UPPER COLUMBIA RIVER STEELHEAD
STATUS OF THE SPECIES UPDATE
JULY 2024

Background

The Upper Columbia River (UCR) steelhead distinct population segment (DPS) was listed as endangered on August 18, 1997 (62 FR 43937), and their status was downlisted to threatened on January 5, 2006 (71 FR 834). On August 16, 2022, in the agency's 5-year review for UCR steelhead, NMFS concluded that the species should remain listed as threatened (NMFS 2022). The UCR steelhead DPS includes all naturally-spawned populations of steelhead in streams in the Columbia River Basin upstream from the Yakima River, Washington, to the United States–Canada border (62 FR 43937). Five artificial propagation programs are also considered part of the DPS: the Wenatchee River Program; Wells Complex Hatchery Program (in the Methow River); Winthrop National Fish Hatchery Program; Ringold Hatchery Program; and the Okanogan River Program (85 FR 81822).

Factors contributing to the decline of UCR steelhead included the intensive commercial fisheries in the lower Columbia River that began in the latter half of the 1800s, continued into the 1900s, and nearly eliminated many salmon and steelhead stocks. With time, the construction of dams and diversions, some without passage, blocked or impeded salmon and steelhead migrations. Early hatcheries, operated to mitigate the impacts of dams on fish passage and spawning and rearing habitat, employed practices such as transferring fish among basins without regard to their origin. While these practices increased the abundance of stocks, they also decreased the diversity and productivity of populations they intended to supplement. Concurrent with these activities, human population growth within the basin was increasing and land uses were adversely affecting UCR steelhead spawning and rearing habitat. In addition, non-native species were introduced by both public and private interests that directly or indirectly affected salmon and steelhead (UCSRB 2007).

Conservation partners have implemented many tributary habitat restoration projects across the DPS, improving habitat conditions for steelhead spawning, rearing, and migration in many reaches. However, widespread areas of degraded habitat persist across the basin, with simplified stream channels, disconnected floodplains, impaired instream flow, loss of cold water refugia, and other limiting factors (NMFS 2022). An emerging risk is climate change and the consequent threat to the juvenile rearing stage vulnerable to low stream flow and high stream changes. Other threats described in the paragraph above as well as pinniped predation continue.

Life history

The life-history pattern of steelhead in the UCR DPS is complex. Adults return to the Columbia River in the late summer and early fall. Unlike some species of salmon, most steelhead do not move upstream quickly to tributary spawning streams. A portion of the returning run overwinters in the mainstem Columbia River reservoirs, passing into tributaries to spawn in April and May of the following year. Spawning occurs in the late spring of the year following entry into the Columbia River. Juvenile steelhead generally spend 1 to 3 years rearing in freshwater before

migrating to the ocean but have been documented spending as many as 7 years in freshwater before migrating. Most adult steelhead return to the Upper Columbia after 1 or 2 years at sea.

Spatial structure and diversity

This DPS is comprised of a single major population group (MPG) – the North Cascades MPG. The MPG includes four populations of UCR steelhead: the Wenatchee, Entiat, Methow, and Okanogan. Spatial structure is rated at low risk for the Wenatchee and Methow populations, moderate risk for the Entiat population, and high risk for the Okanogan population (Ford 2022). All populations have a high diversity risk rating, largely driven by high levels of hatchery spawners within natural spawning areas and lack of genetic diversity. The integrated spatial structure/diversity risk rating for all populations is characterized as high.

Abundance and productivity

The 2015-2019 five-year geometric mean estimates of natural-origin spawner abundance have declined dramatically (ranging from 28 to 63 percent reductions), erasing gains observed over the past two decades for all four populations (Ford 2022). These recent declines are persistent and large enough to result in small, but negative, 15-year trends in abundance for all four populations. Annual brood-year recruits per spawner estimates have been well below replacement in recent years for all four populations. All populations are consistently exhibiting natural production rates well below replacement, and natural production has also declined consistently, resulting in an increasing fraction of hatchery fish on the spawning grounds each year. For these reasons, the integrated abundance/productivity metric for all populations remains at high risk. Since the last 5-year review, returns of natural origin adults have increased from 2018 and 2019 numbers. Adult return data from 2020 and 2021 indicate a significant increase in overall returns for three of the four populations. The Okanogan population adult returns have continued to decline.

Recovery

The ICTRT (2007) recommended that three populations meet viability criteria, two of which meet high viability criteria for the DPS to be viable; the rationale behind this recommendation is because of the relatively low number of extant populations remaining in the DPS. The final recovery plan (UCSRB 2007) adopted by NMFS established a recovery goal of securing long-term persistence of viable populations of naturally produced steelhead distributed across their native range. The UCSRB identified five recovery criteria that address the viable salmonid population (VSP) metrics of abundance, productivity, spatial structure, and diversity. For recovery, the UCSRB recommended that all steelhead populations within the DPS, except the functionally extirpated Crab Creek population, meet abundance/productivity criteria that represent a 5 percent extinction risk over a 100-year period. In addition, the UCSRB recommended that naturally produced steelhead utilize four of the five major spawning areas in the Wenatchee subbasin, two major spawning area within the Entiat subbasin, three major spawning areas in the Methow subbasin, and two of the major and minor spawning areas in the Okanogan subbasin. NMFS adopted the UCSRB recommendations as the recovery scenario. To achieve these criteria, significant improvements in all four VSP parameters is needed.

Many restoration and protection actions have been implemented in freshwater tributary habitat since 2015, but those actions do not change overall trends in habitat quality, quantity, and function. Habitat conditions throughout the range of the UCR steelhead DPS continue to limit recovery of the species, particularly with regard to water quality, water quantity, riparian condition, and floodplain function. The greatest opportunities to advance recovery of the species over the next five years include: (1) prioritizing actions that improve habitat resilience to climate change; (2) reconnecting stream channels with floodplains; (3) implementing restoration actions at watershed scales; and (4) reducing pinniped predation on adults returning to the lower Columbia River (NMFS 2022).

Crozier et al. (2019) concluded that UCR steelhead have a high risk of overall climate vulnerability based on their high risk for biological sensitivity, high risk for climate exposure, and moderate capacity to adapt. Adult UCR steelhead are vulnerable to high stream temperatures during freshwater migration and spawning. However, the impact of climate change specifically on marine survival is uncertain. Risk during early life history is low because of the high elevation and relatively stable flows that influence the egg stage. However, the risk is high for the juvenile freshwater rearing stage because of the year-around reliance on freshwater habitat and sensitivity to changes in summer flows and stream temperatures. UCR steelhead may have some latitude to shift timing of adult migrations to avoid peak late summer temperatures (Robards and Quinn 2002), but the consequences of such timing shifts are not known. In each river population, individuals occupying the mid-to-lower reaches are subject to annual high stream temperatures and summer water deficits, and there are limited opportunities to shift juvenile rearing patterns. Anadromous *O. mykiss* may have some opportunities to expand summer rearing and overwintering to habitat areas upstream, but the amount of suitable habitat is limited compared to the potential loss of habitat in downstream reaches.

Summary

Natural origin abundance has decreased over the levels reported in the prior review for all populations in this DPS, in many cases sharply. The abundance data for the entire DPS show a downward trend over the last 5 years, with the recent 5-year abundance levels for all four populations declining by an average of 48 percent. Relatively low ocean survival in recent years was a major factor in recent abundance patterns. There are high levels of hatchery spawners within natural spawning areas and a lack of genetic diversity among the populations. Based on the combined risk ratings for the VSP parameters, all four populations in the UCR steelhead DPS remain at a high overall risk. In order to achieve recovery, it is essential to continue implementing habitat protection and restoration actions directed at key limiting factors.

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