California Central Valley Steelhead Distinct Population Segment Factsheet

Author List

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California Central Valley Steelhead Distinct Population Segment (DPS) Definition

Naturally spawned anadromous *O. mykiss* (steelhead) originating below natural and manmade impassable barriers from the Sacramento and San Joaquin rivers and their tributaries; excludes such fish originating from San Francisco and San Pablo Bays and their tributaries. This DPS includes steelhead from the Coleman National Fish Hatchery Program, the Feather River Fish Hatchery Program, and the Mokelumne River Hatchery Program.

Federal Endangered Species Act Listing Status

Listed as threatened since 1998.

Historical Distribution

Prior to dam construction, and other large-scale habitat changes, California Central Valley steelhead were distributed throughout the Sacramento and San Joaquin rivers (Busby et al. 1996; NMFS 1996b, McEwan 2001). Steelhead were found from the upper Sacramento and Pit rivers (now inaccessible due to Shasta and Keswick dams) south to the Kings and possibly the Kern River systems, and in both east- and west-side Sacramento River tributaries (Yoshiyama et al. 1996). Lindley et al. (2006) estimated that historically there were at least 81 independent Central Valley steelhead populations distributed primarily throughout the eastern tributaries of the Sacramento and San Joaquin rivers. Presently, impassable dams block access to 80 percent of historically available habitat, and block access to all historical spawning habitat for about 38 percent of historical steelhead populations (Lindley et al. 2006). Steelhead populations may have been extirpated from their entire

historical range in the San Joaquin Valley and most of the larger basins of the Sacramento River.

Current Distribution

Despite the loss of historical habitat caused by dams, Central Valley steelhead populations still occur in the Sacramento and San Joaquin basins (Table 1), distributed among four main diversity groups (Figure 1). A diversity group is a geographically-distinct portion of the DPS which is ecologically or otherwise identifiable and which is essential to the recovery of the entire listed entity (e.g., to conserve genetic robustness, demographic robustness, and important life history stages).

The current steelhead populations primarily occur in the tailwaters of dammed rivers, in a few undammed creeks, and in the four hatchery-supported systems of Battle Creek (Coleman Hatchery), the Feather River (Feather River Hatchery), the American River (Nimbus Hatchery), and the Mokelumne River (Mokelumne River Hatchery).

Current Biological Status

The current status of Central Valley steelhead appears to have slightly improved since 2010, when it was concluded that the DPS was in danger of extinction (Williams et al. 2011). This modest improvement is driven by an increase in adult returns to hatcheries from their recent lows, but the state of naturally-produced fish remains poor and largely unknown. Improvements in hatchery population sizes do not warrant a downgrading of the DPS extinction risk. In fact, the lack of improved natural production as estimated by exit at Chipps Island, and low abundances coupled with large hatchery influence in the Southern Sierra Nevada diversity group is cause for concern.

Central Valley Steelhead Recovery Strategy

Based on recommendations from the Central Valley Technical Review Team, the Central Valley steelhead recovery effort has two primary objectives: (1) secure existing populations by addressing stressors; and (2) reintroduce populations into historically occupied or other suitable areas (Lindley et al. 2007). The steelhead recovery strategy focuses on protecting existing populations while reintroducing populations into their historical habitats, so that viable populations occur in each of the four steelhead diversity groups. This strategy, coupled with actions that address threats, will contribute to meeting the following recovery criteria:

- two viable populations in the Basalt and Porous Lava Diversity Group;
- four viable populations in the Northern Sierra Nevada Diversity Group;
- one viable population in the Northwestern California Diversity Group; and
- two viable populations in the Southern Sierra Nevada Diversity Group

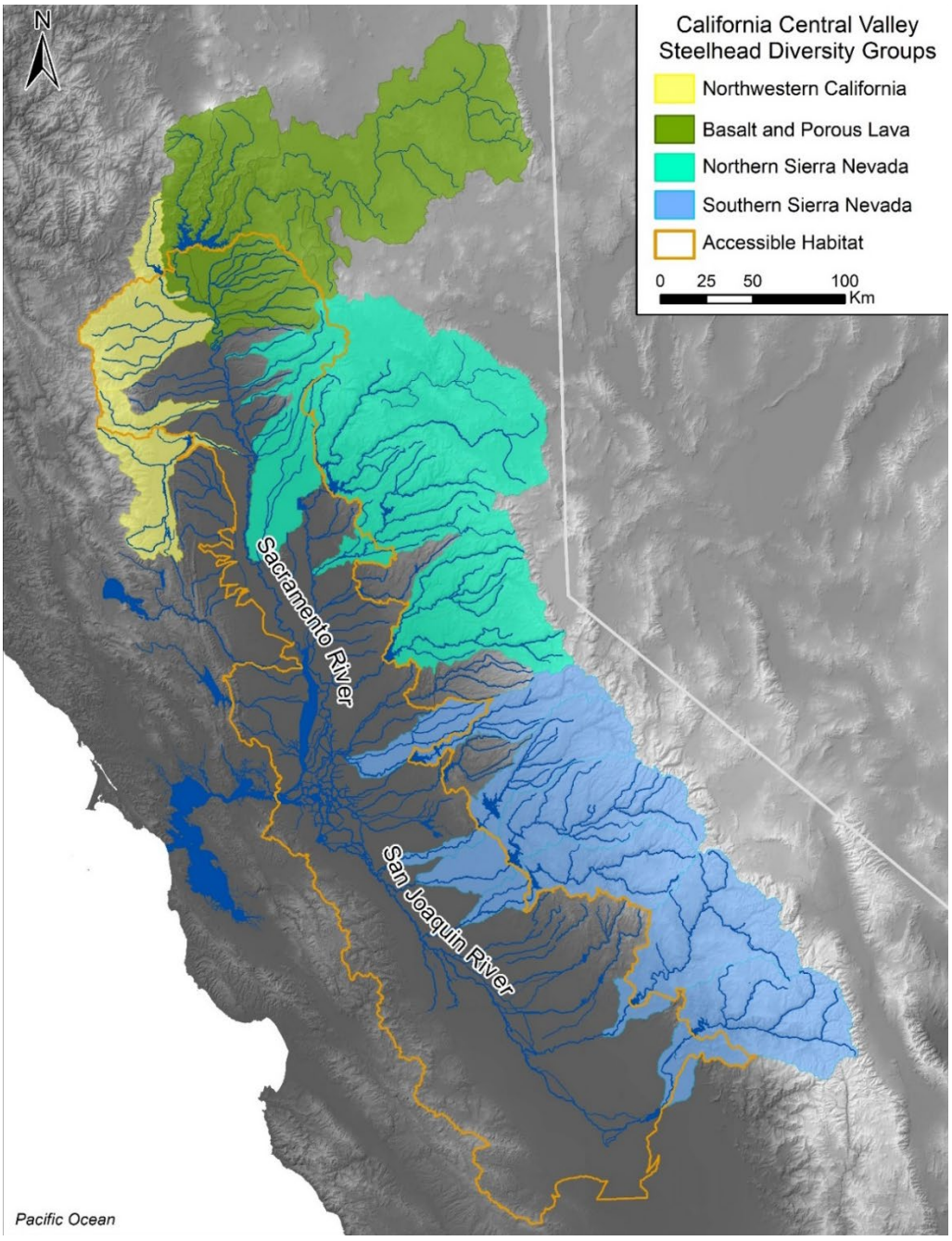

Figure 1. Central Valley Steelhead Diversity Groups as identified in the Central Valley Chinook Salmon and Steelhead Recovery Plan. Figure provided by Mike Beakes (Reclamation).

Table 1. Population presence, risk of extinction (Williams et al. 2011, Lindley et al. 2007), and classification of watersheds with historic and current populations of steelhead. “Primary”: top priority for reintroduction; “Candidate”: possible area for reintroduction; “Non-candidate”: reintroduction should not be attempted here. “NA”: not applicable.

Diversity Group	River, Creek or Sub-reach	Historic Population	Current Population	Population Extinction Risk	Classification
Basalt and Porous Lava	Battle Creek	Yes	Yes	High	Core 1
Basalt and Porous Lava	Cow Creek	Yes	Yes	Uncertain	Core 2
Basalt and Porous Lava	Mainstem Sacramento River (below Keswick)	No	Yes	Uncertain	Core 2
Basalt and Porous Lava	Little Sacramento River	Yes	No	NA	Candidate
Basalt and Porous Lava	McCloud River	Yes	No	NA	Primary
Basalt and Porous Lava	Pit River	Yes	No	NA	Non-Candidate
Basalt and Porous Lava	Redding Area Tributaries	Yes	Yes	Uncertain	Core 2
Northwestern California	Putah Creek	Yes	Yes	Uncertain	Core 2
Northwestern California	Stony Creek	Yes	Yes	Uncertain	Core 3
Northwestern California	Thomes Creek	Yes	Yes	Uncertain	Core 2
Northwestern California	Cottonwood/Beegum	Yes	Yes	Uncertain	Core 2
Northwestern California	Clear Creek	Yes	Yes	Uncertain	Core 1
Northern Sierra Nevada	American River (below Nimbus)	No	Yes	High	Core 2
Northern Sierra Nevada	Upper American (above Folsom)	Yes	No	NA	Candidate
Northern Sierra Nevada	Auburn Ravine	No	Yes	Uncertain	Core 2
Northern Sierra Nevada	Dry Creek	Yes	Yes	Uncertain	Core 3
Northern Sierra Nevada	Feather River (below Oroville)	No	Yes	High	Core 2
Northern Sierra Nevada	West Branch Feather (above Oroville)	Yes	No	NA	Non-Candidate
Northern Sierra Nevada	North Fork Feather (above Oroville)	Yes	No	NA	Candidate
Northern Sierra Nevada	Middle Fork Feather (above Oroville)	Yes	No	NA	Non-Candidate
Northern Sierra Nevada	South Fork Feather (above Oroville)	Yes	No	NA	Non-Candidate
Northern Sierra Nevada	Bear River	Yes	Yes	Uncertain	Core 3
Northern Sierra Nevada	Yuba River (below Englebright)	No	Yes	Uncertain	Core 2
Northern Sierra Nevada	North, Middle, South Yuba Rivers (above Englebright)	Yes	No	NA	Primary
Northern Sierra Nevada	Butte Creek	Yes	Yes	Uncertain	Core 2
Northern Sierra Nevada	Big Chico	Yes	Yes	Uncertain	Core 2
Northern Sierra Nevada	Deer Creek	Yes	Yes	Uncertain	Core 1
Northern Sierra Nevada	Mill Creek	Yes	Yes	Uncertain	Core 1
Northern Sierra Nevada	Antelope Creek	Yes	Yes	Uncertain	Core 1
Northern Sierra Nevada	Cosumnes River	Yes	Yes	Uncertain	Core 3
Southern Sierra Nevada	Mokelumne River (below Comanche)	No	Yes	High	Core 2
Southern Sierra Nevada	Mokelumne River (above Pardee)	Yes	No	NA	Candidate
Southern Sierra Nevada	Calaveras River (below New Hogan)	No	Yes	Uncertain	Core 1

Diversity Group	River, Creek or Sub-reach	Historic Population	Current Population	Population Extinction Risk	Classification
Southern Sierra Nevada	Upper Calaveras River (above New Hogan)	Yes	No	NA	Non-Candidate
Southern Sierra Nevada	Stanislaus River (below Goodwin)	No	Yes	Uncertain	Core 2
Southern Sierra Nevada	Upper Stanislaus River (above New Melones)	Yes	No	NA	Candidate
Southern Sierra Nevada	Tuolumne River (below La Grange)	No	Yes	Uncertain	Core 2
Southern Sierra Nevada	Upper Tuolumne River (abv La Grange and Don Pedro)	Yes	No	NA	Candidate
Southern Sierra Nevada	Merced River (below Crocker Huffman)	No	Yes	Uncertain	Core 2
Southern Sierra Nevada	Upper Merced River (above New Exchequer)	Yes	No	NA	Candidate
Southern Sierra Nevada	San Joaquin River (below Friant)	No	No	NA	Candidate
Southern Sierra Nevada	Upper San Joaquin (above Friant)	Yes	No	NA	Candidate

Central Valley Steelhead Watershed Classification

A key element of this recovery strategy is to focus actions on watersheds that can support viable populations and contribute to meeting diversity group requirements for distribution and redundancy. To assess their potential to contribute to steelhead recovery, watersheds in the four diversity groups that supported historic populations have been placed into three categories, based on their potential to support populations with low risk of extinction. The three categories are Core 1, Core 2, and Core 3.

Core 1 watersheds possess the known ability or potential to support a viable population. For a population to be considered viable, it must meet the criteria for low extinction risk for Central Valley salmonids (Lindley et al. 2007). Core 2 populations meet, or have the potential to meet, the biological recovery standard for moderate risk of extinction. Core 3 watersheds have populations that are present on an intermittent basis and require straying from other nearby populations for their existence. These populations likely do not have the potential to meet the abundance criteria for moderate risk of extinction. Core 3 watersheds are important because, like Core 2 watersheds, they support populations that provide increased life history diversity to the ESU/DPS and are likely to buffer against local catastrophic occurrences that could affect other nearby populations. Dispersal connectivity between populations and genetic diversity may be enhanced by working to recover smaller Core 3 populations that serve as steppingstones for dispersal.

Critical Knowledge Gaps

As stated in the 2021 NOAA Fisheries' Southwest Fisheries Science Center Viability Report, one of the greatest challenges in managing for resilient steelhead populations in our regulated rivers lies in understanding how water project operations and related changes to habitats and ecosystems promote, maintain, or suppress the expression and survival of the anadromous life history form of *O. mykiss*. It is clear that some river habitats support almost exclusively resident populations, while others support the expression of anadromy (Satterthwaite et al. 2010). In the San Joaquin River tributaries specifically, there is great uncertainty in the extent to which the production of anadromous juveniles from tributaries is low and/or whether mortality of juvenile steelhead is so high during outmigration that it is selecting against anadromy and driving populations towards residency. Recent work has dramatically increased our understanding of the genetic basis and maintenance of anadromy in *O. mykiss* populations, which warrants consideration in managing for the anadromous life history for the species (Pearse et al. 2019). More studies are needed to understand the extent to which genes associated with the heritable components of anadromy could be lost from populations with low steelhead numbers, thus placing them at a greater risk of extinction.

Resources

Additional information on Central Valley steelhead recovery available at the NOAA Fisheries California Central Valley Steelhead web page.

The Endangered Species Act 5-year Status Review for California Central Valley Steelhead available at the NOAA Fisheries Publications web page.

Figure 2. Image of juvenile steelhead provided by John R. McMillan NOAA/NWFSC.