Science, Service, Stewardship

5-Year Review: Summary & Evaluation of **Upper Willamette River Steelhead** **Upper Willamette River Chinook**

National Marine Fisheries Service
Northwest Region
Portland, OR

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5-Year Review: Upper Willamette River Species

Species Reviewed	Evolutionarily Significant Unit or Distinct Population Segment
Steelhead (*Oncorhynchus mykiss*)	*Upper Willamette River Steelhead*
Chinook Salmon (*O. tshawytscha*)	*Upper Willamette River Chinook*

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1 ▪ General Information

1.1 Introduction

Many West Coast salmon and steelhead (*Oncorhynchus* sp.) stocks have declined substantially from their historic numbers and now are at a fraction of their historical abundance. There are several factors that contribute to these declines, including: overfishing, loss of freshwater and estuarine habitat, hydropower development, poor ocean conditions, and hatchery practices. These factors collectively led to the National Marine Fisheries Service's (NMFS) listing of 28 salmon and steelhead stocks in California, Idaho, Oregon, and Washington under the Federal Endangered Species Act (ESA).

The ESA, under section 4(c)(2), directs the Secretary of Commerce to review the listing classification of threatened and endangered species at least once every five years. After completing this review, the Secretary must determine if any species should be: (1) removed from the list; (2) have its status changed from threatened to endangered; or (3) have its status changed from endangered to threatened. The most recent listing determinations for most salmon and steelhead occurred in 2005 and 2006. This document describes the results of the review of the ESA-listed Upper Willamette River (UWR) steelhead and Chinook salmon.

1.1.1 Background on salmonid listing determinations

The ESA defines species to include subspecies and distinct population segments (DPS) of vertebrate species. A species may be listed as threatened or endangered. To identify distinct population segments of salmon species we apply the "Policy on Applying the Definition of Species under the ESA to Pacific Salmon" (56 FR 58612). Under this policy we identify population groups that are "evolutionarily significant units" (ESU) within their species. We consider a group of populations to be an ESU if it is substantially reproductively isolated from other populations, and represents an important component in the evolutionary legacy of the biological species. We consider an ESU as constituting a DPS and therefore a "species" under the ESA.

To identify DPSs of steelhead, we apply the joint U.S. Fish and Wildlife Service-National Marine Fisheries Service DPS policy (61 FR 4722) rather than the ESU policy. Under this policy, a DPS of steelhead must be discrete from other populations, and it must be significant to its taxon.

Artificial propagation programs (hatcheries) are common throughout the range of ESA-listed West Coast salmon and steelhead. Prior to 2005, our policy was to include in the listed ESU or DPS only those hatchery fish deemed "essential for conservation" of a species. We revised that approach in response to a court decision and on June 28, 2005, announced a final policy addressing the role of artificially propagated Pacific salmon and steelhead in listing determinations under the ESA (70 FR 37204) (hatchery listing policy). This policy establishes

criteria for including hatchery stocks in ESUs and DPSs. In addition, it (1) provides direction for considering hatchery fish in extinction risk assessments of ESUs and DPSs; (2) requires that hatchery fish determined to be part of an ESU or DPS be included in any listing of the ESU or DPS; (3) affirms our commitment to conserving natural salmon and steelhead populations and the ecosystems upon which they depend; and (4) affirms our commitment to fulfilling trust and treaty obligations with regard to the harvest of some Pacific salmon and steelhead populations, consistent with the conservation and recovery of listed salmon ESUs and steelhead DPSs.

To determine whether a hatchery program is part of an ESU or DPS, and therefore must be included in the listing, we consider the origins of the hatchery stock, where the hatchery fish are released, and the extent to which the hatchery stock has diverged genetically from the donor stock. We include within the ESU or DPS (and therefore within the listing) hatchery fish that are derived from the population in the area where they are released, and that are no more than moderately diverged from the local population,

Because the new hatchery listing policy changed the way we considered hatchery fish in ESA listing determinations, we completed new status reviews and ESA listing determinations for West Coast salmon ESUs and steelhead DPSs. On June 28, 2005, we issued final listing determinations for 16 ESUs of Pacific salmon (70 FR 37160). On January 5, 2006 we issued final listing determinations for 10 DPSs of steelhead (71 FR 834).

1.2 Methodology used to complete the review

On March 18, 2010, we announced the initiation of five year reviews for 16 ESUs of salmon and 10 DPSs of steelhead in Oregon, California, Idaho, and Washington (75 FR 13082). We requested that the public submit new information on these species that has become available since our listing determinations in 2005 and 2006. In response to our request, we received information from Federal and state agencies, Native American Tribes, conservation groups, fishing groups, and individuals. We considered this information, as well as information routinely collected by our agency, to complete these five year reviews.

To complete the reviews, we first asked scientists from our Northwest Fisheries Science Center to collect and analyze new information about ESU and DPS viability. To evaluate viability, our scientists used the Viable Salmonid Population (VSP) concept developed by McElhany et al. (2000). The VSP concept evaluates four criteria – abundance, productivity, spatial structure, and diversity – to assess species viability. Through the application of this concept, the science center considered new information on the four salmon and steelhead population viability criteria. They also considered new information on ESU and DPS boundaries. At the end of this process, the science teams prepared reports detailing the results of their analyses (Ford et al. 2010).

To further inform the reviews, we also asked salmon management biologists from our Northwest Region familiar with hatchery programs to consider new information available since the previous listing determinations. Among other things, they considered hatchery programs that have ended, new hatchery programs that have started, changes in the operation of existing programs, and

scientific data relevant to the degree of divergence of hatchery fish from naturally spawning fish in the same area. These biologists produced a report (Jones et al. 2011) describing their findings. Finally, we consulted salmon management biologists from the Northwest Region who are familiar with hatchery programs, habitat conditions, hydropower operations, and harvest management. In a series of structured meetings, by geographic area, these biologists identified relevant information and provided their insights on the degree to which circumstances have changed for each listed entity.

In preparing this report, we considered all relevant information, including the work of the Northwest Fisheries Science Center (Ford et al. 2010;); the report of the regional biologists regarding hatchery programs (Jones et al. 2011); recovery plans for the species in question; technical reports prepared in support of recovery plans for the species in question; the listing record (including designation of critical habitat and adoption of protective regulations);recent biological opinions issued for UWR species; information submitted by the public and other government agencies; and the information and views provided by the geographically based management teams. The present report describes the agency's findings based on all of the information considered.

1.3 Background – Summary of Previous Reviews, Statutory and Regulatory Actions, and Recovery Planning

1.3.1 Federal Register Notice announcing initiation of this review

75 FR 13082; March 18, 2010

1.3.2 Listing history

In 1999, NMFS listed UWR steelhead and Chinook salmon as threatened species (Table 1).

Table 1. Summary of the listing history under the Endangered Species Act for ESU and DPS in the Upper Willamette River.

Salmonid Species	ESU/DPS Name	Original Listing	Revised Listing(s)
Steelhead (*O. mykiss*)	Upper Willamette River Steelhead	**FR Notice:** 64 FR 14517 **Date:** 3/25/1999 **Classification:** Threatened	**FR Notice:** 71 FR 834 **Date:** 1/5/2006 **Classification:** Threatened
Chinook Salmon (*O. tshawytscha*)	Upper Willamette River Chinook Salmon	**FR Notice:** 64 FR 14308 **Date:** 3/24/1999 **Classification:** Threatened	**FR Notice:** 70 FR 37160 **Date:** 6/28/2005 **Classification:** Threatened

1.3.3 Associated rulemakings

The ESA requires NMFS to designate critical habitat, to the maximum extent prudent and determinable, for species it lists under the ESA. Critical habitat is defined as: (1) specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation, and those features may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time of listing if the agency determines that the area itself is essential for conservation. We designated critical habitat for the UWR steelhead DPS and Chinook salmon ESU in 2005.

Section 9 of the ESA prohibits the take of species listed as endangered. The ESA defines take to mean harass, harm, pursue, hunt, shoot, wound, trap, capture, or collect, or attempt to engage in any such conduct. For threatened species, the ESA does not automatically prohibit take, but instead authorizes the agency to adopt regulations it deems necessary and advisable for species conservation including regulations that prohibit take (ESA section 4(d)). For threatened salmonids, NMFS has adopted 4(d) regulations that prohibit take except in specific circumstances. On June 28, 2005, we revised 4(d) regulations for the UWR Chinook salmon ESU to take into account our hatchery listing policy (70 FR 37160). On January 5, 2006, we applied the 4(d) regulations to the UWR steelhead DPS (71 FR 834).

Table 2. Summary of rulemaking for 4(d) protective regulations and critical habitat for ESU and DPS in the Upper Willamette River.

Salmonid Species	ESU/DPS Name	4(d) Protective Regulations	Critical Habitat Designations
Chinook Salmon (*O. tshawytscha*)	Upper Willamette River Chinook Salmon	**FR Notice:** 70 FR 37160 **Date:** 6/28/2005	**FR Notice:** 70 FR 52630 **Date:** 9/2/2005
Steelhead (*O. mykiss*)	Upper Willamette River Steelhead	**FR Notice:** 71 FR 834 **Date:** 1/5/2006	**FR notice:** 70 FR 52630 **Date:** 9/2/2005

1.3.4 Review History

Table 3 lists the numerous scientific assessments of the status of the UWR steelhead DPS and UWR Chinook salmon ESU. These assessments include status reviews conducted by our Northwest Fisheries Science Center and technical reports prepared in support of recovery planning for these species.

Table 3. Summary of previous scientific assessments for Upper Willamette River Steelhead and Chinook Salmon.

Salmonid Species	ESU/DPS Name	Document Citation
Steelhead (*O. mykiss*)	Upper Willamette River Steelhead	ODFW 2010 McElhany et al. 2007 Myers et al. 2006 WLCTRT and ODFW 2006 NMFS 2005 Good et al. 2005 Maher et al. 2005 WLCTRT 2004 WLCTRT 2003 NMFS 1999a NMFS 1999b NMFS 1998a NMFS 1997a NMFS 1997b NMFS 1997c NMFS 1996
Chinook Salmon (*O. tshawytscha*)	Upper Willamette River Chinook Salmon	ODFW 2010 McElhany et al. 2007 Myers et al. 2006 WLCTRT and ODFW 2006 NMFS 2005 Good et al. 2005 Maher et al. 2005 WLCTRT 2004 WLCTRT 2003 NMFS 1999b NMFS 1998b NMFS 1998c

1.3.5 Species' Recovery Priority Number at Start of 5-year Review Process

On June 15, 1990, NMFS issued guidelines (55 FR 24296) for assigning listing and recovery priorities. We assess three criteria to determine a species' priority for recovery plan development, implementation, and resource allocation: (1) magnitude of threat; (2) recovery potential; and (3) existing conflict with activities such as construction and development. Table 4 lists the recovery priority numbers for the subject species, as reported in the *2006-2008 Biennial Report to Congress on the Recovery Program for Threatened and Endangered Species* (available at: http://www.nmfs.noaa.gov/pr/pdfs/laws/esabiennial2008.pdf).

1.3.6 Recovery Plan or Outline

Table 4. Recovery Priority Number and Endangered Species Act Recovery Plans for Upper Willamette River Steelhead and Chinook Salmon.

Salmonid Species	ESU/DPS Name	Recovery Priority Number	Recovery Plans/Outline
Steelhead (*O. mykiss*)	Upper Willamette River Steelhead	**1**	**Title:** Upper Willamette River Conservation an d Recovery Plan for Chinook Salmon and Steelhead **Date:** October 2010 **Type:** Proposed **FR Notice:** October 22, 2010
Chinook Salmon (*O. tshawytscha*)	Upper Willamette River Chinook Salmon	**1**	**Title:** Upper Willamette River Conservation and Recovery Plan for Chinook Salmon and Steelhead **Date:** October 22, 2010 **Type:** Proposed **FR Notice:** October 22, 2010

2 · Review Analysis

In this section we review new information to determine whether the UWR listed species' delineations remain appropriate.

2.1 Delineation of species under the Endangered Species Act

Is the species under review a vertebrate?

ESU/DPS Name	YES	NO
Upper Willamette River Steelhead	X	
Upper Willamette River Chinook Salmon	X	

Is the species under review listed as an ESU/DPS?

ESU/DPS Name	YES	NO
Upper Willamette River Steelhead	X	
Upper Willamette River Chinook Salmon	X	

Was the ESU/DPS listed prior to 1996?

ESU/DPS Name	YES	NO	Date Listed if Prior to 1996
Upper Willamette River Steelhead		X	n/a
Upper Willamette River Chinook Salmon		X	n/a

Prior to this 5-year review, was the ESU/DPS classification reviewed to ensure it meets the 1996 policy standards?

Not Applicable

2.1.1 Summary of relevant new information regarding delineation of the UWR ESU/DPS

ESU/DPS Boundaries

This section provides a summary of information presented in Ford et al. 2010: Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Northwest.

There is no new information since the last status review that would justify a change in boundaries of either the UWR steelhead DPS or the UWR Chinook salmon ESU.

Membership of Hatchery Programs

In preparing this report, our management biologists reviewed the available information regarding hatchery membership of this ESU and DPS (Jones et al. 2011). They considered changes in hatchery programs that occurred since the last status review (e.g., some have been terminated while others are new) and made recommendations about the inclusion or exclusion of specific programs. They also noted any errors and omissions in the existing descriptions of hatchery population membership. NMFS intends to address any needed changes and corrections via separate rulemaking subsequent to the completion of these five-year status reviews.

UWR Steelhead

The UWR steelhead DPS includes all naturally spawned populations of winter-run steelhead in the Willamette River, Oregon, and its tributaries upstream from Willamette falls to the Calapooia River (inclusive) (64 FR 14517; March 25, 1999). This DPS does not include any artificially propagated steelhead stocks that reside within the historical geographic range of the DPS. Hatchery summer-run steelhead occur in the Willamette Basin but are an out-of-basin stock that is not included as part of the DPS (71 FR 834; January 5, 2006).

There is no change in the UWR steelhead hatchery programs since the previous ESA status review (Jones et al. 2011). All hatchery winter steelhead programs were terminated in the late 1990s, and the summer steelhead hatchery program within the geographic boundaries of the DPS is not part of the DPS because it was originally derived from a non-native, out of DPS Skamania broodstock (Jones et al. 2011).

UWR Chinook salmon

The UWR Chinook salmon ESU includes all naturally spawned populations of spring-run Chinook salmon in the Clackamas River and in the Willamette River, and its tributaries, above Willamette Falls, Oregon (64 FR 14208; March 24, 1999). Seven artificial propagation programs are considered to be part of the ESU: The McKenzie River Hatchery (Oregon Department of Fish and Wildlife (ODFW) stock #24[1]), Marion Forks/North Fork Santiam River (ODFW stock #21), South Santiam Hatchery (ODFW stock #23) in the South Fork Santiam River, South Santiam Hatchery (ODFW stock #23) in the Calapooia River, South Santiam Hatchery (ODFW stock #23) in the Mollala River, Willamette Hatchery (ODFW #22), and Clackamas Hatchery (ODFW #19) spring-run Chinook salmon hatchery programs. We have

[1] The stock numbers for the McKenzie River Hatchery and South Santiam Hatchery programs were mistakenly reversed in the regulatory description of this ESU.

determined that these artificially propagated stocks are no more divergent relative to the local natural population(s) than what would be expected between closely related natural populations within the ESU (70 FR 37160; June 28, 2005).

The only change in the UWR Chinook salmon hatchery membership since the last ESA status review is that of the South Santiam (Calapooia) hatchery adult outplanting program, which was terminated in 2005. Currently the ESU includes the remaining six hatchery programs -- Clackamas, North Santiam, South Santiam (South Santiam River), South Santiam (Molalla River), McKenzie, and Middle Fork Willamette (Jones et al. 2011).

2.2 Recovery Criteria

The ESA requires NMFS to develop recovery plans for each listed species. Recovery plans must contain, to the maximum extent practicable, objective measureable criteria for delisting the species, site-specific management actions necessary to recover the species, and time and cost estimates for implementing the recovery plan.

2.2.1 Do the species have final, approved recovery plans containing objective, measurable criteria?*

ESU/DPS Name	YES	NO
Upper Willamette River Steelhead		X
Upper Willamette River Chinook Salmon		X

* The recovery plan for these species is in development.

2.2.2 Adequacy of recovery criteria

Based on new information considered during this review, are the recovery criteria still appropriate?*

ESU/DPS Name	YES	NO
Upper Willamette River Steelhead	X	
Upper Willamette River Chinook Salmon	X	

*The recovery criteria reflect the best available information, but are recommendations only at this point, as they have not yet been adopted in a final recovery plan.

Are all of the listing factors that are relevant to the species addressed in the recovery criteria?

ESU/DPS Name	YES	NO
Upper Willamette River Steelhead	X	
Upper Willamette River Chinook Salmon	X	

2.2.3 List the recovery criteria as they appear in the recovery plan

For the purposes of reproduction, salmon ESUs and steelhead DPSs typically display a metapopulation structure (Schtickzelle and Quinn 2007, McElhany et al. 2000). Rather than interbreeding as one large aggregation, ESUs and DPSs function as a group of independent populations separated by areas of unsuitable spawning habitat. For conservation and management purposes, it is important to identify the independent populations that make up an ESU or DPS.

For recovery planning and development of recovery criteria, the Willamette-Lower Columbia Technical Recovery Team (WLC TRT) identified independent populations within UWR Chinook salmon ESU and UWR steelhead DPS. The WLC TRT also recommended specific biological viability criteria at the scale of independent populations and ESUs/DPSs. Multiple specific combinations of populations in each ESU or DPS could achieve WLC TRT's criteria (Figures 1 and 2). The *Proposed Upper Willamette River Conservation and Recovery Plan for Chinook Salmon and Steelhead* (ODFW 2010) adopts the biological viability criteria identified by the WLC TRT (McElhany et al. 2003, 2006) as the foundation for biological delisting criteria, and contains additional detail on recovery criteria.

Recovery Criteria Identified in the Recovery Plan

The Oregon Department of Fish and Wildlife (ODFW) and NMFS are currently finalizing the 2010 *Proposed Upper Willamette River Conservation and Recovery Plan for Chinook Salmon and Steelhead* (ODFW 2010). The criteria summarized below are from the proposed plan (ODFW 2010), which relied extensively on the Willamette/Lower Columbia Technical Recovery Team's recommendations for ESU/ DPS and population level viability criteria (McElhany et al. 2003, 2006).

ESU/DPS Level Criteria

1. Achieve delisting from the Federal ESA ESU/DPS threatened species list, based on the NMFS listing status decision framework (NMFS 2007).

2. Base a delisting decision upon an explicit analysis of two suites of criteria: biological viability criteria and listing factor (threats) criteria. The biological viability criteria evaluate the status of the ESU or DPS and its constituent populations. The listing factor (threats) criteria evaluate the status of the five listing factors and how they have changed since the time of listing under the ESA.

3. This Recovery Plan adopts the biological viability criteria identified by the WLC TRT (McElhany et al. 2003, 2006) as the foundation for biological delisting criteria:

- At least two populations in the ESU/DPS meet population viability criteria.

- The average of all population extinction risk category scores within the ESU or DPS is 2.25 or greater.

- The ESU/DPS maintains a semblance of historical normative meta-population processes by restoring most of the "core" populations to viable status.
- The ESU/DPS maintains a semblance of historical normative evolutionary processes by improving the remaining "genetic legacy" populations (steelhead: Santiam populations; Chinook salmon: McKenzie) to be at very low risk of extinction.
- All populations not meeting Population viability criteria do not deteriorate and are maintained at a minimum at their current risk of extinction.

Population-Level Criteria

Based on an integrated assessment of the population's abundance, productivity, spatial structure and diversity statuses, a population is deemed "viable" when the assessment produces an extinction risk classification score of 3 or 4 (based on a scale from 0-4 as identified in the WLC TRT's scoring system) (Table 2.3 in McElhany et al. 2003; ODFW 2010, Section 3.2.1).

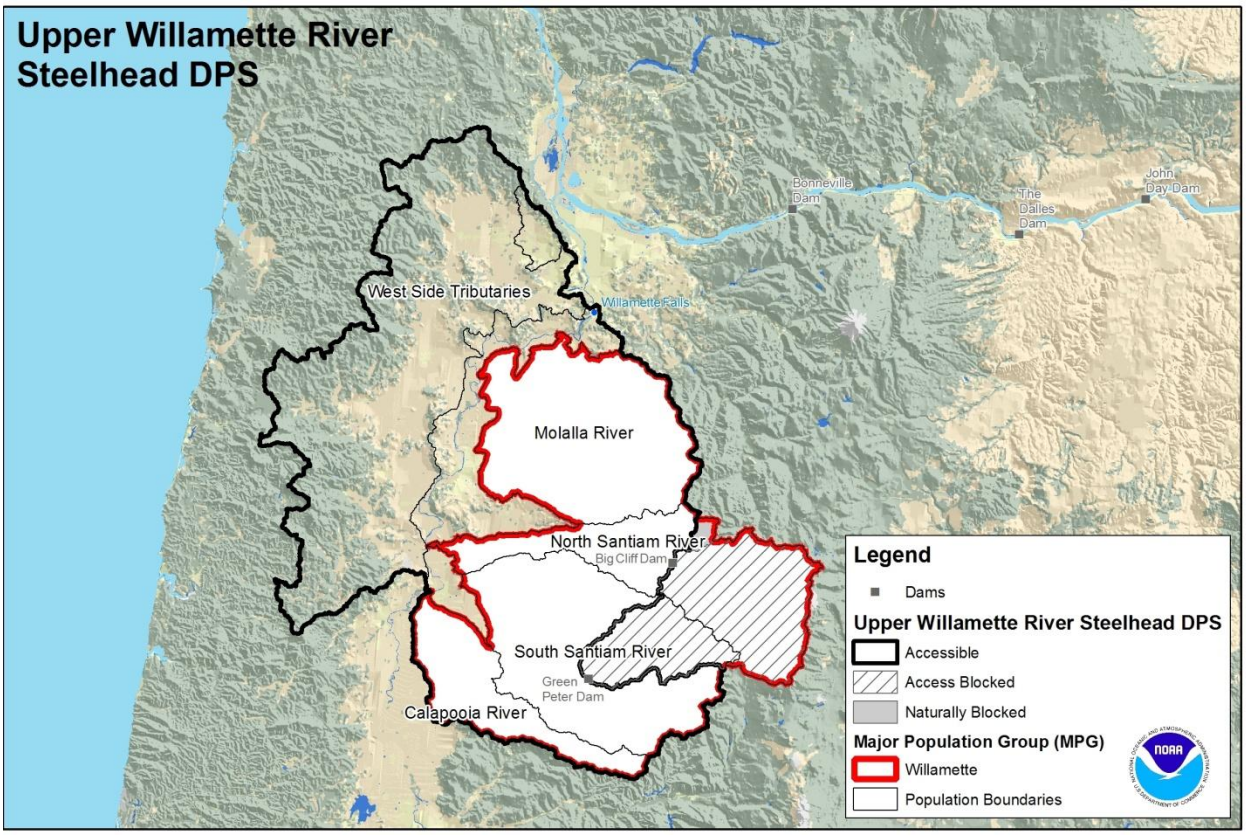
2.3 Updated Information and Current Species' Status

In addition to recommending recovery criteria, the WLC TRT also assessed the current status of each population within each Upper Willamette River ESU/DPS. Each population was rated against the biological criteria identified in the proposed recovery plan and assigned a current viability rating.

2.3.1 Analysis of VSP Criteria (including discussion of whether the VSP criteria have been met).

Information provided in this section is summarized from Ford et al. 2010—*Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Northwest.*

Figure 1. UWR Steelhead population structure[2]



UWR Steelhead DPS

The WLC TRT identified four historical demographically independent populations for Upper Willamette River winter steelhead based on geography, migration rates, genetic attributes, life history patterns, phenotypic characteristics, population dynamics, and environmental and habitat characteristics with guidance found in McElhany et al. 2000 (Figure 1). These include: the Molalla, North Santiam, South Santiam and Calapooia (Myers et al. 2006). There is intermittent spawning and rearing in westside Willamette River tributaries but these areas do not constitute an independent population (Ford et al. 2010).

[2] The map above generally shows the accessible and historically accessible areas for the UWR steelhead. The area displayed is consistent with the regulatory description of the boundaries of the UWR steelhead DPS found at 50 CFR17.11, 223.102, and 224.102. Actions outside the boundaries shown can affect this DPS. Therefore, these boundaries do not delimit the entire area that could warrant consideration in recovery planning or determining if an action may affect this DPS for the purposes of the ESA.

Abundance and Productivity

Population estimates show declines in recent years. All steelhead in the UWR steelhead DPS pass Willamette Falls. In the previous status review, data were only available to the year 2002 when population abundance peaked. However, since then, population abundance has returned to the relatively low levels of the 1990s—with the total abundance of winter steelhead at Willamette Falls in 2008 reaching 4,915 (distributed throughout the entire upper basin, minus basin mortality, including the four populations). Because wild winter steelhead also return outside of the DPS boundaries (ending at the Calapooia River), Willamette Falls counts best estimate the actual DPS abundance. In 2009, the late-returning abundance for the entire DPS was 2,110 fish. Ford et al. 2010 considers all four populations to be in the moderate risk of extinction category for abundance and productivity.

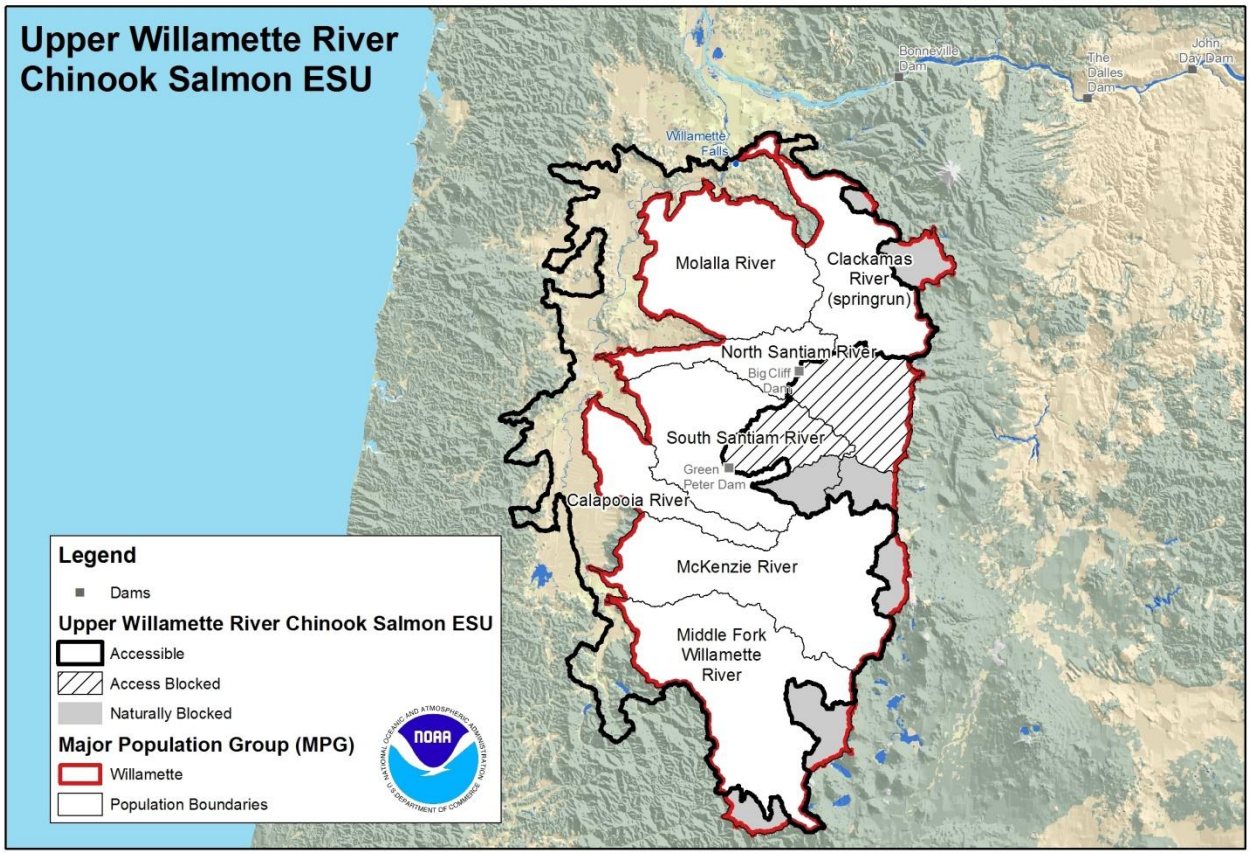
Spatial Structure and Diversity

Winter steelhead hatchery releases in the Upper Willamette River ceased in 1999. However, there is still a substantial hatchery program for non-native summer steelhead. In recent years, returning non-native summer steelhead outnumber the native winter-run steelhead, which raises genetic (diversity) and ecological concerns. All four Upper Willamette River populations are considered to be in the moderate risk category for diversity. With regard to spatial structure, the previous status report considered loss of access to historical spawning grounds because of dams to be a major risk factor. During this current status review, the WLC TRT considers the Molalla population to be in the low risk category for spatial structure, and the other three populations to be in the moderate to high risk categories for spatial structure, because dams block access to the upper watersheds in the North and South Santiam watersheds, and, other water quality problems exist in the Calapooia River. South Santiam steelhead access to the upper watershed is dependent upon trap and haul of fish at Foster Dam.

Updated DPS Risk Summary

Overall, the new information considered does not indicate a change in the biological risk category since the time of the last status review. Although direct biological performance measures for this DPS indicate a little realized progress to date toward meeting its recovery criteria, there is no new information to indicate that its extinction risk has increased significantly. UWR steelhead initially increased in abundance, but subsequently declined. Current abundance is at the levels observed in the mid-1990s when NMFS first listed the DPS. The DPS continues to demonstrate the overall low abundance pattern that was of concern during the last status review. The elimination of winter run hatchery release in the basin reduces hatchery threats, but non-native summer steelhead hatchery releases are still a concern. Human population growth within the Willamette Basin continues to be a significant risk factor for the UWR steelhead populations. New information considered during this review confirms that this DPS remains at a moderate risk of extinction.

Figure 2. UWR Chinook Salmon ESU population structure[3]



UWR Chinook Salmon ESU

Based on geography, migration rates, genetic attributes, life history patterns, phenotypic characteristics, population dynamics, environmental and habitat characteristics, and with guidance found in McElhany et al. 2000, the WLC TRT identified seven demographically independent populations within the ESU (Figure 2). These include: Clackamas, Molalla, North Santiam, South Santiam, Calapooia, McKenzie, and the Middle Fork Willamette (Myers et al. 2006).

[3] The map above generally shows the accessible and historically accessible areas for the UWR Chinook salmon ESU. The area displayed is consistent with the regulatory description of the boundaries of the UWR Chinook salmon ESU found at 50 CFR17.11, 223.102, and 224.102. Actions outside the boundaries shown can affect this ESU. Therefore, these boundaries do not delimit the entire area that could warrant consideration in recovery planning or determining if an action may affect this ESU for the purposes of the ESA.

Abundance and Productivity

The WLC TRT consider the Clackamas and McKenzie populations to be at moderate to low risk of extinction for abundance and productivity; the remaining five are in the very high risk category. Clackamas population returns at the North Fork Dam in 2004 peaked at over 12,000 hatchery and natural fish, but dropped to approximately 2,000 in 2009 and 2010 (Ford et al. 2010). The geometric mean number of natural origin spawners for the last five years is 850 fish per year. The McKenzie population returns increased in abundance, peaking in 2004, but dropped to previous levels of a little more than 1,000 unmarked fish crossing Leaburg Dam. The McKenzie population abundance remained flat in 2010. We are concerned that this may signal a failure of the natural population to respond to increased ocean survivals, but there are multiple factors at play that have yet to be completely evaluated. The Willamette Falls count averaged about 40,000 fish (hatchery and natural origin) and the estimated number of unmarked (mostly natural origin) spawners above Leaburg Dam has recently averaged about 2,000 fish.

Spatial Structure and Diversity

The lack of access to historical habitat above dams continues to be a key limiting factor for the spatial structure metric. The Clackamas population is at very low risk of extinction for spatial structure, the Molalla and McKenzie populations are at low to moderate risk, while the remaining four populations are at very high risk. The majority of natural production in the Clackamas occurs upstream of the North Fork Dam in historically accessible habitat, although there is some spawning, primarily by hatchery origin fish, downstream of the dam. The majority of natural origin spawning in the McKenzie population occurs above Leaburg Dam.

The Clackamas and McKenzie Rivers contain the only two populations in the ESU that have substantial natural production; both are at moderate risk of extinction for the diversity metric. The other five populations are at moderate to high risk for diversity. The previous ESA status analysis reported that nearly all the Molalla, North Santiam, South Santiam, Calapooia, and Middle Fork Willamette spawning populations were of hatchery origin. The analysis of hatchery fraction data collected since the last review support the view that these populations continue to be hatchery dominated and are likely not self-sustaining (McElhany et al. 2007; Schroeder et al. 2007; ODFW 2010). In addition, these populations appear to be experiencing significant risks from pre-spawning mortality of adults (Schroeder et al. 2005; McElhany et al. 2007; Schroeder et al. 2007).

Updated ESU Risk Summary

Two related status evaluations of UWR Chinook salmon have been conducted since the last status update (McElhany et al. 2007; ODFW 2010). Both evaluations concluded that the ESU is substantially below the viability criteria recommended by the WLC TRT. Of the seven historical populations in the ESU, five are considered at very high risk. The remaining two (Clackamas and McKenzie) are considered at moderate to low risk. New data collected since the last report verified the high fraction of hatchery origin fish (in some cases >90 percent of total returns). The

new data also highlight the substantial risks associated with pre-spawning mortality of adults. Although recovery plans are targeting key limiting factors for future actions, there have been no significant on-the-ground actions to resolve the lack of access to historical habitat above dams since the last review; nor have there been substantial actions removing hatchery fish from the spawning grounds. Overall, new information considered does not indicate a change in the biological risk category since the time of the previous status review.

2.3.2 Five-Factor Analysis

Section 4(a)(1)(b) of the ESA directs us to determine whether any species is threatened or endangered because of any of the following factors: (1) the present or threatened destruction, modification, or curtailment of its habitat or range; (2) overutilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) the inadequacy of existing regulatory mechanisms; or (5) other natural or human-made factors affecting its continued existence. Section 4(b)(1)(A) requires us to make listing determinations after conducting a review of the status of the species and taking into account efforts to protect such species. Below we discuss new information relating to each of the five factors as well as efforts being made to protect the species.

Present or threatened destruction, modification or curtailment of its habitat or range

Significant habitat restoration and protection actions at the Federal, state, tribal, and local levels have been implemented to improve degraded habitat conditions and restore fish passage. While these efforts have been substantial and are expected to improve survival and productivity of the targeted populations, we do not yet have information demonstrating that improvements in habitat conditions have led to improvements in population viability. The effectiveness of habitat restoration actions and progress toward meeting the viability criteria will be monitored and evaluated with the aid of new reporting techniques. Generally, it takes one to five decades to demonstrate such increases in viability. Below, we summarize several noteworthy restoration and protection actions implemented since the last review. We also note areas where concerns about UWR salmon and steelhead habitat conditions remain.

Improvements in operations and fish passage at hydropower facilities and dams

The implementation of the Federal Columbia River Power System (FCRPS) Biological Opinion (Opinion) (NMFS 2008a; NMFS 2010) has provided a number of actions that will result in survival improvements, including reduced duration through the estuary. However, lack of adequate upstream and downstream fish passage remains a key limiting factor in the North and South Santiam, Middle Fork Willamette, and McKenzie rivers where significant loss of access to historic habitat for steelhead and spring Chinook salmon persist. NMFS anticipates that implementation of the Willamette Biological Opinion Reasonable and Prudent Alternative (RPA) will result in a number of improvements to fish passage at flood control/hydrosystem facilities within the Willamette Basin over the next 15-20 years (NMFS 2008b). There also have been some improvements in operations and fish passage at Federal hydropower facilities and dams,

including Cougar Dam water temperature management operations and improvements in fish passage at Willamette Falls.

To date, reintroduction efforts have benefited Upper Willamette River steelhead and Chinook salmon by providing access to historic habitats and increasing the distribution of populations. However, adequate downstream passage facilities and operations still need to be implemented pursuant to the RPA identified in the Willamette Opinion (NMFS 2008b) in order to provide meaningful benefits to natural production.

Federal Energy Regulatory Commission (FERC) relicensing settlement agreements are being implemented in a number of Willamette River tributaries. Improvements achieved to date as part of these long-term agreements at the Leaburg-Walterville Hydroelectric Project, Carmen-Smith Hydroelectric Project and the Clackamas River Hydroelectric Projects include:

- new adult fish ladders,
- new juvenile fish screens,
- new tailrace barriers (to keep adult fish from entering into the turbines),
- new minimum instream flows,
- temperature controls, gravel augmentation, and
- habitat improvement projects.

In addition, the Calapooia Watershed Council spearheaded the removal of several small dams that have been part of the FERC-licensed Thompson's Mills Facility on the Calapooia River. Operational improvements addressing stream temperatures below Detroit Dam now are increasing the survival of salmonids. At Fall Creek dam and reservoir, operational measures have been implemented to aid downstream passage of juvenile Chinook salmon through the project.

Management of Tributary Habitat

Numerous habitat protection and restoration efforts have been implemented through the efforts of groups that include local watershed councils, Federal and state agencies, tribal governments, local governments, soil and water conservation districts, conservation organizations, and private landowners. Funding sources include the Oregon Watershed Enhancement Board, the Pacific Coastal Salmon Recovery Fund, and other Federal state, local, and tribal programs. Specific projects and planning efforts are too numerous to mention here, but key habitat improvements since the previous status review include:

- fish passage improvements (e.g., culvert replacement),
- bank restoration

- floodplain connection

A locally developed proposed recovery plan is complete for the Oregon Upper Willamette River (ODFW 2010). This plan, which will form the basis of the NMFS ESA recovery plan for the Upper Willamette River identifies habitat degradation as a limiting factor for almost all Upper Willamette River populations of salmon and steelhead. They also identify the impacts of tributary and/or mainstem hydropower (including effects of mainstem hydropower on the Columbia River estuary) as limiting factors for most populations. Although many habitat restoration projects have been implemented in the Upper Willamette River and its tributaries, it is likely that more habitat restoration actions are needed.

Most land in the Upper Willamette River region is in private ownership, making successful efforts to protect and restore habitat on private lands key to recovery in the Upper Willamette. Accomplishing protection and restoration of these private lands will be especially challenging in the face of continued urbanization, development, and resource extraction.

Substantial opportunities to protect functioning habitat, provide access to historically occupied habitat, and restore degraded habitat continue to exist. Progress in recovery planning has helped to identify priority actions and projects, although continuing work is needed to better define these priorities and to develop projects at the scale and scope that will be most meaningful. Improvements in monitoring and reporting of habitat restoration actions and their effects on habitat function and population parameters are also needed to document population response to changing habitat conditions.

Federal Land Management

A substantial portion of land in the Upper Willamette River region is in Federal ownership, so the protection and restoration of salmon and steelhead habitat on Federal lands is also crucial to recovery. Federal land managers have taken a number of measures to protect and restore habitat throughout the range of the UWR salmon ESUs and steelhead DPS. In response to NMFS' request for information that has become available since the last status evaluations, Federal land managers commented that habitat improvements have occurred on Federal lands because of implementation of the Northwest Forest Plan, restoration activities carried out under the Aquatic Habitat Restoration Activities Biological Opinion (ARBO), and other management efforts, including the Forest Service's Legacy Road Restoration Program.

However, there is uncertainty over the future conservation of UWR salmon and steelhead on Federal lands. The level of protection afforded to the UWR ESUs and DPS and their habitat will be determined on Federal lands by land management plans currently under development by the Forest Service and Bureau of Land Management (BLM). The content of these management plans and the manner in which they are implemented and integrated with the recovery plan will help determine the extent to which Federal land management will contribute to recovery.

Significant opportunities exist for recovery and/or conservation actions on Federal lands because of the responsibilities of the land management agencies under ESA section 7(a)(1). NMFS will continue to work with the Forest Service and BLM to identify opportunities for restoration actions on Federal lands. We will also work with these agencies, to the degree possible, to provide technical assistance for projects that benefit UWR salmon and steelhead species. Initiation and completion of consultation by FS and BLM on all actions where consultation is required is also a conservation priority.

New information available since the last status review indicates that many restoration and protection actions have been implemented in freshwater and estuary habitat but does not reveal overall trends in habitat quality, quantity, and function. In addition, we remain concerned with threats to habitat throughout the range of UWR salmon and steelhead, particularly with regard to activities that affect the quality and accessibility of habitats, and habitat-forming processes, on private lands and considering the likelihood of continuing land use and development. We therefore conclude that the risk to the species' persistence because of habitat destruction or modification has not changed since the last status review.

Overutilization for commercial, recreational, scientific, or educational purposes

UWR steelhead

Fishery exploitation rates have remained relatively stable of the past 15-year period and are at very low rates. Since the 1990s, winter steelhead fisheries have been limited to catch and release fisheries only for wild fish. The overall exploitation rate is less than 5 percent and typically is 1 to 2 percent (ODFW 2001). Because of improvements and changes in fisheries management for winter steelhead, harvest does not appear to be a primary or secondary limiting factor to the DPS at this time.

Authorized take of ESA-listed species for research in the Willamette Basin represents a minor component of overutilization. Although an increase in research activities has occurred as a result of implementation of Research Monitoring and Evaluation for the Willamette Opinion (NMFS 2008b), this listing factor is not a major threat to the UWR steelhead DPS.

New information available since the last ESA status review indicates harvest impacts have remained stable or decreased somewhat. We conclude that the absolute degree of change in either direction from these factors has not changed substantially since the last status review.

UWR Chinook salmon

In general, exploitation rates on UWR Chinook salmon have remained stable since the last status review, with overall exploitation rates (combined marine and fresh water harvest) for Upper Willamette Chinook salmon continuing in the range of 19-21 percent (NMFS 2008b). Analyses conducted as part of the recovery planning process have not identified overutilization from harvest as a limiting factor for the populations of UWR Chinook salmon residing above

Willamette Falls. The recovery plan did identify harvest as a secondary factor for Clackamas spring Chinook salmon. Improvements in fisheries management since the last status review include:

- Negotiation and implementation of the 2008 Pacific Salmon Treaty, which has reduced impacts to Chinook salmon of fisheries that occur north of the US/Canada border (this includes UWR Chinook salmon).
- Use of an abundance-based harvest matrix and continued low exploitation rates, which were reduced in the early 2000s by more than 75percent compared to the previous two decades.
- Implementation of mark-selective fisheries that require all unmarked, wild Chinook salmon to be released unharmed. This has also contributed to reducing the numbers of hatchery-origin spawners.
- Completion of the 2008 U.S. v. Oregon Management Agreement (in effect through 2017), which will maintain harvest impacts reductions in Lower Columbia fisheries affecting returning UWR fish, secured in previous agreements on the ESUs/DPS (NMFS 2008b).

New information available since the last ESA status review indicates harvest impacts have remained stable or decreased somewhat. We conclude that the absolute degree of change in either direction from these factors has not changed substantially since the last status review.

Disease or predation

Although actions to reduce avian predation in the Columbia Basin have been ongoing through implementation of the FCRPS Biological Opinion, high levels of avian predation continue to significantly affect the Upper Willamette River ESU/DPS. A Columbia Basin-wide assessment of avian predation on juvenile salmonids indicates that the most significant impacts to smolt survival occur in the Columbia River estuary (Collis et al. 2009). The combined consumption of juvenile salmonids by Caspian terns and double-crested cormorants nesting on East Sand Island was estimated to be between 7 and 16 million smolts annually. This represents approximately 10 percent of all the salmonid smolts that survive to the estuary in an average year.

Predation also remains a concern due to a general increase in pinniped populations along the West Coast. California sea lion populations are growing rapidly, and there is potential that these predators could substantially reduce the abundance of several salmon and steelhead ESUs/DPSs. The available information clearly indicates that adult salmon contribute substantially to the diets of pinnipeds in the lower Columbia River and estuary, especially in the spring, late-summer, and fall seasons when Chinook salmon are most abundant (Scordino 2010). The effect of marine mammals on the productivity and abundance of Columbia River basin ESA-listed salmon and steelhead populations has not been quantitatively assessed. The absolute number of animals preying upon salmon and steelhead throughout the lower Columbia River and estuary is not known, the duration of time that they are present is uncertain, and the portion of their diet that is made up of listed species is unknown. We do have information to indicate that Steller sea lion

abundance is increasing in the lower Columbia River and that predation by California sea lions at Bonneville Dam continues to increase (NMFS 2011).

A sport fishing reward program was implemented in 1990 to reduce the numbers of Northern pike minnow in the Columbia basin (NMFS 2010). The program continues to meet expected targets, which may reduce predation on smolts in the mainstem Columbia River.

Non- indigenous fishes affect salmon and their ecosystems through many mechanisms. A number of studies have concluded that many established non-indigenous species (in addition to smallmouth bass, channel catfish, and American shad) pose a threat to the recovery of ESA-listed Pacific salmon. Threats are not restricted to direct predation; non-indigenous species compete directly and indirectly for resources, significantly altering food webs and trophic structure and potentially altering evolutionary trajectories (Sanderson et al. 2009; NMFS 2010).

Disease rates over the past five years are believed to be consistent with the previous review period. Climate change impacts such as increasing temperature may increase susceptibility to diseases. Recent reports indicate the spread of a new strain of infectious haematopoietic necrosis (IHN) virus along the Pacific coast may increase disease related concerns for the Upper Willamette River ESU/DPS in the future.

New information available since the last status review indicates there is an increase in the level of avian and pinniped predation on UWR salmon and steelhead. At this time we do not have information available that would allow us to quantify the change in extinction risk due to predation. We therefore conclude that the risk to the species' persistence because of predation has increased by an unquantified amount since the last status review.

Inadequacy of existing regulatory mechanisms

New information available since the last status review indicates that the adequacy of some regulatory mechanisms has improved. For example:

- The City of Portland's stormwater program, including the Green Streets Program and Gray-to-Green Initiative.
- U.S. Army Corps of Engineers and Oregon Department of State Lands modification of permitting requirements to facilitate restoration actions (2008).
- Road maintenance programs approved under the NMFS 4(d) rule for the Oregon Department of Transportation (renewed in 2010), Clackamas County (2009), and Marion County (renewed in 2009)

These and other regulatory mechanisms are promising developments and could yield enhanced protections for ESA-listed salmonids in the Upper Willamette River. At this time, however, we lack adequate documentation of enforcement, compliance, and effectiveness to evaluate whether these programs, and regulatory programs in general, are having the desired beneficial impacts on habitat conditions and salmonid population viability for the ESU/DPS under review.

We conclude that the risk to the species' persistence because of the adequacy of existing regulatory mechanisms has decreased slightly, based on the improvements noted above. However, many ongoing threats to UWR salmon and steelhead habitat could be ameliorated by strengthening existing regulatory mechanisms.

Other natural or manmade factors affecting its continued existence

Climate Change

Current research downscaling global climate change models by Mote and Salathé (2010), and other members of the University of Washington Climate Impacts Group, are providing insights to potential future climate change impacts for the Pacific Northwest. Although the values or severity of these changes may be uncertain, and their biological impacts on salmonids have yet to be demonstrated, there is general scientific agreement on the direction of expected climate trends and that many of the impacts are already evident in the last 40 years of climatological data.

Expected climate change impacts for freshwater conditions and salmon and steelhead populations include:

- Increased water temperatures.
- Decreases in snow pack causing a shift of peak flows from summer to spring, and a decrease in summer flows. Shifts in the timing of peak flows will likely result in changes in outmigration timing, changes in survival, changes in distribution, and changes in the availability of spawning and rearing habitats.
- Peak flows will be flashier, likely resulting in channel scouring and increased risk of sedimentation.
- Likely increase in winter flooding events.
- Under future climate scenarios, higher elevation areas will likely continue to provide habitat conditions within the biological tolerances of salmonids. However, lower and transitional areas will experience increasing temperatures reducing the available spawning and rearing habitats, altering distribution, and diminishing survival.

Expected climate change impacts to ocean conditions include:

- Increasing ocean acidification, although uncertainty about the downstream effects on marine food webs and salmonid survival in the ocean remains
- Ocean temperatures will increase resulting in changes in the distribution and abundance of warm and cold-water species. Again, uncertainty remains about the effects on marine food webs and ocean survival of salmonids.

- Likely changes to a variety of processes such as the pattern and cycle of the Pacific Decadal Oscillation (PDO) and the intensity and patterns of upwelling.

Over the past 40 years climate change has degraded environmental conditions for Pacific Northwest salmon and steelhead. The certainty in modeled climate change impacts has increased as has our understanding of likely impacts of these changes on salmonid populations. While climate change impacts remain a recovery concern over the long term, it is unknown whether climate change impacts have changed in the few years since the last review.

Hatchery Effects

Hatchery programs can provide short-term demographic benefits such as increases in abundance in periods of low natural abundance, and they can help preserve genetic resources until limiting factors are addressed. However, the long-term use of artificial propagation may pose risks to natural productivity and diversity. The magnitude and type of the risk is dependent on the status of affected populations and on specific practices at the hatchery program.

Winter steelhead hatchery releases in the Upper Willamette River ceased in 1999. However, there is still a substantial hatchery program for non-native summer steelhead. In recent years, returning non-native summer steelhead outnumber the native winter-run steelhead, which raises genetic (diversity) and ecological concerns. Studies are on-going to better understand the risks of summer steelhead on listed winter steelhead.

Since 1995, total UWR Chinook salmon hatchery production remained relatively constant in the Upper Willamette at about 5 million smolts. Greater than 90 percent hatchery origin spawners continue to dominate the most depressed populations. New data collected since the last status report continue to verify the high fraction of hatchery origin fish in all UWR Chinook salmon populations (even the Clackamas and McKenzie) at levels above WLC TRT viability thresholds. There has not been a substantive effort to remove hatchery fish from the spawning grounds. The very low level of natural production of most populations (i.e., North Santiam, South Santiam, Molalla, and Middle Fork Willamette) is the reason why hatchery fish dominate the spawning grounds. There are few natural-origin fish, and thus a relatively low stray rate from the hatchery contributes to a significant proportion of the spawning population (i.e., high hatchery fish spawning ratio).

New information available since the last status review indicates that although hatcheries have mitigated the immediate extinction risk of listed salmon and steelhead species in the Upper Willamette River, the long-term role of hatcheries in the conservation of these ESU/DPS remains uncertain.

Efforts being made to protect the species

When considering whether to list a species as threatened or endangered, section 4(b)(1)(A) of the ESA requires that NMFS take into account any efforts being made to protect that species. Throughout the range of salmon ESUs and steelhead DPSs, there are numerous Federal, state,

tribal and local programs that protect anadromous fish and their habitat. The proposed listing determinations for West Coast salmon and steelhead (69 FR 33102) reviewed these programs in detail.

In the final listing determinations for salmon (70 FR 37160) and steelhead (71 FR 834), we noted that while many of the ongoing protective efforts are likely to promote the conservation of listed salmonids, most efforts are relatively recent, have yet to indicate their effectiveness, and few address conservation needs at scales sufficient to conserve entire ESUs. Therefore, NMFS concluded that existing protective efforts lack the certainty of implementation and effectiveness to preclude listing several ESUs of salmon and several DPSs of steelhead.

In our above five factor analysis, we note the many habitat, hydropower, hatchery, and harvest improvements that occurred in the past five years. We currently are working with our Federal, state, and tribal co-managers to develop monitoring programs, databases, and analytical tools to assist us I tracking, monitoring, and assessing the effectiveness of these improvements.

2.4 Synthesis

The ESA defines an endangered species as one that is in danger of extinction throughout all or a significant portion of its range, and a threatened species as one that is likely to become an endangered species in the foreseeable future throughout all or a significant portion of its range. Under ESA section 4(c)(2), we must review the listing classification of all listed species at least once every five years. While conducting these reviews, we apply the provisions of ESA section 4(a)(1) and NMFS's implementing regulations at 50 CFR part 424.

To determine if a reclassification is warranted, we review the status of the species and evaluate the five factors, as identified in ESA section 4(a)(1): (1) the present or threatened destruction, modification, or curtailment of its habitat or range; (2) overutilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; and (5) other natural or man-made factors affecting a species' continued existence. We then make a determination based solely on the best available scientific and commercial information, taking into account efforts by states and foreign governments to protect the species.

The updated status reviews completed by our Northwest Fisheries Science Center indicate that the UWR ESU and DPS are not currently meeting their recovery criteria. Neither the UWR Chinook salmon ESU nor the UWR steelhead DPS is currently considered viable. Multiple populations in each ESU or DPS will need improved viability ratings in order to meet the recovery criteria. While little improvement in ESU or DPS viability has been observed over the last five years, there is also no new information to indicate that the extinction risk has increased. The Science Center concluded, after reviewing the available new information, that the biological risk categories for the UWR steelhead DPS and Chinook salmon ESU have not changed since the last status review.

Our analysis of the ESA section 4(a)(1) factors indicates that the collective risk to the persistence of the UWR Chinook salmon and steelhead has not changed significantly since our final 2005 ESU and 2006 DPS listing determinations. Improvements have been made in operations and fish passage at tributary dams, and numerous habitat restoration projects have been completed in many Upper Willamette River tributaries. We expect that these actions eventually will provide benefit to the UWR Chinook salmon ESU and steelhead DPS, but the scale of habitat improvements needed is greater than the scale of habitat actions implemented to date. Most land in the Upper Willamette River is in private ownership, making successful efforts to protect and restore habitat on private lands key to recovery in the Upper Willamette, particularly in the face of continuing development. There are also substantial portions of Federal land in the Upper Willamette, so the protection and restoration of salmon and steelhead habitat on Federal lands is also crucial to recovery.

Harvest rates on UWR Chinook salmon and steelhead have remained stable and relatively low since the last status review. Research impacts on all species are relatively low but have increased since the last status review. In addition, avian and pinniped predation on Upper Willamette River salmon and steelhead has increased, although we are unable to quantify the resulting change in extinction risk. The impacts that hatcheries and climate change pose to long-term recovery also remain a concern.

After considering the biological viability of the UWR Chinook salmon ESU and steelhead DPS and the current status of the ESA section 4(a)(1) factors, we conclude that the status of the Upper Willamette River ESU and DPS has not changed significantly since the last status review. However, the implementation of sound recovery actions in each "H"—hydropower, habitat, hatcheries, and harvest—is underway and must continue to achieve recovery. In addition, the biological benefits of some actions, habitat restoration and protection efforts, in particular, have yet to be fully expressed and will likely take another five to 20 years to result in measurable improvements to population viability. By continuing to implement actions that address the factors limiting population viability and monitoring the effects of the actions over time, we will ensure that recovery efforts meet the biological needs of each population and, in turn, contribute to the recovery of the Upper Willamette River ESUs and DPS. Once complete, the Upper Willamette River Salmon and Steelhead Recovery Plan will be the primary guide for identifying future actions to target and address limiting factors and threats for the Upper Willamette River ESU and DPS. Over the next five years, it is crucial to continue to implement recovery actions and monitor our progress.

2.4.1 DPS Delineation and Hatchery Membership

1. The Northwest Fisheries Science Center's review revealed no new information that would justify a change in boundaries of the UWR steelhead DPS or the UWR Chinook salmon ESU.

2. The Northwest Regional Office review of new information to inform the ESU/DPS membership status of various hatchery programs (Jones et al. 2011) noted:

- No major hatchery production changes in the UWR Chinook salmon ESU since the last status review, with the exception of the 2005 termination of the Calapooia hatchery adult outplants using South Santiam stock.
- No changes in the UWR steelhead DPS hatchery membership since the last status review. All hatchery winter steelhead programs were terminated in the late 1990s. The only hatchery steelhead program within the geographic boundaries of the DPS is a summer steelhead program, which currently is not part of the DPS because it was originally derived from the non-native, out of DPS Skamania broodstock.

2.4.2 ESU/DPS Viability and Statutory Listing Factors

- The Northwest Fisheries Science Center's review of updated information does not indicate a change in the biological risk category since the time of the last status review for the Upper Willamette River salmon ESU and steelhead DPS (Ford et al. 2010).
- Our analysis of ESA section 4(a)(1) factors indicates that the collective risk to the persistence of the UWR Chinook salmon ESU has not changed significantly since our final listing determination in 2005. Similarly, neither has the collective risk of the five listing factors to the persistence of the UWR steelhead DPS changed significantly since our final listing determination in 2006.

3 ▪ Results

3.1 Recommended Classification

Recommendation for listing status:

Based on the information identified above, no change in listing classification is recommended for either of the Upper Willamette River species. As such, the current listing recommendations are:

- The Upper Willamette River steelhead DPS should remain listed as threatened.
- The Upper Willamette River Chinook salmon ESU should remain listed as threatened.

Recommendation for ESU/DPS delineation:

Based on the information identified above, no change is recommended for species' ESU/DPS delineation.

Recommendations for hatchery membership:

Based on the information identified above, the only change recommended for the species' hatchery membership is:

- The South Santiam Hatchery (Calapooia River) Program has been eliminated and should be removed from the UWR Chinook salmon ESU.
- The ODFW stock numbers for the McKenzie River Hatchery and South Santiam Hatchery programs were mistakenly reversed in the regulatory description of this ESU and should be corrected.

3.2 New Recovery Priority Number

There are no changes in the recovery priority numbers listed in Table 4 for the Upper Willamette River Chinook ESU and steelhead DPS.

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4 · Recommendations for Future Actions

Actions critical to improving the status of the Upper Willamette River steelhead DPS and Chinook salmon ESU over the next five years include:

Implementation of the Biological Opinion for the Willamette River Basin Flood Control Project (NMFS 2008b) (especially reintroduction, passage, and temperature control elements of the Reasonable and Prudent Alternative).

Implementation of the Final Upper Willamette River Conservation and Recovery Plan for Chinook Salmon and Steelhead (especially Section 7, Strategies and Actions; and Section 9, Implementation) (ODFW 2010).

NMFS will work with local recovery planning partners to prioritize and direct actions and to ensure that risk factors and actions identified in recovery plans and relevant biological opinions are addressed. Recovery plan implementation must include efforts to improve coordination and cooperation among implementing partners; to identify clear near-term priorities for recovery actions; and to conduct research, monitoring, and evaluation to address critical uncertainties and improve population status and trend information.

There is also a need for quantitative analysis of net habitat loss and restoration/protective efforts and for developing a methodology for evaluating the effectiveness of regulatory mechanisms relative to VSP criteria. If take associated with research and monitoring continues to increase, the potential impacts to the viability of the affected Upper Willamette River ESU/DPS will need to be evaluated.

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Upper Willamette River Steelhead
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Conclusion:

Based on the information identified above, we conclude:

- The Upper Willamette River steelhead DPS should remain listed as threatened.
- The Upper Willamette River Chinook salmon ESU should remain listed as threatened.

REGIONAL OFFICE APPROVAL

Northwest Regional Administrator, NOAA Fisheries

Approve: _____ Date: *July 26, 2011*