	384,452	1,317,407	631,898	426,637	424,659	700,000	3,885,053

16 Source: SAFE Spring Chinook HGMP 2021

17 Up to 400,000 coho smolts produced and released at Deep River are subject to Bonneville funding, the rest are funded by the Mitchell Act.

2018	333,094	1,407,597	717,121	350,934	620,979	706,000	4,135,725
2019	436,803	1,425,603	745,478	367,768	646,199	176,000	3,797,851
AVERAGE	343,586	1,161,237	715,855	473,009	740,801	685,900	4,197,892

The objective for the 4.3 million smolts would be to produce about 86,000 adult coho, given a 2 percent SAR, that would return to the Columbia River for harvest in SAFE coho salmon commercial fisheries. However, given the variability of recent returns, it is reasonable to assume an average, non-derived SAR ratio of 1.5 percent. Survival averages for individual sites are: Klaskanine Hatchery (1.49 percent), South Fork Klaskanine Hatchery (1.13 percent), Youngs Bay net pens (1.78 percent), Tongue Point net pens (1.93 percent), and Blind Slough nets pens (1.07 percent).

Appendix B: Adult Returns

Adult Returns – Commercial Fisheries

SAFE spring Chinook commercial fisheries occur in winter, spring and summer at each of the Select Area Sites, with fishing efforts separated temporally from other hatchery programs (fall Chinook, coho, and chum salmon). Spring Chinook primarily enter freshwater during February through June to spawn in Columbia River tributaries during August through October. An average of 9,400 spring Chinook are harvested at all the Select Area Sites with a majority caught at the Youngs Bay Select Area Fishery. The amount of returning adults is extremely variable, therefore a 10-year average is used to characterize the status quo spring Chinook harvest conditions for this analysis.

Table 11: Winter/Spring/Summer Spring Chinook Commercial Harvest at Select Area Sites (2011-2020)[18]

YEAR	Youngs Bay	Blind Slough	Tongue Point	Deep River	TOTAL
2011	8,751	1,611	656	100	11,118
2012	8,588	961	503	44	10,096
2013	6,648	936	374	124	8,082
2014	4,034	467	72	65	4,638
2015	9,120	3,117	1,262	204	13,703
2016	6,694	2,617	1,106	79	10,496
2017	10,799	3,261	3,517	21	17,598
2018	6,933	2,164	1,884	0	10,981
2019	2,123	500	545	0	3,168
2020	3,113	615	459	0	4,187
AVERAGE	6,680	1,625	1,038	64	9,407

18 Source: Table 30 from 2022 ODFW&WDFW Joint Staff Report: Stock Status and Fisheries for Spring Chinook, Summer Chinook, Sockeye, Steelhead, and other Species. Joint Columbia River Management Staff. Analyses. ODFW Columbia River Joint Staff Reports (state.or.us)

SAR rates to hatcheries for SAFE released spring Chinook fish ranged from 0.04 to 0.08 percent, whereas returns to hatcheries for river-released fish ranged from 0.08 to 0.43 percent. (Spring Chinook 2021 HGMP). SAR rates for coho seem to be more variable; for BYs 1992 to 2014, the average SAR for CWT groups was 1.57 percent, with 2 percent exceeded in 6 out of 23 brood years, and less than 1 percent in 7 out of 23 years (2021 SAFE Coho Salmon HGMP).

SAFE coho commercial fisheries occur in fall (September and October), with fishing effort concentrated prior to the presence of most wild chum and Coho that may return to the local tributary streams. Coho adults are typically age-3 fish, returning to freshwater after only one year in the ocean. Coho adults enter the Columbia River from mid-August to early October, with peak entry occurring in early September to be harvested at a very high rate (96 percent; FY 2003-2010). More than four times as many Coho (45,079 fish) are harvested commercially than spring Chinook (9,407 fish), establishing the status quo coho harvest conditions.

Table 12: Coho Commercial Harvest at Select Area Sites (2011-2020)[19]

YEAR	Youngs Bay	Blind Slough	Tongue Point	Deep River	TOTAL
2011	26,538	1,388	6,504	15,083	49,513
2012	5,986	1,534	3,902	3,932	15,354
2013	14,254	3,882	14,165	10,002	42,303
2014	65,936	24,620	50,752	27,262	168,570
2015	11,500	1,700	9,721	4,524	27,445
2016	15,784	1,493	11,284	6,162	34,723
2017	13,603	2,460	12,534	9,382	37,979
2018	4,229	1,477	3,682	2,723	12,111
2019	3,589	7,269	7,229	1,204	19,291
2020	19,783	10,424	10,903	2,390	43,500
AVERAGE	18,120	5,625	13,068	8,266	45,079

19 Source: Table 24 from 2021 ODFW&WDFW Joint Staff Report: Stock Status and Fisheries for Fall Chinook Salmon, Coho salmon, chum salmon, summer steelhead and White sturgeon. Joint Columbia River Management Staff. ODFW Columbia River Joint Staff Reports (state.or.us)

Adult Returns – Recreational Fisheries

Recreational fishing has occurred in the Select Areas and associated tributaries since 1998. Under permanent regulations, Youngs Bay, Blind Slough, and Deep River areas are open all year for retention of Chinook and adipose fin-clipped coho with a daily bag limit of two adult salmonids. Retention is limited to hatchery fish (defined in permanent regulations) for coho and steelhead year-round and for Chinook during January 1 through July 31.

In terms of harvest numbers, nearly the opposite trend is observed for recreational fisheries. Spring Chinook are harvested at a higher rate than coho, with an average annual catch rate of 847 spring Chinook to 298 coho). Spring Chinook salmon are preferred by recreational fishermen and are highly prized for being the best eating of all salmon as well as being much bigger. Spring Chinook average 12-17 pounds while coho average 8-10 pounds before dressing.

Table 13: Spring Chinook and Coho Recreational Harvest in Select Areas (2011-2020)[20]

YEAR	Spring Chinook HARVEST	Coho HARVEST
2011	418	208
2012	646	96
2013	341	181
2014	315	971
2015	2,507	641
2016	1,315	115
2017	1,781	162
2018	682	169
2019	172	135
2020	289	NA
AVERAGE	847	298

20 Source: Table 24 & 30 from 2022 ODFW&WDFW Joint Staff Report: Stock Status and Fisheries for Spring Chinook, Summer Chinook, Sockeye, Steelhead, and other Species. Joint Columbia River Management Staff.

Recreational harvest is estimated from catch record cards which are turned in voluntarily by anglers. Reported catch is expanded by a reporting rate to come up with an estimate of total recreational harvest.

Harvest levels will vary dramatically from year to year. Ocean and in-stream harvest management regimes are set by many overlapping jurisdictions that respond to international and national treaties, as well as biological conservation concerns. The 2011-2020 averages are used in this analysis to encompass how adult returns benefit economies through commercial and recreational fisheries.

Appendix C: Economic Analysis

Introduction

This economic analysis quantifies the personal income generated from commercial and recreational fishing activities that target SAFE Program fish harvested in the four Select Area Fisheries. These fisheries are adjacent to SAFE net pen sites located in Youngs Bay, Tongue Point, Blind Slough, and Deep River.

SAFE juvenile production and subsequent adult harvest fluctuate annually, with species mix varying between years. For the cost analysis, calendar year 2011-2020 release counts were used, along with a range of Stock-Specific Adult Return (SAR) rates associated with 1990 broodstocks. Since the "salt" years vary among species to be between one and five years, there is a disconnect between the adopted brood years and the cost estimation years. This approach provides a recent approximation of income levels at both current and maximum production. This methodology was previously employed by TRG in 2006.

SAFE commercial and recreational fisheries contribute to personal income and job creation by exporting goods and services to external economies. This influx of money into businesses within the Lower Columbia River (LCR) region supports wage payments and other compensation, which are then re-spent regionally, generating a multiplier effect. This is quantified by applying a personal income factor to calculated gross revenue. Similarly, non-local recreational anglers (those residing outside the immediate area) spend money on guide services, lodging, and other goods and services, thereby generating income for local communities.

To provide a comparative assessment of annual personal income from commercial harvests, several scenarios have been calculated: a no-fund scenario, a current production scenario, and a maximum production scenario. The no-fund scenario, representing the no-fund Bonneville decision, would approximately halve smolt production, as supported by an independent economic analysis. The current scenario is based on average SAFE Program juvenile production numbers over the last 10 years (2012-2021). The maximum production scenario assumes the release of up to 4.25 million spring Chinook salmon smolts and up to 4.3 million coho salmon smolts annually, as detailed in the three HGMPs by ODFW, ODFW, and WDFW.

For annual SAFE recreational harvests, only the current scenario has been calculated. Changes in recreational harvest are influenced by numerous variables beyond just fish production and adult survival rates. For instance, success rates (catch) have varied significantly due to oceanic conditions, management restrictions (e.g., bag limits, seasonal openings, weekend closures), and angler motivations (e.g., weather, perceived abundances). Consequently, it is challenging to accurately extrapolate changes in recreational harvest for either the no-fund or maximum

production scenarios. The amount of personal income and jobs from recreational harvest is likely to remain similar across all three scenarios because SAFE spring Chinook and coho salmon stocks constitute only a minor portion of the total recreational fishing abundance, and various substitute species are available. While the number of spring Chinook salmon may fluctuate, it is reasonable to assume that the number of sport trips and outings (used to calculate personal income) will remain relatively constant.

Commercial Income

Ex-vessel value serves as a minimum indicator of economic value, as it only reflects direct payments to fishermen and does not capture the broader multiplier effect of money circulating within the community. The ex-vessel prices for commercial salmon caught in the LCRE vary considerably by species (e.g., Chinook vs. coho salmon), race (e.g., spring vs. fall), and stock (e.g., tules vs. brights). Generally, spring Chinook salmon command a much higher commercial value per pound and average weight compared to other salmon species/stocks (Table 14).

Table 14: Ex-Vessel Prices per Pound and dressed weights per Spring Chinook and Coho landed in Oregon

	Average Value per Pound.[21]			**Average Dressed Weight[22]**	
	Spring Chinook	Coho		Spring Chinook	Coho
2011	6.12	1.99		12.5	5.6
2012	6.88	1.90		10.1	6.1
2013	7.50	2.14		11.5	5.9
2014	6.14	1.33		12.4	6.1
2015	6.52	1.72		11.4	5.1
2016	7.93	2.06		12.3	-

21 Pacific Fishery Management Council 2022 Stock Assessment and Fishery Evaluation (SAFE) Report, Tables IV-8 and IV-9. Available at: Salmon management documents - Pacific Fishery Management Council (pcouncil.org)

22 Pacific Fishery Management Council 2022 (Review of 2021 Ocean Salmon Fisheries, Tables D-2 and D-3). Available at: Salmon management documents - Pacific Fishery Management Council (pcouncil.org)

2017	8.22	2.23		12.1	6.0
2018	11.17	2.11		11.8	6.6
2019	11.96	1.79		10.8	4.7
2020	7.45	1.72		14.1	5.8
AVERAGE	$7.99	$1.90		11.9	5.8

To estimate the annual ex-vessel value of SAFE commercial fisheries under the no-fund, current, and maximum production scenarios, the average value per pound was multiplied by the average weight of dressed fish over the same period. This calculation yields the average value per fish ($95.00 per spring Chinook and $11.38 per coho) (See Table 14).

This value can then be multiplied by the average number of fish commercially caught per year to derive This value can then be multiplied by the average number of fish commercially caught per year to derive the average annual commercial harvest value (known as the ex-vessel value, which is the price received for the product "at the dock") of salmon caught from Select Area Fisheries under each of the three scenarios, with juvenile production as the independent variable. For commercial fishermen, this ex-vessel value provides a measure of current gross economic value. This value was then converted to personal income by multiplying the ex-vessel value by a personal income factor of $1.76[23]. This converted value represents the personal income gained on an average annual basis for each of the three scenarios (see Table 15, 16 & 17).

Table 15: No Fund Commercial Harvest Scenario

	Juvenile Production	**SAR**	**Adult Returns**	**Average Value Per Fish**	**Ex-Vessel Value**	**Personal Income Factor**	**Personal Income**
Spring Chinook	2,125,000	0.38%	8,075	$95.00	$767,156	$1.76	$1,350,140
Coho	2,150,000	1.50%	32,250	$11.38	$367,000	$1.76	$645,920

23 Source for Personal Income Factor: Average of State-level income impact coefficients for Oregon and Washington Columbia River commercial salmon harvests estimated by IO-Pac (See: PFMC 2016 Salmon Review computational file tab 'Factors adjusted to 2021 dollars using USDC BEA GDP implicit price deflator.

						Total Value	$1,996,060

Table 16: Current Commercial Harvest Personal Income

	Average Juvenile Production	**Average Adult Returns**	**Average Value Per Fish**	**Ex-Vessel Value**	**Personal Income Factor**	**Personal Income**
Spring Chinook	2,776,977	9,407	$95.00	$893,665	$1.76	$1,572,850
Coho	4,197,892	45,079	$11.38	$512,999	$1.76	$902,878
Total Value						$2,475,728

Maximum production values, at 4.25 million spring Chinook salmon smolts and up to 4.3 million coho salmon smolts annually, were used to calculate the total personal income under the maximum production scenario using the exact same methodology (see Table 18).

Table 17: Maximum Production Commercial Harvest Personal Income

	Juvenile Production	**SAR**	**Calculated Adult Returns**	**Average Value Per Fish**	**Ex-Vessel Value**	**Personal Income Factor**	**Personal Income**
Spring Chinook	4,250,000	0.38%	16,150	$95.00	$1,534,250	$1.76	$2,700,280
Coho	4,300,000	1.50%	64,500	$11.38	$734,010	$1.76	$1,291,857
Total Value							$3,992,137

Environmental variables, such as ocean conditions and estuary smolt predation, significantly affect SAR. SAR rates to hatcheries for SAFE-released spring Chinook fish ranged from 0.04

percent to 0.08 percent, whereas returns to hatcheries for river-released fish ranged from 0.08 percent to 0.43 percent (Spring Chinook 2021 HGMP). SAR rates for coho appear more variable. For Brood Years (BYs) 1992 to 2014, the average coho SAR for CWT groups was 1.57 percent, with two percent exceeded in six out of 23 brood years, and less than 1 percent in seven out of 23 years.

Recreational Income

Recreational anglers harvesting SAFE salmon spend money on guide services, lodging, and other goods and services (e.g., bait, tackle, guide fees, fuel, boat-related expenses, travel expenses). These expenditures generate household income and employment across various sectors of the regional economy. The average cost per sport angler trip (chartered or private) out of Clatsop County/Astoria was approximated at $149.08. Once SAFE recreational catch was converted to sport angler trips, this value was multiplied by the average cost per trip to estimate total trip-related expenditures for spring Chinook and coho in 2020 dollars. This regional transfer of money supports payments for labor, goods, and services provided by the local economy (See Table 18).

Table 18: Total income from SAFE Recreational Harvest

	Average Annual Harvest	Average Catch per Sport Trip[24]	No# Sport Trips	Average Cost Per Trip[25]	Average Annual Value
Spring Chinook	847	0.14	6050	$149.08	$901,934
Coho	298	0.35	851	$149.08	$126,867
Total Income					$1,028,881

Employment

To estimate the total (direct, indirect, and induced) personal income generated by the estimated commercial and recreational catch from the proposed action, personal income impact factors for

24 Average catch per trip for Oregon: compiled from 2010-2020 salmon landing and effort values from the 2021 SAFE Report, Tables IV-10 pg 123

25 Average cost of Clatsop County trip, from Mitchel Act EIS: Table A-5 Expenditures per sport trip (2009) adjusted to 2020 dollars using USDC BEA gross domestic implicit (GDP) price index.

Chinook and coho were applied to the converted catch (i.e., ex-vessel revenue from commercial landings and numbers of sport trips). A personal income factor of $1.76[26] was used, per ex-vessel dollar of commercially landed salmon and a recreational value of $149.08 per sport trip. These values aim to capture the multiplier effect of money being re-spent regionally.

To estimate comparative employment levels supported by each scenario, personal income from commercial harvest is summed with total income from recreational harvest. This combined value represents personal income accruing to households in the local area from the harvest of SAFE Program fish. This value is then divided by the earnings per job value for Clatsop County ($53,230) to determine the number of jobs supported by each scenario (Table 19). The same earnings per job value was applied to an estimate of the total gillnet industry for relative comparisons.

Table 19: Comparative Total Income and Employment from the SAFE Program

	Commercial Income	Recreational Income	Total	No# Jobs Supported
No Fund Scenario	$1,996,060	$1,028,881	$3,024,941	57
Current Scenario	$2,475,728	$1,028,881	$3,504,609	66
Maximum Program Scenario	$3,992,137	$1,028,881	$5,021,018	93
Total Gillnet Industry[27]			$12,000,000	225

26 Source for personal income factor: Average of state-level income impact coefficients for Oregon and Washington

27 Total estimated local (Clatsop and Pacific counties) economic contribution made by gillnet permittees is $12.0 million in personal income (TRG 2006),

Appendix D: Public Comments

Comments Received

This appendix presents comments received on the Draft EA and Bonneville's response to each comment. To solicit comments on the Draft EA, a notice of its availability was emailed or mailed to potentially interested and affected persons, agencies, Tribes, or organizations. The comment period ran from September 25th through October 25th, 2024. A total of four comments were submitted via letter, online comment form, and email from the general public and interested parties or agencies. Each submitted comment was given an identifying number that corresponds to the order in which the submittal was received and was logged in the official Bonneville comment file. Four comments were also received during the public scoping process which ran from January 2nd through February 2nd, 2024 and are included here along with responses. Comments were broken out and numbered consecutively with a unique project identifier, SAFE242400X, as they were received below (Table 20). Comment letter numbers and the associated author are shown below. Breaks in the number sequence resulted from comment letters subsequently deleted because they were submitted in error or determined to be SPAM. Responses to the Draft EA comments are in Table 21 and scoping comment responses are in Table 22.

Table 20: Public Comments Received

Comment No.	Name	Organization	Full Comment Text
SAFE24240001	Lytle	Private Citizen	I write to respectfully urge you to take immediate action to support the breaching of the four lower Snake River dams this November. This is a crucial step to save the wild salmon and the Southern Resident Killer Whales (SRKW), both of which are critically endangered and running out of time. Thanks to the current administration's efforts, we are closer than ever to a solution. NOAA's recent findings make it clear that breaching these dams is the only way to prevent the extinction of the wild Chinook salmon and the Southern Resident Killer Whales that depend on them. With only 73 Southern Resident Killer Whales remaining, the situation is dire. The Army Corps of Engineers and the US President have the authority to proceed with breaching the dams. I urge you to support and advocate for the immediate drawdown of

			the Lower Granite Dam reservoir in November, followed by the removal of the earthen berm in December. The Corps has been prepared for this since 2002 - it is time to act. The Biden administration's recent report acknowledging the ongoing harm these dams have caused to Tribal communities reinforces the urgency of this action. We cannot afford further delay. The endangered wild Chinook salmon and Southern Resident Killer Whales are running out of time. When they're extinct, hope is lost; when endangered, hope remains.

			Clatsop County in Oregon; Wahkiakum, Pacific and Grays Harbor County in Washington. In 2020, Pacific County's per capita personal income· was $43,749, according to the U.S. Census. The national average was $59,510 and the Washington State average was $67,126. Similarly, Clatsop County, Oregon, had a per capita income at that time of $48,777, while Wahkiakum County had $47,027. Grays Harbor County per capita income according to the 2020 census data was $43,710. The economic value and contribution of the SAFE area fisheries thus assist in supporting counties where lower incomes are present as well as significant negative social and community health statistics. We also point out on p. 45 that there appears to be some misunderstanding of fishing businesses. A Columbia River fishing business depends on a Columbia River gillnet permit plus a portfolio of other permits, including Oregon and Washington shrimp, crab, razor clam, and troll permits, and numerous Alaska permits. The income from these other endeavors returns to the Columbia River region, an area with significant poverty issues. The fishery, rather than being "part -time" as suggested in the document, is seasonal, and depends upon which fish are available in any given season. The business itself relies on a variety of opportunities when fish of various species may be accessed, and will shift among different locations, dependent upon species and fisheries available. There may be a fishing season going on elsewhere such as a salmon fishery in Bristol Bay, which some will choose to follow while others may decide to stay in a Select Area fishery. Neither business is "part-time" but may take place in different locations when the opportunity presents itself. On page 48, Variations in rainfall intensity. We point out that the SAFE areas are largely fed by rain-driven streams found in the coastal area, with snowpack being more of a concern for glacier-fed streams.

			Current research indicates that rainfall along the coast is expected to increase as climate change occurs, although summers may be drier. Given the location of the SAFE areas, climate change may affect them less than in other locales. We also point out that chum salmon are unlikely to be in as difficult a situation as other species. They generally arrive as adults in late October and November after the fall rains have begun. Once hatched, they do not remain long in their natal streams but travel to the estuary, where they feed before going to the ocean. They are generally gone by June or before, so their in-river lives do not occur when the water is likely to be shallow and warm. On page 49, top paragraph, we commend the comment regarding the dilution factor in reducing overharvest on listed stocks. This is often overlooked, but is a fact that needs to be taken note of. On page 50, we point out that dredging is also both a past and current action that has contributed to environmental conditions in the estuary and upriver. However, due to the location of the SAFE areas and their proximity to the river's mouth, we do not expect this activity will have any particular effect on SAFE area salmonids. On page 51, the comments regarding hatcheries and potential changes in climate, hydro and fisheries are a reasonable summary and recognition that these are issues that must be addressed. We point out that hatchery technology, as well as other technologies, is dynamic and constantly evolving, and suggest that we leave the door open for possible future developments that show promise for improving fish survival. One example is the Whoosh technology for improving fish passage, and certainly there are numerous examples of improvements in hatchery practices. The SAFE areas themselves could be considered as a hedge against climate change, given their locale and water sources, as described above.

			Again, we find no major flaws in the document and bring up the points above as suggestions for improving the document. If there are any questions regarding points in the document, please contact us at 503-325-2725. Thank you. Sincerely, James Wells, President
SAFE24240004	Charles Pace	Private Citizen	The assessment of water quality impacts is deficient. The estuary extends from the BON tailrace to the ocean. To dismiss water quality impacts because they are not significant for the "basin" is disingenuous. As a result the decision to prepare an EA rather than an EIS cannot be defended. BPA needs to do a serious, in depth analysis of water quality impacts that addresses and mitigates on site contamination.
SAFE24240005	USEPA	Andrew Baca	U.S. EPA NEPA comments on SAFE Program Draft EA. The U.S. Environmental Protection Agency has reviewed the Bonneville Power Administration's September 2024 Draft Environmental Assessment for the proposed Select Area Fisheries Enhancement (SAFE) Program (EPA Project Number 24-0059-BPA). The EPA has conducted its review pursuant to the National Environmental Policy Act and our review authority under Section 309 of the Clean Air Act. The CAA Section 309 role is unique to the EPA and requires the EPA to review and comment publicly on any proposed federal action subject to NEPA's environmental impact statement requirement. The DEA evaluates potential environmental impacts from financing three hatchery programs including acclimation, transport, and release of juvenile salmon (spring Chinook and coho smolts). The fish are collected and reared at various hatchery facilities in the Lower Columbia River and its tributaries and are acclimated and released from SAFE hatchery and net pen sites (SAFE Facilities) in off-channel areas in the Lower Columbia River estuary. Eventually, the fish

			return to the off-channel areas for commercial and recreational harvest. The EPA has concerns about potential impacts from project activities to several resource areas, including water quality and biological resources. Additional analysis may be required to better assess and quantify these impacts and design appropriate mitigation measures to minimize them. The enclosed Detailed Comments provide greater detail of these and other concerns, as well as recommendations for the Final EA. Thank you for the opportunity to review the DEA for this project. If you have questions about this review, please contact Ariana Monroy of my staff at 206-553-2120 and monroy.ariana@epa.gov, or me at 206-553-6387 and baca.andrew@epa.gov. Water Quality Clean Water Act (CWA) § 402 The DEA explains that two of the net pen sites, Youngs Bay, OR and Deep River, WA, currently have National Pollutant Discharge Elimination System (NPDES) permit coverage. The EPA recommends that the FEA clarify current and proposed production levels (lbs/year) and feed levels (lbs/month during month of maximum feeding) at each net pen site and clarify NPDES permitting requirements associated with the updated production/feed levels. For example, clarify if, after maximizing hatchery production, net pen sites at Steamboat Slough, WA and Blind Slough, OR will still operate below the Concentrated Aquatic Animal Production (CAAP) facility threshold of 20,000 lbs/year of fish production or 5,000 pounds of feed during the month of maximum feeding. NPDES permit coverage may be required at facilities not currently covered, and permit updates may be needed for facilities with existing coverage (e.g., submit a notice of significant fish production increase). The DEA states that discharge of effluent from net pens can affect receiving water quality. For example, net pen

			effluent may contain elevated nutrients, such as nitrogen and phosphorus, that can lead to multiple impacts such as low dissolved oxygen, high pH, high ammonia, excess turbidity, algal growth, macroinvertebrate population changes, and other water quality issues. The EPA recommends the FEA describe Best Management Practices (BMPs) that will be implemented to minimize impacts to water quality, regardless of a net pen's NPDES permit coverage. Some BMP examples include: Ensure regular cleaning of net pens (no less frequently than 6-month intervals). Avoid use of biocidal chemicals to disinfect nets and discharging runoff or solids from upland cleaning of nets into Waters of the U.S (WOTUS). Ensure nets and anchoring structures do not impede flow or tidal exchange so as to contribute to the deposition of solids that would impair water quality standards. Avoid fueling, lubrication, and other general maintenance of boats or mechanical equipment at the net pen facility. Treat water used in rearing and holding units or hauling trucks that are disinfected with chlorine or other chemicals before being discharged into WOTUS. Establish spill response procedures and ensure necessary containment supplies are in place. Remove and dispose of fish and other animal mortalities in leak-proof containers at least once per week. Avoid releasing dead animals, fish, fish tissue, or fish products to WOTUS. Establish protocols that ensures excess fish feeding and accumulation of uneaten food below the net pens is avoided. Clean Water Act § 303(d)

			The EPA notes that most streams and rivers in the Lower Columbia River estuary exceed one or more of the CWA § 303(d) listings, so it is important to understand whether and how the SAFE program facilities may cause or contribute to existing water quality problems and whether any contribution would change under the action alternatives. The DEA concludes that the Proposed Action would have "no impact" relative to the surrounding estuary, because of "rapid" dilution of effluent in addition to maintaining rearing densities at "moderate levels" of 20,000-25,000 fish per net pen. The EPA recommends the FEA include additional information to support the water quality analysis. Specifically, we recommend the FEA: Include information on CWA § 303(d) impaired waters in the project area and any efforts related to Total Maximum Daily Loads (TMDLs). Describe existing restoration and enhancement efforts for impaired waters, how the proposed project will coordinate with on-going protection efforts, and any mitigation measures that will be implemented to avoid further degradation of impaired waters. Clarify the net pen fish density level used to evaluate potential water quality impacts. The DEA uses "moderate levels" defined as 20,000 - 25,000 fish per net pen. Clarify whether this is the current or target density. If current density, update the water quality analysis to reflect potential effects from the Proposed Action target density. Columbia River Basin Restoration The 2025 National Marine Fisheries Service (NMFS) Biological Opinion determined that the Proposed Action is likely to adversely affect several Endangered Species Act (ESA)-listed species and their critical habitat, including Lower Columbia River Chinook salmon, Lower Columbia River coho salmon, Lower Columbia River steelhead, Columbia River chum salmon, Upper Willamette River Spring Chinook salmon, and Snake River Spring/Summer Chinook

			salmon. A formal Incidental Take Statement was issued in 2025. The Columbia Basin Restoration Initiative is an agreement between Pacific Northwest Tribes and States to restore wild fish populations. This agreement follows the 2023 Memorandum on Restoring Healthy and Abundant Salmon, Steelhead, and Other Native Fish Populations in the Columbia River Basin, that directs Federal agencies to prioritize the restoration of healthy and abundant salmon, steelhead, and other native fish populations in the Columbia River Basin. Furthermore, the 2023 Memorandum states that "BPA will invest $300 million over 10 years to restore native fish and their habitats throughout the Columbia River Basin, with added measures to increase the autonomy of States and Tribes to use these funds." The success of restoration efforts depends, in part, on larger- scale decisions that can impact ocean conditions, critical habitat, and wild ESA-listed populations. As such, the EPA recommends the FEA discuss potential impacts to water quality and ecological integrity that could make it more difficult to achieve recovery goals for the Columbia River Basin. The DEA explains that BPA must fund fish and wildlife mitigation "in a manner consistent with" the Northwest Power and Conservation Council's (Council's) program under the Northwest Power Act, citing the Council's "1993 Strategy for Salmon." In the FEA, discuss how the Proposed Action aligns with current restoration plans in 2024. Furthermore, discuss alignment of the Proposed Action with the federal-state "10-year fish plan" that is part of the Columbia Basin Restoration Initiative. Agency Coordination In determining impacts to ESA-listed species, the EPA recommends working closely with NMFS and the U.S. Fish and Wildlife Service. To effectively address special status species, the EPA recommends the FEA:

			Identify and quantify which species and/or critical habitat might be directly, indirectly, or cumulatively affected by each alternative. Discuss mitigation measures to minimize impacts to special status species and indicate how they will be implemented and enforced. Environmental Justice (EJ) Executive Order 12898 Federal Actions to Address Environmental justice in Minority Populations and Low-Income Populations, February 11, 1994 was supplemented by Executive Order 14096, Revitalizing Our Nation's Commitment to Environmental Justice for All, April 26, 2023 which directs federal agencies, as appropriate and consistent with applicable law: to identify, analyze, and address disproportionate and adverse human health and environmental effects (including risks) and hazards of Federal activities, including those related to climate change and cumulative impacts of environmental and other burdens on communities with environmental justice concerns. Section 3 (b)(i) of EO 14096 also directs the EPA to assess whether each agency analyzes and avoids or mitigates disproportionate human health and environmental effects on communities with environmental justice concerns when carrying out responsibilities under Section 309 of the Clean Air Act, 42 U.S.C. 7609. The DEA concludes the Proposed Action has "no impact" on EJ concerns. The EPA notes that EJScreen, the EPA's nationally consistent environmental justice screening and mapping tool, was recently updated (version 2.3). The tool offers a variety of powerful data and mapping capabilities that enable users to understand details about the population of an area and the environmental conditions in which they live. The tool provides information on environmental and socioeconomic indicators as well as pollution sources, health disparities, critical service gaps, and climate change data. The data is displayed in color-coded maps

			and standard data reports which feature how a selected location compares to the rest of the nation and state. The EPA recommends the FEA consider updated data on local communities and reflect any changes in the NEPA document's analysis. In addition, the EPA recommends identifying transient users of the project area to identify potential EJ concerns, consistent with Promising Practices for EJ Methodologies in NEPA reviews, which states that agencies can be informed by determining if any minority or low-income transient populations (e.g., Tribes, indigenous populations, migrant farmworkers) may be affected (e.g., may reside elsewhere but come within the affected area for subsistence fishing or to collect traditional medicines) by the project. Tribal Consultation The EPA notes the DEA did not include information about Tribal consultation. The EPA encourages BPA to consult with the Tribes and incorporate feedback from the Tribes when making decisions regarding the project. The EPA recommends the FEA describe the issues raised during the consultations and how those issues were addressed, consistent with Executive Order 13175, Consultation and Coordination with Indian Tribal Governments. Indigenous Knowledge On November 30, 2022, CEQ published Guidance for Federal Department and Agencies on Indigenous Knowledge. The EPA recommends the FEA include the identification, inclusion, and integration of Indigenous Knowledge into the NEPA analysis. Indigenous Knowledge can include the collection of local and traditional knowledge concerning the affected environment, anticipated impacts from the project, as well as traditional hunting and land use patterns in the area. Indigenous Knowledge could also be used to support the understanding of how climate change has impacted local environmental resources and subsistence resources. In addition to reviewing any pertinent Indigenous Knowledge currently available,

			additional studies and outreach may be conducted as necessary to clearly identify concerns and potential impacts, including cumulative impacts, from the proposed project and project alternatives. Climate Change The EPA appreciates the climate change discussion included in the DEA. Given the long-term nature of the Proposed Action, the EPA recommends the FEA include a discussion on current and projected local climate change on the selected hatchery locations. Include a discussion on measures taken to adapt to changing environmental conditions impacted by climate change, and whether changing ocean and ecosystem conditions may change expected migration patterns or impact the survival of hatchery- produced fish. Monitoring and Adaptive Management The EPA recommends the FEA include a monitoring program that would assess information such as program development, triggers for adaptation, and key monitoring parameters. We recommend a monitoring program continue to be implemented to ensure overall impacts to the ecosystem and habitats at large are monitored. Furthermore, in the FEA, clarify the expected duration of the Proposed Action.
SAFE24240006	Charles Pace	Private Citizen	Providing fish for harvest in the lower reaches of the Columbia River is not allowed under the Northwest Power Act, which requires BPA ratepayers not be responsible for other parties; funding obligations that have nothing to do with mitigating the effects of the federal Columbia River power system. In addition to providing opportunities for commercial and recreational fisheries ten miles from the Pacific Ocean will likely provide increased harvest opportunities for terns and cormorants.
SAFE24240007	Charles Pace	Private Citizen	I do not believe BPA funding for this proposal can proceed under the Federal Water Pollution Control Act, 38 U.S.C. 67 and 167; 1251 et seq., which prohibits discharging pollutants into navigable waters without a

			permit. Additional considerations are imposed by the constitutions, general statutes, and common laws of the states of Washington and Oregon. It is also unlikely that this proposal can be funded by Bonneville without violating the in lieu; provisions of the Northwest Power Act. Given these considerations, it would be imprudent for Bonneville to participate in this proposal. If, however, Bonneville moves forward with providing support, it should expect that it will be challenged and become the subject of extensive litigation. It would be foolish to embark on such a course of action.
SAFE24240008	Charles Pace	Private Citizen	I am writing this second comment to ensure the BPA is aware of the Nov. 18, 2022, announcement by the Commissioner of Washington Department of Natural Resources banning net pen aquaculture in Washington waters. According to the news release, Commissioner Franz Ends Net Pen Aquaculture in Washington's Waters and similar bans are in place in Oregon. Please see the link below: https://www.dnr.wa.gov/news/commissioner-franz-ends-net-pen-aquaculture-washington%E2%80%99s-waters#:~:text=Commissioner%20of%20Public%20Lands%20Hilary,of%20Natural%20Resources%20(DNR).
SAFE24240009	Charles Pace	Private Citizen	I am writing this third comment to ensure Bonneville is aware of a NOAA biop that found net pen aquaculture: (1) degrades water quality from discharged fish waste and other pollutants; and (2)reduces foraging production for juvenile and adult salmonids and other protected fish due to bio-deposits and contaminants Please see the following link to a news release by the Wild Fish Conservancy date July 19,2022: https://wildfishconservancy.org/new-federal-analysis-finds-puget-sound-commercial-net-pens-are-harming-salmon-steelhead-and-other-protected-fish/
SAFE24240010	Charles Pace	Private Citizen	I am writing this fourth comment to ensure Bonneville is aware of the fact that under the permitting requirements of the Clean Water Act, net pen facilities

			are considered to be point sources (40 CFR 122.24 and appendix C of 40 CFR part 122). EPA also produced effluent guidelines for the industry in 40 CFR Part 451. For more information see the link below the Washington Department of Ecology website: https://apps.ecology.wa.gov/publications/documents/2206008.pdf

Comments Responses

Bonneville identified isolated concerns, questions, and opinion statements from the submitted comments and provided responses in the following table.

Table 21: Draft EA Comment Responses

Comment No.	Comment	Response
SAFE24240001-01	I write to respectfully urge you to take immediate action to support the breaching of the four lower Snake River dams this November. This is a crucial step to save the wild salmon and the Southern Resident Killer Whales (SRKW), both of which are critically endangered and running out of time. Thanks to the current administration's efforts, we are closer than ever to a solution. NOAA's recent findings make it clear that breaching these dams is the only way to prevent the extinction of the wild Chinook salmon and the Southern Resident Killer Whales that depend on them. With only 73 Southern Resident Killer Whales remaining, the situation is dire. The Army Corps of Engineers and the US President have the authority to proceed with breaching the dams. I urge you to support and advocate for the immediate drawdown of the Lower Granite Dam reservoir in November, followed by the removal of the earthen berm in December. The Corps has been prepared for this since 2002 - it	Comment noted. Breaching of the four lower Snake River dams is outside of the scope of this analysis.

	is time to act. The Biden administration's recent report acknowledging the ongoing harm these dams have caused to Tribal communities reinforces the urgency of this action. We cannot afford further delay. The endangered wild Chinook salmon and Southern Resident Killer Whales are running out of time. When they're extinct, hope is lost; when endangered, hope remains.	
SAFE24240003-01	Salmon For All Inc is a 501 (c) (6) organization of Columbia River commercial fishers, processors and associated businesses. We would like to take this opportunity to comment on the Draft Environmental Assessment on the Select Areas Fisheries Enhancement (SAFE) Program. SAFE is a program that has its origins in the 1970s. It has provided educational opportunities in conjunction with local schools, as well as providing a starting point and training ground for young fishers who want to enter the industry. It has also provided an addition and in some cases a substitute for some mainstem gillnet fisheries. A significant number of our membership fishes in the Select Areas. We believe that the document is well done and covers most of the main points. We do have some specific suggestions as listed below.	Thank you for your comment.
SAFE24240003-02	On Pages 40 and following, we think it might be helpful to provide some local context regarding per capita income, as none of the counties where the majority of the SAFE fleet resides demonstrates a wealthy economy. Over two-thirds of licensed Columbia River gillnetters live in four lower Columbia River counties: Clatsop County in Oregon; Wahkiakum, Pacific and Grays Harbor County in Washington. In 2020, Pacific County's per capita personal income was $43,749, according to the U.S. Census. The national average was $59,510 and the Washington State average was $67,126.	Grays Harbor, WA was not included in the economic analysis as it does not contain or is near any of the SAFE facilities which are primarily located in Oregon. In addition, the analysis focused on the adjacent counties that would be the most dependent on income generated from SAFE Program fish commercial and recreational harvest. The information on per capita income was incorporated into Section 3.5.1, Socioeconomics Affected Environment and

	Similarly, Clatsop County, Oregon, had a per capita income at that time of $48,777, while Wahkiakum County had $47,027. Grays Harbor County per capita income according to the 2020 census data was $43,710. The economic value and contribution of the SAFE area fisheries thus assist in supporting counties where lower incomes are present as well as significant negative social and community health statistics.	the difference between state and national averages was noted.
SAFE24240003-03	We also point out on p. 45 that there appears to be some misunderstanding of fishing businesses. A Columbia River fishing business depends on a Columbia River gillnet permit plus a portfolio of other permits, including Oregon and Washington shrimp, crab, razor clam, and troll permits, and numerous Alaska permits. The income from these other endeavors returns to the Columbia River region, an area with significant poverty issues. The fishery, rather than being "part -time" as suggested in the document, is seasonal, and depends upon which fish are available in any given season. The business itself relies on a variety of opportunities when fish of various species may be accessed, and will shift among different locations, dependent upon species and fisheries available. There may be a fishing season going on elsewhere such as a salmon fishery in Bristol Bay, which some will choose to follow while others may decide to stay in a Select Area fishery. Neither business is "part-time" but may take place in different locations when the opportunity presents itself.	The term “part-time” was corrected with the term “seasonal” where appropriate throughout the document.
SAFE24240003-04	On page 48, Variations in rainfall intensity. We point out that the SAFE areas are largely fed by rain-driven streams found in the coastal area, with snowpack being more of a concern for glacier-fed streams.	The information on the differences between rainfall vs snowpack driven systems has been incorporated into Section 3.6.1, Greenhouse Gases Affected Environment.

	Current research indicates that rainfall along the coast is expected to increase as climate change occurs, although summers may be drier. Given the location of the SAFE areas, climate change may affect them less than in other locales. We also point out that chum salmon are unlikely to be in as difficult a situation as other species. They generally arrive as adults in late October and November after the fall rains have begun. Once hatched, they do not remain long in their natal streams but travel to the estuary, where they feed before going to the ocean. They are generally gone by June or before, so their in-river lives do not occur when the water is likely to be shallow and warm.	
SAFE24240 003-05	On page 49, top paragraph, we commend the comment regarding the dilution factor in reducing overharvest on listed stocks. This is often overlooked, but is a fact that needs to be taken note of.	Thank you for your comment.
SAFE24240 003-06	On page 50, we point out that dredging is also both a past and current action that has contributed to environmental conditions in the estuary and upriver. However, due to the location of the SAFE areas and their proximity to the river's mouth, we do not expect this activity will have any particular effect on SAFE area salmonids.	Navigational dredging has been added as a past and present action within the estuary and incorporated into the analysis in Chapter 4
SAFE24240 003-07	On page 51, the comments regarding hatcheries and potential changes in climate, hydro and fisheries are a reasonable summary and recognition that these are issues that must be addressed. We point out that hatchery technology, as well as other technologies, is dynamic and constantly evolving, and suggest that we leave the door open for possible future developments that show promise for improving fish survival. One example is the Whoosh technology for improving fish passage,	Thank you for your comment. The evolving nature of hatchery technology is difficult to reasonably predict. If future technologies alter the manner that the SAFE Program is operated, any proposed changes would be addressed in future environmental compliance, including NEPA analysis, as appropriate.

	and certainly there are numerous examples of improvements in hatchery practices. The SAFE areas themselves could be considered as a hedge against climate change, given their locale and water sources, as described above.	
SAFE24240003-08	Again, we find no major flaws in the document and bring up the points above as suggestions for improving the document. If there are any questions regarding points in the document, please contact us.	Thank you for your comment.
SAFE24240004-01	The assessment of water quality impacts is deficient. The estuary extends from the BON tailrace to the ocean. To dismiss water quality impacts because they are not significant for the "basin" is disingenuous. As a result the decision to prepare an EA rather than an EIS cannot be defended. BPA needs to do a serious, in depth analysis of water quality impacts that addresses and mitigates on site contamination.	Thank you for your comment. Please see Section 3.2.2 for the water quality effects discussion. The overall effects on water quality from the cumulative discharges from the four net pen sites would be extremely localized, rapidly diluted, and recoverable. As discussed in Section 2.2, BMPs such as monitoring would be implemented to further minimize overall water quality impacts.
SAFE24240005-01	U.S. EPA Detailed Comments on the Select Area Fisheries Enhancement Program DEA Lower Columbia River Estuary, Oregon and Washington October 2024 Water Quality Clean Water Act (CWA) § 402 The DEA explains that two of the net pen sites, Youngs Bay, OR and Deep River, WA, currently have National Pollutant Discharge Elimination System (NPDES) permit coverage. The EPA recommends that the FEA clarify current and proposed production levels (lbs/year) and feed levels (lbs/month during month of maximum feeding) at each net pen site and clarify NPDES permitting requirements associated with the updated production/feed levels. For example, clarify if, after maximizing hatchery	As described in Section 5.2, Clean Water Act implementing regulations (40 C.F.R. 122.24) consider the net pen sites at both Youngs Bay and Deep River to be concentrated aquatic animal feeding operations as they hold 20,000 pounds of fish or more, or feed 5,000 pounds of food or more during any calendar month. The net pen sites at Blind Slough and Tongue Point operate below this production limit and their fishery managers have not proposed to increase their production limits above the concentrated aquatic animal feeding operation threshold described above. Feed levels have been further elaborated upon in Section 2.3 and Section 3.2.2.

	production, net pen sites at Steamboat Slough, WA and Blind Slough, OR will still operate below the Concentrated Aquatic Animal Production (CAAP) facility threshold of 20,000 lbs/year of fish production or 5,000 pounds of feed during the month of maximum feeding. NPDES permit coverage may be required at facilities not currently covered, and permit updates may be needed for facilities with existing coverage (e.g., submit a notice of significant fish production increase).	Please note, as discussed in Section 3.2.2, the SAFE program production/feed levels tends to be small when compared with typical commercial net pen fish production. This is because the fish are not grown to marketable size in the SAFE net pens, and the fish usually occupy the net pens for only a part of the year. It has further been established that returns are maximized when fish are released during colder months, which means less feed.
SAFE24240 005-02	The DEA states that discharge of effluent from net pens can affect receiving water quality. For example, net pen effluent may contain elevated nutrients, such as nitrogen and phosphorus, that can lead to multiple impacts such as low dissolved oxygen, high pH, high ammonia, excess turbidity, algal growth, macroinvertebrate population changes, and other water quality issues. The EPA recommends the FEA describe Best Management Practices (BMPs) that will be implemented to minimize impacts to water quality, regardless of a net pen's NPDES permit coverage.	Please refer to Section 2.3 for a list of BMPs to reduce effects to water quality, regardless of NPDES permit requirements. BMPs that would be implemented to reduce the effects to water quality include feeding fish daily-recommended rations based on water temperature and body weight.
SAFE24240 005-03	The EPA notes that most streams and rivers in the Lower Columbia River estuary exceed one or more of the CWA § 303(d) listings, so it is important to understand whether and how the SAFE program facilities may cause or contribute to existing water quality problems and whether any contribution would change under the action alternatives. The DEA concludes that the Proposed Action would have "no impact" relative to the surrounding estuary, because of "rapid" dilution of effluent in addition to maintaining rearing densities at "moderate levels" of 20,000-25,000 fish per net pen. The EPA recommends the FEA include	Anticipated effects of the proposed action on water quality, including 303(d) listings and TMDLs are further described in more detail in Section 3.2, of this Final EA. As discussed in Section 3.2, the SAFE program has monitored water quality at the net pens for several years and has never encountered an exceedance of any of the parameters, which include temperature, pH, dissolved oxygen, turbidity, and specific conductivity. Additionally, the SAFE program monitors the benthic community at all of its net pen sites and has detected only minor,

	additional information to support the water quality analysis. Specifically, we recommend the FEA: Include information on CWA § 303(d) impaired waters in the project area and any efforts related to Total Maximum Daily Loads (TMDLs).	biologically acceptable changes to the density and richness of macroinvertebrate populations in comparison to reference sites. In addition, Ecology has not documented any water quality impairments in the receiving water in the vicinity of the Net Pens in Washington.
SAFE24240005-04	Describe existing restoration and enhancement efforts for impaired waters, how the proposed project will coordinate with on-going protection efforts, and any mitigation measures that will be implemented to avoid further degradation of impaired waters.	As discussed in Section 3.2, the proposed project would have a low overall effect on water resources, including water quality. As discussed in Chapter 4, Cumulative Effects, ongoing restoration and enhancement efforts are numerous and shall continue to be implemented and would not conflict with this action.
SAFE24240005-05	Clarify the net pen fish density level used to evaluate potential water quality impacts. The DEA uses "moderate levels" defined as 20,000 - 25,000 fish per net pen. Clarify whether this is the current or target density. If current density, update the water quality analysis to reflect potential effects from the Proposed Action target density.	As described in Section 2.1, fishery program managers do not propose to change the net pen fish density level within each individual net pen beyond the range of 20,000 to 25,000 individual fish. However, additional net pen structures may be added. This would create a larger site foot print, but fish densities per pen would be maintained, so increases would not cause elevated impacts per unit of substrate affected.
SAFE24240005-06	The 2021 National Marine Fisheries Service (NMFS) Biological Opinion determined that the Proposed Action is likely to adversely affect several Endangered Species Act (ESA)-listed species and their critical habitat, including Lower Columbia River Chinook salmon, Lower Columbia River coho salmon, Lower Columbia River steelhead, Columbia River chum salmon, Upper Willamette River Spring Chinook salmon, and Snake River Spring/Summer	Potential impacts of water quality and ESA-listed fish and associated habitat are discussed in Section 3.2 and Section 3.1, respectively. Further, Section 5.2 addresses the current ESA consultation status of the SAFE Program. The salmon recovery in the Columbia River Basin is out of scope of this Final EA.

	Chinook salmon. A formal Incidental Take Statement was issued in 2021. The Columbia Basin Restoration Initiative is an agreement between Pacific Northwest Tribes and States to restore wild fish populations. This agreement follows the 2023 Memorandum on Restoring Healthy and Abundant Salmon, Steelhead, and Other Native Fish Populations in the Columbia River Basin, that directs Federal agencies to prioritize the restoration of healthy and abundant salmon, steelhead, and other native fish populations in the Columbia River Basin. Furthermore, the 2023 Memorandum states that "BPA will invest $300 million over 10 years to restore native fish and their habitats throughout the Columbia River Basin, with added measures to increase the autonomy of States and Tribes to use these funds." The success of restoration efforts depends, in part, on larger- scale decisions that can impact ocean conditions, critical habitat, and wild ESA-listed populations. As such, the EPA recommends the FEA discuss potential impacts to water quality and ecological integrity that could make it more difficult to achieve recovery goals for the Columbia River Basin.	
SAFE24240 005-07	The DEA explains that BPA must fund fish and wildlife mitigation "in a manner consistent with" the Northwest Power and Conservation Council's (Council's) program under the Northwest Power Act, citing the Council's "1993 Strategy for Salmon." In the FEA, discuss how the Proposed Action aligns with current restoration plans in 2024. Furthermore, discuss alignment of the Proposed Action with the federal-state "10-year fish plan" that is part of the Columbia Basin Restoration Initiative.	As discussed in Section 1.1, Introduction, in their review, the ISRP (Independent Scientific Review Panel) found that the project is consistent with the Northwest Power and Conservation Council's Fish and Wildlife Program and the Bi-State Lower Columbia River and Columbia River Estuary Subbasin Plan. A variety of restoration and management actions plans are and were proposed in 2025 and for future years in these programs. The SAFE program supports these actions by using hatchery and net pen facilities to mitigate for lost salmon production and reduce harvest pressure on naturally occurring stocks.

		Survival rates of SAFE fish are generally about equal to or better than those achieved at lower Columbia River hatcheries and harvest of SAFE fish makes up a substantial component of the lower Columbia River catch of salmon.
SAFE24240005-08	In determining impacts to ESA-listed species, the EPA recommends working closely with NMFS and the U.S. Fish and Wildlife Service. To effectively address special status species, the EPA recommends the FEA: Identify and quantify which species and/or critical habitat might be directly, indirectly, or cumulatively affected by each alternative. Discuss mitigation measures to minimize impacts to special status species and indicate how they will be implemented and enforced.	As discussed in Section 5.2, Bonneville has consulted with NMFS pursuant to Section 7 of the ESA. A Biological Opinion (NMFS Consultation Number: WCRO-2020-02145) was issued on May 3, 2021, along with terms and conditions to minimize take. Bonneville made a No Effect determination on bull trout and their critical habitat due to lack of presence throughout the action area. Negative interactions such as competition and predation by hatchery fish on juvenile salmon and steelhead, and transfer of disease pathogens from hatchery fish to juvenile salmon and steelhead may occur. As described in Section 3.1.2.1 in this EA, each effect is a function of both spatial and temporal overlap; thus these effects can only take place when hatchery and natural-origin salmon and steelhead encounter each other or are rearing together. In Section 2.3, further BMPs are proposed that would minimize impacts to ESA-listed salmonids mainly by limiting spatial and temporal overlap. Bonneville would direct the fishery co-managers to comply with all proposed mitigation measures.
SAFE24240005-09	The DEA concludes the Proposed Action has "no impact" on EJ concerns. The EPA notes that EJScreen, the EPA's nationally consistent environmental justice screening and mapping tool, was recently updated (version 2.3). The tool offers a variety of powerful data and mapping capabilities that enable users to understand details about the population of an area and the environmental conditions in which they live. The tool provides information on environmental and socioeconomic	The U.S. EPA's EJScreen was used to screen for Environmental justice concerns and disadvantaged communities (EPA, 2025) in Clatsop County, Pacific County and Wahiakum county. Three reports were generated for each county which elaborated on environmental indicators, socioeconomic indicators, EJ indicators, and supplemental indexes. With the exception of drinking water non-compliance for Pacific County, all indices

	indicators as well as pollution sources, health disparities, critical service gaps, and climate change data. The data is displayed in color-coded maps and standard data reports which feature how a selected location compares to the rest of the nation and state. The EPA recommends the FEA consider updated data on local communities and reflect any changes in the NEPA document's analysis. In addition, the EPA recommends identifying transient users of the project area to identify potential EJ concerns, consistent with Promising Practices for EJ Methodologies in NEPA reviews, which states that agencies can be informed by determining if any minority or low-income transient populations (e.g., Tribes, indigenous populations, migrant farmworkers) may be affected (e.g., may reside elsewhere but come within the affected area for subsistence fishing or to collect traditional medicines) by the project.	appear to be within range of state and national averages (< 80 percentile) and no minority populations were identified. Therefore, the proposed action would not cause any disproportionate and adverse human health and environmental effects (including risks) and hazards on environmental justice populations.
SAFE24240 005-10	The EPA notes the DEA did not include information about Tribal consultation. The EPA encourages BPA to consult with the Tribes and incorporate feedback from the Tribes when making decisions regarding the project. The EPA recommends the FEA describe the issues raised during the consultations and how those issues were addressed, consistent with Executive Order 13175, Consultation and Coordination with Indian Tribal Governments. On November 30, 2022, CEQ published Guidance for Federal Department and Agencies on Indigenous Knowledge. The EPA recommends the FEA include the identification, inclusion, and integration of Indigenous Knowledge into the NEPA analysis. Indigenous Knowledge can include the collection of local and traditional knowledge concerning the affected environment, anticipated impacts from the project, as well as traditional hunting and	Section 1.3 was updated to include information about tribal consultation. Bonneville has engaged affected communities, Tribes, and Indigenous Peoples through the public involvement process to inform them of the preparation of this environmental assessment. As discussed in Section 3.5, no quantifiable ceremonial and subsistence tribal harvests are reported to occur in the Lower Columbia River, and no comments or concerns were identified or received from the tribal interests during the public involvement process.

	land use patterns in the area. Indigenous Knowledge could also be used to support the understanding of how climate change has impacted local environmental resources and subsistence resources. In addition to reviewing any pertinent Indigenous Knowledge currently available, additional studies and outreach may be conducted as necessary to clearly identify concerns and potential impacts, including cumulative impacts, from the proposed project and project alternatives.	
SAFE24240005-12	The EPA appreciates the climate change discussion included in the DEA. Given the long-term nature of the Proposed Action, the EPA recommends the FEA include a discussion on current and projected local climate change on the selected hatchery locations. Include a discussion on measures taken to adapt to changing environmental conditions impacted by climate change, and whether changing ocean and ecosystem conditions may change expected migration patterns or impact the survival of hatchery- produced fish.	Bonneville updated its analysis of greenhouse gas effects on the Proposed Action in Final EA Section 3.6.2 to describe the anticipated impacts that climate change would have on hatchery produced SAFE fish.
SAFE24240005-13	The EPA recommends the FEA include a monitoring program that would assess information such as program development, triggers for adaptation, and key monitoring parameters. We recommend a monitoring program continue to be implemented to ensure overall impacts to the ecosystem and habitats at large are monitored.	As discussed in Section 2.3 and Section 3.2, extensive environmental monitoring is currently done and will continue into the future by the three fishery co-managers as required by NPDES permitting. Monitoring is done to ensure excess feed and feces do not accumulate in the pens. Benthic monitoring is conducted seasonally under and adjacent to the net pens. Results to date indicate waste accumulation below the net pens is minimal and does not adversely affect invertebrate communities (North et al. 2004). Finally, core soil samples taken by Clatsop County Staff ensured that organic materials from fish rearing are not accumulating

		under each individual net pen (2023 Biron et al). The environmental monitoring of net pen sites have confirmed that all net pen sites are in compliance with permit conditions and water quality standards.
SAFE24240 005-14	Furthermore, in the FEA, clarify the expected duration of the Proposed Action.	Bonneville responds to program funding requests annually. Bonneville will use the analysis in this EA to inform future funding decisions.

Table 22: Scoping Comments and Responses

Comment No.	Comment	Response
SAFE24240 006-01	Providing fish for harvest in the lower reaches of the Columbia River is not allowed under the Northwest Power Act, which requires BPA ratepayers not be responsible for other parties; funding obligations that have nothing to do with mitigating the effects of the federal Columbia River power system. In addition to providing opportunities for commercial and recreational fisheries ten miles from the Pacific Ocean will likely provide increased harvest opportunities for terns and cormorants.	Thank you for your comment. Bonneville continues to comply with the Northwest Power Act.
SAFE24240 007-01	I do not believe BPA funding for this proposal can proceed under the Federal Water Pollution Control Act, 38 U.S.C. 67 and 167; 1251 et seq., which prohibits discharging pollutants into navigable waters without a permit. Additional considerations are imposed by the constitutions, general statutes, and common laws of the states of Washington and Oregon.	As described in Section 5.2, the SAFE Program is in compliance with Clean Water Act implementing regulations (see 40 C.F.R. 122.24) through attainment of State-issued NPDES permits at the individual net pen sites when required by size and production levels.
SAFE24240 07-02	It is also unlikely that this proposal can be funded by Bonneville without violating the in lieu; provisions of the Northwest Power Act.	Thank you for your comment. Bonneville continues to comply with the Northwest

		Power Act, including all in-lieu prohibitions.
SAFE2424007-03	Given these considerations, it would be imprudent for Bonneville to participate in this proposal. If, however, Bonneville moves forward with providing support, it should expect that it will be challenged and become the subject of extensive litigation. It would be foolish to embark on such a course of action.	Thank you for your comment.
SAFE2424008-01	I am writing this second comment to ensure the BPA is aware of the Nov. 18, 2022, announcement by the Commissioner of Washington Department of Natural Resources banning net pen aquaculture in Washington waters. According to the news release, Commissioner Franz Ends Net Pen Aquaculture in Washington's Waters and similar bans are in place in Oregon. Please see the link below: https://www.dnr.wa.gov/news/commissioner-franz-ends-net-pen-aquaculture-washington%E2%80%99s-waters#:~:text=Commissioner%20of%20Public%20Lands%20Hilary,of%20Natural%20Resources%20(DNR).	Thank you for your comment. Of all the net pen sites, only those at Deep River would fall under WA Department of Natural Resources (DNR) jurisdiction. The referenced ban on commercial net pen fin fish aquaculture order only applies to commercial net pen fish aquaculture and does not apply to hatchery programs that restore or boost native stocks such as the Deep River hatchery program.
SAFE2424009-01	I am writing this third comment to ensure Bonneville is aware of a NOAA biop that found net pen aquaculture: (1) degrades water quality from discharged fish waste and other pollutants;	As discussed in Section 5.2, Bonneville has consulted with NMFS pursuant to Section 7 of the ESA. A Biological Opinion (NMFS Consultation Number: WCRO-2025-00274) was issued on May 5, 2025, along with terms and conditions to minimize take. The biological opinion analyzed the effects of the proposed net pens and their operations on water quality. In the Biological Opinion's critical habitat analysis, "Operations and maintenance activities would include net pen maintenance, cleaning of debris and algae growth on nets. These activities would not be expected to degrade water quality or

		adversely modify designated critical habitat, because they would occur infrequently, and only result in minor temporary effects. The effects of these actions on critical habitat are negligible given the scope of the actions." Anticipated effects of the proposed action on water quality are further described in more detail in Section 3.2 of this EA.
SAFE24240009-02	(2)reduces foraging production for juvenile and adult salmonids and other protected fish due to bio-deposits and contaminants.	As discussed in Section 3.2, the environmental monitoring of net pen salmon rearing is to ensure that the water body is suitable for fish rearing and that the accumulation of organic matter due to fish rearing is not creating a systemic impact in the surrounding areas. The fish in each net pen facility are released as smolts, and only kept for part of the year. This allows the benthic environment time to recover. In addition to this, much of the rearing occurs during times of abundant rainfall and high flows, adding to the cleansing capability of an already turbulent, tidally influenced location. Finally, core soil samples taken by Clatsop County Staff ensured that organic materials from fish rearing are not accumulating under each individual net pen (2023 Biron et al). The visual inspection of each sample supports the notion that either the organic material from fish rearing is being absorbed at the rate of which it is produced, or the biproducts are being flushed away at a rate that does not allow accumulation to occur. The evidence of this is additionally supported by the absence of *Beggiatoa* spp. The lack of organic accumulation from continued fish rearing and acquired water quality data would

		suggest the areas surrounding the net pens are suitable for fish rearing.
SAFE24240009-03	Please see the following link to a news release by the Wild Fish Conservancy date July 19,2022: https://wildfishconservancy.org/new-federal-analysis-finds-puget-sound-commercial-net-pens-are-harming-salmon-steelhead-and-other-protected-fish	Thank you for bringing this to our attention. The article describes an analysis that considers interactions between hatchery and natural salmon and steelhead. Negative interactions such as competition and predation by hatchery fish on juvenile salmon and steelhead, and transfer of disease pathogens from hatchery fish to juvenile salmon and steelhead may occur. As described in Section 3.1.2.1 in this EA, each effect is a function of both spatial and temporal overlap; thus these effects can only take place when hatchery and natural-origin salmon and steelhead encounter each other or are rearing together. The interactions between SAFE production and native stocks are avoided by development of successful net-pen rearing strategies and release timing that facilitate rapid out-migration which eliminates this spatial and temporal overlap.
SAFE24240010-01	I am writing this fourth comment to ensure Bonneville is aware of the fact that under the permitting requirements of the Clean Water Act, net pen facilities are considered to be point sources (40 CFR 122.24 and appendix C of 40 CFR part 122). EPA also produced effluent guidelines for the industry in 40 CFR Part 451. For more information see the link below the Washington Department of Ecology website: https://apps.ecology.wa.gov/publications/documents/2206008.pdf	Thank you for your comment. As described in Section 5.2, Clean Water Act implementing regulations (40 C.F.R. 122.24) require the net pen site at Youngs Bay to obtain an ODEQ-issued NPDES permit, which in turn requires those sites to maintain 50-foot mixing zone from the outside boundary of the floating net-pens. CCF has finalized the permitting review process and was issued an extension of its existing NPDES Permit that expired November 30, 2023, until ODEQ acts on the renewal application (Federal Permit No. OR0040631). At Deep River, WDFW holds a NPDES permit (WA0040053) issued by the Department of Ecology. The permit requires the sampling and reporting of turbidity, dissolved oxygen, and biochemical oxygen demand (BOD) results

		monthly when there is fish present in the net pens, in addition to fish production, fish size, the amount of fish, and fish feed. The production levels at the Tongue Point and Blind Slough sites are below the threshold that would require NPDES permits. These locations incur minimum impact and undergo routine monitoring to document any environmental changes that may occur under the net pens as compared to a reference condition. The environmental monitoring of net pen sites have confirmed that all net pen sites are in compliance with permit conditions and water quality standards.

February 2026

DOE/EA-2277