Washington and Oregon Eulachon Management Plan

2nd Edition

Prepared jointly by:

Washington Department of Fish and Wildlife and
Oregon Department of Fish and Wildlife

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LIST OF ABBREVIATIONS

BRT	Biological Review Team
CIT	Cowlitz Indian Tribe
CPUE	Catch-Per-Unit-Effort
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
CTWS	Confederated Tribes of the Warm Springs Reservation
DPS	Distinct Population Segment
ESA	U.S. Endangered Species Act
NMFS	National Marine Fisheries Service
NPT	Nez Perce Tribe
ODFW	Oregon Department of Fish and Wildlife
OSP	Oregon State Police
PDO	Pacific Decadal Oscillation
SSB	Spawning Stock Biomass
SST	Sea Surface Temperatures
WDFW	Washington Department of Fish and Wildlife
WOEMP	Washington and Oregon Eulachon Management Plan
YN	Confederated Bands and Tribes of the Yakama Nation

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SECTION 1: FISHERIES MANAGEMENT

Introduction

Eulachon *Thaleichthys pacificus* are an anadromous species of smelt, native to the west coast of North America. The Columbia River basin historically supported a very large and productive population of Eulachon; however, in 1994, stocks of Eulachon from the Columbia River to the Klinaklini River in British Columbia experienced a nearly simultaneous collapse (Gustafson et al. 2010; Hay and McCarter 2000; Hay et al. 2002).

The Washington Department of Fish and Wildlife (WDFW) developed the Forage Fish Management Plan in 1998, which provided guiding principles for forage fish conservation and management within Washington (WDFW 1998). In October 2001, WDFW and the Oregon Department of Fish and Wildlife (ODFW), hereafter referred to as "The States", developed the first Washington and Oregon Eulachon Management Plan (WOEMP). The goal of the WOEMP was to reassess the management framework specifically for Eulachon within the Columbia River (WDFW and ODFW 2001). The States determined that management had historically not been responsive to interannual changes in abundance or distribution and developed the 2001 WOEMP to provide abundance-based guidance for Eulachon management and research activities (WDFW and ODFW 2001).

In 2010, the National Marine Fisheries Service (NMFS) Biological Review Team (BRT) categorized climate change impacts on ocean conditions (all subpopulations), and Eulachon bycatch in offshore shrimp fisheries (Columbia River and British Columbia subpopulations) as the most serious threats to the persistence of Eulachon (Gustafson et al. 2010). These threats, together with large declines in abundance, indicated to the BRT that Eulachon were at moderate risk of extinction throughout all of its range (Gustafson et al. 2010). These factors collectively led NMFS to list Eulachon as a threatened species under the United States Endangered Species Act (ESA).

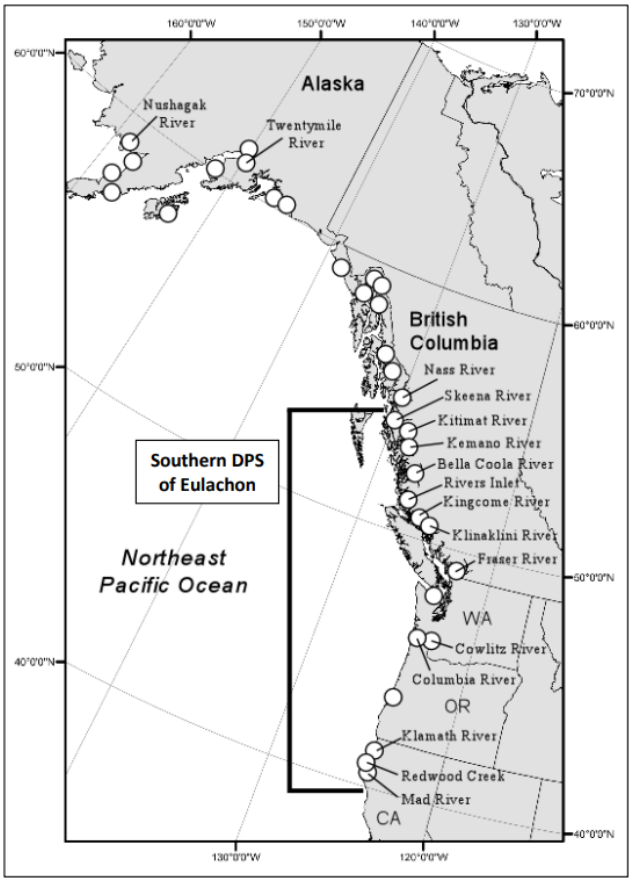

Figure 1. Distribution of the Southern Distinct Population Segment (DPS) of Eulachon *Thaleichthys pacificus* (figure from NMFS 2017).

On March 18, 2010, NMFS published a final rule in the Federal Register (75 FR 13012) listing the southern distinct population segment (DPS) of Eulachon, (hereafter referred to as Eulachon) as threatened. This listing encompassed all Eulachon within the states of Washington, Oregon, and California, and extended from the Skeena River in British Columbia south to the Mad River in Northern California (Figure 1). These Eulachon were identified and reconfirmed as a distinct population through multiple genetic analyses (McLean et al. 1999, McLean and Taylor 2001, Beacham et al. 2005; Candy et al. 2015; Sutherland et al. 2021).

In 2017, NMFS released the ESA recovery plan for the Southern DPS of Eulachon (NMFS 2017). Within this plan, recovery actions were established, and included the implementation of a limited-opportunity Eulachon fishery (Recovery Action 5.16; NMFS 2017). The goals of this action are to "(1) provide essential context for interpreting historical harvest data to better understand trends and variability in Eulachon abundance; (2) filling critical information gaps such as the length and age structure of spawning Eulachon, as well as the temporal and spatial distribution of the run; (3) supporting the cultural traditions of Northwest tribes who rely on Eulachon as a seasonally important food source; and (4) providing a limited public and commercial opportunity for Eulachon harvest to maintain a connection between people and the Eulachon resource" (NMFS 2017). In reference to Tribal/First Nations fisheries, and recreational and commercial harvest, the recovery action includes a goal to "Minimize impacts related to a directed fishery on Eulachon by developing and implementing an abundance-based fishery management and evaluation plan to ensure that exploitation rates do not negatively impact subpopulation productivity" (Recovery Actions 5.16.1-3; NMFS 2017). After completion of the 2022 five-year review, the listing status of Eulachon remained unchanged; however, NMFS included the development of recovery abundance targets (Gustafson et al. 2022; NMFS 2022).

Considering changes in population status, federal regulations, and new information learned since the first WOEMP was developed, an updated management plan is warranted to adaptively manage the Columbia River Eulachon population. With this update, we intend to provide a flexible and transparent approach to sustainably manage Columbia River basin Eulachon harvests consistent with conservation constraints. Additionally, we hope to provide the necessary information to obtain take coverage for Eulachon fisheries under a 4(d) rule, should coverage be required in the future.

Objectives of Management Plan

The States coordinated the development of this management plan with representatives from NMFS, WDFW, ODFW, the Confederated Bands and Tribes of the Yakama Nation (YN), the Confederated Tribes of the Warm Springs Reservation (CTWS), the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), the Nez Perce Tribe (NPT), and the Cowlitz Indian Tribe (CIT).

The objective of this management plan is to update the 2001 WOEMP for the purpose of sustainably harvesting Eulachon in a manner that does not jeopardize their survival and recovery.

Management Area/Time Period

The management area covered by this plan includes the Columbia River mainstem from the mouth, at a true north-south line through Buoy 10, upstream to Bonneville Dam, and adjacent tributaries including the Cowlitz River, Lewis River, Elochoman River, Kalama River, Grays River, and Deep River in Washington and the Sandy River in Oregon (Figure 2). The Eulachon fishing period may extend from December through May, with fishing generally occurring in February through April.

This plan was written to cover a ten-year management period; however, to account for changes in conservation and recovery status of the species, and consistent with an adaptive management philosophy, The States may periodically review, update, and/or revise this plan.

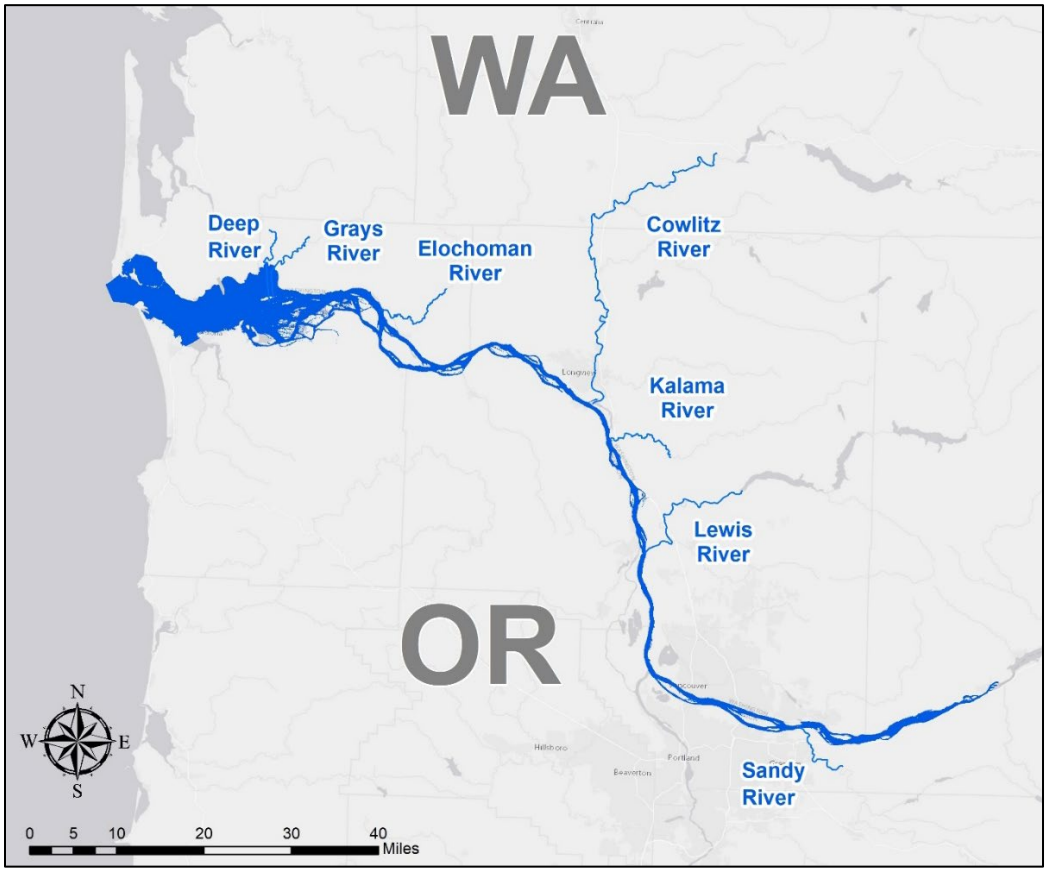

Figure 2. Map of management area captured by this plan, including the mainstem Columbia River and major tributaries downstream of Bonneville Dam.

Management Structure

Eulachon, in common with other fish in the Columbia River system, inhabit a complex regulatory environment. The lower Columbia River marks the border between the states of Washington and Oregon. Management actions for Columbia River fish and fisheries in the trans-boundary mainstem reaches of the lower basin are decided jointly by The States through the Columbia River Compact.

Columbia River Compact

Under the Congressionally approved Columbia River Compact (hereafter "Compact"), The States jointly regulate commercial fishing on the Columbia River. Through the Compact, The States can open a commercial fishery only with the "mutual consent and approbation of both states" (RCW 77.75.010; ORS 507.010). The States' Fish and Wildlife Commissions, through their delegated authority, represent the states of Washington and Oregon on the Compact. The Commissions have delegated to their respective directors (or designees) the authority to make rules for Eulachon fishing.

Joint State Fishery Management

A similar consensus policy is in place for The States to make management decisions for recreational fisheries in the trans-boundary mainstem reaches of the lower Columbia River. This, however, is rarely an issue in Eulachon recreational fishery management since very little recreational effort historically occurred in the mainstem Columbia River, and The States have restricted recreational Eulachon fishing opportunity to Columbia River tributaries since 2011.

Individual State Jurisdictions

Recreational and commercial fisheries in the tributaries are managed by the individual states. In recent years, each state has managed the tributary fisheries consistent with the mainstem fisheries, to meet conservation needs. Additionally, both states have designated Eulachon as a species of greatest conservation need due to their federal listing status as threatened and their importance as a food fish species (ODFW 2016; WDFW 2015).

Federal Regulations

The Southern DPS of Eulachon was listed as a threatened species under the ESA on March 18, 2010 (75 FR 13012). Critical habitat for Eulachon was designated under the ESA on October 20, 2011 (76 FR 65324). The 2015 and 2022 five-year reviews concluded that the DPS's threatened designation remained appropriate (NFMS 2016; NMFS 2022).

The term "4(d) rule" refers to protective regulations issued under section 4(d) of the ESA for threatened species. Unlike endangered species, when a species is listed as threatened, the prohibitions identified in section 9 of the ESA do not automatically apply to that species. To

date, NFMS has not issued a 4(d) rule to customize prohibitions and regulate activities to conserve Eulachon.

Commercial Fisheries:

License Requirements

In Washington, commercial harvesters must obtain a Columbia River smelt commercial license for the harvest of smelt in the mainstem Columbia River and adjacent Washington tributaries, and to sell their catch to wholesale buyers. As of 2022, the Columbia River smelt commercial license costs $500 annually for Washington residents and $885 annually for non-residents (RCW 77.65.200). Additionally, commercial fishers may purchase a Limited Fish Seller Endorsement, allowing a commercial harvester to sell directly to the public at retail. As of 2022, the Limited Fish Seller Endorsement costs $175 annually for Washington residents and $560 annually for non-residents (RCW 77.65.510).

In Oregon, commercial harvesters must obtain a commercial bait fishing license for the harvest of smelt in the mainstem Columbia River and adjacent Oregon tributaries, and to sell their catch to wholesale buyers (ORS 508.235). As of 2022, the commercial bait fishing license costs $125 annually for Oregon residents and $175 annually for non-residents (ORS 508.285). Additionally, commercial fishers may purchase a Fish Bait Dealer license, which allows a commercial harvester to sell directly to the public at retail, as bait only (ORS 508.306). As of 2022, the Fish Bait Dealer license costs $125 annually for both Oregon residents and non-residents (ORS 508.285).

Seasons and Harvest

Historically, Eulachon were commercially fished in the mainstem Columbia River and major tributaries downstream of Bonneville Dam, including the Grays, Cowlitz, Kalama, Lewis, and Sandy rivers. Commercial seasons and landings were relatively stable during 1938–1989, and landings averaged 2.1 million pounds annually. The mainstem Columbia River commercial fishery was open 255 days per year during 1960–1977, year-round during 1978–1985, and seven days per week from December 1 to March 31 during 1986–1994. Mainstem and tributary commercial fisheries were restricted in terms of the number of days open to fishing in 1995, following several years of poor returns. In 1998, the mainstem commercial fishery transitioned into a test fishery with two 12-hour periods per week from January 4 through mid-February. Washington's commercial tributary smelt fisheries were also restricted to two to three openings per week beginning in 1998. Mainstem and tributary commercial fisheries were closed effective December 2010, following the ESA listing of Eulachon. Tributary commercial fisheries have not been re-established since closing.

Prior to ESA listing and the fishery closure in 2010, the Cowlitz River commercial fishery often accounted for the highest landings and was a major source of historical landings data (Table A-

3). Since 1990, mainstem commercial fisheries have been implemented during the peak run window, which generally occurs between February and March (calendar weeks 5–12; Table A-4). Historically, mainstem commercial fishers relied upon the use of gillnets or trawl gear to capture smelt, whereas in the shallower waters of the tributaries, fishers used handheld dipnets fished from shore or vessels. Following the ESA listing of Eulachon in 2010, and despite only being ranked a "low" threat to species persistence (Gustafson et al. 2010), commercial fisheries in both the mainstem Columbia River and tributaries were closed to all harvest. In 2014, The States worked closely with NMFS to reinstate a limited, conservation-minded commercial fishery in the mainstem Columbia River using gillnets as the preferred gear type. The States collect monitoring data from the mainstem fishery; however, commercial fisheries in the Cowlitz River and other tributaries have remained closed. Additional details regarding mainstem and tributary commercial smelt fisheries can be found in Table A-1 and Table A-2. As a result of the limited commercial harvest opportunity since 2010, a lack of market demand, and an aging workforce, the total number of commercial fishers that once participated in this fishery has dwindled to a handful of vessels annually.

Performance Indicators:

- Total fishing effort and fishing opportunity, including total number of fishers, days and hours fished, and open areas (including mainstem and tributary rivers).
- Total harvest by fishery in total number of deliveries, pounds per delivery, and pounds landed, monitored by fish tickets.

Recreational Fisheries:

License Requirements

As of 2023, there are no recreational license requirements to harvest smelt in freshwater in the state of Washington; however, it is unlawful to fish for or possess Eulachon from Washington waters unless authorized by emergency rule (WDFW 2022).

In Oregon, a recreational angling license has been required to harvest Eulachon since 2017. As of 2023, Oregon's recreational angling annual license costs $44.00 for residents and $110.50 for non-residents. A one-day angling license costs $23.00 regardless of residency status (ODFW 2023). In Oregon, it is unlawful to fish for or possess Eulachon in inland waters unless authorized by emergency rule.

Seasons and Harvest

Historically, participation and success in the mainstem recreational smelt fishery has been minimal. In general, the breadth of the mainstem lower Columbia and propensity for smelt to remain off the bank during daylight hours, especially in clear water, make Eulachon difficult to target in the mainstem for recreational dippers. Once smelt enter a tributary en masse, they

are relatively easier to catch. Since 2011, the mainstem Columbia has been closed to recreational smelt fishing.

Recreational fisheries for Eulachon in the tributaries of the lower Columbia historically occurred in the Grays, Elochoman, Cowlitz, Kalama, and Lewis rivers in Washington and the Sandy River in Oregon, depending on which rivers were used by smelt in a given year. In all areas, the primary gear type used for recreational harvest has been the handheld dipnet fished from shore.

In the Sandy River, the Hwy 30 Alternate Bridge in Troutdale is the upstream boundary for the commercial fishery (adopted in 1943), and the Bridge at Viking Park (Stark Street Bridge) was previously the upstream boundary for recreational dippers (also adopted in 1943), but currently there is no upper boundary in the recreational smelt fishery when it is open. A $0.50 license was adopted in 1929 for recreational dippers, and commercial fishers were exempt until 1931 when a $5.00 license was established. The smelt license requirement for recreational dippers was eventually repealed. A daily limit of 25 pounds/person was adopted in 1947 for recreational dippers and remained in effect until 2009.

Recreational smelt fisheries in lower Columbia River tributaries were open year-round with a 20-pound daily limit in Washington and a 25-pound daily limit in Oregon during 1960–1996. In the following years, Washington closed tributaries to recreational fishing effective February 28, 1997 and February 2, 1998 due to poor abundance indicators in the commercial fishery (1998 JSR). Additionally, in 1998, WDFW changed the recreational daily limit to 10 pounds per person (1998 JSR). On May 1, 1999, WDFW closed tributaries to recreational dip-netting by permanent regulation, with periodic opportunity for dippers in the Cowlitz River (by special regulation in years of high abundance). The recreational smelt fisheries in the Cowlitz and Sandy rivers were closed in 2011–2013 after the ESA listing of Eulachon in 2010. Since 2014, recreational fisheries have been periodically opened by emergency rule but were restricted to the Cowlitz and Sandy rivers with a daily limit of 10 pounds per angler. Additional details regarding 1960–2022 recreational smelt fisheries can be found in Table A-5.

Performance Indicators:

- Total fishing effort and fishing opportunity, including total number of anglers, hours fished, days of opportunity, number of tributaries opened, and open area measured in river miles.
- Total harvest by fishery in total pounds landed, monitored by creel survey.

SECTION 2: MONITORING AND EVALUATION

Fishery Monitoring and Biological Sampling

Commercial Fisheries

The commercial fishery serves as an important source of monitoring data to evaluate the biomass of the spawning run. Adult Eulachon caught in commercial fisheries in the lower Columbia River are purchased by WDFW and sampled for biological data: fork length, weight, fecundity, and sex obtained from individual fish. The biological data are then applied to the calculations for spawning stock biomass (SSB). The age composition of a run is determined by extracting and examining otoliths to determine the age of each sampled fish. Assessing the age composition of the run contributes to our understanding of brood-year or cohort strength and is an important data component for forecasting future run sizes.

Commercial Eulachon landings (pounds) by fisher are reported to The States via fish tickets and are used to calculate the daily catch-per-unit-effort (CPUE) in terms of pounds per delivery. This information is used to inform in-season run-size updates and roughly correlates with post-season SSB estimates.

Recreational Fisheries

Recreational Eulachon fishers are interviewed by state agency staff to collect effort and harvest data, including total catch by weight, number of fishers per party, and duration of time spent fishing. Staff also subsample catch for sex, spawn status, and mean weight. Counts of fishers actively dipping, combined with average trip length and catch-per-angler, are used to derive estimates of total harvest and fishing effort. These data from the recreational fishery contribute to our understanding of the migratory behaviors of adult spawning Eulachon within tributaries.

Spawning Stock Biomass (SSB)

The SSB is a weight-based estimate of the minimum spawning adults needed to produce the Eulachon larval outflow observed. The SSB is estimated using a combination of adult biological sampling data, derived from the commercial fishery, and egg and larval density data, from weekly plankton tow surveys on the mainstem Columbia River, January through May. The plankton tow data are collected independently of fisheries and provide the least biased estimate of abundance currently available. These data are used post-season to evaluate run abundance through time and assess within-year harvest impacts (Table A-6).

Review of Plankton Tow Surveys

A smelt larval sampling project was initiated in the Cowlitz River in 1994 and in the Columbia River in 1995. This program was originally developed to answer questions about spawning location, but larval sampling can also help determine relative spawning success of the

population when compared to other years. The smelt larval sampling project served as the prototype for the SSB project in the Columbia, which measures larval density in the Price Island/Clifton Channel area of the lower Columbia and hindcasts the minimum abundance of spawning Eulachon upstream of the collection site needed to produce the observed larval density each year. Eulachon spawning downstream of Price/Clifton are not included in the minimum SSB estimate.

In the Columbia River basin, WDFW has led annual studies to estimate Eulachon SSB in the Columbia River (2000–2023), Grays River (2011–2013, 2015–2016), Skamokawa Creek (2011), Cowlitz River (2011), Kalama River (2011), Lewis River (2011, 2022–2023). Additionally, the Cowlitz Indian Tribe has been monitoring larval densities within the Cowlitz River (2015–2023). Eulachon larvae were captured during each year of these studies. The Eulachon SSB sampling in the mainstem Columbia was concentrated during estimated periods of peak larval abundance in the late-winter in 2000–2010. Since 2011, sampling efforts have encompassed the majority of the larval outflow period, with weekly sampling occurring in January through May.

In 2022, WDFW began a project to estimate Eulachon larvae presence and timing in the lower Lewis River near Woodland, WA. This project is funded by the Washington State Department of Transportation to satisfy a requirement in the Biological Opinion for the new Horseshoe Lake pump installed in 2020. The project will occur for five consecutive years, with sampling conducted a minimum of once per week between November and June.

As the primary baseline monitoring to estimate the Columbia River run size, it is a priority for the States to maintain this sampling effort in perpetuity, pending funding availability. In 2023, the Washington State Legislature funded a proviso to support ongoing SSB monitoring in the Columbia River basin for surveys beginning in January 2024. In the event that future funding is eliminated or the SSB monitoring cannot be completed within a given year, the States will consider a precautionary approach to harvest management.

Sporadic monitoring of the eulachon run has occurred outside of the Columbia River basin. WDFW led studies to estimate Eulachon SSB in the Chehalis River (2015–2018) and Naselle River (2015–2017), and limited sampling to evaluate eulachon presence/absence in the Naselle and Bear rivers in 2011 and in the North Fork of the Willapa, Humptulips, Chehalis, Moclips, Clearwater, Hoh, and Elwha rivers and Goodman Creek in 2012. ODFW led studies to evaluate Eulachon presence/absence in the Umpqua and Coos rivers in 2011. Additionally, the Lower Elwha S'klallam Tribe has sampled Eulachon adults and/or larvae in the Elwha, Dungeness, and Lyre rivers on the Olympic Peninsula of Washington (NMFS 2016, NMFS 2022).

Monitoring Recommendations

The States support the addition of the following monitoring tools to supplement the available information for sustainable harvest management of Eulachon in the future (as funding allows) as described in the five-year review (NMFS 2022).

- **Increased Public Outreach:** Increased public outreach could include identifying communities with a historical, cultural, sociological, or economic interest in Eulachon and effectively working with these communities to raise awareness of the species' importance. This could also include citizen science initiatives and gaining local support for restoration and conservation actions that would benefit recovery of the species.
- **eDNA monitoring:** Development of an environmental DNA (eDNA) monitoring survey within the lower Columbia River basin and throughout the species range could be used to inform species presence/absence in key tributaries during the spawning runs and to evaluate the overall spatial and temporal distribution of those spawning runs within a given year. This monitoring would fill key data-gaps identified within the recovery plan (NMFS 2017), provide important context to the existing SSB surveys, and inform predictive models for run timing and forecasting.
- **Test Fishery:** The development of a state or federally funded test fishery could be operated similarly to the existing commercial fishery (e.g., gear types, fishing periods, etc.), but would include adoption of a standardized sampling design. Implementation of a test fishery with standardized sampling would eliminate bias via market effects on fishing effort and CPUE, thereby improving The States' ability to track the adult run size in-season and more effectively target sustainable harvest limits.
- **Acoustic Surveys:** Acoustic surveys could be developed within the Columbia River estuary and lower river to evaluate run size and spatial distribution to inform harvest management goals. Similar type surveys are used to monitor other forage fish species (e.g., herring) and help inform run-timing to the spawning grounds. This type of information could be useful to managers in determining the timing of harvest seasons upstream of the Columbia estuary.

SECTION 3: DECISION MAKING FRAMEWORK

Sustainable Harvest

Our goal is to develop and implement fisheries management strategies to harvest Eulachon in a manner that will not jeopardize the survival and recovery of the species. To accomplish this goal, this management plan uses an abundance-based management approach, meaning the harvest rate is higher when the Eulachon abundance is large or increasing and the harvest rate is lower when the population is small or decreasing. Lower harvest rates on the population when it is small or decreasing supports population persistence and enables population growth.

The highest harvest rate considered in this management plan (10%) when the population is large and increasing is low relative to typical harvest rates on forage fish stocks and is equivalent to the most-conservative harvest rate considered in the 2001 WOEMP. Although it is likely that a higher harvest rate would be sustainable for this forage fish stock, The States

recognize the importance of an improved quantitative analysis to inform this value. In a meta-analysis of abundance time series for 55 stocks of forage fish, the average harvest rate not associated with stock collapse was 26% and the average rate associated with collapse was 44% (Essington et al. 2015); our proposed 10% maximum rate is well below these values. As another point of reference, the harvest level (in tonnes/pounds) on Fraser River Eulachon in 2017–2023 was set at 3.5% of the average of the previous nine years of the SSB index (Fisheries and Oceans Canada 2023). This 3.5% harvest level is considered a conservative harvest rate that could be increased to accommodate requests for additional harvest by Indigenous peoples (Fisheries and Oceans Canada 2023).

Since the ESA listing, the States have met with NMFS at the onset of each season to review recent Columbia River Eulachon forecast data, and agreed to the annual target harvest rate, which has ranged from 1–2% of the post-season abundance as a conservative approach to management. Recent (2013–2023) harvest rates on Columbia River Eulachon ranged from 0.03–3.03%, including the total harvest from non-treaty commercial, recreational, and tribal ceremonial and subsistence fishing (Table A-6). The proposed harvest rates identified in this plan are similarly conservative, to ensure that there will be no adverse biological effects on the Eulachon population. Furthermore, the timing of fisheries is unlikely to disproportionately affect early- or late-migrating fish.

The following section outlines pre-season management considerations to inform target harvest rates at the onset of the season. Although monitoring has improved over the past decade, Eulachon are still largely a data-poor species. This plan uses the best scientific information available and a precautionary approach with low conservative harvest rates until more information becomes available. The States will strive to improve the information base for Eulachon to better inform conservation and management actions.

Pre-Season Planning:

At the onset of a given season, three pre-season abundance indicators will be evaluated to assign an initial Harvest Phase. These pre-season abundance indicators, described in more detail below, include an analysis of (P1) the mean run-size over the previous three years, (P2) the two-year trend in abundance (i.e., has the abundance been increasing or decreasing over the previous two seasons), and (P3) the trend in forecasted abundance for the upcoming season (i.e., is the run size projected to increase or decrease from the previous season). The Harvest Phases range from Harvest Phase 1 (lowest harvest rate) to Harvest Phase 4 (highest harvest rate) and represent a stepwise approach to determining a sustainable target harvest rate and informing the commercial and recreational harvest opportunities available at the onset of a given season (Table 1; Table 2).

Table 1. Evaluation of the P1, P2, and P3 pre-season abundance indicators inform the selection of the Harvest Phase and target harvest rate at the onset of the season. Pre-season indicator 1 (P1) is the mean run-size over the previous three years. Pre-season indicator 2 (P2) is the two-year trend in abundance (i.e., has the abundance been increasing or decreasing over the previous two seasons). Pre-season indicator 3 (P3) is the trend in forecasted abundance for the upcoming season (i.e., is the run size projected to increase or decrease from the previous season).

Harvest Phase	Pre-Season Target Harvest Rate	P1 (in millions of pounds) min	P1 (in millions of pounds) max	P2	P3
1	1%	-	1.5	--	--
		1.5	5.9	negative	negative
2	2%	1.5	5.9	positive	negative
		1.5	5.9	negative	positive
		6.0	20.5	negative	negative
3	5%	1.5	5.9	positive	positive
		6.0	20.5	positive	negative
		6.0	20.5	negative	positive
4	10%	6.0	20.5	positive	positive
		20.6	+	--	--

Table 2. Annual total catch guidelines (in pounds of fish), based on the maximum post-season run size (in pounds of fish) for each corresponding harvest phase. Actual total catch guidelines will vary, depending on the pre-season abundance indicators, in-season monitoring data, and projected post-season run size estimate.

Harvest Phase	Total Post-Season Run Size	Post-Season Total Harvest Rate	Total Catch Guideline
1	< 1,500,000	1%	< 15,000
2	5,900,000	2%	118,000
3	20,500,000	5%	1,025,000
4	50,000,000	10%	5,000,000

Pre-Season Abundance Indicators

P1: Mean run-size over previous three years.

Pre-season abundance indicator 1 (P1) is used to evaluate recent run-sizes. P1 is calculated using a three-year arithmetic mean adult smelt run-size to the Columbia River. Three years is the average age-at-return for Eulachon in the Columbia River and represents the most relevant recent information for determining the upcoming run-size, due to extreme annual variability and the cyclical nature of forage fish species, as observed in Figure 3.

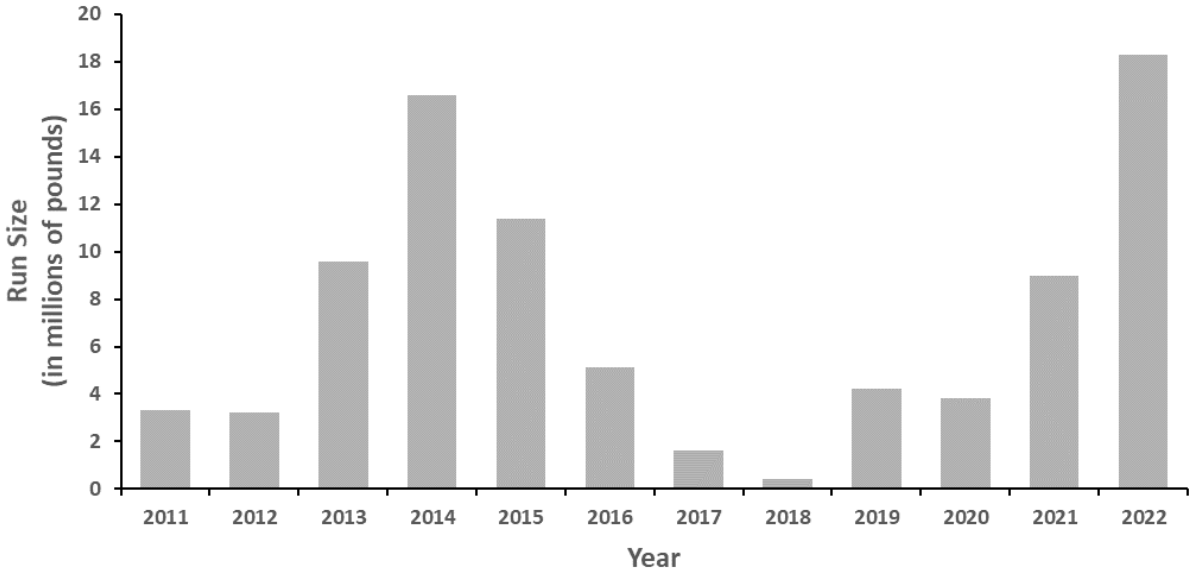

Figure 3. The 2011–2022 mean estimated Columbia River Eulachon run size in millions of pounds of spawning adult fish. The 2020 run size estimate is considered incomplete due to a truncated sampling season as a result of the COVID-19 pandemic.

In the five-year review, NMFS outlined the target abundances for the Columbia River Eulachon sub-population to evaluate recovery (NFMS 2022). The low target abundance of 66,500,000 spawners equates to approximately 5.9 million pounds of fish, and the high target abundance of 229,500,000 spawners equates to approximately 20.5 million pounds of smelt. These values were used to inform the abundance ranges for the P1 indicator. The P1 values were then blocked into ranges of 1.5 million pounds of fish or fewer, 1.6–5.9 million, 6.0–20.5 million, and 20.6 million pounds of fish or greater.

The following represents an example of the use of this indicator for the 2023 season. The States would average the 2020–2022 run size estimates of 3.8 million, 9 million, and 18.3 million pounds, respectively (found in Table A-6). This gives a P1 value of 10.4 million pounds for 2023. This value would then be compared to the blocked ranges for P1 , which would place it within the range of 6.0–20.5 million pounds of fish. Therefore, evaluation of the P1 indicator

determines that the 2023 season would start in Harvest Phase 2, 3, or 4. The Harvest Phase selection is further refined by the use of the P2 and P3 pre-season abundance indicators.

P2: Trend in run-size over previous two years.

Pre-season abundance indicator 2 (P2) is used to evaluate the trend in abundance using past data. P2 is determined by calculating the difference in the run size over the past two years and evaluating whether the resulting value is positive or negative. This short time frame of two years is necessary due to the short cyclical nature of Eulachon abundance and the rapidity at which changes in abundance can occur. The use of this recent trend data serves as a check on the P1 abundance indicator, which has the potential to over- or under-estimate in-season abundance, and provides the flexibility to increase or decrease the harvest rate based on recently observed run-sizes.

The following represents an example of the use of this indicator for the 2023 season. The States would calculate the difference of between 2021 and 2022 run sizes of 9 million and 18.3 million pounds, respectively (found in Table A-6). The resulting value of +9.3 million indicates an increasing (or positive) trend in run sizes over the previous two years. To build off the previous example, evaluation of the P2 indicator for the 2023 season would further narrow the Harvest Phase selection to either Harvest Phase 3 or 4. The final step in identifying the appropriate Harvest Phase incorporates the P3 pre-season abundance indicator.

P3: Trend in forecasted run abundance.

Pre-season abundance indicator 3 (P3) is used to evaluate the predicted trend of abundance for the upcoming season using forecasted data.

Due to data limitations, a qualitative forecast has been developed for Eulachon abundance using environmental and biological indices which are summarized into two primary phases of the Eulachon life cycle—the freshwater phase and ocean phase. Freshwater indices include Columbia River temperatures, river flow anomalies, estuary water particle residence time, and the Columbia River plume volume. Ocean indices include those found within the "stoplight chart" developed annually by NMFS (https://www.fisheries.noaa.gov/content/ocean-conditions-indicators-trends). The use of these freshwater and marine indicators is supported by statistical analyses conducted by Sharma et al. (2017) and Montgomery (2020). Sharma et al. (2017) found that decreased Eulachon abundances correlated with increases in Sea Surface Temperature (SST) and increased survival and abundance correlated with the timing of the spring transition of larvae to the marine environment, the magnitude of the upwelling, and reductions in SST. Montgomery (2020) identified large-scale oceanic drivers, such as the status of the Pacific Decadal Oscillation (PDO), and bottom-up biological indicators, like copepod biomass, as important factors affecting Eulachon abundance. Where available, additional indices may also be considered, including coastal shelf hypoxia, Pink Shrimp trawl fishery

bycatch of Eulachon, and the abundance metrics of other forage fish species (i.e., herring, sardine, and anchovy).

Although the majority of Eulachon return at 3-years, it is common to see fish ranging from 2–5 years within a spawning run. Therefore, these cohort survival factors are compared across the brood years that make up the spawning run and the forecasted contribution of each brood year is assessed (Table 2). The States evaluate the forecasted contribution of each brood year and determine if a positive (increasing) or negative (decreasing) abundance trend is projected for the upcoming season. In the event of a neutral forecast or if managers are unable to determine a forecast, The States will assume a negative forecasted trend as a precautionary approach.

Table 3. An example of the summary of factors used to forecast the Columbia River Eulachon adult return in 2023.

		Cohort Survival Factors		
Brood Year	Age at Spawn	Freshwater Phase	Ocean Phase	Forecasted Contribution
2018	5	+	+	+
2019	4	+	+	+
2020	3	0	+	+
2021	2	-	+	0

Table 3 represents an example of the use of the P3 indicator for the 2023 season. Freshwater conditions during the egg and larval period, before entry to the marine environment, make up the freshwater phase. In this example, the fish comprising the two-year-old cohort (2021 brood year) may have experienced lower survival rates during the freshwater phase of their life cycle. This cohort experienced warmer riverine temperatures and lower river flows during their larval stage, which is hypothesized to cause these tiny larvae to burn through yolk-reserves prior to ocean entry where first feeding is thought to initiate. In-river flows were slightly positive during the outmigration period for the three-year-old cohort; therefore, the slightly elevated water temperatures experienced during their outmigration period are thought to be less detrimental to survival. The four- and five-year-old cohorts experienced better freshwater conditions (including a large Columbia River plume volume and low particle residence time) and a higher likelihood of dispersal into the marine environment.

The marine conditions experienced by Eulachon after ocean entry, but before they re-enter freshwater to spawn, make up the ocean phase. Many of the indices from within the marine environment were positive over the past few years, including PDO, Oceanic Niño Index (ONI), and Copepod Richness. However, SST exhibited increases in 2022 and it is uncertain how much of an impact this may have on Eulachon survival in the marine environment. Due to the

generally favorable nature of marine indices in recent years, all brood years in Table 3 were ranked with a positive survival factor during the ocean phase of their life cycle, and fish from these brood years were likely to experience relatively high survival rates within the marine environment. Additionally, fish from the 2018–2020 brood years have already been observed in relatively good numbers during the 2021 and 2022 spawning runs, providing further evidence for their forecasted contribution. The States concluded that the 2023 season is likely to see an abundance of adult Eulachon similar to the previous year (i.e., a neutral forecast).

To continue building off the previous example, the neutral forecast would require states to take a precautionary approach and assume a negative forecasted trend for the P3 indicator. This narrows the final selection for the 2023 season to Harvest Phase 3. In this Harvest Phase, managers would start the season targeting a 5% harvest rate and use information from the following section, as well as any in-season changes to the Harvest Phase selection, to inform the setting of commercial and recreational seasons.

Season Setting

At the onset of the season, the selection of Harvest Phase determines a pre-season target harvest rate and target harvest guidelines (Table 2) to inform management recommendations on the allowable open areas and periods for commercial and recreational fisheries. To maximize adaptability at meeting these harvest guidelines and ensure longevity of the plan, regulation of daily bag limits, allowable gear types, and final selection of fishing periods and areas will be determined at the discretion of The States.

Commercial Fishery Recommendations:

To aid in monitoring the run size throughout the season, it is recommended that commercial periods span the entire season. During years in which the season begins at a lower Harvest Phase, managers are encouraged to target fishing periods from February to early March, when the peak of the run is mostly likely to occur. During years that start in a higher Harvest Phase, managers may consider opening commercial fisheries earlier in January to aid in collecting early-season run data and extending them through May to collect late-season run data.

It is recommended that seasons are set using a 12-hour minimum window to enable commercial fishers to target a useable tide for capturing smelt. If inadequate hours are provided, fishers will avoid fishing on days without an appropriate tide and limit the collection of monitoring data. Specific tidal choice may vary by fisher and river mile.

During phases in which commercial fishing opportunity exists, the data collected during the commercial fishery may be used as an in-season upgrade or downgrade harvest trigger, changing the Harvest Phase and subsequent allowable harvest opportunities. The in-season Harvest Triggers are described in more detail below.

Recreational Fishery Recommendations:

Recreational fishing opportunities will only be opened at Harvest Phase 2 or higher due to the intense harvest pressure these fisheries can create during a short window of time, and the risk this poses to exceeding the allowable harvest rate. While in Harvest Phase 2 or higher, it is recommended that open periods on the Cowlitz River are set only after commercial landings reach a minimum daily CPUE of 200 pounds per delivery for at least one period to ensure adequate harvest opportunity exists. In the absence of adequate commercial landings data and for recreational fishing opportunities in the Sandy River, managers may use their discretion to set recreational fishing periods.

In just a few hours of fishing, tens of thousands of recreational anglers may dip smelt along the banks of the Cowlitz River. Due to the magnitude of this fishery, it is recommended that managers work closely with Cowlitz County, and the WDFW customer service, enforcement, Region 5 Director, Fish Program Manager, Cowlitz River Hatchery Operations Manager, and District Fish Biologist to coordinate season setting, regulation enforcement, and operation of an effective creel survey. At any phase less than the highest Harvest Phase, it is recommended that recreational openers are not set on back-to-back days and are only open during daylight hours to maintain orderly fisheries and to stay within the target harvest rate. Additionally, it is recommended that managers set a daily bag limit and require the use of individual containers for each angler.

The States will evaluate harvest after every day of recreational fishing, comparing total harvest to the allowable harvest, prior to proceeding with an additional day of recreational fishing.

Harvest Phase 1:

Harvest Phase 1 is assigned to a season in which all indicators point to a very poor return of adult Eulachon and the in-season run size is likely to land below 1.5 million pounds of fish for the Columbia River (Table 1). No recreational fishing opportunity would be allowable for the duration of a season starting in this phase. During this phase, a 1% harvest rate would allow for minimal commercial fishing opportunity and provide a primary monitoring tool for evaluating run-size in-season.

Harvest Phase 2:

Harvest Phase 2 is assigned to a season in which the in-season run size is likely to land below the low target abundance of 5.9 million pounds of fish (Table 1). During this phase, a 2% harvest rate would allow for minimal commercial fishing opportunity and limited recreational fishing opportunity.

Harvest Phase 3:

Harvest Phase 3 is assigned when the in-season run size is likely to land above the low target abundance of 5.9 million pounds of fish but is unlikely to exceed the high target abundance of 20.5 million pounds of fish for the Columbia River (Table 1). During this phase, a 5% harvest rate would allow for increased commercial fishing opportunity and increased recreational fishing opportunity.

Harvest Phase 4:

Harvest Phase 4 is assigned to a season in which the in-season run size is likely to exceed the high target abundance of 20.5 million pounds of fish for the Columbia River (Table 1). During this phase, a 10% harvest rate would allow for the least restrictive commercial fishing opportunity and the least restrictive recreational fishing opportunity.

In-Season Harvest Triggers

After the onset of the season, it may become apparent that the actual Eulachon adult run-size is different than originally projected, and an in-season adjustment to the Harvest Phase may be needed. The fishery may be upgraded or downgraded more than once per season, depending on whether the appropriate criteria are met to trigger a change in Harvest Phase. The sections below outline in-season harvest triggers, which may be easily identified by managers to justify an upgrade or downgrade in the Harvest Phase and any subsequent changes in recommendations for commercial and recreational harvest opportunities (Table 4).

Table 4. In-season management triggers to upgrade (top) or downgrade (bottom) the Harvest Phase. Management triggers are based on CPUE data collected in the mainstem commercial fishery; however, this table may be updated to incorporate CPUE data from a standardized test fishery, should one be developed.

In-Season Management: Upgrade Triggers

Starting Harvest Phase	Ending Harvest Phase	Management Trigger
1	2	Daily CPUE >250 lbs for 1 period
2	3	Daily CPUE >400 lbs for 3 open periods
3	4	Daily CPUE >1000 lbs for 5 open periods

In-Season Management: Downgrade Triggers

Starting Harvest Phase	Ending Harvest Phase	Management Trigger
2 or 3	1	Rolling CPUE <50 after February 25
3 or 4	2	Rolling CPUE <250 after March 1

Upgrade Harvest Triggers

In the event that a spawning run is larger than initially expected, the list of in-season management upgrade triggers (Table 4) outline conditions that will allow managers to upgrade the Harvest Phase in-season. A Harvest Phase upgrade would increase the target harvest rate and may affect managers' recommendations regarding the total number of allowable open periods and areas for commercial and recreational fisheries.

The following represents an example of the use of this upgrade trigger. If it is determined that a season will start in Harvest Phase 1, a recreational fishery would not be initially allowed; however, the States could open commercial fishing periods. If at least 250 pounds per delivery were harvested in at least one open commercial fishing period, this would trigger an upgrade to Harvest Phase 2. Under Harvest Phase 2, it is allowable for managers to then set recreational fishing periods. Additionally, under Harvest Phase 2, managers may use their discretion to extend the total number of commercial fishing periods.

Downgrade Harvest Triggers

In the event that a spawning run is smaller than initially predicted, the list of in-season management downgrade triggers (Table 4) outline conditions that will allow managers to downgrade the Harvest Phase in-season. A Harvest Phase downgrade would decrease the target harvest rate and may affect the recommendations for total number of allowable open periods and areas for commercial and recreational fisheries. If adjusted to Harvest Phase 1, this downgrade may eliminate recreational fishing opportunity for the season.

The following represents an example of the use of this downgrade trigger. If it is determined that a season will start in Harvest Phase 3, managers may set several commercial and recreational fishing periods at the onset of the season. However, if the rolling CPUE of the commercial fishery is not at least 50 pounds per delivery by February 25, then the run may not be sufficient to support ongoing fishing opportunity. This would trigger a downgrade to Harvest Phase 1. Under Harvest Phase 1, managers will rescind any previously set recreational fishing opportunities.

It should be noted that the dates used for these triggers represent the typical run-timing of Eulachon for current fisheries; however, these dates or the management approach may need to be changed in the future as climate change impacts to run timing are better understood.

Likelihood of managing within the Harvest Phases

To evaluate the potential of the various Harvest Phases occurring, the pre-season indicators were considered, and an initial Harvest Phase assigned to every year since 2014 (Table 5). In that time, all Harvest Phases would have been assigned to start the season at least one time, with Harvest Phases 2 and 3 assigned to start the season in four years each. Harvest Phase 4, which allowed for the highest harvest rate of 10%, was only achieved once during this period.

In only one year was the Post-Season Harvest Phase different than the Pre-Season Harvest Phase assignment, and this change was due to low catches in the commercial fishery triggering an in-season downgrade. Note the difference in Pre-Season and Post-Season Target Harvest—even though the Harvest Phase may remain the same, the actual Target Harvest at the end of the season may vary considerably from the pre-season expectations based on in-season monitoring data. This plan is very responsive to in-season monitoring data, allowing managers to scale up or down fishing opportunity as in-season run size information becomes available. Therefore, this plan does not rely solely upon the use of pre-season expectations to manage recreational and commercial fisheries.

Table 5. An exercise to evaluate the 2014–2023 harvest targets if these seasons had been managed following this management plan. The table demonstrates the Pre-Season Harvest Phase assignments and the how these assignments, and subsequent target harvest, would have changed Post-Season, through evaluation of in-season monitoring. The 2011–2013 run size data are displayed to inform the P1 indicator values for 2014 and on; however, the Pre-Season Abundance Indicators (P1, P2, and P3) cannot be determined for these years. Note, the 2023 run size is a preliminary estimate at the time of this publication.

Year	Run Size (in millions)	P1	P2	P3	Pre-Season Harvest Phase	Pre-Season Target Harvest Rate	Pre-Season Target Harvest using P1	Post-Season Harvest Phase	Post-Season Target Harvest Rate	Post-Season Target Harvest using Run Size	Change in Harvest Phase and Rate from Pre- to Post-Season	Change in Target Harvest from Pre- to Post-Season
2011	3.3											
2012	3.2											
2013	9.6											
2014	16.6	5.4	6.4	1	3	5%	268,000	3	5%	830,000	No Change	562,000
2015	11.4	9.8	7.0	1	4	10%	980,000	4	10%	1,140,000	No Change	160,000
2016	5.1	12.5	-5.2	-1	2	2%	251,000	2	2%	102,000	No Change	-149,000
2017	1.6	11.0	-6.3	-1	2	2%	221,000	2	2%	32,000	No Change	-189,000
2018	0.4	6.0	-3.5	-1	2	2%	121,000	1	1%	4,000	Decreased	-117,000
2019	4.2	2.4	-1.2	-1	1	1%	24,000	1	1%	42,000	No Change	18,000
2020	3.8	2.1	3.8	1	3	5%	103,000	3	5%	190,000	No Change	87,000
2021	9.0	2.8	-0.4	1	2	2%	56,000	2	2%	180,000	No Change	124,000
2022	18.3	5.7	5.2	1	3	5%	283,000	3	5%	915,000	No Change	632,000
2023	*16.9*	10.4	9.3	-1	3	5%	518,000	3	5%	845,000	No Change	327,000

Likelihood of Harvest Triggers Affecting Harvest Phase

To evaluate a recent example of the harvest triggers, the 2021–2023 seasons were examined to determine if any in-season harvest triggers would have occurred if that season had been managed under this plan (Tables 6–8). In 2021 and 2022, no harvest triggers would have occurred to alter the pre-season harvest phase in-season (Table 6, Table 7). In 2023, a harvest trigger to downgrade the fishery from Harvest Phase 3 to Harvest Phase 2 would have occurred on March 1, 2023 (Table 8). On this date, the rolling CPUE in the commercial fishery was only 160 pounds per delivery, which does not meet the criteria of 250 pounds per delivery to stay at Harvest Phase 3 (Table 4). This trigger would have decreased the overall recreational and commercial fishery harvest rate from 5% to 2%. However, the 2023 Eulachon run came in later

than usual, so when the daily CPUE for the commercial fishery was over 400 pounds per delivery for the third time on March 16, 2023, a second harvest trigger would have upgraded the fishery back to Harvest Phase 3 (Table 4). This trigger would have increased the harvest rate back up to 5% and potentially allowed the states to consider additional days of recreational or commercial harvest later in the season.

Table 6. An example of the evaluation of the Harvest Phase throughout the 2021 season if that season had been managed following this management plan.

Open Periods	Daily Pounds	Vessels	Daily CPUE	Rolling CPUE	Harvest Phase
1/28/2021	59	2	30	29.5	2
2/1/2021	0	0	0	30	2
2/4/2021	5	1	5	21	2
2/8/2021	100	1	100	41	2
2/11/2021	22	2	11	31	2
2/15/2021	0	0	0	31	2
2/18/2021	6	1	6	27	2
2/22/2021	4287	7	612	320	2
2/25/2021	4928	9	548	409	2
3/1/2021	1106	5	221	375	2
3/4/2021	462	2	231	366	2
3/8/2021	19	3	6	333	2
3/11/2021	3	1	3	323	2

Table 7. An example of the evaluation of the Harvest Phase throughout the 2022 season if that season had been managed following this management plan.

Open Periods	Daily Pounds	Vessels	Daily CPUE	Rolling CPUE	Harvest Phase
1/26/2022	0	0	0	0	3
1/28/2022	0	0	0	0	3
1/31/2022	0	0	0	0	3
2/2/2022	0	0	0	0	3
2/4/2022	0	0	0	0	3
2/7/2022	0	0	0	0	3
2/9/2022	0	0	0	0	3
2/11/2022	0	0	0	0	3
2/14/2022	0	0	0	0	3
2/16/2022	0	0	0	0	3
2/18/2022	1062	3	354	354	3
2/21/2022	3920	6	653.3	554	3
2/23/2022	5684	4	1421	820	3
2/25/2022	3631	4	907.8	841	3
2/28/2022	1730	2	865	844	3
3/2/2022	3157	2	1578.5	914	3
3/4/2022	2937	2	1468.5	962	3
3/7/2022	2327	3	775.7	940	3
3/9/2022	2245	2	1122.5	953	3
3/11/2022	565	1	565	940	3
3/14/2022	140	1	140	913	3
3/16/2022	0	0	0	913	3
3/18/2022	0	0	0	913	3

Table 8. An example of the evaluation of the Harvest Phase throughout the 2023 season if that season had been managed following this management plan. The highlighted rows indicate the timing of a downgrade or upgrade to the Harvest Phase.

Open Periods	Daily Pounds	Vessels	Daily CPUE	Rolling CPUE	Harvest Phase
1/25/2023	0	0	0	0	3
1/26/2026	160	1	160	160	3
1/30/2023	0	0	0	160	3
2/1/2023	0	0	0	160	3
2/2/2023	0	0	0	160	3
2/6/2023	0	0	0	160	3
2/8/2023	0	0	0	160	3
2/9/2023	0	0	0	160	3
2/13/2023	0	0	0	160	3
2/15/2023	0	0	0	160	3
2/16/2023	0	0	0	160	3
2/20/2023	0	0	0	160	3
2/22/2023	0	0	0	160	3
2/23/2023	0	0	0	160	3
2/27/2023	0	0	0	160	3
3/1/2023	0	0	0	160	2
3/2/2023	0	0	0	160	2
3/6/2023	18	1	18	89	2
3/8/2023	418	1	418	199	2
3/9/2023	373	1	373	242	2
3/13/2023	0	0	0	242	2
3/15/2023	0	0	0	242	2
3/16/2023	757	1	757	345	3

SECTION 4: EFFECTS ON ESA-LISTED SPECIES

ESA Recovery - Eulachon

On March 18, 2010, the southern DPS of Eulachon were listed as threatened under the United States ESA (75 FR 13012). Critical habitat was designated for the southern DPS on October 20, 2011 (76 FR 65324), while protective regulations via section 4(d) of the ESA have not yet been promulgated. As of completion of the 2022 5-year review, the listing status of Eulachon remains unchanged; however, NMFS included the development of recovery abundance targets which were considered and incorporated into the development of this plan (Table 7; NMFS 2022).

Table 9. The demographic recovery criteria for the Columbia River subpopulation, as presented in the 2022 5-year Review: Summary and Evaluation of Eulachon, Southern DPS (NMFS 2022).

Demographic Recovery Criteria for the Columbia River Subpopulation
229,500,000 spawners 24 out of 30 years, and 66,500,000 spawners for 6 out of 30 years
PLUS – presence/absence surveys in the Cowlitz River with presence 27 out of 30 years
PLUS - presence/absence surveys in the Grays River with presence 21 out of 30 years
PLUS - presence/absence surveys in the Sandy River with presence 10 out of 30 years
PLUS - presence/absence surveys in the Lewis River with presence 15 out of 30 years

Eulachon Harvest

The direct effects from harvest on ESA-listed Eulachon will be within the quantified harvest constraints as described in Section 3.

Eulachon Research and Monitoring

The direct effects from research and monitoring will be within the following constraints:

Eulachon Eggs/Larvae: handle/remove up to 50,000 Eulachon eggs and larvae annually.

Eulachon Adults: handle/remove up to 1,000 adult Eulachon annually.

Additional detail regarding existing monitoring efforts is described in more detail in Section 2.

Other Species

No bycatch of other ESA-listed species has been observed as a result of these fisheries. Other adult ESA-listed species that may be present in the management area, such as Green Sturgeon, Chinook Salmon, Coho Salmon, Chum Salmon, Sockeye Salmon, and steelhead, are not likely to

be encountered in these fisheries due to the timing and the use of selective gear types. The species most likely to be encountered throughout the spring fisheries are natural-origin or hatchery-reared juvenile Chinook Salmon, Coho Salmon, Chum Salmon, and steelhead with very low handle and very few to no mortalities expected. The States developed the proposed incidental take amounts found in Table 10, based on assumptions of low to no encounters of the listed species.

Table 10. No bycatch of these ESA-listed species has been observed as a result of these fisheries. For the purposes of an incidental take permit, the states proposed the following estimated take for all Eulachon activities, including research, monitoring, and commercial and recreational fisheries.

Species	ESA-Listing Status	Life stage	Encounters	Mortalities	Justification
Salmonid, spp.	--	Juvenile	100	5	Minimal temporal overlap.
Snake River Sockeye	Endangered	Adult	1	1	Low abundance and no temporal overlap.
Upper Columbia Spring Chinook Salmon	Endangered	Adult	5	1	Minimal temporal overlap.
Columbia River Chum Salmon	Threatened	Adult	5	1	Minimal temporal overlap.
Columbia River Coho Salmon	Threatened	Adult	5	1	Minimal temporal overlap.
Green Sturgeon, Southern DPS	Threatened	Sub-adult/Adult	1	1	No temporal overlap.
Lower Columbia River Fall Chinook Salmon	Threatened	Adult	1	1	No temporal overlap.
Lower Columbia River Spring Chinook Salmon	Threatened	Adult	5	1	Minimal temporal overlap.
Lower Columbia River Steelhead	Threatened	Adult	5	1	Minimal temporal overlap.
Middle Columbia River Steelhead	Threatened	Adult	5	1	Minimal temporal overlap.
Snake River Fall Chinook Salmon	Threatened	Adult	1	1	No temporal overlap.
Snake River Spring Chinook Salmon	Threatened	Adult	5	1	Minimal temporal overlap.
Snake River Steelhead	Threatened	Adult	1	1	No temporal overlap.
Snake River Summer Chinook Salmon	Threatened	Adult	1	1	No temporal overlap.
Upper Columbia Steelhead	Threatened	Adult	1	1	No temporal overlap.
Upper Willamette Spring Chinook Salmon	Threatened	Adult	5	1	Minimal temporal overlap.
Upper Willamette Steelhead	Threatened	Adult	5	1	Minimal temporal overlap.

SECTION 5: COMMUNICATION AND COORDINATION

Harvest

The States consider communication and coordination between harvest entities and NMFS to be an essential component of this plan. In this context, a harvest entity is any state or tribal entity that has authorized or participated in the harvest of Eulachon within the management area for the purpose of recreational, commercial, ceremonial, or subsistence purposes. As such, The States recommend an annual coordination meeting between harvest entities to establish pre-season harvest expectations and to facilitate in-season and post-season communication of harvest. Additionally, The States recommend the development of a harvest reporting tool by NMFS to track in-season harvest of all harvest entities and to determine when the target harvest rate has been met.

Enforcement

Non-treaty commercial and recreational fishery regulations are enforced by the WDFW Enforcement Program and the Oregon State Police (OSP). The WDFW Enforcement Program's

commissioned police officers hold general-authority peace officer certifications and provide protection for the state's fish and wildlife habitats and species, respond to human/wildlife contacts, and conduct outreach and education activities for both the citizens and resource users of Washington State. The mission and responsibilities of the Enforcement Program originate with statutes promulgated in several titles of the Revised Code of Washington (RCW) and Washington Administrative Code (WAC). Primary among these is RCW Title 77 - Fish and Wildlife, and WAC 220 – Fish and Wildlife.

Commissioned WDFW Fish and Wildlife Officers (FWOs) stationed in six regions throughout the state work with a variety of state and federal agencies to enforce all fish and wildlife laws, general authority laws, and WDFW rules. FWOs hold commissions with the United States Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration's Office of Law Enforcement (NOAA-OLE), and therefore have jurisdiction over specific federal violations. Officers work joint patrols and coordinate with these federal agencies as well as with the United States Coast Guard (USCG), United States Forest Service (USFS), Federal Bureau of Investigation (FBI), Bureau of Land Management (BLM), tribal police, and the Department of Homeland Security (DHS).

We anticipate that WDFW and OSP enforcement activities will continue similarly to recent years for the duration of this plan. Outreach and education will continue to complement enforcement to improve compliance with fishing regulations and contribute to achieving the biological objectives of the plan.

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APPENDIX A: Additional Figures and Tables

Table A-1. Mainstem Columbia River commercial smelt seasons, 1960–2022 (ODFW and WDFW 2023).

Year	Season	Fishery Level [1]	Weekly Period	Days Open
1960–1964	Jan. 1 – Dec. 31	--	12 PM Sat – 12 AM Wed	~255
1965–1966	Jan. 1 – Dec. 31	--	12 PM Sat – 12 AM Wed	~307
1967–1977	Jan. 1 – Dec. 31	--	12 PM Sat – 12 AM Wed	~255
1978–1984	Jan. 1 – Dec. 31	--	7 days/week	365
1985	Jan. 1 – Dec. 31	--	7 d/wk (upstream of Cowlitz R. 2/22–3/1)	365
1986–1994	Dec. 1 – Mar. 31	--	7 days/week	121
1994/1995	Dec. 7 – Jan. 7	--	7 days/week	38
	Jan. 7 – Mar. 31	--	8 PM Sat – 8 AM Wed	48
1995/1996	Dec. 1 – Feb. 2	--	7 days/week	64
	Feb. 3 – Mar. 31	--	Noon Mon – 6 PM Fri	32
1996/1997	Dec. 1 – Jan. 27	--	7 days/week	58
	Jan. 30 – Feb. 21	--	6 AM Thu – 6 PM Fri	8
1997/1998	Dec. 1 – Dec. 31	--	7 days/week	31
	Jan. 2 – Feb. 13	--	6 AM – 6 PM Mon & Fri	13
1998/1999	Dec. 1 – Dec. 23	--	7 days/week	23
	Dec. 30 – Feb. 10	--	7 AM – 7 PM Wed	7
	Jan. 31, Feb. 7, & Feb. 18	--	7 AM – 7 PM	3
1999/2000	Dec 1 – Dec 26	--	7 days/week	26
	Dec. 29 Feb. 23	--	7 AM – 7 PM Wed	9
2000/2001	Dec 1 – Dec 31	--	7 days/week, 24 hrs/day	31
	Jan. 3 – Mar. 7	One	3 AM – 9 PM Wed	10
	Mar. 12 – Mar. 31	Two (3/06)	3 AM – 9 PM Mon & Wed	6
2001/2002	Dec. 1 – Dec. 31	--	7 days/week, 24 hrs/day	31
	Jan. 2 – Jan. 31	Two	3 AM – 9 PM Sun & Wed	9
	Feb. 1 – Mar. 31	Two (1/31)	3 AM – 9 PM Sun, Wed & Fri	26
2002/2003	Dec. 1 – Dec. 31	--	7 days/week, 24 hrs/day	31
	Jan. 1– Mar. 31	Three	3 AM – 9 PM Sun, Tues, Thurs, & Fri	51
2003/2004	Dec. 1– Dec. 31	--	7 days/week, 24 hrs/day	31
	Jan. 1 – Mar. 21	Three	3 AM – 9PM Sun, Tues, Thurs, & Fri	34
	Mar. 22– Mar. 31	Two (3/18)	3 AM – 9 PM Fri, & Sun	2
2004/2005	Dec. 1 – Dec. 31	--	7 days/week, 24 hrs/day	31
	Jan. 1– Feb. 23	Two	3 AM – 9 PM Mon, & Thurs	15
	Feb. 24 – Mar. 31	One (2/23)	3 AM – 9 PM Thurs	6
2005/2006	Dec. 1 – Dec. 31	--	7 days/week, 24 hrs/day	31
	Jan. 1 – Mar. 2	One	7 AM – 4 PM Mon, & Thurs	20
	Mar. 7	One (3/08)	7 AM – 4 PM Mon	1
	Mar. 13 – Mar. 31	One (3/08)	7 AM – 4 PM Mon & Thurs	6
2006/2007	Dec. 1 – Dec. 31	--	7 days/week, 24 hrs/day	31
	Jan. 1 – Mar. 31	One	7 AM – 4 PM Mon,& Thurs	20
	Mar. 11	One (3/05)	7 AM – 4 PM Sun	1
	Mar. 15– Mar. 31	One (3/05)	7 AM – 4 PM Mon & Thurs	5
2007/2008	Dec. 1 – Dec. 31	--	7 days/week, 24 hrs/day	31
	Jan. 1 – Mar. 31	One	7 AM – 4 PM Mon & Thurs	26
2008/2009	Dec. 1 – Dec. 31	--	7 days/week, 24 hrs/day	31
	Jan. 1 – Mar. 31	One	7 AM – 2 PM Mon & Thurs	26
2009/2010	Dec. 1 – Dec. 31	--	7 days/week, 24 hrs/day	31
	Jan. 1 – Mar. 31	One	7 AM – 2 PM Mon & Thurs	25
2011–2013	Closed	--	--	0
2014	Feb. 10 – Mar. 6	< One	7 AM – 2 PM Mon & Thurs	8
2015	Feb. 2 – Feb. 26	< One	7 AM – 2 PM Mon & Thurs	8
2016	Feb. 1 – Feb. 25	< One	7 AM – 2 PM Mon & Thurs	8
2017	Feb. 2 – Feb. 27	< One	7 AM – 2 PM Mon & Thurs	8
2018	Feb. 1 – Feb. 26	< One	7 AM – 2 PM Mon & Thurs	8
2019	Closed	--	--	0
2020	Feb. 3 – Feb. 27	< One	5 AM – 5 PM Mon & Thurs	8
2021	Jan. 28 – Mar. 11	< One	5 AM – 5 PM Mon & Thurs	13
2022	Jan. 26 – Mar. 28	< One	5 AM – 5 PM Mon, Wed, & Fri	27

[1] *Fishery levels are described in the Joint State Eulachon Management Plan.*

[2] *Commercial fisheries were closed December 2010 through 2013, following the ESA listing of Eulachon as a threatened species, and again in 2019 due to projected low run abundance.*

Table A-2. Washington and Oregon tributary commercial smelt seasons, 2002–2022 (ODFW and WDFW 2023).

Year	Cowlitz River [2]	Kalama River [3]	Lewis River [4]	Oregon Rivers
2002	***1/02–1/31:*** 6 PM Sun – 6 AM Mon, and 6 PM Wed – 6 AM Thu ***2/01–2//25:*** 6 PM Sun – 6 AM Mon, and 6 PM Tue – 6 AM Wed, and Wed – 6 AM Thu ***2/26–3/31:*** 6 PM Sun – 6 AM Mon, and 6 PM Tue – 6 AM Wed, and Wed – 6 AM Thu, and 6 PM Thu – 6 AM Fri	***2/05–2/25:*** 6 PM Sun – 6 AM Mon, and 6 PM Tue – 6 AM Wed, and Wed – 6 AM Thu ***2/26–3/31:*** 6 PM Sun – 6 AM Mon, and 6 PM Tue – 6 AM Wed, and Wed – 6 AM Thu, and 6 PM Thu – 6 AM Fri	***2/05–3/31:*** 6 PM Sun – 6 AM Mon, and 6 PM Tue – 6 AM Wed, and Wed – 6 AM Thu ***2/26–3/31:*** 6 PM Sun – 6 AM Mon, and 6 PM Tue – 6 AM Wed, and Wed – 6 AM Thu, and 6 PM Thu – 6 AM Fri	24-hours daily
2003	***1/01–3/31:*** 6 PM Sun – 6 AM Mon, and 6 PM Tue – 6 AM Wed, and 6 PM Wed – 6 AM Thu	***1/01–3/31:*** 6 PM Sun – 6 AM Mon, and 6 PM Tue – 6 AM Wed, and 6 PM Wed – 6 AM Thu	***1/01–3/31:*** 6 PM Sun – 6 AM Mon, and 6 PM Tue – 6 AM Wed, and 6 PM Wed – 6 AM Thu	24-hours daily
2004	***1/01–3/17:*** 6 PM Sun – 6 PM Tue and 6 PM Wed – 6 PM Fri ***3/18–3/31:*** 6 PM Sun – 6 AM Mon and 6 PM Wed – 6 AM Thu	***1/01–3/17:*** 6 PM Sun – 6 PM Tue and 6 PM Wed – 6 PM Fri ***3/18–3/31:*** 6 PM Sun – 6 AM Mon and 6 PM Wed – 6 AM Thu	***1/01–3/17:*** 6 PM Sun – 6 PM Tue and 6 PM Wed – 6 PM Fri ***3/18–3/31:*** 6 PM Sun – 6 AM Mon and 6 PM Wed – 6 AM Thu	24-hours daily
2005	***1/01–2/22:*** 6 PM Sun – 6 AM Mon and 6 PM Wed – 6 AM Thu ***2/23–3/31:*** 6 PM Wed – 6 AM Thu	Closed	***1/01–2/22*** 6 PM Sun – 6 AM Mon and 6 PM Wed – 6 AM Thu ***2/23–3/31:*** 6 PM Wed – 6 AM Thu	24-hours daily
2006	***1/01–3/31:*** 6 PM –11:59 PM Sun and Wed	Closed	Closed	24-hours daily
2007	***1/01–3/31:*** 6 PM –11:59 PM, Sun and Wed	Closed	Closed	24-hours daily
2009	***1/01–3/31*** 6AM – 10:PM, Saturdays:	Closed	Closed	24-hours daily
2010	***2/03–2/28*** 7 PM –10 PM Sun and Wed	Closed	Closed	24-hours daily through November
2011–2022 [5]	Closed	Closed	Closed	Closed

[1] *Washington tributaries not listed were closed by emergency regulation during this period. All tributary commercial fisheries are restricted to dip net gear.*

[2] *Area restricted to downstream of Peterson's Eddy (approximately River Mile [RM] 8.0).*

[3] *Area restricted to downstream of Modrow Bridge (RM 2.9).*

[4] *Area restricted to the mainstem and North Fork downstream from the overhead powerlines near Eagle Island (approximately RM 11.5).*

[5] *Tributary commercial fisheries were closed effective December 2010, following the ESA listing of Eulachon as a threatened species. These fisheries have not been re-established since closing.*

Table A-3. Columbia River and tributary commercial Eulachon landings (in thousands of pounds), 1938–2022 (ODFW and WDFW 2023).

Year (s)		Columbia River [1]	Grays River	Cowlitz River	Kalama River	Lewis River	Sandy River	Total
1938-1949	Range	200-1,000	0-59	1-3,000	0-77	0-2,000	0-1,400	1,000-5,700
	Average	610	18	1,400	13	300	300	3,000
1950-1959	Range	400-1,300	0-16	0-2,000	0-44	0-900	0-500	1,300-2,600
	Average	800	3	700	11	200	100	1,800
1960-1969	Range	100-800	0-53	1,000	0-0	0-82	0-0	800-1,500
	Average	700	10	600	0	8	0	1,100
1970-1979	Range	900	0-6	100	0-300	0-900	0-800	500-3,200
	Average	300	1	1,400	4	100	100	2,000
1980-1989	Range	53-500	0-35	100-3,700	0-8	0-2,700	0-300	500-3,800
	Average	200	4	2,500	1	600	59	2,400
1990-1999	Range	0.2-37	0.0	0-3,673	0-67	0-22	0.0	9-3,674
	Average	13	0.0	1,029	7	2	0.0	1,051
2000-2009	Range	0.1-159	0.0	0-464	0.0	0-529	0-23	0.2-1083
	Average	37	0	102	0	102	2	244
2010		3.6	0.0	0.0	0.0	0.0	0.0	3.6
2011-2013 [2]		--	--	--	--	--	--	--
2014		18.6	0.0	0.0	0.0	0.0	0.0	18.6
2015		16.5	0.0	0.0	0.0	0.0	0.0	16.5
2016		4.8	0.0	0.0	0.0	0.0	0.0	4.8
2017		5.0	0.0	0.0	0.0	0.0	0.0	5.0
2018		0.1	0.0	0.0	0.0	0.0	0.0	0.1
2019 [2]		--	--	--	--	--	--	--
2020		10.3	0.0	0.0	0.0	0.0	0.0	10.3
2021		11.0	0.0	0.0	0.0	0.0	0.0	11.0
2022		27.4	0.0	0.0	0.0	0.0	0.0	27.4

[1] *Season totals may contain landings from previous December.*

[2] *Commercial fisheries were closed December 2010 through 2013, following the ESA listing of Eulachon as a threatened species, and again in 2019 due to projected low run abundance.*

Table A-4. Eulachon catch-per-unit-effort (CPUE) and landings in Columbia River commercial fisheries, 1990–2022 (ODFW and WDFW 2023).

	CPUE's by Calendar Week								Season Totals	
Year	5	6	7	8	9	10	11	12	CPUE	Pounds [2]
1990	0	0	0	0	0	0	--	--	709	6,381
1991	0	107	685	0	0	940	--	--	389	5,841
1992	344	232	290	0	0	50	--	--	203	2,644
1993	18	0	224	1,731	2,274	3,100	--	--	1,843	33,172
1994	0	0	0	0	35	109	--	--	59	235
1995	216	250	67	0	137	35	--	--	180	7,612
1996	122	0	445	59	150	20	--	--	95	7,208
1997	161	216	672	214	0	0	--	--	304	37,069
1998	94	30	17	0	0	0	--	--	134	11,866
1999	143	183	297	110	0	0	--	--	172	20,834
2000	371	123	330	241	37	0	--	--	211	31,042
2001	0	520	1,604	2,322	3,875	2,194	--	--	2,033	158,809
2002	1,401	2,014	106	0	2,057	7,320	--	--	1,920	57,980
2003	445	581	778	4,350	2,216	2,486	--	--	1,132	66,875
2004	34	693	368	47	21	153	--	--	548	15,431
2005	25	28	0	0	0	0	--	--	27	108
2006	194	209	14	0	0	0	--	--	157	13,099
2007	0	0	0	209	163	39	--	--	153	8,702
2008	0	63	210	58	1	0	--	--	133	11,381
2009	34	3	65	50	45	47	--	--	101	5,539
2010	43	22	7	3	0	0	--	--	96	3,539
2011-13 [3]	--	--	--	--	--	--	--	--	--	--
2014	--	--	0	32	631	200	--	--	453	18,558
2015	--	76	534	469	61	--	--	--	435	16,546
2016	--	146	225	148	36	--	--	--	166	4,822
2017	1	0	258	121	53	--	--	--	167	5,019
2018	51	8	0	0	0	--	--	--	37	110
2019 [3]	--	--	--	--	--	--	--	--	--	--
2020	--	198	402	261	81	--	--	--	250	10,255
2021	30	5	41	6	576	224	6	--	323	10,997
2022	0	0	0	354	945	1,304	856	140	913	27,398

[1] *CPUE = pounds per delivery.*

[2] *May include landings from previous December.*

[3] *Commercial fisheries were closed December 2010 through 2013, following the ESA listing of Eulachon as a threatened species, and again in 2019 due to projected low run abundance.*

Table A-5. Lower Columbia River mainstem and tributary recreational smelt seasons, 1960–2022 (ODFW and WDFW 2003; ODFW and WDFW 2023).

Year	Season Structure
1960–1996	The Columbia River and tributaries open seven days per week the entire year (Washington: 20-lbs daily limit; Oregon: 25-lbs daily limit).
1997	The Columbia River and Oregon tributaries open seven days per week the entire year (Washington: 20-lbs daily limit; Oregon: 25-lbs daily limit). Washington tributaries closed effective February 28.
1998	The Columbia River and Oregon tributaries open seven days per week the entire year (Washington: 10-lbs daily limit; Oregon: 25-lbs daily limit). Washington tributaries closed effective February 2.
1999	The Columbia River and Oregon tributaries open seven days per week the entire year (Washington: 20-lbs daily limit; Oregon: 25-lbs daily limit). Washington tributaries were open on Wednesdays and Saturdays from January 2 through February 13.
2000	The Oregon portion of the Columbia River and Oregon tributaries open seven days per week the entire year. The Cowlitz River was open on Fridays and Saturdays from January 1 through February 26. The Washington portion of the Columbia River and all other Washington tributaries were closed the entire year.
2001	The Oregon portion of the Columbia River and Oregon tributaries open seven days per week the entire year and the Washington portion of the Columbia River was open seven days per week from February 24 through March 31. The Cowlitz River was open on Saturdays from January 6 through March 6. All Washington tributaries, including the Cowlitz River, were open on Saturdays, Sundays, and Wednesdays from March 7 to March 18, and Saturdays, Sundays, Mondays, and Wednesdays from March 19 through March 31.
2002	The Columbia River and Oregon tributaries open seven days per week the entire year. Washington tributaries open Saturdays, Sundays, and Wednesday from 6 AM to 10 PM during January 1–February 25, 2002. Washington tributaries open seven days per week from 6 AM to 10 PM during February 26–March 31, 2002.
2003	The Columbia River and Oregon tributaries open seven days per week the entire year. Washington tributaries open seven days per week from 6 AM to 10 PM during January 1–March 31, 2003.
2004	The Oregon portion of the Columbia River and Oregon tributaries open seven days per week the entire year (25-lbs. daily limit), and the Washington portion of the Columbia River was open seven days per week during January 1–March 31, 2004 (20-lbs. daily limit). Washington tributaries were open seven days per week from 6 AM to 10 PM during January 1–March 19, 2004, and on Wednesdays and Saturdays from 6 AM to 10 PM during March 19–31, 2004 (20-lbs. daily limit).
2005	The Oregon portion of the Columbia River and Oregon tributaries open seven days per week the entire year (25-lbs. daily limit), and the Washington portion of the Columbia River was open seven days per week during January 1–March 31, 2005 (25-lbs. daily limit). Washington tributaries (Grays River, Cowlitz River, Kalama River, and Lewis River) were open on Tuesdays and Saturdays from 6 AM to 10 PM during January 1–February 23, 2005 (10-lbs. daily limit), and in the Cowlitz River only, on Saturdays from 6 AM to 10 PM during February 26–March 31, 2005 (10-lbs. daily limit).
2006–2009	The Oregon portion of the Columbia River and Oregon tributaries open seven days per week the entire year (25-lbs. daily limit), and the Washington portion of the Columbia River was open seven days per week during January 1– March 31 (25-lbs. daily limit). Washington tributaries were closed with the exception of the Cowlitz River, which was open on Saturdays only, from 6 AM to 10 PM, during January 1–March 31 (10-lbs. daily limit).
2010	The Oregon portion of the Columbia River and Oregon tributaries open seven days per week the entire year (10-lbs. daily limit), and the Washington portion of the Columbia River was open seven days per week during January 1–March 31 (10-lbs. daily limit). Washington tributaries were closed with the exception of the Cowlitz River, which was open on Saturdays only from 7 AM to 3 PM, during February (10-lbs. daily limit).

Table continued next page.

Continuation of Table A-5. *Lower Columbia River mainstem and tributary recreational smelt seasons, 1960–2022 (ODFW and WDFW 2003; ODFW and WDFW 2023).*

2011–2013 [1]	Closed
2014	Columbia River closed. All tributaries closed except the Cowlitz River on the Washington shore, which was open on Saturdays (6 AM–noon) during February 8 – March 8 (10-lbs. daily limit) and the Sandy River on the Oregon shore, which was open on Saturdays (6 AM–noon) during March 1–22 (10-lbs. daily limit).
2015	Columbia River closed. All tributaries closed except the Cowlitz River on the Washington shore, which was open 6 AM–noon on Saturday February 7 and 14 (10-lbs. daily limit) and the Sandy River on the Oregon shore, which was open 6 AM–noon on Saturday March 7 and Sunday March 15 (10-lbs. daily limit).
2016	Columbia River closed. All tributaries closed except the Cowlitz River on the Washington shore, which was open 7 AM–1PM on Saturday February 6 (10-lbs. daily limit).
2017	Columbia River closed. All tributaries closed except the Cowlitz River on the Washington shore, which was open 8 AM–1 PM on Saturday February 25 (10-lbs. daily limit).
2018–2019 [1]	Closed
2020	Columbia River closed. All tributaries closed except the Cowlitz River on the Washington shore, which was open 8 AM–1 PM on Saturday February 14 amd Wedndesday February 26 (10-lbs. daily limit).
2021	Columbia River closed. All tributaries closed except the Cowlitz River on the Washington shore, which was open 8 AM–1 PM on Tuesday March 2 (10-lbs. daily limit).
2022	Columbia River closed. All tributaries closed except the Cowlitz River on the Washington shore, which was open 8 AM–1 PM on Saturday March 5 (10-lbs. daily limit).

[1] *Recreational fisheries were closed December 2010 through 2013, following the ESA listing of Eulachon as a threatened species, and again in 2018 and 2019 due to projected low run abundance.*

Table A-6. Eulachon run size and estimated harvest in Columbia River commercial, recreational, and tribal fisheries, 2011–2022 (ODFW and WDFW 2023).

Year	Mean estimated SSB (lbs) [1]	Estimated Harvest (lbs)				Harvest Rate
		Commercial	Recreational	Tribal	Combined	
2011	3,300,000	--	--	--	-	0.00%
2012	3,200,000	--	--	--	-	0.00%
2013	9,600,000	--	--	7,470	7,470	0.08%
2014	16,600,000	18,560	203,880	6,970	229,410	1.38%
2015	11,400,000	16,550	290,770	10,400	317,720	2.79%
2016	5,100,000	4,820	141,050	8,560	154,430	3.03%
2017	1,600,000	5,019	541	1,900	7,460	0.47%
2018	400,000	110	--	0	110	0.03%
2019	4,200,000	--	--	23,660	23,660	0.56%
2020 [2]	3,800,000	10,255	35,040	23,900	69,195	1.82%
2021	9,000,000	10,997	91,250	55,940	158,187	1.76%
2022	18,300,000	27,398	169,543	27,385	224,326	1.23%

[1] *Rounded to the nearest 100,000 pounds.*

[2] *The 2020 SSB estimate is incomplete due to truncated sampling during March*

Table A-7. Eulachon larval sampling densities in the lower Columbia River and select tributaries, 1999–2022 (ODFW and WDFW 2023).

	Catch (eggs and larvae per cubic meter) [2]						
Year	Mainstem Columbia	Cowlitz River	Grays River	Elochoman River	Kalama River	Lewis River	Sandy River
1999	0.7	0.2	0.6	0.8	0.4	0.0	0.1
2000	1.3	41.6	25.7	3.5	0.1	0.2	0.1
2001	42.1	192.0	24.4	0.0	5.5	17.6	N/S
2002	28.2	283.0	N/S	N/S	0.5	0.6	N/S
2003	12.3	1.4	N/S	24.5	N/S	36.2	0.1
2004	3.5	0.9	20.4	N/S	N/S	N/S	N/S
2005	0.3	N/S	0.6	N/S	N/S	N/S	N/S
2006	0.7	0.1	0.0	N/S	N/S	N/S	N/S
2007	0.7	2.8	N/S	N/S	N/S	0.3	N/S
2008	1.1	6.2	44.0	3.3	N/S	<0.1	N/S
2009	2.3	0.1	0.2	N/S	N/S	0.5	N/S
2010	1.0	4.2	178.9	N/S	N/S	0.9	N/S
2011	6.0	29.1	0.2	2.0	0.4	<0.1 [3]	N/C
2012	5.9	N/C [4]	1.6	N/S	N/S	N/S	N/S
2013	20.3	N/C [4]	1.4	N/S	N/S	N/S	N/S
2014	49.0	N/C [4]	N/S	N/S	N/S	N/S	N/S
2015	32.5	N/C [4]	13.4	N/S	N/S	N/S	N/S
2016	13.8	N/C [4]	48.7	N/S	N/S	N/S	N/S
2017	2.8	N/C [4]	N/S	N/S	N/S	N/S	N/S
2018	1.1	N/C [4]	N/S	N/S	N/S	N/S	N/S
2019	15.9	N/C [4]	N/S	N/S	N/S	N/S	N/S
2020	13.1	N/C [4]	N/S	N/S	N/S	N/S	N/S
2021	43.0	N/C [4]	N/S	N/S	N/S	N/S	N/S
2022	47.1	N/C [4]	N/S	N/S	N/S	N/S	N/S

[1] *Inter-annual comparisons of abundance are tentative as sampling has not been systematic from year to year. Mainstem Columbia R. data since 2003 includes multiple collections at Price Island and Clifton Channel sites.*

[2] *N/S = not sampled. N/C = larval density not calculated, but some larvae collected.*

[3] *Average density observed by the Cowlitz Tribe Natural Resources staff was 28 larvae per cubic meter.*

[4] *Average density observed by the Cowlitz Tribe Natural Resources staff, but unavailable.*

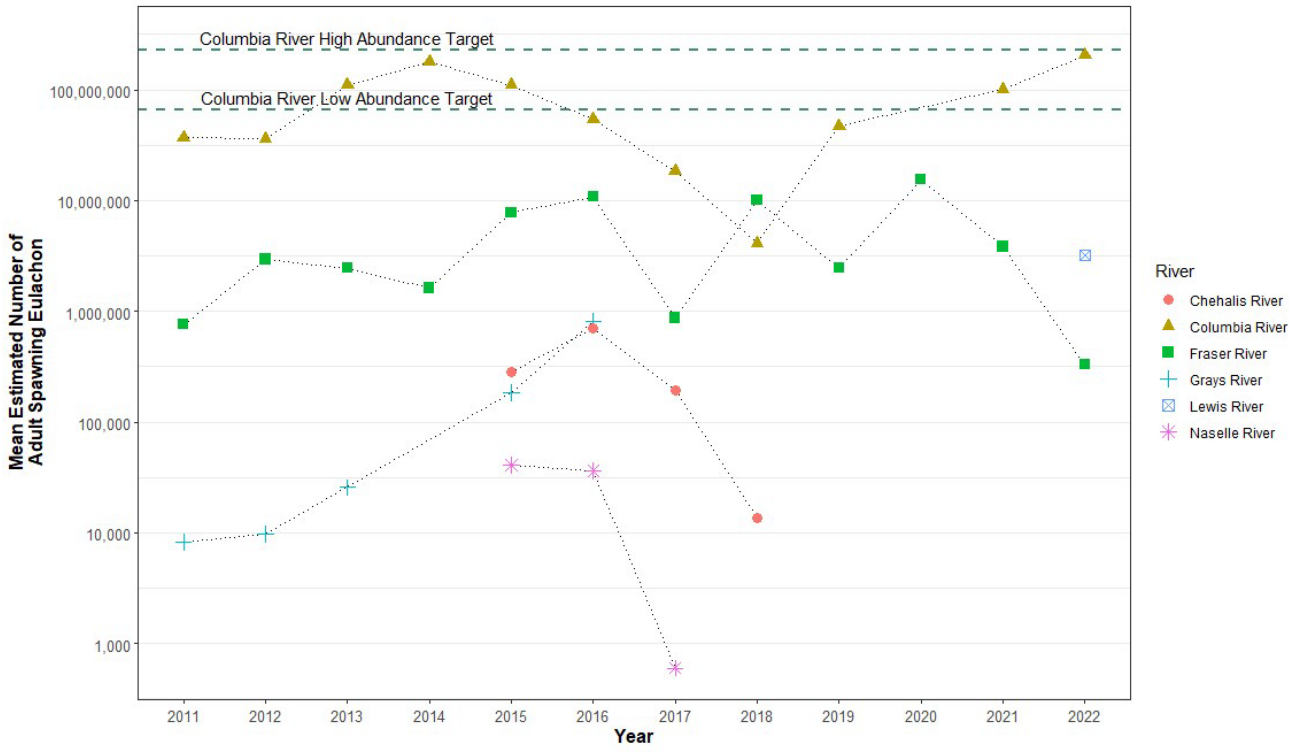

Figure A-1. The estimated number of Eulachon spawning in the Columbia, Fraser, Chehalis, Naselle, and Grays rivers in 2011–2022. Estimates are calculated by multiplying the annual Spawning Stock Biomass (SSB) total weight by a standard 11.16 fish per pound. Estimates for the Fraser River derived from data provided by the Canadian Department of Fisheries and Oceans (DFO; Fisheries and Oceans Canada 2023). The Fraser River estimate for 2022 was not finalized at the time of this publication. No estimate for the Columbia River is available for 2020 due to truncated sampling (ODFW and WDFW 2023)