(d) Subject

Air Transport Association (ATA) of America Code 35, Oxygen.

(e) Reason

This AD was prompted by reports of occurrences of incorrect usage of certain PBEs. The FAA is issuing this AD to address incorrect usage of PBEs. The unsafe condition, if not addressed, could lead to flight or cabin crewmember incapacitation, possibly affecting crewmember capability to accomplish tasks during an emergency, or resulting in fatal injury to that crewmember.

(f) Compliance

Comply with this AD within the compliance times specified, unless already done.

(g) Incorporation of Revised Procedures

(1) For transport category airplanes: Within 30 days after the effective date of this AD, revise the existing maintenance or inspection program, as applicable, to incorporate revised procedures for donning PBE P/N 15–40F–11 and P/N 15–40F–80 as specified in paragraph 3.C., ''Procedure,'' of Safran Aerosystems Service Bulletin 1540F–35–001, dated October 10, 2025. The incorporation of revised procedures includes replacing the pictograms identified in 3.A., ''General,'' of Safran Aerosystems Service Bulletin 1540F–35–001, dated October 10, 2025, with the applicable procedure specified in paragraph 3.C., ''Procedure,'' of Safran Aerosystems Service Bulletin 1540F–35–001, dated October 10, 2025.

(2) For aircraft certificated in any category except for transport category airplanes: Accomplish the applicable action specified in paragraph (g)(2)(i) or (ii) of this AD. The owner/operator (pilot) holding at least a private pilot certificate may perform this action for your aircraft and must enter compliance with the applicable paragraphs of this AD into the aircraft maintenance records in accordance with 14 CFR 43.9(a) and 91.417(a)(2)(v). The record must be maintained as required by 14 CFR 91.417, 121.380, or 135.439.

(i) For aircraft that must comply with 14 CFR 91.417(a)(2) or 135.439(a)(2): Within 30 days after the effective date of this AD, incorporate into maintenance records required by 14 CFR 91.417(a)(2) or 135.439(a)(2), as applicable for your aircraft, revised procedures for donning PBE P/N 15–40F–11 and P/N 15–40F–80 as specified in paragraph 3.C., ''Procedure,'' of Safran Aerosystems Service Bulletin 1540F–35–001, dated October 10, 2025. The incorporation of revised procedures includes replacing the pictograms identified in 3.A., ''General,'' of Safran Aerosystems Service Bulletin 1540F–35–001, dated October 10, 2025, with the applicable procedure specified in paragraph 3.C., ''Procedure,'' of Safran Aerosystems Service Bulletin 1540F–35–001, dated October 10, 2025.

(ii) For non-transport category aircraft other than those identified in paragraph (g)(2)(i) of this AD: Within 30 days after the effective date of this AD, revise your existing approved maintenance or inspection program, as applicable, by incorporating revised procedures for donning PBE P/N 15–40F–11 and P/N 15–40F–80 as specified in paragraph 3.C., ''Procedure,'' of Safran Aerosystems Service Bulletin 1540F–35–001, dated October 10, 2025. The incorporation of revised procedures includes replacing the pictograms identified in 3.A., ''General,'' of Safran Aerosystems Service Bulletin 1540F–35–001, dated October 10, 2025, with the applicable procedure specified in paragraph 3.C., ''Procedure,'' of Safran Aerosystems Service Bulletin 1540F–35–001, dated October 10, 2025.

(h) No Alternative Procedures

After incorporating revised procedures as required by paragraph (g) of this AD, no alternative procedures may be used unless the procedures are approved as an alternative method of compliance (AMOC) in accordance with the procedures specified in paragraph (i)(1) of this AD.

(i) Additional AD Provisions

The following provisions also apply to this AD:

(1) *Alternative Methods of Compliance (AMOCs):* The Manager, International Validation Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or responsible Flight Standards Office, as appropriate. If sending information directly to the manager of the International Validation Branch, send it to the attention of the person identified in paragraph (j) of this AD and email to: *AMOC@faa.gov*. Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the responsible Flight Standards Office.

(j) Additional Information

For more information about this AD, contact Harjot Rana, Aviation Safety Engineer, FAA, 1600 Stewart Avenue, Suite 410, Westbury, NY 11590; phone: 516–228–7344; email: *9-AVS-AIR-BACO-COS@faa.gov*.

(k) Material Incorporated by Reference

(1) The Director of the Federal Register approved the incorporation by reference (IBR) of the material listed in this paragraph under 5 U.S.C. 552(a) and 1 CFR part 51.

(2) You must use this material as applicable to do the actions required by this AD, unless this AD specifies otherwise.

(i) Safran Aerosystems Service Bulletin 1540F–35–001, dated October 10, 2025.

(ii) [Reserved]

(3) For Safran Aerosystems material, contact Safran Aerosystems, Customer Support & Services, Technical Publication Department, 61 Rue Pierre Curie, CS20001, 78373 Plaisir Cedex, France; phone: + 33 (0)1 61 34 23 23; email: *tech-support.sao@safrangroup.com;* website: *https://www.safran-aerosystems.com.*

(4) You may view this material at the FAA, Airworthiness Products Section, Operational Safety Branch, 2200 South 216th St., Des Moines, WA. For information on the availability of this material at the FAA, call 206–231–3195.

(5) You may view this material at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, visit *www.archives.gov/federal-register/cfr/ibr-locations* or email *fr.inspection@nara.gov.*

Issued on December 3, 2025.

Steven W. Thompson,

Acting Deputy Director, Compliance & Airworthiness Division, Aircraft Certification Service.

[FR Doc. 2025–22338 Filed 12–5–25; 4:15 pm]

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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Parts 223 and 224

[Docket No. 251204–0176: RTID 0648–XR123]

Endangered and Threatened Wildlife and Plants; Notice of 12-Month Finding on a Petition To List the Oregon Coast and Southern Oregon and Northern California Coastal Chinook Salmon Evolutionarily Significant Units Under the Endangered Species Act

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice of 12-month petition finding.

SUMMARY: We, NMFS, have completed a comprehensive status review of the Oregon Coast (OC) and Southern Oregon and Northern California Coastal (SONCC) Chinook salmon (*Oncorhynchus tshawytscha*) Evolutionarily Significant Units (ESUs) in response to a petition to list these species as threatened or endangered under the Endangered Species Act (ESA) and to designate critical habitat concurrently with the listings. Based on the best scientific and commercial information available, including the status review report, and taking into account efforts being made to protect the species, we have determined that the OC and SONCC Chinook salmon ESUs do not warrant listing.

DATES: This finding was made available on December 9, 2025.

ADDRESSES: The petition, status review report, **Federal Register** notices, and the list of references can be accessed electronically online at: *https://www.fisheries.noaa.gov/species/Chinook-salmon-protected#conservation-management.* The peer review report is available online at: *https://www.noaa.gov/*

information-technology/biological-status-of-oregon-coast-and-southern-oregon-northern-california-coastal-Chinook-salmon.

FOR FURTHER INFORMATION CONTACT: Robert Markle, NMFS West Coast Region, at *robert.markle@noaa.gov,* (971) 710–8155; or Heather Austin, NMFS Office of Protected Resources, at *heather.austin@noaa.gov,* (301) 427–8422.

SUPPLEMENTARY INFORMATION:

Background

On August 4, 2022, we received a petition from the Native Fish Society, Center for Biological Diversity, and Umpqua Watersheds to list the OC and SONCC Chinook salmon ESUs as threatened or endangered under the ESA or, alternatively, list only spring-run Chinook salmon in both the OC and SONCC ESUs as threatened or endangered under the ESA. On January 11, 2023, we published a 90-day finding (88 FR 1548) announcing that the petition presented substantial scientific and commercial information indicating the petitioned actions to list the OC and SONCC Chinook salmon ESUs may be warranted. With respect to the request to list only the spring-run components of those ESUs, we found that the petition did not present substantial scientific and commercial information indicating that the petitioned action was warranted. We also initiated a status review of the species, as required by section 4(b)(3)(A) of the ESA, and requested information to inform the agency's decision on whether the species warrant listing as threatened or endangered under the ESA. We received information from the public in response to the 90-day finding and incorporated that information into both the status review report and this 12-month finding. This information complemented our thorough review of the best available scientific and commercial data for these species (see *Status Review* below).

Listing Determinations Under the ESA

We are responsible for determining whether a species meets the definition of threatened or endangered under the ESA (16 U.S.C. 1531 *et seq.*). To make this determination, we first consider whether a group of organisms constitutes a species under section 3 of the ESA, then whether the status of the species qualifies it for listing as either threatened or endangered. Section 3 of the ESA defines ''species'' to include ''any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature'' (16 U.S.C. 1532(16)). In 1991, we issued the Policy on Applying the Definition of Species Under the Endangered Species Act to Pacific Salmon (ESU Policy; 56 FR 58612, November 20, 1991). Under the ESU Policy, a Pacific salmon population is a distinct population segment (DPS), and hence a species under the ESA, if it represents an ESU of the biological species. The ESU Policy identifies two criteria for making ESU determinations: (1) it must be substantially reproductively isolated from other conspecific population units and (2) it must represent an important component in the evolutionary legacy of the species. The first criterion, reproductive isolation, need not be absolute, but must be strong enough to permit evolutionarily important differences to accrue in different population units. A population would meet the second criterion if it contributes substantially to the ecological and genetic diversity of the species as a whole.

We use the ESU Policy exclusively for delineating distinct population segments of Pacific salmon. A joint NMFS—U.S. Fish and Wildlife Service (USFWS) (jointly, the Services) policy clarifies the Services' interpretation of the phrase ''distinct population segment'' for the purposes of listing, delisting, and reclassifying a species under the ESA (DPS Policy; 61 FR 4722, February 7, 1996). In announcing this policy, the Services indicated that the ESU Policy was consistent with the DPS Policy and that NMFS would continue to use the ESU Policy for Pacific salmon.

Section 3 of the ESA further defines an endangered species as ''any species which is in danger of extinction throughout all or a significant portion of its range'' and a threatened species as one ''which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range'' (16 U.S.C. 1532(6), (20)). Thus, we interpret an ''endangered species'' to be one that is presently in danger of extinction. A ''threatened species,'' on the other hand, is not presently in danger of extinction, but is likely to become so in the foreseeable future.

When we consider whether a species qualifies as threatened under the ESA, we must consider the meaning of the term ''foreseeable future.'' 50 CFR 424.11(d) provides: ''In determining whether a species is a threatened species, the Services must analyze whether the species is likely to become an endangered species within the foreseeable future. The foreseeable future extends as far into the future as the Services can make reasonably reliable predictions about the threats to the species and the species' responses to those threats. The Services will describe the foreseeable future on a case-by-case basis, using the best available data and taking into account considerations such as the species' life-history characteristics, threat-projection timeframes, and environmental variability. The Services need not identify the foreseeable future in terms of a specific period of time.''

Section 4(a)(1) of the ESA requires us to determine whether any species is endangered or threatened as a result of any one or a combination of the following factors: (A) the present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence (16 U.S.C. 1533(a)(1)). Section 4(b)(1)(A) of the ESA requires us to make listing determinations solely on the basis of the best scientific and commercial data available after conducting a review of the status of the species and after taking into account efforts, if any, being made by any state or foreign nation or political subdivision thereof to protect the species. In evaluating the efficacy of existing domestic conservation efforts, we rely on the Services' joint Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE; 68 FR 15100, March 28, 2003) for any conservation efforts that have yet to be implemented or demonstrate effectiveness.

Life History of Chinook Salmon

The largest of the Pacific salmon, Chinook salmon (*Oncorhynchus tshawytscha*) are in the Salmonidae subfamily, which consists of six genera of trout and salmon (Nelson *et al.* 2016). Chinook salmon are anadromous and semelparous (*i.e.,* individuals die after spawning). Their life history involves incubation, hatching, and emergence in freshwater, migration to the ocean, and subsequent return to freshwater for completion of maturation and spawning. Within this general life history strategy, however, Chinook salmon display considerable variation with respect to age at outmigration from freshwater, ocean distribution and migratory patterns, length of residence in the ocean, and time of year in which they return to freshwater and spawn. Juvenile rearing in freshwater can be minimal or extended; the majority (~95 percent) of Chinook salmon in the OC and SONCC ESUs typically migrate to the ocean in their first year of life (ODFW 2007a, ODFW 2013, ODFW 2014a). This is sometimes referred to as an ocean-type life history as opposed to fish that overwinter and migrate to the ocean as yearlings (stream-type life history).

Duration of ocean residence is highly variable. Some Chinook salmon rear in the ocean for less than 1 year, returning to freshwater as age-2 fish and are almost all males (known as ''jacks''). The most common life history is 2 or 3 years of ocean residence and sexual maturation at age 3 or 4 (ODFW 2007a, 2013, 2014a). A smaller proportion of fish rear in the ocean for 4 years and return to freshwater as age-5 fish, while an even small percentage rear in the ocean for 5 years and return at age 6.

Chinook salmon may return to their natal river mouth during almost any month of the year (Healey 1991). Temporal ''runs'' of Chinook salmon are identified by the time of year in which adult salmon return to freshwater to spawn. Although the timing of the run is the focus, distinct runs also differ in the degree of maturation at the time of river entry and actual time of spawning (Myers *et al.* 1998). For example, spring-run Chinook salmon tend to enter freshwater as immature or ''bright'' fish, migrate farther upriver, and finally spawn in the late summer and early autumn. In contrast, fall-run Chinook salmon generally enter freshwater at a more advanced stage of maturity, move rapidly to their spawning areas on the mainstem or lower tributaries of the rivers, and spawn within a few days or weeks of freshwater entry (Myers *et al.* 1998).

Previous ESA Status Reviews

OC Chinook Salmon ESU

In 1998, we conducted a comprehensive status review of West Coast Chinook salmon populations in California, Oregon, Washington, and Idaho (Myers *et al.* 1998). We convened an expert panel of scientists from NMFS' Northwest and Southwest Fisheries Science Centers, NMFS' Northwest and Southwest Regional Offices, and a representative of the National Biological Survey to (1) identify ESUs of West Coast Chinook salmon and (2) evaluate their risk of extinction. During this review, we determined that the OC Chinook salmon ESU is composed of coastal populations of fall- and spring-run Chinook salmon from the Elk River north to the mouth of the Columbia River.

This ESU falls within the Coastal Ecoregion which has a strong maritime influence, with moderate temperatures and high precipitation levels. Regional rainfall averages 200–240 cm per year, with generally lower levels to the south of this ESU. Average annual river flows for most rivers in this region are among the highest found on the West Coast when adjusted for watershed area. These conditions allow returning adult fish easy access to the river systems' upper reaches. Populations within this ESU typically migrate to the ocean in their first year of life (ocean-type), spend most of their marine life in coastal waters, and mature at ages 3, 4, and 5. This ESU contains several large estuary areas: Tillamook Bay, Coos Bay, Winchester Bay, and Yaquina Bay. Sub-yearling Chinook salmon in these systems utilize productive estuary areas as rearing habitat before they emigrate to the ocean.

In contrast to the more southerly ocean distribution pattern shown by populations from the lower Columbia River and from populations south of this ESU, populations within the OC Chinook salmon ESU have a predominantly northerly coastal distribution as evidenced from coded-wire-tag recoveries from British Columbia and Alaska coastal fisheries. Myers *et al.* (1998) also identified a strong genetic separation between Oregon Coast ESU populations and neighboring populations to the north and south. Based on the available information, we concluded that OC Chinook salmon met the ESU criteria because they were (1) substantially reproductively isolated from populations of Chinook salmon to the north and south and (2) represented an important component in the evolutionary legacy of the species.

Myers *et al.* (1998) concluded that production in this ESU was mostly dependent on naturally-spawning fish, and spring-run Chinook salmon in this ESU were in relatively better condition than those in adjacent ESUs. Long-term trends in abundance of Chinook salmon within most populations in this ESU were upward (1950–1997).

In spite of a generally positive outlook for this ESU, Myers *et al.* (1998) noted that several populations were exhibiting severe (greater than 9 percent per year) short-term declines in abundance (1987–1996). In addition, there were several hatchery programs releasing Chinook salmon throughout the ESU, and many of the fish were from a single stock (Trask River). Most importantly, there was a lack of clear information on the degree of straying among these hatchery fish into naturally-spawning populations. There were also many populations within the ESU for which there were no abundance data and NMFS was concerned about the uncertain risk assessment given these data gaps. Finally, NMFS was concerned that harvest could be a significant source of risk if exploitation rates were to revert back to historically high rates. Also, freshwater habitats were generally in poor condition, with numerous problems such as low summer flows, high temperatures, loss of riparian cover, and streambed changes (Myers *et al.* 1998).

Previous assessments of stocks within the OC ESU identified several stocks at risk or of concern. Of the eight (out of 22 total stocks) within this ESU considered by Nehlsen *et al.* (1991), they identified two stocks at high extinction risk (South Umpqua River and Coquille River spring-run), one stock at moderate extinction risk (Yachats River fall-run) and five stocks of ''special concern.'' Nehlsen *et al.* (1991) defined a population as ''special concern'' if it met certain criteria that did not yet put it in a high or moderate risk category but still warranted attention. Of the 44 stocks within this ESU considered by Nickelson *et al.* (1992), they identified 26 as healthy, 2 as depressed (South Umpqua River and Coquille River spring-run Chinook salmon), 7 as of ''special concern'' due to hatchery strays, and 9 of unknown status (4 of which they suggested may not be viable). Of the 18 stocks evaluated in Huntington *et al.* (1996), 6 were identified as healthy Level I (those having adult abundance at least two-thirds as great as would be found in the absence of human impacts) and 12 healthy Level II stocks (those with adult abundance between one-third and two-thirds as great as expected without human impacts).

In 1998, this ESU had relatively high abundance and occupied most of the available habitat. Production in this ESU was mostly dependent on naturally-spawning fish. Long-term trends in abundance of Chinook salmon within most populations in this ESU were upward. Informed by the findings in the 1998 status review of West Coast Chinook salmon, we previously concluded that the OC Chinook salmon ESU did not warrant listing under the ESA (63 FR 11482; March 9, 1998).

SONCC Chinook Salmon ESU

Based on the results of the status report on West Coast Chinook salmon (Myers *et al.* 1998), we originally identified a Southern Oregon and California Coastal Chinook salmon ESU and proposed to list it as threatened (63

FR 11482, March 9, 1998). After completing an updated status review (NMFS 1999), we determined that the best available information supported dividing the previously identified ESU into two ESUs: a SONCC Chinook salmon ESU and a California Coastal Chinook salmon ESU. A summary of the updated status review findings for the SONCC Chinook salmon ESU follows.

In 1999, we completed an analysis of new genetic data collected from spawned adult Chinook salmon in 1998 and 1999 (West Coast Chinook Salmon Biological Review Team 1999). We analyzed the new samples along with data for California and southern Oregon Chinook salmon used in the NMFS coastwide status review (Myers *et al.* 1998). The new analysis revealed two genetic groups composed of samples from the Klamath River Basin and from coastal rivers. Within the Klamath River Basin, the Blue Creek population in the lower Klamath River was more similar to southern Oregon and California coastal Chinook salmon populations than to populations in the upper Klamath and Trinity rivers. The samples from coastal rivers formed two sub-clusters: with rivers to the south of the Klamath River in one sub-cluster and the lower Klamath River (Blue Creek) and rivers to the north of the Klamath River in the second sub-cluster.

We also identified ecological differences between the northern and southern portions of the Southern Oregon and California Coastal Chinook salmon ESU. Rivers to the north (especially the Rogue River) tended to be larger than those to the south. River flows in the northern portion tend to peak in January, while those to the south peak in February (Myers *et al.* 1998). Annual precipitation is considerably higher in the northern portion than in the south. Furthermore, soils in the southern portion are highly erodible, causing high silt loads that result in berms which close off the mouths of many of the rivers during summer low flows. River conditions in most of these coastal basins, especially in the south, have very limited temporal windows for adult access and juvenile emigration.

We also considered the presence of spring-run Chinook salmon in the northern portion of the ESU, the Rogue and Smith rivers, as a further indicator of geographic and life history differences (although there may have historically been a spring-run in the Eel River). Finally, there was some ocean harvest information that indicated differences in the migration pattern of populations from the northern (Rogue and Smith rivers) and southern (Eel River) portions of the previously identified Southern Oregon and California Coastal Chinook salmon ESU (Gall *et al.* 1989). A review of ocean distribution information collected from 1986 to 1989 (Gall *et al.* 1989) suggested that there may be geographic and timing differences in the ocean distribution of Chinook salmon from the Smith River and southern Oregon relative to the populations south of the Klamath River.

Based on this information we concluded that SONCC Chinook salmon met the ESU criteria because they were (1) substantially reproductively isolated from other populations of Chinook salmon and (2) represented an important component in the evolutionary legacy of the species.

Escapement is the number of salmon that return to spawn in a stream or hatchery. At the time of the 1999 status review, total estimated escapement of fall- and spring-run Chinook salmon in the Oregon portion of the ESU was close to 100,000 fish. The largest run of fall-run Chinook salmon in the ESU occurred in the Rogue River, where the Oregon Department of Fish and Wildlife (ODFW) estimated an average annual escapement of more than 51,000 fish. In addition, ODFW estimated that the escapement of fall-run Chinook salmon to the Chetco River in 1995 and 1996 was 8,500 and 3,500 fish, respectively.

Although there were mixed trends in abundance over the long-term, most short-term trends in abundance of fall-run Chinook salmon were positive in the smaller coastal streams in the ESU. Spawning ground surveys from a number of smaller coastal and tributary streams from Euchre Creek to the Smith River showed declines in abundance from the late 1970s through the late 1980s, but subsequent peak counts predominantly began to show increases through the late 1990s (1988–1998). In addition to adult counts, downstream migrant trapping generally showed increases in production in fall-run Chinook salmon juveniles in the 1990s in the Pistol and Winchuck rivers and in Lobster Creek, a tributary to the lower Rogue River. Short- and long-term trends in abundance for the Rogue River fall-run Chinook salmon were declining, but as mentioned above, the overall run size was still large.

Overall, the 1999 status review update indicated a continuing trend of declining abundance for spring-run Chinook salmon. The average run size of spring-run Chinook salmon in the Rogue River was 7,709 (1988–1992) and the estimated percentage of hatchery fish in the run ranged from 25 to 30 percent over that time period. The Smith River contained the only known populations of spring-run Chinook salmon outside of the Rogue River basin, and those runs were declining in the Middle Fork Smith River but increasing in the South Fork Smith River.

While the status of spring-run Chinook salmon continued to be an area of concern, the overall numbers of fall-run Chinook salmon in this ESU and the recent increases in abundance in many of the smaller coastal streams were considered indicators of low extinction risk. At that time, efforts of the co-managers were also underway to improve monitoring of Chinook salmon in this region. NMFS was concerned about the high percentages of naturally spawning hatchery fall-run Chinook salmon in the Chetco River and naturally spawning hatchery spring-run Chinook salmon in the Rogue River. In addition, NMFS considered the restricted distribution of spring-run Chinook salmon to the Rogue and Smith River basins and their significant decline in the Rogue River as a potentially important threat to the total diversity of fish in this ESU.

NMFS concluded several ongoing management activities were likely to improve the conditions for Chinook salmon in the SONCC Chinook salmon ESU, including harvest reductions in the Klamath Management Zone troll fishery, the ESA listing of coho salmon, changes in harvest regulations by the States of Oregon and California to protect natural-origin coho salmon and steelhead, and changes in timber and land-use practices on federal public lands resulting from the Northwest Forest Plan (U.S. Forest Service 1994). Informed by the 1999 status review update and after considering efforts being made to improve conditions for Chinook salmon, we determined that the ESU did not warrant listing under the ESA (64 FR 50394, September 16, 1999).

Updated Status Reviews of OC and SONCC Chinook Salmon ESUs

To help ensure that this review was based on the best available and most recent scientific information, we solicited information during a 60–day public comment period regarding the ESU structure and extinction risk of the species, along with any relevant protective efforts (88 FR 1548, January 11, 2023). We also convened an OC and SONCC Status Review Team (SRT) to review the best available scientific and commercial data regarding the ESU structure and extinction risk of Chinook salmon in the areas previously identified as the OC and SONCC Chinook salmon ESUs and consistent with the scope of the listing petition.

Specifically, the SRT addressed (1) whether the geographic boundaries of the previously identified ESUs warrant redelineation or refinement, (2) the relationship to the defined ESUs of hatchery programs propagating Chinook salmon, and (3) the level of extinction risk of the ESUs throughout all or a significant portion of their ranges. The status review report (SRT 2024) presents the SRT's professional judgement of the extinction risk facing the OC and SONCC Chinook salmon ESUs but makes no recommendation as to the listing status of the species. The status review report (SRT 2024) is available electronically (see **ADDRESSES**).

The status review report was subject to independent peer review pursuant to the Office of Management and Budget Final Information Quality Bulletin for Peer Review (M–05–03; December 16, 2004). The status review report was peer reviewed by three independent scientists selected from the academic and scientific community with expertise in salmonid biology, conservation, and management and specific knowledge of Chinook salmon. The SRT asked peer reviewers to evaluate the adequacy, appropriateness, and application of data used in the status review report, as well as the findings made in the ''Risk Assessment'' section of the report. The SRT addressed all peer reviewer comments prior to finalizing the status review report.

We subsequently reviewed the status review report, its cited references, and peer review comments and conclude the status review report, upon which this 12-month finding is based, provides the best available scientific and commercial information on the OC and SONCC Chinook salmon ESUs. Much of the information discussed below on the ESU configurations, demographics, threats, and extinction risks is attributable to the status review report. We have applied the statutory provisions of the ESA, including evaluation of the factors set forth in section 4(a)(1)(A)–(E), our regulations regarding listing determinations, and relevant policies identified herein in making the listing determination. In the sections below, we provide information from the report regarding threats to and the status of the OC and SONCC Chinook salmon ESUs.

Review of ESU Delineations

As mentioned above, NMFS initially identified the OC and SONCC ESUs in the late 1990s as part of the coastwide status review process undertaken by the agency. Factors considered in delineating these ESUs included patterns of juvenile and adult life-history variation, freshwater ecological provinces, patterns in ocean distribution, and patterns of genetic variation at individual loci assessed using molecular methods. The SRT reviewed the analyses that identified the current ESU configuration (Myers *et al.* 1998, NMFS 1999) and concurred with the conclusions of those analyses. In particular, patterns of genetic variation indicated that the OC and SONCC Chinook salmon ESUs were substantially reproductively isolated from each other and other Chinook salmon ESUs, and patterns of life-history, genetic, and ecological variation indicated that each of these ESUs formed an important component of the evolutionary legacy of the species.

In the intervening decades, the most marked change in population information has been the analysis of additional genetic variation, along with some updates to information on ocean distribution. The SRT reviewed the available genetic and ecological information obtained since the original ESU designations. The SRT found an additional five studies published subsequent to 1998–1999 that included coast wide samples of Chinook salmon analyzed for genetic variation. The SRT found that the genetic data collected over the past ~20 years generally continues to support the OC and SONCC ESU boundaries identified in the coastwide status review (Myers *et al.* 1998) and status review update (West Coast Chinook Salmon Biological Review Team 1999). In particular, the status reviews differentiated genetic samples from the OC and SONCC into distinct groups, providing evidence in support of both the reproductive isolation and evolutionary legacy prongs of the ESU definition. There are, however, some exceptions that the SRT noted and discussed.

The SRT noted a study by Kinziger *et al.* (2013) that presented updated information related to the boundary between SONCC and the Upper Klamath–Trinity River (UKTR) Chinook salmon ESU. Previously, we included all Chinook salmon upstream of the confluence of the Klamath and Trinity rivers in the UKTR Chinook salmon ESU (63 FR 11482, March 9, 1998). Genetic patterns described by Kinziger *et al.* (2013) are consistent with this boundary, with the exception of the sample from Horse Linto Creek. Horse Linto Creek is a small tributary of the Trinity River above the confluence of the Trinity River with the Klamath River, but the Horse Linto Creek sample is more genetically similar to SONCC samples from streams below the Trinity River confluence. Despite this discrepancy, the SRT concluded that current boundary between the SONCC and UKTR ESUs should remain at the confluence of the Trinity and Klamath rivers. The SRT acknowledged that genetic samples from Horse Linto Creek (above the confluence) from a single year were genetically more similar to SONCC than to UKTR. However, the SRT considered that this small stream could well function as a transition zone between these two ESUs and might well change its genetic structure from time to time depending on the composition of the returns. The SRT therefore did not consider the available information to be sufficient to change the ESU boundary, but they encouraged continued collecting of genetic data from that area.

The SRT also noted some uncertainty regarding Chinook salmon in the Umpqua River. The previous status review (Myers *et al.* 1998) concluded that Chinook salmon in the Umpqua River were part of the OC Chinook salmon ESU, despite some genetic similarity of a Rock Creek Hatchery (in the Umpqua River Basin) to samples from the SONCC Chinook salmon ESU. Based on a review of several additional studies, the SRT found that both hatchery- and natural-origin spring (but not fall) Umpqua River Chinook salmon are genetically different from other OC populations. In particular, the Umpqua River spring-run Chinook salmon appear to be genetically similar to the SONCC (spring and fall). The Umpqua River spring-run Chinook salmon also are similar to SONCC Chinook salmon in their ocean distribution patterns and age structure. The SRT considered that historical releases of out-of-basin spring-run Chinook salmon from the Rogue and Columbia River basins are a likely explanation for this pattern, but the SRT also considered the possibility that spring-run Chinook salmon from the Rogue River might sometimes naturally stray into the Umpqua River or that there are older evolutionary connections between spring-run Chinook salmon in the Rogue and Umpqua Rivers. While acknowledging this uncertainty, the SRT nonetheless concluded that both natural and hatchery-origin spring-run Chinook salmon in the Umpqua River are part of the OC ESU, consistent with the original 1998 review. This conclusion was based on the integrated nature of the Rock Creek Hatchery broodstock, which regularly incorporates natural-origin fish returning to the Umpqua River, and the continuous recorded presence of natural-origin spring-run Chinook salmon in the Umpqua River since the early 1900s.

Another factor Myers *et al.* (1998) used to differentiate Chinook salmon ESUs is their ocean distribution. Chinook salmon ocean distribution depends strongly on region of origin and has a genetic basis (Myers *et al.* 1998, SRT 2024). We can infer ocean distribution from coded wire tag recoveries in commercial and recreational ocean fisheries. Because the vast majority of coded wire tagged Chinook salmon come from hatchery populations, we must also infer the migratory routes of natural-origin fish from their corresponding hatchery populations.

The SRT compared the more recent published analyses of spatial differences in ocean distribution (Weitkamp 2010, Shelton *et al.* 2019, 2021) to the information presented in Myers *et al.* (1998). Two of the four OC Chinook salmon ESU stocks, the Trask River and Salmon River fall-run stocks, have a clearly northern distribution. The Umpqua River spring-run Chinook salmon stock appears to have a more southerly distribution, with a larger proportion of coded wire tag recoveries in Oregon and California than other OC stocks. The SRT also noted from the data that Chinook salmon from the Umpqua River show a younger ocean age structure more similar to Chinook salmon from SONCC populations than other OC populations.

The fourth OC Chinook salmon ESU stock, the Elk River fall-run stock, appears to have an intermediate ocean distribution between Salmon River fall-run and Umpqua River spring-run stock distributions. However, a directed fishery near the mouth of the Elk River has a substantial influence on the coded wire tag recovery data.

In the SONCC Chinook salmon group, commercial and recreational fisheries recover coded wire tags from the Rogue River spring-run and fall-run Chinook salmon stocks almost exclusively off the coasts of Oregon and California. Similarly, fisheries recover coded wire tags from the Chetco River fall-run stock predominantly off Oregon and northern California in both the summer and fall. The SRT also noted that ocean distribution for SONCC Chinook salmon ESU is very similar to ocean distribution of fall- and spring-run Chinook salmon from the upper Klamath River.

As a result of all this, the SRT concluded, and we agree, that the patterns of genetic variation continue to support the originally defined ESU boundaries. Updated evaluations of adult ocean distribution were also consistent with the information originally used to identify the ESUs.

ESU Membership of Hatchery-Origin Chinook Salmon

In 2005, we issued a policy for considering hatchery-origin fish in ESA listing determinations (Hatchery Listing Policy; 70 FR 37204, June 28, 2005). Under the Hatchery Listing Policy, we consider a hatchery stock to be part of an ESU if it exhibits a level of genetic divergence relative to the local natural population(s) that is no more than what occurs within the ESU (70 FR 37215, June 28, 2005). We recognize that there are a number of ways to compute and compare genetic divergence and that it is not possible to sample all fish within the ESU to precisely determine the range of genetic diversity within an ESU. In factoring artificial propagation into the extinction risk assessment for an ESU, we evaluate potential risks to the naturally-spawned components of the ESU posed by hatchery programs determined not to be part of the ESU and look at the potential benefits and risks to the naturally-spawned components of the ESU posed by hatchery programs determined to be part of the ESU.

Below, we summarize information on the current hatchery practices and the source broodstocks for the hatcheries. We consider hatchery programs for Pacific salmon and steelhead to be either ''integrated'' or ''isolated'' based on the genetic management goals and protocols for propagating a hatchery broodstock. We would consider a hatchery program to be genetically integrated if a principal goal is to minimize potential genetic divergence between the hatchery broodstock and a naturally-spawning population. Genetically integrated programs systematically include natural-origin fish in the broodstock each year or generation. We would consider hatchery programs to be genetically isolated if the principal goal is to produce a reproductively distinct population primarily, if not exclusively, from adult returns back to the hatchery. In isolated programs, little or no gene flow should occur from a naturally spawning population to the hatchery broodstock.

OC Chinook Salmon ESU Hatchery Stocks

Artificial propagation efforts for OC Chinook salmon began in the late 1890s. By the early 1900s, there were hatcheries and egg-take stations on most of the larger streams on the Oregon coast, especially the Yaquina, Alsea, Siuslaw, Umpqua, Coos, and Coquille Rivers (Cobb 1930, Wahle and Smith 1979). In addition to local stocks, there is a history of hatchery programs using out-of-basin stocks. Prior to the 1960s, a substantial portion of the hatchery fish released in OC river basins came from the lower Columbia River—mostly from the Bonneville and Clackamas Hatcheries (Myers *et al.* 1998). There are several hatcheries currently producing fall-run and spring-run Chinook salmon in the OC Chinook salmon ESU. These hatcheries release Chinook salmon into the Necanicum, Trask, Nestucca, Salmon, Umpqua, Coos, Coquille and Elk river basins.

ODFW manages the Trask River hatchery fall-run and spring-run Chinook salmon stocks as segregated stocks (ODFW 2023). In addition to the Trask River, ODFW releases the fall-run stock into the Necanicum River. For the years 2014 through 2021, the Trask River hatchery included an average of 12 percent natural-origin fish in the fall-run Chinook salmon broodstock annually (ODFW 2024). The hatchery rarely includes natural-origin fish in the spring-run Chinook salmon broodstock. Although the Trask River hatchery has largely derived its fall-run and spring-run stock from adults returning to the Trask River, historically there were considerable transfers from out-of-basin stocks including a hatchery stock known as the ''Lower Columbia River/Oregon Coast Mix'' and fish from the Nestucca, Rogue, and Umpqua Rivers (Myers *et al.* 1998).

Within the Nestucca River basin, ODFW operates a hatchery on Cedar Creek that produces fall-run and spring-run Chinook salmon. Historical records for Cedar Creek Hatchery (1955–1959) indicate that past hatchery managers released Chinook salmon from the lower Columbia River and Oregon coast into Cedar Creek, but the records do not specify the run timing. Since 1975, ODFW has managed the spring-run program as a segregated stock, with few if any natural fish incorporated annually into broodstock. The hatchery began annual releases of fall-run Chinook salmon in 1975 but suspended the program in 1993. ODFW restarted the fall-run Chinook salmon program in 1999 using local broodstock and for the years 2014 through 2021 has annually integrated an average of 21 percent naturally-produced fish in the broodstock (ODFW 2024).

According to ODFW, the goal of the current Salmon River hatchery program is to have the hatchery fish mimic the characteristics of the naturally reproducing fall-run Chinook salmon population (ODFW 2023). In furtherance of this goal, hatchery program staff annually attempt to incorporate naturally-produced fish at a rate of 50 percent in the broodstock. ODFW has met this broodstock goal in 2 of the last 5 years. Records (although likely incomplete) do not indicate the release of any non-native fall-run Chinook salmon into the Salmon River basin.

The Elk River fall-run Chinook salmon hatchery program began in 1968 with the first smolts released in 1969. Records indicate there have been few transfers of fall-run Chinook salmon from out-of-basin sources (Myers *et al.* 1998). ODFW classifies the Elk River fall-run program as an isolated program but incorporates a small proportion of natural-origin fish in the broodstock annually (14 percent, 2014–2021). According to ODFW (2016), no purposeful or inadvertent selection has been applied to change characteristics of the founding broodstock. ODFW staff have detected no genetic, phenotypic, or ecological differences between hatchery and natural-origin Elk River fall-run Chinook salmon.

The Umpqua River spring-run Chinook salmon program at Rock Creek began in 1950 using local broodstock. The Umpqua River spring-run Chinook salmon program became an integrated program, and for the years 2014 through 2021 23 percent of the broodstock was of natural origin (ODFW 2024). Prior to the initiation of the Rock Creek Hatchery Program, there were transfers of spring-run Chinook salmon from the Rogue, Trask, and Imnaha rivers (ODFW 1954, Wallis 1963). Prior to 1997, the Umpqua River fall-run Chinook salmon program collected broodstock from the South Umpqua River. From 1997 until 2000, the program used broodstock from the lower Umpqua River brood and over 90 percent of the broodstock used by the program were natural-origin Chinook salmon. In 2000, the program began capturing returning hatchery fish at Winchester Creek. The goal of the program is to integrate at least 10 percent natural-origin fish into the broodstock. Myers *et al.* (1998) noted that there have been some transfers into the Umpqua River basin from non-native sources, including the Columbia River and other Oregon coast tributaries.

ODFW initiated the current Coos River fall-run Chinook salmon hatchery program in 1982 with local broodstock, though private aquaculture facilities, as described below, used out-of-basin stocks. Although the intent of the program is to integrate natural-origin fish into the broodstock, ODFW (2023) reported that the program has included few natural-origin fish. ODFW monitoring summaries indicate from 2014 through 2021, ODFW incorporated natural-origin fish in two years and in low numbers. Private aquaculture facilities have also operated in the Coos River basin. During the 1980s, private aquaculture facilities released both fall- and spring-run Chinook salmon that originated primarily from out-of-basin stocks, including some 23 million fall-run Chinook salmon from Anadromous, Inc., and Oregon Aqua Foods (Myers *et al.* 1998).

Myers *et al.* (1998) reported that there have been numerous releases of non-local fish into the Coquille River, primarily from the Coos River, Bonneville (Lower Columbia River), Chetco, and Elk River hatcheries. ODFW currently maintains two fall-run Chinook salmon hatchery programs in the Coquille River basin. ODFW initiated the primary program in 1983 using Coquille River basin broodstock with a goal of increasing the harvestable numbers of fish. In 2022, ODFW started a second program designed to serve as a conservation program using the same local broodstock. The Coquille River fall-run Chinook salmon population is considered to be at high risk, and the conservation hatchery program is an emergency measure to prevent its extinction (ODFW 2022).

Based on their local origin and the integrated nature of the programs, we conclude that the fall-run and spring-run Chinook salmon hatchery stocks from the majority of the hatchery programs meet the criteria to be considered part of the OC Chinook salmon ESU. The only exception is the spring-run Chinook salmon stock from the Trask and Nestucca hatchery programs. The SRT concluded that these stocks are genetically distinct from most natural-origin fish in these basins. The genetic distinctness of these stocks is likely due to a combination of documented out-of-basin introductions and a long history of using only hatchery-origin fish for broodstock (SRT 2024). Although the SRT acknowledged limited use of local brood stock for the Coos River fall-run program, the SRT ultimately considered this part of the OC Chinook salmon ESU. We therefore conclude that the spring-run hatchery stocks from the Trask and Nestucca programs are not part of the OC Chinook salmon ESU.

SONCC Chinook Salmon ESU and Hatchery Stocks

Hatchery programs have been operating in the Rogue River basin since 1877. ODFW began construction and operation of the Butte Falls hatchery in 1916. The Butte Falls hatchery program produced salmon and steelhead for release into the Rogue River basin from the 1940s until the construction of Lost Creek Dam and the associated Cole Rivers Hatchery on the upper Rogue in 1978. The Cole Rivers spring-run Chinook salmon hatchery broodstock originated from Rogue River natural-origin fish. The purposes of the program are to augment fishing and harvest opportunities and mitigate the loss of habitat resulting from the construction of dams on the Rogue and Applegate Rivers (ODFW 2024).

The fall-run Chinook salmon program at the Indian Creek Hatchery in the Rogue River basin began in 1986 using fish from a hatchery stock known as ODFW stock 61. Prior to 1989, hatchery fall-run Chinook salmon releases consisted of Upper Rogue River stock (ODFW stock 052). Since 1991, the hatchery program has collected broodstock of both hatchery and natural origin from the Lower Rogue River (ODFW stock 61).

The Chetco River fall-run Chinook salmon hatchery program began in 1968 using local Chetco River Chinook salmon broodstock (ODFW stock 96). There were non-native releases of fall-run Chinook salmon from the Elk, Coquille, and unknown hatchery sources during the 1960s and 1970s, although the majority of releases appear to be of Chetco River origin (Myers *et al.* 1998).

The Rowdy Creek fish hatchery in the Smith River basin produces fall-run Chinook salmon. According to the Hatchery Genetic Monitoring Plan (HGMP) (Tolowa Dee-ni' Nation 2018), the Tolowa Dee-ni' Nation operates the Rowdy Creek hatchery program as an integrated program incorporating natural-origin fish in the broodstock.

Based on their local origin and the integrated nature of the programs, we conclude that the Rogue River, Chetco River, and Smith River hatchery stocks meet the criteria to be considered part of the SONCC Chinook salmon ESU.

Determination of Species

OC Chinook Salmon ESU

Based on the information above, we conclude that the OC Chinook salmon ESU constitutes a species under the ESA and includes coastal populations of fall- and spring-run Chinook salmon from the Elk River north to the mouth of the Columbia River, as well as the fall- and spring-run Chinook salmon hatchery stocks in the Necanicum, Salmon, Umpqua, Coos, Coquille, and Elk rivers and the fall-run hatchery stocks in the Trask and Nestucca rivers.

SONCC Chinook Salmon ESU

Based on the information above, we conclude that the SONCC Chinook salmon ESU constitutes a species under the ESA and includes coastal populations of fall- and spring-run Chinook salmon from Euchre Creek, Oregon, through the Lower Klamath River (below the confluence of the Klamath and Trinity rivers), California (inclusive), as well as the fall- and spring-run Chinook salmon hatchery stocks in the Rogue River, Chetco River, and Smith River.

Assessment of Extinction Risk

The SRT synthesized the best scientific and commercial data available regarding the ESU's status, which includes its life history, demographic trends, and susceptibility to threats, and evaluated the extinction risk of each ESU. The SRT included in its assessment an evaluation of the likely effects of hatchery-origin fish on the viability of the ESU. The SRT's extinction risk assessment reflects the SRT's professional scientific judgment, guided by the analysis of the demographic risks and threats.

Demographic Risk Analysis

The SRT assessed demographic risk using four key viability criteria: abundance, productivity, spatial structure, and diversity. A summary of our evaluation follows, with a detailed discussion of the demographic risk analysis available in SRT (2024). The demographic risk analysis compared current to historical abundance and evaluated recent trends in abundance. The SRT calculated average abundance as a 5-year geometric mean. Salmonid abundance data tend to be skewed by the presence of outliers (observations considerably higher or lower than most of the data). For skewed data, the geometric mean is a more stable statistic than the arithmetic mean. The SRT calculated population trends over 15-year windows.

OC Chinook Salmon ESU

The OC Chinook salmon ESU consists of 18 fall-run and 2 spring-run populations (ODFW 2014a). The fall-run Chinook salmon life-history pattern is numerically more abundant, with populations present in all major rivers between the Nehalem River in the north and Elk River in the south. Salmon with early-run (spring- or summer-run) life histories are present in many of the same rivers, including the Nehalem, Tillamook, Nestucca, Siletz, Alsea, and Coquille, where they are considered to be demographically part of the same populations as the fall runs, with the exception of the Umpqua River where the spring runs are considered to be separate populations from the fall run (ODFW 2014a). The two spring-run populations occupy the north and south forks of the Umpqua River.

Recent information on fall-run Chinook salmon abundance (1986–2021) show that for 14 monitored populations, 13 have spawning abundance in the thousands to tens of thousands and most have relatively stable abundances over the past 35 years (SRT 2024). There are several notable exceptions to this pattern, however, with the Coquille, Tillamook, and Siuslaw populations at or near their lowest abundance of the time-series in 2021. Overall, population trends in the most recent 15-year period (2008–2022) are relatively stable. Population trends are positive (increasing trend) for half of the fall-run populations and negative (decreasing trend) for the other half. This relative stability has occurred despite ocean and freshwater harvest that together capture between 40 and 50 percent of each cohort on average (see OC Chinook Salmon ESU and Harvest).

Most of the fall-run fish in this ESU are of natural origin. Only four populations have more than a 5 percent contribution of hatchery-origin spawners in any 1 year between 2014 and 2020 (SRT 2024). The two populations with a long history of substantial hatchery production (Elk and Salmon rivers) both show a trend toward increased natural spawners since the late 1990s.

The combined number of natural-origin spawners in the Umpqua River spring-run Chinook salmon populations has been at or below 5,000 individuals in recent years (1986–2022; SRT 2024). Longer time series are available since 1946 for spring-run fish passing Winchester Dam on the North Umpqua River and suggest relative stability of spring-run abundance since about 1960 (note that fisheries and other sources of mortality occur upstream of Winchester Dam and so abundance at the dam is not equivalent to spawning escapement). Hatchery-origin individuals contribute more to the North Umpqua spring-run spawners than any of the fall-run stocks, but since 2000, the trend is toward more natural-origin spawners (SRT 2024).

Aggregating across runs, since 1986, OC Chinook salmon ESU spawning escapements ranged between about 45,000 and 190,000 individuals annually. While there have been some substantial swings in abundance over the past 35 years, the trend in aggregate abundance appears to be roughly flat. In most years, greater than 90 percent of spawners in the OC Chinook salmon ESU are fall-run salmon, and the vast majority are of natural origin.

SONCC Chinook Salmon ESU

The SONCC Chinook salmon ESU consists of 8 fall-run and 2 spring-run populations. Similar to OC Chinook ESU, the fall-run Chinook salmon life-history pattern is numerically more abundant. Within the SONCC Chinook salmon ESU, fall-run Chinook salmon occupy the Euchre and Hunter creeks and the Rogue, Pistol, Chetco, Winchuck, Smith and lower Klamath rivers (specifically Blue Creek but also other small tributaries). The Rogue River contains the largest population of spring-run Chinook salmon with smaller numbers recorded in the Smith River. ODFW (2007b) also notes that surveys have observed a few spring-run Chinook salmon in the Applegate, Pistol, Illinois, and Chetco rivers.

The SRT estimated a 5-year annual abundance of 31,709 natural-origin fall-run spawners (2016–2020) and 5,454 natural-origin spring-run spawners (2018–2022) in the Rogue River basin. The SRT estimated that the 5-year average annual abundance for the remaining 5 fall-run populations with data (Blue Creek, Chetco River, Pistol River, Winchuck River, and Hunter River) ranged from 185 (Blue Creek) to 1,899 (Chetco river) natural-origin spawners (2016–2020). The SRT found anecdotal evidence indicating that there may be thousands of Chinook salmon (hatchery- and natural-origin combined) in the Smith River. The Smith River has had a number of surveys occurring in different parts of the river between 1980 and 2021, but there are no consistent system-wide estimates of spawner abundance for this basin. Due to the data consistency issue, the SRT did not include the Smith River in trend analyses.

The SRT estimated trends in abundance for fall-run populations for three 15-year periods: 1986–2001, 1997–2011, and 2007–2021. With the exception of Blue Creek, trends for fall-run populations were negative for the two most recent 15-year periods. Blue Creek exhibited a positive trend in the 1997–2011 time period, negative in the more recent time period. The SRT noted that although the majority of the fall-run populations exhibited negative trends in abundance in the two recent time periods, collectively, fall-run Chinook salmon abundance in 2021 was similar to other troughs in the time-series (*e.g.,* 1990–1991, 2006–2008).

The SRT estimated trends in abundance of spring-run Chinook salmon in the Rogue River for five 15-year periods: 1948–1962, 1963–1977, 1978–1992, 1993–2007, and 2008–2022. The recent 5-year geometric mean of natural-origin spring-run spawners in the Rogue River was 5,454 (2018–2022; SRT 2024). This is considerably lower than the pre-1990 abundance, which was typically >15,000 and commonly >30,000. Abundance of spring-run Chinook salmon in the Rogue River basin was relatively stable from 1948 to 1962 followed by a substantial negative trend from the middle of the 1960s through the early 1990s. By the middle of the 1990s trends in abundance began to level off and have been relatively flat since (SRT 2024).

Available data suggest that the proportion of natural-origin spawners was high for all fall- and spring-run populations throughout the time-series (greater than 70 percent). This occurs despite substantial hatchery production for both fall- and spring-run Chinook salmon in the Rogue River. For the spring-run population, ODFW (2019) reported that the percentage of hatchery fish among Chinook salmon spawning naturally in the Rogue River averaged 5 percent over the 10-year period from 2008–2017. For the fall-run populations, a lack of monitoring data for fish by natural- versus hatchery-origin (with the notable exception of the lower Rogue) makes it difficult to determine the exact contribution of fall-run hatchery fish to natural spawners in the Rogue.

Data for the Smith River, a sizable population, were insufficient to evaluate trends. Several estimates for the Smith River from 2010 to 2021 were between 10,000 and 20,000 fall-run Chinook salmon, suggesting that it is likely the second largest population in the ESU. If these numbers are accurate, that would suggest the overall fall-run Chinook salmon spawner abundance for the SONCC ESU would have been 60,000–70,000 in 2021.

Analysis of Section 4(a)(1) Factors

As described above, section 4(a)(1) of the ESA and NMFS' implementing regulations (50 CFR 424.11(c)) state that we must determine whether a species is endangered or threatened because of any one or a combination of the following factors: the present or threatened destruction, modification, or curtailment of its habitat or range; overutilization for commercial, recreational, scientific, or educational purposes; disease or predation; the inadequacy of existing regulatory mechanisms; or other natural or manmade factors affecting its continued existence. We evaluated whether and the extent to which each of the foregoing factors contributes to the overall extinction risk of the OC and SONCC Chinook salmon ESUs. A summary of our evaluation follows. See SRT (2024) for a detailed discussion of the ESA section 4(a)(1) factors.

NMFS has discussed the impacts of various factors contributing to the decline of Pacific salmon and steelhead in previous listing determinations (*e.g.,* 63 FR 11482, March 9, 1998; 69 FR 33102, June 14, 2004) and supporting documentation (*e.g.,* NMFS 1996, NMFS 1997, NMFS 1998). In each case, we concluded that all of the factors identified in section 4(a)(1) of the ESA had played a role in the decline of West Coast Chinook salmon. More recently, we reviewed and provided a detailed analysis of these factors for the ESA-listed OC and SONCC coho salmon (*Oncorhynchus kisutch*) ESUs, which overlap the OC and SONCC Chinook salmon ESUs (NMFS 2014, 2016, and 2022; Stout *et al.* 2012). Because of the similarities in life-history strategies and associated habitat types for coho and Chinook salmon (SRT 2024), this section draws largely from NMFS' previous listing determinations and supporting documentation.

The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

The complex life cycle of Chinook salmon gives rise to complex habitat needs, particularly during the freshwater phase (Bjornn and Reiser 1991; Spence *et al.* 1996; Quinn 2018). Spawning gravels must be of a certain size and free of sediment to allow successful incubation of the eggs. Eggs require cool, clean, and well-oxygenated waters for proper development. Juveniles need abundant food sources, including insects, crustaceans, and other small fish. Juveniles need places to hide from predators (mostly birds and bigger fish), such as under logs, root wads and boulders in the stream and beneath overhanging vegetation. They also need places to seek refuge from periodic high flows (side channels and off channel areas) and from warm summer water temperatures (cold water springs and deep pools). Returning adults generally do not feed in fresh water but instead rely on limited energy stores to migrate, mature, and spawn. Like juveniles, they also require cool water and places to rest and hide from predators. During all life stages salmon require cool water that is free of contaminants. They also require rearing and migration corridors with adequate passage conditions (water quality and quantity available at specific times) to allow access to the various habitats required to complete their life cycle.

Our previous **Federal Register** notices and reports (NMFS 1996, 1997, 1998, 2014, 2016; Stout *et al* 2012), as well as numerous other reports and assessments (Kostow 1995; National Research Council 1996; Spence *et al* 1996; Nicholas *et al.* 2005; ODFW 2007a, 2007b, 2013, 2014c, 2021), have reviewed in detail the effects of historical and ongoing land-management practices that have altered Oregon and California coastal salmon habitat. A major determinant of trends in salmon abundance is the condition of the freshwater, estuarine, and ocean habitats on which salmon depend. While we rarely have sufficient information to predict the population-scale effects of habitat loss or degradation with precision, it is clear that habitat availability imposes an upper limit on the production of salmon, and reduction in habitat area or quality reduces potential production.

A broad range of historical and ongoing land and water-management activities and practices have adversely impacted the freshwater and estuarine habitats used by Chinook salmon, including construction of dams and other barriers, water diversions, channelization and diking, agricultural practices, roads, timber harvest, mining, and urban development. In the 1850s, settlers began developing the flat alluvial valley bottoms and filling wetlands to increase agricultural productivity in the OC and SONCC Chinook salmon ESUs' ranges. In the years that followed, people straightened and disconnected stream channels from their floodplains, diked, drained and filled wetlands associated with historically braided river channels and estuaries, eliminated beaver and their ponds, and negatively modified riparian habitats (Kostow 1995; Nicholas 1997).

By the mid-1800s, placer mining (mining of stream bed deposits for minerals, especially gold) became a major industry in the Pacific Northwest. Mineral and sand and gravel mining can alter riparian habitats, streambanks, channel morphology, floodplain function, bed material composition, and instream habitat complexity (NRC 1996). Mining can also pollute streams by increasing in-stream sediment loads and by releasing toxic heavy metal and acids (Meehan 1991). The hand methods used in the early days of placer mining later gave way to hydraulic mining and dredging. Placer mining in the 1800s destroyed spawning and rearing habitats either directly or through increased sedimentation, and in some areas, mine wastes still affect water quality and riparian function (NMFS 1997). Motorized in-stream placer mining is another common form of mining that impacted salmon habitats. California banned motorized in-stream placer mining in 2016 and Oregon banned it in 2018.

Timber harvesting and associated road building are widespread throughout the range of both the OC and SONCC Chinook salmon ESUs. The immediate effects of these activities were the loss of important habitat features. Efforts to ''clean'' the stream channel for fish passage began in the 1940s and continued through the 1970s (Reeves *et al.* 1991). The principal consequences of these activities include changed rates of sediment and nutrient delivery, increased fine sediment levels, reduced levels of instream large wood, altered levels of temperature and dissolved oxygen, and altered watershed hydrology (Meehan 1991). The Forest Ecosystem Management Assessment Team (FEMAT 1993) characterized forest road networks as the most important sources of accelerated delivery of sediment to fish-bearing streams. While timber harvest activity has decreased since the peak over 50 years ago, and timber harvest practices and forest management have improved, the effects of past timber harvest practices and road building continue and future timber harvest (particularly on private lands) may pose a threat to Chinook salmon. The threat from future timber harvest will rely partly on the states' forest practices and the forest practices for federal lands (see *Inadequacy of Existing Regulatory Mechanisms*).

Agricultural activities reduced instream flows through water diversions and altered stream stability by removing stream-side vegetation and through the building of dikes and levees that disconnected streams from their floodplains and resulted in loss of natural stream sinuosity. Urban development has also led to building of roads by streams, stream channelization, and loss of instream wood in some areas. Urban, industrial, and rural developments can also result in increased peak flows, simplification of downstream channels, increased channel width to depth ratios, and toxic non-point source pollution (Booth and Jackson 1997, Booth and Steinemann 2006). Agricultural land conversion and urban, industrial, and rural development are also the primary causes of freshwater and estuarine wetland losses. Wetlands are important rearing habitat for Chinook salmon.

Roads can contribute to the degradation of salmonid habitat in several ways. ''Roads can affect salmonid habitat by reducing natural infiltration and increasing hydro-confinement, leading to altered flow regimes, [and] peak flows. . . .'' (NMFS 2013). Roads also increase sediment loads in streams ''due to mass failures of cut and fill slopes and channelized surface erosion'' (Spence *et al.* 1996). By increasing the magnitude and frequency of peak flows, roads can cause excess scouring of downstream stream beds and banks. Lastly, ''runoff from roads in urban areas can contain significant concentrations of substances that are toxic to fish'' (Spence *et al.* 1996).

Dams affect the way water and sediment move down a river, changing the amount and timing of flow, the size of substrates downstream of the dam, and the temperature and chemical characteristics (NMFS 2013 and 2014). And because dams transform the upstream habitat from a river into a lake, they change the amount and location of available habitat and significantly alter salmonid interactions with predators and competitors. Dams can also act as barriers to juvenile salmon migrating to the ocean, and as obstacles to adult fish returning to their natal streams to spawn.

NMFS (1998) identified all of the factors described above as factors contributing to the decline of West Coast Chinook salmon. Below we summarize the key habitat-related factors that may be currently limiting the viability of the OC and SONCC Chinook salmon ESUs in particular.

OC Chinook Salmon ESU and Habitat

Numerous evaluations have identified the loss of stream complexity as one of the key factors limiting the distribution and abundance of Chinook and coho salmon (NMFS 1996, 1997, 2016, and 2022; Nicholas 1997; Stout 2012; ODFW 2021). ODFW (2007a) defines stream complexity as the ability of a stream to provide the typical variety of habitats. ODFW's Oregon Coast Coho Assessment (Nicholas *et al.* 2005) identified stream complexity as either a primary or secondary limiting factor throughout all basins of the ESU. In addition to stream complexity, ODFW (2007a) identified water quality, water quantity, hatchery impacts, spawning gravel and exotic species as factors limiting the distribution and abundance of salmonids.

The state of Oregon, as well as federal land and natural resource management agencies, have made great progress towards addressing many of the habitat limiting factors described above. ODFW recently completed a 12-year review of the OC coho conservation plan and included an evaluation of habitat trends (ODFW 2021). In their evaluation of habitat trends, ODFW observed signs of improvement in pool frequency and channel shade. ODFW also observed a flat trend in percent fine sediments and wood volume. The detection of positive trends and the lack of undesirable trends suggests progress in arresting further declines in habitat conditions.

Similar to ODFW's 12-year review for OC coho salmon, NMFS (2022) observed improvements in habitat conditions. NMFS (2022) noted the restoration of thousands of acres of off channel habitat in estuarine and freshwater areas, restoration of fish passage and access to tributary habitats, and the continued implementation of existing management plans and regulations that reduce impacts to freshwater habitats. ODFW's analysis of habitat trends and NMFS' assessment for the OC Coho salmon ESU are directly relevant to the OC Chinook salmon ESU.

The SRT used a risk matrix to evaluate if the present or threatened destruction, modification, or curtailment of the OC Chinook salmon ESU's habitat or range is currently contributing to a risk of extinction or is likely to contribute to a risk of extinction in the foreseeable future. There has been a long history of land-use practices leading to habitat degradation, but freshwater habitat has been improving slowly over the past several decades due to stricter land-use regulations compared to the early 20th century. The existing regulatory frameworks and continued conservation efforts are generally expected to support a positive trend in salmon habitat recovery for the foreseeable future. The SRT concluded, and we agree, it is unlikely that this factor contributes significantly to a risk of extinction. Although past resource management practices negatively impacted the species habitat and range, we find that habitat destruction and modification is not a factor limiting the rangewide viability of the OC Chinook salmon ESU now or in the foreseeable future.

SONCC Chinook Salmon ESU and Habitat

A wide variety of past and present activities have impacted salmonid habitat within the SONCC Chinook salmon ESU. The primary factors that may be limiting the productivity of the habitat to some degree are water quality, water quantity, habitat complexity, and access to off channel habitats. The water quality problems include excess temperatures, flow modification, sedimentation, and bacterial contamination. The causes for these problems are various and include the legacy and ongoing effects of land and resource management, urban, rural, industrial, and agricultural developments, and dams.

Since the last status review the state of California's Fisheries Restoration Grants Program (FRGP) and Oregon's Watershed Enhancement Board (OWEB) have funded numerous habitat restoration projects in the SONCC Chinook salmon ESU (CalFish 2024, OWEB 2024). The types of projects include riparian habitat improvement, instream habitat improvement, and fish passage improvement. In the past 23 years (2000 through 2023), the FRGP funded 48 habitat restoration projects in river basins that support SONCC Chinook salmon. In the past 22 years (2000 to 2022), OWEB funded 63 habitat restoration projects in basins that support SONCC Chinook salmon. In addition to the actions funded through these programs, several dams have been removed in the Rogue River basin. Savage Rapids and Gold Ray dams on the upper Rogue River have been removed. Elk Creek dam, Jackson Street dam on Bear Creek, and Lovelace and Santilla Fish Farm dams on Slate Creek have also been removed.

The Rogue River basin contains two dams operated by the U.S. Army Corps of Engineers (USACE). In 1977, the USACE completed construction of the William Jess Dam on the mainstream Rogue River at river mile 157. Because the dam does not have fish passage it blocks access to approximately 25 percent of the primary spring-run Chinook salmon spawning habitat in the basin (Kostow 1995, ODFW 2007b). The USACE completed construction on the Applegate Dam on the upper Applegate River in 1979. The USACE manages the water stored in the reservoirs created by the William Jess and Applegate dams for multiple purposes, one of which is to increase the amount of downstream habitat for juvenile salmonids. This operational strategy has successfully enhanced habitat for juvenile Chinook salmon in the Rogue River as evidenced by the increase in flow during the summer rearing period (ODFW 2007b). USACE operation of Applegate Dam affects flow in the Applegate River during autumn to aid the upstream migration of adult Chinook salmon. The operational strategy has been successful in enhancing the available spawning habitat of fall-run Chinook salmon in the Applegate River (ODFW 2013). Prior to construction of Applegate Dam, 90 percent of fall-run Chinook salmon spawning in the Applegate River occurred in the lower 13 miles of the river. After dam construction and due largely to reservoir operation, spawning shifted upstream with an average of 33 percent of spawners found above that same point (ODFW 2013).

Dams can also alter natural sediment transport processes and decrease the recruitment of coarse materials (*e.g.,* spawning gravels) into downstream habitats (Spence *et al.* 1996, ODFW 2000). ODFW (2007b, 2013, and 2024) has documented a reduction in spawning gravel linked to the dams in both the Rogue and Applegate rivers. The USACE has funded efforts to supplement instream gravel below the Lost Creek dam, and ODFW expects those efforts to begin in 2025 (ODFW 2024).

The recent removal of four dams (Iron Gate, Copco 1, Copco 2, and J.C. Boyle) on the upper Klamath River will improve downstream habitat conditions and water quality in the lower Klamath River basin. However, water diversions in the Upper Klamath River, the Trinity River, and the Scott and Shasta Rivers decrease the total volume of water that otherwise would have naturally flowed down the Lower Klamath River reach (NMFS 2014). These diversions decrease the quantity of mainstem flows on the Klamath River mostly during the spring and summer months, when juvenile access to cooler tributaries and cooler mainstem water temperatures is essential. Generally, spring and summer flows are lower than historical conditions, while fall and winter flows in the Lower Klamath are generally similar to those in the past.

Spring-run Chinook salmon continue to be limited in distribution with the majority of the spawning in the mainstem Rogue River below Lost Creek dam. The dam limits access to approximately one-third of historical spring-run Chinook spawning habitat (ODFW 2007b). The effects of the Lost Creek dam on gravel recruitment will be a recurring problem, and it is not clear if gravel augmentation plans below Lost Creek dam will successfully address the problem.

The SRT evaluated if the present or threatened destruction, modification, or curtailment of the SONCC Chinook salmon ESU's habitat or range is currently contributing to a risk of extinction or is likely to contribute to a risk of extinction in the foreseeable future. In evaluating habitat threats, the SRT concluded that current threats (timber harvest, mining, dams and diversions, channelization, diking, roads) presented low-to-moderate risks to the ESU. While there are some concerns with habitat in the upper Rogue River mainly impacting spring-run fish, the SRT concluded, and we agree, that it is unlikely that this factor contributes significantly to a risk of rangewide extinction now or in the foreseeable future. Factors leading to this conclusion are dam removal on the Klamath River and the fish habitat management strategies implemented at the dams in the Rogue River basin. Additionally, the SRT noted that while there is a long history of land-use practices leading to habitat degradation, freshwater habitat has likely been improving slowly over the past several decades due to habitat restoration projects and stricter land-use regulations compared to the early 20th century. We anticipate the benefits of these efforts will continue.

Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Tribal, commercial, and recreational salmon fisheries in the ocean and fresh water harvest fish from the OC and SONCC Chinook salmon ESUs. State and federal agencies use harvest restrictions to reduce impacts, with the intent of ensuring enough adult fish return to spawn and maintain healthy run sizes. However, ocean fisheries are inherently mixed-stock, creating the potential for ocean harvest to disproportionately affect weaker stocks. Across the West Coast, salmon fisheries are managed to limit fishery impacts on certain low abundance or protected stocks; this weak-stock management can result in constraints on fisheries for abundant stocks that would not otherwise be necessary (Pacific Fishery Management Council (PFMC) 2022).

OC Chinook Salmon ESU and Harvest

For OC stocks, the SRT examined two data sets: The Pacific Salmon Commission Chinook Technical Committee's (CTC) Exploitation Rate Analysis (ERA) and ODFW's terminal harvest rate estimates. The CTC's ERA contains estimates of total exploitation rate (ocean and freshwater) for Chinook salmon fisheries and stocks harvested within the Pacific Salmon Treaty area (CTC 2023). The two southernmost stock aggregates in the ERA (North Oregon Coast and Mid-Oregon Coast groups) represent fall-run Chinook salmon arising from the OC Chinook salmon ESU. In the North Oregon Coast aggregate, the ERA includes fall-run Chinook salmon in the Nehalem, Salmon, Siletz, and Siuslaw rivers. In the Mid-Oregon Coast aggregate, the ERA includes fall-run Chinook salmon in the South Umpqua, Coquille, and Elk rivers. The ERA does not estimate exploitation rates for spring-run Chinook salmon from the OC Chinook salmon ESU.

The SRT analyzed the ERA data for fisheries mortality from 1979 through 2020 (SRT 2024). Despite substantial inter-annual variation in exploitation rates of the North Oregon stocks, there has been a modest decline in fisheries related mortality since the early 1980s. Exploitation rates for the North Oregon stocks have varied between 30 to 85 percent and averaged 52 percent over this time period. There has also been a lot of inter-annual variation in the Mid-Oregon stocks, but there appears to be a modest decline in exploitation since the early 1980s. Exploitation rates for the Mid-Oregon stocks have varied between 14 and 71 percent and averaged 43 percent over the same time period.

In addition to the CTC model, the SRT examined ODFW's terminal harvest estimates for 12 coastal river basins (bay and freshwater fisheries). ODFW's harvest rate estimates represent the number of fish harvested as a proportion of the total run returning to each basin in a given year. Among the 12 rivers, terminal exploitation rates vary from 60 percent (Tillamook) to 20 percent (Nehalem and Floras). Broadly speaking, there appears to be an increasing trend in terminal exploitation rates for the Nestucca, Siletz, Siuslaw, Umpqua, and Coos stocks over the past several decades (1986–2021). We did not detect a trend in terminal exploitation rates for the other river basins.

The Pacific Salmon Commission does not manage harvest of OC spring-run Chinook salmon in the Pacific Salmon Treaty area. ODFW monitors terminal harvest of spring-run Chinook salmon in the Umpqua River, but not in ocean fisheries. Terminal harvest rates for Umpqua River spring-run Chinook salmon has averaged 25 percent (2004–2019).

Several members of the SRT expressed concern over what they considered to be high total exploitation rates (*i.e.,* combined ocean and terminal exploitation rates of 50 percent or more) of fall-run Chinook salmon stocks. Whether or not exploitation rates greater than 50 percent are sustainable depends on the productivity of the stock. Harvest rates above 50 percent can be sustainable if the stocks are productive. The PFMC working group on Sacramento River Chinook salmon has recently calculated exploitation rates corresponding to maximum sustainable yield for 14 stocks of fall-run OC Chinook salmon and 2 stocks of spring-run OC Chinook salmon (PFMC Sacramento River Fall-run Chinook Work Group (SRWG) unpublished) based on the published estimates of spawner-recruit parameters for those stocks (Table A–II:11 in ODFW 2014b). The maximum sustainable yield is the largest long-term average catch that can be taken from a stock under prevailing environmental and fishery conditions. For all but one of the stocks (Elk River), exploitation rates corresponding to maximum sustainable yield are greater than 50 percent.

Based on the findings in PFMC SRWG (unpublished), we find that current harvest rates are generally within the range of those expected to produce maximum sustainable yield and overutilization is not currently limiting the viability of the OC Chinook salmon ESU nor is it likely to limit the viability in the foreseeable future.

SONCC Chinook Salmon ESU and Harvest

The PFMC manages ocean fisheries affecting the SONCC Chinook salmon ESU under the Pacific Coast Salmon Fishery Management Plan (Salmon FMP). The PFMC conducts annual stock assessments and fishery evaluations under the Salmon FMP (PFMC 2022). These stock assessments draw conclusions about the status of the stock (*e.g.,* whether the stock is overfished or approaching an overfished condition or whether overfishing is occurring) in relation to the fishery management terms defined under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and/or NMFS' National Standards Guidelines, such as minimum stock size threshold (MSST) and maximum fishing mortality threshold (MFMT). The PFMC considers a stock to be overfished when the 3-year geometric mean of escapement falls below MSST. The MFMT is the level of annual fishing mortality above which overfishing is occurring. These stock assessments, which provide information for determining the sustainability of a fishery, are based on different criteria than those under the ESA, which relate directly to the likelihood of extinction of the species. In other words, an overfished status under MSA does not necessarily correlate with a species' extinction risk. For example, harvesting a salmonid stock at levels that make it subject to overfishing and/or contribute to an overfished condition may not necessarily pose a risk of extinction such that the species would qualify for listing as an endangered or threatened species.

The Salmon FMP defines a Southern Oregon and Northern California Chinook salmon stock complex that consists of natural and hatchery stocks of spring- and fall-run Chinook salmon south of the Elk River, Oregon, to (and including) the Klamath River, plus Umpqua River spring-run Chinook salmon (PFMC 2024). The Salmon FMP defines three stocks that overlap with the SONCC Chinook salmon ESU: Klamath River fall-run, Smith River, and Southern Oregon Coast Chinook salmon. The Klamath River fall-run Chinook salmon stock only partially overlaps with the SONCC Chinook salmon ESU, since the stock consists of a small lower Klamath River portion (part of the SONCC Chinook salmon ESU) and a larger portion from the Upper Klamath/Trinity River Chinook salmon ESU. The Salmon FMP does not include escapement goals or fishery impacts on the Smith River. The Southern Oregon stock consists of spring- and fall-run Chinook salmon south of the Elk River. The Salmon FMP includes escapement goals for Rogue River fall-run Chinook salmon to track the status of the Southern Oregon stock with respect to abundance. However, the Salmon FMP does not include goals for fishery impacts on the stock.

The Salmon FMP defines an MFMT for Southern Oregon Coast Chinook salmon of 78 percent, a species-specific proxy value derived from twenty stock-recruitment data sets (covering brood years as early as 1946 and no later than 2000, though it varies widely by stock) for stocks ranging from northern Washington to the Sacramento River basin. In 2014, the Salmon Technical Team (STT 2014) and the Scientific and Statistical Committee (SSC 2014) of the PFMC recommended adoption of a stock-specific MFMT of 54 percent based on an analysis of Rogue River fall-run Chinook salmon (Confer and Falcy 2014). The PFMC did not adopt the recommendation, choosing instead to continue to use the proxy value of 78 percent.

The PFMC assumes that age-specific harvest rates (the age of fish caught by the fishery) of the Southern Oregon Chinook salmon stock are equal to those estimated for the Klamath River Fall-run Chinook salmon stock, but river harvest rates and age structure, and thus total exploitation rates of southern Oregon Chinook salmon, are not tracked by the PFMC (PFMC 2024). For the years 2013 through 2022, estimated age-4 ocean harvest rates on the Klamath River Fall-run Chinook salmon stock ranged from 4 to 38 percent (mean 22 percent). ODFW (unpublished data) reports 2012–2021 terminal harvest rates on Rogue Fall-run Chinook salmon of 4 to 28 percent with mean 12 percent and 2009–2018 river harvest rates of Rogue Spring-run Chinook salmon of 1 to 14 percent with mean 8 percent. In order to combine the ocean and terminal harvest rates into a total exploitation rate we would need information on maturation schedules (the probability of spawning if alive at a given age). Because such information is not available, we were unable to estimate the total exploitation rates for Rogue River fall-run Chinook salmon. However, it seems unlikely that exploitation rates would exceed the recommended MFMT of 54 percent, let alone the MFMT of 78 percent defined in the Salmon FMP (PFMC 2024).

Terminal harvest rate estimates were higher on the Chetco River (range of 8 to 37 percent with mean 18 percent) and Winchuck River (0 to 36 percent with mean 9 percent) during the same 10-year time period (2012–2021). However, the mean terminal harvest rates for these stocks are still likely to equate to total exploitation rates that are less than the Rogue River Fall-run Chinook salmon MFMT, although this cannot be determined with confidence without information on age structure and maturation rates.

Given the available, albeit limited information for total exploitation rate of stocks in the SONCC Chinook salmon ESU and the fact that Rogue River Fall-run Chinook salmon have rarely fallen below the MSST defined in the Salmon FMP, we found that overutilization is not limiting the viability of the SONCC Chinook salmon ESU now nor is it likely to limit the viability in the foreseeable future.

Disease

Chinook salmon are exposed to numerous bacterial, protozoan, viral, and parasitic organisms in spawning and rearing areas, hatcheries, migratory routes, and the marine environment. Increased physiological stress and physical injury in migrating salmonids may increase their susceptibility to pathogens (Matthews *et al.* 1986, Maule *et al.* 1988). The presence of adequate water quantity and quality during late summer is a critical factor in controlling disease epidemics for salmonids. As water quantity and quality diminish, and freshwater habitat becomes more degraded, many previously infected salmonid populations may experience large mortalities because added physiological stress can trigger the onset of disease. These factors (common in various rivers and streams) may increase anadromous salmonid susceptibility and exposure to disease (Holt *et al.* 1975, Wood and WDFW 1979).

OC Chinook Salmon ESU and Disease

Common diseases that affect Chinook salmon on the Oregon coast include amoebic gill disease, bacterial cold-water disease, bacterial kidney disease, columnaris, furunculosis, ich, and trichodiniasis. In the Oregon Coastal Conservation and Management Plan (2014), ODFW identified population-level factors that may be limiting the viability of coastal Chinook salmon. ODFW (2014c) did not consider disease to be a limiting factor for the OC Chinook salmon ESU. The SRT similarly concluded that disease poses a low risk to the OC Chinook salmon ESU. We conclude that disease poses a low risk to the viability of the OC Chinook salmon.

SONCC Chinook Salmon ESU and Disease

ODFW (2007a, 2013) considered disease to be a primary factor that affects the abundance of Chinook salmon in the Rogue River basin. ODFW documented extensive mortalities of adult Chinook salmon in the mainstem Rogue River in 1977, 1981, 1987, 1992, and 1994. Estimates of mortality rates during those years ranged between 28 percent and 70 percent of the spring-run Chinook salmon that entered the Rogue River (ODFW 2000). Columnaris was the disease most frequently identified in dead and dying fall-run Chinook salmon sampled in the Rogue River during the late 1970s and early 1980s (Amandi *et al.* 1982). Mortality rates of juvenile Chinook salmon infected with *F. columnare* increase as water temperature increases between 54 °F and 70 °F (Becker and Fujihara 1978). Summertime water temperatures in the Rogue River can approach the upper end of this range.

To minimize losses of adult and juvenile Chinook salmon to disease, ODFW identified targets for maximum water temperature at the U.S. Geological Survey gage near Agness, Oregon, and requested releases of reservoir storage from Lost Creek Lake in order to meet water temperature targets in downstream areas. Since 1995, the USACE has directed the reservoir water release strategy toward using reservoir storage to prevent, or to delay as long as possible, disease outbreaks. The strategy appears to be working; no large disease outbreaks have been documented in the Rogue River during the current multi-year drought, nor during the recent ''heat dome'' event that occurred in 2021 (ODFW 2024).

The Klamath River has a history of myxosporean parasite infections, including *C. shasta* and *Parvicapsula minibicornis,* which can significantly impact survival of juvenile Chinook salmon. The highest rates of infection in the Klamath River have been documented downstream of Iron Gate Dam and are less likely to occur downstream of the Trinity River confluence within the SONCC Chinook salmon ESU (Stocking and Bartholomew 2007, Bartholomew and Foott 2010). Furthermore, the removal of four dams (Iron Gate, Copco 1, Copco 2, and J.C. Boyle) on the upper Klamath River should reduce the impacts of parasite infections downstream (NMFS 2021).

Strategic water releases, dam removals, and other factors combined have reduced the risk of disease for the SONCC Chinook Salmon ESU. The SRT concluded that disease poses a low risk to the SONCC Chinook Salmon ESU. We found no evidence to indicate otherwise, and conclude that disease poses a low risk to the viability of the species.

Predation

A variety of species prey on juvenile and adult Chinook salmon. Below we summarize the effects of predation separately for marine and freshwater habitats.

Marine Predation

The Marine Mammal Protection Act (MMPA) of 1972 stopped the decline of many marine mammal populations and led to the recovery of several in the northeastern Pacific Ocean, such as populations of harbor seals, Steller sea lions, and California sea lions. Studies indicate that pinnipeds (seals and sea lions) prey on a wide variety of fish species, and salmonids appear to be a minor part of their diet. Riemer and Brown (1996) collected Steller sea lion scat (fecal) samples from the Rogue Reef and Orford Reef breeding sites (Oregon) and identified salmonids in 19.3 percent of samples. Riemer and Brown (1996) collected California sea lion samples at the Cascade Head haul-out area near Lincoln City, Oregon, and identified salmonids in 24.3 percent of samples in February and 7.9 percent in October. Riemer *et al.* (2001) collected scat samples from harbor seals in the Alsea and Rogue rivers and found the frequency of occurrence of salmonids to range from 4.3 to 14.8 percent. Orr *et al.* (2004) found that harbor seals in the lower Umpqua River consumed prey from over 35 taxa and found salmonid remains in only 6 percent of samples. Lastly, Hillemeier (1999) assessed pinniped predation rates within the Klamath River estuary during August, September, and October 1997 and estimated that seals and sea lions consumed a total of 8,809 adult fall-run Chinook salmon during the study period (8.8 percent of the estimated fall-run Chinook salmon run).

Fish-eating killer whales (*Orcinus orca*) consume a wide variety of fish and squid, but salmon are their primary prey (Ford *et al.* 1998, 2000, Ford and Ellis 2006, Ford *et al.* 2016, Hanson *et al.* 2021). Scale and tissue sampling from

May to September in inland waters of Washington and British Columbia, Canada, indicate that fish-eating killer whale diets consist of a high percentage of Chinook salmon (monthly proportions as high as 90 percent; Hanson *et al.* 2010). Ford *et al.* (2016) found that most of the salmon consumed by the whales were Chinook salmon (nearly 80 percent).

Harbor seals, sea lions, and killer whales (including populations in British Columbia and Alaska that feed on north-migrating salmon like OC Chinook) have all increased at least three-fold over the past 50 years, and some studies suggest these increases have resulted in proportional increases in predation pressures on salmon (SRT 2023). Although the diets of seals and sea lions are diverse and salmon may be a minor part of their diet, the overall increase in abundance of these species, as well as resident killer whales, may have implications for the long-term status of depleted, and in some cases ESA-listed, salmonid populations. Chasco *et al.* (2017) estimated that, while production of wild and hatchery Chinook salmon increased between 1975 and 2015 and harvest levels decreased, the increased consumption by sea lions, harbor seals, and killer whales more than offset the first two. Based on the model results, for stocks that have a longer and more northerly migration route, such as those from the OC Chinook salmon ESU, predation impacts have increased over time, exceeding harvest in recent years (Chasco *et al.* 2017). The longer migration routes expose these stocks to more predation by marine mammals.

Freshwater Predation

Kostow (1995) and ODFW (2014c) noted that a substantial smallmouth bass population in the lower mainstem Umpqua River is of particular concern. ODFW (2022) estimated that smallmouth bass were illegally introduced into the Coquille River sometime prior to 2011. Since then, the population of smallmouth bass has grown substantially and become one of the primary factors limiting viability of the Coquille River Chinook salmon population. ''Although wild fall-run Chinook [salmon] in the Coquille suffered from poor ocean conditions, predation by smallmouth bass is the primary reason these fish have not rebounded to the same extent as in other coastal rivers'' (ODFW 2022). ODFW is actively trying to remove smallmouth bass from the Coquille River to reduce predation on juvenile wild fall-run Chinook salmon.

Umpqua pikeminnow were illegally introduced into the Rogue River in the 1970s. Pikeminnow consume juvenile Chinook salmon and steelhead and compete with native fishes for food and space. The estimated impact of pikeminnow on the abundance of juvenile Chinook salmon in the Rogue River basin is difficult to ascertain. Beamesderfer *et al.* (1996) estimated that northern pikeminnow consumed about 16 million (8 percent) of the estimated 200 million juvenile salmonids emigrating annually in the Columbia River Basin. The mainstem dams on the Columbia River exacerbate predation opportunities. Umpqua pikeminnow predation rates in the Rogue River are likely lower due to flow and temperature management implemented at the William Jess and Applegate dams. ''Decreased water temperatures, resulting from reservoir releases during summer, have likely limited the upstream distribution of Umpqua pikeminnows in the Rogue River'' (ODFW 2013).

In addition, hatchery-produced coho salmon and steelhead consume the fry of natural-origin spring-run Chinook salmon. Surveys from 1979 through 1981 estimated that the total annual number of spring-run Chinook salmon fry consumed by hatchery coho salmon and steelhead was between 163,000 and 275,000, representing 3–7 percent of Rogue River spring-run Chinook salmon fry production during those years (ODFW 2007b). In addition to preying on natural-origin fish, large numbers of hatchery fish can attract predators and increase predation rates on natural-origin fish (Nickelson 2003, Weber and Fausch 2003, Nowak *et al.* 2004). Hatchery programs attempt to limit predation impacts on natural-origin salmonids through control of hatchery release numbers and by minimizing spatial and temporal overlap with natural-origin salmonid juveniles.

In summary, although the abundance of some marine mammals has increased since the 1970s and the numbers of salmon have decreased, we found no data to establish a cause-and-effect relationship. Anadromous salmonids have historically coexisted with both marine and freshwater predators. Studies focused on pinniped predation of OC and SONCC salmonids suggest salmonids are a minor component of their diet. While longer-ranging ESUs like OC Chinook are at greater risk of killer whale predation, the available information led the SRT to conclude predation is a low risk for both ESUs. Although introduced species appear to be a leading cause for the decline of the Coquille River Chinook salmon population, we found no evidence to indicate that freshwater predation is a rangewide concern for the viability of the OC Chinook salmon ESU. Similarly, the introduction of Umpqua pikeminnow into the Rogue River basin does not appear to be a factor limiting the viability of either spring-run or fall-run Chinook salmon populations in the SONCC Chinook salmon ESU. Based on the available evidence and consistent with the findings of the SRT, we conclude that predation poses a low risk to the rangewide viability of the OC and SONCC Chinook salmon ESUs.

Inadequacy of Existing Regulatory Mechanisms

A variety of Federal, state, tribal, and local laws, regulations, treaties and measures affect the abundance and survival of the OC and SONCC Chinook salmon ESUs and the quality of their habitat. NMFS (1998) found that the serious depletion of Chinook salmon and other anadromous salmonids, coupled with the poor health and low abundance of many distinct populations of Chinook salmon, was an indication that existing regulatory mechanisms had largely failed to prevent the depletion. The SRT reviewed existing regulatory mechanisms as part of the status review. The SRT noted several Federal, state, and local regulatory programs that have been successfully implemented to substantially reduce historical risks to the OC and SONCC Chinook salmon ESUs. For example, the U.S. Forest Service and Bureau of Land Management have consulted with NMFS on land management plan amendments that include adequate protection of riparian and stream habitat complexity for salmon and steelhead (NMFS 2022). The states of Oregon and California have amended or are in the process of amending their forest practices and road management plans to address NMFS' concerns related to listed OC and SONCC coho salmon. We expect that efforts designed to benefit coho salmon will also benefit the co-occurring Chinook salmon.

Changes in regulations governing Chinook salmon fisheries have significantly reduced the risks for Chinook salmon identified in the coastwide status review (Myers *et al.* 1998) and status review update (West Coast Chinook Salmon Biological Review Team 1999). For ocean salmon fisheries on the West Coast, NOAA Fisheries works with the PFMC to establish annual harvest levels in federal waters from 3 to 200 miles off the coasts of Washington, Oregon, and California. In addition, adult salmon returning to Washington and Oregon migrate through both U.S. and Canadian waters and are harvested by fishermen from both countries. The U.S. and Canadian governments work with tribes, states, and sport and commercial fishing groups to provide for shared conservation and harvest objectives. These proceedings are guided by the 1985 Pacific Salmon Treaty that is implemented through the Pacific Salmon Commission.

The SRT concluded, and we agree, that the inadequacy of existing regulatory mechanisms poses a low risk to the rangewide viability of the OC and SONCC Chinook salmon ESUs. In the range of OC and SONCC Chinook salmon, the regulation of some activities and land uses will alter past harmful practices, resulting in habitat improvements. Similarly, existing regulations governing Chinook salmon harvest have improved the OC and SONCC ESUs likelihood of persistence.

Other Natural or Manmade Factors Affecting Its Continued Existence

Environmental Variation

Scientists predict the rising temperatures and associated ecosystem changes caused by environmental variation to impact Pacific salmon by a variety of mechanisms throughout their life cycle (Crozier *et al.* 2008, 2019, Isaak *et al.* 2022, Crozier and Siegel 2023). These impacts are complex and vary among species, ESUs, and habitats. For U.S. West Coast salmon and steelhead, expected changes to freshwater habitats include increased air and stream temperatures and changes in seasonal (but not necessarily annual mean) rainfall patterns, with larger and more extreme storms and droughts. These increased temperatures will result in more winter precipitation falling as rain than snow at intermediate elevations, which alters both seasonal streamflow and water temperatures. Within the range of the OC and SONCC ESUs, experts predict stream temperatures to rise, winter flows to increase, and summer flows to decrease compared to current patterns (ODFW 2021). In marine habitats, we expect the food webs that support salmon to change in response to factors including increased temperatures, acidification, and the strength and timing of wind-driven upwelling, although how these changes will affect salmon growth and survival is difficult to predict.

Crozier *et al.* (2019) undertook a comprehensive climate vulnerability assessment for Pacific salmon and steelhead along the U.S. West Coast, focusing on ESUs that have received or are candidates for protection under the ESA. Crozier *et al.* (2019) reported that Chinook salmon populations ocean-type life histories (like OC and SONCC) produced relatively low vulnerability scores during the early life history and juvenile freshwater stages, due to limited rearing in freshwater in summer, when thermal impacts, hydrologic regime shifts, and low-flow impacts are expected to be highest. The OC and SONCC Chinook salmon ESUs were not included in the Crozier *et al.* (2019) assessment, so the SRT evaluated vulnerability to changing environmental conditions using results for ESUs that had similar life histories, geographic ranges, and human land use activities. For early life history, estuary, and adult freshwater stages, the SRT used listed Chinook salmon ESUs that had overlapping adult river entry timing (spring and fall runs), fall spawn timing, limited freshwater residency and extended estuarine residency, and predicted low-moderate sensitivity for these attributes (early life history, estuary, and adult freshwater stages) for the OC and SONCC Chinook salmon ESUs. For the marine stage, OC Chinook salmon marine distributions extend from local waters to SE Alaska and scored as a low-moderate sensitivity. In contrast, the SONCC Chinook salmon marine distribution is largely restricted to the California current and scored as moderate-high sensitivity. The SRT ranked the cumulative life cycle effects for the OC ESU as low-moderate vulnerability and for the SONCC ESU as moderate-high. The estimated overall vulnerability rank is a measure of how susceptible a particular ESU is to the impacts of environmental variation and was estimated as moderate for OC and high for the SONCC Chinook salmon ESUs.

However, the SRT also noted that there remains considerable uncertainty about the localized effects of environmental variation on these ESUs, and that predicted future stream temperatures in many of the coastal streams should remain within suitable ranges for salmon. For the OC and SONCC Chinook salmon ESUs, the predicted effects of increasing temperatures may be greater for the rivers that are already relatively warm during the summer, such as the Umpqua, Rogue, and Coquille rivers, and less so for others, such as northern rivers of the Oregon coast and the Smith River in California. The SRT (2024) predicted portions of the spawning and rearing areas in some rivers, including the Umpqua, Rogue, Nehalem, and Coquille to have average August temperatures above 20° C, a point at which salmon are stressed physiologically and subject to greater disease pressures (Richter and Kolmes 2005). However, these predictions are based on average stream temperatures for relatively large river reaches and do not account for potential small-scale thermal refuges that salmon may use currently and in the foreseeable future. Isaak *et al.* (2022) highlighted that Chinook salmon in the South Fork Umpqua River as likely to be particularly vulnerable to warming temperatures, since it already experiences near-lethal temperatures in some years and is expected to become 1–3 °F warmer by the end of century. Isaak *et al.* (2022) concluded that other populations of OC and SONCC Chinook salmon may be less impacted by warming temperatures due to a relatively short juvenile freshwater life history. They also noted that the regulation of water temperature by Lost Creek Dam is expected to mitigate climate effects related to temperate and flow for portions of the Upper Rogue River.

In marine habitats, the effects of sea level rise are largely restricted to estuarine environments, but changes in sea surface temperature, upwelling, currents, and ocean acidification, all of which influence salmon productivity, are expected in estuarine and ocean habitats. Crozier *et al.* (2019) reported that high levels of projected changes in sea surface temperature and ocean acidification will be compounded by regional variations in sea level rise, flooding, and changes in upwelling. Crozier *et al.* (2019) noted that while coastal areas may benefit from oceanic buffering effects that can reduce extreme climate impacts, the complexity of marine food webs and inconsistencies in projections for ocean currents and upwelling add considerable uncertainty to predicting the full biological consequences on salmon growth and survival. Prolonged periods of poor ocean survival observed during warm decades suggest that rising ocean temperatures could lead to negative impacts for salmon populations (Crozier *et al.* 2019).

Based on the SRT findings, we conclude that the effects of future predicted environmental variation may pose a moderate risk to OC and SONCC salmon ESUs. The SRT was particularly concerned that rising stream temperatures and lower summer flows would be detrimental to the spring-run life history, since adults spend some or all of the summer in freshwater systems that are predicted to be exposed to higher temperatures, and the spring runs are already at low abundance in most of these rivers. Populations characterized by late-summer/early-fall smolt outmigration may also be more vulnerable to temperature increases than those with early-summer outmigration. The team also noted, however, that there remains considerable uncertainty about the localized effects of environmental variation to these populations, and that predicted future stream temperatures in many of the coastal streams remain within the healthy range for salmon.

Hatcheries

Hatcheries are another factor identified as a threat in the coastwide Chinook salmon status review (Myers *et al.* 1998) and status review update (West Coast Chinook Salmon Biological Review Team 1999). Research on the risks and benefits of hatcheries to natural salmon populations has been the subject of numerous reviews (*e.g.,* Hard *et al.* 1992, Hatchery Scientific Review Group (HSRG) 2004, Mobrand *et al.* 2005, Araki *et al.* 2008, Naish *et al.* 2008, Kostow 2009, Anderson *et al.* 2020). In general, hatchery programs can potentially provide demographic benefits to salmon and steelhead, such as increases in abundance during periods of low natural abundance (*e.g.,* Berejikian *et al.* 2009, Janowitz-Koch *et al.* 2019, Koch *et al.* 2022). Hatcheries may also help preserve genetic resources until limiting factors can be addressed (*e.g.,* Flagg *et al.* 1995, Kalinowski *et al.* 2012). However, these reviews have also concluded that long-term use of artificial propagation poses risks to natural productivity and diversity. Hatchery programs can affect natural-origin populations of salmon and steelhead in a variety of ways, including competition (for spawning sites and food) and predation effects, disease effects, genetic effects (*e.g.,* domestication selection or introgression due to stock transfers), and facility effects (*e.g.,* water withdrawals, effluent discharge). The magnitude and type of risk depend on the status of affected populations and on specific practices in the hatchery program.

With the exception of the Elk and Salmon rivers, the fall-run spawning populations in both ESUs consist primarily of natural-origin spawners (SRT 2024). The situation with the spring-run populations is more complex. Spring-run hatchery stocks released in the northern portion of the OC Chinook salmon ESU likely originated from outside of the ESU and pose genetic risks to native spring-run Chinook salmon that spawn in the same rivers. In the southern portion of the OC Chinook salmon ESU, the small South Fork Umpqua River spring-run population has little hatchery influence, while the larger North Fork spring-run spawning population typically consists of ~50 percent hatchery-origin fish.

In the SONCC Chinook salmon ESU, ODFW operates the Cole Rivers Hatchery on the Rogue River to mitigate the effects of Lost Creek Dam and to provide fishing opportunities for spring-run Chinook salmon (ODFW 2007b, 2016). ODFW founded the program from the local naturally spawning population and reportedly uses ~27 percent natural-origin fish in the broodstock annually (ODFW 2016, p. 31). ODFW estimates the proportion of hatchery fish on the spawning grounds to be very low—only 1.5 percent for the years 2016 and 2017 (ODFW 2007b). Based on the local origin of the broodstock, the proportions of natural-origin fish compared to hatchery-origin fish on the spawning grounds and in broodstock, and the hatchery's potential as an important reservoir for the run-type, the Cole River Hatchery program may be providing a net conservation benefit to the SONCC Chinook salmon ESU.

Consistent with the above discussion, the SRT concluded, and we agree, that hatcheries pose a low risk to the rangewide viability of the OC and SONCC Chinook salmon ESUs.

Rangewide Risk of Extinction

The SRT's determination of rangewide extinction risk to the OC and SONCC Chinook salmon ESUs used the categories of high, moderate, and low risk of extinction. The risk levels are defined as:

(1) *High risk:* A species or ESU with a high risk of extinction is at or near a level of abundance, productivity, diversity, and/or spatial structure that places its continued existence in question. The demographics of a species or ESU at such a high level of risk may be highly uncertain and strongly influenced by stochastic and/or depensatory processes. Similarly, a species or ESU may be at high risk of extinction if it faces clear and present threats (*e.g.,* confinement to a small geographic area; imminent destruction, modification, or curtailment of its habitat; disease epidemic) that are likely to create such imminent demographic risks.

(2) *Moderate risk:* A species or ESU is at moderate risk of extinction if it exhibits a trajectory indicating that it is more likely than not to reach a high level of extinction risk in the foreseeable future. A species or ESU may be at moderate risk of extinction due to projected threats and/or declining trends in abundance, productivity, spatial structure, or diversity. The appropriate time horizon for evaluating whether a species or DPS is more likely than not to become at high risk in the future depends on various case- and species-specific factors. For example, the time horizon may reflect certain life-history characteristics (*e.g.,* long generation time or late age-at-maturity) and may also reflect the timeframe or rate over which identified threats are likely to impact the biological status of the species or ESU (*e.g.,* rate of disease spread). The appropriate time horizon is not limited to the period that status can be quantitatively modeled or predicted within predetermined limits of statistical confidence.

(3) *Low risk:* A species or ESU is at low risk if it is not at moderate or high risk of extinction.

The SRT considered the foreseeable future to extend over a time period of 30 to 80 years. The shorter end of this time period corresponds to approximately 10 Chinook salmon generations, which the SRT concluded was a reasonable value over which to consider current demographic trends. The most common age at spawning for the OC and SONCC Chinook salmon ESUs is 3 to 4 years of age (ODFW 2007a, 2013, 2014a). The longer end of this range corresponds approximately to the timeframe over which scientific studies of the impacts of environmental variation on salmon freshwater and ocean habitat are available. For example, the SRT cited and utilized analyses of predicted future stream temperatures (Isaak *et al.* 2017 and 2022) that ranged from approximately 40 to 80 years in the future.

OC Chinook Salmon ESU

The SRT concluded, and we concur, that the OC Chinook salmon ESU is at low risk of extinction. The primary factors leading to this conclusion include relatively high total abundance, with multiple populations having natural-origin spawning abundance of >10,000 spawners in typical years, and total-ESU abundance commonly >100,000 spawners. The high total exploitation rates (often exceeding 50 percent for most populations), although a source of some concern, are also evidence of relatively high productivity, because the populations are (generally) maintaining their abundance despite higher harvest rates. An analysis of the spatial structure and diversity factors also indicate low risk. The ESU consists of numerous, well-distributed spawning populations, indicating that there is low risk associated with spatial structure. The presence of spring- and summer-run fish distributed throughout many of the basins indicates that the ESU as a whole contains considerable life-history diversity. There is some concern over the potential effects of the long-term, segregated hatchery programs in the Trask and Nestucca rivers. However, because there is relatively limited hatchery production rangewide (when compared to natural production), we conclude that hatcheries pose a low risk to the rangewide diversity of the ESU.

In our evaluation of the factors identified in section 4(a)(1) of the ESA, we find that the factors do not contribute to rangewide extinction risk now or in the foreseeable future. There is a long history of land-use practices leading to habitat degradation, but freshwater habitat appears to be improving due to restoration efforts and stricter land-use regulations compared to the 20th century (see OC Chinook salmon and Habitat and *Inadequacy of Existing Regulatory Mechanisms*). The SRT identified predation by nonnative small-mouth bass as a factor limiting the viability of the Coquille River population, but otherwise predation by nonnative species poses a low risk to the ESU rangewide. Although ODFW (2014a) identified predation by marine mammals as a matter of public interest, we found no evidence to indicate that it poses a risk to the viability of the species. Although some SRT members were concerned about exploitation rates that occasionally exceed 50 percent for some populations, we find that fishery management has responded to changes in status of individual populations and reduced exploitation rates as necessary, particularly for terminal fisheries.

The SRT concluded, and we concur, that the predicted effects of environmental variation will likely have a negative effect on the OC Chinook salmon ESU. The SRT was particularly concerned that rising stream temperatures and lower summer flows would be detrimental to the spring-run life history, since adults spend some or all of the summer in freshwater systems that are predicted to be exposed to higher temperatures, and the spring runs are already at low abundance in most of these rivers. Populations characterized by late-summer/early-fall smolt outmigration may also be more vulnerable than those with early-summer outmigration. The SRT also considered environmental variation effects on marine ecosystems and concluded that the OC Chinook salmon ESU is predicted to have a moderate sensitivity to marine climate effects but noted the complexity of ocean food webs and their response to changing conditions, as well as the indirect nature of impacts through prey availability and predator distribution, make direct predictions of salmon survival difficult. However, the SRT noted that the ESU consists of 16 major populations and additional smaller ones that are distributed among multiple coastal streams, many of which are predicted to remain at appropriate temperatures for salmon even in the face of environmental variation. Thus, although the SRT concluded that portions of the ESU will be negatively impacted by changing environmental conditions, the ESU as a whole is likely buffered against these predicted changes for the foreseeable future.

Considering the analysis of the viability of the ESU and the factors identified in section 4(a)(1) of the ESA, we find that the OC Chinook salmon ESU is at a low risk of extinction rangewide, now and in the foreseeable future.

SONCC Chinook Salmon ESU

The SRT concluded, and we concur, that the SONCC Chinook salmon ESU is at low risk of extinction rangewide. Factors supporting this conclusion include overall high abundance, which has been commonly >50,000 natural spawners for the ESU as a whole (not including the Smith River), most of which consist of natural-origin fish. The ESU also appears to have high productivity, as indicated by the fact that the ESU has maintained high abundance levels in the presence of relatively high total exploitation rates. The ESU consists of numerous, well-distributed spawning populations, indicating that there is low risk associated with spatial structure. Although there are concerns about the status of the spring-run component of the ESU (discussed below), the spring-run life history nonetheless comprises several thousand spawners annually in the Rogue River, as well as a much smaller number of spring-run Chinook salmon spawners in the Smith River. The fall-run component is spatially spread across multiple populations, most of which typically have natural spawning abundance in the thousands.

In our evaluation of the factors identified in section 4(a)(1) of the ESA, we find that the factors do not contribute substantially to rangewide extinction risk now or in the foreseeable future. Although habitat loss and the ongoing effects of land management activities continue to be a concern, freshwater habitat appears to be improving due to habitat restoration activities and stricter land-use regulations compared to the 20th century (see SONCC Chinook salmon and Habitat and *Inadequacy of Existing Regulatory Mechanisms*). Since the previous status review a number of actions have been taken to restore or improve fish passage, riparian conditions, and instream habitat in the coastal basins of southern Oregon and northern California (OWEB 2024, CalFish 2024). As a result, habitat utilization has improved for Chinook salmon since the late 1990s. Although some members of the SRT were concerned about harvest rates, overall abundance remains high, and we found no evidence to indicate that overutilization is limiting the viability of the SONCC Chinook salmon ESU now or in the foreseeable future.

The SRT concluded, and we concur, that the predicted effects of environmental variation will likely have a negative effect on the SONCC Chinook salmon ESU, particularly for the spring-run life history whose habitat may be differentially vulnerable to high temperatures, lower summer flows, and the effects of increasing wildfires and associated disturbances. Populations characterized by late-summer/early-fall smolt outmigration may also be more vulnerable than those with early-summer outmigration. The SRT also considered the effect of environmental variation on marine ecosystems and ranked SONCC ESU with a moderate sensitivity score in their marine stage, but the team also noted the complexity of ocean food webs and their response to changing environmental conditions, as well as the indirect nature of impacts through prey availability and predator distribution, which makes direct predictions of salmon survival difficult. The SRT noted that the ESU consists of at least eight major populations and additional smaller ones that are distributed among multiple coastal streams, many of which are predicted to remain at appropriate temperatures for salmon even in the face of future environmental variation. Thus, although the SRT concluded that portions of the ESU will be negatively impacted by changing environmental conditions, the ESU as a whole is likely buffered against these predicted changes for the foreseeable future.

Considering the analysis of the viability of the ESU and the factors identified in section 4(a)(1) of the ESA, we find that the SONCC Chinook salmon ESU is at a low risk of extinction rangewide, now and in the foreseeable future.

Significant Portion of Its Range Analysis

As noted in the introduction above, the definitions in section 3 of the ESA of both ''threatened species'' and ''endangered species'' contain the term ''significant portion of its range'' (SPR), which we interpret to refer to an area smaller than the entire range of the species. As indicated by these definitions, we can list a species based on their status in all of their range or based on their status in a SPR. The range of a species is considered to be the general geographical area within which that species can be found. A species' range includes those areas used throughout all or part of the species' life cycle, even if they are not used regularly (*e.g.,* seasonal habitats) (79 FR 37578, 37583, July 1, 2014).

In construing the statutory definitions of threatened and endangered species, we are required to give some independent meaning to the SPR phrase to avoid rendering it superfluous to the ''throughout all'' language (See *Defenders of Wildlife* v. *Norton,* 258 F.3d 1136 (9th Cir. 2001)). Under the 2014 policy regarding the interpretation of the phrase ''significant portion of its range'' (SPR Policy; 79 FR 37578, July 1, 2014), which was issued jointly by NMFS and USFWS, if we find that a species is facing low extinction risk throughout its range (*i.e.,* not warranted for listing), we must consider whether the species may have a higher risk of extinction in a SPR (79 FR 37578, July 1, 2014). In addition, if we find that a species is threatened rangewide, we must also consider whether the species may be endangered in an SPR, which would result in the higher-level listing of the species as endangered (See *CBD* v. *Everson,* 435 F. Supp. 3d 69 (D.D.C. 2020)).

Having concluded that the OC Chinook salmon and SONCC Chinook salmon ESUs are at low risk of extinction now and in the foreseeable future throughout all of their respective ranges, we requested the SRT conduct an assessment to determine whether the ESUs may be at greater risk of extinction now or in the foreseeable future in any identified SPR. The SRT's SPR analysis consisted of identifying and evaluating portions, also described as strata, of each ESU that are potentially at moderate or high risk of extinction and are important to the overall ESU's long-term viability, yet not so important as to be determinative of its overall current or foreseeable status. In other words, the goal of the SPR evaluation was to determine if there are biologically important portions of the ESU that are currently at high or moderate risk but that are not so important that their status would lead to the entire ESU being currently at high or moderate risk.

Because a species' range can theoretically be divided into an infinite number of portions, the SRT first discussed and identified several sub-ESU strata that had a reasonable likelihood of being at moderate or high risk of extinction and a reasonable likelihood of being biologically significant to the species. Unless a portion met both of these conditions, the SRT did not consider it further in the analysis as they could not form the basis for a proposed listing. In evaluating whether a portion was biologically significant, the SRT considered whether the species within that portion was important to the ESU's long-term viability but not so important that their status would drive current or foreseeable ESU-wide extinction risk. After considering multiple possibilities, the SRT settled on a more detailed evaluation of two types of strata based on geography or adult run-timing.

OC Chinook Salmon ESU

In the geographic SPR analysis, the SRT divided the OC Chinook salmon ESU into four geographic strata: North Coast, Mid-Coast, Umpqua, and Mid-South Coast. The North Coast stratum is composed of populations of Chinook salmon from the Necanicum River south to the Nestucca River (inclusive). The Mid-Coast stratum is composed of populations of Chinook salmon from the Salmon River south to the Siuslaw River (inclusive). The Umpqua stratum is composed of the Chinook salmon populations in the Umpqua River basin. The Mid-South Coast stratum is composed of populations of Chinook salmon from the Tenmile basin south to the Elk River. In Oregon's Coastal Multi-Species Conservation and Management Plan, ODFW divides the OC Chinook salmon ESU into these same four geographic strata (ODFW 2014a).

The SRT evaluated the extinction risk for each stratum. The SRT concluded, with varying degrees of confidence, that all four strata were most likely to be at low risk of extinction. The SRT was less confident that the Mid-South Coast stratum was at low risk based on concerns that the southern populations included generally lower and recently declining abundance, especially a sharp recent decline of the Coquille River population (2007–2021). The SRT noted that the Mid-South Coast stratum contains four populations other than the Coquille population with a combined total of several thousand spawners, and, despite recent trends, the populations have largely been stable over the last 35 years leading to the low-risk conclusion. The SRT also noted that each of the four strata had at least one, and usually several, populations that the SRT considered to be abundant, productive, and at low risk of extinction. We evaluated the SRT's findings and concluded that the findings are well-supported and that all four strata are a low risk of extinction now and in the foreseeable future, so we did not assess the geographic strata further.

The SRT also considered whether the variation in adult run-timing might form the basis for identifying alternative portions. In many river systems along the West Coast, spring- and fall-run Chinook salmon utilize spatially different freshwater habitats, particularly during the adult freshwater migration and spawning portions of the life cycle. While there is evidence of some spatial segregation between the spring- and fall-run timing components in the Umpqua River basin (ODFW 2014a) and Siletz River basin (Davis *et al.* 2017), the relatively small size of other OC basins limits the amount of habitat available and minimizes the likelihood of spatial separation of run times (Myers *et al.* 1998). For OC basins utilized by spring-run Chinook salmon, spring-run-only habitat constitutes 4 percent of the available spawning and rearing habitat. In other words, 96 percent of the spring-run geography is shared with the fall-run fish. Given the substantial overlap in spring- and fall-run habitat, we have determined the spring-run stratum does not qualify as a valid portion of the OC Chinook salmon range. Consistent with the ESA, the 2014 SPR Policy defines ''range'' in geographic terms, and the selection of portions for consideration should be premised at least in part on a geographically oriented rationale. Although run timing might provide an appropriate basis for delineating portions under certain circumstances, here, the spring-run component lacks sufficient spatial segregation from the fall run to be considered a valid portion for the purposes of SPR analysis under the ESA. Additionally, the SRT concluded that the spring-run component of the OC Chinook salmon ESU was not biologically significant to the long-term viability of the ESU. Factors leading to this conclusion included the lack of spring-run specific habitat in most of the river systems in the ESU and the lack of strong evidence that the spring run was ever historically a substantial component of the ESU. Therefore, we determined the spring-run component does not qualify as a valid portion of the OC Chinook salmon range.

The fall-run component is the most numerous and widespread portion of the ESU. The status of the fall-run component is determinative of the rangewide status of the ESU and also considered to be at low extinction risk.

Therefore, the fall-run component is not a valid SPR.

We did not identify any other valid portions that were both significant and at a higher extinction risk than the ESU rangewide, now or in the foreseeable future. Based on the above, we conclude that Chinook salmon in the OC ESU are not presently in danger of extinction nor are they likely to become endangered in the foreseeable future.

SONCC Chinook Salmon ESU

The SRT identified two geographic strata within the SONCC Chinook salmon ESU: a Rogue River stratum and a coastal river system (Hunter, Pistol, Chetco, Winchuck, Smith, and Lower Klamath rivers) stratum. For the Rogue River stratum, the SRT concluded that it was at low risk based on consistently high overall abundance, including thousands of spring-run spawners and fall-run populations spatially distributed across multiple populations despite significant harvest pressure. For the coastal stratum, the SRT narrowly concluded that it is at moderate risk based on relatively small sizes and small number of coastal populations and a lack of consistent monitoring for the important Smith River population. However, the relatively small size of SONCC coastal basins limits the amount of available habitat, so small number and sizes of coastal populations do not necessarily mean the coastal populations are at a higher risk of extinction. Though the coastal populations are smaller than the Rogue River, recent abundances for the combined Hunter, Pistol, Chetco, Winchuck, and Blue River populations total a few thousand spawners annually. Furthermore, estimates for the Smith River from 2010 to 2021 were between 10,000 and 20,000 fall-run Chinook salmon, suggesting that it is likely the second-largest population in the SONCC ESU. The lack of adequate monitoring for the Smith River was also a primary concern that led the team to conclude the coastal stratum was at moderate risk, which indicates that the uncertainty from the lack of monitoring shifted the team towards a higher risk category for this geographic area. However, the absence of monitoring or data does not directly cause a species to decline or face extinction and does not in and of itself support a positive listing determination. While monitoring data are limited, the available data do suggest the Smith River contains a sizeable fall run as noted above. Additionally, the threats to these populations are similar to the threats facing the entire ESU, so the stratum does not face an elevated extinction risk. Based on the coastal population sizes (including the Smith River), spatial distribution, and similar threats across the ESU, we determined that the SONCC coastal stratum is at low risk of extinction now and in the foreseeable future.

We have determined the spring-run stratum does not qualify as a valid portion of the SONCC Chinook salmon range because, consistent with the ESA and the 2014 SPR Policy (79 FR 37578, 37583 July 1, 2014), the selection of portions for consideration should be premised at least in part on a geographically oriented rationale. Here, the spring-run component lacks sufficient spatial segregation from the fall run to be considered a valid portion of the ESU's range for the purposes of SPR analysis under the ESA. While there is evidence of spatial segregation between the spring- and fall-run timing components in the Rogue River, the relatively small size of other SONCC basins limits the amount of habitat available and minimizes the likelihood of spatial separation of run times. A review of spawning and rearing habitat utilized by spring-run Chinook salmon, mainly found in the Rogue River and Smith River basins, found only 6 percent of the habitat was used solely by spring-run Chinook salmon. In other words, 94 percent of spring-run geography is shared with fall-run fish. Therefore, the spring-run component does not qualify as a valid portion of the SONCC Chinook range.

Spring-run Chinook salmon was narrowly voted by the SRT to have a higher risk than the ESU rangewide, but given that spring-run populations do not reflect a sufficiently unique geographic area from fall-run populations, the spring-run portion cannot be considered a SPR. The fall-run component is the most numerous and widespread portion of the ESU. The status of the fall-run component is determinative of the rangewide status of the ESU and also considered to be at low extinction risk. Therefore, the fall-run component of the SONCC ESU is not a valid SPR.

We did not identify any other valid portions that were both significant and at a higher level of extinction risk than the ESU rangewide, now or in the foreseeable future. Based on the above, we conclude that SONCC Chinook salmon ESU is at low risk of extinction throughout its range and is not presently in danger of extinction nor is it likely to become endangered in the foreseeable future.

Final Determination

Section 4(b)(1) of the ESA requires that we make listing determinations based solely on the best scientific and commercial data available after conducting a review of the status of the species and taking into account those efforts, if any, being made by any State or foreign nation, or political subdivisions thereof, to protect and conserve the species. We have independently reviewed the best available scientific and commercial information, including references cited in the petition, public comments submitted on the 90-day finding (88 FR 1548, January 11, 2023), and the status review report, and we have consulted with species experts and individuals familiar with Chinook salmon.

Our determination set forth here is based on a synthesis and integration of the foregoing information. Based on our consideration of the best available scientific and commercial information, as summarized here and in the status review report, we conclude that Chinook salmon in the OC and SONCC ESUs, inclusive of all run types, are not presently in danger of extinction nor are they likely to become endangered in the foreseeable future throughout all or a significant portion of their range. Consequently, the OC and SONCC ESUs do not warrant listing under the ESA.

This is a final action, and, therefore, we are not soliciting public comments.

References

A complete list of all references cited herein is available upon request (See **FOR FURTHER INFORMATION CONTACT**).

Authority

The authority for this action is the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Dated: December 4, 2025.

Samuel D. Rauch III,

Deputy Assistant Administrator for Regulatory Programs, National Marine Fisheries Service.

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