

First record of endangered southern California steelhead (*Oncorhynchus mykiss*) in Conejo Creek, Ventura County, California

TIM E. HOVEY* AND JOHN W. O'BRIEN

California Department of Fish and Wildlife, 21729 Canyon Heights Circle, Santa Clarita, CA 91390, USA (TEH)

California Department of Fish and Wildlife, 4665 Lampson Ave, Suite C, Los Alamitos, CA 90720, USA (JWO)

*Correspondent: Tim.Hovey@wildlife.ca.gov

Key words: Calleguas Creek, Conejo Creek, distinct population segment, endangered species, *Oncorhynchus mykiss*, southern California steelhead, Ventura County

Southern California steelhead (*Oncorhynchus mykiss*), referred to as southern steelhead, historically occurred from Santa Maria River, Santa Barbara County, to Santo Domingo River in northern Baja California. Major streams within this geographic region (Santa Ynez River, Ventura River, Santa Clara River, Malibu Creek, Arroyo Trabuco Creek, Santa Margarita River, and San Mateo Creek) supported runs of southern steelhead in the beginning of the twentieth century (Titus et al. 2010). Steelhead sightings dropped off in the 1940s and 1950s, and consistent abundance of trout has not been present in the southern portion of their range in the last 60 years (USFWS 1995, Titus et al. 2010, Capelli 2011). The decline in quality steelhead habitat, and the overall absence of steelhead in southern California, prompted the National Marine Fisheries Service (NMFS) to list southern California's Distinct Population Segment (DPS) of steelhead as endangered from the Santa Maria River south to the Malibu Coast in 1997 (Federal Register 62 FR 43937). In 2001, the range of the listing was extended to include all of the watersheds south to the Tijuana River at the U.S.-Mexico Border (Federal Register 67 FR 2002); this listing was reconfirmed in 2005 (Federal Register 70 FR 37204).

Southern steelhead are highly adaptable, able to survive in variable habitat conditions, and withstand higher stream temperatures and lower dissolved oxygen concentrations than their northern counterparts (USFWS 1995, Hovey 2004, Boughton et al. 2007, Spina 2007, Sloat and Osterback 2013). Despite this plasticity, steelhead populations have been greatly diminished in the Southern California Steelhead (SCS) DPS.

On 26 April 2013, while collecting flow rate data in Conejo Creek, Ventura County, California, we observed and collected a dead adult southern steelhead (Figure 1). The fish was observed at 34° 12' 30" N, 118° 59' 43" W, approximately 100 meters below the



Figure 1.—An adult, female southern California steelhead (*Oncorhynchus mykiss*) discovered in Conejo Creek, Ventura County, California, 26 April 2013. Photograph by T. E. Hovey.

Highway 101 freeway overpass, and was collected at 1045. The air temperature and water temperatures at time of collection were 25° C and 19° C, respectively. The steelhead was 57.5 cm total length and weighed 1.66 kg. A small ventral incision was made after collection and the fish was determined to be a female. A small sample of hydrated eggs was collected and preserved in 90% ETOH. Tissue was excised (1 cm x 1 cm) from the upper lobe of the caudal fin for genetic analysis, cut into two equal halves, and preserved dry on filter paper. Scales were collected from the dorsal area mid-body and stored in a dry, empty vial. Scaled photographs were taken of the specimen shortly after collection. After data processing, the steelhead was put on ice and transported to the regional office of the California Department of Fish and Wildlife (CDFW), Los Alamitos, for storage.

Based on carcass characteristics, it was our professional judgment that the fish had been dead ≤ 2 days. The gills were still red and blood filled, and body coloration at time of collection indicated that the fish had expired only recently. No external injuries were observed.

A cursory upstream and downstream search on the day of discovery revealed marginal spawning habitat a short distance upstream, but no other steelhead were observed. An additional focused survey was conducted by CDFW staff on 3 June 2013. Field assessment began downstream at the confluence of Calleguas and Conejo creeks (34° 10' 46" N, 119° 02' 22" W), and continued upstream on Conejo Creek to the 101 Highway overpass (34° 12' 32" N, 118° 59' 39" W). Suitable holding habitat for steelhead was discovered on Conejo Creek, and additional spawning habitat was observed near the area from which the specimen had been obtained. No additional steelhead were observed.

Conejo Creek is a tributary to Calleguas Creek, and discharges to the Pacific Ocean through Mugu Lagoon. Calleguas Creek extends upstream approximately 10.9 km to the

confluence with Conejo Creek. We discovered the carcass of the steelhead approximately 4.3 km upstream of that confluence. The creek continues upstream, and terminates in the foothills above Thousand Oaks, Ventura County, California. Conejo Creek winds through agricultural fields, and receives consistent flow from field water runoff and waste-water treatment plants. Without this artificial flow, the lower portions of the drainage would be dry part of the year.

Regular steelhead runs have been reported in recent decades north and south of the discovery area, and occasional sightings of individual adult and smolt steelhead in coastal drainages within the SCS DPS previously have been reported from San Mateo Creek (Hovey 2004), San Luis Rey River (Kajtaniak 2007), San Juan Creek (O'Brien 2007), Santa Margarita River (Dickinson 2009), Santa Clara River (Southwick 2006, Howard 2009), and the Ventura River (Capelli 2007). A comprehensive overview of the status and distribution of southern California freshwater fishes (Swift et al. 1993) listed drainages north and south of Calleguas Creek as historically supporting steelhead trout. However, no mention is made of steelhead being observed previously in Calleguas or Conejo creeks. To the best of our knowledge, this is the first documented presence of southern steelhead trout in this drainage.

The area of the discovery is heavily developed with agricultural fields and vast residential areas, and associated flood control facilities. Historical records indicate that Conejo Creek did not maintain a defined channel on the lower Oxnard Plain, and did not regularly discharge directly to the Pacific Ocean; flows were naturally dispersed onto the Oxnard Plain and either percolated into the ground before reaching the ocean, or terminated in a lagoon and distributary channels north of Round Mountain, near the current location of California State University, Channel Islands. Calleguas Creek itself did not maintain a defined channel to Mugu Lagoon across the Oxnard Plain prior to its channelization in the late 19th and early 20th centuries, and was hydrologically connected to the Pacific Ocean on an irregular basis until a series of jetties constructed at the east end of the lagoon created a permanent, year-round opening to the watershed. Although this has been widely recognized by researchers, there is little evidence establishing the exact date of the aforementioned channelization; the date most often suggested is 1884, (Steffen 1982, Onuf 1987, Swanson 1994, Beller 2011). The Calleguas Creek Watershed Management Plan indicates that Calleguas Creek was connected to Conejo Creek by 1889, although no firm evidence is provided (Calleguas Watershed District 2004, 2005).

The marginal steelhead spawning and holding habitat in Conejo Creek is sustained only by manmade flows. The potential for a successful steelhead spawn and fry development is extremely low due to the diverse number of exotic aquatic species (common carp, channel catfish, green sunfish and largemouth bass) that likely would prey on eggs, fry, or smolts. Despite the physical challenges in Conejo Creek, our discovery illustrates the opportunistic and resilient character of southern steelhead.

LITERATURE CITED

- BELLER, E. E., R. M. GROSSINGER, M. N. SALOMON, S. DARK., E. STEIN, B. ORR, P. DOWNS, T. LONGCORE, G. COFFMAN, A. A. WHIPPLE, R. A. ASKEVOLD, B. STANFORD, AND J. BEAGLE. 2011. Historical ecology of the lower Santa Clara River, Ventura River, and Oxnard Plain: an analysis of terrestrial, riverine, and coastal habitats. San Francisco Estuary Institute, Oakland, California, USA.

- BOUGHTON, D. A., M. GIBSON, R. YEDOR, AND E. KELLEY. 2007. Stream temperature and the potential growth and survival of *Oncorhynchus mykiss* in a southern California creek. *Freshwater Biology* 52:1353-1364.
- CALLEGUAS MUNICIPAL WATER DISTRICT. 2004. Calleguas Creek watershed management plan: a cooperative strategy for resource management and protection. Calleguas Municipal Water District, Thousand Oaks, California, USA.
- CALLEGUAS MUNICIPAL WATER DISTRICT. 2005. Calleguas creek watershed management plan: a cooperative strategy for resource management and protection. Integrated regional water management plan. Calleguas Municipal Water District, Thousand Oaks, California, USA.
- CAPELLI, M. H. 2007. Recent Ventura River steelhead (*Oncorhynchus mykiss*) sightings. Memorandum to David Boughton, Chair, Technical Recovery Team South-Central and Southern California Coast Steelhead Recovery Planning Area, Anthony Spina, Southern California Steelhead Team Leader. August 27, 2007. National Marine Fisheries Service, Southwest Region, Santa Barbara, California, USA.
- CAPELLI, M. H. 2011. South-central and southern California coast steelhead recovery planning domain. Five-year review: summary and evaluation of southern California coast steelhead distinct population segment. National Marine Fisheries Service, Southwest Region, Long Beach, California, USA.
- DICKINSON, A., AND M. McVAY. 2009. Steelhead caught late March, Santa Margarita River. 18 April 2009. Unpublished field report submitted to California Department of Fish and Wildlife, Los Alamitos, USA.
- HOVEY, T. E. 2004. Current status of southern steelhead-rainbow trout in San Mateo Creek, California. *California Fish and Game* 90:140-154.
- HOWARD, S. R. 2009. Adult steelhead passes Freeman diversion [Santa Clara River] fish ladder. Letter to Darren Brumback. 5 March 2009. National Marine Fisheries Service, Southwest Region, Long Beach, California, USA.
- KAJTANIAK, D., I. DELGADO, AND K. SNYDER. 2007. Field survey report: steelhead sighting in San Luis Rey River. 2 May 2007. California Department of Fish and Game, South Coast Region, Los Alamitos, USA.
- O'BRIEN, J. 2007. Salmonid sighting in San Juan Creek. Memorandum to D. Maxwell. California Department of Fish and Game, Los Alamitos, USA.
- ONUF, C. P. 1987. The ecology of Mugu Lagoon, California: an estuarine profile. Biological Report 85. Marine Science Institute, University of California, Santa Barbara, USA.
- SLOAT, M. R., AND A-M. K. OSTERBACK. 2013. Maximum stream temperature and the occurrence, abundance, and behavior of steelhead trout (*Oncorhynchus mykiss*) in a southern California Stream. *Canadian Journal of Fisheries and Aquatic Sciences* 70:64-73.
- SOUTHWICK, J. 2006. Freeman diversion [Santa Clara River] trout incident report for 16 May 2006. United Water Conservation District, Santa Paula, California, USA.
- SPINA, A. 2007. Thermal ecology of juvenile steelhead in a warm-water environment. *Environmental Biology of Fishes* 80:23-34.
- STEFFEN, L. J. 1982. Mugu Lagoon and its tributaries: geology and sedimentation. USDA Soil Conservation Service, Davis, California, USA.
- SWANSON, M. T. 1994. From Spanish land grants to World War II: an overview of historic resources at the Naval Air Weapons Station, Point Mugu, California. Statistical

Research Technical Studies, Tucson, Arizona, USA.

- SWIFT, C. C., T. R. HAGLUND, M. RUIZ, AND R. N. FISHER. 1993. The status and distribution of the freshwater fishes of southern California. *Bulletin of the Southern California Academy of Sciences* 92:101-167.
- TITUS R. G., D. C. ERMAN, AND W. M. SNIDER. 2010. History and status of steelhead in California coastal drainages south of San Francisco Bay [draft report]. California Department of Fish and Game, Sacramento, USA.
- U.S. FISH AND WILDLIFE SERVICE. 1995. Santa Margarita River and San Mateo Creek salmonid study. Progress report prepared for Camp Pendleton Marine Corps Base, January–September 1995. Coastal California Fish and Wildlife Office, Arcata, USA.

Received 26 September 2013

Accepted 16 October 2013

Associate Editor was D. Lentz