South-Central/Southern California Coast Steelhead Recovery Planning Domain

5-Year Review:
Summary and Evaluation of
South-Central California Coast Steelhead Distinct Population Segment

San Carpoforo Creek Steelhead

National Marine Fisheries Service
Southwest Region
Long Beach, CA

5-YEAR REVIEW
South-Central/Southern California Coast Steelhead Recovery Planning Domain

Species Reviewed	Evolutionarily Significant Unit or Distinct Population Segment
Steelhead (*O. mykiss*)	**South-Central California Coast Steelhead DPS**

1.0 GENERAL INFORMATION

1.1 Reviewers

1.1.1. Southwest Region:

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1.2 Introduction

Many West Coast salmon and steelhead (*Oncorhynchus* spp.) stocks have declined substantially from their historic numbers and now are at a fraction of their historical abundance. There are multiple factors that contribute to these declines, including, particularly the loss of freshwater and estuarine habitat, periodic poor ocean conditions, and a variety of land-use practices which have impacted many watershed processes. These factors collectively led to the National Marine Fisheries Service (NMFS) listing of south-central California steelhead as threatened 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 salmon and steelhead occurred in 2005 and 2006, respectively. This document reflects the agency's 5-year review of the ESA-listed South-Central California Coast Steelhead Distinct Population Segment (DPS).

Figure 1. South-Central California Coast Steelhead Recovery Planning Area.

1.3 Methodology used to complete the review

The Endangered Species Act (ESA) Section 4(c) (2) requires 5 year reviews for all species once listed to determine if a change in status is necessary. A public notice initiating this review and requesting information was published on March 18, 2010, with a 60-day response period (75 FR 13082).

This 5-year review was conducted by NOAA Fisheries Southwest Regional Staff and Southwest Fisheries Science Center (SWFSC) personnel. The review relied principally on the 2011 status review update prepared by NOAA Fisheries Science Center, the Technical Memoranda prepared by the SWFSC, a DPS wide threats assessments prepared by contractor (Hunt and Associates 2008), and miscellaneous run-size data from a small number of watersheds where such data are regularly collected.

The SWFSC reviewed all new and substantial scientific information since the last review in 2005 and produced an updated biological status summary report for the listed salmon and steelhead in California (Williams et al. 2011). The purpose of the status update report was to determine whether or not the biological status of the South-Central California Steelhead DPS had changed since the 2005 status review was conducted. Southwest Regional office staff from Protected Resources Division reviewed the status update report and also assessed whether the five ESA listing factors (threats) had changed substantially since the 2006 listing determination for this DPS.

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

1.4.1 FR Notice citation announcing initiation of this review

75 FR 13082; March 18, 2010

1.4.2 Listing history

Table 1. Summary of the listing history under the Endangered Species Act for the South-Central California Coast steelhead DPS.

Salmonid Species	ESU/DPS Name	Original Listing	Revised Listing(s)
Steelhead *(O. mykiss)*	**South-Central California Coast Steelhead ESU/DPS**	**FR Notice: 62 FR 43937** **Date Listed: 08/18/1997** **Classification: Endangered**	**FR Notice: 71 FR 5248** **Date: 01/05/2006** **Re-classification: Threatened**

1.4.3 Associated rulemakings

Table 2. Summary of rulemaking for 4(d) protective regulations and critical habitat for the South-Central California Coast steelhead DPS.

Salmonid Species	ESU/DPS Name	4(d) Protective Regulations	Critical Habitat Designations
Steelhead *(O. mykiss)*	**South-Central California Coast Steelhead ESU/DPS**	**FR Notice: 70 FR 37160 Date: 06/28/2005**	**FR Notice: 70 FR 52488 Date: 09/02/2005**

1.4.4 Review History

Table 3. Summary of previous scientific assessments for the South-Central California Coast steelhead DPS.

Salmonid Species	ESU/DPS Name	Document Citation
Steelhead *(O. mykiss)*	**South-Central California Coast Steelhead DPS**	**Williams T. H. *et al.* 2011. Status Review Update for Pacific Salmon and Steelhead Listed Under the Endangered Species Act: Southwest. Southwest Fisheries Science Center.** **Boughton, D. A. 2010. Some Research Questions on Recovery of Steelhead on the South-Central and Southern California Coast. NOAA-TM-NMFS-SWFSC-467.** **Clemento, A. J. *et al.* 2009. Population Genetic Structure and Ancestry of *Oncorhynchus mykiss* Populations Above and Below Dams in South-Central California. *Conservation Genetics* 10:1321-1336.** **Pearse, D. and J. C. Garza. 2008. Historical Baseline for Genetic Monitoring of Coastal California Steelhead, *Oncorhynchus mykiss.* Final Report for California Department of Fish and Game Fisheries Restoration rant Program P0510530.** **Garza, J. C. and A. Clemento. 2007. Population Genetic Structure of Oncorhynchus *mykiss* in the Santa Ynez River, California. Final Report for Project Partially Funded by the Cachuma Conservation Release Board.** **Boughton, *et al.* 2007. Viability Criteria for Steelhead of the South-Central and Southern California Coast. NOAA-TM-NMFS-SWFSC-407.** **Jackson, T.A. 2007. California Steelhead Fishing Report-Restoration Card: A Report to the Legislature. California Department of Fish and Game, Sacramento, California.** **Girman, D. and J. C. Garza. 2006. Population Structure**

		and Ancestry of O. mykiss populations in South-Central California Based on Genetic Analysis of Microsatellite Data. Final Report for California Department of Fish and Game Project No. P0350021 and Pacific State Marine Fisheries Contract No. AWIP-S-1. **Boughton, *et al.* 2006. Steelhead of the South-Central/Southern California Coast: Population Characterization for Recovery Planning NOAA-TM-NMFS-SWFSC-394** **Boughton, D. A. and M. Goslin. 2006. Potential Steelhead Over-Summering Habitat in the South-Central/Southern California Coast Recovery Domain: Maps Based on the Envelope Method NOAA-TM-NMFS-SWFSC-391** **Boughton, *et al.* 2005. Contraction of the Southern Range Limit for Anadromous Oncorhynchus mykiss. NOAA-TM-NMFS-SWFSC-380** **Helmbrecht, S and D. A. Boughton. 2005. Recent Efforts to Monitor Anadromous Oncorhynchus Species in the California Coastal Region: A Complication of Metadata NOAA-TM-NMFS-SWFSC-381** **Good, T. P., R. S. Waples, and P. Adams (eds.) 2005. Updated Status of Federally Listed EUS of West Coast Salmon and Steelhead. NOAA-TM-NWFSC-66.** **Busby, P. J. T. C. Wainwright, G. J. Bryant, L. Liereimer, R. S. Waples, F. W. Waknitz, and I. V. Lagomarsino. 1996. Status Review of West Coast Steelhead from Washington, Idaho, Oregon, and California. NOAA-TM-NWFSC-27.**

1.4.5 Species' Recovery Priority Number at start of 5-year review

NOAA Fisheries issued guidelines in 1990 (55 FR 24296) for assigning listing and recovery priorities. Three criteria are assessed 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. The recovery priority number for this DPS, as reported in the *2008-20010 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), is* listed in Table 4 below.

Planning Domain which extends from the Pajaro River in the north to the Tijuana River in the south.

2.2 Recovery Criteria

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

ESU/DPS Name	YES	NO
South-Central California Coast Steelhead DPS		X

A co-manager draft recovery plan has been prepared for the South-Central California Coast Steelhead DPS. The draft recovery plan contains objective and measurable recovery criteria for both individual populations and the DPS as a whole, based upon the viability criteria developed by the SWFSC and the recovery strategy developed by the Southwest Region (Boughton et al. 2007). These criteria specify a minimum number of populations distributed through five distinctive biogeographic population groups within the DPS each of which must exhibit a suite of biological characteristics, including minimum annual run-size, life-history diversity, persistence through long-term oceanic conditions, population density, and an anadromous fraction.

2.2.2 Adequacy of recovery criteria.

2.2.2.1 Do the recovery criteria reflect the best available and most up-to date information on the biology of the species and its habitat?

ESU/DPS Name	YES	NO
South-Central California Coast Steelhead DPS	X	

The recovery in the co-manager draft recovery plan reflect the best available and most up-to-date information on the biology of the species and are based upon the viability criteria developed by the SWFSC. The draft recovery plan has undergone independent scientific peer and co-manager review.

2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria?

ESU/DPS Name	YES	NO
South-Central California Coast Steelhead DPS	X	

The draft recovery plan includes recovery criteria that address identified threats to key populations and the species as a whole. The identified threats include those factors considered responsible for the species decline and its listing.

2.2.3 List the recovery criteria as they appear in any final or interim recovery plan, and discuss how each criterion has or has not been met, citing information

The draft recovery plan contains objective and measurable recovery criteria based upon the viability criteria developed by the SWFSC and the recovery strategy developed by the Southwest Region.

Population-Level Criteria

Mean Annual Run Size – Each core population within each of the five biogeographic regions must meet the mean annual run size; in some cases the population may be comprised of two or more closely interacting watersheds. This numeric criterion is subject to modification pending further research and may vary for individual populations.

Ocean Conditions –Each core population within each of the five biogeographic regions must meet the mean annual run size during variable oceanic conditions over at least 6 decades; in some cases the population may be comprised of two or more closely interacting watersheds

Population Density - Each core population within each of the five biogeographic regions must meet the density criteria (currently unspecified pending further research); in some cases the population may be comprised of two or more closely interacting watersheds.

Anadromous Fraction - Each core population within each of the five biogeographic regions must be comprised of 100% anadromous fish. In some cases the population may be comprised of two or more closely interacting watersheds. This numeric criterion is subject to modification pending further research.

DPS-Level Criteria

Biogeographic Diversity – A minimum number of viable populations must be distributed through each of the five biogeographic population groups and these viable populations must inhabit watersheds with drought refugia and be separated a minimum of 68 km to the maximum extent possible. The draft recovery plan identifies a minimum suite of core populations within each biographic group, including those portions of the watersheds which contain drought refugia.

Life-History Diversity – The viable populations within each biogeographic populations group must exhibit the three principal steelhead life-history types (fluvial-anadromous, lagoon-anadromous, and freshwater resident). The draft recovery plan identifies a suite of core populations in each biogeographic population group with habitats hving the intrinsic potential to support the three principal life-history types.

2.3 Updated Information and Current Species Status

2.3.1 Analysis of Viable Salmonid Population (VSP) Criteria

There is little new evidence to suggest that the status of the South-Central California Steelhead DPS has changed appreciably since the last status review was completed (Good et al. 2005). New information available on anadromous runs since the 2005 review remains limited and does not appear to suggest a change in extinction risk. The following provides a summary of the run size information available from those few watersheds where monitoring has occurred (Williams et al. 2011):

Carmel River

Steelhead have been counted at the San Clemente Dam fish ladder on the Carmel River since the early 1990s when the run size rebounded following changes in water-management practices, the end of a regional drought, and the improvement of ocean conditions in the late 1990s. Since a peak around the turn of the millennium, the number of adult steelhead migrating through the fish ladder appears to have undergone a steady decline (Figure 2). Fisheries staff from the Monterey Peninsula Water Management District (MPWMD) consider the apparent decline to be partly due to mortality from various sources, and partly due to increased numbers of fish spawning before they reach the fish ladder in response to improved habitat conditions downstream of the dam. If spawning is occurring downstream of the dam, the decline in run size is less steep than the decline in fish numbers at the ladder indicate (Williams et al. 2011).

Staff have periodically surveyed occurrence of redds and adults in the mainstem between the ladder and the ocean. The most extensive observations were made in the spring of 2007 and 2008 when one survey was conducted per year of the mainstem only. These data certainly show substantial numbers of fish spawn below the dam and are omitted from the ladder-counts. To calibrate these findings, we draw on information from Gallagher and Gallagher (2005), who conducted extensive redd surveys in Mendocino County streams and estimated redd-detection rates to be 0.67 – 0.75 per person-redd encounter, and redds per female to be 1.93 – 3.46. Assuming that similar rates apply to the surveys in the Carmel River, and that the sex ratio of the run is 1:1 (both of these assumptions are at best only approximately correct), the redd data imply that somewhere between 162 and 324 migrants spawned in the lower mainstem in 2007, and somewhere between 104 and 208 spawned there in 2008. For comparison the ladder counts of those two years are 222 and 412 adults, respectively, suggesting that about 20% to 60% of adults spawned below the ladder (Williams et al. 2011).

Figure 2. Anadromous adult steelhead observed in the Santa Carmel System. Open symbols: recent steelhead counts at the San Clemente Dam fish ladder at river mile 18.6 of the Carmel River. Gray symbols: high and low estimates of the number of steelhead spawning downstream of the San Clemente Dam (Williams et al. 2011).

San Luis Obispo Creek

Alley and Steiner (2008) electrofished a stratified-random sample of pools from the San Luis Obispo Creek system in June 2007. Although the intent of the sampling was to estimate juvenile abundance and distribution of habitat quality, Alley and Steiner (2008) also observed three adult steelhead in their sample, over summering in freshwater pools (over summering of adults steelhead in freshwater was widely reported in the summer of 2007, a very dry year, presumably with restricted opportunities for migration). These data indicate a run of at least 3 anadromous fish for at least one year, but a time-series of steelhead runs is not yet available.

Discussion

The picture which emerges from these data are the presence of relatively small or very small runs of anadromous fish across a limited but diverse set of currently monitored basins in the DPS. Unusually strong runs occurred in the year 2008, possibly because it occurred two years after a long wet spring that presumably gave smolts ample opportunity to migrate to the ocean late in the spring. Use of the term "strong" here is very relative and only appropriate within the context of this recovery domain since elsewhere such small runs would be considered quite weak. Some

of the strength of the 2008 season may also be an artifact of conditions that year. Low rainfall appears to have caused many spawners to get trapped in freshwater where they were observed during the summer and it probably improved conditions for viewing fish during snorkel surveys, and for trapping fish in weirs (Williams et al. 2011).

How such small runs of anadromous fish (single digits) persist, even over the short term (1 decade) is not clear, but they could be maintained either by strays from some source population located elsewhere and/or from the consistent production of smolts by the local population of freshwater non-anadromous *O. mykiss*. Genetic assignment tests can be used to assess the likelihood that anadromous fish are strays from other basins. Of the 16 anadromous fish captured in the Santa Ynez River system in 2008, data from tissue samples assigned 6 (38%) to origins outside the basin, and 10 to origins within the basin (T. Robinson, personal communication). The broader-scale study of Clemento *et al.* (2009) tended to indicate that populations in different basins are linked by frequent straying, although "frequent" should be understood here in a genetic sense rather than a demographic sense: frequent enough so that family structure dominated the genetic distinctions among basins. There is also anecdotal evidence that freshwater resident populations of *O. mykiss* can produce smolts (reviewed in previous status reviews and TRT reports). Size and growth rate may provide valuable information as to whether the anadromous or freshwater-resident strategy would provide greater reproductive potential. If this model is generally applicable, then fish with this plastic strategy should generally outcompete either a purely resident or purely anadromous strategy over the long term. However, conditions particular to a given basin and time period may select for a pure strategy in the short term. One would expect that if such a situation persisted long enough, the ability to express the plastic strategy would become vestigial. This has yet to be empirically demonstrated in *O. mykiss* (Williams *et al.* 2011).

2.3.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

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

Steelhead in this DPS have declined in large part as a result of agriculture, mining, and urbanization activities that have resulted in the loss, degradation, simplification, and fragmentation of habitat (Hunt & Associates 2008).

Water storage, withdrawal, conveyance, and diversions for agriculture, flood control, domestic, and hydropower purposes have greatly reduced or eliminated historically accessible habitat. Modification of natural flow regimes by dams and other water control structures have resulted in increased water temperatures, changes in fish community structures, depleted flow necessary for migration, spawning, rearing, flushing of sediments from spawning gravels, and reduced gravel recruitment. The substantial increase of impermeable surfaces as a result of urbanization (including roads) has also altered the natural flow regimes of rivers and streams, particularly in the lower reaches.

Land-use activities associated with urban development, mining, agriculture, ranching, and recreation have significantly altered steelhead habitat quantity and quality. Associated impacts of these activities include: alteration of stream bank and channel morphology; alteration of ambient stream water temperatures; degradation of water quality; elimination of spawning and rearing habitats; fragmentation of available habitats; elimination of downstream recruitment of spawning gravels and large woody debris; removal of riparian vegetation resulting in increased stream bank erosion; and increased sedimentation input into spawning and rearing areas resulting in the loss of channel complexity, pool habitat, suitable gravel substrate, and large woody debris.

A significant percentage of estuarine habitats have been lost, particularly in the northern and southern portions of the DPS where the majority of the wetland habitat historically occurred. The condition of these remaining wetland habitats is largely degraded, with many wetland areas at continued risk of loss or further degradation. Although many historically harmful practices have been halted, much of the historical damage remains to be addressed and the necessary restoration activities will likely require decades. Many of these threats are associated with the larger river systems such as the Pajaro, Salinas, Carmel Rivers and Arroyo Grande, and many also apply to the smaller coastal systems such as Morro, San Luis Obispo, and Pismo Creeks (NMFS 2011).

Overall, these threats have remained essentially unchanged for the DPS as a whole since the last status review (Good et al. 2005) though some individual, site specific threats have been reduced or eliminated as a result of conservation actions such as the removal of small fish passage barriers.

2.3.2.2 Overutilization for commercial, recreational, scientific, or educational purposes

Steelhead populations traditionally supported an important recreational fishery throughout their range and likely increased the mortality of adults and juveniles. Although such impacts may have contributed to the decline of some naturally small populations, it is not considered to be a principal cause for the decline of this DPS or the species overall. During periods of decreased habitat availability (*e.g.*, drought conditions or summer low flow when fish are concentrated in freshwater habitats); however, the impacts of recreational fishing or harassment on native anadromous stocks can increase (NMFS 2011).

Although steelhead in this DPS are listed as threatened, some recreational angling for *O. mykiss* continues to be allowed in all coastal drainages in its range and also continues to occur in areas above currently impassible barriers. Angling for both adults and juveniles in those portions of coastal rivers and streams accessible to anadromous fish has been restricted through modification of the CDFG's angling regulations (*i.e.*, angling only below the first crossing about the estuary, limited to three days a week, with artificial, single barbless hooks, and catch and release); however, no Fishery Management and Evaluation Plan has been approved by NMFS and the fisheries are not currently authorized under the ESA.

Ocean harvest of steelhead is extremely rare and is considered an insignificant source of mortality for this DPS since both sport and commercial harvest of steelhead in the ocean is prohibited by CDFG (California Department of Fish and Game 2010). Incidental harvest of

steelhead in high seas driftnet fisheries in the past may have caused limited impacts in some local areas, but steelhead are not targeted in commercial fisheries and reports of incidental catches are rare.

While insufficient data exists to estimate exploitation rates for steelhead in this DPS, these rates are likely relatively low given California's statewide prohibition of natural-origin steelhead retention since 1998. Fishing effort estimates based on angler self-report cards are available for 1993–2005 which suggest extremely low levels of effort in this DPS over this period (Figure 5). Although fishing effort estimates for more recent years are not available, there has been no change in the fishing opportunity during this time. In summary, while no direct information is available regarding the level of recreational fishery impacts on this DPS since 2005, it is reasonable to conclude that the level of impact has not appreciably changed since 2005(Good et al. 2005).

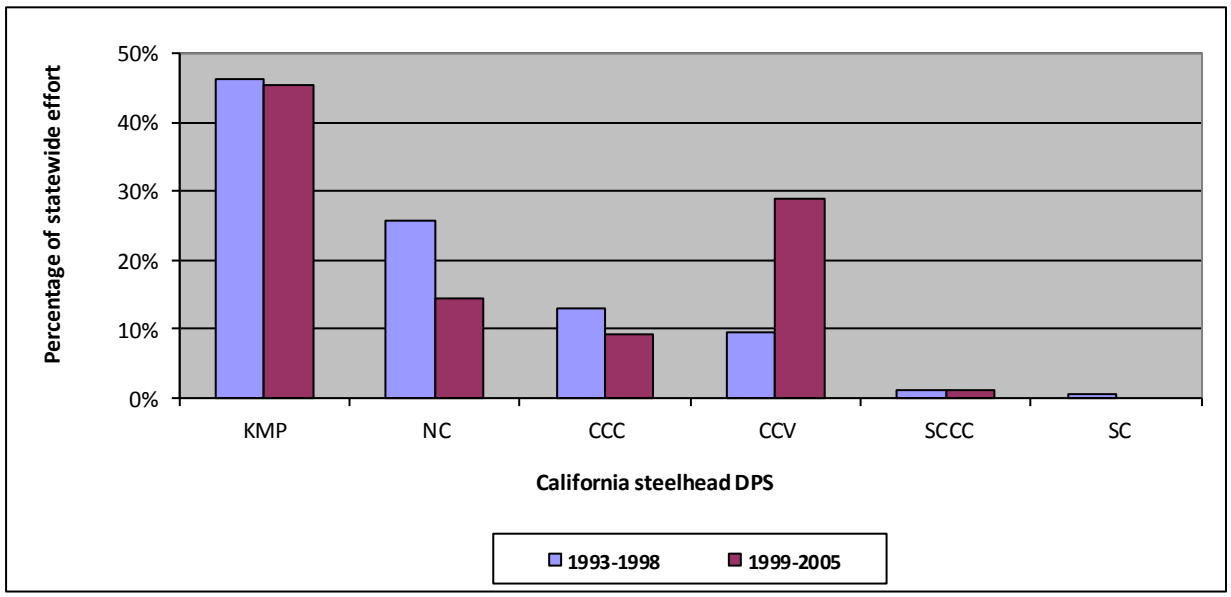

Figure 5. Distribution of California statewide steelhead fishing effort by DPS for years 1993–1998 and 1999–2005 (Jackson 2007).

2.3.2.3 Disease or predation

Infectious disease is one of many factors that can influence adult and juvenile steelhead survival. Specific diseases such as bacterial kidney disease, Ceratomyxosis, Columnaris, Furunculosis, infectious hematopoietic necrosis, redmouth and black spot disease, Erythrocytic Inclusion Body Syndrome, and whirling disease among others are present and are known to affect steelhead and salmon. Very little current or historical information exists to quantify changes in infection levels and mortality rates attributable to these diseases for steelhead. Warm water temperatures, in some cases can contribute to the spread of infectious diseases. However, studies have shown that native fish tend to be less susceptible to pathogens than hatchery cultured and reared fish (Buchanon *et al*. 1983).

Introductions of non-native aquatic species (including fishes and amphibians) and habitat modifications (*e.g.*, reservoirs, altered flow regimes, *etc*.) have resulted in increased predator populations in numerous river systems, thereby increasing the level of predation experienced by native salmonids (Busby *et al.* 1996). Non-native species, particularly fishes and amphibians such as large and smallmouth basses and bullfrogs have been introduced and spread widely. These species can prey upon rearing juvenile steelhead (and their conspecific resident forms), compete for living space, cover, and food, and act as vectors for non-native diseases. Artificially induced summer low-flow conditions may also benefit non-native species, exacerbate spread of diseases, and permit increased avian predation.

In previous reviews, NMFS did not conclude that disease and predation were significant factors responsible for the decline of steelhead in this DPS. However, small populations of steelhead such as those found in this DPS may be more vulnerable to the effects of disease and/or predation particularly in combination with the synergistic effects of other threats. In addition, the effects of disease or predation may be heightened under conditions of periodic low flows or high temperatures which are characteristic of watersheds in this DPS.

Overall, these threats have remained essentially unchanged for the DPS as a whole since the last status review (Good et al. 2005) though some individual, site specific threats may have been reduced or eliminated as a result of conservation actions such as the restoration of flows or riparian habitats which influence water temperature.

2.3.2.4 Inadequacy of existing regulatory mechanisms

At the time of listing in 1997, several Federal regulatory and planning mechanisms were identified as having potential adverse effects on steelhead populations and their habitat within this DPS. These included: 1) land management practices within the Los Padres National Forest; 2) the regulation of dredging and the placement of fill within the waters of the United States by the U.S. Army Corps of Engineers (USACE) through the Clean Water Act (CWA) Section 404 Program; 3) the regulation of dredging and the placement of fill within the waters of the United States through the CWA section 401 water quality certification regulations; 4) the Federal Emergency Management Agency (FEMA) administration of a Flood Insurance Program which strongly influences the development in waterways and floodplains; and 5) inadequate implementation of the CWA sections 303(d)(1)(C) and (D) to protect beneficial uses associated with aquatic habitats, including fishery resources, particularly with respect to non-point sources of pollution (including increased sedimentation from routine maintenance and emergency flood control activities within the active channel and floodplain).

For example, the USACE's program is implemented through the issuance of a variety of Individual, Nationwide and Emergency permits. Permitted activities should not "cause or contribute to significant degradation of the waters of the United States." A variety of factors, including inadequate staffing, training, and in some cases regulatory limitations on land uses (e.g., agricultural activities) and policy direction, have resulted in the ineffective protection of aquatic habitats important to migrating, spawning, or rearing steelhead. The deficiencies of the current program are particularly acute during large-scale flooding events, such as those

associated with El Niño conditions, which can put additional strain on the administration of the CWA Section 404 and 401 programs.

Similarly, the National Flood Insurance Program regulations allow for development in the margins of active waterways if they are protected against 100-year flood events, and do not raise the water elevations within the active channel (floodway) more than one foot during such flood events. This standard does not adequately reflect the dynamic, mobile nature of watercourses in southern California, and the critical role that margins of active waterways (riparian areas) play in the maintenance of aquatic habitats. In addition, FEMA programs for repairing flood related damages (Public Assistance Program, Individual and Households Program, and Hazard Mitigation Grant Program) promote the replacement of damaged facilities and structures in their original locations which are prone to repeated damage from future flooding, and thus lead to repeated disturbance of riparian and aquatic habitats important to migrating, spawning, or rearing steelhead.

At the time of listing, several non-Federal regulatory and planning mechanisms were identified as having potential adverse effects on steelhead populations and their habitat within this DPS. These included: 1) administration of the California State Water Resources Control Board (SWRCB) water rights permitting system which controls utilization of waters for beneficial uses throughout the state; 2) state and local government permitting programs for land uses on non-Federal and non-state owned lands; 3) administration of the Fish and Game Code Section 1600 (Streambed Alteration Agreements) program; and 4) the lack of a State-wide coastal anadromous fish monitoring plan for California that would inform regulatory actions such as angling restrictions.

For example, the SWRCB water rights permitting system contains provisions (including public trust provisions) for the protection of instream aquatic resources. However, the system does not provide an explicit regulatory mechanism to implement the CDFG Code Section 5937 requirement for the owner or operator of a dam to protect fish populations below impoundments. Additionally, SWRCB generally lacks the oversight and regulatory authority over groundwater development comparable to surface water developments for out-of-stream beneficial uses.

The Section 1600 Lake or Streambed Alteration Agreements program is the principal mechanism through which the CDFG provides protection of riparian and aquatic habitats. Inadequate funding, staffing levels, training and administrative support have led to inconsistent implementation of this program, resulting in inadequate protection of riparian and aquatic habitats important to migrating, spawning and rearing steelhead.

Additionally, there is a lack of local or regional public institutions specifically dedicated to promote steelhead recovery planning and implementation within the geographic range of this DPS. Only the Tri-Counties Fish Team (which deals with the Counties of Ventura, Santa Barbara, and San Luis Obispo) currently exists to promote funding and implementation of steelhead recovery actions in a specific geographic area. Elsewhere within the range of this DPS, conservation of steelhead is only the focus of individuals, groups, or agencies with broader responsibilities or interests.

Finally, monitoring of steelhead populations (particularly annual run-sizes) is essential for assessing the current and future status of this DPS, as well as collecting basic ecological information about the species. Unfortunately, the State's coast-wide anadromous fish monitoring plan remains unfinished and funding for its implementation has not been identified or secured.

These regulatory mechanisms have not been fundamentally changed since the last status review (Good et al. 2005) and as a consequence the threats to steelhead and its habitat from inadequate regulatory mechanisms are largely unchanged.

2.3.2.5 Other natural or manmade factors affecting its continued existence

At the time of listing, two specific threats to steelhead were identified under this factor: 1) environmental variability, including projected long-term climate change, and 2) stocking programs. Similar to the other listing factors, these threats continue to persist and recent information about environmental variability, including the effects of ocean conditions on the survival of salmonid populations and increases in wildfire occurrence and severity, indicate that the threat from "environmental variability" can be expected to increase.

Environmental Variability

Variability in natural environmental conditions has both masked and exacerbated the problems associated with degraded and altered riverine and estuarine habitats. Floods and persistent drought conditions have periodically reduced naturally limited spawning, rearing, and migration habitats. Furthermore, El Nino events and periods of unfavorable ocean-climate conditions can threaten the survival of steelhead populations already reduced to low abundance levels due to the loss and degradation of freshwater and estuarine habitats. However, periods of favorable ocean productivity and high marine survival can temporarily offset poor habitat conditions elsewhere and result in dramatic increases in population abundance and productivity by increasing the size and correlated fecundity of returning adults (NMFS 2011).

Overall, this threat has remained essentially unchanged since the last status review (Good et al. 2005), though the threats posed by environmental variability (from projected climate change) are likely to exacerbate this effects of this factor on steelhead and its habitat in the future.

Stocking Program

There are no steelhead hatcheries operating in or supplying hatchery reared steelhead for stocking into streams within the range of this DPS. However, there is an extensive stocking program of hatchery cultured and reared, non-anadromous *O. mykiss* which supports a "put-and-take" fishery that is stocked for removal by anglers. These stockings are now generally conducted in non-anadromous waters although other non-native game species such as large and smallmouth bass and bullhead catfish are stocked into anadromous waters by a variety of public and private entities). Nevertheless, hatchery origin non-anadromous fish may enter anadromous waters as a result of spillage over dams.

While some of these programs have succeeded in providing seasonal fishing opportunities, the impacts of these programs on native, naturally-reproducing steelhead stocks are not well understood. Competition, genetic introgression and disease transmission resulting from hatchery introductions may significantly reduce the production and survival of native, naturally-reproducing steelhead (Araki *et al.* 2007, 2008, 2009). However, genetic investigations of southern California steelhead have not detected any substantial interbreeding of native steelhead with hatchery reared *O. mykiss* (Girman and Garza 2006, Garza and Clemento 2007, Clemento et al. 2009; see also, Christie, et al. 2011, Abadia-Cardoso et al. 2011). These stockings are now generally carried out in non-anadromous waters, though fish in some cases may escape into anadromous waters. Collection of native steelhead for hatchery broodstock purposes can harm small or dwindling natural populations. Artificial propagation can also, in some situations, play an important role in steelhead recovery through, among other means, preservation of individuals representing genetic resources which would otherwise be lost as a result of local anthropogenic driven extinctions, but are not a substitute for naturally-reproducing populations.

Overall, threats from stocking have remained essentially unchanged since the last status review (Good et al. 2005).

2.4 Synthesis

There is little new evidence to suggest that the biological status of the South-Central California Coast Steelhead DPS has changed appreciably since the last status review (Good et al. 2005) and Williams et al (2011) conclude the extinction risk of this DPS is essentially unchanged since 2005. Similarly, our review indicates that the listing factors (or threats) identified at the time of listing and reviewed during the last status review also remain largely unchanged. However, increased environmental variability resulting from projected climate change is now recognized as a new and more serious threat to this DPS because it is likely to exacerbate those factors currently and contributing to its threatened status.

While the status of steelhead populations within the DPS has not changed appreciably since the last status review, a number of recovery related activities have been undertaken which may reduce threats in the future and lead to increased abundance of individual populations. Fish passage facilities have been constructed on the Carmel River at the Los Padres Dam with funding from the Carmel River Steelheaders and the CalAm Water Agency. A number of impediments to fish passage caused by road crossings and other instream structures have been eliminated or substantially improved as a result of retrofitting such structures. Funding for these projects was provided through the Pacific Coast Salmon Recovery Fund (PCSRF). Planning for the removal of San Clemente Dam in the Carmel River has advanced and completion is pending final design and permitting. Funding for this project has been provided by the California American Water Agency, California Department of Water Resources, and California Coastal Conservancy. Additionally, NMFS staff in cooperation with the Santa Clara Valley Water District and the CDFG successfully negotiated a water release agreement for Uvas Creek, a major spawning and rearing tributary to the Pajaro River, one of the core watersheds identified in the draft recovery plan for this DPS. NMFS has conducted both formal and informal section 7 consultations throughout the range of this DPS, including a consultation providing for bypass flows and monitoring on the Salinas River, the largest river system within the DPS and a core

watershed identified in the draft recovery plan. Finally, angling regulations for sport fishing have been changed to better protect steelhead in virtually all coastal rivers and streams in this DPS that are accessible to adult steelhead migrating up from the ocean. This recreational fishery is limited to several days a week during the migratory season and is limited to catch-and-release angling. Additionally, the CDFG has curtailed its stocking of hatchery-reared trout, limiting stockings to reservoirs or stream reaches above impassible barriers.

In summary, the best available information on the biological status of the South-Central California Coast Steelhead DPS and the factors (threats) responsible for its decline indicate that it continues to be a threatened species.

3.0 RESULTS

3.1 Recommended Classification

Based upon a review of the best the available information, we recommend that the South-Central California Coast steelhead DPS remain classified as a threatened species. Similarly, we do not recommend any changes to the geographic boundary of this DPS at this time. The SWFSC has convened a Biological Review Team to evaluate all new genetic information for this and the other coastal steelhead DPSs in California. The SWFSC will provide the Region with an analysis of this and other information which will be subsequently evaluated by the Region to determine whether any steelhead DPS boundary changes are warranted.

3.2 New Recovery Priority Number

No change is recommended in the recovery priority number for this DPS.

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

We recommend the following future actions be implemented to promote conservation of the Southern California Coast steelhead DPS:

(1) Finalize the South-Central California Steelhead Recovery Plan
(2) Finalize the Coast-Wide Salmonid Monitoring Plan for California
(3) Initiate the research and monitoring plan identified in the draft South-Central California Steelhead Recovery Plan. Important research topics that should be addressed include:

a. Ecological factors that promote anadromy
b. Reliability of migration corridors
c. Steelhead-Promoting nursery habitats
d. Comparative evaluation of seasonal lagoons
e. Potential nursery role of mainstem habitats
f. Potential positive spawner density as an indicator of viability
g. Roles of intermittent creeks
h. Population structure
i. Partial migration and life history crossovers

j. Rates of dispersal between watersheds
k. Revision of population viability targets

(4) Regarding the population viability and delisting criteria for this DPS, it is essential to investigate further the life-history of the species, including utilization of estuarine habitat, juvenile growth and smolting patterns, distribution of residualized populations above artificial impassable barriers, and the relationship between putative resident and migratory forms of steelhead.
(5) High priority recovery actions identified in the South-Central California Steelhead Recovery Plan should be implemented including.

- Identification and removal of fish passage barriers in all core population watersheds.
    - Complete planning and permitting for the removal of San Clemente Dam on the Carmel River.

- Provide ecological meaningful flows below dams and diversions in all core population watersheds.
    - Re-establish adequate flow regimes for the Pajaro, Salinas, Nacimiento, and Carmel Rivers.

- Further investigate potential recovery actions in watershed south of San Simeon, particularly Pismo, San Luis Obispo, and Arroyo Grande Creeks.

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NATIONAL MARINE FISHERIES SERVICE
5-YEAR REVIEW
South-Central/Southern California Coast Steelhead Recovery Domain
South-Central California Coast Steelhead DPS

Current Classification: Threatened

Recommendation resulting from the 5-Year Review: Retain current ESA classification as endangered and current DPS boundary.

REGIONAL OFFICE APPROVAL:

Lead Regional Administrator, NOAA Fisheries

Approve[signature] For Rodney McInnis Date: 11 NOV 2011

Cooperating Regional Administrator, NOAA Fisheries

_____Concur _____ Do Not Concur

Signature_____ Date_____

HEADQUARTERS APPROVAL:

Assistant Administrator, NOAA Fisheries

__C__Concur _____ Do Not Concur

Signature[signature] Date 11/28/11