

APPENDIX F: HABITAT RESTORATION IN THE ARROYO SECO WATERSHED

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Habitat Restoration in the Arroyo Seco Watershed

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Native Fish Focal Species Summaries

Historically, the Arroyo Seco and greater Los Angeles River supported a highly diverse assemblage of freshwater fishes. At least seven fish species originally occurred in the inland freshwaters of the Los Angeles River, including five freshwater residents and two migratory sea-run (anadromous) species. Streams to the north and south of the Los Angeles Basin contained only 2-4 species of fish (Swift et al. 1993). This diversity of fish remained in the Arroyo Seco and Los Angeles River until the 1940's when flood control projects led to the extirpation of most of these species (Van Wormer 1991, Swift 1993).

Currently, the rainbow trout may be the only native fish species that still occurs in the Arroyo Seco. The Arroyo Seco has received stocked rainbow trout of different strains and the current population has a questionable genetic make up. Further investigations are needed to determine if any other native species still occur in the Arroyo Seco. Fortunately, all of the native fish species that historically occurred in the Los Angeles River watershed are represented by populations that could be used in reestablishment efforts on the Arroyo Seco.

Coastal Rainbow Trout (*Oncorhynchus mykiss*) /Southern Steelhead (*O. m. irideus*)

Rainbow Trout (*Oncorhynchus mykiss*)

Rainbow trout exist in the upper Arroyo Seco and were observed upstream of the Brown Canyon Debris Dam to the Lower Switzer Campground in the Fall of 2000 (pers. obs. Stoecker). Rainbow trout were also observed in the lowest 200 feet and 50 feet of the Bear Canyon and Little Bear Canyon Creek tributaries respectively (pers. obs. Stoecker 2000). The current genetic makeup of the rainbow trout population in the Arroyo Seco is not well understood, but has certainly been influenced by the planting of rainbow trout strains from different origins. It is not known if any of the native strain rainbow trout still exist in the Arroyo Seco or its tributaries.

Several age classes of rainbow trout, including young-of-the-year, were observed in the upper Arroyo Seco and natural reproduction is occurring. Upstream of the Long Canyon tributary, rainbow trout were observed in moderate to high numbers and appeared in good health with individuals up to 13 inches in length. All rainbow trout observed had adipose fins present (pers. obs. Stoecker 2000). Adipose fins are often removed from hatchery reared/stocked trout, but are present on naturally reared individuals.

Higher elevation species requirements- Focal species: rainbow trout (Upstream of JPL)

Summer/fall water temperatures- below 75-80F

Summer/fall water column DO levels- over 6.0 mg/l

Winter/spring intragravel DO levels- over 7.2 mg/l

Spawning Gravel Size (inch diameter)- 0.2"- 5.0"

Sand/Silt associated with spawning gravels- optimal below 5%

Suspended sediment concentration- below 3,000 ppm

Food items- Mayfly, Caddisfly, Stonefly, Ants, Beetle, Damselfly, Dragonfly, smaller fish species

Favorable Habitat Conditions- Deep pools, riffles, cool, clean, oxygen-saturated water, instream cover, clean permeable gravel, woody debris, boulders

Steelhead (*O. m. irideus*)

The steelhead is an anadromous form of the rainbow trout and is often taxonomically classified as the subspecies *O. m. irideus*. Steelhead entering streams south of, and including, the Santa Maria River (San Luis Obispo and Santa Barbara Counties) are recognized by the National Marine Fisheries Service (NMFS) as a Evolutionary Significant Unit (ESU) and commonly referred to as southern steelhead. Currently, NMFS does not acknowledge the Los Angeles River and many other southern California streams as part of this designation. The southern steelhead is federally listed as an endangered species and has experienced the most dramatic declines of any ESU in California.

Steelhead historically utilized the Arroyo Seco River and documentation of a 25-inch long adult steelhead caught in the Los Angeles River near Glendale in January 1940 (Leonard G. Hogue) proves their presence in the watershed (Swift et al. 1993) prior to downstream flood control projects and construction of migration barriers. While anadromous steelhead can no longer return to the Arroyo Seco River it has been observed that individuals from the existing rainbow trout population migrate downstream in the Arroyo Seco during typical steelhead outmigration times. It is unknown if any of these individuals ever enter the ocean alive, become steelhead, and/or attempt to return to the Los Angeles River or other coastal streams. Steelhead continue to survive in several streams just to the north, including several drainages of the Santa Monica Mountains and the Santa Clara River. Steelhead are also documented in San Mateo Creek (San Diego County) and likely return to other historically occupied watersheds to the south.

Watershed Connectivity Requirements- Focal subspecies steelhead (Pacific Ocean upstream to lowest Switzer Falls)

Migration Barrier/Impediment Jump Height- less than 8 feet
Minimum Jump Depth (downstream pool at structure)- 1.25 X Jump Height
Water Velocity (except during peak flows)- below 10-13 cfs
Water Depth During upstream migration- over 7 inches
Streambed- Fairly naturalized, heterogeneous

Unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*)

This species was described by Culver and Hubbs (1917) as “one of the most abundant fishes in the lowlands of the Los Angeles Basin (Swift et al. 1993). The stickleback is thought to have been extirpated from the watershed in the 1940’s, which coincides with the completion of the large flood control projects in the lowlands (Van Wormer 1991; Swift et al. 1993). Populations of this unique stickleback subspecies currently exist in the upper Santa Clara River and San Antonio Creek to the north. This species is a state and federally listed endangered species. The 1985 USFWS Recovery Plan for the unarmored threespine stickleback calls for reestablishing two viable populations of stickleback in the Los Angeles River Watershed.

Lower Elevation Species Habitat Requirements- Focal species: unarmored threespine stickleback (Los Angeles River confluence upstream to JPL)

Water Temperature- Below 31 C

Dissolved Oxygen- 7.22 ppm “normal for clean, natural streams in southern California” (Feldman, Baskin) 2.0ppm lowest tolerance limit.

Nesting Sites- Areas of gentle flow and near or within aquatic vegetation (filamentous algae).
Nesting velocity 0-.08 m/second

Rearing- Young fish seek cover from predators in aquatic vegetation.

Food items- mayfly nymphs, nematodes, snails, beetles, fly larvae, aphids, leafhoppers, and ostracods

Favorable Habitat Conditions - Mild water velocities, some circulation, and moderate algal cover; Gravel and sand dominated substrate with low amount of cobbles, deposited silt.

Flow- Portions of stream can be dry part of the year

Native Fish Communities and Focal Species

While each native fish species exhibits unique habitat preferences, many of these species co-occur in the same aquatic habitat and have similar requirements. It is well documented on the Santa Clara River to the north that arroyo chub, Santa Ana sucker, and the unarmored threespine stickleback exhibit a sympatric relationship and occur in similar habitat conditions (Baskin 1974). Swift (1993) noted that adequate conditions for unarmored threespine stickleback “would suffice for arroyo chub and Pacific brook lamprey”. It has also been noted that the spawning and rearing habitat requirements of the rainbow trout, steelhead, and Pacific lamprey are also similar (Swift et al. 1993). The Santa Ana speckled dace is known to exist in a variety of habitats and has been observed occurring in habitats used by all of these native fish species.

The fish species of the Arroyo Seco can be divided into two groups associated with different habitat types (higher elevation and lower elevation fish communities). Rainbow trout, speckled dace, and the spawning and rearing stages of the steelhead and Pacific lamprey are associated with the more mountainous, higher elevation stream habitat. The unarmored threespine stickleback, arroyo chub, and Pacific brook lamprey favor the slower water found in the lower elevation aquatic habitat. These communities do overlap and the Santa Ana sucker is especially hard to place in one category as this species is often found in both. The transition between these habitats will likely occur near the Jet Propulsion Laboratory, where the Arroyo Seco emerges from a mountainous canyon onto the flatter alluvial fan upstream of Devils Gate Dam.

The rainbow trout and unarmored threespine stickleback were identified as focal species for the higher elevation and lower elevation fish communities respectively. It is believed that focusing restoration-planning efforts on the known habitat requirements of these two focal species will provide the necessary habitat requirements for the other co-occurring species found in (or between) that habitat type(s).

The steelhead was identified as another focal species to help focus efforts on reestablishing a migration corridor in order to achieve the long-term goal of reestablishing connectivity between the Pacific Ocean and the upper tributaries of the Arroyo Seco. The reestablishment of a

steelhead population to the Arroyo Seco is highly dependant on improving connectivity along the Los Angeles River downstream of the Arroyo Seco and will require additional effort outside the scope of this study.

Related Fish Species

These fish species will also likely benefit from restoration efforts geared towards the Rainbow Trout, Southern Steelhead, and Unarmored Threespine Stickleback.

Pacific lamprey (*Lampetra tridentata*)

This species was collected in the Los Angeles River Watershed in 1925 (Swift et al. 1993) but is now extirpated from the watershed due to migration barriers associated with downstream flood control projects. Pacific lamprey utilized the Arroyo Seco to spawn (Swift et al. 1993). This anadromous species continues to run up Malibu Creek and the Santa Clara River to the north.

Pacific brook lamprey (*Lampreta pacifica*)

This species was collected in the Los Angeles River at Griffith Park in 1930 and is now thought to be extirpated (Swift et al. 1993). It is presumed that this species also utilized the Arroyo Seco. The Pacific brook lamprey still occurs in northern California streams and could be successfully reestablished after habitat conditions are improved.

Santa Ana sucker (*Catostomus santaanae*)

This species was described as “common” in the Arroyo Seco (Culver and Hubbs 1917) and was observed as recently as 1992 upstream of Hansen Dam on Big Tujunga Creek (Los Angeles River tributary). It is likely that the sucker has been extirpated from the Arroyo Seco and it may have disappeared from the entire Los Angeles River Watershed. Populations of Santa Ana sucker still exist in the San Gabriel and Santa Ana Rivers (Swift et al. 1993). This species is federally listed as a threatened species.

Santa Ana speckled dace (*Rhinichthys osculus*)

This dace was observed in the Big Tujunga Creek tributary of the Los Angeles River until the mid-1980s and has not been observed since (Swift et al. 1993). It is not known if this species currently exists in the Arroyo Seco or greater Los Angeles River. Populations still exist in the San Gabriel and Santa Ana Rivers (Swift et al. 1993).

Arroyo chub (*Gila orcutti*)

In a 1917 survey, the arroyo chub was described as “common in the Arroyo Seco” (Culver and Hubbs 1917; Swift et al. 1993). In 1993, Swift noted that this species still occurs in the Big Tujunga and Pacoima tributaries of the Los Angeles River and the Sepulveda Flood Control Basin. It is not known if this species currently exists in the Arroyo Seco.