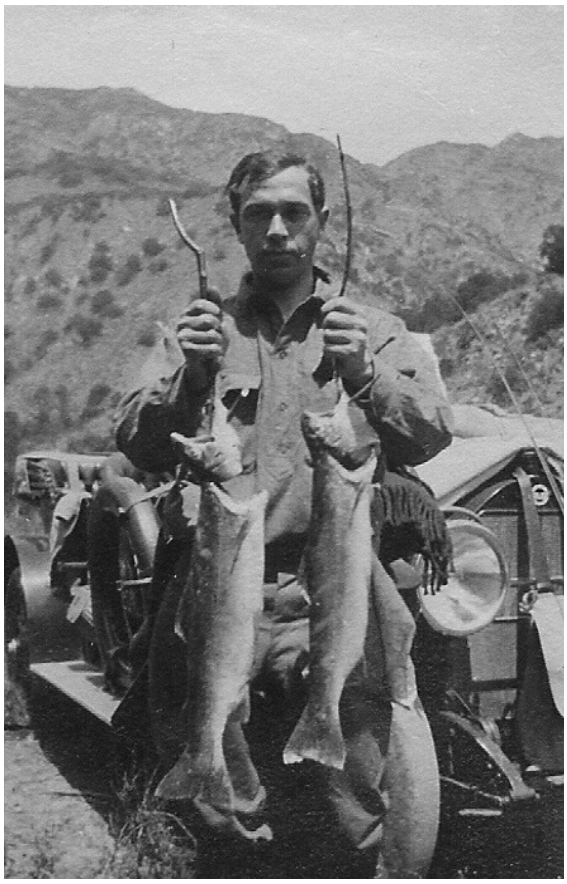
Santa Clara River Steelhead Trout: Assessment and Recovery Opportunities



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The Santa Clara River Trustee Council and The Nature Conservancy

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GIS Information:

Projection Datum: NAD 1983, UTM Zone 11N
To install project on your computer: create folder c:/SCRtrout and place all GIS project files there

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Abbreviations

ACOE	Army Corps of Engineers
Caltrans	California Department of Transportation
CDFG	California Department of Fish and Game
cfs	Cubic feet per second
ESU	Evolutionarily Significant Unit
FERC	Federal Energy Regulatory Commission
LPNF	Los Padres National Forest
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
pers. comm.	personal communication
RBT	Rainbow Trout
UCSB	University of California at Santa Barbara
USDA	United States Department of Agriculture
UWCD	United Water Conservation District
VFD	Vern Freeman Diversion

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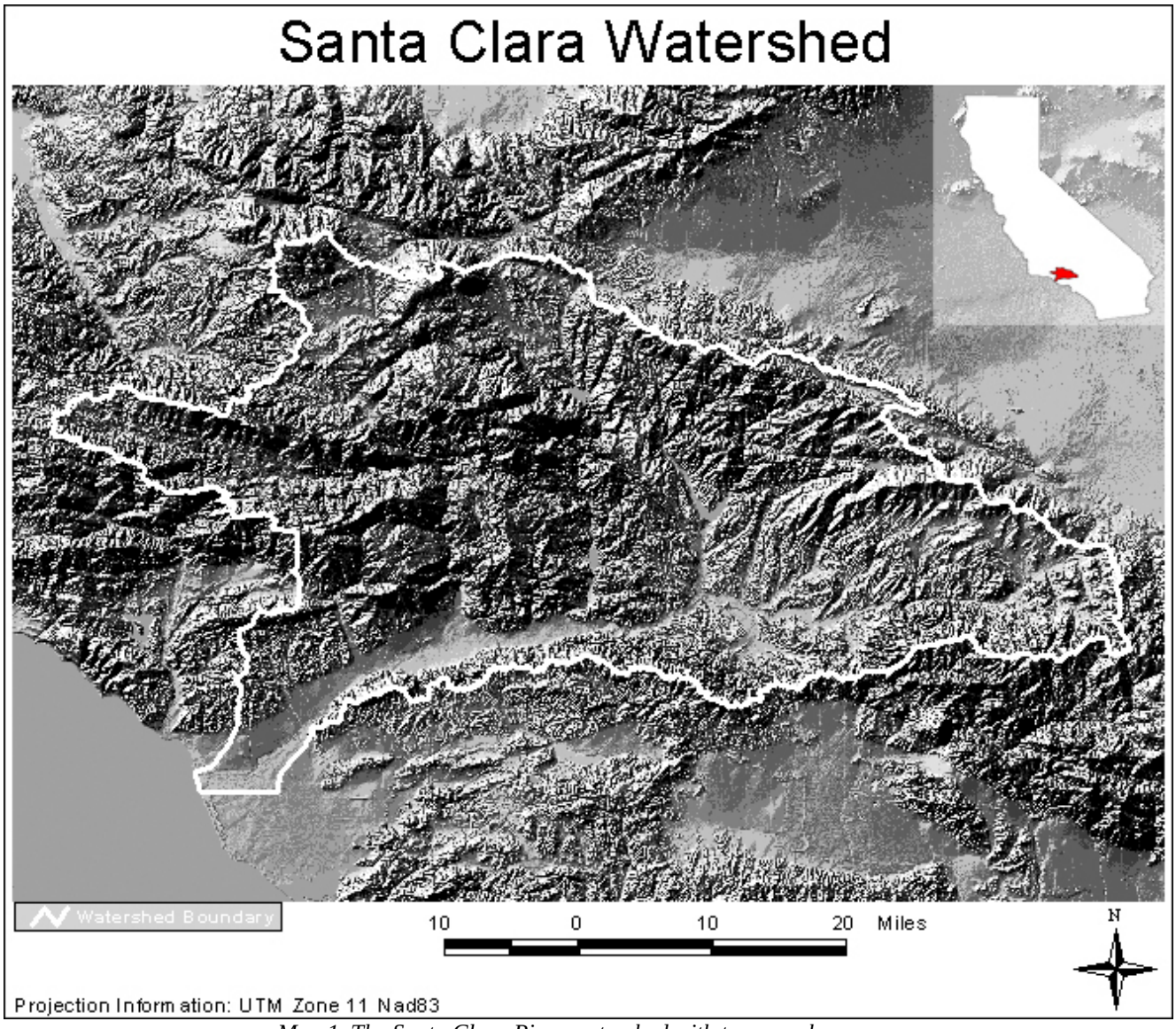
Executive Summary

The Santa Clara River watershed is located primarily in Los Angeles and Ventura Counties in California (Map 1). The watershed is large for southern California, at 1600 square miles. The purpose of this project was to analyze the habitat conditions, population status and barriers to migration for *Oncorhynchus mykiss* (steelhead trout) in the lower Santa Clara River watershed from the Piru Creek tributary downstream including significant drainages.



Map 1. The Santa Clara River watershed with topography.

Historic documentation of an important recreational steelhead fishery occurs for the Santa Clara River into the mid 1900's. Construction of dams and other migration barriers on the mainstem, Santa Paula Creek, Sespe Creek, Piru Creek, and other tributaries during the mid 1900's appear to be correlated with the demise of the steelhead run as habitat availability decreased and surface flows became highly manipulated (Capelli 1983, Moore 1980a, Outland 1971). Adult steelhead have continued to attempt to migrate up the Santa Clara River into recent times with an adult trapped at the Vern Freeman Dam in 2001. A wild, self-sustainable rainbow

trout population still exists in the headwaters of the Santa Paula, Sespe, Hopper, and Piru Creek tributaries and is producing out-migrating steelhead smolts bound for the Pacific.

Surface water diversions and groundwater pumping on the Santa Clara River reduce the river's flows, and cause barriers to migration in the forms of diversion dams, grade control structures, road crossings, and channelization projects impacting access to the river's critical spawning and rearing habitat in the tributaries. Exotic predator fish such as green sunfish and bullhead catfish observed in Sespe Creek, and other exotic gamefish in Piru Creek and other watershed reservoirs, compete with and prey upon the native steelhead and rainbow trout population.

This study commenced with a compilation and synthesis of all prior surveys for steelhead that were conducted on the Santa Clara River, and were available in either the Mark H. Capelli Southern California Steelhead Watershed Archive at the University of California, Santa Barbara (UCSB), or the U. S. Forest Service office in Santa Maria. The findings from this synthesis are located in Table C.

The tributaries that occur within the geographic boundaries of this study include: Santa Paula Creek, Sespe Creek, Pole Creek, Hopper Creek, and Piru Creek. The largest of these tributaries are Sespe and Piru Creeks. There were 702 habitat units surveyed in the Santa Clara River watershed for this study, and 129 natural and anthropogenic fish migration barriers identified. Some of the projects key findings were:

1. **Santa Paula Creek**
   a. Santa Paula Creek contained the most productive habitat in the study area for salmonids. However, the quantity of habitat is limited when compared to the amount of habitat in the Sespe Creek drainage.
   b. Santa Paula Creek appears to have greater potential to contribute to the recovery of the Southern California ESU (Evolutionarily Significant Unit) than the Hopper Creek and lesser Pole Creek tributaries.
   c. Sisar Creek accounts for 84% of the trout observed in the Santa Paula Creek drainage.
   d. Severe barriers to steelhead passage are located on Santa Paula and Sisar Creeks.
2. **Sespe Creek**
   a. Sespe Creek supports a much higher abundance of trout than Santa Paula Creek, despite the occurrence of an exotic predatory fish population. Sespe Creek also had higher numbers of larger fish than Santa Paula Creek.
   b. No individual reaches in Sespe Creek tributaries that had habitat quality scores below 5.5 had trout observed in them, and trout did not start occurring in larger numbers and with regularity until scores reached 7.0.
   c. Severe barriers to steelhead passage exist on tributaries to Sespe Creek.
3. **Pole Creek**
   a. Pole Creek had both the lowest quality estimated habitat scores and the least habitat available of all Santa Clara River mainstem tributaries measured, but could likely support a small population of *O. mykiss* with adequate fish passage in the lower reaches.
4. **Hopper Creek**
   a. Hopper Creek contains a limited amount of high quality salmonid habitat and an existing *O. mykiss* population that may contribute to the anadromous steelhead population.
   b. Severe barriers to steelhead passage occur on Hopper Creek.
5. **Piru Creek**
   a. Barriers on Piru Creek rated very highly but access would need to be developed around Santa Felicia Dam for the barriers on Piru's mainstem upstream of Santa Felicia Dam to warrant fish passage improvements.

6. **Mainstem Santa Clara**
    a. The most significant barrier to steelhead passage within the lower watershed is the Vern Freeman Diversion Dam on the mainstem of the Santa Clara River.
7. No tributaries rated low in habitat quality and high in trout abundance.
8. The average habitat quality scores and rankings for each major tributary are in Table A1. The total amount of habitat by tributary and habitat type is in Table A2.

Table A1. Average Habitat Quality Scores, in order of highest to lowest

	Habitat Quality
Santa Paula	6.45
Sespe	5.59
Piru	5.47
Hopper	5.21
Santa Clara Mainstem	4.75
Pole	3.75

The higher overall habitat quality on Santa Paula Creek may be due to almost all of the available habitat observed in the Santa Paula Creek drainage being of relatively high quality compared to Sespe Creek which contained a high amount of high quality habitat in its tributaries and portions of its mainstem, but also many dry tributaries and dry reaches in the middle and upper mainstem that reduced the overall habitat score for the drainage.

The overall high trout productivity of Sespe Creek can be accounted for by the high productivity of its tributaries, which accounted for 98% of the observed trout occurrence in the Sespe Creek drainage. Piedras Blancas Creek was observed to be the most productive followed by Howard/Rose Valley, Bear, Trout, and West Fork Sespe Creeks.

It should be noted that this study was conducted after several recent fires in the Sespe watershed, and following a five year below average rainfall period that could have differentially affected observations within watershed tributaries (e.g., the prolonged low flows in Sespe Creek created conditions favorable to the proliferation of exotic species such as bullheads which prey upon juvenile trout, a species not found in Santa Paula Creek.). There can be considerable inter-annual, decadal variability between reaches within the watershed.

Based on the findings of this study we recommend the following be priorities for revitalization of the steelhead run on the Santa Clara River.

Habitat and Population Priorities

1. Due to *O. mykiss* occurrence, abundance and habitat quality the following tributaries should receive the highest level of protection and where necessary rehabilitation:
    a. In the Sespe Creek Drainage: Piedras Blancas Creek, Howard Creek/RoseValley, W.F. Sespe Creek, Bear Creek, Lion Creek, Timber Creek.
    b. In the Santa Paula Creek drainage: Sisar Creek, and upper Santa Paula Creek.
    c. Upper Hopper Creek.
2. Protection of the highly productive mainstem reaches on Santa Paula and Sespe Creeks .

Fish Passage Priorities

1. Improved fish passage at the Vern Freeman Diversion Dam that is effective over a wider range of flows and utilizes by-pass flows more effectively to allow unimpeded upstream and downstream migration independent of water diversion operations, maintenance, debris blockage, or fish ladder damage. This dam is the most significant steelhead migration barrier within the lower Santa Clara River watershed.

2. Removal or modification of gray and red barriers in the Santa Paula, Sespe, and Hopper Creek drainages.
3. Identification and implementation of dedicated fish passage flows for the mainstem of the Santa Clara River and those reaches on Santa Paula Creek, Sespe Creek, and Piru Creek downstream of Harvey Diversion Dam, Fillmore Irrigation Diversion, and Santa Felicia Dam respectively.
4. Other high priorities are associated with many of the complex, instream migration barriers described and include; stream channel restoration, riparian restoration, removal of reservoirs harboring exotic and hatchery fish species, and elimination or reduction of erosion, pollution, and hazardous features.

Providing improved fish passage within the main tributaries of the lower Santa Clara River is a high priority to ensure that steelhead have adequate access between the critical headwater habitats and the ocean. This report outlines the specific, prioritized barriers in detail within the priority tributaries and habitat areas.

Table A2. Miles of habitat by tributary and habitat type. Approximately 17 miles of habitat were not assigned a habitat type.

	SC Mainstem	Santa Paula	Sespe	Pole	Hopper	Piru	Total
Bedrock Sheet		0.01	0.15				0.17
Cascade		0.05	0.13				0.18
Channel Confluence Pool			0.33				0.33
Corner Pool		0.02					0.02
Culvert		0.09		1.23		0.21	1.52
Dammed Pool	0.67		0.03			4.56	5.25
Dry		0.19	50.86		1.16	4.17	56.39
Glide	31.74	0.02	0.82		4.35	38.52	75.44
High Gradient Riffle			0.14				0.14
Low Gradient Riffle	0.04	0.02	0.32			0.66	1.04
Lateral Scour Pool - Bedrock Form		0.11	3.43			0.06	3.59
Lateral Scour Pool - Boulder Form		0.02	0.50				0.52
Mid Channel Pool		0.03	2.18				2.21
Plunge Pool		0.02	0.06		0.02	0.71	0.82
Pocket Water		1.24	2.88			11.66	15.77
Step Run	0.17	2.66	10.11			0.05	12.99
Step Pool		4.83	42.72	3.45	4.77	67.28	123.05
Trench Pool			0.55			0.15	0.70
Total	32.62	9.30	115.22	4.68	10.30	128.02	300.15