Status of the Species
Middle Columbia River Steelhead
February 2023

On March 25, 1999, NMFS listed the Middle Columbia River (MCR) steelhead (*O. mykiss*) distinct population segment (DPS) as a threatened species (64 FR 14517). 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 MCR steelhead DPS includes all naturally spawned anadromous steelhead originating below natural and manmade impassable barriers from the Columbia River and its tributaries upstream of the Wind and Hood Rivers (exclusive) to and including the Yakima River; it excludes fish originating from the Snake River basin. It also includes steelhead from artificial propagation programs: the Touchet River Endemic Program; Umatilla River Program; and the Deschutes River Program (85 FR 81822). This DPS does not include steelhead in the upper Deschutes River basin, which are designated as part of an experimental population (71 FR 834).

Estimates of historical (pre-1960s) abundance indicate that the total historical run size for this DPS might have been in excess of 300,000. Total run sizes for the major steelhead stocks above Bonneville Dam were estimated in the early 1980s to be approximately 4,000-winter steelhead and 210,000-summer steelhead. Based on dam counts for this period, the MCR steelhead DPS represented the majority of this total run estimate, so the returns to this DPS were probably somewhat below 200,000 at that time. It was also estimated that 74 percent of the returns to this DPS were of hatchery origin at that time.

Several factors led to NMFS' 1999 conclusion that MCR steelhead were threatened: destruction and modification of habitat; overutilization for recreational purposes; impacts of hydropower development and operation; and high percentages of hatchery fish spawning naturally. Despite efforts to reduce the impact of these threats, extensive miles of stream remain inaccessible or unsuitable for steelhead, many habitat threats continue, and threats from on-going development remain (NMFS 2022).

Life History. Summer steelhead enter freshwater between May and October and require several months to mature before spawning; winter steelhead enter freshwater between November and April and spawn shortly thereafter. Summer steelhead usually spawn farther upstream than winter steelhead (NMFS 2009). Steelhead may enter streams and arrive at spawning grounds weeks or months (and even up to a year) before they spawn. They are therefore vulnerable to disturbance and predation. They need cover, in the form of overhanging vegetation, undercut banks, submerged vegetation, submerged objects such as logs and rocks, floating debris, deep water, turbulence, and/or turbidity. Once in the river, steelhead apparently rarely eat and grow little, if at all (NMFS 2009).

Summer rearing takes place primarily in the faster parts of pools, although young-of-the-year are abundant in glides and riffles. Winter rearing occurs more uniformly at lower densities across a wide range of fast and slow habitat types. Depending on water temperature, steelhead eggs may incubate for 1.5 to 4 months before hatching. Young steelhead typically rear in streams for 1-3

(or sometimes more) years before migrating to the ocean. Some juveniles move downstream to rear in larger tributaries and mainstem rivers. Most fish in this DPS spend 1 to 2 years in saltwater before re-entering freshwater (NMFS 2009). Repeat spawning for Columbia River basin steelhead ranges from reported rates of 2 to 4 percent above McNary Dam (Busby et al. 1996) to 17 percent in the unimpounded tributaries below Bonneville Dam (at RM 146.1). Adult survival to allow repeat spawning of MCR steelhead is compromised by the need to pass multiple mainstem dams multiple times (NMFS 2022).

Spatial structure and diversity. The DPS comprises 20 historical populations (three of which are extirpated) grouped into the following four major population groups (MPGs): Cascades Eastern Slope Tributaries; John Day River; Yakima River; and Umatilla/Walla-Walla (Table 1). The spatial structure risk ratings are either very low or low for 13 populations and moderate for the four remaining extant populations. Diversity risk ratings are moderate for the vast majority of populations in this DPS. The most common reason for moderate diversity risk ratings are genetic impacts from hatchery supplementation and/or straying from out-of-basin stocks (Ford 2022). Updated information indicates that stray levels into the John Day River populations have decreased in recent years. Out-of-basin hatchery stray proportions remain high in spawning reaches within the Deschutes River basin and the Umatilla, Walla Walla, and Touchet River populations. The Yakima River upper mainstem population is the only one with a high-risk rating for the integrated spatial structure/diversity metric. This is due to a substantial decrease in distribution from historic levels and loss of life-history and phenotypic diversity inferred from habitat degradation (including passage impacts).

Abundance and productivity. As reported in the most recent viability assessment (Ford 2022), the five-year (2015-2019) geometric mean abundance estimates for 16 of the 17 evaluated populations are lower than the corresponding estimates for the previous five-year period by varying degrees, with an average decline of 43 percent. Only the Klickitat River population exhibited an increase in spawner abundance. The fifteen-year trends in natural-origin spawner abundance is slightly negative for ten populations, neutral for two populations and slightly positive for four populations. Some of the positive trends are driven largely by peak returns in the earlier years of the averaging time period. Natural origin spawning estimates are highly variable relative to minimum abundance thresholds across the populations in the DPS (Ford 2022). Freshwater productivity is considered to be low to moderate across the populations. Two of the four MPGs contain populations that have achieved a low or very low risk rating for the integrated abundance/productivity metric. However, this is insufficient for these MPGs to be considered viable on the whole. The majority of populations are not achieving their desired abundance and productivity targets.

Recovery. The recovery strategy consists of a DPS-wide recovery plan (NMFS 2009) and associated geographic management unit plans (Klickitat, NMFS 2009; Oregon, Carmichael and Taylor 2010; Rock Creek, NMFS 2009; SE Washington, SRSRB 2011; White Salmon River, NMFS 2013; and Yakima Basin, YBFWRB 2009). In these plans, NMFS adopted the viability criteria metrics defined by the Interior Columbia Technical Recovery Team (ICTRT 2007) as the biological recovery criteria for the DPS. The recovery and management unit plans call for achieving MPG-level viability (low risk), through different combinations of viability status of the MPG's component populations (NMFS 2009). For example, at least half of the populations in

the MPG must be viable and at least one population must be highly viable for the MPG to be regarded as viable (NMFS 2009). The recovery documents described the most likely scenario to achieve viability in each MPG. The latest viability ratings for MCR steelhead populations and their proposed viability ratings to support recovery are summarized in Table 1. Overall, none of the MPGs currently meet viability criteria (Ford 2022, NMFS 2022). The newly re-established run in the White Salmon River and the developing time series of population data from the Klickitat River and Rock Creek warrant consideration in the recovery plan.

Widespread areas of degraded or inaccessible habitat continue to persist for all four MPG's due to: (1) dams and irrigation infrastructure; (2) low summer flows and high summer water temperatures; (3) disconnected floodplains; and (4) loss of riparian function. Other factors pertain to some MPG's more than others, such as grazing effects in the John Day River MPG, and levees in the Walla Walla and Umatilla Rivers and in the Yakima River MPG's. Finally, the effects of increasing floodplain development and other anthropogenic factors likely offset at least some restoration benefits, but are not well documented or quantified. There remain numerous opportunities for habitat restoration or protection throughout the range of this DPS. The greatest opportunities to advance recovery of the species over the next five years include: (1) protect and enhance cold water refugia habitat in the Columbia River; (2) advance water conservation agreements, improve streamflows, and lower water temperatures in tributary habitats; (3) restore complex floodplain habitats; and (4) provide/improve passage and screening (NMFS 2022).

Crozier et al. (2019) recently completed a climate vulnerability assessment for Pacific salmon and steelhead, including MCR steelhead. Crozier et al. (2019) concluded that the MCR steelhead DPS has a high risk of overall climate vulnerability based on its high risk for biological sensitivity, high risk for climate exposure, and moderate capacity to adapt. The adult freshwater stage was rated the most highly vulnerable life stage due to high summer stream temperatures.

Summary. Overall, this DPS is at a moderate risk of extinction. Recent five-year returns experienced steep declines across most populations. Natural-origin spawning estimated are highly variable relative to minimum abundance thresholds across the populations in the DPS. Four of the populations rated at "low" or "very low" risk for abundance and productivity, while the remaining populations are rated as "moderate" to "high" risk. Additional priority recovery actions and best management practices that apply to all populations and protect the highest quality habitats and conserve ecological processes that support population viability must be implemented to recover this species.

Table 1. Summary of viable salmonid population (VSP) parameter risks and overall current status and proposed recovery goals for each population in the Middle Columbia River steelhead distinct population segment (Ford 2022; NMFS 2009).

Major Population Group	Population (Run Type)	VSP Risk Rating[1]		Viability Rating	
		Abundance/ Productivity	Spatial Structure/ Diversity	2022 Assessment	Proposed Recovery Goal[2]
Cascades Eastern Slope Tributaries[3]	Klickitat River (summer/winter [sw])	Moderate	Moderate	Maintained	Viable
	White Salmon River (summer [su])			*Functionally Extirpated*	
	Rock Creek (su)	High	Moderate	High Risk	Maintained
	Fifteenmile Creek (winter [wi])	Moderate	Low	Maintained	Viable
	Deschutes River Westside (su)	High	Moderate	High Risk	Viable
	Deschutes River Eastside (su)	Moderate	Moderate	Maintained	Viable
	Crooked River (su)			*Extirpated*	
John Day River[4]	John Day River Lower Mainstem (su)	Moderate	Moderate	Maintained	Viable
	North Fork John Day (su)	Very Low	Low	Highly Viable	Viable
	Middle Fork John Day (su)	Very Low	Moderate	Viable	Option
	John Day River Upper Mainstem (su)	Moderate	Moderate	Maintained	Option
	South Fork John Day River (su)	Very Low	Moderate	Viable	Maintained
Umatilla / Walla Walla[5]	Touchet River (su)	High	Moderate	High Risk	Option
	Walla Walla River (su)	Moderate	Moderate	Maintained	Option
	Umatilla River (su)	Moderate	Moderate	Maintained	Viable
	Willow Creek (su)			*Functionally Extirpated*	
Yakima River[6]	Yakima River Upper Mainstem (su)	Moderate	High	High Risk	Option
	Naches River (su)	Moderate	Moderate	Maintained	Option
	Toppenish Creek (su)	Moderate	Moderate	Maintained	Maintained
	Satus Creek (su)	Low	Moderate	Viable	Option

[1]Risk ratings are defined based on the risk of extinction within 100 years: High = greater than or equal to 25 percent; Moderate = less than 25 percent; Low = less than 5 percent; and Very Low = less than 1 percent.
[2]There are several scenarios that could meet the requirements for species recovery, as indicated by the "Option" label. See the MPG specific notes for more detail.
[3]In order for the MPG to be viable, at least one of the four populations targeted for viable status, must be highly viable.
[4]In order for the MPG to be viable, then (1) either the Middle Fork John Day or John Day River Upper Mainstem populations should be viable and the other may be maintained; and (2) at least three populations should be viable, one of which should be highly viable.
[5]In order for the MPG to be viable, at least two populations should be viable, one of which should be highly viable.
[6]In order for the MPG to be viable, at least two populations should be viable, one of which should be highly viable.

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