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Center for Ecosystem Management & Restoration
4179 Piedmont Ave, Suite 325, Oakland, CA 94611
510.420.4565   http://www.cemar.org

Becker
Reining

Steelhead/Rainbow Trout *(Oncorhynchus mykiss)* Resources South of the Golden Gate, California

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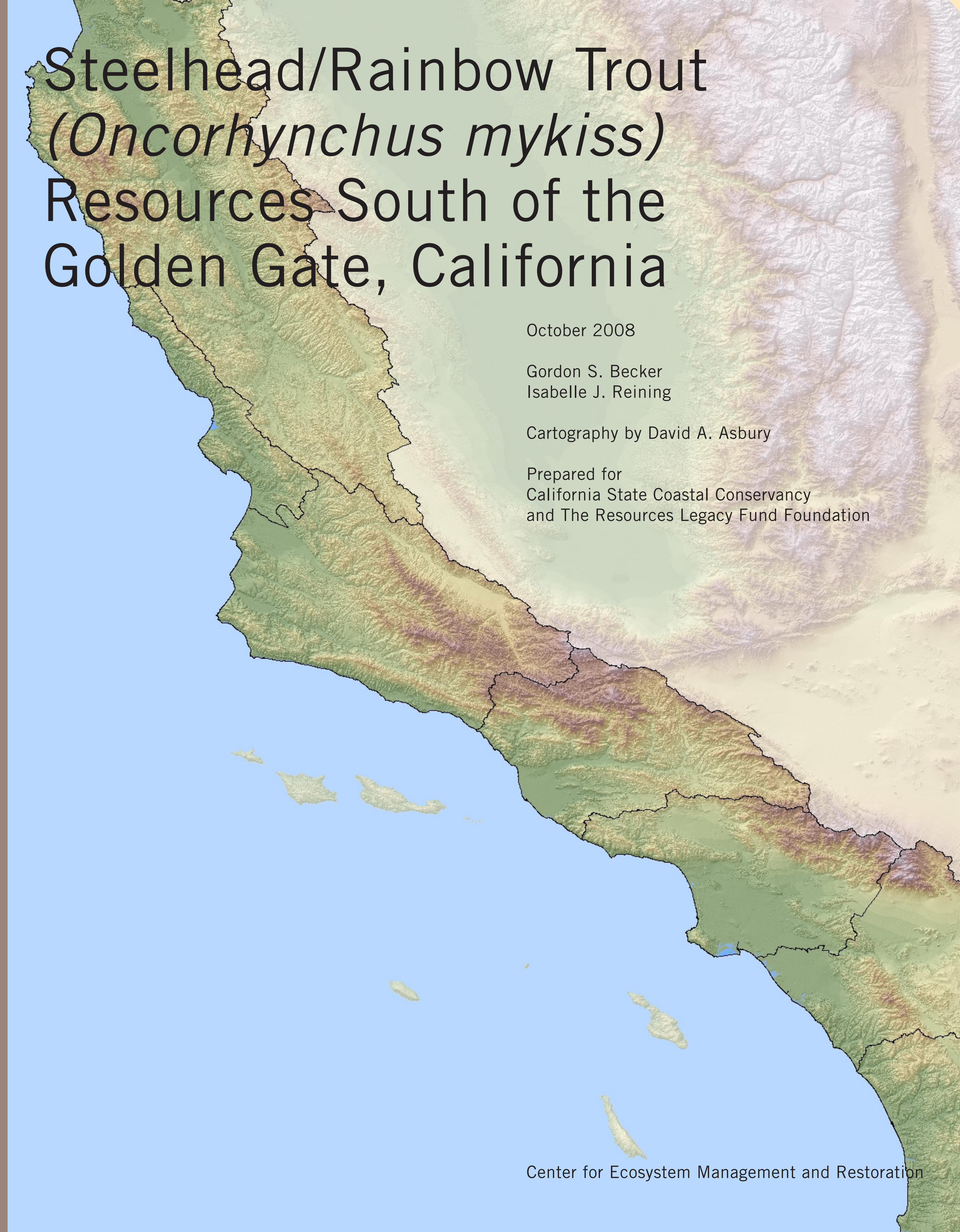


Steelhead/Rainbow Trout *(Oncorhynchus mykiss)* Resources South of the Golden Gate, California

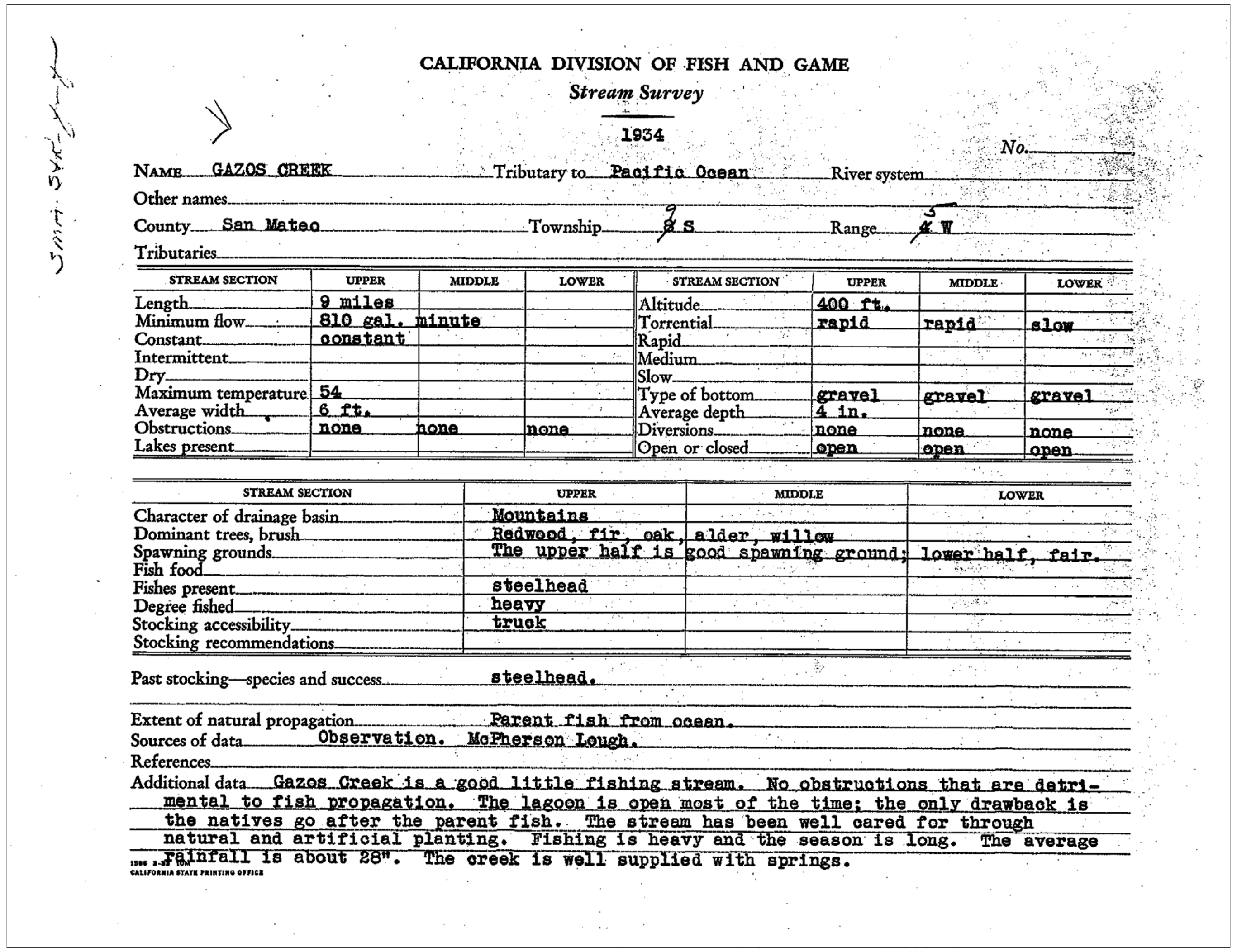
October 2008

Gordon S. Becker
Isabelle J. Reining

Cartography by David A. Asbury

Prepared for
California State Coastal Conservancy
and The Resources Legacy Fund Foundation

Center for Ecosystem Management and Restoration



CALIFORNIA DIVISION OF FISH AND GAME

Stream Survey

1934

No.

NAME GAZOS CREEK Tributary to Pacific Ocean River system

Other names

County San Mateo Township ~~8~~ 9 S Range ~~4~~ 5 W

Tributaries

STREAM SECTION	UPPER	MIDDLE	LOWER	STREAM SECTION	UPPER	MIDDLE	LOWER
Length	9 miles			Altitude	400 ft.		
Minimum flow	810 gal. minute			Torrential	rapid	rapid	slow
Constant	constant			Rapid			
Intermittent				Medium			
Dry				Slow			
Maximum temperature	54			Type of bottom	gravel	gravel	gravel
Average width	6 ft.			Average depth	4 in.		
Obstructions	none	none	none	Diversions	none	none	none
Lakes present				Open or closed	open	open	open

STREAM SECTION	UPPER	MIDDLE	LOWER
Character of drainage basin	Mountains		
Dominant trees, brush	Redwood, fir, oak,	alder, willow	
Spawning grounds	The upper half is	good spawning ground;	lower half, fair.
Fish food			
Fishes present	steelhead		
Degree fished	heavy		
Stocking accessibility	truck		
Stocking recommendations			

Past stocking—species and success steelhead.

Extent of natural propagation Parent fish from ocean.

Sources of data Observation. McPherson Lough.

References

Additional data Gazos Creek is a good little fishing stream. No obstructions that are detrimental to fish propagation. The lagoon is open most of the time; the only drawback is the natives go after the parent fish. The stream has been well cared for through natural and artificial planting. Fishing is heavy and the season is long. The average rainfall is about 28". The creek is well supplied with springs.

CALIFORNIA STATE PRINTING OFFICE

The cover image is a map of the watershed area of streams tributary to the Pacific Ocean south of the Golden Gate, California, by CEMAR.

The image above is a 1934 Gazos Creek stream survey report published by the California Division of Fish and Game.

Book design by Audrey Kallander.

Steelhead/Rainbow Trout *(Oncorhynchus mykiss)* Resources South of the Golden Gate, California

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Center for Ecosystem Management and Restoration

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FOREWORD

To many people, one of the most surprising revelations about fish in California has been that southern California has significant runs of fish that come up from the ocean to spawn in fresh water: steelhead, coho salmon, and Pacific lamprey. Coho salmon only make it as far south as Santa Cruz County but both steelhead and lamprey had populations as far south as Baja California in Mexico. The presence of steelhead in particular seems counter-intuitive. These are fish famous among anglers for living in the streams that flow through the dense forests of the Pacific Northwest, migrating upstream every year in the dead of winter when flows are high, rain is pouring down, and temperatures are cold. So how do we account for anglers once being able to catch steelhead migrating upstream in downtown Los Angeles as well the historic presence of steelhead in literally hundreds of streams south of San Francisco Bay? Most of these streams, even prior to the colonization of California by Euro-Americans, flow through dry oak and chaparral covered hills, the often-intermittent stream beds lined with a thin band of sycamores, live oaks, and willows. The mouths of the streams are usually small lagoons that in dry years or dry months are closed to ocean access by sand bars. There are four keys to understanding how a cold water loving, migratory fish can persist in such a dry area.

First, the headwaters of steelhead streams typically have permanent flows, with cold ground water seeping in to maintain them as "trout streams." Often these areas have thin forests of pine and other trees we associate with steelhead habitat. Second, the Mediterranean climate of the region consistently provides high flows in winter from heavy rain. These flows not only fill dry stream beds and provide steelhead access to the permanent headwaters, but breach the bars of the lagoons. The floodwaters send a message to the fish waiting in the ocean that now is the time to move upstream. Third, the ocean region off California is one of the most productive in the world, with cold water upwelling from the bottom providing the base of a food web in which the steelhead is one of the top predators. Fourth, and most importantly, the steelhead/rainbow trout is an enormously adaptable fish. It is more widely distributed and occurs in a greater variety of habitats than any other trout or salmon. The steelhead of southern California have life histories adapted to local conditions. The ocean-going adults live long enough so they do not have to come back every year to spawn successfully. If the streams are inaccessible, they come back the following year. Upstream, the juveniles may wait one, two, or even three years before going out to sea. Perhaps it is not surprising, therefore, that in a region where life history flexibility is an adaptive advantage the southern populations of steelhead are among the most diverse genetically of any steelhead. In fact, the research of Dr. Jennifer Nielsen and others suggests that steelhead may have *originated* in southern California, their enormous adaptability allowing them to spread northward around the Bering Sea and into Asia.

Unfortunately, the actions of humans are pushing even the adaptability of steelhead to its limits. The watersheds of southern California have been abused for hundreds of years, first by livestock grazing and other agriculture, now increasingly by urbanization and associated water diversions. All populations of steelhead south of San Francisco Bay are consequently formally recognized as threatened or endangered by both state and federal governments.

This report documents why steelhead are listed. It shows where the steelhead once were and where they are today. And it shows how almost all populations, at least where documentation exists, are much worse off today than they were 25, 50, or 100 years ago. This report summarizes an enormous amount of information, although for most streams this information is fragmentary at best. The report then establishes a new baseline for the status of steelhead in southern California streams, against which future status reports must be compared. I can only hope that it will help individuals and groups in all steelhead watersheds in southern California to find ways to protect and restore their streams so that this remarkable fish can continue to exist and even thrive. The southern steelhead is truly an iconic species, whose survival will depend on a great deal of good will from us humans. But its persistence will signify that we have created an environment that is not only good for fish, but for ourselves as well.

Peter B. Moyle
Davis, California

INTRODUCTION

Researchers characterizing the distribution of steelhead/rainbow trout *(Oncorhynchus mykiss*) face a variety of challenges on a path to an inherently imperfect result. Indeed, a complete, accurate record of the species' historical use of streams over time cannot be assembled (Swift 1975). California's streams have not been systematically and consistently surveyed, and the historical survey record is dispersed and incomplete. There can be no doubt, however, that compiling historical references provides a valuable resource to those interested in stream and steelhead restoration. This volume represents our attempt to synthesize available information to establish an authoritative record of steelhead distribution in coast-draining streams south of the Golden Gate. These streams support the winter (ocean-maturing) steelhead ecotype as well as the non-anadromous, or resident, form of rainbow trout[1].

Several important reviews have been completed previously regarding *O. mykiss* in all or part of the study area. In particular, Titus *et al.* (in prep.), and Boughton and his colleagues (Boughton and Fish 2003; Boughton *et al.* 2005) provided valuable contributions to the understanding of the historical and current distribution of the species. Our work builds upon these previous efforts, greatly expanding the spatial and temporal coverage by accessing primary sources never previously cited. We have located and reviewed thousands of documents in public and private collections, and interviewed biologists, to bring the work of this and previous generations of fisheries scientists into on-going processes relating to conservation of stream resources. We conducted our review using the methods of Leidy *et al.* (2005), as this study (of San Francisco Estuary tributaries) has proven useful to resource agency staff, planners, consulting biologists, scientists, and interested members of the public. The method of Leidy *et al.* (2005) in turn was based on the approach of Titus *et al.* (in prep.).

In short, this report presents a distillation of a substantial amount of readily available, reliable information regarding *O. mykiss* and *O. mykiss* habitat. As such, it is intended to serve as a stream-by-stream steelhead resources reference for the community of people with interest in steelhead in coastal watersheds in central and southern California.[2] Our report incorporates information concerning presence/absence and other natural history and habitat features in specific streams to contribute to the understanding of how steelhead resources may have changed over time. We made every effort to be consistent in the types of information we cited in the text of the report and to provide the most salient resource characterizations we encountered in the references. Nevertheless, readers are encouraged to access primary sources both for context to the citations and for a more thorough understanding of steelhead resources in the study area than can be provided by this review.

An understanding of historical steelhead resources (*i.e.*, populations and occupied habitat) is pivotal to effective environmental review and resource planning processes. For example, a long-term record of *O. mykiss* observations can provide the basis for ascribing a beneficial use to a specific watershed or stream or for characterizing population structure within a large watershed. Similarly, information concerning the likely range of the number of individuals in a steelhead run prior to substantial urbanization can be used to guide the development of reasonable restoration goals. At the broadest scale, exercises in historical ecology such as

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1 We follow the convention of McEwan (2001) when referring to anadromous and non-anadromous forms of rainbow trout *(O. mykiss)*. We use "steelhead" and '"resident" when referring to anadromous and non-anadromous life history forms of rainbow trout, respectively. We use "rainbow trout" for populations where we are unable to determine the life history strategy. Individuals within populations of coastal rainbow trout exhibit varying life-history strategies and a continuum of migratory behaviors from anadromy (strong migratory) to residency (non-migratory).

2 Staff of the California Department of Fish and Game (DFG) have contributed to, reviewed, and provided comment on drafts of this report. However, the report does not constitute current DFG policy or position regarding the assessment, management, or restoration of steelhead rainbow trout in California. Similarly, the report has no relationship to National Marine Fisheries Service (NMFS) recovery planning or other processes, although NMFS staff have contributed substantially to its content.

the current project can allow information developed by past observers to be used in addressing key issues such as reference conditions, changes in resource conditions over time and their mechanisms, and guidance on future management (Swetnam *et al*. 1999).

Leidy *et al.* (2005) completed a thorough investigation into the steelhead resources of San Francisco Estuary streams and documented a paucity of reliable information, particularly quantitatively estimated factors such as abundance, fish size, and density. (Such measures are used in determining the presence of a population reproducing over time, in habitat quality estimates, and in other important applications.) In general, streams of central and south coast watersheds also have been surveyed on relatively few occasions. And it may be argued that fewer fiscal resources have been dedicated to stream restoration projects in this geographic region than to projects on Central Valley or North Coast streams. By making available the existing survey record and other related information, we expect to expand understanding of steelhead use of the creeks that comprise the southern extent of the species' range and to facilitate conservation activities.

Despite strong public interest in the conservation and restoration of anadromous salmonids in streams of coastal California, and substantial efforts toward improving habitat, these populations remain in a perilous state. The federal Endangered Species Act listing status for steelhead populations south of the Golden Gate is alternately "threatened" or "endangered" (Good *et al*. 2005). That steelhead remain, albeit in small numbers, in many (even highly degraded) watersheds is both evidence of its resistance to stressors and reason for optimism that restoration actions will be fruitful.

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FPO - figure 1

METHODS

The primary goal of this study was to document the historical distribution and current status of steelhead/rainbow trout *(Oncorhynchus mykiss*) populations in the coastal watersheds south of the Golden Gate, California. Watersheds were identified based on streams terminating in the Pacific Ocean and naming conventions were adopted from the National Geographic TOPO!™ software, with modifications as described later in this section. The study area consists of the coastal watersheds between San Pedro Creek, in northern San Mateo County, and the Tijuana River, southern San Diego County, inclusive.

We reviewed published literature and environmental reports, unpublished reports and studies, sampling data sheets, newspaper accounts, field notes, public agency memoranda, and personal correspondence, and interviewed individuals knowledgeable about *O. mykiss* distribution within particular streams, watersheds, or regions. Source materials were obtained from agency and public libraries and collections, consulting firms, telephone and email contacts, in-person interviews, Web sites, and other sources. Relevant information was copied, scanned, or downloaded and retained either in files or through electronic storage[1]. Reference information was entered for all sources.

We reviewed the available source materials and stored important information regarding distribution, life history and habitat features, and several attributes of the resources either in a customized Microsoft® Access database or in text. The text comprises the body of this report (*i.e.*, the Results section), while the database may be obtained by contacting the authors. Information that appears in the report best characterizes particular *O. mykiss* populations or habitat resources in the judgment of the authors, and provides the basis by which we determined historical presence and current status. We also summarize or quote statements that establish the relative importance to a particular population of a stream or streams within a watershed or the relationship of a watershed's population to the regional population. Every effort was made to document assumptions and provide attribution as context for readers of the report.

Also included is additional information contained in survey reports or other sources that we deemed otherwise important to the analysis or to an understanding of the resources. For example, statements representing well-grounded opinion on such issues as ancestry, life history strategy (*i.e.*, anadromy or non-anadromy), impairment factors, and appropriate management are reproduced in the text. We do not restate most habitat descriptions contained in our information sources because of the changeable nature of the resource, and the amount of variability in the habitat assessment methods applied and the quality of the analyses. Similarly, we relate information on total passage barriers and rarely on partial barriers because information concerning the former appears less subject to variation over time or to mischaracterization.

The Results section contains chapters regarding the coastal streams of the nine counties in the study area. The location, blue line stream length, and other features are provided, followed by information establishing historical and current presence/absence, and other population and habitat related material. For each watershed, information regarding the mainstem is provided first, followed by descriptions of the various tributaries ordered most downstream first to most upstream last. All tributaries a of particular stream are described before advancing to the next most upstream tributary.

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1 A DVD containing source materials prepared by the California Department of Fish and Game and other agency references is included with this report. Please contact CEMAR for further information on reference materials.

In order to provide a convenient data summary for report users, tables describing *O. mykiss* historical distribution and current status in streams of each county are presented at the end of each chapter. Table headings and terms are defined as follows.

Watershed: Name of the watershed designated by the primary stream that terminates in the Pacific Ocean.

Stream/tributary: Name of the mainstem or the tributary ordered in a downstream to upstream direction.

Historical, current status. Designations indicate our judgment regarding the likelihood that a stream was occupied or is currently occupied by a spawning run or population. For purposes of this document, "historical" means before 1997, while "current" reflects status in the last ten years. The terms are defined as follows.

DF Definite run or population. Streams for which there is reliable, direct evidence for fish use, such as collections made during stream surveys, published literature, unpublished biological or archaeological reports and surveys, and museum surveys. These sources may be combined with other historical and current evidence on the existence of suitable habitat.

PB Probable run or population. Streams for which there is some reliable direct evidence for fish use, and we were able to determine that suitable habitat existed historically. This determination was made using information concerning stream habitat characteristics based on reference data, or knowledge of the current presence of suitable habitat.

PS Possible run or population. Streams for which there is minimal or no direct reliable evidence of fish use, but suitable habitat existed historically or is currently present.

PA Possibly absent. Streams for which there is no evidence of fish use and inferences from historical and current habitat conditions (*e.g.*, extreme ephemeral runoff conditions, barriers to upstream migration of fishes, lack of suitable spawning and/or rearing habitat, etc.) indicate the lack of suitable habitat.

UN Unknown/Insufficient information. Streams for which there is insufficient information on fish use and/or historical and current habitat conditions to assign a status value.

We used several sources of information to discern the status of *O. mykiss* in study area streams. Evidence of a run or the existence of a population did not require that fish be recorded every year. Rather, we used existing evidence, our best professional judgment, and the judgments of other researchers to assess the likelihood that *O. mykiss* either regularly or intermittently utilized a particular stream. Because *O. mykiss* in the region are adapted to highly variable climatic, rainfall, and stream discharge conditions, we assumed that a stream could contain suitable habitat for steelhead even if fish were not recorded in successive years.

Evidence of decline. Values indicate that there is or is not evidence of decreased *O. mykiss* abundance over time.

Y Yes. Substantial evidence exists that a significant decrease in abundance has occurred. Such evidence may include population estimates, loss of access to habitat, decreased habitat quality, or similar factors resulting in reduced carrying capacity.

- No value. Insufficient evidence was found to ascribe decreased abundance over time.

Anadromy. Values indicate whether streams presently support the anadromous *O. mykiss* life history form.

Y Yes. Current evidence indicates natural propagation is successfully occurring in the stream, or in upstream tributaries of the stream, and no complete barrier to upstream and downstream migration exists between the area of natural propagation and the ocean.

N No. Either a complete migration barrier exists between the ocean and any naturally propagating populations, or current evidence indicates *O. mykiss* are not present or are not naturally propagating in the stream.

UN Unknown. The current status of passage conditions or *O. mykiss* populations is undetermined.

Current population status. Current status of a population in a stream is indicated by the following values: 0 = population absent or unknown, 1 = individuals observed within approximately the last ten years, 2 = some evidence of reproduction within the last ten years, and 3 = evidence of regular reproduction during the last ten years. It should be noted that values are dependent on the robustness of the supporting data. Additional detail is provided in the text description for each study area stream.

Steelhead/rainbow trout distribution maps

The maps prepared for this publication were compiled with data from several sources. We were committed to creating a data product that could be integrated easily by other users and conveniently enhanced in the future. To achieve these objectives we chose the medium resolution National Hydrography Dataset (NHD) as a framework. This comprehensive, standardized dataset produced by the United States Geological Survey (USGS) includes some error and uncertainty, but is one of the most up-to-date and reliable sources available. Another advantage is that it seamlessly covers the entire geographic extent of our study area. We modified the data to make them more accurate, as outlined below, but some uncorrected error likely remains.[2]

Occasionally a stream we referenced did not appear in the medium resolution NHD. In these cases, we manually extracted the line work from the corresponding high resolution NHD and appended the streams to the medium resolution dataset. The extracting technique used retained all of the feature's attributes as well as the NHD data schema. Streams appearing on the maps as "other streams" typically exist in the medium resolution NHD but are not associated with an *O. mykiss* status designation since we did not locate relevant information. In the southern counties, notably Los Angles, Orange and San Diego, we performed "stream thinning" (*i.e.*, eliminating intermittent streams with no available fisheries information) using the value added attributes included in NHD Plus[3]. Stream level as defined by NHD Plus was used to determine the mapped streams.

The boundary for each depicted geographic area was created by combining sub-watersheds from the Calwater 2.2.1 database and checking for consistency with USGS Hydrologic Unit Codes and a 7.5 degree Digital Elevation Model (DEM) from National Geographic TOPO!.[4,5] A custom script was written to merge watersheds (identified on the basis of convenience of viewing) into single polygons. Shading effects are products from National Geographic TOPO!, and are based on the USGS National Elevation Dataset (NED) at a resolution of one arc second (or approximately 30 meters).[6]

2 More information about the accuracy of the NHD metadata and its is available at http://nhd.usgs.gov/.
3 See http://www.horizon-systems.com/nhdplus/ for more on the NHD Plus project.
4 The Calwater database is described at http://www.ca.nrcs.usda.gov/features/calwater/.
5 TOPO! (2003). California seamless USGS topographic maps on CD-ROM.
6 See http://ned.usgs.gov/ for more information regarding the NED.

Stream names are derived from the NHD, which in turn imports names from the USGS Geographic Names Information System (GNIS).[7] However, the NHD often does not associate canyon or gulch names with the streams that run through them. To rectify this situation we created a shapefile of California's valleys, canyons and gulches using the source and outlet latitude/longitude pairs (couplets) from the GNIS database. We then associated each of the unnamed streams with the name of the appropriate physical feature. Other unnamed streams were labeled using local naming conventions. We also corrected misspellings, inaccuracies, and differences from common usage in the GNIS database. For example, the GNIS label "Frijoles, Arroyo De Los" was changed to "Arroyo de los Frijoles." Metadata included in the dataset complies with Federal Geographic Data Committee (FGDC) standards.

It should be noted that the steelhead/rainbow trout run/population designations on our maps are coincident with the "blue line" stream locations of our mapping data sources and do not indicate habitat use by *O. mykiss*. In other words, we highlight the entire length of a particular stream to show its population status rather than attempt to indicate which portions are accessed by steelhead. Reliable information concerning limits to anadromy was not available for a sufficient proportion of the streams in the study area to allow us to depict this stream attribute.

7 See http://geonames.usgs.gov/ for more information regarding the GNIS dataset.

San Pedro

San Pedro Creek flows northwesterly, entering the Pacific Ocean at Pacifica State Beach. It drains a watershed about eight square miles in area. The upper portions of the drainage contain springs (feeding the south and middle forks) that produce perennial flow in the creek. Documents with information regarding steelhead in the San Pedro Creek watershed may refer to the North Fork San Pedro Creek and the Sanchez Fork. For purposes of this report, these tributaries are considered as part of the mainstem.

A 1912 letter regarding San Mateo County streams indicates that San Pedro Creek was stocked. A fishway also is noted on the creek (Smith 1912). Titus *et al.* (in prep.) note DFG records of steelhead spawning in the creek in 1941.

In 1968, DFG staff estimated that the San Pedro Creek steelhead run consisted of 100 individuals (Wood 1968). A 1973 stream survey report notes, "Spawning habitat is a limiting factor for steelhead" (DFG 1973a, p. 2). The report called the steelhead resources of San Pedro Creek "viable and important" but cited passage at culverts, summer water diversion, and urbanization effects on the stream channel and watershed hydrology as placing "the long-term survival of the steelhead resource in question"(DFG 1973a, p. 5).

The lower portions of San Pedro Creek were surveyed during the spring and summer of 1989. Three *O. mykiss* year classes were observed during the study throughout the lower creek. Researchers noticed "a marked exodus from the lower creek during the late summer" of yearling and age 2+ individuals, many of which showed "typical smolt characteristics" (Sullivan 1990). The riparian area between the mouth and the Highway 1 bridge was noted to be "very degraded."

Surveys performed for a recent study found *O. mykiss* in mainstem San Pedro Creek and several tributaries (HES 2002a). The report concluded that the mainstem and the Middle Fork provide the primary steelhead habitat in the watershed. The study author noted several significant factors limiting *O. mykiss* in the San Pedro Creek watershed including passage barriers, low stream flows, sedimentation, and others (HES 2002a).

Middle Fork San Pedro

Middle Fork San Pedro Creek consists of about 1.5 stream miles. Its confluence with the South Fork comprises the headwaters of San Pedro Creek.

Staff from DFG sampled Middle Fork San Pedro Creek in 1973 and collected juvenile *O. mykiss*. The sampling was used to prepare a population estimate for the creek (DFG 1973b).

Surveys performed for a recent study found *O. mykiss* in Middle Fork San Pedro Creek. The report concluded that the mainstem and the Middle Fork provide the primary steelhead habitat in the watershed, with "the best quality spawning habitat…in the Middle Fork" as well as "good conditions for steelhead rearing" (HES 2002a, p. 1).

South Fork San Pedro

South Fork San Pedro Creek consists of about 1.3 stream miles. Its confluence with the Middle Fork comprises the headwaters of San Pedro Creek.

Staff from DFG sampled South Fork San Pedro Creek in 1973 and collected juvenile *O. mykiss*. The sampling was used to prepare a population estimate for the creek (DFG 1973b).

Surveys performed for a 2002 study found *O. mykiss* in South Fork San Pedro Creek. The resulting report stated, "[S]teelhead… abundance appeared extremely low based on visual counts. Suitable spawning sites were very scarce in the South Fork" (HES 2002a, p. 1).

Martini

Martini Creek consists of about 1.7 stream miles. It flows southwest, entering the Pacific Ocean at Montara State Beach.

In a 1976 memo regarding Martini Creek, DFG staff noted that the creek is in a 100 foot long culvert under Highway 1. The culvert was suspected to be a barrier to upstream passage of steelhead (DFG 1976a).

A 1995 DFG memo indicates that Martini Creek is "…now inhabited by steelhead/resident rainbow trout" (DFG 1995). An undated DFG creek inventory states, "The Highway 1 culvert, which has a four foot drop at both ends, represents an impassable barrier to any migratory fish. Additionally, an instream impoundment blocks the flow approximately 100 yards upstream from highway 1" (DFG ca 1994).

San Vicente

San Vicente Creek consists of about 3.9 stream miles and drains a watershed of approximately five square miles. It flows southwest, entering the Pacific Ocean south of the town of Moss Beach.

We did not encounter reliable evidence that steelhead used the San Vicente Creek watershed historically. According to a DFG creek inventory, "Steelhead migration is effectively blocked by the culvert located by the parking lot in Fitzgerald Marine Reserve" (DFG ca 1994). The inventory also states, "Agricultural diversions and streamside wells dewater most of the stream during the summer months" (DFG ca 1994).

A fish passage assessment included an examination of potential habitat in March 2004. The report states, "…this watershed may not be fish-bearing, at least for anadromous salmonids" (Taylor 2004, p. 40).

Denniston

Denniston Creek consists of about 4.4 stream miles. It flows southwest, entering the Pacific Ocean at Half Moon Bay. According to a DFG memo, a ten foot high instream impoundment at about stream mile 1.2 is a total barrier to fish passage (DFG ca 1994).

Notes taken in 1941 by DFG staff indicated that Denniston Creek historically supported spawning runs of coho salmon and steelhead (Moore 1941). A 1953 stream survey report indicates the presence of steelhead and rainbow trout in the creek (DFG 1953a). Sampling in 1974 produced observations of *O. mykiss*, including YOY and additional year classes upstream of the impoundment (DFG 1974a).

An undated DFG creek inventory summarizes conditions in Denniston Creek. It states, "The creek and its tributaries provide a good potential habitat for steelhead trout if the barriers to migration were removed. Steelhead were observed in the lower stretches of the stream as late as 1987 when drought and agricultural pumping trapped steelhead in pools in the area adjacent to the Clipper Ridge subdivision" (DFG ca 1994). The inventory adds, "The final mile is usually dewatered in the summer due to agricultural diversions and withdrawal by the Coastside Water District which maintains a 10 foot high instream impoundment with a 100 foot downstream apron" (DFG ca 1994).

During a 1992 DFG survey, *O. mykiss* was observed "throughout the drainage" (DFG 1992a). Staff from DFG surveyed Denniston Creek downstream from the dam in May and June 2006 and observed *O. mykiss* fry and individuals to about six inches in length. The survey report contains by pass flow recommendations and also recommended non-native vegetation removal, and investigation of habitat upstream from the dam and the source of sediment producing high turbidity in the survey reach (DFG 2006).

Deer

Deer Creek consists of about 1.9 stream miles. It flows southwest, entering the Pacific Ocean at the city of El Granada.

According to a DFG creek inventory, "CalTrans and the Pillar Point Harbor district have diverted the mouth of the creek into culverts terminating near the southern breakwater" (DFG ca 1994). The inventory also cites the presence of a small impoundment for agricultural purposes (DFG ca 1994).

According to the creek inventory, "Deer Creek is currently little more than an urban ditch although it was a producing trout stream within the memory of local area residents (DFG ca 1994).

Frenchmans

Frenchmans Creek consists of about 4.3 stream miles and drains a watershed of about 4.3 square miles. It flows south, entering the Pacific Ocean at Half Moon Bay State Park.

A 1912 letter regarding San Mateo County streams describes Frenchmans Creek. The letter notes a steelhead run and states, "Has not been stocked by Commission, but has trout" (Smith 1912). A 1953 report notes stocking in 1930 and 1932 (DFG 1953b).

Staff from DFG surveyed Frenchmans Creek in 1953 and observed *O. mykiss*. The survey report states, "A good creek for migratory salmonids however water used by nursery farms for floral crops. Very extensive and is a threat to any crop of small fishes in creek" (DFG 1953b). In a 1958 stream survey, DFG staff suggested that Frenchman's Creek should be "considered as a minor steelhead stream" (DFG 1958a).

An undated DFG document notes, “1979 DFG Stream Survey and e[lectrofishing] sample found SH…” (DFG ca 1992). A DFG stream inventory notes the presence of steelhead in Frenchmans Creek and states, “Frenchmans Creek is heavily sedimented…” (DFG ca 1994).

Multiple *O. mykiss* year classes were observed both upstream and downstream from a flashboard dam in Frenchmans Creek during sampling in 2004 (Atkinson pers. comm.). Staff from DFG electrofished reaches immediately upstream and downstream from the dam in 2006 and again found *O. mykiss*. The upstream sampling group varied between about 0.9 and 7.5 inches in length, while the downstream size ranged between about 1.6 and 6.0 inches. The dam is “problematic” for fish passage (Nelson pers. comm.). According to staff from the RCD, seasonal water diversions are “affecting the system” (K. Nelson, pers. comm.).

Locks

Locks Creek consists of about 1.9 stream miles and is tributary to Frenchmans Creek. It flows southeast, entering Frenchmans Creek in the headwaters area.

A DFG stream inventory characterizes the fishery resources of Locks Creek as “good”. It cites the creek’s value to the watershed in providing “winter flow and some steelhead spawning” (DFG ca 1965).

Pilarcitos

Pilcarcitos Creek consists of about 12. 8 stream miles and drains a watershed of about 30 square miles. Stone Dam, constructed in the 1880s, is located at about stream mile 8.5, while the dam forming Pilarcitos Lake, constructed in 1861, is located approximately 10.8 miles from the creek mouth.

Staff from DFG surveyed Pilarcitos Creek in 1953 and observed *O. mykiss*. The survey report states, “A fair creek for the reproduction of migratory fish not a summer trout stream” (DFG 1953c). A 1958 survey report characterizes the creek, “A fair to good SH spawning and nursery stream, which has been mistreated by local residents and public utilities – but still produces SH (what was it like before settlement?)” (DFG 1958b). In 1960, DFG staff estimated the steelhead run in Pilarcitos Creek to consist of about 50 to 100 individuals (Entrix 2006).

A 1977 stream survey report indicated the impact of drought on the Pilarcitos Creek fishery. It also stated, “Adjacent agricultural and urban developments impose severe limitations upon aquatic habitats. Pollution and the dumping of urban debris into the channel are major problems… Removal of riparian vegetation and the presence of cattle in the channel are additional degrading factors” (DFG 1977a). The creek was stocked in 1978 and in subsequent years (DFG 1985a).

In 1985, DFG found that about 7.5 miles of Pilarcitos Creek was available as spawning and rearing habitat (DFG 1985a). The survey report noted aquatic plant growth as a limiting factor, and recommended planting riparian vegetation and “limiting water diversion to preserve the minimum flows” (DFG 1985a). An undated creek inventory characterizes negative impacts on Pilarcitos Creek by stating, “The creek has severe overdraft, dumping of agricultural and domestic debris, effluent from several sources, degraded streambanks due to livestock and severe siltation downstream from Highway 92 and the Ox Mountain Landfill” (DFG ca 1994).

A 1992 DFG stream survey report stated that because the "area is pumped dry during the summer it does not provide rearing space" (DFG 1992b). The report also recommended re-vegetation in the lower watershed. A restoration plan for the Pilarcitos Creek watershed was prepared in 1996 and reported observations of *O. mykiss* YOY and "smolt-sized" individuals. The report identified several issues of concern including reduced stream flow, sedimentation, and riparian condition (PWA 1996).

In response to a 2003 notice from NMFS, the SFPUC commissioned fisheries studies in the Pilarcitos watershed that are reported in a 2006 publication. The investigations concerned the five mile reach centered at Stone Dam. Multiple *O. mykiss* year classes were observed at three sampling sites between Stone and Pilarcitos dams. The report concludes, "About 2.3 miles of potential steelhead habitat exists upstream of Stone Dam Reservoir compared to 2.7 miles from Stone Dam to the downstream boundary of the CCWD property" (Entrix 2006, p. 3-9). According to the study, the reach between the dams "…will support the production of about 8 pairs of adult steelhead" (Entrix 2006, p. 4-1). The study also used average population densities from previous surveys to estimate production of juvenile steelhead between Stone Dam and the CCWD property boundary at about 5,500 individuals (Entrix 2006).

An assessment of Pilarcitos Creek fish habitat is included in a recent draft watershed management plan. Spawning and rearing habitat are cited as ranging from "poor" to "fair-good," and limiting factors are considered to be flow and fine sediment (PWA 2007). Information regarding the resident *O. mykiss* population of Pilarcitos Lake tributaries is being developed (Sak pers. comm.).

Arroyo Leon

Arroyo Leon consists of about 6.5 stream miles and is tributary to Pilarcitos Creek. It flows northwest, entering Pilarcitos Creek on the eastern side of the city of Half Moon Bay. Two seasonal dams on Arroyo Leon between Half Moon Bay and the Johnston Historic Site may comprise passage barriers (DFG ca 1994).

A 1941 DFG note relays reports of steelhead spawning in Arroyo Leon. The note also indicates the impact of agricultural water diversion, but notes "summer fishing" upstream from diversion dams in the creek (DFG 1941).

Staff from DFG surveyed Arroyo Leon in 1958 and observed multiple *O. mykiss* year classes. The survey report states, "At least and probably better than Pilarcitos Creek…as regards steelhead spawning and nursery areas" (DFG 1958c).

Arroyo Leon was surveyed in 1977 and was said to have "…lost its former value as an anadromous fishery resource" (DFG 1977b). Limiting factors included removal of riparian vegetation, dumping of debris and fill, and siltation due to reduced flows and bank erosion.

A restoration plan for the Pilarcitos Creek watershed was prepared in 1996 and reported observations of "smolt-sized" *O. mykiss* individuals in Arroyo Leon. The report identified "potential migration barriers created by inadequate flow during smolt migration periods" (PWA 1996, p. 31). Studies of Arroyo Leon and its reservoirs were performed in 2000. The resulting report states, "It is possible that in years like 2000 the Arroyo Leon reservoirs could account for the majority of smolt production in the Arroyo Leon watershed" (Smith 2001, p. 6).

During a consultant's site visit to Arroyo Leon in 2002, multiple *O. mykiss* year classes, including YOY and an individual about 21 inches in length, were observed (HES 2002b). An assessment of Arroyo Leon fish habitat is included in a recent draft management plan for the Pilarcitos Creek watershed. Spawning and rearing habitat are cited as mostly "poor" or "fair," and limiting factors are considered to be flow and fine sediment (PWA 2007).

Mills

Mills Creek consists of about 3.8 stream miles and is tributary to Arroyo Leon. It flows west, entering Arroyo Leon in Higgins Canyon. According to a 1996 report, "scour downstream of the historic bridge has created a potential migration barrier" (PWA 1996, p. 31). A series of rock weirs downstream of the historic bridge were placed in the creek in 2001 to facilitate passage (Nelson pers. comm.).

Staff from DFG surveyed Mills Creek in 1958 and observed *O. mykiss* juveniles. The survey report states, "Mills Creek should be an excellent SH spawning ground but appears to be a weak nursery area because of lack of cover" (DFG 1958d).

An undated creek inventory states, "Mills Creek is a pristine stream" (DFG ca 1994). Sampling in 1995 in Mills Creek produced observations of multiple *O. mykiss* year classes (HRG 1996). A restoration plan for the Pilarcitos Creek watershed was prepared in 1996 and reported observations of *O. mykiss* at "relatively high" densities. The report recommended addressing the Mills Creek passage barrier (PWA 1996).

An assessment of Mills Creek fish habitat is included in a recent draft management plan for the Pilarcitos Creek watershed. Spawning and rearing habitat are cited as mostly "fair," and limiting factors are considered to be flow and fine sediment (PWA 2007).

Madonna

Madonna Creek consists of about 2.5 stream miles and is tributary to Pilarcitos Creek. It flows west, entering Pilarcitos Creek northwest of the city of Half Moon Bay. According to a 1996 consultants' report, a fish passage barrier is located approximately 0.3 miles upstream from the Pilarcitos Creek confluence (PWA 1996).

A restoration plan for the Pilarcitos Creek watershed was prepared in 1996 and reported no observations of *O. mykiss* during "spot" checks in 1995. The creek was said to have "low potential for salmonid fisheries" due to the passage barrier and low streamflow (PWA 1996).

An assessment of Madonnas Creek fish habitat is included in a recent draft management plan for the Pilarcitos Creek watershed. Spawning and rearing habitat are cited as mostly "poor," and limiting factors are considered to be flow and fine sediment (PWA 2007).

Apanolio

Apanolio Creek consists of about 3.4 stream miles and is tributary to Pilarcitos Creek. It flows south, entering Pilarcitos Creek near the entrance to Diggs Canyon. According to a 1996 consultants' report, the Bongard Diversion Dam "…is impassable for upstream migration during most flow conditions" (PWA 1996). A second diversion dam also is a passage barrier (Nelson pers. comm.).

Staff from DFG sampled Apanolio Creek in 1987 and observed multiple *O. mykiss* year classes (DFG 1987). A 1988 memo characterizes the fishery, "Adult steelhead probably utilize the headwaters area for spawning and nursery habitat during favorable flow conditions coexisting with a resident trout population that reproduces without ever leaving the stream" (DFG 1988a).

In 1990, Apanolio Creek was studied in relation to the steelhead fishery of the Pilarcitos Creek watershed. The resulting report notes passage problems limiting use by steelhead and states, "…Apanolio Creek probably can make a major contribution to watershed steelhead production in wetter years" (Smith 1990a, p. 9). Multiple *O. mykiss* year classes were observed during sampling in 1995 (HRG 1996).

A restoration plan for the Pilarcitos Creek watershed was prepared in 1996 and reported observations of multiple *O. mykiss* year classes with "relatively high" densities in 1995. The report recommended modifying the fish passage barrier on Apanolio Creek (PWA 1996).

An assessment of Apanolio Creek fish habitat is included in a recent draft management plan for the Pilarcitos Creek watershed. Spawning and rearing habitat are cited as mostly "poor" or "fair," and limiting factors are considered to be flow and fine sediment (PWA 2007).

Corinda Los Trancos

Corinda Los Trancos Creek consists of about 1.6 stream miles and is tributary to Pilarcitos Creek. It flows south, entering Pilarcitos Creek at about stream mile three.

A 1974 DFG letter reported on a survey of Corinda Los Trancos Creek. It states, "Juvenile steelhead trout were found in the lower reach of Corinda Los Trancos Creek, but no fish were found in the upper stream reaches…" (DFG 1974b).

A 1992 stream survey of Pilarcitos Creek indicated that sediment produced in association with the landfill in the Corinda Los Trancos Creek watershed was impacting downstream reaches (DFG 1992b). A restoration plan for the Pilarcitos Creek watershed was prepared in 1996 and reported observations of YOY/yearling *O. mykiss* in 1995. Corinda Los Trancos Creek was said to have "low quality salmonid fisheries habitat" (PWA 1996).

Nuff

Nuff Creek consists of about 1.9 stream miles and is tributary to Pilarcitos Creek. It flows south, entering Pilarcitos Creek in lower Albert Canyon. Quarrying operations near the Pilarcitos Creek confluence involved installation of a culvert in the 1960s that is considered a total passage barrier (DeAtley pers. comm.).

The creek was spot checked in 1995 as part of a watershed assessment and *O. mykiss* was not observed. The resulting report states, "…fish have not been known to reside in Nuff Creek for at least thirty years" (PWA 1996).

An assessment of Nuff Creek fish habitat is included in a recent draft management plan for the Pilarcitos Creek watershed. Spawning and rearing habitat are cited as mostly "poor," and sediment is noted as a limiting factor (PWA 2007).

Albert Canyon

Albert Canyon Creek consists of about 1.5 stream miles and is tributary to Pilarcitos Creek. It flows northwest, entering Pilarcitos Creek west of Cahill Ridge. A boulder falls located about 0.5 miles upstream from the Pilarcitos Creek confluence is believed to be the upstream limit of anadromy (PWA 2007).

Staff from DFG surveyed Albert Canyon Creek in 1988 and observed multiple *O. mykiss* year classes. The latter creek was deemed "an important spawning and nursery stream for steelhead trout" (DFG 1988b, p. 2).

In 1997, DFG staff documented sedimentation impacts of road construction on Albert Canyon Creek and observed *O. mykiss*. The records state in part, "In summer when the creek water level is lowest, the steelhead trout are limited to the pools of the creek bottom; …the effect of the silt and sediment…[was] especially serious…" (Vonarb 1997). Sampling in 1998 and 1999 also produced *O. mykiss* (PWA 2007).

An assessment of Albert Canyon Creek fish habitat is included in a recent draft management plan for the Pilarcitos Creek watershed. Rearing habitat is cited as mostly "poor-fair," and flow, sediment, and access are noted as limiting factors (PWA 2007). However, the creek is called "…probably a very important spawning site that seeds much of the rearing habitat downstream in Pilarcitos Creek" (PWA 2007).

Cañada Verde

Cañada Verde Creek consists of about 2.5 stream miles. It flows west, entering the Pacific Ocean south of Miramontes Point.

A 1912 letter regarding San Mateo County streams describes Cañada Verde Creek, which it refers to as Franklin or Cowell Ranch creek. The letter states, "Has not been stocked by Commission for past three years, but has trout" (Smith 1912). A fishway also is noted on the creek at about stream mile 1.5.

Purisima

Purisima Creek consists of about 7.9 stream miles and drains a watershed of about nine square miles. It flows west, entering the Pacific Ocean south of Eel Rock. The creek is inaccessible to migratory fish due to a 30 foot waterfall at the Pacific Ocean (DFG ca 1994).

A 1912 letter described Purissima Creek and noted that steelhead could not enter the stream. The creek was said to offer "fine fishing," presumably of stocked rainbow trout (Smith 1912).

Staff from DFG surveyed Purisima Creek in the 1930s and noted the presence of rainbow trout and steelhead. The survey report indicates that steelhead were stocked with "poor" success" and rainbow trout stocking was "successful" (DFG ca 1934a). It is unclear what differentiated between the two *O. mykiss* forms.

Purisima Creek was surveyed in 1958 and *O. mykiss* was observed. The survey report states, "Judging from the present population a fair trout stream supporting resident trout that are apparently self-sustaining" (DFG 1958e).

An undated creek inventory states, "Much of the upper drainage is located within the Purisima Creek Open Space Preserve and presents a pristine appearance although heavily logged in the past" (DFG ca 1994). It adds, "Extensive grazing has caused streambank degradation in the lower portions of the creek. Coliform bacteria are present in much of the downstream area" (DFG ca 1994).

Staff from NMFS observed multiple *O. mykiss* year classes in Purisima Creek in 1995 (NMFS 1996). In June 2006, multiple *O. mykiss* year classes were observed "in moderate abundance" near two road crossings of the creek (Stoecker pers. comm.).

Lobitos

Lobitos Creek consists of about five stream miles and has a watershed of about four square miles. It flows southwest, entering the Pacific Ocean at Martins Beach. According to DFG staff, the Highway 1 and Verde Road crossings are total passage barriers (Nelson pers. comm.).

According to DFG records reviewed by Titus *et al.* (in prep.), *O. mykiss* was stocked in Lobitos Creek in the 1930s. Shapovalov reported steelhead caught from this stream in 1939 (DFG 1939). Staff from DFG surveyed Lobitos Creek in 1953 and observed *O. mykiss* fingerlings. The survey report calls Lobitos Creek, "A small coastal stream used as a nursery by migratory fish" (DFG 1953d).

A 1975 survey report states, "Lobitos Creek presently supports a minimal rainbow trout/steelhead resource. Steelhead usage appears to be restricted to the lowermost 0.2-mile reach because of fish passage problems (DFG 1975a). It adds, "Fair spawning habitat exists above the fish passage hazards" (DFG 1975a).

An undated creek inventory states, "While the downstream portion of Lobitos flows through an agricultural terrace, the stream is [in] fair condition and reportedly supports an annual steelhead run" (DFG ca 1994). In a 1999 memo DFG staff state, "One of the most predominant problems in the watershed is siltation" (DFG 1999). Necessary remediation efforts were said to include debris removal, revegetation, and control of stormwater runoff for improving water quality and decreasing sedimentation.

A brief survey was conducted in the Lobitos Creek reach between the Highway 1 crossing and the lagoon in 2002. The reach had "low densities of fry" and *O. mykiss* between about six and seven inches in length (Nelson pers. comm.). Extensive habitat typing was conducted in Lobitos Creek in 2006. Multiple *O. mykiss* year classes were observed upstream from the Highway 1 crossing. Staff from DFG indicate that *O. mykiss* in the creek likely have been stream reproducing since the 1920s (Nelson pers. comm.).

Schoolhouse

Schoolhouse Creek consists of about 0.5 stream miles and is tributary to Lobitos Creek. It flows northwest, entering Lobitos Creek at the town of Lobitos.

Since Schoolhouse Creek enters Lobitos Creek upstream from a total passage barrier, DFG staff speculates that steelhead spawners have not had access to the creek since the 1920s (Nelson pers. comm.). The lower reach of the creek was found to be dry during a 2006 DFG survey.

Rogers Gulch

Rogers Gulch Creek consists of about 0.5 stream miles and is tributary to Lobitos Creek. It flows northwest, entering Lobitos Creek at about stream mile 1.6.

Since Rogers Gulch Creek enters Lobitos Creek upstream from a total passage barrier, DFG staff speculates that steelhead spawners have not had access to the creek since the 1920s (Nelson pers. comm.).

Tunitas

Tunitas Creek consists of about 6.6 stream miles and has a watershed of about 15 square miles. It flows southwest, entering the Pacific Ocean at Tunitas Beach. The upstream limit of anadromy appears to be a boulder/bedrock falls at about stream mile 6.2 (Nelson pers. comm.).

Shapovalov reported smolts of anadromous origin in Tunitas Creek in 1939 (DFG 1939). According to a 1962 stream survey report, steelhead normally had access to good spawning and nursery areas in at least the lower two miles of Tunitas Creek (DFG 1962a). The survey report cites the local warden as estimating the run to be 100 to 200 individuals.

Staff from NMFS found *O. mykiss* in Tunitas Creek during two visits to the headwaters in 1995 (NMFS 1996). Extensive habitat typing was conducted by DFG staff in the Tunitas Creek watershed in 2006. The watershed's *O. mykiss* population appeared to be at relatively low abundance overall, with the greatest density of juveniles occurring in the upper creek reach (Nelson pers. comm.). Limiting factors include excessive sedimentation, low creek flows, and water quality issues.

Dry Creek

Dry Creek consists of about 2.5 stream miles and is tributary to Tunitas Creek. It flows west, entering Tunitas Creek at about stream mile 0.5.

Dry Creek was named as an important source of Tunitas Creek flows in a 1962 DFG stream survey report (DFG 1962a). The survey also found *O. mykiss* in the lower portion of the creek (DFG 1962a).

Extensive habitat typing was conducted by DFG staff in the Tunitas Creek watershed in 2006. *Oncorhynchus mykiss* fry and parr were observed at very low densities (Nelson pers. comm.).

East Fork Tunitas

East Fork Tunitas Creek consists of about 2.1 stream miles and is tributary to Tunitas Creek. It flows west, entering Tunitas Creek at about stream mile 2.3. The creek passes under Tunitas Creek Road in a culvert immediately upstream from the Tunitas Creek confluence. The culvert is believed to be passable by migrating steelhead (Nelson pers. comm.).

A 1964 stream survey report called the East Fork "an important steelhead spawning and nursery tributary and a main source of summer and winter flow to Tunitas Creek (DFG 1964a). *Oncorhynchus mykiss* YOY were observed during the survey.

Staff from DFG visited East Fork Tunitas Creek in 2006. *Oncorhynchus mykiss* parr and age 1+ individuals were observed (Nelson pers. comm.).

San Gregorio

San Gregorio Creek consists of about ten stream miles and drains a watershed of about 51 square miles. It is formed by the confluence of La Honda and Alpine Creeks and flows west, entering the Pacific Ocean at San Gregorio State Beach. Other important tributaries include El Corte de Madera, Bogess, and Harrington creeks.

San Gregorio Creek was one of four "A-1" streams noted in San Mateo County in a 1912 memo, which also noted that the stream was stocked (Smith 1912). A DFG field note from 1962 relays the warden's estimate of the maximum steelhead run at about 1,000 individuals. The 1961-1962 run was estimated to be about 300 individuals (DFG 1962b). Estimation methods are not provided in the note.

A 1971 report states, "critical summer flows are likely an important factor that limits steelhead production in the creek" (DFG 1971a, p. 6). In 1975, DFG staff stated, "the San Gregorio River system is one of the more important salmonid spawning and nursery resources along the coast of central California" (DFG 1975b).

A 1984 SWRCB report delineates bypass flow requirements for San Gregorio Creek and some tributaries. Flow recommendations in the report include seasonal minimum flows and migration flows following storm events (SWRCB 1984).

Staff from DFG surveyed San Gregorio Creek in 1985 and observed *O. mykiss*, including individuals to 22 inches in length. The survey report states, "All illegal dams and diversions should be investigated. Additional water diversions should be considered very carefully to avoid reducing the water level of the creek below the minimal flow to sustain fish life" (DFG 1985b).

Jerry Smith notes that "a substantial portion of potential smolt production is in the relatively large lagoon…" of San Gregorio Creek and deduces that "actions affecting lagoon quality probably have the biggest effect on steelhead production" (Smith 1994, p. 6). Staff from NMFS observed multiple *O. mykiss* year classes in San Gregorio Creek in 1995 (NMFS 1996).

In a 2001 letter staff from the Division of Water Rights states, "…our preliminary analysis of water availability in the San Gregorio Creek watershed indicates that collectively, existing approved water demands exceed 50 percent of the estimated average unimpaired flow from October 1 to March 31 at the San Gregorio gage. According to guidelines…diversion of over 10 percent of the average unimpaired flow is likely to cause adverse effects on coho salmon and steelhead trout habitat in San Gregorio Creek" (SWRCB 2001). The watershed is fully adjudicated and there are numerous individuals seeking to obtain water rights.

Coyote

Coyote Creek consists of about 2.2 stream miles and is tributary to San Gregorio Creek. It flows south, entering San Gregorio Creek at about stream mile 2.6.

Staff from DFG surveyed Coyote Creek in 1973. The survey report deems the creek "…an intermittent seasonal tributary to San Gregorio Creek" and states, "Coyote Creek provides minimal spawning and no summer nursery habitat for anadromous salmonids. This creek has been heavily damaged by man and livestock" (DFG 1973c). A total barrier to fish passage was noted in the lower reach of the stream.

Clear

Clear Creek consists of about three stream miles and is tributary to San Gregorio Creek. It flows south, entering San Gregorio Creek less than one mile upstream from the Coyote Creek confluence.

Staff from DFG surveyed Coyote Creek in 1973. The survey report deems the creek "…an intermittent seasonal tributary to San Gregorio Creek" and states, "It does not provide salmonid summer nursery habitat, and offers minimal spawning habitat" (DFG 1973d).

El Corte de Madera

El Corte de Madera Creek is tributary to San Gregorio Creek and consists of about 8.5 stream miles draining an area of about ten square miles. It flows south, entering San Gregorio Creek about 1.5 miles upstream from the Clear Creek confluence.

Staff from DFG surveyed El Corte de Madera Creek in the 1930s, noting the presence of steelhead and observations of spawning. The survey report notes the impact of fishing on the run in the creek (DFG ca 1934b). A 1942 DFG letter indicates stocking between 1930 and 1941 (DFG 1942).

A 1962 letter characterizes El Corte De Madera Creek in stating, "The steam has only fair spawning gravel, but its length and relatively permanent flow make it a fairly important steelhead spawning and nursery tributary to the San Gregorio Creek drainage" (DFG 1962c). In 1964, DFG surveyed El Corte de Madera Creek and noted impacts of sediment produced by poor logging practices (DFG 1964b).

Staff from DFG surveyed the creek in 1985 and observed multiple *O. mykiss* year classes, including individuals to 18 inches in length. The survey report states, "Cattle grazing and logging have been the two major problems which have greatly reduced the amount of salmonid spawning habitat" (DFG 1985c). These land uses also were said to have reduced rearing habitat.

Staff from DFG conducted a stream inventory of El Corte de Madera Creek in 1996. Steelhead were observed at each of the four sample sites and ranged in size between about two and 9.5 inches in length. The resulting report recommended allowing recruitment of woody debris and decreasing impacts of cattle on the stream and riparian areas (Hickethier and Miles 1996).

El Corte Madera Creek was the subject of a 2001 NMFS letter to the regional open space district. The letter indicated that roads and trails in the upper portion of the basin were producing high sedimentation rates in the creek and recommended a program of maintenance and closure (NMFS 2001).

Bogess

Bogess Creek is tributary to San Gregorio Creek and consists of about 4.7 stream miles draining an area of about 3.3 square miles. It flows south, entering San Gregorio Creek about 0.7 miles upstream from the El Corte de Madera Creek confluence.

A field note from 1964 states, "It was the opinion of the observers that [Bogess Creek] would not support fishlife during the summer…" (DFG 1964c). However, in an inventory of San Mateo County streams, the creek is said to be "important for steelhead spawning and nursery" (DFG ca 1965).

A 1984 SWRCB report delineates bypass flow requirements for San Gregorio Creek and some tributaries. Flow recommendations in the report include seasonal minimum flows for Bogess Creek (SWRCB 1984).

Staff from DFG conducted a stream inventory of Bogess Creek in 1996. Steelhead were observed at each of the 16 sample sites and ranged in size between about 1.5 and ten inches in length. The resulting report recommended allowing recruitment of woody debris, identifying and treating sediment sources, decreasing impacts of cattle on riparian areas, and modifying the culvert under Highway 84 to improve passage conditions (Dunn and Renger 1996).

Staff from DFG sampled two Bogess Creek sites in September 2007. Multiple *O. mykiss* year classes were observed at both the lower and upper creek locations (Nelson pers. comm.).

Kingston

Kingston Creek consists of about 1.6 stream miles and is tributary to San Gregorio Creek. It flows northwest, entering San Gregorio Creek north of Deer Park Ridge.

A 1985 DFG survey found that Kingston Creek provided "good rearing habitat for salmonid fish" and supported a population of resident rainbow trout (DFG 1985d). The survey report said that natural propagation appeared to be poor and also described barriers that limited or precluded steelhead migration. The report recommended, "water diversions should be kept to a minimum to guarantee minimum flows to sustain fish life" (DFG 1985d, p. 3).

Harrington

Harrington Creek consists of about five stream miles and is tributary to San Gregorio Creek. It flows south, entering San Gregorio Creek west of the town of Redwood Terrace.

Staff from DFG surveyed Harrington Creek in 1964 and observed multiple *O. mykiss* year classes and "good" natural propagation. The survey report states, "Harrington Creek is an important spawning and rearing area for RT-SH" (DFG 1964d). The report noted that siltation resulting from cattle use of the stream was decreasing the creek's productivity.

Staff from DFG conducted a stream inventory of Harrington Creek in 1996. Steelhead were observed at each of the three sample sites and ranged in size between about 1.8 and 7.4 inches in length. The resulting report recommended allowing recruitment of woody debris and identifying and treating sediment sources (DFG 1996a).

Staff from DFG sampled two Harrington Creek sites in September 2007. Multiple *O. mykiss* year classes were observed at both the lower and upper creek locations (Nelson pers. comm.)

La Honda

La Honda Creek consists of about 7.6 stream miles and is tributary to San Gregorio Creek. It flows south, entering San Gregorio Creek at the town of La Honda.

A field note from 1962 indicates "a bad siltation problem" in La Honda Creek due to logging. It states, "The steelhead run in this stream has been steadily going downhill…" (DFG 1962d). Staff from DFG surveyed La Honda Creek in 1964 and noted multiple *O. mykiss* year classes. The survey report states, "…the lower three miles of the stream provide a highly productive spawning and nursery area for steelhead" (DFG 1964e).

A 1973 survey report notes that La Honda Creek provides "good to excellent spawning and summer nursery habitat for steelhead trout…" (DFG 1973e). The report recommends protesting additional diversion applications and improving operations of flashboard dams.

In 1985, DFG staff surveyed the creek and found "fair" habitat. The survey report states, "The limiting factor for rearing habitat is the amount of food available to the fish. Due to the low flow over the riffles, food is not being carried into the pools where the fish are holding" (DFG 1985e).

Sampling was performed in 1995 as part of a comprehensive stream survey and multiple *O. mykiss* year classes were observed. The survey report recommends revegetation and improved road maintenance among other measures to control sediment (DFG 1997a). A 1996 review of habitat limitations noted additional stream impacts including encroachment within the floodplain and on streambanks, decreased streamflow due to diversion, and water quality impacts from dumping and discharge to the creek (DFG 1996b).

Staff from DFG sampled two LaHonda Creek sites in September 2007. Multiple *O. mykiss* year classes were observed at both the lower and upper creek locations (Nelson pers. comm.)

Woodhams

Woodhams Creek consists of about 1.8 stream miles and is tributary to La Honda Creek. It flows west, entering La Honda Creek north of the town of La Honda. A mutual water company diverts water from Woodhams Creek for storage in an unnamed tributary to Woodhams Creek.

In a 1964 field note, DFG staff noted that Woodhams Creek was "not suitable for spawning or nursery by [steelhead]" due to the presence of total passage barriers near the La Honda Creek confluence" (DFG 1964f). The cited barrier is a 12 foot high waterfall (Nelson pers. comm.).

Langley

Langley Creek consists of about 1.7 stream miles and is tributary to La Honda Creek. It flows west, entering La Honda Creek approximately 0.6 miles upstream from the Woodhams Creek confluence.

A 1964 field note indicates that Langley Creek is "not suitable for spawning or nursery" by steelhead (DFG 1964f). Low flows and substrate are cited as limiting factors.

In a 1996 stream inventory report, DFG noted that steelhead were sampled in the previous year. The report recommended management as a "natural production steelhead stream" including increasing woody debris recruitment and reducing sedimentation (McKernan and Ouradnik 1996).

Woodruff

Woodruff Creek consists of about 3.1 stream miles and is tributary to La Honda Creek. It flows west, entering La Honda Creek about 0.6 miles north of the Langley Creek confluence.

In 1964, DFG surveyed Woodruff Creek and noted steelhead in the lower part (~1.25 miles) of the stream and rainbow trout throughout the surveyed reach (DFG 1964g). The report stated that the creek "contributes significant unpolluted winter and summer flow to La Honda Creek and extends [steelhead] spawning and nursery grounds of La Honda Creek by 15/100 of a mile" (DFG 1964g).

The stream has been stocked historically. However, a 1978 DFG report cites Woodruff Creek *O. mykiss* as being "a remnant of the historic runs once utilizing the San Gregorio Creek drainage" (DFG 1978a).

Alpine

Alpine Creek consists of about 5.2 stream miles and is tributary to San Gregorio Creek. It flows west, entering San Gregorio Creek south of the town of La Honda. A fishway was constructed in 1974 at the "Pescadero Road culvert".

A field note from 1962 states, "A good run of adult steelhead enters Alpine Creek normally" (DFG 1962d). Staff from DFG surveyed Alpine Creek in 1963 and observed multiple *O. mykiss* year classes. The survey report states, "It is an important spawning and nursery area for steelhead. It has a good summer flow" (DFG 1963a).

A 1996 memo concerning coho salmon habitat in San Mateo and Santa Cruz counties discusses Alpine Creek. The memo notes sedimentation impacts from road maintenance and home construction, as well as decreased stream flow due to diversion (DFG 1996b). Alpine Creek was surveyed in 1995 and multiple *O. mykiss* year classes were observed, including YOY. The survey report recommended removing exotic riparian plants and re-vegetating with native species, controlling sediment input into the creek, and other habitat protection measures (DFG 1997b). Staff from NMFS surveyed Alpine Creek in 2006 and observed multiple *O. mykiss* year classes (Spence pers. comm.).

Mindego

Mindego Creek is tributary to Alpine Creek and consists of about 4.5 stream miles. It flows southwest, entering Alpine Creek at about stream mile 1.8. A dam is located at stream mile 0.75 that has a fishway. A mutual water company diverts water from Mindego Creek for storage in an unnamed tributary to Woodhams Creek.

In a 1964 survey report, DFG staff noted that "Mindego Creek is [an] important supplement to [the] water supply of Alpine Creek, and contributes approximately 1/2 mile of fair silver salmon and steelhead trout spawning grounds to [the] San Gregorio river system" (DFG 1964h, p. 1). The survey found steelhead downstream from Log Cabin Ranch dam and "native" rainbow trout upstream from the dam (DFG 1964h).

A 1973 DFG survey report recommended management of Mindego Creek for steelhead spawning and nursery purposes, including discontinuing the practice of seasonal damming and protesting additional water diversion during the summer and fall months (DFG 1973f). A 1984 SWRCB report delineates bypass flow requirements for San Gregorio Creek and some tributaries. Flow recommendations in the report include seasonal minimum flows for Mindego Creek (SWRCB 1984).

In sampling during the summer of 1996, DFG found *O. mykiss* at two sites. The survey report recommended identifying and treating sediment sources, and monitoring and maintaining the fishway at the dam (DFG 1996a). Staff from NMFS sampled Mindego Creek in 2006 and observed multiple *O. mykiss* year classes (Spence pers. comm.).

Rodgers Gulch

Rodgers Gulch Creek consists of about 1.4 stream miles and is tributary to Alpine Creek. It flows southwest, entering Alpine Creek about one quarter mile upstream from the Mindgeo Creek confluence.

As part of a fish passage evaluation, Rodger's Gulch Creek was inspected in March 2004. A single three inch long "salmonid" was observed near the Alpine Road crossing (Taylor 2004).

Pomponio

Pomponio Creek consists of about seven stream miles. It flows west, entering the Pacific Ocean at Pomponio State Beach. The dam forming Pomponio Reservoir is located at about stream mile 6.2. A 15 foot high bedrock waterfall is located about 2.3 miles upstream from the creek mouth.

In 1958, a DFG survey found *O. mykiss* fingerlings "common" downstream from a 25 foot bedrock falls on Pomponio Creek and absent upstream (DFG 1958f). The survey report noted that about one mile of the creek was open to, and used by, steelhead. The five mile reach upstream of the falls was estimated to have a "small native trout population" (DFG 1958f).

Pomponio Creek was part of a study of estuary/lagoon systems between 1985 and 1989. The resulting report states, "Pomponio Creek is…a very small stream with negligible summer flow…" (Smith 1990b). During the study, two steelhead smolts were collected from the creek's lagoon.

Staff from DFG surveyed Pomponio Creek in 2000. The survey report noted "adequate" steelhead spawning and rearing habitat downstream of the waterfall (DFG 2000). Two *O. mykiss* year classes were collected during the sampling. The report recommended decreasing sedimentation through cattle exclusion, evaluating instream flow availability, and riparian revegetation with native species (DFG 2000).

Pescadero

The Pescadero-Butano watershed has headwaters in the Santa Cruz Mountains and drains an area of about 81 square miles. Portions of this system often cited as most important in terms of salmonid resources include the Pescadero mainstem (especially the lagoon) and the upper watershed tributaries Tarwater, Peters, Slate, Oil and Lambert creeks.

Pescadero Creek was one of four "A-1" streams noted in San Mateo County in a 1912 DFG letter and appears to have supported the largest steelhead run in the county historically (DFG 1912). Staff from DFG visited Pescadero Creek in 1946. The resulting report states, "Undoubtedly, the condition of Pescadero Lagoon and the lower part of Pescadero Creek has deteriorated over the years, the lagoon becoming shallower and the summer flows in the stream smaller. The principal causes have been the increasing use of water for irrigation and domestic use, deforestation of the drainage basin, and silting created by highway construction and erosion of cultivated fields" (DFG 1946).

The report from a 1962 DFG survey noted that Pescadero Creek was "under-utilized" due to passage barriers and sedimentation (DFG 1962e). In a 1967 report concerning Love Creek (tributary to the San Lorenzo River), the annual steelhead run of Pescadero Creek was estimated to consist of 1,500 individuals (DFG 1967). (The estimation method is not provided in the report.) Pescadero Creek has been the object of extensive "annual maintenance stockings" and the population may reflect mixed wild, hatchery origin.

Research on the Pescadero Creek watershed indicates the relative importance of the lagoon to the system. According to a principal researcher, up to 80 percent of the steelhead population of the watershed may rear in the lagoon (SWRCB 1996, p. 4).

Staff from DFG surveyed Pescadero Creek in 1996 and observed multiple *O. mykiss* year classes, including YOY and individuals to about 10.5 inches in length. The survey report recommends assuring adequate stream flows for over-summering, reducing nutrient loading, and decreasing sedimentation through land use improvements and re-vegetation (DFG 1996c). Staff from DFG also has recommended only off-stream reservoirs in the watershed and establishing minimum flows to be measured in the area near the mouth of the creek (SWRCB 1996).

A watershed assessment noted abundant salmonid habitat, including areas of high quality habitat in the mid and upper Pescadero Creek watershed (ESA 2004, p. 8-14). The assessment identified several primary limiting factors for the Pescadero Creek system including lack of pool habitat (due in part to logging effects) and sedimentation (ESA 2004). Staff from NFMS observed multiple *O. mykiss* year classes throughout a 13-mile section of Pescadero Creek in 2005, and in four locations in 2006 (Spence pers. comm.). Spawning steelhead were observed in the creek in April 2005 and March 2006 (Stoecker pers. comm.).

In recent years, fishkills have been associated with the breaching of the sandbar forming the Pescadero Creek lagoon. An on-going stakeholder process is being conducted to identify the mechanism for the kills. Recent lagoon sampling produced *O. mykiss* individuals between about 4.5 and 12.5 inches in length (DPR 2007).

Butano

Butano Creek consists of about 14.7 stream miles and is tributary to Pescadero Creek. It flows largely west, entering Pescadero Creek in the Pescardero Marsh.

Titus *et al.* (in prep.) reported DFG observations of juvenile and adult steelhead in Butano Creek in the 1930s. Stocking of the stream was noted in the 1930s as well.

Staff from DFG surveyed Butano Creek in 1964 and noted *O. mykiss* with "fair" natural propagation. The survey report noted that the creek supported both a residualized population of hatchery origin rainbow trout and reproduction by steelhead. The survey report states, "Logging practices have resulted in damage to watershed. Erosion is noticeable. Stream channels have a deep layer of silt" (DFG 1964i).

A 1996 memo concerning habitat limitations notes removal of riparian vegetation and lack of instream flow due to water diversions as factors affecting Butano Creek (DFG 1996b). A 1997 letter from staff at the San Mateo County RCD indicates that Butano Creek supports a steelhead population (Schroeder 1997).

A 2004 watershed assessment assigned low habitat rating scores to Butano Creek and noted sedimentation as the limiting factor in the drainage (ESA 2004). Staff from NMFS surveyed Butano Creek in 2006 and observed multiple *O. mykiss* year classes (Spence pers. comm.). Conversations with a local resident indicate that adult steelhead have been observed up to the base of Butano Falls in recent years (Stoecker pers. comm.).

Little Butano

Little Butano Creek consists of about 4.9 stream miles and is tributary to Butano Creek. It flows west, entering Butano Creek at about stream mile 5.3. In 1958, DFG noted a dam 180 yards upstream from the "bridge on Little Butano" that constituted a passage barrier (DFG 1958g). A natural falls at stream mile 0.15 (~300 yards upstream from the mouth) was considered a total migration barrier in a 1962 survey (DFG 1962f).

Titus *et al.* (in prep.) noted stocking of Little Butano Creek in the 1930s. During a 1958 survey, DFG noted *O. mykiss* "common to abundant" downstream of the dam and speculated that *O. mykiss* observed upstream of the dam "must be off-spring of resident trout" (DFG 1958g). The survey report recommended dam removal to provide access to "fairly good spawning areas" upstream (DFG 1958g).

In a 1962 survey report, DFG noted "much damage from old logging" in Little Butano Creek (DFG 1962f). The report noted that the creek "had good possibilities for spawning and nursery for trout" but largely was inaccessible due to a culvert and the natural falls in the lower channel (DFG 1962f). In 1977, DFG characterized the creek as "an important tributary to Butano Creek in providing both winter and summer flows" and recommended conserving flows by protesting additional water diversion (DFG 1977c).

Staff from NMFS observed multiple *O. mykiss* year classes in Little Butano Creek in October 1995 (NMFS 1996). A 1996 DFG memo concerning habitat limitations noted sedimentation effects from poorly constructed dirt road crossings and cattle grazing, and nutrient loading from cattle grazing in the Little Butano Creek watershed (DFG 1996b). A 2004 Pescadero Creek watershed assessment found the creek to have "optimal" aquatic habitat and placed priority on conserving and improving habitat in this tributary (ESA 2004). Staff from NMFS surveyed Little Butano Creek in 2006 and observed multiple *O. mykiss* year classes (Spence pers. comm.).

South Fork Butano

South Fork Butano Creek consists of about four stream miles and is tributary to Butano Creek. It flows northwest, entering Butano Creek upstream from Butano Falls.

Staff from DFG surveyed South Fork Butano Creek in 1964 and observed multiple *O. mykiss* year classes, including YOY. The survey report indicates that the population was established by stocking and states, "…under poor stream conditions, …success is remarkably good" (DFG 1964j). The report adds, "Logging has resulted in erosion problems" (DFG 1964j).

Bradley

Bradley Creek consists of about 2.9 stream miles and is tributary to Pescadero Creek. It flows south, entering Pescadero Creek west of the town of Pescadero.

A 1996 memo regarding coho salmon habitat in San Mateo and Santa Cruz counties addresses Bradley Creek. The memo notes habitat impacts from grazing and over allocation of water rights (DFG 1996b). Staff from DFG visited Bradley Creek in April 1997 and found multiple *O. mykiss* age classes in multiple locations (SWRCB 1997). The resulting report expressed DFG's opinion that the fish were progeny of steelhead and possibly resident rainbow trout (DFG 1997c). The report stated, "no new diversions should be allowed from March through December" in order to maintain rearing habitat (SWRCB 1997, p. 3).

Bradley Creek was evaluated in 2004 as part of a fish passage study. The resulting report states, "On repeated site visits in spring of 2002…, numerous juvenile steelhead and a single adult steelhead were observed…" (Taylor 2004, App. B)

Shaw Gulch

Shaw Gulch Creek consists of about 1.1 stream miles and is tributary to Bradley Creek. It flows west, entering Bradley Creek at about stream mile 1.9. A reservoir on Shaw Gulch Creek is a total barrier to fish passage (SWRCB 1998).

Staff from several State agencies visited Shaw Gulch Creek in 1998 as part of a water rights investigation and noted the presence of "excellent" spawning and rearing habitat (SWRCB 1998).

Bradley Creek tributary (Tahana Gulch)

This unnamed tributary to Bradley Creek consists of about 1.4 stream miles. It flows southwest, joining Bradley Creek immediately upstream from the Chandler Gulch Creek confluence.

Tahana Gulch Creek was evaluated as part of a 2004 fish passage study. The resulting report states, "Seems like a good fish stream" (Taylor 2004, App. A).

Honsinger

Honsinger Creek consists of about 2.7 stream miles and is tributary to Pescadero Creek. It flows south, entering Pescadero Creek east of the town of Pescadero.

A field note from 1962 indicates the Honsinger Creek does not carry flow during the summer (DFG 1963b). Staff from DFG visited the creek again in 1963. *Oncorhynchus mykiss* of unknown origin were seen upstream of a dam, and a person familiar with the site reported "steelhead…pass over the spillway at the dam site" (DFG 1963c). The dam has since been removed and perennial flow re-established (Nelson pers. comm.).

Staff from DFG visited Honsinger Creek in 1976. The resulting memo states, "It appears the stream will become intermittent shortly and possibly dry up late this summer" (DFG 1976b).

As part of a fish passage evaluation, Honsinger Creek was visited in March 2004. The resulting report states, "Steelhead are currently present in Honsinger Creek and young-of-the-year were observed…in spring of 2002 and March of 2004" (Taylor 2004, p. 43). Eight Honsinger Creek locations were sampled in October 2005 and "Steelhead/rainbow trout were relatively abundant at all sites…" (HES 2005). The resulting report adds, "The future health of these populations is most sensitive to fine sediments (silt and sand) entering the stream from the surrounding watershed lands and reductions in summer flow levels from direct diversion or change in watershed runoff characteristics…" (HES 2005, p. 5).

Weeks

Weeks Creek consists of about 1.5 stream miles and is tributary to Pescadero Creek. It flows northwest, entering Pescadero Creek in the vicinity of Dearborn Park.

In 1993, staff from DFG noted that steelhead historically occurred in Weeks Creek. A water rights protest indicates that construction of on-stream reservoirs prevented access by steelhead and that required bypass flows were not provided despite a requirement to maintain a "live stream" (DFG 1993).

Staff from DFG observed *O. mykiss* in Weeks Creek in 1994 and noted that the individuals could have been from anadromous or resident parents (DFG 1994). The survey report noted several limiting factors including a total passage barrier (*i.e.*, culvert), debris in the channel, and minimal spawning habitat (DFG 1994).

McCormick

McCormick Creek consists of about 1.5 stream miles and is tributary to Pescadero Creek. It flows south, entering Pescadero Creek southeast of Mount Ellen.

Staff from DFG investigated McCormick Creek in 1971 in relation to an application to divert water. The field notes from the visit indicate that juvenile "steelhead trout" were present (DFG 1976c); (DFG 1971b).

As part of a fish passage evaluation, McCormick Creek was visited in October 2003. Several juvenile "salmonids" were observed (Taylor 2004)

Hoffman

Hoffman Creek consists of about 1.2 stream miles and is tributary to Pescadero Creek. It flows north, entering Pescadero Creek west of Oakland Camp.

In the late 1970s and early 1980s, *O. mykiss* was caught in the most downstream one quarter mile of Hoffman Creek according to a personal account (Stoecker pers. comm.).

Hoffman Creek was evaluated as part of a 2004 fish passage study. The resulting report states, "Steep – Deemed not fish bearing" (Taylor 2004, App. A).

Tarwater

Tarwater Creek consists of about 2.2 stream miles and is tributary to Pescadero Creek. It flows south, entering Pescadero Creek approximately two miles downstream from the park headquarters.

In a 1962 DFG stream report, staff found juvenile *O. mykiss* in Tarwater Creek at low densities and attributed limited production to migration barriers (DFG 1962g). The report provides recommended fish flows by season.

Staff from DFG observed *O. mykiss* in Tarwater Creek in 1995, 2000, and 2001 (Nelson pers. comm.). Tarwater Creek was examined as part of a watershed assessment published in 2004. The report finds "optimal" habitat in Tarwater Creek and notes that the tributary requires "special attention in regards to conservation and restoration" (ESA 2004, p. 8-14).

Peters

Peters Creek consists of about 7.3 stream miles and is tributary to Pescadero Creek. It flows southwest, entering Pescadero Creek at the park headquarters. The headwaters of Peters Creek flow through Devils Canyon and this portion of the creek is referred to in some reports as Devils Canyon Creek.

A 1962 memo relays reports of "nearly 200 steelhead in Peters Creek" in that year (DFG 1962h). Also in 1962, DFG found steelhead and rainbow trout "abundant throughout all areas of the stream (DFG 1962i, p. 2). The creek was assessed as having "conditions favorable for silver salmon, steelhead, and rainbow trout spawning and rearing" (DFG 1962i, p. 1).

Staff from DFG surveyed Peters Creek in 1996 and observed multiple *O. mykiss* year classes, including YOY and individuals to about 10 inches in length (DFG 1996d). The creek was examined as part of a watershed assessment published in 2004. The report finds "optimal" habitat in Peters Creek and notes that the tributary requires "special attention in regards to conservation and restoration" (ESA 2004, p. 8-14).

Evans

Evans Creek consists of about 1.3 stream miles and is tributary to Peters Creek. It flows south, entering Peters Creek at about stream mile 0.7. The culvert under Portola Park Road is considered a passage barrier under most, if not all, flows. Additionally, a 13 foot high dam located 1,200 feet upstream from the Peters Creek confluence is a total passage barrier (Nelson pers. comm.).

Staff from DFG surveyed Evans Creek in 1995 and observed multiple *O. mykiss* year classes, including YOY. The creek was deemed to be perennial (DFG 1997d).

Bear

Bear Creek consists of about 1.3 stream miles and is tributary to Peters Creek. It flows west, entering Peters Creek about 1.5 miles upstream from the Evans Creek confluence.

Staff from DFG surveyed Bear Creek in July 1995. The survey report noted that potential spawning sites were "heavily inundated with silt" (DFG 1997e). A small number of *O. mykiss* were observed in the most downstream portion of the creek and DFG reported that the upstream area had "overall poor condition" and was not expected to provide fish habitat (DFG 1997e).

Lambert

Lambert Creek consists of about 1.3 stream miles and is tributary to Peters Creek. It flows southwest, entering Peters Creek approximately 1.7 miles upstream from the Bear Creek confluence.

Staff from DFG observed YOY and age 1+ *O. mykiss* in the lower portion of Lambert Creek during a Peters Creek survey in 1995 (Nelson pers. comm.). Lambert Creek was examined as part of a watershed assessment published in 2004. The report notes that the tributary requires "special attention in regards to conservation and restoration" due to its high quality habitat (ESA 2004, p. 8-14).

Fall

Fall Creek consists of about 1.4 stream miles and is tributary to Pescadero Creek. It flows northeast, entering Pescadero Creek south of the park headquarters. A 1962 survey report noted a natural rock barrier about 300 yards upstream from the mouth of Fall Creek.

A 1962 memo relays a report of "about 25 spawning steelhead" observed in Fall Creek in that year (DFG 1962h). Staff from DFG surveyed the creek in 1962 and observed *O. mykiss* fingerlings. The survey report states, "Fall Creek is an important tributary because of its value as a spawning stream and minor nursery area for steelhead. Summer flows are present." The report also noted, "This stream supports a relatively large run of steelhead for its size" but suggested management for "spawning grounds only" as "Summer flows are not adequate" (DFG 1962j).

In 2008, staff from DFG indicated that Fall Creek is "very small (e.g., three feet wide, 100 feet between Pescadero and the barrier)" (Nelson pers. comm.).

Slate

Slate Creek consists of about 3.2 stream miles and is tributary to Pescadero Creek. It flows southwest, entering Pescadero Creek approximately 1.6 miles upstream from the park headquarters. A "waterfall barrier" is located at stream mile 1.24 (DFG 1997f).

In a 1962 stream survey, DFG found *O. mykiss* downstream and upstream from natural falls believed to limit steelhead migration (DFG 1962k). The survey report stated that the creek was "an excellent spawning and nursery area for steelhead and/or rainbow trout" (DFG 1962k, p. 2). Upstream from Page Mill, DFG staff noted poor condition of the channel (including heavy siltation) resulting from poor logging practices.

In September 1995, DFG sampled Slate Creek downstream from the waterfall by electrofishing. *Oncorhynchus mykiss* was found at the two sampling stations (DFG 1997f).

Slate Creek was examined as part of a watershed assessment published in 2004. The report finds "optimal" habitat in Slate Creek and notes that the tributary requires "special attention in regards to conservation and restoration" (ESA 2004, p. 8-14).

Oil

Oil Creek consists of about 5.1 stream miles and is tributary to Pescadero Creek. It flows south, entering Pescadero Creek approximately 1.1 miles upstream from the Slate Creek confluence. Staff from DFG indicated in 2008 that no permanent barriers occur in the lower 4.5 miles of Oil Creek (Nelson pers. comm.).

In August 1962, DFG found “steelhead and/or trout” in Oil Creek showing “good” natural propagation and success (DFG 1962l). The survey report noted “poor condition because of silted conditions” due to logging in the lower half of the creek with “good spawning grounds” in the upper stream reach (DFG 1962l).

In October 1995, DFG sampled Oil Creek at 11 stations by electrofishing. *Oncorhynchus mykiss* was found throughout the system, and the survey report recommended decommissioning or stabilizing the road along Oil Creek between stream mile 2.7 and 4.0 for erosion control (DFG 1997g).

Oil Creek was examined as part of a watershed assessment published in 2004. The report finds “optimal” habitat in Oil Creek and notes that the tributary requires “special attention in regards to conservation and restoration” (ESA 2004, p. 8-14).

Little Boulder

Little Boulder Creek drains a watershed of about 1.5 square miles. About 0.75 miles of channel are accessible to migratory fish (DFG 1962m). The stream provides summer flows to Pescadero Creek (DFG 1962m).

In 1962, DFG surveyed Little Boulder Creek and observed “abundant” *O. mykiss*. The report noted that the creek had “good spawning gravel for steelhead and/or trout, nursery grounds and summer flows” (DFG 1962m).

A 2004 Pescadero Creek watershed assessment assigned a habitat rating of ten (of a maximum of 14) to Little Boulder Creek. The assessment gave “moderate” priority to improving habitat in the creek (ESA 2004, p. 8-15).

Waterman

Waterman Creek consists of about 2.9 stream miles and is tributary to Pescadero Creek. It flows south, entering Pescadero Creek approximately 0.7 miles upstream from the Little Boulder Creek confluence. In 2008, DFG staff noted that a defunct ten foot high dam located at approximately stream mile 0.5 is a passage barrier (Nelson pers. comm.).

Staff from DFG surveyed Waterman Creek in August 1962 and observed *O. mykiss*. The creek was characterized as “an unimportant tributary to the Pescadero Creek system” due in part to the presence of a 360 foot culvert in the creek channel (DFG 1962n). This structure was subsequently removed (Nelson pers. comm.).

A 1996 memo concerning coho habitat in San Mateo and Santa Cruz counties notes impacts of excavation activities on Waterman Creek (DFG 1996b). A 1997 letter from the San Mateo County Resource Conservation District notes, “Waterman Creek currently supports a resident trout population (Schroeder 1997).

A 2004 Pescadero Creek watershed assessment assigned a habitat rating of eight (of a maximum of 14) to Waterman Creek. The assessment gave “moderate” priority to improving habitat in the creek (ESA 2004, p. 8-15).

Arroyo de los Frijoles

Arroyo de los Frijoles consists of about 5.9 stream miles. It flows northwest, entering the Pacific Ocean near Bean Hollow State Beach. The dam forming Lake Lucerne is located about 0.2 miles upstream from the mouth. Upstream, additional impoundments form the Bean Hollow Lakes. Water is transferred from Little Butano Creek to Arroyo de los Frijoles via a flume.

According to a 1948 memo, "Steelhead have been known to come over the spillway at the [Lake Lucerne] dam during periods of high water" (DFG 1948). The origin of the fish described in the memo is not provided.

Gazos

Gazos Creek consists of about 9.4 stream miles and drains a watershed of approximately eight square miles. It flows southwest, entering the Pacific Ocean north of Franklin Point.

A 1912 report on San Mateo County streams noted perennial flow in Gazos Creek. The creek was given an "A-1" rating for fishing (Smith 1912). In a 1955 stream survey report, DFG staff noted "considerable damage to [Gazos Creek] by…logging" (DFG 1955).

Staff from DFG surveyed Gazos Creek in 1964 and observed multiple *O. mykiss* year classes, including YOY and an individual 22 inches in length. The survey report recommended investigating the effect "of the diversion near the mouth, which stops all flow to the ocean, and the downstream migration of young salmon and steelhead" (DFG 1964k, p. 2). It also recommended discontinuing the on-going catchable trout planting program (that was discontinued in 1973).

In a Gazos Creek survey report from 1978, DFG staff found "siltation and flow reduction due to diversion are significant habitat alteration factors in the lowermost reach" (DFG 1978b). The report recommended monitoring and regulating existing diversions, and protesting additional diversion "to insure adequate bypass conditions" (DFG 1978b).

Staff from DFG operated an outmigrant trap on Gazos Creek in 1993. Steelhead parr and smolts were captured during the trapping. Associated documentation notes that Gazos Creek road is a source of sediment introduced into the creek and recommends a program to address the issue (DFG 1996e).

Records from sampling of numerous Gazos Creek sites between the years 1992 and 1997 indicate the consistent presence of 0+ and 1+ age *O. mykiss* (Smith 1997). This research has led to a characterization of the creek as having "relatively high, stable abundances of young-of-the-year" (Alley 2003). A 1996 DFG memo noted high sedimentation rates produced in part by logging operations and road maintenance and high water diversion levels as affecting habitat in mainstem Gazos Creek (DFG 1996b).

A fishery assessment was conducted for Gazos Creek and the results published in 2003. The study reported lower juvenile *O. mykiss* abundance in the reach downstream from the Old Womans Creek confluence and higher abundance in the upstream reaches. Fine sediment originating from Old Womans Creek was said to "likely restrict YOY steelhead and coho production" in Gazos Creek downstream from the confluence (Alley 2003). Regarding lagoon habitat the assessment states, "The Gazos Creek estuary is generally small and shallow, offering no saltwater transition between the Creek and the ocean. A concern is that if too much streamflow is diverted in dry years, the sandbar may close prematurely to block smolt out-migration for coho and steelhead"

(Alley 2003, p. 16). The study also noted low spring baseflow as a factor limiting juvenile salmonid growth in the spring and early summer.

The 2003 Watershed Assessment and Enhancement Plan for Gazos Creek lists prioritized restoration projects including, most importantly, reducing erosion on lower Old Woman's Creek Road, purchasing water rights, improving large wood-formed instream habitat, and constructing off-stream water storage (Alley 2003). The plan also points to the need for conducting erosion risk assessments in various parts of the watershed.

In reporting on 2006 sampling Dr. Jerry Smith states, "Overall steelhead density (18.7/100 feet) was the lowest since sampling began in 1992" (Smith 2007). The density of yearling fish was said to be "similar to that of recent years."

Old Womans

Old Womans Creek consists of about 2.5 stream miles and is tributary to Gazos Creek. It flows west, entering Gazos Creek at about stream mile 2.2.

In 1964, DFG staff found that "not more than 500" salmonids (two to six inches) existed in Old Womans Creek. The survey report notes "adequate" spawning and nursery habitat (DFG 1964l).

A 1994 DFG survey report said that Old Womans Creek "offers marginal and limited spawning and rearing habitat" (DFG 1996e). The report recommended addressing sediment problems (*i.e.*, siltation) in the creek. A 1996 DFG memo noted high sedimentation rates produced in part by poor road construction and road maintenance as affecting habitat in Old Womans Creek (DFG 1996b).

Staff from DFG observed low densities of *O. mykiss* in the lower portion of Old Womans Creek in 2001 (Nelson pers. comm.). According to a 2003 fishery assessment for Gazos Creek, "[Dr. Jerry] Smith has identified Old Womans Creek as a chronic sediment source with very limited value to the fishery…" (Alley 2003, p. 27).

Whitehouse

Whitehouse Creek consists of about 5.1 miles of channel draining a watershed of about five square miles. It flows southwest, entering the Pacific Ocean south of Franklin Point.

Titus *et al.* (in prep.) note that *O. mykiss* plantings from Scott Creek stock occurred in 1929. A 1954 DFG fish bulletin describes Whitehouse Creek as a "small stream." It is noted to have a "very small steelhead run" (DFG 1954).

A 1978 DFG survey report noted that Whitehouse Creek "has available habitat for steelhead spawning and nursery" (DFG 1978c). The survey found "small salmonids". The report speculated that the 200 yard long, 12 foot wide "tube beneath Highway 1" was a possible barrier to fish migration. Staff from DFG summarized conditions in Whitehouse Creek: "There appears to be little value to the anadromous fishery, due to heavy siltation and downstream barriers" (DFG 1978c).

Whitehouse Creek was surveyed in 1988 by DFG, resulting in multiple observations of *O. mykiss*. Staff distinguished between steelhead and "resident rainbow trout above the concrete dam" (DFG 1988c). Habitat was rated "good to excellent" although degradation by cattle was observed. Other limiting factors cited included barriers and low summer flows.

Staff from DFG surveyed Whitehouse Creek in 1997 and observed "abundant" *O. mykiss* downstream of a perched culvert at about stream mile three (DFG 1997h). The survey report recommended reducing sedimentation in the system and modifying passage barriers, including the concrete apron below Highway 1.

In 2007, staff from DFG characterized the *O. mykiss* population upstream from the Highway 1 crossing as having three year classes in low abundance. Observations made downstream from the highway suggested that only age 1+ individuals were present in low densities (Nelson pers. comm.).

Cascade

Cascade Creek consists of about three stream miles. It flows southwest, entering the Pacific Ocean within the Año Nuevo State Reserve.

A farm manager interviewed as part of a 1978 DFG survey said that the creek formerly supported trout. The survey report noted, "Cascade Creek has little or no value as an anadromous salmonid stream. Damming of the stream prevents fish passage and heavy siltation prevents use of the stream for salmonid spawning" (DFG 1978d).

Green Oaks

Green Oaks Creek consists of about 3.7 miles of channel draining a watershed of approximately three square miles. The creek has several dams in its lower reach.

We did not find information describing conditions on Green Oaks Creek prior to dam construction. Rainbow trout have been stocked in the impoundments in the lower watershed. A 1978 DFG survey report noted, "Green Oaks Creek has little value in its present condition to the anadromous fishery resource" (DFG 1978e).

Año Nuevo

Año Nuevo Creek consists of over four miles of channel draining a 2.3 square mile watershed. A dam at stream mile 0.8 precludes steelhead migration upstream (DFG 1996f).

A 1954 DFG fish bulletin describes Año Nuevo Creek as a "small stream". It is noted to have a "very small steelhead run" (DFG 1954).

A 1996 DFG survey found multiple year-classes of *O. mykiss* downstream from the dam on Año Nuevo Creek. The survey report recommended surveying habitat resources upstream from the dam (DFG 1996f, p. 8).

Finney

Finney Creek consists of about 1.4 stream miles. It flows southwest into Año Nuevo Bay.

A 1954 DFG fish bulletin describes Finney Creek as a "small stream." It is noted to have a "very small steelhead run" (DFG 1954).

Elliot

Elliot Creek consists of about 2.1 stream miles. It flows south, entering the Pacific Ocean northwest of the San Mateo/Santa Cruz county border.

A draft inventory of aquatic life in Big Basin Redwoods State Park was prepared in 2000. The report notes that resident rainbow trout occurs in Elliot Creek "…but not within BBRSP boundaries" (Rischbieter 2000, p. AQ-27).

Other information regarding San Mateo County steelhead resources

As part of the 1965 state fish and wildlife plan, DFG prepared an inventory of anadromous salmonids. No major steelhead streams were noted for San Mateo County. However, the county's streams were estimated to offer about 111 stream miles of steelhead habitat (DFG 1965). The combined spawning steelhead population using these streams was estimated to comprise about 8,000 individuals. The method of estimation was not provided.

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Table 1. Distribution status of *O. mykiss* in coastal streams of San Mateo County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
San Pedro	San Pedro	DF	DF	Y	Y	3
San Pedro	Middle Fork San Pedro	DF	DF		Y	3
San Pedro	South Fork San Pedro	DF	DF		Y	2
Martini	Martini	DF	PB		N	0
San Vicente	San Vicente	UN	PA		N	0
Denniston	Denniston	DF	DF	Y	Y	3
Deer	Deer	PB	PA		N	0
Arroyo de en Medio	Arroyo de en Medio	PS	UN		UN	0
Frenchmans	Frenchmans	DF	DF	Y	Y	3
Frenchmans	Locks	PB	UN		UN	0
Pilarcitos	Pilarcitos	DF	DF	Y	Y	3
Pilarcitos	Arroyo Leon	DF	DF	Y	Y	3
Pilarcitos	Mills	DF	DF		Y	3
Pilarcitos	Madonna	UN	PA		N	0
Pilarcitos	Apanolio	DF	DF	Y	UN	3
Pilarcitos	Corinda Los Trancos	DF	DF	Y	N	3
Pilarcitos	Nuff	PS	PA		N	0
Pilarcitos	Albert Canyon	DF	DF	Y	Y	3
Cañada Verde	Cañada Verde	DF	UN		UN	0
Purisima	Purisima	DF	DF	Y	N	3
Lobitos	Lobitos	DF	DF	Y	N	3
Lobitos	Schoolhouse	PS	PA		N	0
Lobitos	Rogers Gulch	PS	PA		N	0
Tunitas	Tunitas	DF	DF	Y	Y	3
Tunitas	Dry	DF	DF		Y	3
Tunitas	East Fork Tunitas	DF	DF		Y	3
San Gregorio	San Gregorio	DF	DF	Y	Y	3
San Gregorio	Coyote	UN	PA		N	0
San Gregorio	Clear	UN	PA		UN	0
San Gregorio	El Corte de Madera	DF	DF	Y	Y	3
San Gregorio	Bogess	DF	DF		Y	3

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 1. Distribution status of *O. mykiss* in coastal streams of San Mateo County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
San Gregorio	Kingston	DF	PA	Y	N	0
San Gregorio	Harrington	DF	DF	Y	Y	3
San Gregorio	La Honda	DF	DF	Y	Y	3
San Gregorio	Woodhams	PS	UN		N	0
San Gregorio	Langley	DF	DF		Y	1
San Gregorio	Woodruff	DF	UN		N	0
San Gregorio	Alpine	DF	DF		Y	3
San Gregorio	Mindego	DF	DF		Y	3
San Gregorio	Rodgers Gulch	DF	DF		UN	1
Pomponio	Pomponio	DF	DF	Y	Y	3
Pescadero	Pescadero	DF	DF	Y	Y	3
Pescadero	Butano	DF	DF	Y	Y	3
Pescadero	Little Butano	DF	DF	Y	UN	3
Pescadero	South Fork Butano	DF	UN	Y	N	0
Pescadero	Bradley	DF	DF		Y	3
Pescadero	Shaw Gulch	UN	UN		UN	0
Pescadero	Bradley Creek tributary (Tahana Gulch)	UN	UN		UN	0
Pescadero	Honsinger	DF	DF	Y	Y	3
Pescadero	Weeks	DF	DF	Y	UN	3
Pescadero	McCormick	DF	DF		Y	2
Pescadero	Hoffman	DF	PA		UN	0
Pescadero	Jones Gulch	PS	UN		UN	0
Pescadero	Tarwater	DF	DF	Y	Y	3
Pescadero	Peters	DF	DF		Y	3
Pescadero	Evans	DF	DF		Y	3
Pescadero	Bear	DF	DF	Y	Y	2
Pescadero	Lambert	DF	DF		Y	3
Pescadero	Fall	DF	UN		UN	0
Pescadero	Slate	DF	DF		Y	3
Pescadero	Oil	DF	DF	Y	Y	3

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 1. Distribution status of *O. mykiss* in coastal streams of San Mateo County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Pescadero	Little Boulder	DF	DF		Y	3
Pescadero	Waterman	DF	DF		Y	1
Arroyo de los Frijoles	Arroyo de los Frijoles	DF	UN	Y	N	0
Gazos	Gazos	DF	DF	Y	Y	3
Gazos	Old Womans	DF	DF	Y	Y	3
Whitehouse	Whitehouse	DF	DF	Y	Y	3
Cascade	Cascade	PB	UN		UN	0
Green Oaks	Green Oaks	PS	UN		N	0
Año Nuevo	Año Nuevo	DF	DF	Y	Y	2
Finney	Finney	DF	UN		UN	0
Elliot	Elliot	DF	DF		UN	1

[1]Please see Methods section for an explanation of titles and values used in this table.

FPO - figure 2

FPO - figure 3

Waddell

Waddell Creek is formed by the confluence of West and East Waddell creeks and consists of about 3.4 stream miles. It flows south, entering the Pacific Ocean in Big Basin Redwoods State Park. Waddell Creek was stocked in 1913 and in subsequent years (DFG 1995).

Migrant traps were operated on Waddell Creek between 1933 and 1942 *(i.e.*, nine years) as part of a study of coho salmon and steelhead. (Information developed through this "classic" study has been used widely in managing these species in California and other regions.) During this period, an average of 432 in-mig rant steelhead were collected per season (DFG 1954a). The resulting report states, "Spawning sea-run steelhead are very often accompanied by stream trout, which may eat loose eggs, but whose primary purpose in being present probably is to participate in the spawning activities" (DFG 1954a, p 286). In a 1967 report concerning Love Creek (tributary to the San Lorenzo River), the annual steelhead run of Waddell Creek was estimated to consist of 450 individuals (DFG 1967a).

In 1980, DFG noted that steelhead used the area between the mouth and the confluence of the East Fork and the West Fork, as well as the 0.6 mile portion of the East Fork immediately upstream from the confluence (DFG 1980a). This study also noted resident rainbow trout upstream of the area open to anadromous *O. mykiss*.

Records from sampling of numerous Waddell Creek sites between the years 1992 and 1997 indicate the consistent presence of 0+ and 1+ age *O. mykiss* (Smith 1997a). Scales from 202 steelhead adults collected between in the early 1990s were analyzed to provide information regarding the natural history of Waddell Creek *O. mykiss*. Researchers stated, "…about 1/3 of returning adults reared in the lagoon as juveniles" (Smith 1997a).

The lower portion of Waddell Creek and surrounding areas was investigated between 1995 and 1997. In a subsequent lagoon management plan the researchers state, "The lagoon produced an estimated 2500 steelhead in 1995 and 6600 in 1996" (Smith 1997a, p. 14). The plan notes, "Upstream of the lagoon juvenile steelhead production has been both high and stable for the last 5 years…, with an adult run in excess of 200 fish per year" (Smith 1997a, p. 15). Recommendations in the plan focused on managing diversions rights and practices to maintain stream flow appropriate for the season and water year type.

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note the impact of debris clearing for flood control and water diversions on Waddell Creek (DFG 1996c). A stream inventory was conducted on Waddell Creek in 1997. Recommendations from the inventory included allowing the accumulation of woody debris, treating sediment sources, and planting riparian vegetation (DFG 1997a).

In reporting on 2006 sampling of Waddell Creek, Dr. Jerry Smith "very low steelhead densities…apparently due to the 8th consecutive year of fish kills…" (Smith 2007a). The report recommends eliminating pollution sources in the Last Chance Creek drainage that likely create the fish kills.

According to DFG staff, *O. mykiss* abundance in mainstem Waddell Creek in the years preceding 2007 is lower than expected. Investigations are planned to increase the understanding of the under-production issue (Nelson pers. comm.).

West Waddell

West Waddell Creek consists of about 6.1 stream miles and is tributary to Waddell Creek. It flows southwest to its confluence with East Waddell Creek.

According to a 1960 DFG memo, "Juvenile and adult steelhead, although not plentiful, were observed throughout almost the entire length" of West Waddell Creek (DFG 1960a). The surveyor noted individuals to 16 inches in length. The survey report indicated that logging in the Kelly Creek basin resulted in sedimentation of West Waddell Creek downstream from the Kelly Creek confluence.

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note the impact of debris clearing for flood control West Waddell Creek (DFG 1996c).

West Waddell Creek was inventoried in 1997. Management recommendations in the resulting report included revegetation, particularly in areas of stream bank erosion, allowing natural recruitment of woody debris, and treating sediment sources (DFG 1997b).

Staff from San Jose State University has studied sites in West Waddell Creek as part of a long-term monitoring of Gazos, Waddell, and Scott creeks. In reporting on West Waddell Creek sampling in 2004, Dr. Jerry Smith noted, "On the upper portion of West Fork Waddell Creek streamside hog wallows and bank damage became especially common in 2002" (Smith 2004).

Staff from DFG conducted snorkel surveys in West Waddell 2003, 2004, and 2005. In each year, *O. mykiss* YOY and age 1+ individuals were observed (Nelson pers. comm.).

West Waddell tributary (Buck)

Buck Creek consists of about one stream mile. It flows west, entering West Waddell Creek at about stream mile 1.5.

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that steelhead use a portion of Buck Creek (County of Santa Cruz 2004).

Henry

Henry Creek consists of about 1.3 stream miles and is tributary to West Waddell Creek. It flows south, entering West Waddell Creek at approximately stream mile 2.2.

A habitat inventory was conducted on Henry Creek in 1997. Management recommendations included allowing natural recruitment of woody debris (DFG 1997c). A draft inventory of aquatic life in Big Basin Redwoods State Park was prepared in 2000. The report notes perennial flow in Henry Creek, with about three-fourths of a mile accessible to anadromous fish (DPR 2000).

Snorkel surveys were performed in Henry Creek in 2003, 2004, and 2005. Juvenile *O. mykiss* were observed in all years (Nelson pers. comm.).

Henry tributary

An unnamed tributary to Henry Creek consists of about 0.7 stream miles. If flows east, entering Henry Creek at about stream mile 0.5. A 13 foot high waterfall located at about stream mile 0.1 precludes salmonids from using the upper reaches of the creek (Nelson pers. comm.).

The Henry Creek tributary was inventoried in 1997. The survey report suggests that *O. mykiss* was present in the downstream 190 feet of the tributary, below a log debris accumulation (DFG 1997c).

Berry

Berry Creek consists of about two stream miles and is tributary to West Waddell Creek. It flows south, entering West Waddell Creek approximately 0.7 miles upstream from the Henry Creek confluence. A 40 foot waterfall occurs about 100 yards upstream from the mouth of the creek.

A draft inventory of aquatic life in Big Basin Redwoods State Park was prepared in 2000. The report notes perennial flow in Berry Creek, with steelhead using the reach downstream from the falls and a resident rainbow trout population occurring upstream (DPR 2000).

Kelly

Kelly Creek consists of about 0.9 stream miles and is tributary to West Waddell Creek. It flows west, entering West Waddell Creek approximately 0.8 miles upstream from the Berry Creek confluence.

In a 1960 survey, DFG found "heavy damage to the stream from siltation" due to logging (DFG 1960a).

Kelly Creek was inventoried in 1997, when no salmonids were observed. Management recommendations in the resulting report included allowing natural recruitment of woody debris and treating sediment sources (DFG 1997b).

A draft inventory of aquatic life in Big Basin Redwoods State Park was prepared in 2000. The report notes perennial flow in Kelly Creek, with steelhead occurring in its lower reaches (DPR 2000).

East Waddell

East Waddell Creek consists of about 3.5 stream miles and is tributary to Waddell Creek. It is formed by the confluence of Opal and Blooms creeks and flows southwest to its confluence with West Waddell Creek. A waterfall at about stream mile 1.5 is believed to be the upstream limit of anadromy (Nelson pers. comm.).

During sampling in 1996, *O. mykiss* was observed in East Waddell Creek in the vicinity of the Big Basin Redwoods State Park sewage treatment plant. The fish were described as resident rainbow trout (DPR 2000).

A 1996 memo concerning habitat deficiencies in coastal streams of San Mateo and Santa Cruz counties addresses East Waddell Creek. The memo indicates habitat impacts by Sempervirens Creek diversions reducing flow in East Waddle Creek, and possibly by sewage treatment plant effluent (DFG 1996c).

A stream inventory was conducted on East Waddell Creek in 1997. In the resulting report DFG staff states, "Suitable size spawning substrate on East Branch Waddell Creek is limited to relatively few reaches" (DFG 1997d). Management recommendations included treating sediment sources and increasing riparian vegetation, particularly in areas of stream bank erosion.

A draft inventory of aquatic life in Big Basin Redwoods State Park was prepared in 2000. The report notes that steelhead can access about 1.5 miles of East Waddell Creek, downstream from a 30 foot waterfall (DPR 2000). According to the report, "Resident rainbow trout are abundant upstream of the waterfall…" (DPR 2000, p. AQ-26).

Staff from San Jose State University has studied sites in East Waddell Creek as part of long term monitoring of Gazos, Waddell, and Scott creeks. In reporting on monitoring in 2006, Dr. Jerry Smith noted "The most reasonable explanation for the extremely low numbers [of steelhead] on the East Fork and main stem of Waddell Creek in 2006 (and from 1999-2005) is highly toxic chemicals periodically coming down Last Chance Creek" (Smith 2007a, p. 10).

Last Chance

Last Chance Creek consists of about 1.5 stream miles and is tributary to East Waddell Creek. It flows west, entering East Waddell Creek at about stream mile 0.5. A 15-18 foot high waterfall is located less than 0.1 miles upstream from the confluence (Nelson pers. comm.).

In a 2006 report, Dr. Jerry Smith indicated his belief that toxic chemicals were periodically discharged into Last Chance Creek (Smith 2007a). Staff from DFG conducted a "spot check" of Last Chance Creek in spring 2006 and observed multiple *O. mykiss* year classes (Atkinson pers. comm.). Oncoryhnchus mykiss upstream from the falls are considered to be stream reproducing (*i.e.*, resident) (Nelson pers. comm.).

Opal

Opal Creek consists of about 3.8 stream miles. The confluence of Opal and Blooms creeks forms East Waddle Creek.

A draft inventory of aquatic life in Big Basin Redwoods State Park was prepared in 2000. The report notes that Opal Creek is perennial in its most downstream two miles. The report indicates that natural propagation of resident rainbow trout occurs in the creek (DPR 2000, p. AQ-27).

Blooms

Blooms Creek consists of about three stream miles and is tributary to East Waddell Creek. The confluence of Blooms and Opal creeks forms East Waddle Creek.

A draft inventory of aquatic life in Big Basin Redwoods State Park was prepared in 2000. The report notes that resident rainbow trout occurs in Blooms Creek "…throughout the portion within BBRSP" (DPR 2000, p. AQ-27).

Sempervirens

Sempervirens Creek consists of about 2.1 stream miles and is tributary to Blooms Creek. It flows south, entering Blooms Creek at about stream mile 0.8. The dam forming Sempervirens Reservoir is located about 1.6 miles upstream from the mouth of the creek. Records indicate that Sempervirens Reservoir was stocked with "steelhead" in 1989 and 1990 (DFG 1995).

A 1996 memo concerning habitat deficiencies in coastal streams of San Mateo and Santa Cruz counties addresses Sempervirens Creek. It notes diversion of Sempervirens flows as adversely affecting salmonid habitat (DFG 1996c).

A draft inventory of aquatic life in Big Basin Redwoods State Park was prepared in 2000. The report notes, "[Resident rainbow trout] are normally distributed throughout Sempervirens Creek…" (DPR 2000, p. AQ-26). It adds, "The rainbow trout in Sempervirens Reservoir…most recently colonized the reservoir in 1995 following their escape from rearing pens used to hold steelhead for the Monterey Salmon and Trout Project" (DPR 2000, p. AQ-29).

Union

Union Creek consists of about 1.6 stream miles and is tributary to Sempervirens Creek. It flows southwest, entering Sempervirens Creek at about stream mile 0.6.

A draft inventory of aquatic life in Big Basin Redwoods State Park was prepared in 2000. The report notes, "[Resident rainbow trout] are present in lower and middle reaches of Union Creek (DPR 2000, p. AQ-27).

Scott

Scott Creek consists of about 10.4 stream miles. It flows south from headwaters northeast of Pine Mountain, entering the Pacific Ocean south of the community of Swanton.

Staff from DFG surveyed Scott Creek in 1934 and noted the presence of steelhead. The survey report indicates that the creek was dried in its lower reach due to diversion pumping, and that stocking had occurred.

A 1942 memo reported the presence of an estimated 1,500 to 3,000 juvenile steelhead immediately upstream from the mouth of Scott Creek. The observer notes, "I believe that these fish will form the juvenile upstream migration, or the type that has been observed to a greater or less extent in Waddell Creek each year during the autumn and winter months" (DFG 1942).

Staff from DFG surveyed Scott Creek in 1953 and noted the presence of steelhead and rainbow trout. The survey report states, "The lower parts are nursery and spawning areas for SH and salmon [and] the upper parts are trout waters" (DFG 1953a).

In a 1961 survey, DFG staff called *O. mykiss* "common throughout" Scott Creek (DFG 1961a). The creek was characterized as a "good spawning and nursery stream", while diversion for irrigation was said to dry the most downstream mile to two miles of channel in most years.

A 1987 DFG memo documents the effects of seasonal dams on lower Scott Creek. The memo states, "In Scott Creek, dewatering of the stream below the diversion has eliminated almost 50% of available lagoon habitat for juvenile steelhead trout" (DFG 1987). According to DFG staff, diversion no longer incorporates seasonal dams, and dewatering abated since the time of this memo (Nelson pers. comm.).

Trapping of downstream migrant *O. mykiss* in 1992 revealed "…nearly equal numbers of wild juvenile steelhead and hatchery juvenile steelhead" (DFG 1992a). Records from sampling of numerous Scott Creek sites between the years 1992 and the present indicate the consistent presence of 0+ and 1+ age *O. mykiss* (Smith 1997c; Smith 2004).

A 1995 DFG study used modeling to develop relationships between Scott Creek flows and salmonid habitat availability. The report states, "Optimum coho and steelhead juvenile habitat conditions are provided at 20 cfs, while juvenile habitat availability is rapidly depleted as flow falls below 8 cfs…" (DFG 1995).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note the impact of channel modifications associated with the Highway 1 bridge on Scott Creek, as well as siltation effects from local land uses, and other impacts (DFG 1996c).

Monitoring was performed in the Scott Creek lagoon and sampling occurred in six upper Scott Creek watershed sites as part of a masters thesis study in 2003-2004. The study concludes, "Although the Scott Creek estuary comprises less than 5% of the watershed area, it is critical nursery habitat, as estuary-reared juveniles make a disproportionate contribution to the spawning adult pool" (Bond 2006). A 2004 report on sampling in Scott Creek states, "The amount of fine sediment present in late summer appears to have increased…in recent years. Streambed and bank rooting by feral pigs substantially increased on Scott and Waddell creeks from 1999 to 2002, and is probably a major factor in the increase in sediment" (Smith 2004, p. 4).

In reporting on 2006 sampling Dr. Jerry Smith states, "…in years when the sandbar forms and remains in place in summer to provide rearing habitat, yearling and YOY steelhead can rear to large size in the resulting lagoon… However, over the last 2 decades the lagoon provide little summer rearing habitat in the majority of years because of heavy water diversion during dry years…and because of artificial breaching of the sandbar… In addition, the straightened estuary (modified during the construction of the Highway 1 Bridge) at Scott Creek is normally very shallow and mostly fresh water in spring prior to sandbar formation. It provides little opportunity for either feeding or adapting to salt in a brackish environment…" (Smith 2007a).

Steelhead runs in the Scott Creek watershed have typical sizes of 200 to 400 adults in recent years. Spawning occurs in upper Scott, Big and Mill creeks. Resident rainbow trout occur upstream from a natural passage barrier in Scott Creek (Hayes pers. comm.).

Scott tributary 1 (Quesaria)

An unnamed tributary of Scott Creek enters from the east at about stream mile 0.4. The tributary consists of about 1.2 stream miles. The lower creek channel has been re-aligned recently as part of a stream restoration effort.

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that steelhead use a portion of the unnamed Scott Creek tributary (County of Santa Cruz 2004). Researchers have observed resident rainbow trout in Quesaria Creek, and speculate that steelhead spawning occurs "occasionally" (Hayes pers. comm.).

Little

Little Creek consists of about 2.9 stream miles and is tributary to Scott Creek. It flows west, entering Scott Creek at approximately stream mile 1.9.

Staff from DFG surveyed Little Creek in 1934 and noted the presence of steelhead. The survey report indicated that stocking had occurred and deemed the extent of natural propagation to be "very little" (DFG 1934a).

Steelhead were found in 1960 to be "fairly numerous" between the mouth and the Scott Creek Road bridge, and present at lower density upstream. Staff from DFG speculated that at least some of the *O. mykiss* in the area near the confluence of the headwater forks were resident rainbow trout. The survey report cited "extreme misuse" of Little Creek by past logging practices (DFG 1960b).

In 1992, DFG found *O. mykiss* "throughout the surveyed area". The survey report noted impacts to the stream from logging, cattle ranching, and water diversions (DFG 1992b). A 1993 DFG report states, "Little Creek provides approximately 2 miles of spawning and rearing habitat for steelhead" (DFG 1993a).

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that steelhead use the portion of Little Creek downstream from the confluence of the headwater forks (County of Santa Cruz 2004).

Long-term sampling in lower Little Creek suggests that steelhead spawning occurs "almost every year" (Hayes pers. comm.). Also, resident rainbow trout occur in Little Creek upstream from a natural migration barrier.

Big

Big Creek consists of about 7.5 stream miles draining a watershed of about eight square miles. It flows southwest, entering Scott Creek at about stream mile 2.2. In 1960, DFG noted a 50 foot natural falls about 2.5 miles upstream of the mouth. The Monterey Bay Salmon and Trout Project operates a hatchery on Big Creek to supplement natural production.

In 1958, DFG characterized the 2.5 mile reach of Big Creek upstream from the Scott Creek confluence as a "fair spawning and nursery tributary" (DFG 1958a). The stream survey report also noted the contribution to the Scott Creek fishery from Big Creek's "permanent water flow". Staff from DFG noted under-utilization of Big Creek by steelhead in 1960, and cited "excessive erosion" and "possible silting of redds" as limiting the fishery (DFG 1960c).

A 1996 DFG review of coastal streams noted several problems in Big Creek including reduced flows from water diversions in the headwaters tributaries and the mainstem, and regular removal of woody debris (DFG 1996c).

Big Creek has been sampled regularly as part of an examination of steelhead and coho salmon resources of Gazos, Waddell and Scott creeks, and multiple *O. mykiss* year classes are regularly observed. Reporting on sampling in 2006 states, "As in several recent years densities [of steelhead] were particularly low…in Big Creek… This is apparently due to storm flows and sandy substrate that results in poor redd survival…" (Smith 2007a, p. 8).

Sampling in Big Creek suggests that steelhead spawning occurs "on an annual basis" (Hayes pers. comm.). Also, resident rainbow trout occur in Big Creek upstream from a natural migration barrier.

Boyer

Boyer Creek consists of about 2.9 stream miles and is tributary to Big Creek. It flows south, entering Big Creek at about stream mile 2.5. A dam on Boyer Creek forms Boyer Lake. In a 1953 field note, DFG cited an impassable barrier falls about 0.25 miles downstream from the reservoir (DFG 1953b).

Stocking of Boyer Lake has occurred historically, possibly beginning in 1930 (DFG 1939). In 1934, DFG staff stated, "…some of the large fish out of the lake run up to the creek to spawn, but very few" (DFG 1934b).

Mill

Mill Creek consists of about 5.2 stream miles and is tributary to Scott Creek. It flows southwest, entering Scott Creek about 1.2 miles upstream from the Big Creek confluence. Mill Creek Reservoir is located about 3.5 miles upstream from the Scott Creek confluence. Water is used for power generation by delivery to Big Creek in a flume. A 1960 survey noted, "The major barriers to steelhead migration are found in a falls area 2.6 mi. upstream from the mouth" (DFG 1960d).

Mill Creek was stocked in 1932 and in subsequent years (DFG 1932). In a DFG memo from the 1950s, the use of Mill Creek upstream of the reservoir for spawning is noted (DFG 1953c).

In a 1960 stream survey, DFG noted "a surprising number of fish for such a small stream" and found Mill Creek to be "an exceptional steelhead stream" (DFG 1960d). The survey report called Mill Creek one of three Scott Creek tributaries containing a "substantial steelhead population."

Staff from DFG examined the downstream 2.4 miles of Mill Creek in 1993 and found *O. mykiss* to be "abundant throughout the surveyed reach" (DFG 1993a). The survey report recommended protecting summer base flows from future water diversion and improving reservoir releases for instream habitat purposes. A 1996 DFG review of coastal stream habitat noted several problems in Mill Creek including reduced flows from water diversions in the headwaters and regular removal of woody debris (DFG 1996c).

Faculty from San Jose State University has studied steelhead in Mill Creek as part of a long-term examination of Gazos, Scott, and Waddell creeks watersheds. Steelhead density varied from about 42 individuals per 100 feet to about 63 individuals per 100 feet between 2001 and 2004 (Smith 2004).

Sampling in Mill Creek suggests that steelhead spawning occurs in virtually all years (Hayes pers. comm.). Also, resident rainbow trout also occur in Mill Creek upstream from a natural migration barrier.

Scott tributary 2 (Bettencourt Gulch)

Bettencourt Gulch Creek consists of about 1.6 stream miles and is tributary to Scott Creek. It flows southwest, entering Scott Creek at about stream mile 5.2.

According to staff from DFG, Bettencourt Gulch Creek "is used for spawning and minor rearing" (Nelson pers. comm.). A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that steelhead use a portion of Bettencourt Gulch Creek (County of Santa Cruz 2004).

Molino

Molino Creek consists of about 3.7 stream miles. It flows southwest, entering the Pacific Ocean north of El Jarro Point. On-stream ponds occur in the lower portion of the stream.

As part of preparing a resource protection plan, Molino Creek was surveyed in spring 2001, and YOY and/or yearling *O. mykiss* were observed (ESA 2001). A long-term resource protection and access plan indicates that the stream provides "limited habitat for anadromous salmonids" and suggests that "…the area does not appear to produce sufficient storm runoff to maintain optimal water depths throughout the spring, even with the upstream on-channel reservoir being operated as a flow-through system" (TPL 2004, p. III-10).

Unnamed coastal stream (Ferrari)

Ferrari Creek consists of about 2.5 stream miles. It flows southwest, entering the Pacific Ocean at the town of Davenport Landing. In 2008, DFG staff noted that in the most downstream 700 feet of the stream, it is channelized and flows through an abalone hatchery building (Nelson pers. comm.).

According to a 2001 memo by Coast Dairies, Ferrari Creek is an intermittent stream and is diverted for irrigation purposes. As part of preparing a resource protection plan, Ferrari Creek was surveyed in spring 2001, and YOY and/or yearling *O. mykiss* were observed (ESA 2001). The resulting report states, "…Ferrari Creek appears to provide adequate habitat for a small salmonid population. Clearly the primary limiting factor on this creek is the presence of…migration barriers…" (ESA 2001, p. 3.3-15).

San Vicente

San Vicente Creek consists of about 9.2 stream miles and drains a watershed of about 11 square miles. It flows southwest, entering the Pacific Ocean at the town of Davenport.

In 1934, DFG staff surveyed San Vicente Creek and noted both the presence of steelhead and past steelhead stocking. Natural propagation was said to be "good in normal years". The survey report states, "San Vicente was at one time the best fishing stream along the coast, and is a good fishing stream now yet only there is so much water taken out now that it is dry at mouth during the late summer" (DFG 1934c).

A 1953 survey report noted the presence of steelhead and rainbow trout in San Vicente Creek. The report states, "The upper portion of this creek is a beautiful trout creek…" (DFG 1953d).

As part of a larger study of Santa Cruz County streams, consultants sampled San Vicente Creek in 1981. The resulting report indicated that *O. mykiss* was observed at seven sites and found lack of cover to be a primary limiting factor to production (HSA 1982).

A 1991 DFG letter describes effects of quarrying operations on the natural resources of San Vicente Creek. The letter notes lack of progress "…in rectifying the impacts resulting from past and current operations which have primarily occurred to the aquatic habitats associated with the quarrying sites, as a result of excessive sedimentation and summertime water diversions" (DFG 1991, p. 2). A consultant's report from 1991 concludes, "San Vicente Creek is one of the most productive anadromous creek habitats in the greater Santa Cruz/San Mateo County area" (McGinnis 1991, p. 16).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note the impact of water diversions, improper grading, and an impassable barrier consisting of a tunnel on San Vicente Creek (DFG 1996c). A 1996 biological inventory report recommended mapping and treating erosion sources and assuring adequate bypass flows (DFG 1996d). Sampling by DFG staff in 1998 found multiple year classes, including YOY and individuals to about 14 inches in length (Nelson 1998).

A 2001 resource protection plan states, "San Vicente Creek…supports a healthy steelhead run…" (Elliot 2002). The plan also notes, "…a disproportionate volume of the stream's sediment load is entering the system from the [Coast Dairies] property…" (Elliot 2002). According to the Central Coast Regional Water Quality Control Board (CCRWQCB), water quality in the creek is impaired by sedimentation from silviculture (CCRWQCB 2006). Staff from NMFS sampled San Vicente Creek in 2006 and observed multiple *O. mykiss* year classes (Spence pers. comm.).

Mill

Mill Creek consists of about 2.9 stream miles and is tributary to San Vicente Creek. It flows southwest, entering San Vicente Creek at about stream mile 2.8. A dam located at about stream mile 0.7 constitutes a total migration barrier.

In the report from a 1960 survey of the lower portion of Mill Creek staff from DFG noted, "…it is surprising to find such large amounts of juvenile steelhead trout" (DFG 1960e). The report did not recommend removal of the dam at stream mile 0.7 as it was "…doubtful although not improbable that [the upstream reach] would be of much value for steelhead trout" (DFG 1960e).

As part of a larger study of Santa Cruz County streams, consultants sampled Mill Creek in 1981. The resulting report indicated that *O. mykiss* was observed at two sites and found low flow and lack of cover to be primary limiting factors to production (HSA 1982). Reporting on sampling in 1990 notes, "Pools which provide summer rearing habitat for yearling fish are the limiting factor to steelhead production in San Vicente and Mill Creeks" (Engineering-Science Inc. 1991, p. 3-110).

A 1991 DFG letter describes effects of quarrying operations on the natural resources of Mill Creek. The letter notes lack of progress "…in rectifying the impacts resulting from past and current operations which have primarily occurred to the aquatic habitats associated with the quarrying sites, as a result of excessive sedimentation and summertime water diversions" (DFG 1991, p. 2). In a 1996 inventory of Mill Creek DFG staff collected multiple *O. mykiss* year classes, including YOY and individuals to [258 convert] in length. The resulting report recommended improving woody debris for cover and developing an erosion control strategy for the creek (Fisher and Renger 1996).

Liddell

Liddell Creek consists of about 3.2 stream miles. It flows southwest, entering the Pacific Ocean southeast of the town of Davenport.

Staff from DFG surveyed Liddell Creek in 1934 and noted the presence of steelhead as well as past stocking. The survey report calls the creek "small" and indicates that "very little" natural propagation occurs. However, it cites use of the creek by spawning steelhead on heavy flows (DFG 1934d).

As part of a larger study of Santa Cruz County streams, consultants sampled Liddell Creek in 1981. The resulting report indicated that *O. mykiss* was observed at one site and found low flow and lack of cover to be primary limiting factors to production (HSA 1982).

According to a 1990 paper by San Jose State University faculty, minimal "suitable" spawning substrate exists in Liddell Creek. The paper states, "Rearing habitat is more likely to be limited, and can usually be saturated by a relatively few successful spawners" (Smith 1990, p. 2).

A 1991 DFG letter describes effects of quarrying operations on the natural resources of Liddell Creek. The letter notes lack of progress "…in rectifying the impacts resulting from past and current operations which have primarily occurred to the aquatic habitats associated with the quarrying sites, as a result of excessive sedimentation and summertime water diversions" (DFG 1991, p. 2).

A 2001 resource protection plan included a survey of Liddell Creek. The plan noted, "All three branches of Liddell Creek support steelhead trout" (Elliot 2002). The plan indicates that land use in the watershed "has greatly accelerated erosion" and cites the fishery impact of the City of Santa Cruz's Liddell Spring water diversion.

According to DFG staff, the barrier beach at the mouth of Liddell Creek may limit steelhead access into the watershed regularly (Nelson pers. comm.).

West Liddell

West Liddell Creek consists of about 2.7 stream miles and is tributary to Liddell Creek. It flows southwest, entering Liddell Creek at about stream mile 0.3.

In 1960, DFG staff estimated the juvenile *O. mykiss* population in West Liddell Creek to be about 2,000 to 3,000 individuals. The survey report deems the creek "one of the least productive" of the coastal streams in the area (DFG 1960f). The report also noted that the creek was "extensively damaged by logging activity" (DFG 1960f).

As part of a larger study of Santa Cruz County streams, consultants sampled West Liddell Creek in 1981. The resulting report indicated that *O. mykiss* was observed at one of two sites and found low flow to be a primary limiting factor to production (HSA 1982).

In a 1992 letter, DFG staff cited quarrying activities as the cause of sedimentation and water quality degradation in West Liddell Creek. The letter states, "…due to the conveyor beltline and maintenance road, the upper reaches of the west branch of Liddell Creek are no longer reachable by steelhead" (DFG 1992c, p. 2).

A 2001 resource protection plan noted sedimentation of West Liddell Creek due to quarrying operations. The report states, "… options for improving sediment containment should be a high priority for this watershed. Another significant limiting factor appears to be the unlimited water rights the City of Santa Cruz holds…" (ESA 2001, p. 3.3-21). Staff from DFG walked West Liddell Creek in 2005 and observed *O. mykiss* in "low numbers" in the lower watershed (Nelson pers. comm.).

East Branch Liddell

East Branch Liddell Creek consists of about 1.7 stream miles and is tributary to Liddell Creek. It flows southwest, entering Liddell Creek at about stream mile 1.3.

Staff from DFG surveyed East Branch Liddell Creek in 1934 and noted the presence of steelhead as well as past stocking. The survey report calls the creek "small" and indicates that "very little" natural propagation occurs (DFG 1934d).

During a 1960 survey DFG staff noted multiple *O. mykiss* year classes in low abundance. The survey report states, "It is the opinion of this writer that this stream has a population of juvenile steelhead trout far below its potential. The main factor involved in reducing the steelhead population in the stream is believed to be extensive siltation which has occurred in the stream" (DFG 1960g).

As part of a larger study of Santa Cruz County streams, consultants sampled East Branch Liddell Creek in 1981. The resulting report indicated that *O. mykiss* was observed at five sites and found lack of cover and low flow to be primary limiting factors to production (HSA 1982).

In a 1991 letter, DFG staff noted the effect of water diversions on East Branch Liddell Creek. The letter states, "The resulting effect of these two diversions has been the drastic reduction of crucial summertime and fall streamflows into this stream system. The effect to fisheries has been reduction in rearing habitat for steelhead" (DFG 1991, p. 3).

As part of preparing a resource protection plan, East Branch Liddell Creek was surveyed in spring 2001 and "a few yearling salmonids" were observed. The plan notes large amounts of fine sediment in the creek resulting from poor management of sedimentation ponds (ESA 2001).

Yellow Bank

Yellow Bank Creek is a coastal stream consisting of about 2.7 stream miles. It flows southwest from headwaters on Bald Mountain. It may have been known previously as Respini Creek. Yellow Bank Creek has two on-channel reservoirs. The creek also passes through tunnels associated with the railroad track and Highway 1 crossing. The reservoirs and tunnels are believed to present impassable barriers.

In a 1954 DFG fish bulletin, Respini Creek was deemed a "small stream". It was noted to have a smaller steelhead run than Waddell and Scott creeks (DFG 1954a).

According to a habitat description, "Upstream of the second reservoir (Yellow Bank Dam), the creek is an undisturbed, natural stream that provides both spawning and rearing habitat for salmonids. Salmonids, presumably landlocked steelhead, were actually seen in this part of the stream" (Elliot 2002). A resource protection plan notes, "A road failure…is contributing significant amounts of fine sediments to the stream" (ESA 2001, p. 3.3-21). Other failures were observed in various reaches of the creek.

Laguna

Laguna Creek consists of about 8.5 stream miles. It flows southwest, entering the Pacific Ocean north of San Hill Bluff. In 1948, DFG staff said that a series of falls about two miles upstream from the mouth were total migration barriers (DFG 1948).

Staff from DFG surveyed Laguna Creek in 1934 and noted the presence of steelhead and past stocking (DFG 1934e). During a 1948 survey, staff observed YOY and individuals to 12 inches in length (DFG 1948).

In 1960 reports, DFG staff refers to Laguna Creek as a "good steelhead stream" that "supports a small run of steelhead rainbow trout" (DFG 1960h); (DFG 1960i). The stream survey report cited "very poor" spawning habitat below the falls as being the major limiting factor in the system. However, "a fair size [resident] rainbow trout population" was observed upstream of the falls in "pools in the upper sections of the stream" (DFG 1960i).

As part of a larger study of Santa Cruz County streams, consultants sampled Laguna Creek in 1981. The resulting report indicated that *O. mykiss* was observed at five sites and found diversion related low flow to be a primary limiting factor to production (HSA 1982). In a 1985 DFG survey report, staff concluded that "the presence of YOY upstream, and the lack of [adult] resident fish" indicated that steelhead could in-migrate past the falls (DFG 1985).

A 2001 resource protection plan involved surveying Laguna Creek. The plan notes that the creek supports steelhead, "…though Laguna Creek has severely impaired summer flow from numerous water diversions upstream of the [Coast Dairies] Property boundary" (Elliot 2002). The plan adds, "The City [of Santa Cruz] diverts close to 100 percent of the headwater flows from Laguana Creek…" (Elliot 2002). Yearling *O. mykiss* was observed during the survey.

In a memo regarding lagoon management a researcher noted, "Laguna Creek suffers from a lack of water in summer, drying the lagoon… Transition habitat in spring now depends upon the sandbar partially forming and trapping saltwater during spring tides…. Artificial breaching must be prevented" (Smith 2007b). A related memo from DFG staff states, "The limiting factor at Laguna Creek lagoon is lack of water due to upstream diversions. Diverting less water upstream would provide habitat… In addition, keeping the sandbar in place would increase lagoon water volumes as well as improve water quality" (DFG 2006).

Laguna tributary (Y)

Y Creek consists of about 1.6 stream miles and is tributary to Laguna Creek. It flows south, entering Laguna Creek at about stream mile 1.5.

Y Creek was surveyed as part of preparing a resource protection plan in spring 2001, when YOY and yearling salmonids were observed. The plan noted cattle in the channel and states, "Largely uncontrolled cattle grazing occurs on both sides of the creek" (ESA 2001, p. 3.3-23).

Majors

Majors Creek consists of about 5.9 stream miles. It flows southwest, entering the Pacific Ocean northwest of Table Rock. In a 1960 report, DFG noted a "high waterfall" less than 0.5 miles from the ocean that precluded steelhead in-migration. The City of Santa Cruz's dam at about stream mile 2.0 was cited as another passage barrier (DFG 1960h).

Majors Creek was stocked in 1938 and in subsequent years (DFG 1938a); (DFG 1945a). In 1960, staff from DFG characterized Majors Creek as "not a good steelhead stream" due to the impassable barrier, but noted "populations of [resident] native trout" upstream of the falls (DFG 1960h). Productivity downstream of the dam was described as "quite low" resulting from "heavy siltation due to extensive logging damage" and from, most importantly, "low summer flows" (DFG 1960h). Erosion control and dam releases were recommended to improve habitat. According to the 1960 stream survey report, "High productivity…is characteristic of the stream above the dam" (DFG 1960h).

As part of a larger study of Santa Cruz County streams, consultants sampled Majors Creek in 1981. The resulting report indicated that *O. mykiss* was observed at five of six sites and found diversion related low flow and lack of cover to be primary limiting factors to production (HSA 1982).

According to DFG staff, anadromous *O. mykiss* utilizes the reach downstream from the falls while the upstream area of Majors Creek "supports a viable population of landlocked rainbow trout" (DFG 1988a). Information gathered from an area resident as part of a 1988 stream survey suggested that "steelhead trout once returned in large numbers to Majors Creek" (DFG 1988a). The survey report noted the importance of "a respite from sediment producing activities" to allow for improved spawning habitat.

Staff from DFG surveyed the east branch of Majors Creek in 1996 and observed resident rainbow trout "in spite of poor habitat" (DFG 1996e). High levels of sedimentation were noted, resulting in part from poor road crossing construction. Staff from DFG walked Majors Creek in 2000 and observed resident *O. mykiss* upstream from a waterfall located about one quarter mile upstream from Highway 1. *Oncorhynchus mykiss* was noted downstream from Highway 1 in low densities. Sedimentation and low flows in the creek continue to limit steelhead production (Nelson pers. comm.).

Majors Creek was surveyed in 2001, when multiple *O. mykiss* year classes including "abundant" YOY were observed. The resulting report states, "…the stream becomes quite steep and potentially impassible a short distance upstream of Highway 1" (DPR 2001, p. 35).

Baldwin

Baldwin Creek consists of about 4.2 stream miles and drains a watershed of approximately 2.5 square miles. It flows southwest, entering the Pacific Ocean southeast of Table Rock.

In 1960, DFG said that Baldwin Creek "is a steelhead and [resident] native trout stream and the fish populations exceed that of both Laguna Creek and Majors Creek" (DFG 1960j). Staff cited the lack of diversions on the stream and resulting permanent flow as creating an "extremely productive" system. The steelhead run size was estimated to average about 50 individuals.

As part of a larger study of Santa Cruz County streams, consultants sampled Baldwin Creek in 1981. The resulting report indicated that *O. mykiss* was observed at four of five sites and found low flow and substrate [jerry smith for translation] to be primary limiting factors to production (HSA 1982).

Baldwin Creek was surveyed in 2001, when multiple *O. mykiss* year classes including YOY were observed. The resulting report states, "Steelhead passage is likely impaired, if not severely constrained, due to the hydrologic modifications at the lowest end of Baldwin Creek… two large impoundments are located just upstream from the beach…" (DPR 2001, p. 31). A 2002 survey report states, "The diversion of Baldwin Creek into Rancho Gordola Impoundment #1, apparently an exercise of riparian water rights, probably results in downstream-migrating steelhead smolts being subject to intense predation by largemouth bass in the lentic environment" (DPR 2002).

Wilder (Medor)

Wilder Creek consists of about 2.5 stream miles and flows south, entering the Pacific Ocean west of Terrace Point. According to a 2001 report, the upstream limit of anadromy is located about 0.4 miles downstream from Cave Gulch (DPR 2001).

In 1960, DFG characterized Wilder Creek as "one of a series of small steelhead streams". The stream survey report noted "many juvenile steelhead" and "a surprisingly large steelhead population" (DFG 1960k). Staff noted some habitat damage "due to the running of cattle…and due to logging activity".

A report prepared after a 1993 stream survey noted that in the reach open to steelhead, "spawning and rearing conditions were poor because of the tremendous amount of sand and silt deposited in the area." (DFG 1993b, p. 5). Two *O. mykiss* year classes were observed, and the report recommended removal of the Wilder Creek barriers and acquisition of water rights to allow for "perennial water".

Habitat assessment and sampling were performed on Wilder Creek in 2001. Multiple *O. mykiss* year classes were observed throughout the creek, with relatively high densities occurring in two upstream reaches. A population estimate of over 4,000 individuals per mile was noted for the reach having the highest *O. mykiss* density. The resulting report states, "Steelhead have access to approximately two miles of stream habitat in Wilder Creek" (DPR 2001, p. 25).

Peasley Gulch

Peasley Gulch Creek consists of about 2.8 stream miles and is tributary to Wilder Creek. It flows south, entering Wilder Creek at about stream mile 1.1.

Peasley Gulch Creek was visually surveyed in 2001 and multiple *O. mykiss* year classes were observed including "very abundant" fry. The resulting report states, "…it is very possible that steelhead have accessed Peasley Gulch during the last season. At a minimum there appears to be good production from resident trout" (DPR 2001, p. 27).

San Lorenzo River

The San Lorenzo River consists of about 29 stream miles as well as numerous tributaries as described below. The watershed comprises about 138 square miles. The river flows southeast from headwaters on Castle Rock Ridge, entering the Pacific Ocean at the City of Santa Cruz. The upstream limit of anadromy is an area of steep gradient within Castle Rock State Park (DPR 1996).

There are 12 main tributaries in the San Lorenzo River system, and the most important fisheries resources in the watershed likely are contained in Branciforte (including Carbonera), Zayante (including Bean), Fall, Boulder, and Bear creeks. Also, the river's lagoon provides important rearing habitat for juvenile steelhead, particularly during dry years when upstream nursery areas may be dewatered.

Diversion facilities at Tait Street include instream intakes and streamside wells than can substitute for the intakes. According to a 2001 enhancement plan, "Flow reductions at Tait Street can be significant, especially during summer months. Although the City is not required to bypass flow, it currently adjusts pumping rates to maintain a minimum flow downstream" (Alley 2004a, p. ES-11).

The Felton Diversion Dam is located about 0.5 miles downstream from the Zayante Creek confluence. The operator and DFG have developed operating procedures to improve passage efficiency at the associated fishway (Alley 2004a). About 26 anthropogenic fish passage barriers (including defunct seasonal dams and culverts) are located on the mainstem San Lorenzo River that can impede, and in some cases prohibit, adult steelhead migration (Nelson pers. comm.).

The San Lorenzo River was stocked in 1938 and in subsequent years (DFG ca 1939). In 1945, DFG staff estimated that mainstem San Lorenzo River contained 21 miles of steelhead spawning habitat (McDermott and Shapovalov 1945).

A 1954 DFG memo states, "The San Lorenzo River is the best winter steelhead stream in existence south of San Francisco Bay" (DFG 1954b). The memo notes impacts to the population from angling and closure of the "lower third" to protect nursery areas.

The 1965 Fish and Wildlife Plan for California states, "There are…239 miles of steelhead habitat in the San Lorenzo drainage" (DFG 1965a). At that time, the annual steelhead run was estimated to consist of 19,000 individuals. The plan adds, "The chief limiting factor is siltation of spawning beds. Maximum runs could be achieved only by stringent erosion control" (DFG 1965a). A 1967 report concerning Love Creek stated that the "San Lorenzo River is considered virtually 'lost' to spawning fish below the mouth of Boulder Creek because of heavy siltation and cementation of spawning gravel" (DFG 1967a).

Staff from DFG surveyed the upper San Lorenzo River and several tributaries in 1974. The survey report states, "The deleterious effects of siltation are rapidly degrading the habitat and discouraging fish production throughout the SLR and its tributaries. The causes include faulty logging and sand plant operations and road maintenance within the drainage" (DFG 1974a).

Staff from DFG counted steelhead spawners at the Felton Diversion Dam in 1977. The seasonal total was 1,614 individuals (DFG 1979a). The 1978-1979 steelhead run was estimated by DFG to be 625 individuals (Sullivan 1988). A 1982 draft report by the State Water Resources Control Board noted an estimated steelhead run of about 750 individuals (SWRCB 1982). The estimating method and information sources were not provided in the report.

Regular stocking has occurred since at least the 1950s, making wild steelhead run estimates problematic. Before 1982, planted steelhead were largely from Mad River hatchery stock while "native" stock from Scott Creek and the Carmel River were introduced later. The Monterey Bay Salmon and Trout Project estimated that about half of the 3,000 adults returning to the San Lorenzo River in 1987-1988 "were wild fish and the other half hatchery fish" (Sullivan 1988).

Staff from DFG and Santa Cruz County prepared a study of fishery habitat in San Lorenzo River in 1979. The study described the effect of water diversion on summer nursery habitat and recommended increasing bypass flow at the Felton Diversion Dam to 40-50 cfs (DFG 1979b).

According to Dr. Jerry Smith, "smolt production within the [San Lorenzo River] watershed appears to fluctuate with year-to-year streamflow conditions" (Smith 1994, p. 8). He noted generally similar habitat conditions in the watershed between 1981 and 1994, when he surveyed the river and its tributaries (Smith 1994). Dr. Smith also stated that channelization and artificial breaching have led to "poor summer rearing habitat" in the lagoon (Smith 1994).

According to an enhancement plan, data from monitoring between 1994 and 2001 "…suggest fairly stable steelhead populations between 1981 and [2001] with year-to-year variations dependent upon sedimentation, streamflow, and habitat conditions…" (Alley 2004a, p. ES-1). The report noted smaller population estimates for "key reaches such as the Middle River" toward the latter part of the study period that were attributed to habitat loss by sedimentation from tributary streams. The plan noted two "functional regimes" in the San Lorenzo River system, the first being the lower and middle mainstem downstream from the Boulder Creek confluence and the second comprising the upper mainstem and tributaries. According to the report, "…results suggest that smolts leaving the system (out-migrating to the ocean) each year are mostly a combination of large YOY's from the middle and lower river and yearlings from the tributaries and upper mainstem River" (Alley 2004a, p. ES-3).

Staff from DPR sampled the San Lorenzo River within Castle Rock State Park in 1996. Multiple *O. mykiss* year classes were observed upstream and downstream from the natural passage barrier, and were said to comprise resident and a likely anadromous populations (DPR 1996).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff noted that water diversions reduce flows sufficiently to impact the San Lorenzo system, particularly during summer when low flow occurs naturally (DFG 1996c). The memo cited the reduction of flow reaching the San Lorenzo River lagoon due to operations of Loch Lomond Reservoir.

The 2001 San Lorenzo River enhancement plan contained recommendations for timing and quantity of minimum bypass flows for the Felton Diversion between January 1 and April 1. It also recommended allowing sufficient bypass to maintain hydraulic continuity to the estuary and an open sandbar to the ocean between April 1 and June 1 (Alley 2004a).

Mainstem San Lorenzo River was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. The resulting report indicates that "prime spawning habitat" exists in the middle and upper watershed (Allen 2003). Staff from NMFS surveyed seven San Lorenzo River locations in 2006 and observed "low numbers" of fish representing multiple *O. mykiss* year classes (Spence pers. comm.). Juvenile steelhead densities were estimated for five sites in the mainstem San Lorenzo River during 2006. The resulting report notes that "especially low" juvenile densities were observed, particularly in the lower mainstem (Alley 2007).

According to the CCRWQCB, water quality in the creek is impaired by sedimentation from specialty crop production, silviculture, road construction, disturbed sites, erosion, and nonpoint sources (CCRWQCB 2006). In a memo regarding lagoon management a researcher noted, "[The San Lorenzo River lagoon] is open due to breaching in summer so calm habitats are reduced. Steelhead would benefit from keeping [the] sand bar closed in summer and providing sufficient inflows to convert most of the system to freshwater" (Smith 2007b).

Branciforte

Branciforte Creek consists of about 9.9 stream miles and is tributary to the San Lorenzo River. It flows southwest, entering the San Lorenzo within the City of Santa Cruz. In a 1980 barrier review, DFG staff noted two dams upstream from the Crystal Creek confluence with non-functioning fishways (DFG 1980b). A 2001 enhancement plan indicates that these fishways require maintenance to allow passage (Alley 2004a).

In a 1956 stream survey report, DFG called Branciforte Creek "a very poor steelhead and spawning stream" (DFG 1956a). Another 1956 report cited "the lack of suitable spawning areas" as justification for leaving passage barriers in place (DFG 1956b).

The report from a 1974 survey noted "rainbow trout and steelhead rainbow trout present, but very scarce" in the creek (DFG 1974b). Staff from DFG found adequate summer flows but foresaw limitation of the fishery by sedimentation of spawning areas. Based on observations in August 1980, DFG again found *O. mykiss* present, "though not in any great numbers" (DFG 1980b).

A stream inventory was conducted on Branciforte Creek in 1996 and *O. mykiss* representing sizes from about two to six inches was sampled in four of the five sampling locations. The inventory report recommends treating sediment sources, allowing natural recruitment of woody debris, removing defunct dams, and modifying the culvert at stream mile 10.2 for improved passage (DFG 1996f). In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note the impact of flood control projects, logging, flashboard dams, and water diversions on Branciforte Creek (DFG 1996c).

An enhancement plan noted "fairly stable" *O. mykiss* numbers from 1998 to 2000 and deemed Branciforte Creek one of seven "important producers of YOY's and yearlings" (Alley 2004a). The creek also was included in a list of six priority tributaries for focusing sediment reduction efforts (Alley 2004a). A 2002 survey recommended maintenance in the channelized portion of the creek to allow for passage to upstream spawning and rearing habitat in Branciforte Creek and its tributaries (DFG 2002b).

In a 2002 stream survey report DFG staff states, "…it is essential that the channel be maintained for optimal adult and juvenile salmonid passage. In addition to the 10.5 miles of salmonid spawning and rearing habitat in Branciforte Creek above the concrete channel, an additional 8 miles are available in the three major tributaries to Branciforte Creek" (DFG 2002b). Branciforte Creek was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. Juvenile *O. mykiss* density was estimated to be approximately 50 fish per 100 feet in the creek, while the range for sampling sites in the watershed was about 3 to 140 fish per 100 feet (Allen 2003). Two Branciforte Creek sites were assessed for habitat conditions in 2006 as part of a larger study of several Santa Cruz watersheds. The resulting report notes "general habitat degradation" in Branciforte Creek and states, "Percent fines, embeddedness and escape cover all worsened" in relation to conditions in 2000 and 2005 (Alley 2007, p. 58). According to the CCRWQCB, water quality in the creek is impaired by sedimentation from silviculture, road construction, and nonpoint sources (CCRWQCB 2006).

Carbonera

Carbonera Creek consists of about 9.9 stream miles and is tributary to Branciforte Creek. It flows south, entering Branciforte Creek at about stream mile 1.2. In 1956, DFG described a "forty-foot natural rock falls at [stream mile 3.5 that] forms the upstream limit for salmon and steelhead" (DFG 1956c). A 2001 enhancement plan refers to this feature as Moose Lodge Falls.

The stream survey report from 1956 calls Carbonera Creek "an important spawning tributary [to the San Lorenzo River]" while noting that "approximately 1/2 mile of spawning area has been destroyed by logging operations" resulting in siltation and debris loading (DFG 1956c). The surveyor found *O. mykiss* fingerlings to be "quite common throughout" the creek.

In a 1966 survey report, DFG states that Carbonera Creek "has some of the best spawning areas in the county" for steelhead and resident trout (DFG 1966a). By 1974, DFG said that most Carbonera Creek spawning areas were degraded by silt derived largely from logging operations (DFG 1974c). Based on observations in August 1980, DFG found *O. mykiss* present throughout Carbonera Creek, "though in small numbers" (DFG 1980b).

As part of a larger study of Santa Cruz County streams, consultants sampled Carbonera Creek in 1981. The resulting report indicated that *O. mykiss* was observed at two of three sites. The report notes "poor" rearing habitat, with substrate, lack of cover, and low flows presenting primary limiting factors to production (HSA 1982).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note the impact of groundwater pumping, encroachment, and runoff on Carbonera Creek (DFG 1996c). A 1996 survey report recommended allowing recruitment of woody debris and controlling sediment sources into the creek (DFG 1996a).

An enhancement plan deemed Carbonera Creek one of seven "important producers of YOY's and yearlings" (Alley 2004a). According to the plan, the creek is one of three particularly important sources of summer baseflow for the San Lorenzo River (Alley 2004a). It also is said to produce high sediment loads related to urbanization.

Carbonera Creek was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. The resulting report notes that "consistently low [*O. mykiss*] densities since 2000" were observed in lower Carbonera Creek (Allen 2003).

Branciforte tributary (Glen Canyon)
Glen Canyon Creek consists of about 3.1 stream miles and is tributary to Branciforte Creek. It flows south, entering Branciforte Creek about one mile upstream from the Carbonera Creek confluence.

In 1956, DFG staff noted "scarce" rainbow trout fingerlings in Glen Canyon Creek. Spawning areas were deemed to be "too poor" to justify barrier modifications in the lower creek section (DFG 1956b).

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that the portion of Glen Canyon Creek downstream from the Redwood Creek confluence is used by steelhead (County of Santa Cruz 2004).

Glen Canyon tributary (Redwood)
Redwood Creek consists of about 2.2 stream miles and is tributary to Glen Canyon Creek. It flows south, entering Glen Canyon Creek at about stream mile 0.9.

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that a portion of Redwood Creek downstream from a passage barrier is used by steelhead (County of Santa Cruz 2004). Staff from NMFS surveyed Redwood Creek in 2006 and observed YOY and age 1+ *O. mykiss* in "low numbers" (Spence pers. comm.).

Granite
Granite Creek consists of about 2.6 stream miles and is tributary to Branciforte Creek. It flows south, entering Branciforte Creek approximately 1.8 miles upstream from the Glen Canyon Creek confluence.

In a 1956 stream survey report for Branciforte Creek, DFG said that Granite Creek supported "a good population of steelhead" (DFG 1956a). Another 1956 report states, "RT fingerling are quite common in this creek" (DFG 1956b). In a 1957 DFG "Basic Survey", Granite Creek was deemed an "important spawning and nursery area" (DFG 1957a).

Granite Creek was surveyed in 1996, when electrofishing was conducted at three sites. Two sites produced *O. mykiss* between about 2.4 and 7.5 inches in length. The survey report recommended allows recruitment of woody debris and reducing sediment inputs to the creek (CCC 1996).

Crystal
Crystal Creek consists of about 1.7 stream miles and is tributary to Branciforte Creek. It flows southwest, entering Branciforte Creek about 0.9 miles upstream from the Granite Creek confluence.

In a 1956 report, this creek is said to be unnamed and is referred to as “Happy Valley Road Tributary.” The report noted that Crystal Creek was dry 1.5 miles upstream from the mouth and the rainbow trout fingerlings were “common in the lower section” (DFG 1956b).

Crystal Creek was surveyed in 1996 and multiple *O. mykiss* year classes, including YOY and individuals to about 12 inches in length were observed (DFG 1996g). The survey report noted a relatively small amount of cover in the creek and recommended controlling sediment inputs.

Tie Gulch

Tie Gulch Creek consists of less than one stream mile and is tributary to Branciforte Creek. It flows south, entering Branciforte Creek near Branciforte Drive about 0.4 miles southwest of the Vine Hill and Mountain View roads intersection.

In 2002, DFG staff examined a culvert near the mouth of Tie Gulch Creek. At that time, “numerous fry were observed upstream from the road crossing” (Nelson pers. comm.).

San Lorenzo River tributary 1 (Powder Mill)

Powder Mill Creek consists of about 1.7 stream miles and is tributary to the San Lorenzo River. It flows south, entering the San Lorenzo at Paradise Park.

A 1965 DFG document notes use of Powder Mill Creek by rainbow trout, but not by steelhead (Evans 1965). A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use of a short reach in lower Powder Mill Creek (County of Santa Cruz 2004).

San Lorenzo River tributary 2 (Eagle)

Eagle Creek consists of about 1.3 stream miles and is tributary to the San Lorenzo River. It flows west, entering the San Lorenzo about 0.8 miles downstream from the park headquarters.

A 1965 DFG document notes use of Eagle Creek by rainbow trout and by steelhead (Evans 1965).

A 2004 consultant’s report regarding juvenile steelhead densities in the San Lorenzo River watershed also discusses distribution in various tributaries. The report states that Eagle Creek in Henry Cowell State Park is “known to contain steelhead from past sampling and observation…” (Alley 2002, p. 38). A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use a short reach in Eagle Creek (County of Santa Cruz 2004).

Gold Gulch

Gold Gulch Creek consists of about 2.6 stream miles and is tributary to the San Lorenzo River. It flows east, entering the San Lorenzo south of the town of Felton.

A 1957 survey report states that Gold Gulch Creek “appears to be of little value to the San Lorenzo salmon or steelhead fishery” (DFG 1957b). The report notes the occasional presence of adult steelhead in the reach immediately upstream from the mouth, but cites low flows as precluding spawning and rearing. According to the report, the main value of the creek for salmonids is its contribution to the flow of the San Lorenzo River.

In a survey in April 1980, DFG found "numerous [*O. mykiss*] fry" in the downstream portion of Gold Gulch Creek (DFG 1980b). In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Gold Gulch Creek, particularly during summer when low flow occurs naturally (DFG 1996c).

A 2004 consultant's report regarding juvenile steelhead densities in the San Lorenzo River watershed also discusses distribution in various tributaries. The report states that Gold Gulch Creek is "likely to provide steelhead access and perennial habitat" (Alley 2002, p. 38). Staff from NMFS surveyed Gold Gulch Creek in 2006 and observed multiple *O. mykiss* year classes (Spence pers. comm.).

Shingle Mill

Shingle Mill Creek consists of about 1.5 stream miles and is tributary to the San Lorenzo River. It flows east, entering the San Lorenzo south of the town of Felton.

Staff from DFG observed Shingle Mill Creek in July 1980 but did not note *O. mykiss*. The survey report cited fish migration barriers in the lower portion of the creek (DFG 1980b).

A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use of about 0.7 miles of Shingle Mill Creek (County of Santa Cruz 2004).

Zayante

Zayante Creek consists of about 10.2 stream miles and is tributary to the San Lorenzo River. It flows southwest, entering the San Lorenzo in the town of Felton.

In 1955, DFG said that Zayante Creek had perennial flow and was an important steelhead spawning and nursery area "in the past" (DFG 1964a). A stream survey report cited damage to the stream from past logging and from the 1955 flood. A 1957 DFG "Basic Survey" called Zayante Creek one of the most important, or possibly the most important, San Lorenzo River tributary in terms of resources for steelhead (DFG 1957a).

According to a 1966 DFG survey report, Zayante Creek contributed about five cubic feet per second to the summer flow the San Lorenzo River (DFG 1966b). The report noted continuing effects of siltation, particularly in the lower stream section.

In response to a water right application, DFG estimated the Zayante Creek steelhead run in 1971. The study found that between 450 and 630 returning adult steelhead would be produced annually from the most upstream six miles of the creek (DFG 1971a). In 1973, DFG estimated the total run production potential of Zayante Creek to be about 800 individuals (DFG 1973a).

As part of a larger study of Santa Cruz County streams, consultants sampled Zayante Creek in 1981. The resulting report indicated that *O. mykiss* was observed at three of three sites. The report notes some "very good" rearing habitat, with substrate presenting a primary limiting factor to production (HSA 1982).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Zayante Creek, particularly during summer and fall when low flow occurs naturally (DFG 1996c). A steam inventory was performed on the creek in 1997, when at least three *O. mykiss* year classes were noted at numerous sampling sites. Management recommendations included increasing woody debris, improving screens on diversions, maintaining the three fishways on mainstem Zayante Creek, and modifying or removing several dams, weirs, and culverts (DFG 1997e).

An enhancement plan for the San Lorenzo system states, "Zayante Creek is usually the most productive [tributary] in terms of YOY's and smolt-sized fish…" (Alley 2004a, p. 19). The plan adds, "[The creek has] shown a precipitous decline in size class 1 and YOY numbers from 1998 to 2000, presumably due to sedimentation of pool habitat and a reduction in spawning success" (Alley 2004a, p. ES-4). According to the enhancement plan, Zayante Creek is one of three particularly important sources of summer baseflow for the San Lorenzo River. The plan notes pumping of "significant groundwater resources" from the basin. The stream also was noted as one of five important contributors to fine sediment loading in the middle and lower reaches of the San Lorenzo River and was included in a list of six priority tributaries for focusing sediment reduction efforts (Alley 2004a).

Zayante Creek was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. The resulting report states, "…[*O. mykiss*] densities were especially high in Zayante Creek" (Allen 2003, p. 31). Staff from NMFS surveyed Zayante Creek in 2005 and observed multiple *O. mykiss* year classes throughout a five-mile section (Spence pers. comm.). According to the CCRWQCB, water quality in the creek is impaired by sedimentation from agriculture, silviculture, road construction, disturbed sites, erosion, and nonpoint sources (CCRWQCB 2006).

Bean

Bean Creek consists of about 8.5 stream miles and is tributary to Zayante Creek. It flows southwest, entering Zayante Creek at about stream mile 0.8.

Bean Creek was stocked in 1938 and in subsequent years (DFG 1938b). According to a 1956 DFG Bean Creek survey report, "This tributary appears to be one of the better producers of steelhead in the San Lorenzo drainage" (DFG 1956d). Another 1956 report cited heavy siltation effects of logging debris blocking the stream (DFG 1956b).

A 1971 survey found *O. mykiss* "in good numbers" and the survey report described a "good fishery" in Bean Creek despite a portion of the channel being dry (McIlhatten and Smith 1971). A 1974 Bean Creek stream survey report states, "…heavy accumulations of silt in [the] lower section are probably limiting fish production" (DFG 1974d). Staff from DFG expected a larger steelhead/rainbow trout population due to the stream's perennial flow.

As part of a larger study of Santa Cruz County streams, consultants sampled Bean Creek in 1981. The resulting report indicated that *O. mykiss* was observed at four of five sites. The report notes some "good" rearing habitat, with substrate presenting a primary limiting factor to production (HSA 1982).

According to a 1990 paper by San Jose State University faculty, minimal "suitable" spawning substrate exists in Bean Creek. The paper states, "Rearing habitat is more likely to be limited, and can usually be saturated by a relatively few successful spawners" (Smith 1990, p. 2).

An enhancement plan noted "fairly stable" *O. mykiss* numbers from 1998 to 2000 and deemed Bean Creek one of seven "important producers of YOY's and yearlings (Alley 2004a). According to the plan, Bean Creek is one of three particularly important sources of summer baseflow for the San Lorenzo River. The plan notes pumping of "significant groundwater resources" from the basin. The stream also was noted as one of five important contributors to fine sediment loading in the middle and lower reaches of the San Lorenzo River (Alley 2004a).

Bean Creek was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. The resulting report indicates that "fairly high" *O. mykiss* densities were observed in the creek (Allen 2003). Staff from NMFS surveyed Bean Creek in 2005 and observed multiple *O. mykiss* year classes throughout a two-mile section (Spence pers. comm.). According to the CCRWQCB, water quality in the creek is impaired by sedimentation/siltation from road construction, disturbed sites, resource extraction, erosion, and nonpoint sources (CCRWQCB 2006).

Lockhart Gulch

Lockhart Gulch Creek consists of about 2.7 stream miles and is tributary to Bean Creek. It flows south, entering Bean Creek southwest of the town of Mission Springs.

In 1956, DFG staff said that Lockhart Gulch Creek appeared unimportant in terms of a trout fishery as residents in the area stated that they had not observed steelhead adult in the creek (DFG 1962a).

As part of a larger study of Santa Cruz County streams, consultants sampled Lockhart Gulch Creek in 1981. The resulting report indicated that *O. mykiss* was observed at one site. The report notes "poor" rearing habitat, with low flow, substrate, and lack of cover presenting primary limiting factors to production (HSA 1982).

A 2004 consultant's report regarding juvenile steelhead densities in the San Lorenzo River watershed also discusses distribution in various tributaries. The report states that Eagle Creek in Henry Cowell State Park is "known to contain steelhead from past sampling and observation…" (Alley 2002, p. 38). A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use of the reach of Lockhart Gulch Creek downstream from a passage barrier at stream mile 1.25 (County of Santa Cruz 2004).

Ruins

Ruins Creek consists of about 2.6 stream miles and is tributary to Bean Creek. It flows south, entering Bean Creek south of the town of Mission Springs.

In 1956, DFG staff said that Ruins Creek appeared unimportant in terms of a trout fishery as residents in the area stated that they had not observed steelhead adults in the creek (DFG 1962a).

Ruins Creek was habitat mapped and sampled by electrofishing at three sites in August and September 1997. *Oncorhynchus mykiss* was observed at one site in "very low" densities (Nelson pers. comm.). The inventory report states, "Active and potential sediment sources related to the road system and other land use need to be identified, mapped, and treated…" (CCC 1997a).

A 2004 consultant's report regarding juvenile steelhead densities in the San Lorenzo River watershed also discusses distribution in various tributaries. The report states that Ruins Creek is "likely to provide steelhead access and perennial habitat" (Alley 2002, p. 38). A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use of a short reach of lower Ruins Creek (County of Santa Cruz 2004).

Mackenzie

Mackenzie Creek consists of about 1.6 stream miles and is tributary to Bean Creek. It flows south, entering Bean Creek at about stream mile 3.6.

Mackenzie Creek was habitat mapped and sampled by electrofishing in five sites in August and September 1997. *Oncorhynchus mykiss* was observed in "very low" densities at two sites (Nelson pers. comm.). The inventory report states, "Active and potential sediment sources related to the road system need to be identified, mapped, and treated…" (CCC 1997b). The report also recommended removing a failed bridge at about stream mile 0.7 from the channel.

A 2004 consultant's report regarding juvenile steelhead densities in the San Lorenzo River watershed also discusses distribution in various tributaries. The report states that Mackenzie Creek is "likely to provide steelhead access and perennial habitat" (Alley 2002, p. 38). A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use of the majority of Mackenzie Creek's length (County of Santa Cruz 2004).

Lompico

Lompico Creek consists of about 4.5 stream miles and is tributary to Zayante Creek. It flows south, entering Zayante Creek southwest of the town of Zayante. A fishway located immediately upstream from the Zayante Creek confluence has improved access since the 1980s (Collins pers. comm.).

Staff from DFG surveyed Lompico Creek in 1956 and observed multiple *O. mykiss* year classes. The survey report states, "Although several steelhead got over the 8-ft. natural bedrock falls at the mouth this year due to the heavy rains, this creek normally contributes very little or nothing to the San Lorenzo steelhead fishery" (DFG 1956e).

Lompico Creek was characterized as having "marginal spawning-nursery habitat" in a 1974 DFG stream survey report (DFG 1974e). The survey found *O. mykiss* fingerlings in the creek between the mouth and the Lompico Club dam.

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Lompico Creek, particularly during summer when low flow occurs naturally (DFG 1996c). A stream inventory was conducted on Lompico Creek in 1997. Fish sampling was performed at 16 sites, all of which produced steelhead observations. Individuals represented three year classes. The resulting report recommended inventory and mapping of sediment sources, and prioritization for treatment to reduce the amount of fine sediment entering the stream (CCC 1997c).

Lompico Creek was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. Juvenile *O. mykiss* density was estimated to be between about 40 and 80 fish per 100 feet at three sampling sites in the creek, while the range for all sampling sites in the watershed was about 3 to 140 fish per 100 feet (Allen 2003). Juvenile steelhead densities were estimated and habitat conditions assessed in Lompico Creek in 2006 as part of a study of several Santa Cruz County watersheds. The resulting report notes an estimated smolt density of 5.7 per 100 feet of stream at the sampling site, that may be compared to a range of 1.2 to 41.6 per 100 feet throughout the study area (Alley 2007). The report rates the smolt habitat at the Lompico Creek site as "Below Average."

Mountain Charlie Gulch (East Branch Zayante)

Mountain Charlie Gulch Creek consists of about 3.9 stream miles and is tributary to Zayante Creek. It flows southwest, entering Zayante Creek northeast of the town of Zayante.

In 1956, DFG staff stated, "This branch appears to be a good nursery stream" (DFG 1956b). A 1957 DFG "Basic Survey" said that Mt. Charlie Gulch was "good to fair" in its importance to the steelhead resources of the San Lorenzo River system (DFG 1957a). *Oncorhynchus mykiss* fingerlings were sampled in the creek as part of a 1968 DFG sediment study (DFG 1968a).

Mountain Charlie Gulch Creek was studied in 2004 as part of a pilot steelhead habitat and abundance survey, when multiple *O. mykiss* year classes were observed. The resulting report states, "Substrate characteristics were typical of good steelhead rearing habitat" (HES 2005, p. 2).
According to the CCRWQCB, water quality in the creek is impaired by sedimentation from silviculture, road construction, erosion, and nonpoint sources (CCRWQCB 2006).

Zayante tributary

This unnamed tributary to Zayante Creek consists of about 1.2 stream miles and flows southwest. It enters Zayante Creek about two miles upstream from the Mountain Charlie Gulch Creek confluence.

Staff from NMFS sampled the unnamed tributary to Zayante Creek in 2006. They observed multiple *O. mykiss* year classes (Spence pers. comm.).

Bull

Bull Creek consists of about two stream miles and is tributary to the San Lorenzo River. It flows east, entering the San Lorenzo in the town of Felton.

A DFG protest to a water right application on Bull Creek was prepared in 1975. The protest attributes steelhead "spawning and nursery areas" to the creek but does not provide observation information concerning *O. mykiss* (SWRCB ca 1970).

In 1980 memo, DFG noted that the creek did not have hydrologic connectivity to the San Lorenzo year-round (DFG 1980b). Staff from DFG interviewed a local landowner in the Bull Creek watershed in 1980. He stated that he had never seen salmonids in the stream (DFG 1980b).

Fall

Fall Creek consists of about six stream miles and is tributary to the San Lorenzo River. It flows southeast, entering the San Lorenzo in the northern portion of the town of Felton. A "significant" diversion is located at about stream mile one. A 2001 enhancement plan notes that the fishway at the diversion requires "continuous maintenance" for proper functioning (Alley 2004a). A boulder falls at about stream mile three is considered the upstream limit of anadromy.

A 1954 field note states, "[Fall Creek] appears to be the best small trout stream available in the San Lorenzo system" (DFG 1954c). The note indicates the presence of a stocking program on the creek. A 1957 DFG "Basic Survey" called Fall Creek "one of [the] more important streams of the [San Lorenzo River] drainage" (DFG 1957a).

In 1966, DFG said that Fall Creek was in "excellent condition" (DFG 1966c). This survey found *O. mykiss* fry upstream from a dam but did not note their origin (*i.e.*, planted or landlocked native).

Based on observations in April 1980, DFG called *O. mykiss* fry "common" in the downstream portion of Fall Creek (DFG 1980b). Staff also noted "adult steelhead" during the survey (DFG 1980b). A 1988 letter from DFG staff states, "Fall Creek is the most important tributary stream for coho salmon and steelhead trout in the San Lorenzo River watershed" (DFG 1988b).

Staff from DFG surveyed Fall Creek in 1995. The survey report stated that the creek "was still recovering from past land use activities (logging and limestone mining)" (DFG 1996h). Management recommendations included improving instream and riparian cover (DFG 1996h).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that siltation has impacted habitat in Fall Creek. Also, water diversions have decreased flows sufficiently to impact the creek (DFG 1996c). The memo cited the specific impact of the substantial water diversion at stream mile one.

An enhancement plan noted "fairly stable" *O. mykiss* numbers from 1998 to 2000 and deemed Fall Creek one of seven "important producers of YOY's and yearlings" (Alley 2004a). The plan also notes the important effect of diversions reducing Fall Creek flows on the growth rate of YOY's in the mainstem San Lorenzo River.

Fall Creek was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. Juvenile *O. mykiss* density was estimated to be about 50 fish per 100 feet at one sampling site in the creek, while the range for all sampling sites in the watershed was about 3 to 140 fish per 100 feet (Allen 2003). According to the CCRWQCB, water quality in the creek is impaired by sedimentation from road construction, habitat modification, erosion, and nonpoint sources (CCRWQCB 2006).

Bennett

Bennett Creek consists of about 1.8 stream miles and is tributary to Fall Creek. It flows east, entering Fall Creek at about stream mile 0.7.

In 1980, DFG staff stated, "Bennett Creek is impassable to upstream migrating fish" (DFG 1980b). However, the creek was characterized as a "significant perennial tributary [to Fall Creek]" in 1996 (DFG 1996h).

South Fork Fall

South Fork Fall Creek consists of about 1.6 stream miles and is tributary to Fall Creek. It flows east, entering Fall Creek at about stream mile 1.4.

In 1980, DFG staff stated, "South Fork of Fall Creek is impassable to upstream migrating fish" (DFG 1980b). However, the creek was characterized as a "significant perennial tributary [to Fall Creek]" in 1996 (DFG 1996h).

Newell

Newell Creek consists of about 7.6 stream miles and is tributary to the San Lorenzo River. It flows southwest, entering the San Lorenzo in the southern portion of the town of Ben Lomond. Loch Lomond Reservoir, constructed in the late 1950s, is located at about stream mile 1.8 and is a total passage barrier. A minimum release of 1.0 cfs is provided into Newell Creek (Alley 2004a).

In 1956 DFG staff noted that Newell Creek was a "fair spawning and nursery area," particularly in the upper section (DFG 1956f). It was deemed to be less important in this capacity than other San Lorenzo River tributaries. Another 1956 report states, "RT fingerling are very scarce in this stream" (DFG 1956b).

In 1966, Newell Creek's importance to the steelhead fishery of the drainage was said to be "its contribution of summer flow" (DFG 1966d). A 1967 report concerning Love Creek states, "Newell Creek has been damaged [by siltation] and lost to the fish resource" (DFG 1967a).

During observations in May 1980, DFG noted "numerous [*O. mykiss*] fry" in Newell Creek (DFG 1980b). Upstream of the dam, *O. mykiss* were present in lesser numbers. In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Newell Creek, particularly during summer and fall when low flow occurs naturally (DFG 1996c).

An enhancement plan states, "…there would be little benefit in transporting adults above and providing smolt passage down past the dam. There is less than 2 miles of stream habitat for salmonids, which is of low quality…" (Alley 2004a). The plan notes that the creek is not highly productive due to the short steelhead reach. It also recommends proactive watershed management activities upstream from the reservoir to maximize storage capacity and avoid future storage projects elsewhere in the San Lorenzo River watershed.

Newell Creek was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. The resulting report notes that "consistently low [*O. mykiss*] densities since 2000" were observed in the creek (Allen 2003). A Newell Creek site was sampled to estimate juvenile steelhead density and assessed for habitat conditions in 2006 as part of a larger study of several Santa Cruz watersheds. The resulting report states, "Overall habitat quality worsened in Newell Creek from 2000 to 2006 primarily due to great loss in escape cover. Substrate generally improved…" (Alley 2007, p. 59). According to the CCRWQCB, water quality in the upper creek is impaired by sedimentation from agriculture, silviculture, road construction, disturbed sites, erosion, and nonpoint sources (CCRWQCB 2006).

Love

Love Creek consists of about 3.6 stream miles and is tributary to the San Lorenzo River. It flows south, entering the San Lorenzo in the town of Ben Lomond. A Denil fishway is located at about stream mile 0.9.

Staff from DFG surveyed Love Creek in 1956. Stocking in 1950 was noted in the survey report. A 1957 DFG "Basic Survey" said that Love Creek was an "important [steelhead] spawning and nursery area" (DFG 1957a).

A 1967 report concerning Love Creek divided it into three reaches: upper, middle, and lower. At the time of this report, the creek was said to be in "good condition" and supported steelhead runs annually. Most spawning occurred in "the middle and lower sections" while "a few" steelhead entered the upper section of Love Creek to spawn (DFG 1967a).

Based on observations in July 1980, DFG said that "numerous [*O. mykiss*] fry" were present in lower Love Creek and "scarce" in upper Love Creek (DFG 1980b). According to a 1982 memo, "less than 1/2 mile of Love Creek, at present, is available to anadromous salmonids" (DFG 1982a). At that time, staff from DFG cited a flashboard dam at the Love Creek Road crossing as precluding use of the upper reaches by steelhead.

An enhancement plan for the San Lorenzo system notes overall good condition of riparian vegetation except for several areas like Love Creek with "prevalent" gaps in the canopy (Alley 2004a). The plan recommends that the fishway on Love Creek be assessed, modified if necessary, and continually maintained. According to the CCRWQCB, water quality in the creek is impaired by sedimentation from sources such as silviculture, road construction, disturbed sites, erosion, and nonpoint sources (CCRWQCB 2006).

A 2004 consultant's report regarding juvenile steelhead densities in the San Lorenzo River watershed also discusses distribution in various tributaries. The report states that Love Creek is "known to contain steelhead from past sampling and observation…" (Alley 2002, p. 38). A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that most of Love Creek is used by steelhead (County of Santa Cruz 2004). According to DFG staff, "…the creek is very degraded with excessive sediment depostion" (Nelson pers. comm.).

Smith

Smith Creek consists of about 0.8 stream miles and is tributary to Love Creek. It flows south, entering Love Creek at about stream mile 0.8.

In 1980, DFG staff stated, "…[t]here is no possible upstream migration of fish on Smith Creek after the first 1/8 of a mile" (DFG 1980b).

Fritch

Fritch Creek consists of about 1.1 stream miles and is tributary to Love Creek. It flows southeast, entering Love Creek at about stream mile 1.7.

A 1967 report concerning Love Creek noted that "…a few [steelhead] manage to ascend Fritch Creek" (DFG 1967b). In 1980, DFG said, "Fritsch Creek is impassable to upstream migrating fish" (DFG 1980b).

A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use of over one half of the length of Fritch Creek (County of Santa Cruz 2004).

Marshall (Hubbard Gulch)

Marshall Creek consists of about 1.5 stream miles and is tributary to the San Lorenzo River. It flows east, entering the San Lorenzo west of the town of Ben Lomond.

A 1964 stream survey report characterized Marshall Creek as "a good but very small stream" (DFG 1964b). Multiple *O. mykiss* year classes were observed during the survey. In a report on observations of Marshall Creek in July 1980, DFG staff stated, "…[*O. mykiss*] fry were present in good numbers" between the mouth and the first crossing of Hubbard Gulch Road (DFG 1980b).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Marshall Creek, particularly during summer when low flow occurs naturally (DFG 1996c). The memo also cites the habitat impacts of sedimentation from improper grading and from a landslide on Hubbard Gulch Creek.

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that a short reach of Hubbard Gulch Creek is used by steelhead (County of Santa Cruz 2004). [Kristen, recent?]

Alba

Alba Creek consists of about 1.4 stream miles and is tributary to the San Lorenzo River. It flows east, entering the San Lorenzo south of the town of Brookdale. There is a high gradient bedrock feature at the confluence with the San Lorenzo River.

In 1980, DFG staff stated, “Alba Creek is impassable to upstream migrating fish” (DFG 1980c). A researcher has attributed the impassability to high gradient (County of Santa Cruz 2004).

Clear

Clear Creek consists of about 2.3 stream miles and is tributary to the San Lorenzo River. It flows east, entering the San Lorenzo in the town of Brookdale.

Clear Creek was stocked in 1945 and subsequent years. A 1957 stream survey report calls Clear Creek “[an] unimportant steelhead or catchable [*i.e.*, planted] rainbow trout tributary in the San Lorenzo drainage” (DFG 1957c).

During observations of Clear Creek in May 1980, DFG found three *O. mykiss* individuals (DFG 1980b). In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Clear Creek, particularly during summer when low flow occurs naturally (DFG 1996c). The memo also cites the lack of bypass requirements for water district diversions on the creek.

A 2004 consultant’s report regarding juvenile steelhead densities in the San Lorenzo River watershed also discusses distribution in various tributaries. The report states that Clear Creek is “known to contain steelhead from past sampling and observation…” (Alley 2002, p. 38). An enhancement plan notes the important effect of diversions reducing Clear Creek flows on the growth rate of YOY’s in the mainstem San Lorenzo River (Alley 2004a). A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that a short reach of Clear Creek is used by steelhead (County of Santa Cruz 2004).

Boulder

Boulder Creek consists of about 7.6 stream miles and is tributary to the San Lorenzo River. It flows southeast, entering the San Lorenzo in the town of Boulder Creek. A bedrock chute located upstream from the Hare Creek confluence is considered the upstream limit of anadromy (Alley 2004a).

In 1956 DFG surveyed Boulder Creek and observed “generally scarce” fingerlings. The survey report states, “This appears to be a very good nursery stream in the lower section and a fair steelhead spawning stream. The quality and quantity of suitable spawning areas are not as good as other tributaries in its drainage (DFG 1956g).

In a 1966 survey report the creek was deemed "an important tributary to the San Lorenzo River" as if offered "both spawning and nursery areas" and contributed "summer flows" (DFG 1966e). The report noted that siltation was a "serious" problem in the system and found steelhead abundance to be "very poor".

Based on observations in July 1980 DFG staff said, "[*O. mykiss*] fry were present in Boulder Creek, though not in great numbers" (DFG 1980b). The report indicated that good spawning gravels were present in only a headwaters reach about 0.5 miles in length. A draft report by staff of the State Water Resources Control Board from 1982 estimated that the historical steelhead run in Boulder Creek was about 1,600 individuals (SWRCB 1982). The estimating method and information sources were not provided in the report.

An enhancement plan for the San Lorenzo system states, "[Boulder Creek has] shown a precipitous decline in size class 1 and YOY numbers from 1998 to 2000, presumably due to sedimentation of pool habitat and a reduction in spawning success" (Alley 2004a, p. ES-4). It nevertheless deemed Boulder Creek one of seven "important producers of YOY's and yearlings (Alley 2004a). The plan analyzed the effects of diversions in the Boulder Creek drainage and found, "Flow extractions… appeared to significantly impact the growth rate of YOY's and the overall density of smolt sized juveniles produced in the middle [San Lorenzo] River, particularly in drier years" (Alley 2004a, p. 54). The stream also was noted as one of five important contributors to fine sediment loading in the middle and lower reaches of the San Lorenzo River and was included in a list of six priority tributaries for focusing sediment reduction efforts (Alley 2004a).

Boulder Creek was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. The resulting report notes that "consistently low [*O. mykiss*] densities since 2000" were observed in upper Boulder Creek (Allen 2003). Juvenile steelhead densities were estimated and habitat conditions assessed in Boulder Creek in 2006 as part of a study of several Santa Cruz County watersheds. The resulting report notes estimated total juvenile steelhead densities of 30.7 and 57.6 per 100 feet of stream at the two sampling sites in 2006 (Alley 2007). The report states, "In Boulder Creek, habitat worsened overall from 2005 to 2006" and placed particular emphasis on "loss of escape pool cover" (Alley 2007, pp. 59 and 113).

Foreman

Foreman Creek consists of about 1.3 stream miles and is tributary to Boulder Creek. It flows northeast, entering Boulder Creek at about stream mile 0.9.

Rainbow trout/steelhead were noted in Foreman Creek during a 1959 survey of stream condition by DFG (DFG 1961b). In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Foreman Creek, particularly during summer when low flow occurs naturally (DFG 1996c). The memo also cites the habitat impacts of sedimentation from improper grading and other activities on Foreman Creek.

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that Foreman Creek is not accessible to steelhead due to the high gradient (County of Santa Cruz 2004).

Bracken Brae

Bracken Brae Creek consists of about 0.7 stream miles and is tributary to Boulder Creek. It flows south, entering Boulder Creek near the town of Forest Springs.

Streams surveys and a pollution investigation in 1975 documented the presence of *O. mykiss* in Bracken Brae creek (DFG 1975). Anecdotal reports of *O. mykiss* presence between 1964 and 1975 were included in the documentation.

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Bracken Brae Creek, particularly during summer when low flow occurs naturally (DFG 1996c). The memo also cites the habitat impacts of sedimentation from improper grading and other activities on Bracken Brae Creek.

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that steelhead cannot access Bracken Brae Creek due to a bedrock drop at the Boulder Creek confluence (County of Santa Cruz 2004).

Jamison

Jamison Creek consists of about 2.2 stream miles and is tributary to Boulder Creek. It flows east, entering Boulder Creek northwest of the town of Forest Springs.

A 1957 DFG "Basic Survey" said that Jamison Creek was of "fair, but limited" importance to the steelhead resources of the San Lorenzo River system (DFG 1957a). In a 1961 field note, DFG staff said that the creek "offers limited spawning area" (DFG 1961c).

Based on observations in July 1980, DFG said that "a few" *O. mykiss* were present in the most downstream portion of Jamison Creek (DFG 1980b). A 1982 survey report states, "The stream is in excellent condition but supports only a limited anadromous fishery" (DFG 1982b).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Jamison Creek, particularly during summer when low flow occurs naturally (DFG 1996c). The memo also cites the habitat impacts of sedimentation from improper grading and other activities on Jamison Creek.

A 2004 consultant's report regarding juvenile steelhead densities in the San Lorenzo River watershed also discusses distribution in various tributaries. The report states that Jamison Creek is "known to contain steelhead from past sampling and observation…" (Alley 2002, p. 38). A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use of less than half the length of Jamison Creek (County of Santa Cruz 2004).

Hare

Hare Creek consists of about 1.5 stream miles and is tributary to Boulder Creek. It flows east, entering Boulder Creek about 0.6 miles upstream from the Jamison Creek confluence. An earthen dam was constructed on Hare Creek in 1960 without provision for fishery water releases.

A 1961 memo cited the warden's belief that upper Hare Creek "formerly provided a limited spawning area for steelhead" (DFG 1961d). In 1961, DFG called Hare Creek "a small, unimportant, intermittent, spawning tributary of Boulder Creek" with "little fisheries value except for its contribution of flows to Boulder Creek" (DFG 1961e). The stream survey report from that year noted heavy damage (*i.e.*, siltation) from past logging.

Hare Creek was sampling in 1973 as part of a water diversion application review. Staff from DFG said "[Hare Creek] is a steelhead spawning and/or rearing area, as shown by the number of steelhead captured in the sampling" (DFG 1973b). A population estimate of 163 individuals between the mouth of Hare Creek and the dam was produced in 1973 (DFG 1973c).

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that steelhead use the portion of Hare Creek downstream from the dam (County of Santa Cruz 2004).

Bear

Bear Creek consists of about 8.2 stream miles and is tributary to the San Lorenzo River. It flows west, entering the San Lorenzo in the town of Boulder Creek.

Bear Creek was stocked in 1938 and in subsequent years (DFG 1938b). A 1945 DFG report notes the use of the creek by spawning steelhead (DFG 1945b).

Staff from DFG surveyed Bear Creek in 1956 and observed "common" *O. mykiss* fingerlings. The survey report states, "This tributary appears to be an important one to the San Lorenzo Salmon Steelhead Fishery. There are good spawning areas for adults and good nursery grounds for the young. Residents in the area report that this creek supports a good run of steelhead each year" (DFG 1956h).

A 1966 stream survey report noted "abundant spawning in the lower midsection of the stream" (DFG 1966f). The report noted siltation caused by logging and road building in the upper watershed that threatened the habitat value of Bear Creek.

Based on observations in July 1980, DFG called *O. mykiss* fry "abundant" in portions of Bear Creek downstream from the Shear Creek confluence (DFG 1980b). A draft report by staff of the State Water Resources Control Board from 1982 estimated that the historical steelhead run in Bear Creek was about 1,400 individuals (SWRCB 1982). In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Bear Creek, particularly during summer when low flow occurs naturally (DFG 1996c).

An enhancement plan for the San Lorenzo system states, "[Bear Creek has] shown a precipitous decline in size class 1 and YOY numbers from 1998 to 2000, presumably due to sedimentation of pool habitat and a reduction in spawning success" (Alley 2004a, p. ES-4). It nevertheless deemed Bean Creek one of seven "important producers of YOY's and yearlings (Alley 2004a). The stream also was noted as one of five important contributors to fine sediment loading in the middle and lower reaches of the San Lorenzo River and was included in a list of six priority tributaries for focusing sediment reduction efforts (Alley 2004a).

Bear Creek was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. The resulting report indicates that "fairly high" *O. mykiss* densities were observed in the creek (Allen 2003). Juvenile steelhead densities were estimated and habitat conditions assessed in Bear Creek in 2006 as part of a study of several Santa Cruz County watersheds. The resulting report notes an estimated total juvenile steelhead density of 52.9 per 100 feet of stream at the sampling site (Alley 2007). The report states, "…percent fines increased in pools, embeddedness increased in all habitat types, and escape cover worsened in pools and runs [from 2005 to 2006]" (Alley 2007, p. 60). rates the smolt habitat at the Lompico Creek site as

"Below Average." According to the CCRWQCB, water quality in the creek is impaired by sedimentation from silviculture, road construction, disturbed sites, erosion, and nonpoint sources (CCRWQCB 2006).

Deer

Deer Creek consists of about 3.8 stream miles and is tributary to Bear Creek. It flows south, entering Bear Creek at about stream mile 4.8.

A 1957 DFG "Basic Survey" called Deer Creek one of the most important San Lorenzo River tributaries in terms of resources for steelhead (DFG 1957a). Based on observations in July 1980, DFG called *O. mykiss* "abundant" in Deer Creek (DFG 1980b). A 1982 memo describes Deer Creek as in "good condition" though lacking sufficient gravels to provide good spawning habitat.

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Bear Creek, particularly during summer when low flow occurs naturally (DFG 1996c).

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. A former artificial passage barrier indicated on the map has since been removed (Kittleson pers. comm.).

Two Bar

Two Bar Creek is tributary to the San Lorenzo River. It consists of about four stream miles and flows southwest, entering the San Lorenzo about 1.2 miles upstream from the Bear Creek confluence.

Two Bar Creek was surveyed in 1966, when juvenile *O. mykiss* were said to be "quite common throughout the length" (DFG 1966g). According to the survey report, "this tributary contributes approximately 2 to 3 miles of spawning and nursery area to the San Lorenzo River" (DFG 1966g).

A 1972 survey report called Two Bar Creek "a poor fishery" due in part to logging debris and silt (McIlhatten and Smith 1972). In 1974, DFG staff described the *O. mykiss* population size as "poor" (DFG 1974f). Based on observations in July 1980, DFG called *O. mykiss* fry "common" in the lower mile of Two Bar Creek (DFG 1980b).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Two Bar Creek, particularly during summer when low flow occurs naturally (DFG 1996c). According to an enhancement plan, Two Bar Creek is one of six particularly important tributaries of the San Lorenzo for focusing sediment reduction efforts (Alley 2004a).

A 2004 consultant's report regarding juvenile steelhead densities in the San Lorenzo River watershed also discusses distribution in various tributaries. The report states that Two Bar Creek is "known to contain steelhead from past sampling and observation…" (Alley 2002, p. 38). A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use of the over one half of the length of Two Bar Creek (County of Santa Cruz 2004).

Kings

Kings Creek consists of about seven stream miles and is tributary to the San Lorenzo River. It flows southwest, entering the San Lorenzo in the community of Redwood Grove.

Staff from DFG surveyed Kings Creek in 1956. The survey report states, "This tributary appears to be a fairly important steelhead stream. Judging by the numbers of fingerling observed, tributary apparently contributes a considerable number of steelhead to the San Lorenzo fishery" (DFG 1956i). The report noted stocking in 1945.

In a 1966 survey report, DFG said Kings Creek was in "very poor condition" due to siltation resulting from logging and road construction (DFG 1966h). In 1974, DFG said that the creek offered "a good nursery area" but poor spawning habitat (DFG 1974g). Based on observations in July 1980, DFG called *O. mykiss* fry "abundant" in the downstream portion of Kings Creek (DFG 1980b).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Kings Creek, particularly during summer when low flow occurs naturally (DFG 1996c). An enhancement plan states, "Kings Creek is relatively unproductive despite its comparably long steelhead reach. This is because of high sediment impacts and relatively low spring and summer flow" (Alley 2004a, p. 19). In the plan, Kings Creek was noted as one of five important contributors to fine sediment loading in the middle and lower reaches of the San Lorenzo River and was included in a list of six priority tributaries for focusing sediment reduction efforts (Alley 2004a).

Kings Creek was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. Juvenile *O. mykiss* density was estimated to be between about 20 and 40 fish per 100 feet at two sampling sites in the creek, while the range for all sampling sites in the watershed was about 3 to 140 fish per 100 feet (Allen 2003). According to the CCRWQCB, water quality in the creek is impaired by sedimentation from silviculture, road construction, disturbed sites, erosion, and nonpoint sources (CCRWQCB 2006).

Logan

Logan Creek consists of about 1.5 stream miles and is tributary to Kings Creek. It flows west, entering Kings Creek at about stream mile 2.7.

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that steelhead use a portion of Logan Creek (County of Santa Cruz 2004).

Arana Gulch

Arana Gulch Creek consists of about five stream miles and is tributary to Woods Lagoon. It flows south, entering the Pacific Ocean at the Santa Cruz Harbor.

According to a 1966 memo, residents of the area stated that they had observed "a few steelhead" ascending the stream (DFG 1966i). The memo cites the recent burial of the stream in a culvert.

Staff from DFG sampled the stream in 1983 and found *O. mykiss* (DFG 1983a). A subsequent stream survey report characterized Arana Gulch as in "poor condition" due largely to excess sedimentation (DFG 1983b).

A fisheries habitat study was conducted in the Arana Gulch watershed in 1999 including electrofishing at five sites. Multiple *O. mykiss* year classes were represented in the samples and scale analysis indicated that a portion of the population was resident, having a stream reproduction life history (DFG 2001). Based on comparison with other Santa Cruz County streams, density of smolt-sized *O. mykiss* in Arana Gulch was described as "very poor" to "below average." The study found "extremely poor" spawning habitat and "generally limited" rearing habitat largely due to sedimentation (DFG 2001). Staff from NMFS observed age 2+ *O. mykiss* in the Arana Gulch basin in 2006. The fish were believed to be resident due to the presence of a passage barrier downstream (Spence pers. comm.).

Soquel

Soquel Creek consists of about seven stream miles between the mouth and the confluence of the West Branch. Upstream of this point is regularly referred to as the East Branch, although this reach is discussed here as part of mainstem Soquel Creek.

In 1959, DFG staff said Soquel Creek upstream of the West Branch confluence appeared to be the most productive stream reach in the drainage based on a count of 11,500 "steelhead rainbow trout" (DFG 1959a). The stream survey report noted that stocking did not occur historically in the upper and middle sections of this reach.

As part of a water rights application process, DFG summarized the steelhead resources of Soquel Creek in a 1973 memo. The average annual steelhead run was estimated to be 500-1,000 individuals (DFG 1973d). According to the memo, steelhead use about 20 miles of the creek while "resident rainbow trout exist in about 16 miles of stream above barriers to migrating anadromous fishes" (DFG 1973d). Staff from DFG state that "a major threat to the existence of Soquel Creek fishes has been low flows, siltation, and pollution caused by accelerated development and resource use in the watershed" and recommend "limitations on future water uses" (DFG 1973d).

In 1982, DFG staff said Soquel Creek was "in excellent condition" (DFG 1982c). A 1988 DFG memo indicates that a diversion dewatered about 0.5 miles of Soquel Creek, resulting in a fish kill of an estimated 864 juvenile *O. mykiss* (DFG 1988c). Soquel Creek was stocked in 1988 and in subsequent years (HSA 1988).

The East Branch of Soquel Creek was the subject of a 1993 watershed assessment that found over-drafting of water and filling of pools with find sediment to be limiting to *O. mykiss* production. According to the assessment, a ten-foot natural falls at Ashbury Gulch is considered to be a barrier to upstream fish migration (CDF 1993). However, staff from CDF found *O. mykiss* upstream of the natural falls in that year. Steelehad smolts reared at the Monterey Bay Salmon and Steelhead Project were planted upstream from Ashbury Falls in the early 1990s (Nelson pers. comm.).

A 1996 estimate of the steelhead run size in Soquel Creek was about 100 individuals (Sutfin 1996). The estimating method and supporting information are not provided in the reference. In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact habitat in the Soquel Creek mainstem and lagoon, particularly during summer when low flow occurs naturally (DFG 1996c). The memo also specifically cites flood control, logging, quarrying, and road maintenance activities as having impacts on habitat conditions in Soquel Creek.

A spawning survey was conducted in lower Soquel Creek in 2002, when redds and evidence of successful reproduction were noted. The surveyor observed "at least 13" adult steelhead at one time during the surveys (HES 2002). East Branch Soquel Creek upstream from Ashbury Falls was surveyed in 2002 as part of a study of the Soquel Creek watershed. The resulting report states, "…the potential for production of yearling fish is high in this reach" (Alley 2003, p. 43).

Staff from NMFS sampled multiple sites on the east branch of Soquel Creek in 2003, 2004, and 2005 as part of a study of demographic processes of steelhead. A draft manuscript states, "In Soquel Creek, variability in water flow appears to play a major role in demographic processes of steelhead, with high survival, minimal movement, and limited growth during the summer and fall dry season, and low survival, extensive movement, and limited growth during the flashy flows of the winter and spring rainy season" (Sogard *et al.* In review).

A management plan update was prepared in 2004 by consultants to the City of Capitola. The report cites previously generated information that, "The [Soquel Creek] lagoon typically produces a significant 10-35% of the smolt-sized juveniles in the mainsteam Creek each year" (Alley 2004b, p. 14). According to the CCRWQCB, water quality in the lagoon is impaired by sedimentation from construction/land development (CCRWQCB 2006). The lagoon is managed by the city of Capitola, including sandbar construction and artificial breaching. A flume exists that carries a portion of the lagoon's discharge.

A mark/recapture study of the lagoon's juvenile steelhead population in fall 2006 produced an estimate of about 992 individuals, which was compared to a 14-year average of about 1,160 individuals (Alley 2006). The resulting monitoring report included numerous management recommendations including recommendations for flume operations, lagoon inflow, water quality related factors, and invasive plant species control. Juvenile steelhead densities were estimated and habitat assessed in mainstem Soquel Creek during 2006 as part of a larger study of Santa Cruz County watersheds. (Juvenile steelhead densities have been measured in Soquel Creek since 1997.) The resulting report notes that "especially low" juvenile densities were observed, particularly in the lower mainstem (Alley 2007). Estimated smolt densities at four sites ranged from 2.8 to 9.1 per 100 feet of stream, that may be compared a range of 1.2 to 41.6 per 100 feet throughout the study area (Alley 2007). The report rates the smolt habitat at the Soquel Creek sites from "Fair" to "Poor."

Bates

Bates Creek consists of about three stream miles and is tributary to Soquel Creek. It flows southwest, entering Soquel Creek north of the city of Soquel. Prescott Dam (also known as "Little Hoover" dam) at stream mile 1.5 is a total barrier to fish passage.

In notes from a 1957 stream survey, DFG staff characterized Bates Creek as a "very poor steelhead spawning and nursery tributary to Soquel Creek" (DFG 1957d). The creek's value was said to be in its contribution of flow to Soquel Creek.

Notes from a 1988 survey of Bates Creek indicate the presence of *O. mykiss* in "good habitat" with flow present (DFG 1988d). A single trout also was observed upstream of the dam (and a waterfall) on Bates Creek in 1988 (DFG 1988e).

Bates Creek was surveyed in 1996 and multiple *O. mykiss* year classes were observed. The survey report recommended allowing recruitment of woody debris, controlling sediment input into the creek, and providing bypass flows (DFG 1996b).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact habitat in Bates Creek, particularly during summer when low flow occurs naturally (DFG 1996c). The memo also cites "Little Hoover" dam as a habitat deficiency.

Bates Creek was surveyed in 2002 as part of a study of the fishery of the Soquel Creek watershed. Multiple *O. mykiss* year classes were observed, and the age structure was said to indicate "resident trout" in some portions of the creek. The resulting report states, "Spawning habitat was poor with a preponderance of sand from the Dam to the mouth" (Alley 2003, p. 41).

Grover Gulch

Grover Gulch Creek consists of about 2.5 stream miles and is tributary to Bates Creek. It flows south, entering Bates Creek at about stream mile 1.5 (upstream from the Bates Creek Dam).

Grover Gulch Creek was surveyed in 2002 as part of a study of the fishery of the Soquel Creek watershed. The resulting report noted the presence of resident trout and poor spawning conditions in the creek (Alley 2003).

Soquel tributary (Laurel Glen, Moores Gulch)

This tributary consists of about three stream miles and is called alternately Moores Gulch Greek and Laurel Glen Creek. It flows generally south before entering Soquel Creek at about stream mile three. The County of Santa Cruz has constructed a fishway at the Soquel - San Jose Road crossing.

In a 1957 stream survey, DFG found fingerling steelhead to be "quite common in the lower section" (DFG 1957e). The stream was characterized as "a fair to good spawning tributary in the lower section and an excellent nursery ground for steelhead". Limiting water diversion was recommended.

Staff from DFG surveyed Laurel Glen Creek in 1961 and observed *O. mykiss* "in fair numbers". The survey report states, "… success and natural propagation are probably poor. Lack of suitable spawning area seems to be a limiting factor" (DFG 1961f).

As part of a larger study of Santa Cruz County streams, consultants sampled Moore's Gulch Creek in 1981. The resulting report indicated that *O. mykiss* was observed at one site and found spawning habitat and substrate to be primary limiting factors to production (HSA 1982). Notes from a 1988 survey of Moore's Gulch Creek indicate the presence of *O. mykiss* in "good habitat" with summer streamflow (DFG 1988d).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact habitat in Laurel Creek, particularly during summer when low flow occurs naturally (DFG 1996c). The memo also specifically cites flood control and logging activities as having impacts on habitat conditions in the creek.

Moores Gulch Creek was surveyed in 1996 and multiple *O. mykiss* year classes were observed. The survey report recommended a program to control erosion, assessing passage at culverts, and increasing woody cover in the creek (DFG 1996i).

Moores Gulch Creek was surveyed in 2002 as part of a study of the Soquel Creek watershed. The resulting report discounts the value of restoration actions on the creek "…because of Moores Gulch's high sediment content and poor rearing and spawning habitat" (Alley 2003, p. 42).

West Branch Soquel

West Branch Soquel Creek is tributary to Soquel Creek. It consists of about 6.1 stream miles. It flows southeast, entering Soquel Creek at about stream mile 6.4. Laurel Mill Dam, immediately downstream from the Laurel and Burns creeks confluence is a total passage barrier.

Records of DFG observations of spawning steelhead observed in West Branch Soquel Creek go back to the 1940s (DFG 1940a). In a 1957 stream survey report, DFG characterized the upper portion of the creek as "excellent steelhead spawning and nursery grounds (DFG 1957f).

As part of an investigation of a proposed dam, DFG surveyed West Fork Soquel Creek in 1963. The resulting memo states, "… it appears that a small run of steelhead frequent the area in which is this proposed dam site. This steelhead run also appears to be erratic in occurrence and size" (DFG 1963a). The memo adds, "A resident trout population appears to be well established in this stream and tributary areas above. It is not know whether the fingerling success is related to steelhead or resident trout propagation" (DFG 1963a). The memo noted an on-going stocking program on the creek.

As part of a larger study of Santa Cruz County streams, consultants sampled West Fork Soquel Creek in 1981. The resulting report indicated that *O. mykiss* was observed at three of three sites and found some "good" rearing habitat, limited in part by low flow (HSA 1982).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact habitat in West Branch Soquel Creek, particularly during summer when low flow occurs naturally (DFG 1996c). The memo also specifically cites flood control and logging activities as having impacts on habitat conditions in West Branch Soquel Creek. West Branch Soquel Creek was surveyed in 1996 and multiple *O. mykiss* age classes were observed. The survey report noted limited spawning substrate and recommended increasing woody cover and a program of erosion control (DFG 1996j).

West Branch Soquel Creek was surveyed in 2002 as part of a study of the Soquel Creek watershed. Regarding the reach between Girl Scout Falls I and II the resulting report states, "Spawning habitat appeared to be adequate to saturate rearing habitat in 2002" (Alley 2003, p. 44). High YOY densities were noted in the reach upstream from Girl Scout Falls II. The life history form of this population (resident or anadromous) was indeterminate. According to the report, "Approximately 3.7 miles of potential steelhead habitat exists upstream of Girl Scout Falls II" (Alley 2003, p. 44).

Juvenile steelhead densities were estimated and habitat assessed in West Branch Soquel Creek during 2006 as part of a larger study of Santa Cruz County watersheds. (Juvenile steelhead densities have been measured in West Branch Soquel Creek since 1997.) Estimated smolt densities at three sites ranged from 4.7 to 14.1 per 100 feet of stream, that may be compared a range of 1.2 to 41.6 per 100 feet throughout the study area (Alley 2007). The report rates the smolt habitat at the West Soquel Creek sites as "Fair" or "Below Average."

Hester

Hester Creek consists of about four stream miles and is tributary to West Branch Soquel Creek. It flows south, entering West Fork Soquel Creek at about stream mile 0.9.

Field notes from 1953 indicate “poor spawning possibilities” in Hester Creek (DFG 1953e). In a 1959 survey, DFG staff found “few” *O. mykiss* in Hester Creek and noted that the culvert at the mouth of the stream could be a limiting factor (DFG 1959b).

As part of a larger study of Santa Cruz County streams, consultants sampled Hester Creek in 1981. The resulting report indicated that *O. mykiss* was observed at two of two sites and found some “below average” rearing habitat, limited in part by lack of cover and low flow (HSA 1982).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact habitat in Hester Creek, particularly during summer when low flow occurs naturally (DFG 1996c).

Hester Creek was surveyed in 1996 and multiple *O. mykiss* year classes were observed. The survey report recommended a program to control erosion and allowing recruitment of woody debris (DFG 1996k).

Hester Creek was surveyed in 2002 as part of a study of the Soquel Creek watershed. The resulting report states, “Hester Creek may be expected to produce few yearlings and low densities of young-of-the-year juveniles” (Alley 2003, p. 43).

Laurel

Laurel Creek consists of about 3.1 stream miles and is tributary to West Branch Soquel Creek. It flows east to its confluence with Burns Creek, where the creeks form the West Branch. A 1948 survey notes a dam at about stream mile 0.8. A 1963 survey cited a series of natural falls at about stream mile 4.0 as constituting the natural limit of anadromy (DFG 1963b).

In a 1963 survey report, DFG characterized Laurel Creek as an important drainage due to its summer flows and its resident trout population (DFG 1963b). At the time of the survey, it was unknown if steelhead were using the stream; however, very limited spawning habitat was noted.

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact habitat in Laurel Creek, particularly during summer when low flow occurs naturally (DFG 1996c).

A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates that Laurel Creek is not accessible to steelhead (County of Santa Cruz 2004).

Burns

Burns Creek consists of about 2.3 stream miles and is tributary to West Branch Soquel Creek. It flows south to its confluence with Laurel Creek, where the creeks form the West Branch.

Staff from DFG surveyed Burns Creek in 1963 and observed multiple year classes, including “abundant” fingerling *O. mykiss*. The survey report states, “These fish appear to be the result of natural propagation from the resident rainbow population… There was no evidence of steelhead or salmon utilization” (DFG 1963c).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact habitat in Burns Creek, particularly during summer when low flow occurs naturally (DFG 1996c).

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that steelhead cannot access Burns Creek due to a dam at the mouth (County of Santa Cruz 2004).

Hinckley

Hinckley Creek consists of about 4.1 stream miles and is tributary to Soquel Creek. It flows west, entering Soquel Creek about 1.3 miles upstream from the West Branch Soquel Creek confluence.

Hinckley Creek was stocked in 1938 and in subsequent years (DFG 1938c). As part of a 1959 stream survey, DFG staff estimated the *O. mykiss* population in Hinckley Creek to be 2,000 individuals. The creek was characterized as "a moderate producer of steelhead rainbow trout" (DFG 1959c).

In 1982, DFG staff said that lower Hinckley Creek was in poor condition due to numerous landslides (DFG 1982d). Notes from a summer 1988 survey of Hinckley Creek indicate the presence of *O. mykiss* and states "flow present" (DFG 1988d).

Hinckley Creek was surveyed in 1996 and multiple *O. mykiss* year classes were observed. The survey report recommended a program to control erosion and allowing natural recruitment of woody debris (DFG 1996l).

Hinckley Creek was surveyed in 2002 as part of a study of the Soquel Creek watershed. Young-of-the-year *O. mykiss* were observed and the resulting report notes the importance of the creek in providing relatively cool summer flow to Soquel Creek.

Amaya

Amaya Creek consists of about 2.5 stream miles and is tributary to Soquel Creek. It flows south, entering Soquel Creek about 1.6 miles upstream from the Hinckley Creek confluence.

In a 1959 stream survey report, DFG said that spawning habitat was available only in the lower third of Amaya Creek. The creek was said to be "…in very poor condition due to the extensive logging operations which have occurred in the past" (DFG 1959d). The *O. mykiss* population of the creek was estimated to be about 1,500 individuals.

Sampling by CDF in 1998 found two *O. mykiss* year classes in Amaya Creek. The survey report notes a low population estimate due in part to "small stream size, intermittent fish barrier debris jams, and low habitat quality" (Kotter and Sutfin 1998). Amaya Creek sampling between 1997 and 2003 indicates high variability in the proportion of YOY in the population, ranging from zero percent to about 79 percent (CDF 2003). The oldest fish collected are age 2+.

Amaya Creek was surveyed in 2002 as part of a study of the Soquel Creek watershed. The resulting report states, "…the lower reaches of Amaya Creek were likely productive for juvenile steelhead due to the good cover in pools. And spawning substrate was better quality than other tributaries" (Alley 2003, p. 42).

Aptos

Aptos Creek consists of about 9.4 stream miles and drains a watershed of about 25 square miles. It flows southwest from headwaters on Santa Rosalia Mountain, entering the Pacific Ocean at Seacliff State Beach.

Aptos Creek was stocked prior to 1934 and in subsequent years (DFG 1934f). In 1960, DFG staff stated, "This stream can be considered one of the larger steelhead spawning and nursery streams in the Santa Cruz and San Mateo County areas" (DFG 1960l)

In a 1965 survey, DFG staff said that Aptos Creek contained approximately eight miles of *O. mykiss* nursery area. The population of the creek was estimated to be almost 43,300 individuals, and the stream was called "an important spawning and nursery area for steelhead trout" (DFG 1965b).

As part of a larger study of Santa Cruz County streams, consultants sampled Aptos Creek in 1981. The resulting report indicated that *O. mykiss* was observed at five of five sites. Rearing habitat quality was deemed "good" at only one site, and substrate and lack of cover were said to be primary limiting factors to production (HSA 1982).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact habitat in the Aptos Creek mainstem and lagoon (DFG 1996c). The memo also specifically cites development within the floodplain and channel confinement in lower Aptos Creek as producing impacts on habitat conditions. A 1996 memo states, "From a fisheries standpoint, the most significant factor influencing quality and quantity of habitat in the Aptos Creek watershed is sediment" (DFG 1996m).

A 1997 habitat inventory report recommends mapping and treating priority erosion sites related to the road system (DFG 1997f). Staff from DFG surveyed Aptos Creek in 1998 and observed multiple *O. mykiss* year classes, including YOY and individuals to 10.2 inches in length. The survey report recommended discontinuing the practice of constructing rock crossings of the creek (DFG 1998).

As part of an annual survey, Aptos Creek was sampled in 2001 by DFG staff. Steelhead between about two and 12.9 inches in length were observed. Two adult steelhead also were seen, one of which was dead and measured about 21 inches (DFG 2002a).

Stream habitat in the Aptos Creek watershed was assessed in 2001, when multiple *O. mykiss* year classes were observed in five mainstem Aptos Creek reaches. The resulting report states, "Sediment is likely the major factor limiting salmonid production on both a watershed and individual reach scale" (HES 2003, p. 52). Two adult steelhead were observed in Aptos Creek during sampling in 2001 (DFG 2002a). Staff from NMFS surveyed Aptos Creek in 2005 and observed multiple *O. mykiss year* classes throughout a six-mile section (Spence pers. comm.). Juvenile steelhead densities were estimated and habitat conditions assessed in Aptos Creek in 2006 as part of a study of several Santa Cruz County watersheds. The resulting report notes estimated smolt densities of 10.1 and 19.0 per 100 feet of stream at the sampling sites, that may be compared to a range of 1.2 to 41.6 per 100 feet throughout the study area (Alley 2007). The report rates the smolt habitat at the Aptos Creek sites as "Fair" and "Good."

According to the CCRWQCB, water quality in the creek is impaired by sedimentation from disturbed sites and channel erosion (CCRWQCB 2006). In a memo regarding lagoon management a researcher noted, "If the sandbar were in place in summer, the [Aptos Creek] lagoon would probably convert mostly to freshwater, improving mixing and reducing temperature and DO problems" (Smith 2007b).

Valencia

Valencia Creek consists of about 7.2 stream miles, draining a watershed of about 12 square miles, and is tributary to Aptos Creek. It flows southwest, entering Aptos Creek at about stream mile 0.6.
The County of Santa Cruz has constructed a fishway at the Soquel Drive crossing.

Staff from DFG visited Valencia Creek in June 1965 and observed *O. mykiss* (DFG 1965c). As part of a larger study of Santa Cruz County streams, consultants sampled Valencia Creek in 1981. The resulting report indicated that *O. mykiss* was observed at two of three sites. Rearing habitat quality was deemed "good" as only one site, and substrate and lack of flow were said to be primary limiting factors to production (HSA 1982). Staff from DFG inventoried Valencia Creek in 1997. The resulting draft report recommends mapping and treating priority erosion sites to reduce sediment input to the creek (DFG 1997g).

Stream habitat in the Aptos Creek watershed was assessed in 2001, when multiple *O. mykiss* year classes were observed in two of three sampling locations in Valencia Creek. The resulting report states, "Evidence from past sampling indicates that Valencia Creek has had higher densities of rearing trout and lower levels of fine sediments than currently occur… The greatest increase in steelhead production on a watershed scale would come from restoring the greatly diminished productive capacity of Valencia Creek (HES 2003, p. 52).

Young of the year *O. mykiss* likely of resident trout ancestry were observed in the Bear Valley headwater fork of Valencia Creek in 2006 (Spence pers. comm.). Juvenile steelhead densities were estimated and habitat conditions assessed in Valencia Creek in 2006 as part of a study of several Santa Cruz County watersheds. The resulting report notes estimated smolt densities of 3.8 and 12.9 per 100 feet of stream at the sampling sites, that may be compared to a range of 1.2 to 41.6 per 100 feet throughout the study area (Alley 2007). The report rates the smolt habitat at the Valencia Creek sites as "Poor" and "Fair." It states, "…much habitat degradation [since 1981 was] observed in the lower reach and similar habitat quality in the upper reach" (Alley 2007, p. 16). The lower reach was deemed "badly sedimented."

Trout Creek Gulch

Trout Creek Gulch consists of about four stream miles and is tributary to Valencia Creek. It flows south, entering Valencia Creek in the city of Aptos.

Trout Creek Gulch was inventoried in 1997 and no salmonids were observed. The resulting report notes a culvert under Trout Gulch Road as a barrier to migration. Trout Creek was surveyed in 2001 as part of a fisheries habitat assessment of the Aptos Creek watershed, and *O. mykiss* was not observed (HES 2003).

Bridge

Bridge Creek consists of about 2.4 stream miles and is tributary to Aptos Creek. It flows south, entering Aptos Creek at about stream mile 4.5. In 1960, DFG staff noted that a 30 to 40 foot natural falls was a barrier to fish passage (DFG 1960m).

In a 1960 stream survey, DFG staff found *O. mykiss* "throughout the lower and mid sections in fair numbers" (DFG 1960m). The report notes that Bridge Creek "appears to be a good spawning and nursery stream up to the natural falls" (DFG 1960m).

Staff from DFG noted in 1982 that Bridge Creek was "suffering from numerous slides" and had "virtually no habitat to support an anadromous fishery" (DFG 1982e). A 1997 stream inventory included sampling at 13 locations, of which nine had *O. mykiss* comprising two year classes (CCC 1997). Staff from DFG surveyed Bridge Creek in 1998 and observed *O. mykiss* YOY at one site (DFG 1998).

Bridge Creek was surveyed in 2001 as part of a fisheries habitat assessment of the Aptos Creek watershed, when multiple *O. mykiss* year classes were observed. The resulting report notes very little spawning habitat in the creek and states, "Fine sediments…likely limit the productive capacity of Aptos and Bridge Creeks…" (HES 2003, p. 52).

Pajaro River

The Pajaro River consists of about 31 stream miles and drains a watershed of approximately 1,300 square miles. It flows west from headwaters at San Felipe Lake, entering the Pacific Ocean southwest of the city of Watsonville.

A 1960 DFG letter states, "…steelhead runs in the Pajaro apparently fluctuate greatly from a few fish to several hundred" (DFG 1960n). In 1961, DFG noted, "Warden Smith feels that the Pajaro River provides more fish and fishing than any other stream in this area" (DFG 1961g).

According to a DFG estimate, the 1963-1964 steelhead run comprised 1,500 individuals (DFG 1964c). A 1964 DFG memo noted that steelhead used the mainstem Pajaro River near the "gravel plant at Gilroy" for spawning (DFG 1964c). In 1965, DFG staff offered the following assessment:

> "The Pajaro River has lost the majority of its anadromous fish runs. Only a limited steelhead run persists in the lower reaches and enters several small tributary streams. Logging, conversion of land to agricultural crops, and construction of dams have resulted in the decline of this habitat in the drainage. Not much hope can be expressed for improving this situation.
>
> The limiting factor is siltation erosion of the spawning grounds. Maximum runs could be achieved only by stringent erosion control measures" (DFG 1965d, p. 397).

In a 1966 memo, DFG staff noted that most spawning in the Pajaro River system occurred in the mainstem Pajaro River between the Granite Rock Company Plant and the Llagas Creek confluence (DFG 1966j). The memo states, "Over the last ten years it is estimated that the runs varied from a low of 500 to a high of 2,000 spawning pairs. Some spawning takes place, but results are nil due to activities of flood control people with bull-dozers" (DFG 1966j). The memo characterized the Pajaro River lagoon as having "year-round fishery importance" due in part to its function of providing a holding area for downstream steelhead migrants.

In 1975, Jerry Smith stated, "Three general factors affect the steelhead populations in the Pajaro system: the migration pathway, spawning sites, and nursery areas. Of the three, the most critical is suitable nursery areas" (Smith 1975).

In a 1994 report Jerry Smith notes, "…because of the very poor passage conditions during the drought, most of the steelhead now in the watershed are probably descended from hatchery origin fish" (Smith 1994, p. 9). In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that severe erosion due in part to the removal of riparian vegetation and illegal grading has led to sedimentation of spawning habitat in the mainstem Pajaro (DFG 1996c). The memo also specifically cites reduced stream flow due to diversion and well pumping, lack of riparian cover, and pollution from agricultural, septic, and stormwater sources as degrading habitat.

In a draft 2002 report Jerry Smith states, “Steelhead apparently do not rear in the lagoon because spawning areas are far upstream within Pajaro River tributaries… However, the lagoon provides potentially important feeding habitat in spring for outmigrating smolts” (Smith 2002, p. 2). The draft also notes, “The Pajaro River serves as a migration pathway for steelhead, but because of low and warm summer streamflows and substrate dominated by sand or silt it provides almost no potential rearing habitat for steelhead” (Smith 2002, p. 1). According to Dr. Smith, spawning and rearing habitat occurs in Corralitos, Pescadero, Uvas, Llagas and Pacheco creeks.

A 2002 letter from NMFS staff addressed the flood control project in the lower portion of the Pajaro. The letter states, “Existing impacts to the Pajaro River fishery include, but are not limited to, water diversions, permanent and seasonal dams, urban and agricultural pollution, sedimentation, timber harvest, loss of riparian and instream habitat, and channelization. Impacts to this fishery are pervasive, chronic, and ongoing: viable steelhead runs are limited to a few tributaries principally located in Uvas, Bodfish, Corralitos, Salsipuedes, and Llagas Creeks” (NMFS 2002a). Based in part on the approach being taken to flood control, the environmental organization American Rivers named the Pajaro River the “most endangered river” in the United States in 2006.

Corralitos (Salsipuedes)

Corralitos Creek consists of about 16 stream miles and is tributary to the Pajaro River. On USGS maps and in some reports, Corralitos Creek between the mouth and Highway 152 is referred to as Salsipuedes Creek. The creek flows southeast, entering the Pajaro in the southeast portion of the city of Watsonville. A diversion dam supplying Watsonville is located upstream from the town of Corralitos. According to DFG staff, the existing fishway may be replaced to improve fish passage prior to the year 2010 (Nelson pers. comm.).

In 1959, DFG referred to Corralitos Creek as one of the principal tributaries of the Pajaro River, noting that the stream supported a “good steelhead run” and included more than nine miles of spawning area (DFG 1956j). A 1960 stream survey report stated that the creek was small but served as nursery habitat due to perennial flow produced by springs in the drainage (DFG 1960o).

A 1966 memo notes that lower Corralitos and Salsipuedes Creek is an important migration route. The memo states, “Corralitos Creek from the water diversion is an important steelhead spawning and nursery area” (DFG 1966j).

San Jose State University faculty noted “good extensive spawning and nursery areas” in Corralitos Creek in 1975 (Smith 1975). In 1980, Dr. Smith referred to Corralitos Creek as an “important steelhead stream” for the Pajaro River system (Smith 1980). According to a consultant’s report, Salsipuedes Creek “has persistent, low summer streamflow and, due to lack of shading, has high summer water temperatures (to 80 degrees)” (Swanson ca 1991).

As part of a larger study of Santa Cruz and Monterey counties streams, consultants sampled Corralitos Creek in 1981. The resulting report indicated that *O. mykiss* was observed at nine of nine sites. Rearing habitat was deemed “good” or better at three sites, with substrate and lack of flow comprising primary limiting factors to production (HSA 1982).

A 1994 study of *O. mykiss* in Corralitos and Browns creeks found a substantial decrease (74 percent) in the estimated number of YOY from the 1981 estimate. The study produced an estimate of 259 “total spawners” in the basin (Alley 1994). The report noted that the expected run size could be 50 percent of the estimated value, or about 130 individuals. In a 1994 report, Jerry

Smith notes that the Corralitos Creek steelhead population, unlike those in other Pajaro River tributaries, “is likely to still retain a substantial native genetic component” (Smith 1994).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff noted silt loading from logging and poor road maintenance and lack of riparian cover as adversely affecting habitat (DFG 1996c).

Juvenile steelhead densities were estimated and habitat conditions assessed in Corralitos Creek in 2006 as part of a study of several Santa Cruz County watersheds. The resulting report notes estimated smolt densities of 19.3, 13.2, and 41.6 per 100 feet of stream at the sampling sites, that may be compared to a range of 1.2 to 41.6 per 100 feet throughout the study area (Alley 2007). The report rates the smolt habitat at the Corralitos Creek sites as “Good,” “Fair,” and “Very Good.” It states, “Substrate conditions in Corralitos Creek have generally degraded in the 3 reaches studied [since 1994]” (Alley, p. 115). The report recommends installing stream gages at the diversion dams on Browns Valley and Corralitos Creeks to allow comparison of streamflow upstream and downstream from the diversions.

Casserly

Casserly Creek consists of about 6.2 stream miles. It flows south, and its confluence with Corralitos Creek north of the city of Watsonville marks the beginning of Salsipuedes Creek. College Lake is formed seasonally by impounding Casserly Creek flows.

As part of a larger study of Santa Cruz County streams, consultants sampled Casserly Creek in 1981. The resulting report indicated that *O. mykiss* was not observed at any of three sites. Rearing habitat was deemed “below average”, with substrate and lack of flow comprising primary limiting factors to production (HSA 1982). As part of a 1982 barrier survey, staff from DFG noted “abundant” steelhead YOY in Banks Canyon, which is the headwaters of Casserly Creek (DFG 1982f).

In a 1997 letter, Jerry Smith reported observing multiple *O. mykiss* age classes and smolts in Casserly Creek. The letter states, “…outmigration from Casserly is difficult; by 3 May flows in the lower part of the creek were already too low to permit outmigration” (Smith 1997d).

Green Valley

Green Valley Creek consists of about 5.1 stream miles and is tributary to Casserly Creek. Green Valley Creek flows south, entering Casserly Creek upstream from the location of College Lake.

A 1958 memo states, “The College Lake drainage is intermittent. It is of no value to fishlife. We have taken measures in the past to prevent steelhead from ascending this drainage, as flows dry before many of the adults and all of their spawn have a chance to reach permanent water” (DFG 1958b).

As part of a larger study of Santa Cruz County streams, consultants sampled Green Valley Creek in 1981. The resulting report indicated that *O. mykiss* was not observed at any of four sites. Rearing habitat was deemed “below average” or worse and migration access was generally “poor” (HSA 1982).

In a 1997 letter, Jerry Smith notes that *O. mykiss* in Green Valley Creek, “may be exclusively or primarily a resident trout population” (Smith 1997d). The letter states, “Up and downstream passage is difficult in this system…” (Smith 1997d). A 2001 restoration plan states, “Size structure in spring 1997, lack of smolted fish, and distinctive genetics indicate that all or most of the ‘rainbow trout’ in Green Valley Creek are now resident, rather than migratory steelhead” (ESE 2001, p. 98).

Browns (Browns Valley)

Browns Creek consists of about 5.9 stream miles and is tributary to Corralitos Creek. It flows southwest, entering Corralitos Creek near the town of Corralitos. A diversion dam on the creek has a fishway.

Staff from DFG surveyed Browns Creek in 1934 and noted the presence of steelhead. The survey report indicates past stocking and “very good” natural propagation (DFG 1934g).

In 1962, DFG noted “limited and scattered pockets of suitable spawning gravel” in Brown’s Valley Creek (DFG 1962b). This survey report stated that the stream was accessible to spawning steelhead only after heavy flows when fish could pass downstream “dry areas” (DFG 1962b). Surprisingly, perennial flow was attributed to the stream. A 1966 memo states, “From 2.5 miles from mouth upstream to Gamecock Canyon (3 miles) is a steelhead spawning and nursery area. Summer trout fishery…exists” (DFG 1966j).

Jerry Smith noted “good extensive spawning and nursery areas” in Browns Valley Creek in 1975 (Smith 1975). In 1980, Dr. Smith referred to Brown’s Valley Creek as an “important steelhead stream” for the Pajaro River system (Smith 1980).

As part of a larger study of Santa Cruz County streams, consultants sampled Browns Creek in 1981. The resulting report indicated that *O. mykiss* was observed at two of two sites. Some rearing habitat was deemed “good to very good”, with substrate and lack of flow comprising primary limiting factors to production (HSA 1982).

A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use of most of the length of Browns Creek (County of Santa Cruz 2004). However, the portion of Browns Creek that flows through the alluvial valley is de-watered during the summer months (Nelson pers. comm.).

Juvenile steelhead densities were estimated and habitat conditions assessed in Browns Creek in 2006 as part of a study of several Santa Cruz County watersheds. The resulting report notes estimated smolt densities of 17.0 and 16.9 per 100 feet of stream at the sampling sites, that may be compared to a range of 1.2 to 41.6 per 100 feet throughout the study area (Alley 2007). The report rates the smolt habitat at the Browns Creek sites as “Good.” It states, “Substrate conditions in Browns Valley Creek generally declined in 2006 compared to 1994 in the 2 reaches studied” (Alley, p. 28). The report recommends installing stream gages at the diversion dams on Browns Valley and Corralitos Creeks to allow comparison of streamflow upstream and downstream from the diversions.

Ramsey Gulch

Ramsey Gulch Creek consists of about 2.2 stream miles and is tributary to Brown’s Creek. It flows south, entering Brown’s Creek east of the mouth of Redwood Canyon.

A 1966 memo states, “Lower Gamecock Canyon and Lower Ramsey Gulch have steelhead spawning and nursery areas” (DFG 1966j). In a 1967 survey of Browns Valley Creek, DFG staff noted multiple *O. mykiss* year classes in Ramsey Gulch Creek (DFG 1967c).

As part of a larger study of Santa Cruz County streams, consultants sampled Ramsey Gulch Creek in 1981. The resulting report indicated that *O. mykiss* was observed at one site. Rearing habitat was deemed “below average”, with substrate and lack of flow comprising primary limiting factors to production (HSA 1982).

Staff from DFG surveyed Ramsey Gulch Creek in 2002 and observed *O. mykiss*. The survey report states, “The anadromous portion of this stream is relatively short” (DFG 2003).

Gamecock Canyon

Gamecock Canyon Creek consists of about 2.3 stream miles and is tributary to Brown’s Creek. It flows south, entering Brown’s Creek immediately upstream from the Ramsey Gulch Creek confluence.

A 1966 memo states, “Lower Gamecock Canyon and Lower Ramsey Gulch have steelhead spawning and nursery areas” (DFG 1966j). In a 1967 survey of Brown’s Valley Creek, DFG staff noted multiple *O. mykiss* year classes in Gamecock Canyon Creek (DFG 1967c).

As part of a larger study of Santa Cruz County streams, consultants sampled Gamecock Canyon Creek in 1981. The resulting report indicated that *O. mykiss* was observed at one site. Rearing habitat was deemed “poor to below average”, with substrate and lack of flow comprising primary limiting factors to production (HSA 1982). A 1996 DFG memo indicates that poor grading practices and removal of riparian vegetation adversely impacted habitat in the creek (DFG 1996c).

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that steelhead can access the lower one mile of Gamecock Canyon Creek, while resident rainbow trout occur upstream from a natural passage barrier (County of Santa Cruz 2004).

Rider

Rider Creek consists of about 1.8 stream miles and is tributary to Corralitos Creek. It flows southeast, entering Corralitos Creek about 1.8 miles upstream from the Browns Creek confluence.

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that steelhead can access the one half mile reach downstream of Rider Creek downstream from a natural passage barrier (County of Santa Cruz 2004).

Eureka Gulch

Eureka Gulch Creek consists of about 1.5 stream miles and is a headwaters tributary of Corralitos Creek. It flows east, entering Corralitos Creek in Eureka Canyon.

Staff from DFG noted *O. mykiss* in Eureka Gulch Creek in 1945 (DFG 1945c). A 1963 memo relays observations of adult steelhead in the creek in that year (DFG 1963d).

A 1983 consultants’ report does not note a native fish association in Eureka Canyon Creek. The report states that Eureka Gulch has “barriers and poor substrate which prevent…use for steelhead rearing” (Alley 1983).

Shingle Mill Gulch (Shingle Mill)

Shingle Mill Gulch Creek consists of about 1.6 stream miles and is a headwaters tributary of Corralitos Creek. It flows east, entering Corralitos Creek in the northern portion of Eureka Canyon.

Staff from DFG surveyed Shingle Mill Gulch in 1967 and observed *O. mykiss*. The survey report noted the presence of suitable spawning areas (DFG 1967d).

As part of a larger study of Santa Cruz County streams, consultants sampled Shingle Mill Gulch Creek in 1981. The resulting report indicated that *O. mykiss* was observed at three of three sites. Rearing habitat was deemed "fair", with low summer flow comprising a primary limiting factor to production (HSA 1982).

Shingle Mill Gulch was sampled as part of a study of Santa Cruz County streams in 1994. Three *O. mykiss* year classes were noted, and results were used to estimate a possible contribution to the Corralitos Creek steelhead run (Alley 1994).

Juvenile steelhead densities were estimated and habitat conditions assessed in Shingle Mill Gulch Creek in 2006 as part of a study of several Santa Cruz County watersheds. The resulting report notes estimated smolt densities of 16.2 and 3.4 per 100 feet of stream at the sampling sites, that may be compared to a range of 1.2 to 41.6 per 100 feet throughout the study area (Alley 2007). The report rates the smolt habitat at the Shingle Mill Creek sites as "Good" and "Poor." It states, "Substrate conditions in Shingle Mill Gulch have generally degraded since 1994" (Alley, p. 28).

Rattlesnake Gulch

Rattlesnake Gulch Creek consists of 1.5 stream miles and is tributary to Shingle Mill Gulch Creek. It flows south, entering Shingle Mill Gulch Creek at Grizzly Flat.

A 1967 survey report for Corralitos Creek notes that Rattlesnake Gulch has steelhead spawning areas (DFG 1967d). A 1996 DFG memo indicates that poor grading practices and removal of riparian vegetation adversely impacted habitat in the creek (DFG 1996c).

A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use of a short reach of Rattlesnake Gulch Creek (County of Santa Cruz 2004).

Diablo Gulch

Diablo Gulch Creek consists of about 1.7 stream miles and is tributary to Corralitos Creek. It flows southwest entering Corralitos Creek near the headwaters.

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates the presence of resident rainbow trout in Diablo Gulch Creek (County of Santa Cruz 2004).

Coward

Coward Creek consists of about 5.2 stream miles and is tributary to the Pajaro River. It flows southwest, entering the Pajaro River south of Johnston Corner.

Coward Creek appears on a DFG list of streams with historical steelhead populations (DFG ca 1990). The basis for inclusion is not known.

A 1983 consultants' report states, "The upper section of the stream…has summer flow but spawning substrate is very poor. Pools are shallow and rearing habitat is also poor (no fish were seen in 1982)" (Alley 1983).

Pescadero

Pescadero Creek consists of about 8.6 stream miles and is tributary to the Pajaro River. It flows southeast, entering the Pajaro near the town of River Oaks.

A 1964 DFG memo noted that steelhead used Pescadero Creek "at Chittenden, up approximately 3 miles" for spawning (DFG 1964c). In a 1967 report, DFG notes that the creek "is an important tributary in that it contributes about 7 miles of spawning and nursery area for steelhead" (DFG 1967e).

As part of a larger study of Santa Cruz County streams, consultants sampled Pescadero Creek in 1981. The resulting report indicated that *O. mykiss* was observed at two of two sites. Rearing habitat was deemed "fair", with substrate and lack of flow comprising primary limiting factors to production (HSA 1982). A 1983 consultants' report states, "In dry years, rearing habitat is greatly reduced, with much of the lower streambed going dry. Even in dry years, however, the stream is important for steelhead rearing because migration into and out of the creek is still possible" (Alley 1983, p. 250).

In a 1996 memo, staff from DFG noted that logging operations produced high sedimentation levels in Pescadero Creek (DFG 1996c). Information collected by NMFS staff indicates that steelhead was observed in Pescadero Creek in the years 1999 to 2001. Observations included *O. mykiss* YOY and adults (NMFS 2002b).

In a recent survey, staff from DFG observed *O. mykiss* YOY and 1+ in Pescadero Creek upstream to about stream mile 4.0 (Nelson pers comm.). Habitat appeared to be in relatively good condition although some excess sedimentation was occurring due to cattle access to the riverine/riparian area.

Star

Star Creek consists of about 1.3 stream miles and is tributary to Pescadero Creek. It flows east, entering Pescadero Creek at about stream mile 3.7.

Star Creek appears on a DFG list of streams with historical steelhead populations (DFG ca 1990). The basis for inclusion is not known.

San Benito River

The San Benito River consists of more than 100 stream miles and is tributary to the Pajaro River. It flows northwest, entering the Pajaro east of the town of River Oaks.

The San Benito River was stocked in 1938 and in subsequent years (DFG 1940b). In a 1940 correspondence, DFG states that San Benito Creek "is a good trout stream in its headwaters" with "considerable runs of sea-run steelhead" in some years. The letter also noted annual drying of the lower portions of the San Benito River (DFG 1940b).

A 1962 DFG correspondence states that the "small sporadic run of steelhead" in the San Benito River "has been largely if not completely eliminated by the construction of the Hernandez Project near San Benito (DFG 1962c). In a 1965 letter, DFG states that the San Benito River has "steelhead runs when there is a series of wet winters" (DFG 1965e). In 1968, DFG said that the San Benito River had four miles of "trout water" (DFG 1968b).

A 1983 consultants' report indicates that no rearing habitat exists downstream from Hernandez Reservoir. The report states, "From the mouth upstream to Prescott Road, the San Benito River is dry in summer (and most of the rest of the year)" (Alley 1983, p. 244).

A 2002 draft report states, "Steelhead have occasionally entered tributaries of the San Benito River in recent wet yeas (1995-1998)… The observed steelhead were probably the result of adult straying by hatchery-reared smolts planted in the Pajaro River and Uvas Creek" (Smith 2002, p. 5). Staff from NMFS found *O. mykiss* to be absent from the San Benito River in 2003 (NMFS 2005).

San Juan Canyon

San Juan Canyon Creek consists of more than ten stream miles and is tributary to the San Benito River. It flows through San Juan Canyon, then the San Juan Valley, and enters the San Benito River immediately upstream from the Pajaro River confluence.

In a 1965 letter, DFG states that San Juan Canyon Creek has "steelhead runs when there is a series of wet winters" (DFG 1965e). In 1993 DFG staff stated, "This stream is one of the higher quality stream corridors that I have observed in San Benito County because of the cleaner gravel substrate, the existence of water flow, and the healthy riparian vegetation" (DFG 1993c).

Bird

Bird Creek consists of about 7.8 stream miles and is tributary to the San Benito River. The stream flows northeast, entering the San Benito River south of Hollister.

Bird Creek is included in a DFG list of Monterey County streams with historical steelhead populations (DFG ca 1990). The basis for inclusion is not known.

Juvenile *O. mykiss* were observed in Bird Creek in 1995. The fish were believed to be the progeny of hatchery-reared trout planted in the Pajaro River and Uvas Creek (Smith 2002, p. 5). Staff from DPR surveyed Bird Creek in 2004 and observed *O. mykiss* to about seven inches in length near Cienega Road. The survey report indicates that most of Bird Creek is dry during the summer. Within the Hollister Hills Vehicular Recreation Area, the creek was said to be largely "pristine," while downstream areas showed "pronounced" effects from cattle grazing (DPR 2004).

Tres Pinos Creek

Tres Pinos Creek is tributary to the San Benito River. It flows generally northwest, entering the San Benito River just west of the town of Tres Pinos.

Tres Pinos Creek was sampled between 1972 and 1974 by Dr. Jerry Smith. *Oncorhynchus mykiss* was not observed in the three sampling locations (Smith 1974).

Pescadero

Pescadero Creek consists of about 13.8 stream miles and is tributary to the San Benito River. It flows east, entering the San Benito south of the town of Paicines.

A 1973 DFG warden's letter describes steelhead trout in the Pajaro and San Benito river systems. The letter states, "A small stream…called Pescadero Creek…used to have great numbers of steelhead trout" (DFG 1973e).

Dead adult steelhead were observed in Pescadero Creek in 1997. The fish were believed to be straying individuals of hatchery origin (Smith 2002, p. 5).

Picacho

Picacho Creek consists of about 2.7 stream miles and is tributary to the San Benito River. It flows southwest from Picacho Peak, entering the San Benito upstream from Hernandez Reservoir.

A 1946 DFG record indicated that *O. mykiss* was present in Picacho Creek (DFG 1946). The origin of the fish was not stated.

Uvas (Carnadero)

Uvas Creek consists of more than 27 stream miles and is tributary to the Pajaro River. The confluence is south of the town of Carnadero. In surveys and maps, the most downstream reach is referred to as Carnadero Creek. Uvas Dam, constructed in the late 1950s, is located at about stream mile 17.5.

A 1912 report noted, "The dead bodies of large steelheads were occasionally seen in Uvas, Arroyo Seco, and Nacimiento Creeks. At high water they are said to enter all the streams in large numbers" (Snyder 1912). A 1955 field note reports loss of about 200 "large SH spawners" due to drying of the Uvas Creek channel (DFG 1955).

In 1963, DFG estimated that the Uvas Creek fingerling *O. mykiss* population in 1954 (prior to completion of Uvas Dam) exceeded one million individuals (DFG 1963e). In a 1960 survey report, DFG states that "Uvas-Carnadero Creek is the largest in that area and in the past has had the largest steelhead run" (DFG 1960p). The report notes, "…steelhead trout still ascend the stream every year although in diminishing numbers" (DFG 1960p). The surveyors observed "highly productive" habitat between the Adams School bridge and the base of Uvas Dam, with less productive downstream conditions due to lack of flow (DFG 1960p). Uvas Creek upstream from the reservoir also was surveyed in 1960 by DFG. While the report notes "excellent trout habitat" in the stream, it cites low summer flows as a limiting factor to production (DFG 1960q).

A DFG letter from 1963 noted that approximately 30 stream miles of nursery area were "wiped out" by dam construction (DFG 1963e). In 1966, DFG staff stated about Uvas Creek, "Poor nursery area due to poor summer flows from Uvas Dam" (DFG 1966j).

A 1983 consultants' report states, "A portion of the water stored in Uvas Reservoir is transferred to the Llagas Creek basin for groundwater percolation. The loss of this water, the timing of its transfer to Llagas basin, and variation in releases from Uvas Reservoir from year to year, limit steelhead production downstream of the reservoir" (Alley 1983, p. 234)

In a 1994 memo, Jerry Smith notes that releases are made from Uvas Dam for percolation, "potentially providing good summer steelhead rearing except in extreme drought years" (Smith 1994). In a 1997 letter, Dr. Smith reported observing multiple *O. mykiss* year classes in upper Uvas Creek (Smith 1997d). He notes, "…the trout population [upstream from the reservoir] appears to depend upon immigration of fish from upstream" (Smith 1980).

A draft 2002 report states, "Uvas Reservoir is the only reservoir in the Pajaro river watershed…whose water right specified minimum winter releases and summer releases (usually 10 cfs, except in drought years) for maintaining fish resources" (Smith 2002, p. 7). It adds, "…fish captured during recent late summer sampling (1997-2000) have generally been substantially smaller and scarcer than in the past, apparently due to declines in substrate quality and food availability due to development along the stream" (Smith 2002, p. 10). According to the draft report, *O. mykiss* occurring in Uvas Creek likely is descended from stocked smolts. However, "Fish upstream of barriers on Bodfish and Little Arthur creeks and upstream of the reservoir on Uvas Creek appear to be native strains, but they are resident rainbow trout, rather than anadromous steelhead" (Smith 2002, p. 10).

Tar

Tar Creek consists of about 7.9 stream miles and is tributary to Carnadero Creek. It flows southeast, entering Carnadero Creek at about stream mile 0.3.

Staff from DFG surveyed Tar Creek in 1967 and observed *O. mykiss*. The survey report states, "It is possible that steelhead may ascend this stream occasionally but absence of fingerlings show it probable none ascended this year. There appears to be sufficient cover, food and low enough water temperatures to support trout but stream may be intermittent in dryer years" (DFG 1967f).

Tar Creek was surveyed in 1978 and *O. mykiss* was observed. The survey report states, "Tar Creek appears to support some salmonid production… Overgrazing of the watershed and wallowing in the streambed by cattle has caused heavy silt loads in the streambed" (DFG 1978). The creek was characterized as having "minor importance" for spawning and nursery, but greater value in providing winter and spring flows to downstream areas. Faculty from San Jose State University sampled Tar Creek in 1979. The resulting report indicates "…a good population of yearling and young-of-the-year steelhead" (Smith 1979).

Staff from DFG visited Tar Creek in 2000 and observed multiple *O. mykiss* year classes. Abundance was not quantified but population density appeared to be in the medium range. Low flows and sedimentation were identified as factors limiting the population (Nelson pers. comm.).

A draft 2002 report states, "This small tributary provides spawning and rearing in most years, but the small size of the stream, low streamflows, dense shading, and shallow pools probably limit young-of-year steelhead density and growth rate" (Smith 2002, p. 6).

Tick

Tick Creek consists of about 2.8 stream miles and is tributary to Carnadero Creek. It flows southeast, entering Carnadero Creek immediately upstream from the Tar Creek confluence.

Tick Creek appears on a DFG list of streams with historical steelhead populations (DFG ca 1990). The basis for inclusion is not known.

Bodfish

Bodfish Creek consists of about 7.9 stream miles and is tributary to Uvas Creek. The stream's watershed is about 7.5 square miles and the confluence with Uvas Creek is just west of Gilroy.

A 1959 survey report noted that steelhead spawned mostly in the lower section of Bodfish Creek, although "scarce" native trout existed in the upper (DFG 1959e). In 1967, DFG characterized Bodfish Creek as providing "important nursery and spawning areas" for the Pajaro River steelhead run (DFG 1967g). A 1968 survey report indicated that the best spawning habitat occurred "one mile above and below the Granite Creek tributary" (DFG 1968c, p. A-29).

Jerry Smith noted "good spawning and nursery areas" in Bodfish Creek in 1975 (Smith 1975). In a 1976 letter he stated, "Bodfish Creek produces relatively stable numbers of steelhead juveniles" (Smith 1976). A 1980 summary of sampling results describes Bodfish Creek as a "small, generally shallow, cool stream" (Smith 1980).

A 1983 consultants' report notes the presence of a "fair trout" association in Bodfish Creek, as well as some "good" or better rearing habitat. Access to spawning steelhead is not available upstream from Sprig Lake, according to the report. It states, "Sprig Lake provides good to excellent rearing habitat for juvenile steelhead in most years…" (Alley 1983). Stocking of the lake is cited.

According to a draft 2002 report, *O. mykiss* occurring in Bodfish Creek likely is descended from stocked smolts. However, "Fish upstream of barriers on Bodfish and Little Arthur creeks and upstream of the reservoir on Uvas Creek appear to be native strains, but they are resident rainbow trout, rather than anadromous steelhead" (Smith 2002, p. 10).

Bodfish tributary 1 (Renz Gulch, Granite)

Granite Creek consists of about one stream mile and is tributary to Bodfish Creek. It flows north through Renz Gulch, joining Bodfish Creek in the Whitehurst area.

A 1967 DFG stream survey noted *O. mykiss* in Granite Creek. The survey report states, "…two tributaries of Bodfish [Creek] provide spawning and nursery areas" (DFG 1967g). Granite Creek is assumed to be one of the tributaries.

Blackhawk Canyon

Blackhawk Canyon Creek consists of about 1.8 stream miles is tributary to Bodfish Creek. The creek flows east to its confluence with Bodfish Creek at Sprig Lake.

A 1940 DFG survey report for Blackhawk Canyon Creek found "excellent" propagation of steelhead (DFG 1940c).

In 1990 Jerry Smith wrote, "…Blackhawk Canyon Creek…has only very shallow pools, supports only small young-of-the-year steelhead, and is unable to provide overwintering habitat for steelhead, which move into Bodfish Creek with heavy winter flows. The fish are able to fulfill their additional needs elsewhere, and Blackhawk Canyon Creek is heavily and continuously utilized by spawning steelhead" (Smith 1990, p. 3).

Bodfish tributary 2

This unnamed creek consists of about 2.1 stream miles and is tributary to Bodfish Creek. It flows east, parallel to Highway 152 in Mt. Madonna County Park.

A 1967 DFG stream survey indicates observations of *O. mykiss* in this unnamed tributary. The survey report states, "two tributaries of Bodfish [Creek] provide spawning and nursery areas" (DFG 1967g). The unnamed headwater tributary to Bodfish Creek is identified as one of the tributaries.

Little Arthur

Little Arthur Creek consists of about 6.1 stream miles and is tributary to Uvas Creek. It flows east, entering Uvas Creek about four miles downstream from Uvas Reservoir. A fishway was constructed on Pickel's Dam, located at stream mile 1.5, in the mid 1980s. Ferbrache Dam also is a barrier to upstream passage.

A 1961 DFG field note conveys the observation of the game warden that approximately 200 steelhead spawned in Little Arthur Creek in the winter of 1959-1960 (DFG 1961h). In a 1968 memo concerning central coast streams, the annual steelhead run of Little Arthur Creek was estimated to consist of 25-150 individuals (Wood 1968).

A 1973 DFG survey report states, "Summer flow is the limiting factor regarding steelhead production" (DFG 1973f). In 1975, Jerry Smith noted "potentially good spawning and nursery areas" in Little Arthur Creek upstream from the dam (Smith 1975). A 1976 memo from Jerry Smith states, "Ferbrache Dam is a barrier preventing use of 2 miles of nursery areas downstream from Redwood Retreat" (Smith 1976). The memo also notes that the stream typically goes dry downstream of the dam.

According to a draft 2002 report, *O. mykiss* occurring in Little Arthur Creek likely is descended from stocked smolts. However, "Fish upstream of barriers on Bodfish and Little Arthur creeks and upstream of the reservoir on Uvas Creek appear to be native strains, but they are resident rainbow trout, rather than anadromous steelhead" (Smith 2002, p. 10).

Uvas tributary

This creek consists of about 1.7 stream miles. It flows north, entering Uvas Creek about 0.2 miles downstream from Uvas Dam.

In 1983, staff from DFG noted *O. mykiss* juveniles in the unnamed tributary to Uvas Creek. A memo states, "This stream reportedly had a large number of adult steelhead enter it this last season…" (DFG 1983c).

Croy

Croy Creek consists of about 2.4 stream miles and is a headwaters tributary of Uvas Creek. It flows north, on the western flank of Croy Ridge.

In a 1997 letter, Jerry Smith reported observing multiple *O. mykiss* year classes in Croy Creek (Smith 1997d).

Llagas

Llagas Creek consists of about 30 stream miles and is tributary to the Pajaro River. It flows southwest, entering the Pajaro southeast of the city of Gilroy. Chesbro Dam, constructed in the late 1950s, is located about two miles west of the city of Morgan Hill at stream mile 29.5.

A 1956 DFG plan for Llagas Creek notes, "even in the winter in most years…there is seldom a flow as far downstream as U.S. Highway 101. As a consequence, there is no significant annual run of steelhead…" (DFG 1956k). The plan characterizes the impact of Chesbro Dam:

> "During those rare winters when flows permit a good run of steelhead in Llagas Creek, the dam will block the fish from about 11 miles of fair spawning gravel. Since this occurs only about once in 10 or more years on the average, the run in not felt to contribute much to the steelhead population of the Pajaro River drainage" (DFG 1956k).

In a 1960 survey report, DFG summarized the portion of Llagas Creek upstream of the reservoir thusly, "Because of the general lack of water which occurs in the stream during the summer months, it is estimated by this investigator that the stream is of little use as a game fish fishery" (Schreiber 1960).

A 1966 memo states, "Nursery areas for steelhead are doubted to exist due to poor flows originating from Chesbro Dam" (DFG 1966j). In a 1968 memo concerning central coast streams, DFG staff state, "…the steelhead resource is almost completely gone because of this reservoir" (Wood 1968).

A 1971 DFG estimate of the Llagas Creek steelhead run was 50-150 individuals (DFG 1971b). In 1973, Jerry Smith estimated the YOY population in the 0.5 reach below Chesbro Dam to be 1,000 individuals (Smith 1973). A 1978 summary of sampling results noted that drought and the presence of a migration barrier might have "temporarily eliminated the run" in Llagas Creek (Smith 1978).

In a 1980 letter, DFG staff stated, "…steelhead spawning and rearing apparently were restricted to the approximate 5-mile reach from Chesbro Dam downstream to Santa Teresa Boulevard" (DFG 1980d). The letter notes, "…channel modification, streamflow regulation, and the severe 1976-1977 drought…may have eliminated the steelhead population as a self-sustaining resource" (DFG 1980d). To re-establish the population, DFG recommended dam releases of 5 cubic feet per second to provide "significant rearing habitat" and 15 to 20 cubic feet per second to support "good spawning conditions" (DFG 1980d, p. 4).

In a 1994 memo, Jerry Smith notes that releases are made from Chesbro Dam for percolation, "potentially providing good summer steelhead rearing except in extreme drought years" (Smith 1994). He points out, however, that minimum release requirements are not in place for the reservoir.

A draft 2002 report states, "The present steelhead run in Llagas Creek probably amounts to relatively few adult fish, possibly as strays, in wetter years only" (Smith 2002, p. 27). The report adds that the perennial headwaters of Llagas Creek upstream from the reservoir contain a healthy population of resident rainbow trout. Staff from NMFS observed Llagas Creek to be dry in 2003, and therefore not supporting *O. mykiss* (NMFS 2005). According to the CCRWQCB, water quality in the creek is impaired by low dissolved oxygen from municipal point sources, irrigated crop production, agricultural return flows, and habitat modification (CCRWQCB 2006).

Machado Creek

Machado Creek consists of about 2.2 steam mile and is tributary to Llagas Creek. The confluence is located at the south end of Paradise Valley.

In a 1973 report Jerry Smith states, “In wet years, steelhead will also spawn in small tributary streams such as the one which parallels Sycamore Avenue; they did so in 1973. However, these tributary streams dry up early and strand the steelhead fry” (Smith 1973). The creek being described is assumed to be Machado Creek.

Tequisquita Slough

Tequisquita Slough is tributary to the Pajaro River via San Felipe Lake. The confluence is west of the town of San Felipe.

Tequisquita Slough appears on a DFG list of streams with historical steelhead populations (DFG ca 1990). While we did not find records of *O. mykiss* observed in the slough, upstream tributaries appear to have had historical *O. mykiss* occurrence.

Santa Ana

Santa Ana Creek consists of about 20 stream miles and is tributary to Tequisquita Slough. The confluence is south of the town of Dunneville.

Santa Ana Creek appears on a DFG list of streams with historical steelhead populations (DFG ca 1990). The basis for inclusion is not known.

A draft 2002 report indicates that Santa Ana Creek is “…apparently too dry to support stream fishes” (Smith 2002, p. 30).

Arroyo de las Viboras

Arroyo de las Viboras consists of more than 13 stream miles and is tributary to Tequisita Slough. It flows west, entering Tequisita Slough north of the Hollister airport.

In a 1938 letter to DFG, a sportsman describes Arroyo de las Viboras as an “excellent” stream for trout (Garcia 1938). Stocking occurred in years prior to 1938, and it is unclear the origin of *O. mykiss* in the arroyo. However, the letter indicated that steelhead accessed the creek in some years.

Arroyo de las Viboras appears on a DFG list of streams with historical steelhead populations (DFG ca 1990). The basis for inclusion is not known.

A 1983 consultants’ report summarized conditions in the arroyo by stating, “Unused dams at miles 2 and 2 1/2…block steelhead access to perennial habitat upstream. No suitable rearing habitat is now present below the dams due to low flows and high water temperatures. Adult steelhead do occasionally enter the stream…” (Alley 1983, p. 244).

A draft 2002 report indicates that Arroyo de las Viboras is “…apparently too dry to support stream fishes” (Smith 2002, p. 30).

Sulfur

Sulfur Creek consists of about three stream miles and is tributary to Arroyo de las Viboras. It flows south in the canyon east of Dunne Ridge.

Sulfur Creek appears on a DFG list of streams with historical steelhead populations (DFG ca 1990). The basis for inclusion is not known.

Arroyo Dos Picachos

Arroyo Dos Picachos consists of about 11.8 stream miles and is tributary to Tequisquita Slough. It flows west to its confluence with Arroyo de las Viboras north of the town of Hollister.

In a 1938 letter to DFG, a sportsman describes Arroyo Dos Picachos as an "excellent" stream for trout (Garcia 1938). Stocking occurred in years prior to 1938, and it is unclear the origin of *O. mykiss* in the arroyo. However, the letter indicated that steelhead accessed the creek in some years.

A 1938 stream survey report noted juvenile *O. mykiss* in Arroyo Dos Picachos (DFG 1938d). Arroyo Dos Picachos appears on a DFG list of streams with historical steelhead populations (DFG ca 1990). The basis for inclusion is not known.

Arroyo Dos Picachos was surveyed in 1969. The survey report indicates that a self-sustaining "native" *O. mykiss* population existed in the upper 4.5 miles of the arroyo (DFG 1969).

Oncorhynchus mykiss was collected in Arroyo Dos Picachos in the early 1970s. Abundance was characterized as "5" on a ten point scale (with ten indicating greatest abundance) (Smith 1974).

A draft 2002 report states, "Arroyo Dos Picachos has a healthy population of resident rainbow trout. Steelhead originally used this watershed for spawning and rearing, and may still use it in wet years". According to the report, fish in this creek likely are "native strain". (Smith 2002, p. 30)

Lone Tree

Lone Tree Creek is tributary to Arroyo Dos Picachos. The confluence is in the Arroyo Dos Picachos canyon immediately north of Coyote Peak.

In a 1938 letter to DFG, a sportsman describes Lone Tree Creek as an "excellent" stream for trout (Garcia 1938). Stocking occurred in years prior to 1938, and it is unclear the origin of *O. mykiss* in the creek. However, the letter indicated that steelhead accessed the creek in some years.

Pacheco

Pacheco Creek consists of about 21 stream miles and is tributary to the Pajaro River via San Felipe Lake. It flows southwest from headwaters near Pacheco Pass.

In a 1957 survey report, DFG noted, "…there was a good run of steelhead up Pacheco Creek as far as North Fk. Dam and on up the South Fk. of Pacheco Creek in 1955" (DFG 1957g). The report provides the following estimate:

> "[Pacheco Creek] appears to be a fair steelhead spawning stream when sufficient water is present in the winter to allow adult steelhead to ascend through Tequisquito Slough…[T]his creek goes dry every summer at the [State Forestry] station and below and becomes intermittent above. This stream also appears to support a fairly good population of trout" (DFG 1957g).

A 1973 report summarized fishery resources in Pacheco Creek in response to the application to build a dam in the watershed. The report cites "an estimated 36 miles of stream in the Pacheco Creek drainage below the North Fork Dam which are accessible to steelhead trout" (DFG 1973g). Regarding the run size circa 1973 DFG states, "Estimates by local Department personnel place the steelhead run, depending on the water year, at 50-150 adults" (DFG 1973g).

A report on sampling in Pacheco Creek in November 1975 noted that despite "very successful spawning", insufficient releases from Pacheco Reservoir led to the destruction of "miles of steelhead nursery habitat and thousands of steelhead" (Scoppettone and Smith 1975). According to Jerry Smith in 1976, "Maintenance of adequate flows through until the winter rains is critical to perpetuating this substantial [Rancho los Laureles] steelhead nursery area" (Smith 1976). A 1978 summary of sampling results ascribed the lack of juvenile steelhead in Pacheco Creek to the drought occurring at the time (Smith 1978). Jerry Smith said in 1980 that the Rancho Los Laureles area of Pacheco Creek "was probably the most productive area [for smolts] in the entire Pajaro River basin" (Smith 1980).

Consulting biologists visited Pacheco Creek in the vicinity of Casa de Fruta in 1992 to assess habitat conditions. The resulting report notes "limited and sporadic" spawning gravel and states, "low flows, hot water temperatures, the lack of shade, and absence of instream structure were the limiting factors…in Pacheco Creek" (Rich 1992, p. 2). No fish were observed during surveys.

According to a 2002 draft report, "Rearing habitat in Pacheco Creek is almost completely dependent upon releases from North Fork Pacheco Reservoir" (Smith 2002, p. 32). Staff from NMFS observed *O. mykiss* in Pacheco Creek in 2003 (NMFS 2005).

Harper Canyon

Harper Canyon Creek consists of about 3.6 stream miles and is tributary to Pacheco Creek. It flows northwest, entering Pacheco Creek upstream from the Pacheco Ranger Station.

A 1973 DFG warden's memo relayed historical accounts of steelhead in Harper Canyon Creek (DFG 1973e).

Cedar

Cedar Creek consists of about 6.1 stream miles and is tributary to Pacheco Creek. It flows south through Hurricane Canyon to the Pacheco Creek confluence near Bell Station.

A 1973 report summarized fishery resources in the Pacheco Creek watershed in response to the application to build a dam. Regarding the Cedar Creek run size circa 1973 DFG states, "Estimates by local Department personnel place the steelhead run, depending on the water year, at 50-150 adults" (DFG 1973g). In 1975, Jerry Smith noted "good, cool-water nursery areas" in Cedar Creek in wet years (Smith 1975).

A 1983 consultants' report notes mostly "poor" rearing habitat in Cedar Creek. Low flow is deemed a primary limiting factor to production (Alley 1983).

North Fork Pacheco

North Fork Pacheco Creek consists of about 18.4 stream miles and is tributary to Pacheco Creek. It flows south, entering Pacheco Creek northeast of Lovers Leap. North Fork Dam was constructed in 1938 near the Pacheco Creek confluence.

In a 1957 survey report, DFG noted, "…there was a good run of steelhead up Pacheco Creek as far as North Fk. Dam…in 1955" (DFG 1957g).

North Fork Pacheco Creek was sampled upstream from the dam in the early 1970s. Rainbow trout was not observed (Smith 1974).

East Fork Pacheco

East Fork Pacheco Creek consists of about 5.2 stream miles and is tributary to North Fork Pacheco Creek. It flows southwest, entering North Fork Pacheco Creek at Chimney Rock, upstream of the North Fork Reservoir.

East Fork Pacheco Creek appears on a DFG list of streams with historical steelhead populations (DFG ca 1990). The basis for inclusion is not known.

South Fork Pacheco

South Fork Pacheco Creek is tributary to Pacheco Creek. It flows north, entering Pacheco Creek upstream of the North Fork confluence.

In a 1957 survey report, DFG noted, "…there was a good run of steelhead up Pacheco Creek…and on up the South Fk. of Pacheco Creek in 1955" (DFG 1957g).

A survey report from 1982 indicates *O. mykiss* adults were observed in South Fork Pacheco Creek (Logan and Turner 1982). A 1983 consultants' report noted "poor to below average" rearing habitat in South Fork Pacheco Creek due to low flow (Alley 1983).

Other information regarding Santa Cruz County steelhead resources

As part of the 1965 state fish and wildlife plan, DFG prepared an inventory of anadromous salmonids. The major steelhead streams of Santa Cruz County were said to be the San Lorenzo and Pajaro rivers. According to the inventory, there are about 67 stream miles of steelhead habitat in the minor streams of the county (DFG 1965a). The combined spawning population in the minor streams was estimated to be about 5,000 steelhead individuals. Including the estimates for the San Lorenzo and Pajaro runs, the 1965 DFG estimate for the average annual steelhead run in all streams of Santa Cruz County was about 26,000 individuals. The estimation method is not provided.

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Table 2. Distribution status of *O. mykiss* in coastal streams of Santa Cruz County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Waddell	Waddell	DF	DF	Y	Y	3
Waddell	West Waddell	DF	DF	Y	Y	3
Waddell	West Waddell tributary (Buck)	DF	DF		Y	3
Waddell	Henry	DF	DF		Y	3
Waddell	Henry tributary	DF	DF		UN	2
Waddell	Berry	DF	DF		Y	3
Waddell	Kelly	DF	DF	Y	Y	1
Waddell	East Waddell	DF	DF	Y	Y	3
Waddell	Last Chance	DF	DF		N	3
Waddell	Opal	DF	DF		N	3
Waddell	Blooms	DF	DF		N	3
Waddell	Sempervirens	DF	DF	Y	N	3
Waddell	Union	DF	DF		N	3
Scott	Scott	DF	DF	Y	Y	3
Scott	Scott tributary 1 (Quesaria)	DF	DF		Y	2
Scott	Little	DF	DF	Y	Y	3
Scott	Big	DF	DF	Y	Y	3
Scott	Boyer	DF	UN	Y	N	0
Scott	Mill	DF	DF	Y	Y	3
Scott	Scott tributary 2 (Bettencourt Gulch)	DF	DF		Y	1
Molino	Molino	DF	DF		Y	2
Unnamed coastal stream (Ferrari)	Unnamed coastal stream (Ferrari)	DF	DF	Y	N	1
San Vicente	San Vicente	DF	DF	Y	Y	3
San Vicente	Mill	DF	DF	Y	Y	3
Liddell	Liddell	DF	DF	Y	Y	3
Liddell	West Liddell	DF	DF	Y	Y	2
Liddell	East Branch Liddell	DF	DF	Y	Y	2

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 2. Distribution status of *O. mykiss* in coastal streams of Santa Cruz County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Yellow Bank	Yellow Bank	DF	DF	Y	N	3
Laguna	Laguna	DF	DF	Y	Y	3
Laguna	Laguna tributary (Y)	DF	DF	Y	UN	3
Majors	Majors	DF	DF	Y	N	3
Baldwin	Baldwin	DF	DF	Y	Y	3
Wilder (Medor)	Wilder (Medor)	DF	DF	Y	Y	3
Wilder (Medor)	Peasley Gulch	DF	DF		UN	3
San Lorenzo River	San Lorenzo River	DF	DF	Y	Y	3
San Lorenzo River	Branciforte	DF	DF	Y	Y	3
San Lorenzo River	Carbonera	DF	DF	Y	Y	3
San Lorenzo River	Branciforte tributary (Glen Canyon)	DF	DF		Y	1
San Lorenzo River	Glen Canyon tributary (Redwood Creek)	DF	DF		Y	2
San Lorenzo River	Granite	DF	DF	Y	Y	3
San Lorenzo River	Crystal	DF	DF	Y	Y	3
San Lorenzo River	Tie Gulch	DF	DF		Y	2
San Lorenzo River	San Lorenzo River tributary 1 (Powder Mill)	DF	DF		UN	1
San Lorenzo River	San Lorenzo River tributary 2 (Eagle)	DF	DF		Y	1
San Lorenzo River	Gold Gulch	DF	DF	Y	Y	3
San Lorenzo River	Shingle Mill	DF	DF		Y	1
San Lorenzo River	Zayante	DF	DF	Y	Y	3
San Lorenzo River	Bean	DF	DF	Y	Y	3
San Lorenzo River	Lockhart Gulch	DF	DF		Y	1
San Lorenzo River	Ruins	DF	DF		Y	2
San Lorenzo River	Mackenzie	DF	DF		Y	2
San Lorenzo River	Lompico	DF	DF	Y	Y	3

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 2. Distribution status of *O. mykiss* in coastal streams of Santa Cruz County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
San Lorenzo River	Mountain Charlie Gulch (East Branch Zayante)	DF	DF	Y	Y	3
San Lorenzo River	Zayante tributary	DF	DF		Y	3
San Lorenzo River	Bull	UN	PA		UN	0
San Lorenzo River	Fall	DF	DF	Y	Y	3
San Lorenzo River	Bennett	UN	PA		N	0
San Lorenzo River	South Fork Fall	UN	PA		N	0
San Lorenzo River	Newell	DF	DF	Y	Y	3
San Lorenzo River	Love	DF	DF	Y	Y	1
San Lorenzo River	Smith	UN	PA		N	0
San Lorenzo River	Fritch	DF	DF		Y	1
San Lorenzo River	Marshall (Hubbard Gulch)	DF	DF	Y	Y	1
San Lorenzo River	Alba	UN	PA		N	0
San Lorenzo River	Clear	DF	DF	Y	Y	1
San Lorenzo River	Boulder	DF	DF	Y	Y	3
San Lorenzo River	Foreman	DF	UN	Y	N	0
San Lorenzo River	Bracken Brae	DF	UN	Y	N	0
San Lorenzo River	Jamison	DF	DF	Y	Y	1
San Lorenzo River	Hare	DF	DF	Y	Y	1
San Lorenzo River	Bear	DF	DF	Y	Y	3
San Lorenzo River	Deer	DF	DF	Y	Y	1
San Lorenzo River	Two Bar	DF	DF	Y	Y	1
San Lorenzo River	Kings	DF	DF	Y	Y	3
San Lorenzo River	Logan	DF	DF		Y	1
Arana Gulch	Arana Gulch	DF	DF	Y	Y	3
Soquel	Soquel	DF	DF	Y	Y	3
Soquel	Bates	DF	DF	Y	Y	3
Soquel	Grover Gulch	DF	DF		UN	1
Soquel	Soquel tributary (Laurel Glen, Moores Gulch)	DF	DF	Y	Y	3

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 2. Distribution status of *O. mykiss* in coastal streams of Santa Cruz County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Soquel	West Branch Soquel	DF	DF	Y	Y	3
Soquel	Hester	DF	DF	Y	Y	3
Soquel	Laurel	DF	UN	Y	N	0
Soquel	Burns	DF	UN	Y	N	0
Soquel	Hinckley	DF	DF	Y	Y	3
Soquel	Amaya	DF	DF	Y	Y	3
Aptos	Aptos	DF	DF	Y	Y	3
Aptos	Valencia	DF	DF	Y	Y	3
Aptos	Trout Creek Gulch	UN	PA		N	0
Aptos	Bridge	DF	DF	Y	Y	3
Pajaro River	Pajaro River	DF	DF	Y	Y	1
Pajaro River	Corralitos (Salsipuedes)	DF	DF	Y	Y	3
Pajaro River	Casserly	DF	DF		Y	3
Pajaro River	Green Valley	DF	DF	Y	N	2
Pajaro River	Browns	DF	DF		Y	1
Pajaro River	Ramsey Gulch	DF	DF		Y	3
Pajaro River	Gamecock Canyon	DF	DF	Y	Y	1
Pajaro River	Rider	PB	PB		UN	0
Pajaro River	Eureka Gulch	DF	PA	Y	UN	0
Pajaro River	Shingle Mill Gulch	DF	DF		Y	3
Pajaro River	Rattlesnake Gulch	DF	DF	Y	Y	1
Pajaro River	Diablo Gulch	DF	DF		N	1
Pajaro River	Coward	PS	PA		UN	0
Pajaro River	Pescadero	DF	DF	Y	Y	3
Pajaro River	Star	PS	UN		UN	0
Pajaro River	San Benito River	DF	PA	Y	UN	0
Pajaro River	San Juan Canyon	DF	UN		UN	0
Pajaro River	Bird	DF	DF		UN	2
Pajaro River	Tres Pinos	UN	UN		UN	0
Pajaro River	Pescadero	DF	PA		UN	0
Pajaro River	Picacho	DF	UN		UN	0

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 2. Distribution status of *O. mykiss* in coastal streams of Santa Cruz County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Pajaro River	Uvas (Carnadero)	DF	DF	Y	Y	3
Pajaro River	Tar	DF	DF	Y	Y	3
Pajaro River	Tick	PS	UN		UN	0
Pajaro River	Bodfish	DF	DF	Y	Y	3
Pajaro River	Bodfish tributary 1 (Renz Gulch, Granite)	DF	UN		UN	0
Pajaro River	Blackhawk Canyon	DF	DF		Y	2
Pajaro River	Bodfish tributary 2	DF	UN		UN	0
Pajaro River	Little Arthur	DF	DF	Y	N	3
Pajaro River	Uvas tributary	DF	UN		UN	0
Pajaro River	Croy	DF	DF		UN	3
Pajaro River	Llagas	DF	DF	Y	N	3
Pajaro River	Machado	DF	UN		UN	0
Pajaro River	Tequisquita Slough	DF	UN		UN	0
Pajaro River	Santa Ana	PS	PA		UN	0
Pajaro River	Arroyo de las Viboras	DF	PA	Y	UN	0
Pajaro River	Sulfur	PS	UN		UN	0
Pajaro River	Arroyo dos Picachos	DF	DF		UN	3
Pajaro River	Lone Tree	DF	UN		UN	0
Pajaro River	Pacheco	DF	DF	Y	UN	2
Pajaro River	Harper Canyon	DF	UN		UN	0
Pajaro River	Cedar	DF	UN	Y	UN	0
Pajaro River	North Fork Pacheco	DF	UN	Y	UN	0
Pajaro River	East Fork Pacheco	PS	UN		UN	0
Pajaro River	South Fork Pacheco	DF	UN	Y	UN	0

[1]Please see Methods section for an explanation of titles and values used in this table.

FPO - figure 4

FPO - figure 5

FPO - figure 6

FPO - figure 7

Salinas River

The Salinas River consists of more than 75 stream miles and drains a watershed of about 4,780 square miles. The river flows northwest from headwaters on the north side of Garcia Mountain to its mouth near the town of Marina.

A stone and concrete dam is located about 8.5 miles downstream from the Salinas Dam. It is approximately 14 feet high and is considered a total passage barrier (Hill pers. comm.). The dam forming Santa Margarita Lake is located at stream mile 154 and was constructed in 1941. The Salinas Dam is operated under an agreement requiring that a "live stream" be maintained in the Salinas River from the dam continuously to the confluence of the Salinas and Nacimiento rivers. When a "live stream" cannot be maintained, operators are to release the amount of the reservoir inflow. At times, there is insufficient inflow to ensure a "live stream" to the Nacimiento River (Biskner and Gallagher 1995).

In addition, two of the three largest tributaries of the Salinas River have large water storage projects. Releases are made from both the San Antonio and Nacimiento reservoirs that contribute to flows in the Salinas River. Operations are described in an appendix to a 2001 EIR:

> "During periods when…natural flow in the Salinas River reaches the north end of the valley, releases are cut back to minimum levels to maximize storage. Minimum releases of 25 cfs are required by agreement with CDFG and flows generally range from 25-25[sic] cfs during the minimum release phase of operations. If flow is low in the Salinas River and no flow reaches the north end of the valley, conservation releases are made to bring end of flow downstream to about Spreckels. Conservation releases during the winter steelhead spawning period are typically around 300 cfs…" (Needham and Taft 1934).

Staff from DFG met in 1959 to discuss fisheries of the Salinas River watershed. Notes from the meeting indicate the position of DFG at the time, notably that "in wet years there is a rudimentary [steelhead] run" and "primary areas for fish life are…sections up to 5-10 miles below dams, *e.g.* below Nacimiento, because of lower water temperatures and spawning areas which will be scoured out by releases; this to be a trout fishery…" (DFG 1959a). Additionally, the notes state, "We do not see any fishery values in the main Salinas River…" (DFG 1959a).

The Salinas River upstream of Santa Margarita Lake was surveyed by DFG in 1961. The survey report states, "Success of fishes is nil due to lack of water" (DFG 1961a).

Field notes by DFG staff from 1963 summarized the Salinas system thusly:

> "The historical background of the anadromous fish runs in the Salinas River is basically as follows. In the historical past, the river did support a fair steelhead run. It was probably largely supported by spawning and nursery areas in the upper main river, Nacimiento, San Antonio and Arroyo Seco rivers. The water development projects in the drainage have gradually reduced these steelhead runs, probably due mainly to the reduction of available spawning and nursery

areas. The Salinas Dam cut off the upper main river area. The Nacimiento River dam further reduced this. The San Antonio Dam will eliminate any runs remaining in that tributary. The Arroyo Seco River only will remain. Water development will no doubt reduce the availability of water from this tributary. This results in insufficient spawning and nursery areas remaining in the drainage to support any sizeable run. Also, it can be anticipated in the future that there will be very little runoff to the ocean in future years, except in wet years when the dams spill. With the construction of the Nacimiento and San Antonio Dams, an endeavor will be made to store the winter runoff and percolate it into the underground basin. There will therefore be an attempt to prevent loss of water to the ocean. There will still be water reaching the ocean on wet years. For percolation purposes, the entire channel of the Salinas River will be utilized to a point opposite Spreckels, which is 16 miles above the ocean.

It can be concluded that the utilization of the Salinas River by anadromous fishes is largely a thing of the past. This is based upon (1) winter runoff of water to the ocean will not be sufficient to attract steelhead runs and permit them to enter from the ocean, (2) adequate spawning and nursery areas are no longer present, (3) conditions in the Salinas River proper are not suitable for the development of anadromous fishes" (DFG 1963a).

As part of the 1965 state fish and wildlife plan, DFG prepared an inventory of anadromous salmonids. According to the inventory, about 404 mile of steelhead habitat, "much of which is of very poor quality," exists in the Salinas River system. At the time of the inventory the Salinas steelhead run was estimated to consist of about 500 individuals. The plan states, "The most critical factors are the lack of water and the need to develop what water there is for agriculture" (DFG 1965a, p. 398)

In a 1994 report Jerry Smith states about the Salinas River system:

> "…surface flow reaches the mouth only during the winter and during the spring of wet years. Spring passage flows for steelhead smolts are not required and rarely occur. Steelhead rearing habitat is probably extensive and is also probably present in most years in the three tributaries, but can seldom be used because of the poor migration conditions" (Smith 1994).

The report also notes that Salinas River steelhead may be of "mixed genetic origin" due to poor conditions for steelhead production in the watershed and the stocking of steelhead by the Monterey Bay Salmon and Steelhead Trout Project (Smith 1994). An anecdotal account of steelhead in the Salinas near Atascadero in the winter of 1995 was reported by DFG staff (DFG 1999a).

A 2001 report included discussion of the "Upper Salinas", which was defined as the 14-mile reach downstream from Santa Margarita Lake. The report summarized steelhead resources of the watershed as follows:

> "There is some suitable habitat for steelhead in the Upper Salinas Basin and possibly remnant steelhead populations. However, habitat in the Upper Salinas is of lower quality and is less extensive than that in the Arroyo Seco and its tributaries…The Upper Salinas is also less accessible for steelhead than the Arroyo Seco" (EDAW 2001).

In a 2001 memorandum, DFG staff recommended the following:

> "Information on the flow releases from Nacimiento, San Antonio and the Salinas Dam needs to be compiled or obtained in order to determine if flow in the Salinas River is sufficient to allow upstream passage of adult steelhead from late November through April and downstream passage of juveniles from December through May.

Concurrent with obtaining the flow data, select channel measurements of the Salinas River need to be made in order to calculate the flow needed to provide a minimum of 10 to 12 inches depth" (DFG 2001b).

The Salinas River lagoon is managed by sandbar breaching "when flow in the Salinas River is predicted to be sufficiently high to cause an increase in lagoon stage that threatens to flood adjacent agricultural lands" (HES 2004, p. 2). The lagoon was monitored during 2003-2005 in association with the lagoon breaching program, and steelhead were not observed. A resulting report notes that the absence of rearing juvenile steelhead in the lagoon "…is consistent with results of previous surveys going back to 1990" (HES 2004, p. 1).

As part of the Salinas Valley Water Project, an inflatable dam is planned for construction on the Salinas River at about river mile 4.0. The project will include a fishway and a steelhead population and habitat monitoring program, and has been tied to re-operation of the Nacimiento and San Antonio rivers reservoirs to facilitate steelhead passage (NMFS 2007). The Biological Opinion for the project identified an "Upper Salinas" *O. mykiss* population consisting of resident rainbow trout that "co-occur" with steelhead.

Gabilan Creek

In a 1960 memo, Gabilan Creek was called tributary to Tembladero Slough. It drains to Elkhorn Slough via the Old Salinas River channel. The creek consists of about 19.3 stream miles flowing overall southwest from headwaters in Fremont Peak State Park. The lower reaches are referred to as the Reclamation Ditch.

A 1959 survey report notes that steelhead spawning could occur in upper Gabilan Creek during wet years (DFG 1959b). Resident rainbow trout, likely descended from planted *O. mykiss* was said to be "fairly successful" in the creek (DFG 1959b). In a 1960 memo DFG states, "…Gabilan Creek…supports a small trout fishery. It is not known whether the existent trout fishery involves young steelhead or resident rainbow" (DFG 1960a).

Gabilan Creek was surveyed in 2000. The survey found multiple age classes of steelhead (DFG 2000a). An adult steelhead was collected from Gabilan Creek in 2004 (DFG 2004).

Natividad

Natividad Creek consists of about seven stream miles and is tributary to Gabilan Creek. It flows southwest, entering Gabilan Creek in the city of Salinas.

A 2002 DFG letter states, "Natividad Creek is known as a migration route for steelhead trout" (DFG 2002). The basis for the statement is not provided.

Pilarcitos Canyon

Pilarcitos Canyon Creek consists of about 4.8 stream miles and is tributary to the Salinas River. It flows northwest, entering the Salinas at about stream mile 11.

Pilarcitos Canyon Creek appears on an undated list of Monterey County streams with historical steelhead populations. The basis for inclusion is not provided.

El Toro

El Toro Creek consists of more than 16 stream miles and is tributary to the Salinas River. It flows east from headwaters at Mt. Toro through Calera Canyon, then north to its confluence with the Salinas at about stream mile 12.

As part of a steelhead range contraction study, NMFS staff visited El Toro Creek 2003. It was found to be dry and therefore not capable of supporting *O. mykiss* (NMFS 2005).

Watson

Watson Creek consists of about 6.5 stream miles and is tributary to El Toro Creek. It flows west through the Corral de Tierra Valley.

Watson Creek appears on an undated list of Monterey County streams with historical steelhead populations. The basis for inclusion is not provided.

Limekiln

Limekiln Creek consists of about five stream miles and is tributary to the Salinas River. It flows east to its confluence with the Salinas west of the town of Gonzalez.

Limekiln Creek appears on an undated list of Monterey County streams with historical steelhead populations. The basis for inclusion is not provided.

Arroyo Seco

Arroyo Seco is one of the three main tributaries of the Salinas River. It flows east from the Santa Lucia range and has its confluence with the Salinas River near Greenfield. It consists of about 37 stream miles and has a watershed of about 303 square miles. A fishway is located at the Thorne Road crossing at about stream mile 7.5. Various problems with passing fish at this location have led to a planned road crossing replacement that is expected in 2008 (Hill pers. comm.). Several reports note that flows in the lower ten miles of the Arroyo Seco go "underground most years" (DFG 1957a; Bianchi and Miller 1994).

A 1948 DFG letter characterized the typical steelhead run in the Arroyo Seco as "heavy" (DFG 1948a). A 1957 DFG survey report calls the upper Arroyo Seco "an excellent stream with good year round flow but with a definitely limited capacity" (DFG 1957a).

In a letter in 1986 DFG stated, "Steelhead have returned to the Arroyo Seco River eight of the last ten year" (DFG 1986). The lack of a run during the other two years was ascribed to the bar at the mouth not being breached due to drought. A 1992 DFG memo noted, "…no steelhead have gone through the [Thorne Road] ladder between 1987 and 1992" (DFG 1992a). Staff from DFG believed that insufficient Arroyo Seco flows existed to reach the Salinas River confluence.

Surveys of five streams were conducted in 1992 by DFG to inform management, including about four miles of the Arroyo Seco. In the survey report, *O. mykiss* population density was estimated to be 362 individuals per mile, which was characterized as "poor" (DFG 1993a). The survey report states, "Two possible factors for the low estimated trout population are the lack of stream flow (measured in August at 0.3 cfs) and suitable spawning substrate" (DFG 1993a). A 1994 report by a consulting firm examined passage flows in the Arroyo Seco and documented steelhead migration and spawning. The surveys "revealed areas of excellent trout habitat" largely inaccessible to steelhead due to insufficient inmigration flows (Bianchi and Miller 1994).

In 1999, NMFS stated that the recommended "long-term fix for [the Thorne Road Crossing] migration barrier would be to replace the low-flow crossing with a bridge or a series of short-span structures…[that] would eliminate the need for the fish ladder and allow passage at all flows through a natural stream channel" (NMFS 1999). Staff from USFS surveyed Arroyo Seco in 1999 and 2000 and observed multiple *O. mykiss* year classes (USFS 1999a).

Arroyo Seco was surveyed as part of a Salinas River system fish distribution study in 2001. Multiple *O. mykiss* year classes were observed between Government Camp and the Willow Creek confluence. The resulting report states, "Today the best remaining habitat [in the Salinas River system] for anadromous salmonids is in the Arroyo Seco Watershed" (Casagrande 2003, p. 48). A biological opinion prepared for a water supply project on the Salinas River states, "[T]he Arroyo Seco River is the most important remaining steelhead habitat in the Salinas River watershed" (NMFS 2007, p. 65). Staff from DFG recovered the carcass of an adult steelhead (about 28 inches in length) at the Thorne Road crossing in August 2008 (Highland pers. comm.).

Reliz

Reliz Creek consists of about 16.5 stream miles and is tributary to Arroyo Seco. It flows north, entering Arroyo Seco west of the town of Greenfield.

In a 1969 document, Reliz Creek is listed as having "spawning and nursery areas" for steelhead (SWRCB 1969).

Vaqueros

Vaqueros Creek consists of about eight stream miles and is tributary to Arroyo Seco. The confluence is downstream from Sycamore Flat.

Trout were noted in winter 1993-1994 by consulting biologists surveying Vaqueros Creek (Bianchi and Miller 1994). As part of a study of steelhead in the Salinas River, Vaqueros Creek was surveyed again in 1996. The biologists observed “resident rainbow trout” in Vaqueros Creek during the surveys (HES 1996).

As part of a fish distribution study published in 2002, historical accounts of steelhead observations were reviewed and described. The resulting report notes an observation of several steelhead in Vaqueros Creek in 1998 (Casagrande 2003).

Sweetwater

Sweetwater Creek consists of about 5.1 stream miles and is tributary to Arroyo Seco. The confluence is downstream from Sycamore Flat.

No fish were observed in a winter 1993-1994 survey of Sweetwater Creek by consulting biologists (Bianchi and Miller 1994).

Horse

Horse Creek consists of about 7.2 stream miles and is tributary to Arroyo Seco. The confluence is upstream from Sycamore Flat. The creek is referred to as Horse Canyon Creek in reports.

In 1936, DFG stocked Brookdale Hatchery steelhead in Horse Canyon Creek (DFG 1938).

Piney

Piney Creek consists of about ten stream miles and is tributary to Arroyo Seco. It enters the arroyo from the north downstream from Millers Ranch.

In a 1992 memo DFG states that Piney Creek “supports a spawning population of trout in good water years” (DFG 1992a). Several surveys between 1994 and 2001 by consultants and staff from the U.S. Forest Service and NFMS found *O. mykiss* in Piney Creek (Bianchi and Miller 1994; Chubb 1997; NMFS 2003a). As part of a fish distribution study published in 2002, historical accounts of steelhead observations were reviewed and described. The resulting report notes an observation of up to 50 steelhead “throughout the winter in a pool on Piney Creek” in the mid to late 1990s (Casagrande 2003). The context for the observation suggests that the individuals were adult in-migrants.

Rocky

Rocky Creek consists of about 4.2 stream miles and is tributary to Arroyo Seco. It flows southeast, entering Arroyo Seco upstream from the Arroyo Seco Station.

A 1948 DFG letter states that Rocky Creek is not accessible to steelhead because of a natural falls at the confluence (DFG 1948b).

Santa Lucia

Santa Lucia Creek consists of about ten stream miles and is tributary to Arroyo Seco. It flows northwest, entering Arroyo Seco upstream from The Lakes Campground.

A 1945 DFG survey of Santa Lucia Creek found "extensive" natural production of *O. mykiss* in the stream (DFG 1945a). Surveys between 1997 and 2000 indicated the presence of *O. mykiss* in Santa Lucia Creek (Chubb 1997; Murphy 2000).

As part of a larger study of streams of the Los Padres National Forest, USFS staff surveyed Santa Lucia Creek in 1999 and 2000. Multiple *O. mykiss* year classes were observed at two sampling locations (USFS 1999a).

Tassajara

Tassajara Creek consists of about 10.7 stream miles and is tributary to Arroyo Seco. It consists of about eight stream miles. Survey reports note this creek as tributary to Willow Creek.

In the remarks from a 1945 survey DFG relays, "The caretaker at Tassajara Hot Springs…said that there is a very large run of sea-run steelhead in Tassajara Creek and that the fish run up to the falls…above Tassajara Hot Springs" (DFG 1945b).

Notes by DFG staff from 1959 indicate that the creek supported both resident rainbow trout and steelhead (DFG 1959c). Staff also commented, "This stream gets very low in the summer time and goes dry in places" (DFG 1959c).

Staff from USFS observed *O. mykiss* in Tassajara Creek in 1997 (Chubb 1997). As part of a larger study of streams of the Los Padres National Forest, USFS staff surveyed Tassajara Creek in 1999. Multiple *O. mykiss* year classes were observed (USFS 1999a).

Tassajara Creek was sampled in 2003 as part of a study of *O. mykiss* genetic structure in southern California. A resulting 2006 paper states, "…differences between above and below barrier groups were not significantly different from zero for the Salinas [River drainage]" (Girman and Garza 2006, p. 16).

Willow

Willow Creek consists of about 2.8 stream miles and is tributary to Tassajara Creek. Survey reports note this creek as tributary to Arroyo Seco, though its flow is substantially less than that of Tassajara Creek.

In 1957 DFG characterized Willow Creek by stating,
"In general, flows and temperatures were quite suitable for fish life and pool development was excellent. On the other hand the capacity of the stream appeared limited due to limitations in amount of food present and the lack of much suitable spawning gravel" (DFG 1957b).

Staff from USFS observed *O. mykiss* in Tassajara Creek in 1997 (Chubb 1997). Observations also were made by NMFS staff in 2001 (NMFS 2001).

Lost Valley

Lost Valley Creek consists of about 6.6 stream miles and is tributary to Arroyo Seco. It flows northwest, then east, before entering Arroyo Seco. It drains a portion of the Santa Lucia Range in the Ventana Wilderness.

A 1971 DFG memo includes a juvenile steelhead standing crop estimate of 360-980 individuals per mile in three miles of Lost Valley Creek (DFG 1971). In 1979 DFG stated, "Lost Valley Creek supports an excellent rainbow trout fishery and the stream conditions are generally good" (DFG 1979a).

Staff from USFS observed *O. mykiss* in Lost Valley Creek in 1997 (Chubb 1997).

ZigZag

ZigZag Creek consists of about 5.6 steam miles and is tributary to Lost Valley Creek. It flows southeast from headwaters in the Strawberry Valley.

A 1971 DFG memo includes a juvenile steelhead standing crop estimate of 689 individuals per mile in one mile of Zigzag Creek (DFG 1971). Staff from DFG observed *O. mykiss* in 1978 and noted, "conditions were excellent for trout" (DFG 1979a).

Higgins

Higgins Creek consists of about 4.8 stream miles and is the principal tributary to Lost Valley Creek. It flows southeast, entering Lost Valley Creek at Lost Valley.

In 1957 DFG characterized Lost Valley Creek as follows, "Flows, temperatures and spawning areas on Higgins Creek were suitable for fish life. Pool development is also good and forage is fair" (DFG 1957b).

A 1971 DFG memo includes a juvenile steelhead standing crop estimate of 796-901 individuals per mile in two miles of Higgins Creek (DFG 1971).

Staff from USFS observed juvenile *O. mykiss* in Higgins Creek in 1997 (Chubb 1997).

San Antonio River

The San Antonio River is one of the three main tributaries of the Salinas River. The river consists of about 40 stream miles and its watershed is about 342 square miles. The dam forming San Antonio Reservoir, at stream mile 8.4, was completed in 1965. Under an MOU between the MCWRA and DFG, the minimum release from San Antonio Reservoir is three cubic feet per second, although low storage conditions can lead to reduction of this flow (EDAW 2001).

In a review of the application to construct San Antonio Reservoir in 1956 DFG states, "…there is no foreseeable opportunity to use the stream area below the reservoir for any kind of fishery and therefore no such recommendation is made" (DFG 1956). A DFG survey report from 1958 notes, "Upper section of stream is only section having fish. Lower section flows underground except during heavy rains" (DFG 1958a). In a 1965 survey of upper San Antonio Creek, DFG found "good" natural propagation of *O. mykiss* (DFG 1965b).

As part of 1994 surveys of upper San Antonio Creek, DFG estimated *O. mykiss* density in the reach downstream from the Salsipuedes Creek confluence, the reach between Salsipuedes Creek and Fresno Camp, and the headwaters. According to DFG in 1994, the San Antonio River upstream of the reservoir "…does not provide significant amounts of summer rearing habitat for a large number of medium…to large…trout" (DFG 1995).

Staff from NMFS observed *O. mykiss* in the upper San Antonio River during surveys reported in 2005 (NMFS 2005). The San Antonio River upstream of the reservoir was sampled in 2003 as part of a study of *O. mykiss* genetic structure in southern California. A resulting 2006 paper indicates that populations from above the dam and below it "form a well supported cluster" (Girman and Garza 2006, p. 21).

Bear Canyon

Bear Canyon Creek is tributary to the San Antonio River and consists of about 15 stream miles. It flows south, entering the San Antonio River upstream of the Forest Creek confluence.

In a DFG survey report from the 1960s, the stream was called an "intermittent tributary" (DFG ca 1965b). However, *O. mykiss* was observed at a density of three individuals per 100 feet and natural propagation was deemed "good" (DFG ca 1965b).

North Fork San Antonio River

The North Fork San Antonio River consists of about 6.8 stream miles and is tributary to the San Antonio River. The confluence is in the vicinity of Merle Ranch.

Staff from DFG surveyed the North Fork San Antonio River in 1965. The survey report notes, "Condition, success and natural propagation for [*O. mykiss*] is good" (DFG 1965c).

Staff from DFG also surveyed a portion of the upper North Fork in 1965. This reach likely was mis-characterized as a "major tributary to the San Antonio River, North Fork" (DFG 1965d). The survey report stated, "Success, condition and natural propagation of [rainbow trout] were good" (DFG 1965d).

Rattlesnake

Rattlesnake Creek is tributary to the North Fork San Antonio River and consists of about seven stream miles. It enters the North Fork San Antonio River at about stream mile 1.0.

Staff from DFG surveyed Rattlesnake Creek and observed *O. mykiss* with "fair" natural propagation (DFG ca 1965a). The survey likely was conducted in the 1960s.

Pinal

Pinal Creek is tributary to Rattlesnake Creek and consists of about ten stream miles. It flows south, entering Rattlesnake Creek at about stream mile 0.4.

Staff from DFG observed *O. mykiss* with "fair" natural propagation in Pinal Creek downstream from a natural falls (DFG ca 1965a). The survey likely was conducted in the 1960s.

Santa Lucia (Sycamore)

Santa Lucia Creek consists of more than stream miles and is tributary to the North Fork San Antonio River. It flows south, entering the North Fork in the vicinity of The Indian Ranch.

The report for a 1960s survey of Santa Lucia Creek states, "Success of rainbow trout, the condition and natural propagation were also good" (DFG ca 1960).

A trip report indicates that Santa Lucia Creek was surveyed in 2000 and *O. mykiss* was observed. The report form appears to be of a format used by USFS staff (Weddle 2000).

Carrizo

Carrizo Creek is tributary to the North Fork San Antonio River and consists of about two stream miles. It flows east, entering the North Fork San Antonio south of The Indian Ranch.

Staff from DFG surveyed Carrizo Creek in 1965. The survey report notes, "Success, condition and natural propagation for [*O. mykiss*] is good" (DFG 1965e).

Wizard Gulch

Wizard Gulch is tributary to the San Antonio River and consists of about 2.5 stream miles. It flows north, entering the San Antonio River upstream from the North Fork confluence.

A DFG field note from 1961 states, "This is reported to have been a good trout stream near the headwaters in the past" (DFG 1961b). The observer found the gulch dry during his visit.

Salsipuedes

Salsipuedes Creek consists of over five stream miles and is tributary to the San Antonio River. The confluence is south of Avila Ranch.

Staff from DFG surveyed the Salsipuedes Creek in 1965. The survey report called the stream a "minor tributary" but noted, "Success, condition and natural propagation for [*O. mykiss*] was good" (DFG 1965c).

San Antonio River tributary

This unnamed creek consists of about 2.5 stream miles and is tributary to the San Antonio River. It flows southeast, entering the San Antonio at San Antonio Campsite.
Staff from DFG surveyed this creek in the 1960s and observed multiple *O. mykiss* year classes. The survey report states, "Success, condition, and natural propagation of the rainbow trout was good" (DFG 1965f).

Nacimiento River

The Nacimiento River is the largest of the three main tributaries of the Salinas River in terms of streamflow. The river consists of about 50 stream miles and has a watershed of about 380 square miles. The dam forming Lake Nacimiento, at river mile 12.1, was completed in 1957. Under an MOU between the MCWRA and DFG, the minimum release from Lake Nacimiento is 25 cubic feet per second, although low storage can lead to reduction of this flow (EDAW 2001). A pipeline is planned to deliver a portion of the water stored in the reservoir to users outside of the Salinas River basin.

Extensive *O. mykiss* stocking has occurred in the Nacimiento River both upstream and downstream from the reservoir. According to DFG staff, the presence of piscivorous warm water assemblage species in the reservoir makes its use by an adfluvial *O. mykiss* population unlikely (Hill pers. comm.).

A 1912 academic paper notes the presence of steelhead spawners in the Nacimiento River. The paper states, "…especially good fishing may be had in Nacimiento and San Antonio Creeks" (Snyder 1912, p. 70).

In 1965 DFG summarized the steelhead resources of the Nacimiento River:

"Historically, the Nacimiento River supported a fair-sized run of steelhead rainbow trout. However, due primarily to changes in land and water uses, the run has dwindled to a remnant of its previous magnitude. At present, a few fish occasionally enter the Nacimiento River, but only when winter releases are being made from the dam" (DFG 1965g).

Surveys of five streams were conducted in 1992 by DFG to inform management, including about five miles of the Nacimiento River upstream of the reservoir. In the survey report, the *O. mykiss* population density was estimated to be 1,036 individuals per mile, which was characterized as "one of the lowest" of the surveyed streams (DFG 1993a). The survey report states, "The overall shelter value is low…showing little habitat for trout production" (DFG 1993a). However, DFG notes that the area upstream from the Nacimiento-Ferguson Road bridge "does show much greater potential for a wild trout sport fishery" (DFG 1993a). "Abundant" resident rainbow trout were observed in a 1994 survey about five miles downstream of the dam (Cummings 1995).

Staff from DFG surveyed the Nacimiento River downstream of the dam in 2001 and stated, "Although the physical habitat features are present in the Nacimiento River for steelhead spawning and rearing, other parameters may not be optimal and may preclude steelhead from using the river" (DFG 2001b). According to a 2002 biological assessment, the Nacimiento River downstream of the dam offers “only marginal steelhead habitat” (Entrix 2002). The assessment noted that the last steelhead reported in this reach was taken by an angler in 1998.

As part of a fish distribution study of the Salinas River system, the upper Nacimiento River was surveyed during summer and fall of 2002. Multiple *O. mykiss* year classes were observed near the Summit Ranger Station (Casagrande 2003).

Staff from NMFS surveyed the Nacimiento River downstream from the dam in 2003 and did not observe *O. mykiss* (NMFS 2005). Observations of *O. mykiss* were made by NMFS upstream of the reservoir and were reported in a 2005 study, which listed the population as “resident, residualized, or stocked” (NMFS 2005). Nacimiento Creek upstream of the reservoir was sampled in 2003 as part of a study of *O. mykiss* genetic structure in southern California. A resulting 2006 paper states, “…differences between above and below barrier groups were not significantly different from zero for the Salinas [River drainage]” (Girman and Garza 2006, p. 16).

In 2005 and 2006, DFG staff sampled upstream reaches of the Nacimiento River on USFS land west of Fort Hunter Liggett. A small population of wild *O. mykiss* was observed in both years (Hill pers. comm.).

Dip

Dip Creek flows northwest, entering the Nacimiento River via the Nacimiento Reservoir. The reservoir fills the lower portion of the creek’s valley.

Dip Creek appears on a 1969 list of streams in the Salinas River basin identified as having steelhead spawning and rearing habitat (SWRCB 1969).

Las Tablas

Las Tablas Creek consists of about 25 stream miles and is tributary to the Nacimiento River. The Nacimiento Reservoir fills the lower portion of the Las Tablas Creek valley.

A 1966 DFG survey report noted, “Historically, some steelhead used this creek prior to the construction of Nacimiento Reservoir” (DFG 1966a). The surveyor estimated the condition of the creek as follows:

“The upper portions of this stream support a limited trout fishery. Habitat is good to excellent” (DFG 1966a).

Staff from DFG also noted that *O. mykiss* in Nacimiento Reservoir move into Las Tablas Creek during the spring period, presumably to spawn (DFG 1966b).

Little Burnett

Little Burnett Creek consists of about 8.9 stream miles and is tributary to the Nacimiento River. It flows southeast, entering the Nacimiento upstream from Grizzly Bend.

A long-time Salinas Valley resident produces an account of steelhead in the Salinas River and its tributaries. The account included reports of steelhead in Little Burnett Creek (Franklin 1999).

Tobacco

Tobacco Creek consists of about 4.9 stream miles and is tributary to Little Burnett Creek. It flows northwest, entering Little Burnett Creek at about stream mile 1.8.

A long-time Salinas Valley resident produced an account of steelhead in the Salinas River and its tributaries. The account included reports of steelhead in Tobacco Creek (Franklin 1999).

Stony

Stony Creek consists of about 11 stream miles and is tributary to the Nacimiento River. It flows southeast, entering the Nacimiento south of San Miguelito Ranch. Stony Creek Reservoir is located in the lower portion of the drainage basin.

Surveys and sampling occurred in 1945 and 1961, but *O. mykiss* was not observed (DFG 1945c; DFG 1962). Stony Creek appears on a 1969 list of streams in the Salinas River basin identified as being "spawning and nursery areas" for steelhead (SWRCB 1969).

San Miguel

San Miguel Creek consists of about 8.4 stream miles and is tributary to the Nacimiento River. It flows east, entering the Nacimiento west of San Miguelito Ranch.

A 1979 DFG inventory of Monterey County streams indicates that rainbow trout occurs in the creek (DFG 1979b). Previously, permission had been given to stock the creek (DFG 1978a).

Negro Fork Nacimiento River

The Negro Fork is tributary to the Nacimiento River and consists of about three stream miles. It flows northeast from headwaters on Chalk Peak.

A 1961 survey of the Negro Fork found multiple *O. mykiss* year classes (DFG 1961c). A 1979 stream inventory also cites *O. mykiss* in the Negro Fork (DFG 1979b).

Surveys of five streams were conducted in 1992 by DFG to inform management, including four stations in the Old Negro Fork. In the survey report, *O. mykiss* population density was characterized as "one of the best" of the surveyed streams (DFG 1993a). The survey report states, "Because of the low summer stream flows the pool habitats and riparian vegetation play a critical role in maintaining a resident trout population in this stream" (DFG 1993a).

Huerhuero

Huerhuero Creek is tributary to the Salinas River. It flows west, entering the Salinas north of Paso Robles.

A 1982 DFG memo listed Huerhuero Creek as having a "known" historical steelhead run (DFG 1982a). The basis for this determination is not provided in the memo.

As part of a steelhead range contraction study, NMFS staff visited Huerhuero Creek in 2003. It was found to be dry and therefore not capable of supporting *O. mykiss* (NMFS 2005). Staff from DFG consider Huerhuero Creek as lacking suitable *O. mykiss* habitat due to the seasonal nature of flows (Hill pers. comm.).

Paso Robles

Paso Robles Creek consists of about eight stream miles and is tributary to the Salinas River. The confluence is just south of Templeton.

During a 1957 survey of Paso Robles Creek, DFG staff found intermittent flow and "no fish life" (DFG 1957c). The survey report states, "Because of the lack of sufficient water in the Salinas River this tributary is of no value to steelhead" (DFG 1957c). A 1960 survey report states, "[Paso Robles Creek] is probably one of the few streams in the Salinas River system that is capable of providing a steelhead trout fishery within the Salinas River" (DFG 1960b). The report also provides the following estimate:

"Although reports from local residents and the local warden indicate that the steelhead runs are small in the stream, it is noted… the juvenile steelhead trout are quite numerous and are found along the entire length of the stream…[T]he stream becomes almost dry during the late summer months and that..is a very marked limiting factor to the survival of fish…" (DFG 1960b).

Staff from DFG sampled Paso Robles Creek in 1997 and observed two *O. mykiss* year classes (DFG 1999a). As part of a steelhead range contraction study, NMFS staff surveyed Paso Robles Creek in 2003 and observed *O. mykiss* (NMFS 2005). Additional observations by DFG staff occurred near York Mountain Road in 2002 and near the Jack Creek confluence in 2005 (Hill pers. comm.).

Santa Rita

Santa Rita Creek consists of about 7.6 stream miles and is tributary to Paso Robles Creek. The creek flows east from headwaters in the Santa Lucia Range.

A 1960 survey report for Paso Robles Creek states, "Santa Rita Creek below the forks [and] the north fork of Santa Rita Creek… contain steelhead trout although it is a marginal fishery due to the low or non-existent summer flow" (DFG 1960b).

As part of a steelhead range contraction study, NMFS staff surveyed Santa Rita Creek in 2003 and observed *O. mykiss* (NMFS 2005).

Rocky

Rocky Creek consists of about 5.2 stream miles and is tributary to Santa Rita Creek. It flows southeast, entering Santa Rita Creek south of York Mountain.

A long-time Salinas Valley resident produced an account of steelhead in the Salinas River and its tributaries. The account included reports of steelhead in Rocky Creek (Franklin 1999).

Sheepcamp

Sheepcamp Creek consists of about 5.6 stream miles and is tributary to Paso Robles Creek. It flows south, entering Paso Robles Creek at about stream mile 6.4.

A long-time Salinas Valley resident produced an account of steelhead in the Salinas River and its tributaries. The account included a report of "native trout" in Sheepcamp Creek in the 1940s (Franklin 1999).

Jack

Jack Creek is tributary to Paso Robles Creek. It consists of about 7.5 stream miles and has a watershed of about 25.3 square miles. It flows southeast, entering Paso Robles Creek at about stream mile 7.5.

Regarding Jack Creek, a 1957 DFG survey report states, "This tributary is of no value to the Salinas steelhead fishery" (DFG 1957d). A 1960 survey report for Paso Robles Creek states, "Jack Creek…contain[s] steelhead trout although it is a marginal fishery due to the low or non-existent summer flow" (DFG 1960b).

A site visit to Jack Creek was conducted in March 1998 as part of a larger water resources study. The consultants found "good" habitat conditions for *O. mykiss* (EDAW 2001).

Staff from DFG note that water diversion appears to lead to frequent dewatering of Jack Creek. The creek is expected to offer suitable habitat should flows be maintained (Hill pers. comm.).

Graves

Graves Creek consists of about 10.4 stream miles and is tributary to the Salinas River. It flows northeast, entering the Salinas north of Atascdero.

Anecdotal accounts by a local resident indicate that trout were abundant in Graves Creek until the 1950s (NMFS 2003b).

A 1999 DFG survey of Graves Creek noted that flow in the creek "normally disappears in June/July" (DFG 1999b). *Oncorhynchus mykiss* was not observed during the survey. Graves Creek was "spot checked" downstream of the most downstream barrier by NMFS staff and the results reported in a 2005 study. *Oncorhynchus mykiss* was absent from the creek and the population was deemed "extirpated" (NMFS 2005).

Atascadero

Atascadero Creek consists of about 9.4 steam miles and is tributary to the Salinas River. It flows east from headwaters on Cerro Alo, entering the Salinas River at Atascadero.

Notes from a 1961 stream survey indicate the presence of *O. mykiss* in Atascadero Creek (Unknown 1960).

Adult steelhead were reported in Atascadero Creek in January 1999 (DFG 1999a). Field notes and survey reports from DFG visits between 1999 and 2005 describe multiple *O. mykiss* year classes (DFG 2000b; Highland 2005).

Eagle

Eagle Creek consists of about 1.7 stream miles and is tributary to Atascadero Creek. It drains the north flank of Eagle Peak.

Staff from DFG surveyed Eagle Creek in 1999. Multiple *O. mykiss* year classes were observed (DFG 2000b). Since the confluence of Eagle and Atascadero creeks is upstream from a 17 foot bedrock waterfall on Atascadero Creek, it appears unlikely that *O. mykiss* observed in Eagle Creek are of anadromous origin (Nelson pers. comm.).

Hale

Hale Creek is tributary to Atascadero Creek. It consists of about 3.2 stream miles and drains the south flank of Eagle Peak. A dam is located at about stream mile 1.7.

Staff from DFG surveyed Hale Creek on two occasions in 1999. Multiple *O. mykiss* year classes were observed (DFG 2000b). Since the confluence of Hale and Atascadero creeks is upstream from a 17 foot bedrock waterfall on Atascadero Creek, it appears unlikely that *O. mykiss* observed in Hale Creek are of anadromous origin (Nelson pers. comm.).

Kathleen Valley

Kathleen Valley Creek consists of about 1.7 streams miles and is tributary to Hale Creek. The confluence is just downstream from the Eagle Ranch Dam on Hale Creek.

Staff from DFG surveyed Kathleen Valley Creek on two occasions in 1999. Multiple *O. mykiss* year classes were observed (DFG 2000b). Since the confluence of Hale and Atascadero creeks is upstream from a 17 foot bedrock waterfall on Atascadero Creek, it appears unlikely that *O. mykiss* observed in Kathleen Valley Creek are of anadromous origin (Nelson pers. comm.).

Santa Margarita

Santa Margarita Creek consists of about nine stream miles and is tributary to the Salinas River. It flows northeast, entering the Salinas north of Cushing.

A 1947 DFG letter indicated that "a smaller number" of steelhead spawned in Santa Margarita Creek at that time (DFG 1947). An adult steelhead was reported caught by a fisherman in Santa Margarita Creek in 1997 (DFG 1999a). As part of a steelhead range contraction study, NMFS staff surveyed Santa Margarita Creek in 2003 and observed *O. mykiss* (NMFS 2005).

Trout

Trout Creek consists of about ten steam miles and is tributary to Santa Margarita Creek. It flows north, entering Santa Margarita Creek immediately upstream from latter's confluence with the Salinas River.

A DFG stream survey report from the 1940s documented the presence of *O. mykiss* in Trout Creek (DFG ca 1940). The report stated, "Not much to be expected from this stream", apparently due to low streamflows (DFG ca 1940). However, DFG staff noted that sportsmen considered the creek to offer some of the best fishing in the area.

In 1999 DFG memo DFG staff stated, "I found that [Trout Creek] offered no real steelhead habitat" (DFG 1999d).

Tassajera

Tassajara Creek consists of about three stream miles and is tributary to Santa Margarita Creek. It flows east, entering Santa Margarita Creek west of the town of Santa Margarita.

An undated DFG stream survey (likely from the 1940s) indicates the presence of *O. mykiss* in Tassajera Creek and notes past stocking (DFG ca 1934c). The creek is deemed "small, brushy…and hard to fish" (DFG ca 1934c).

A summary of DFG field notes indicates sighting of adult steelhead and observations of multiple *O. mykiss* year classes in Tassajera Creek between 1995 and 1999 (DFG 1999a).

Tassajera was sampled in 2003 as part of a study of *O. mykiss* genetic structure in southern California. A resulting 2006 paper states, "…differences between above and below barrier groups were not significantly different from zero for the Salinas [River drainage]" (Girman and Garza 2006, p. 16). Staff from DFG observed juvenile *O. mykiss* in Tassajera Creek about one mile upstream from the Santa Margarita Creek confluence in 2004 (Hill pers. comm.).

Rinconada

Rinconada Creek is tributary to the Salinas River. It consists of about seven stream miles and enters the Salinas River about 4.3 miles downstream of the Salinas Dam (Santa Margarita Lake).

A stream survey report from the 1940s indicates that Rinconada Creek was stocked with "very poor success" due to low flows and high temperature (DFG ca 1934b). However, *O. mykiss* was observed during the survey.

Carmel River

The Carmel River consists of about 35 stream miles and has a watershed of approximately 255 square miles. According to a 1965 DFG report, there are seven major tributaries to the Carmel River that comprise about 30 stream miles collectively (DFG 1993a).

The San Clemente Dam, located at river mile 18.5, was constructed in 1921. The Los Padres Dam was constructed in 1949 at river mile 24.8. Conditions downstream of the dam are described in a 1994 DFG report:

"Carmel River flows decrease in early summer, due to reduced runoff and water diversions… These diversions significantly alter the stream flows in the lower portions of the Carmel River to the extent that several miles of river are dewatered each summer and fall and a sand bar is formed at the mouth of the river. The dewatering of the stream channel significantly reduces rearing habitat below San Clemente Dam and strands early migrating juvenile trout in isolated pools in the lower river. Fish rescue operations are conducted by the Monterey Peninsula Water Management District in an effort to mitigate for water diversions. Fish rescued are transported and released into upstream reaches of perennial stream flow…[The] sand bar is artificially breached each winter in order to allow the upstream migration of steelhead from the ocean…" (DFG 1995).

As part of the 1965 state fish and wildlife plan, DFG prepared an inventory of anadromous salmonids. According to the inventory, the Carmel River system contained about 93 stream miles of steelhead habitat (DFG 1965a). The annual steelhead run of the Carmel was estimated to consist of about 1,500 individuals. The inventory notes "Increased water use and diversion results in less favorable water conditions for salmonids. It may be possible to sustain this run if adequate minimum flows are provided" (DFG 1965a, p. 399).

According to a 1983 DFG letter, the historical steelhead run (prior to dam construction) in the Carmel River was 8,000 adults annually (DFG 1983a).

San Clemente Reservoir is operated by California-American Water Company (Cal-Am) under a 2001 agreement with DFG. Flows are stipulated, "…no less than 10 cfs during June and July, 7.5 cfs during August, and 6 cfs September through December…" (DFG 2001a).

Rainbow trout have been stocked in various portions of the watershed historically including the reach between the San Clemente and Los Padres dams, upstream from Los Padres Dam (DFG 1957e; DFG 1957f). The ancestry (*i.e.*, native, hatchery, residualized) of *O. mykiss* observed or otherwise sampled therefore is largely a matter of speculation.

In a report on a 1957 survey of the portion of the Carmel River downstream of San Clemente Dam, the river was said to be "a good spawning stream, but only a fair to poor nursery" (DFG 1957g). About the reach between the dams DFG stated, "This section of the Carmel River contains the best spawning and nursery areas observed in the entire drainage… It is the most productive part of the entire river" (DFG 1957e). The reach upstream from Los Padres Dam also was surveyed. The report notes, "This appears to be an excellent resident trout stream. However, because of the limited spawning areas available in the main stream and tributaries, the productive capacity for steelhead in this stream section is considered to be limited" (DFG 1957f).

In a 1967 report concerning Love Creek (tributary to the San Lorenzo River), the annual steelhead run of the Carmel River was estimated to consist of 1,500 individuals (DFG 1967).

A 1982 DFG memo notes, "…the entire steelhead population located between Los Padres dam and Syndicate Camp, 2.2 river miles downstream, were (sic) lost due to deposition of large volumes of silt and adverse water quality conditions" (DFG 1982b). The source of the silt was prolonged release of sediment from Los Padres Dam in October 1981. As part of the process of determining mitigation for the damage DFG prepared an estimate of the juvenile steelhead population for the Carmel River watershed, which was more than 114,000 individuals (DFG 1982b).

A draft consultants report from 1982 offered the following summary of Carmel River steelhead resources:

> "The Carmel River supports an annual run of steelhead that the Department of Fish and Game estimates averages about 2000 adults per year. Adults…spawn in the lower Carmel between Shulte Road and the San Clemente Dam. Some climb the ladder at San Clemente, spawn in the river between the two dams or in the tributaries of that reach, and some are passed over Los Padres to spawn in the upper Carmel and its tributaries" (Kelley 1983).

The report also states, "…April-May flows below San Clemente Dam are inadequate for the emigration of juveniles downstream to the ocean" (Kelley 1983). A 1983 DFG study estimated the *O. mykiss* standing crop and concluded, "The lower Carmel River definitely has the capacity to sustain large populations of juvenile steelhead" (DFG 1983b).

Surveys of five streams were conducted in 1992 by DFG to inform management, including three stations in the Carmel River upstream of the Los Padres Reservoir. In the survey report, the *O. mykiss* population density was estimated to be 5,269 individuals per mile, which was characterized as "good" (DFG 1993a). The survey report characterized the fishery in the sampled area as follows:

"This drainage is historically a steelhead drainage, but does contain a (sic) undefined population of resident rainbow trout… It is the opinion of several biologists that there are inadequate hydraulic conditions to encourage outmigrating smolts and kelts to enter and pass over the Los Padres Dam spillway…Upon sexual maturity, these trout trapped in the reservoir appear to seek suitable spawning habitat in the upper river and spawn successfully as evidenced by the high yearling population sampled" (DFG 1993a).

A 1992 memo summarized conditions in the Carmel system for the previous several years. It stated, "No sea run adults spawned in the Carmel River drainage in 1988, 1989 and 1990. Limited spawning occurred in 1991 and 1992. During the 1992 season, only 14 adult steelhead were recorded passing through the San Clemente Dam fishway" (Murphy 1992). In 1991, only a single steelhead was counted. An additional report notes, "Counts at the fishway increased to 317 for the 1993 migration period" (DFG 1995).

Surveys of three Carmel River reaches upstream from Los Padres Dam were conducted in 1994. The survey report included an average *O. mykiss* density estimate of 4,528 individuals per mile, with juvenile trout comprising more than 98 percent of the population (DFG 1995). Staff from DFG concluded, "Even though only a small number of adult steelhead have been passed over the Los Padres Dam to spawn in the headwaters, the population size structure still reflects that of a steelhead population" (DFG 1995).

As part of a larger study of streams of the Los Padres National Forest, USFS staff surveyed the Carmel River in 1999. Multiple *O. mykiss* year classes were observed at three sampling locations (USFS 1999a).

According to a 2002 breach monitoring report, "In order to reduce the potential for flooding, the [Carmel River lagoon] sandbar is breached in advance of winter storms" (HES 2002a, p. 3). In 2001-2002, consultants determined that most of the shallow waters of the Carmel River lagoon provided suitable habitat for juvenile steelhead during the fall, but noted previous studies indicating that over-summering conditions "are not considered to be good" (HES 2002a). The monitoring program did not find evidence that juvenile steelhead were swept from the lagoon by breaching. The Carmel River lagoon was surveyed between 2004 and 2006 in association with a lagoon enhancement project. The 2006 survey results were used to prepare an estimate of the smolt population in the lagoon. The result was an estimate of 3,734 juvenile fish (Urquhart pers. comm.).
The trap and truck program at Los Padres Dam is conducted annually. Out-migration of smolts occurs via a spillway about 600 feet long. While mortality and injury of outmigrants previously caused concern, the rates appear to have been lessened by modifications of the plunge pool at the base of the spillway (Highland pers. comm.).

The Carmel River Steelhead Association conducts fish rescues in the Carmel system wherein juvenile steelhead in drying tributaries are collected and transported to the Carmel River lagoon or other suitable habitat areas. In 2002, more than 3,000 young-of-year fish were released into the lagoon (HES 2003). In 2007, 2,780 juvenile steelhead reared at the Sleepy Hollow Steelhead Rearing Facility were released to the lagoon and to suitable mainstem habitat. A fish counter was installed at the San Clemente Dam fish facility in December 2007. In 2008, 412 adult steelhead were counted (MPWMD 2008). A total of 158 adult steelhead were counted in 2008 at the Los Padres Dam fish trap and truck facility. More than 69,000 juvenile steelhead were rescued from drying portions of the Carmel in 2008, the largest number ever processed. More than 48,000 steelhead were transported to the rearing facility, while more than 11,000 were released into the Carmel mainstem and more than 9,600 individuals were released into the lagoon.

Potrero Canyon

Potrero Canyon Creek consists of about 5.3 stream miles and is tributary to the Carmel River. It flows northwest, entering the Carmel at about stream mile 3.6.

Fish rescues were carried out in Potrero Canyon Creek in 2002. Only yearling *O. mykiss* individuals were observed (CRWA 2004). Consultants prepared an assessment of conditions for steelhead in Potrero Creek in 2002 and observed "a few" rainbow trout during the associated survey. The resulting report states, "Channel conditions in the continuously wetted 1.7 miles of Potrero Creek…provide fair to good steelhead rearing habitat" (Entrix 2003a, p. 7).

Robinson Canyon

Robinson Canyon Creek consists of about 3.3 stream miles and is tributary to the Carmel River. It flows north, entering the Carmel at about stream mile 7.5.

A 1979 DFG stream inventory lists Robinson Canyon Creek as having steelhead (DFG 1979b). According to a 1992 DFG letter, Robinson Canyon Creek supported a steelhead population and was an important habitat component of the Carmel River fishery (DFG 1992b).

Consultants prepared an assessment of conditions for steelhead in Robinson Canyon Creek in 2002 and did not observe *O. mykiss* during the associated survey. The resulting report states, "Wet or above normal years are probably necessary to provide adequate upstream migration flows and to sustain rearing flows through the summer. In dry and below normal years, it appears that most of Robinson Canyon Creek provides very limited opportunities for migration and rearing" (Entrix 2003a, p. 12). Fish rescues were carried out in Robinson Canyon Creek in 2004. Two *O. mykiss* year classes were observed (CRWA 2004).

Las Garzas

Las Garzas Creek consists of about 8.4 stream miles. It flows northeast, entering the Carmel River at about river mile 12.5. Upstream of San Francisquito Flat, it is called on maps and in reports "Las Gazas."

Notes from a 1912 DFG visit to Las Garzas Creek state, "plenty water+fish" (Oyer 1912). The term "fish" is assumed to indicate *O. mykiss*. A 1958 DFG field note indicates spawning steelhead in Las Gazas Creek (DFG 1958b).

In 2000 DFG surveyed Las Garzas Creek and observed multiple *O. mykiss* year classes of (DFG 2000c). The survey report noted, "The major factors limiting steelhead production are inadequate sized gravels for spawning and low stream flows… The low stream flows during the summer could be supplemented with flow releases from Moore Lake, especially later in the summer when Las Garzas Creek becomes intermittent" (DFG 2000c). Staff from DFG also recommended cattle exclusion from the stream and riparian corridor. According to DFG staff, a series of boulder falls at stream mile 4.3 is the upstream limit of anadromy (DFG 2000c).

Consultants prepared an assessment of conditions for steelhead in lower Las Garzas Creek in 2002. Juvenile *O. mykiss* were observed at six locations during the survey. The resulting report states, "Excellent rearing habitat is available in the 1.8 miles [of the middle reach]" (Entrix 2003b, p. 6). A bedrock falls at stream mile 2.6 was noted to be the upstream limit of anadromy.

Hitchcock Canyon

Hitchcock Canyon Creek consists of about 3.7 stream miles and is tributary to the Carmel River. It flows northeast, entering the Carmel near the town of Carmel Valley.

A 1988 draft management plan states, "The creek reportedly supports a few steelhead in wet years…" (Greenwood 1988).

Staff from DFG visited Hitchcock Canyon Creek in 1998 and observed *O. mykiss* YOY in several locations (Highland 1998).

Fish rescues were carried out in Hitchcock Canyon Creek in 2002. Only yearling *O. mykiss* individuals were observed (CRWA 2004).

Tularcitos

Tularcitos Creek consists of about 14.2 stream miles and is tributary to the Carmel River. It flows northwest, entering the Carmel southeast of the town of Carmel Valley.

Notes from a 1986 advisory committee meeting indicate that approximately 15,000 steelhead juveniles rescued from the Carmel River were planted in Tularcitos Creek (Wehner 1986). A draft watershed management plan from 1988 states, "…with little gravel and almost no cobbles, the stream provides sparse rearing habitat" (Greenwood 1988, p. 5-24). The plan ascribes value to the stream in supplying some summer flow to the lower mainstem Carmel River.

Chupines

Chupines Creek consists of more than eight stream miles and is tributary to Tularcitos Creek. It flows southwest, entering Tularcitos Creek at about stream mile 1.5.

A 1988 draft management plan states, "…in 1983 steelhead spawned in Chupines Creek…, reportedly for the first time since the flood year of 1958" (Greenwood 1988).

San Clemente

San Clemente Creek consists of about eight stream miles and is tributary to the Carmel River. The historical confluence is flooded by the San Clemente Reservoir. A small reservoir (Trout Lake) is located on San Clemente Creek about 1.5 miles upstream from the reservoir. A fishway downstream from the reservoir is considered to be of poor design and in a poor state of repair (Highland pers. comm.).

Based on a survey in 1957, DFG staff deemed the natural reproduction of *O. mykiss* in San Clemente Creek to be "fair" (DFG 1957h). In 1960 DFG stated, "The upper section of San Clemente Creek appears to be a poor spawning and nursery stream due to lack of suitable gravel and intermittent flow" (DFG 1960c).

As part of a fisheries study of the Carmel system, DFG staff estimated "sea-run steelhead production" from various streams. The mean production from San Clemente Creek in 1973 and 1974 was estimated to be 278 individuals, or about 11.5 percent of total production (DFG 1983c).

San Clemente Creek was sampled between the San Clemente Reservoir and Trout Lake in 1992 and two *O. mykiss* year classes were observed. The resulting memo states, "San Clemente Creek contains quality salmonid spawning and rearing habitats accessible to steelhead trout" (Murphy 1992).

A migrant trap was operated on San Clemente Creek in spring of 2003. Almost 300 *O. mykiss* YOY and age 1+ individuals were captured (Froke and Reis 2003).

Consultants prepared an assessment of conditions for steelhead in upper San Clemente Creek in 2002 and observed *O. mykiss* only "rarely" during the associated survey. The resulting report states, "Rearing habitat conditions are good to excellent throughout most of the sections of San Clemente Creek that were surveyed… Spawning habitat is limited…" (Entrix 2003a, p. 15).

Black Rock

Black Rock Creek consists of about 4.5 stream miles and is tributary to San Clemente Creek. A DFG report notes that a 30-40 foot bedrock falls is located at about stream mile 3.0 or 3.5.

Information generated in 1948 by DFG staff indicates that Black Rock Creek offers 3.5 miles of spawning habitat (DFG 1970). A 1957 survey report states, "This appears to be a fair steelhead spawning area and a very good nursery stream for steelhead ascending from San Clemente Reservoir" (DFG 1957i).

According to DFG staff, sterile trout are planted in "White Rock Lake", an artificial pond upstream of the falls. Also, the lake is screened to limit the possibility of the progeny of stocked fish entering downstream reaches (Hill pers. comm.).

South Fork Black Rock

The South Fork Black Rock Creek consists of about three stream miles and is tributary to Black Rock Creek. It drains the north side of the Ponciano Ridge.

Information generated in 1948 by DFG staff indicates that South Fork Black Rock Creek offers two miles of spawning habitat (DFG 1970). In a 1957 survey report DFG deemed South Fork to be an "unimportant tributary to Black Rock Creek" (DFG 1957j). However, *O. mykiss* was observed downstream of a 10-12 foot high rock falls located about 100 feet upstream from the mouth of the creek.

Pine Creek

Pine Creek consists of about six stream miles and is tributary to the Carmel River. It flows northeast, entering the Carmel about four miles upstream from the San Clemente Dam. A 1948 DFG document suggests that a natural falls at stream mile 2.0 constitutes the upstream limit of anadromy.

Information generated in 1948 by DFG staff indicates that Pine Creek offers two miles of spawning habitat (DFG 1970). Staff from DFG surveyed Pine Creek in 1957. The survey report states, "This tributary appears to be a very good steelhead spawning and nursery tributary to the Carmel River. Judging by the abundance of fingerlings throughout the stream section, natural propagation is very good to excellent" (DFG 1957k).

As part of a fisheries study of the Carmel system, DFG staff estimated "sea-run steelhead production" from various streams. The mean production from Pine Creek in 1973 and 1974 was estimated to be 978 individuals, or about 40.5 percent of total production (DFG 1983c).

Cachagua

Cachagua Creek consists of about 12 stream miles and is tributary to the Carmel River. Upstream from the Conejo Creek confluence, Cachagua Creek is called Finch Creek (described separately below).

Information generated in 1948 by DFG staff indicates that Cachagua Creek does not offer spawning habitat due to low flow (DFG 1970). A 1959 DFG field note states, "…this stream dries up early and many fish are lost" (DFG 1959d). In 1963, DFG staff characterized the steelhead run in Cachagua Creek as "erratic" and "small". The population of juvenile fish is the creek also was deemed "negligible" (DFG 1963b).

As part of a fisheries study of the Carmel system, DFG staff estimated “sea-run steelhead production” from various streams. The mean production from Cachagua Creek in 1973 and 1974 was estimated to be 128 individuals, or about 5.3 percent of total production (DFG 1983c).

Fish rescues were carried out in Cachagua Creek in 2003. Two *O. mykiss* year classes were observed (CRWA 2004).

Boronda

Boranda Creek consists of about 3.4 stream miles and is tributary to Cachagua Creek. It flows north, entering Cachagua Creek at about stream mile 2.2.

Information generated in 1948 by DFG staff indicates that Boronda Creek does not offer spawning habitat (DFG 1970). Notations suggest that low flow precluded access to potential suitable habitat.

Conejo

Conejo Creek consists of about five stream miles and is tributary to Cachagua Creek. It flows southwest to its confluence with Finch Creek, which constitutes the headwaters of Cachagua Creek.

Information generated in 1948 by DFG staff indicates that Conejo Creek does not offer spawning habitat (DFG 1970). A 1979 stream inventory notes the presence of “SH” in Conejo Creek (DFG 1979b). The basis for the determination in not provided.

Finch

Finch Creek consists of about eight stream miles and is tributary to Cachagua Creek. It flows northwest to its confluence with Conejo Creek, which constitutes the headwaters of Cachagua Creek.

Finch Creek appears in a 1979 DFG stream inventory in which fish species present in various streams is noted. The creek is shown to support steelhead and rainbow trout in the inventory (DFG 1979b).

Danish

Danish Creek consists of about seven stream miles and is tributary to the Carmel River. It flows east, entering the Carmel via Los Padres Reservoir.

Information generated in 1948 by DFG staff indicates that Danish Creek offers one mile of spawning habitat (DFG 1970). A 1957 DFG survey report states, “Although a very nice, small, densely shaded mountainous stream, it is considered to have very limited fishery value because of its short length and poor spawning areas” (DFG 1957l). According to DFG notes from 1959, “This stream gets very low in the summer and goes dry in many places” (DFG 1959c). Staff also commented, “This is only a small stream and many fish are lost when it gets low” (DFG 1959c).

Staff from DFG sampled *O. mykiss* in 1973 and 1974 in Danish Creek. The population was considered to be resident rainbow trout due to passage issues (DFG 1983c).

Rattlesnake

Rattlesnake Creek consists of about three stream miles and is tributary to Danish Creek. It flows northeast, entering Danish Creek at about stream miles 1.6. A 15 foot falls may be the upstream limit of anadromy.

Rattlesnake Creek was stocked in 1930 and in subsequent years (DFG 1939). A stream survey report, probably from the 1930s, calls natural *O. mykiss* propagation "limited" and states, "Past several years stream has gone dry below the falls, and in places above the falls" (DFG ca 1934a). Information generated in 1948 by DFG staff indicates that Rattlesnake Creek does not offer spawning habitat (DFG 1970).

Miller Fork Carmel River

The Miller Fork of the Carmel River consists of about seven stream miles. It flows northwest through Miller Canyon, entering the Carmel about three miles upstream of the Los Padres Dam.

Information generated in 1948 by DFG staff indicates that the Miller Fork offers two miles of spawning habitat (DFG 1970). Staff from DFG surveyed the Miller Fork in 1957, finding *O. mykiss* to be "scarce" (DFG 1957m). The survey report states, "Because of the limited suitable spawning areas available, this tributary is considered to be of minor importance to the Carmel steelhead fishery" (DFG 1957m). According to DFG notes from 1959, "This stream gets very low in the summer and goes dry in many places" (DFG 1959c). Staff also commented, "Fish go into this stream from the Carmel River" (DFG 1959c).

A sampling results form indicates that multiple *O. mykiss* year classes were observed in the Miller Fork in 1994 (Dvorsky 1994). A survey of the Miller Fork in 1999 noted trout "in entire [seven mile] reach" (USFS 1999b). Staff from USFS surveyed the Miller Fork in the vicinity of Nason Cabin in 2000. Field notes indicate "large numbers" of trout between one and six inches in length (USFS 2000).

Staff from MPWMD visited the most downstream reach of the Miller Fork in 2005. Young of the year and age 1+ *O. mykiss* were observed (Hamilton pers. comm.).

Bruce Fork

The Bruce Fork consists of about 1.5 stream miles and is tributary to the Carmel River. It enters the Carmel River about 0.5 miles downstream from the Miller Fork confluence with the Carmel.

Information generated in 1948 by DFG staff indicates that the Bruce Fork offers one mile of spawning habitat (DFG 1970). Staff from DFG surveyed the Bruce Fork in 1957 and did not observe *O. mykiss*. The survey report states, "This is an unimportant spawning or nursery tributary to the Carmel River" (DFG 1957n).

Hiding Canyon

Hiding Canyon Creek consists of about two stream miles and is tributary to the Carmel River. It flows west, entering the Carmel downstream from Round Rock Campsite.

A 1979 stream inventory notes the presence of "RT" in Hiding Canyon Creek (DFG 1979b). The basis for inclusion is not provided.

Carmel River tributary

This creek drains the north slope of the Ventana Cone. It enters the Carmel River near the Round Rock Campsite.

Staff from DFG surveyed the unnamed tributary in 1957 and observed *O. mykiss*. The survey report states, "Appears to be of relatively minor importance judging by evidence of natural reproduction" (DFG 1957o).

San Jose

San Jose Creek consists of about 8.3 stream miles. It flows northwest, entering the Pacific Ocean at Monastery Beach.

A 1989 consultants' report cites a 1963 DFG estimate of 50 to 100 spawning steelhead in the creek "during good water years" (JSA 1989). The report states, "Isolated, small populations of rainbow trout reside permanently in the upper stream sections of San Jose Creek. These fish are probably 'residualized' steelhead trout that remain in the stream, mature, and spawn without ever going to the ocean" (JSA, p. 13).

Staff from DFG surveyed San Jose Creek in 1993, and observed multiple *O. mykiss* year classes (DFG 1993b). The survey report states, "…the summer/fall slow situation is a concern" (DFG 1993b). The report also noted sedimentation of the creek, possibly associated with on-going logging, upstream of an impoundment at stream mile 4.2.

Consultants prepared an assessment of conditions for steelhead in San Jose Creek in 2002 and observed juvenile *O. mykiss* during the associated survey. The resulting report states, "There are about 2.5 miles of accessible steelhead habitat on San Jose Creek between the [Santa Lucia Preserve] property line and the Pond [at Rancho San Carlos Properties]…" (Entrix 2003a, p. 7).
A memo describing a reconnaissance survey in 2002 notes, "…it is not possible to determine conclusively whether [juvenile *O. mykiss*] were the progeny of anadromous steelhead or resident spawning rainbow trout" (HES 2002b). The memo cites the stream as "in a relatively natural state" but notes relatively high sand concentration in the substrate and some evidence of cattle grazing impacts.

Staff from DFG observed "good densities" of *O. mykiss* YOY and age 1+ individuals in San Jose Creek downstream from Rancho in the mid 2000s. According to DFG staff, sedimentation and water diversion are the two factors mostly likely to limit production in the creek (Nelson pers. comm.).

Seneca

Seneca Creek consists of about 2.4 stream miles is tributary to San Jose Creek. It flows north through Palo Corona Ranch before entering San Jose Creek.

Staff from DFG recently observed *O. mykiss* YOY and age 1+ individuals throughout about three miles of Seneca Creek. Road crossings of the creek may be problematic for fish passage and excessive sedimentation appears to be occurring in the drainage (Nelson pers. comm.).

Williams Canyon

Williams Canyon Creek consists of about 3.6 stream miles and is tributary to San Jose Creek. It drains the north flank of Palo Corona.

Staff from DFG surveyed Williams Canyon Creek in 1990 and observed one *O. mykiss* year class. The resulting memo states, "The stream is in very poor condition. Heavy sedimentation from road construction and maintenance has buried any spawning areas that may have been present" (DFG 1990a).

Staff from DFG recently observed *O. mykiss* YOY and age 1+ individuals throughout about three miles of Williams Canyon Creek. Excessive sedimentation appears to be occurring in the drainage (Nelson pers. comm.).

Gibson

Gibson Creek consists of about 2.4 stream miles and drains the south side of the Santa Lucia Range. It enters the Pacific Ocean at Sandy Beach, north of Carmel Highlands.

A 1944 note indicates that Gibson Creek was dry by June of that year (DFG 1944). Staff from DFG surveyed the creek in 1981. The report notes, "No fish were observed in the creek. The small flow along with the barriers would preclude fish access" (DFG 1981a).

According to a 2003 NMFS report on steelhead distribution, Gibson Creek had a total barrier that precluded spawning in the stream (NMFS 2003a).

Malpaso

Malpaso Creek consists of about 4.6 stream miles. It enters the Pacific Ocean south of Yankee Point. A 48-inch high diversion dam is located near the downstream boundary of Garrapata State Park.

Multiple *O. mykiss* year classes were observed during sampling in Malpaso Creek 1989 and 1990 (DFG 1989; DPR 1990a). A draft DPR report speculates that the rainbow trout population in Malpaso Creek is resident and of unknown origin. However, the report states, "Since no barrier[s] are known to exist in the 1-1/2 miles of stream below the park, some part of Malpaso Creek is probably used by steelhead (DPR 1990b, p. 31)". The report adds, "…withdrawals from Malpaso Creek appear to be in excess of permitted volumes… Low flows, the diversion dam, and the debris barrier probably combine to prevent anadromous fish from reaching waters in Garrapata State Park (DPR 1990b, p. 32)".

In 2002, NMFS conducted a systematic survey of historical steelhead streams in central and south coast streams. Researchers found *O. mykiss* in Malpaso Creek near the mouth (NMFS 2003a).

Garrapata

Garrapata Creek consists of about 7.4 stream miles draining a watershed of about 11 square miles. It enters the Pacific Ocean via a lagoon north of Kasler Point. According to a 2005 DFG study, the anadromous reach could extend to a bedrock fall at stream mile 3.4.

Staff from DFG surveyed Garrapata Creek in 1990 and observed multiple *O. mykiss* year classes in the creek. The survey report states, "Garrapata Creek is a degrading steelhead stream due to the heavy granite sand erosion problem occurring in the watershed" (DFG 1990b).

In 1997, State Board staff published an analysis of protested water right applications in Garrapata Creek. The analysis recommended that rights be contingent upon maintaining flow records and implementing conservation strategies when dry season flows fell below 0.25 and 0.10 cubic feet per second thresholds (SWCRB 1997). Testimony in 1999 by DFG staff states, "…a minimum bypass flow of 60 percent of the mean annual unimpaired flow is required to protect steelhead trout resource in Garrapata Creek" (SWRCB 1999).

Staff from DFG prepared a steelhead population assessment for Garrapata Creek in 2005. Data were collected from three stations and indicated that four *O. mykiss* year classes were present (DFG 2005). A watershed assessment and restoration plan for the watershed was published in 2006. The document notes key limiting factors to the steelhead fishery including excessive sedimentation from road erosion, migration barriers, and poor riparian condition due to invasive species (GCWC 2006). Four fish passage barriers in the lower portion of the creek are identified as high priority for removal.

Joshua

Joshua Creek consists of about 3.4 stream miles and is tributary to Garrapta Creek. It flows west, entering Garrapata Creek at about stream mile 0.8. A 40 foot waterfall at about stream mile 0.7 is considered the upstream limit of anadromy.

Joshua Creek appears in a 1979 DFG stream inventory in which fish species present in various creeks is noted. The creek is shown to support rainbow trout in the inventory (DFG 1979b).

In 2002, NMFS conducted a systematic survey of historical steelhead streams in central and south coast streams and found *O. mykiss* YOY in Joshua Creek (NMFS 2003a). Staff noted excessive sedimentation in the sampling notes (NMFS 2002a).

A watershed assessment and restoration plan for the Garrapata Creek watershed was published in 2006. The plan recommends addressing four high priority fish passage barriers in lower Joshua Creek (GCWC 2006).

Wildcat Canyon

Wildcat Canyon Creek is tributary to Garrapata Creek. It flows southwest, entering Garrapata Creek at about stream mile 2.2. A 30 foot falls located at about stream mile 0.2 is considered the upstream limit of anadromy.

In a 1964 DFG letter staff stated, "I believe that this stream has been completely ruined for steelhead and trout for a period of 6-12 years…" (DFG 1964). The source of the damage was said to be sedimentation resulting from improper grading.

Staff from DFG sampled Wildcat Canyon Creek in 1990 and observed *O. mykiss* (DFG 1990c). A watershed assessment and restoration plan for the Garrapata Creek watershed was published in 2006. The plan recommends addressing two structures that act as fish passage barriers in Wildcat Canyon Creek (GCWC 2006).

Rocky

Rocky Creek consists of about 6.9 stream miles. It enters the Pacific Ocean north of Castle Rock.

Rocky Creek appears in a 1979 DFG stream inventory in which fish species present in various creeks is noted. The creek is shown to support steelhead and rainbow trout in the inventory (DFG 1979b). A 1991 DFG memo states, "Even under 'natural' conditions, low streamflow in summer and fall months is a limiting factor for trout survival in Rocky Creek" (DFG 1991).

In 2002, NMFS conducted a systematic survey of historical steelhead streams in central and south coast streams and found *O. mykiss* YOY in Rocky Creek (NMFS 2003a). A local landowner told NMFS staff that trout of edible size were present in Rocky Creek historically.

Bixby

Bixby Creek consists of about 4.1 stream miles. It enters the Pacific Ocean south of Castle Rock.

Staff from DFG surveyed Bixby Creek in 1981 and observed *O. mykiss*. The survey report states, "Bixby Creek appears to be a good spawning and nursery stream for steelhead/rainbow trout" (DFG 1981b). The report recommended abandoning road crossings contributing to sedimentation in the creek.

In 2002, NMFS conducted a systematic survey of historical steelhead streams in central and south coast streams. One *O. mykiss* year class was observed in Bixby Creek (NMFS 2003a).

Little Sur River

The Little Sur River consists of about 14.3 stream miles draining a watershed of about 40 square miles. It enters the ocean north of Point Sur. An impassable natural barrier located at about stream mile 17 was noted in a 1965 DFG report. Stocking has been documented between at least 1913 and 1941 (Kittleson 2003).

As part of the 1965 state fish and wildlife plan, DFG prepared an inventory of anadromous salmonids. According to the inventory, the Little Sur River system contained about 30 miles of steelhead habitat (DFG 1965a). The annual steelhead run of the Little Sur River was estimated to consist of about 500 individuals. The inventory noted "Heavy siltation from the county road system" as a critical factor impacting habitat (DFG 1965a, p. 400).

In testimony in the 1980s, Dr. Jerry Smith likened the Little Sur River to north coast streams in terms of steelhead spawning as "…generally unaffected by drought" (Smith 1989).

Staff from USFS surveyed the Little Sur River in the vicinity of the Pico Blanco Boy Scout Camp. The survey notes indicated "a lot of trout throughout" (USFS 1999c). A DFG memo from 1999 said about the Little Sur River, "This is one of the best steelhead streams in the county" (DFG 1999e).

The Little Sur River in the vicinity of the Pico Blanco Camp was surveyed in 2002 by DFG staff, and "numerous" steelhead fry and fingerlings were observed. The survey report describes primary impacts to the steelhead fishery including sedimentation from land uses adjacent to the stream and hindrance of movement due to the flashboard dam and numerous rock dams (DFG 2003). It recommended operating the flashboard dam so as not to inundate redds or dewater downstream reaches.

In 2002 NMFS and DFG studied the steelhead fishery of the Little Sur River in relation to the Camp Pico Summer Dam. In a the resulting 2003 report NMFS stated, "Little Sur drainage is probably the most productive steelhead river south of the San Francisco Bay at this time" (NMFS 2003c). The study concluded that operation of the summer dam adversely affected steelhead. According to DFG staff, the dam was modified to include a fishway in about 2005 (Hill pers. comm.).

South Fork Little Sur River

The South Fork of the Little Sur River consists of about 11.1 stream miles and is tributary to the Little Sur River. It flows northwest, entering the Little Sur at about stream mile 1.8. An impassable falls, approximately 12 to 14 feet high, is located about five miles upstream from the Highway 1 crossing (Hill pers. comm.).

South Fork Little Sur River appears in a 1979 DFG stream inventory in which fish species present in various streams is noted. The stream is shown to support "SH/RT" in the inventory (DFG 1979b).

In 2002, NMFS conducted a systematic survey of historical steelhead streams in central and south coast streams. *Oncorhynchus mykiss* YOY were observed in South Fork Little Sur River. Notes from the survey state, "…good flow…, clear water, low fines" (NMFS 2002b). A report on a steelhead assessment of the South Fork was published in 2003. The report notes that steelhead have access to the lower five miles of the stream, and that juvenile steelhead were observed most frequently in the lower 3.75 miles (Kittleson 2003). According to the report, the size distribution "…implies a predominantly resident rainbow population upstream of Andrew Molera Park" (Kittleson 2003, p. 7). The assessment found the South Fork to be "in largely pristine condition" and adds, "In general, habitat quality is excellent throughout…" (Kittleson 2003, p. 16). A steelhead redd was noted by DFG staff during a visit to the river in 2005 (Hill pers. comm.).

Big Sur River

The Big Sur River consists of about 21 stream miles draining a watershed of about 60 square miles. It enters the Pacific Ocean northwest of the town of Big Sur.

In a 1957 stream survey report, DFG noted "good" spawning areas in the four mile reach between Barlow Flat and Sykes Camp (DFG 1957p). Other reaches were "poor" to "fair" in terms of spawning habitat. The survey report notes "good" *O. mykiss* populations both upstream and downstream of natural barriers and assumes that the upstream population consists of "resident trout that are propagating under natural conditions" (DFG 1957p).

As part of the 1965 state fish and wildlife plan, DFG prepared an inventory of anadromous salmonids. According to the inventory, the Big Sur River system contained about 17 miles of steelhead habitat (DFG 1965a). The annual steelhead run of the Big Sur River was estimated to consist of about 250 individuals.

A 1981 memo summarized conditions in the Big Sur watershed:

"The clean, free-flowing waters provide ideal conditions for natural steelhead trout spawning. The lower seven miles of stream from the State Park to the ocean support a substantial run of steelhead; however, fish migration above the Park is blocked by a 26-foot barrier of boulders and compacted gravel" (DFG 1981c).

The middle reach of the Big Sur River between Ventana and Barlow Flats camps) was surveyed in 1981 by USFS staff. The survey report cites a "large, thriving rainbow trout fishery" comprised of mainly smaller fish. The observed size range was about three to seven inches (USFS 1981a). The upper reach (from Barlow Camp to the confluence of the North and South forks) also had "abundant" rainbow trout (USFS 1981b)

A protected waterway management plan for the Big Sur was certified in 1986. It recommended permitting well withdrawals adjacent to the lower Big Sur, limiting dry season diversion, and adopting a Riparian Corridor Protection Ordinance (County of Monterey 1986). A 1990 resources inventory notes approximately three miles of "excellent habitat" in the lower portions of the watershed. The report states, "The majority of steelhead move upstream beyond Andrew Molera State Park to spawn… There are no barriers to migration for 8 miles " (DPR 1990c, p. 8).

Extensive sampling in the Big Sur watershed in 1993 revealed that *O. mykiss* classified as smolts occurred in the lagoon and river outlet and not in the mainstem. The 1994 report on this study noted, "The lagoon appeared to be heavily used by presmolt steelhead as rearing habitat" (DFG 1994a). Staff from DFG surveyed the Big Sur River in 1994 between the Pfeiffer Big Sur Campground and the North Fork confluence. Rainbow trout were said to be "abundant" and included individuals from one to twelve inches in length. "Numerous" spawning areas were noted throughout the survey reach. The survey report states, "The Big Sur River has excellent potential as a wild trout fishery" (DFG 1994b).

An enhancement plan was prepared for a portion of the Big Sur River watershed and published in 2003. The report notes two key limiting factors to the steelhead population of the system and states, "Where visitor use is concentrated, the visible impacts to salmonid habitat occur through trail erosion, trampling of riparian and instream habitat, and construction of rock dams and channel modifications" (Duffy 2003, p. 15). The plan noted that "reconnaissance" snorkel surveys found juvenile steelhead in multiple sites in Andrew Molera State Park and the gorge area in Pfeifer Big Sur State Park. Adult steelhead were observed immediately upstream from the park headquarters in June 2005 and in June 2007 (Stoecker pers. comm.).

Pheneger

Pheneger Creek consists of about 1.4 stream miles and is tributary to the Big Sur River. It enters the Big Sur River at the town of Big Sur.

Staff from DFG inspected Pheneger Creek in 1978. Notes from the visit state, "…there are many natural falls blocking anadromous fish passage… The creek is silted apparently from poor road construction" (DFG 1978b). A 1979 DFG inventory of Monterey County streams indicates that steelhead and rainbow trout occur in the creek (DFG 1979b).

Juan Higuera

Juan Higuera Creek consists of about two stream miles and is tributary to the Big Sur River. It enters the Big Sur River southeast of the town of Big Sur. The creek is the largest perennial tributary to the lower Big Sur.

Staff from DFG surveyed Juan Higuera Creek in 1961. The survey report relayed anecdotal information that the creek supported a small population of trout but was valuable in contributing between 16 and 25 percent of the flow in the Big Sur River "during critical periods" (DFG 1961d).

A 1994 report on a study of the Big Sur River noted, "The [*O. mykiss*] population in lower Juan Higuera Creek was…clearly dominated by young-of-the-year… In contrast, sampling in upper Juan Higuera Creek suggested a resident rainbow trout population" (DFG 1994a).

A 2003 enhancement plan prepared for the Big Sur River watershed notes, "Post Creek in [Pfeifer-Big Sur State Park] and Juan Higuera Creek are the only two tributaries to the Big Sur known to support steelhead" (Duffy 2003, p. 1). A private road crossing of the creek approximately 50 feet upstream from the confluence is considered a passage barrier under some flow conditions (Highland pers. comm.).

Juan Higuera tributary

This creek consists of about 1.1 stream miles. It drains the north flank of Hopkins Ridge.

A 1979 DFG inventory of Monterey County streams indicates that steelhead and rainbow trout occur in the creek (DFG 1979b). The basis for the determination is not provided.

Pfeiffer-Redwood

Pfeiffer-Redwood Creek consists of about 1.6 stream miles and is tributary to the Big Sur River. It flows southwest, entering the Big Sur downstream from the park headquarters. According to notes from 1953, "there are large falls 30' to 40' high, which act as a barrier to all fishlife" (DFG 1953).

Staff from DFG surveyed Pfeiffer-Redwood Creek in 1940 and did not observe *O. mykiss*. The report notes that the creek is "probably barren" due to low flow (DFG 1940). Field notes from 1953 indicate that the creek "is of no importance to fishlife" (DFG 1953). However, a 1979 DFG inventory of Monterey County streams indicates that steelhead and rainbow trout occur in the creek (DFG 1979b).

A 1990 draft report by DPR noted impacts to the channel from "facility development." It states, "Pfeiffer-Redwood Creek flows intermittently and, in its channelized state, is of little habitat value" (DPR 1990d, p. 32).

Post

Post Creek consists of about 1.5 stream miles and is tributary to the Big Sur River. It flows northwest, entering the Big Sur upstream from the park headquarters at about stream mile seven.

A 1980 study of lower Post Creek found multiple *O. mykiss* year classes. The study report states, "General stream conditions and the abundance of available food provide an excellent nursery and spawning habitat for steelhead" (DFG 1980).

In a 1993 survey, DFG staff recommended stabilizing bare banks in the portion of the creek in the vicinity of the campground. The survey report also states, "…the young of adult steelhead that spawn in intermittent streams [like Post Creek] usually migrate down to the main river to rear" (DFG 1993c).

Post Creek was observed and electrofished in 1993 by DFG staff. Steelhead YOY and age 1+ fish were found in the survey and the resulting report states, "From a steelhead production perspective, Post Creek functions primarily as a nursery for age 0+ fish… A lack of depth/cover in the stream, at least within the sample section, precluded greater inhabitation by age 1+ and older steelhead or resident rainbow trout" (DFG 1993d). A 1994 report on a study of the Big Sur River noted, "Post Creek has probably supported more extensive steelhead spawning and rearing, as current poor conditions for steelhead production appear to be the product of logging effects and water diversion" (DFG 1994a). The report states, "Post Creek is a smaller tributary, with interrupted flow in many summers" (DFG 1994a).

A 2003 enhancement plan prepared for the Big Sur River watershed notes, "Post Creek in [Pfeifer-Big Sur State Park] and Juan Higuera Creek are the only two tributaries to the Big Sur known to support steelhead" (Duffy 2003, p. 1). The plan noted that young of the year steelhead were observed in the lower 600 feet of Post Creek in summer 2002.

Ventana

Ventana Creek consists of about 4.2 stream miles and is tributary to the Big Sur River. It flows southwest, entering the Big Sur near the Ventana Campsite.

A 1979 letter from a fisherman to the USFS documents the angler's 31 years of trout fishing in Ventana Creek (Flodberg 1979). A response from DFG acknowledges the presence of a naturally propagating *O. mykiss* population in the creek (DFG 1979c). A 1979 DFG inventory of Monterey County streams indicates that rainbow trout occur in Ventana Creek (DFG 1979b).

Terrace

Terrace Creek consists of about one stream mile and is tributary to the Big Sur River. It flows north, entering the Big Sur near the Terrace Creek Campsite.

Staff from DFG surveyed Terrace Creek in 1945 and observed *O. mykiss*. "Excellent" pools and shelter were indicated in the survey report (DFG 1945d).

Terrace Creek appears in a 1979 DFG stream inventory in which fish species present in various creeks is noted. The creek is not shown to support *O. mykiss* in the inventory (DFG 1979b).

According to a 1981 stream survey report, Terrace Creek was "not accessible to fish because of [a] high waterfall…" at its mouth (USFS 1981c).

Lion

Lion Creek consists of about 3.1 stream miles and is tributary to the Big Sur River. It flows south, entering the Big Sur downstream from the Sykes Campsite.

Staff from USFS surveyed Lion Creek in 1981 and observed multiple *O. mykiss* year classes. The survey report states, "Lion Creek is a narrow, steady flowing creek which provides additional water to the Big Sur River. This creek has a good fishery and serves as a spawning area" (USFS 1981d).

North Fork Big Sur River

The North Fork Big Sur River consists of about 6.5 stream miles. Downstream of the confluence of the North and South forks is referred to as Big Sur River. A 20 foot waterfall at the Cienaga Creek confluence is considered the upstream limit of anadromy.

A 1979 DFG inventory of Monterey County streams indicates that steelhead and rainbow trout occur in the North Fork Big Sur River (DFG 1979b). Staff from USFS surveyed the North Fork in 1981 and observed multiple *O. mykiss* year classes. The survey report provides an overall fishery rating of "excellent" for the North Fork (USFS 1981e).

Staff from USFS surveyed North Fork Big Sur River in 1999 and observed "common" *O. mykiss* between two and ten inches in length. Natural reproduction was deemed "good" (USFS 1999d).

Redwood

Redwood Creek consists of about 3.3 stream miles and is tributary to the North Fork Big Sur River. It flows southwest, entering the North Fork Big Sur upstream from Sykes Campsite.

Redwood Creek appears in a 1979 DFG stream inventory in which fish species present in various creeks is noted. The creek is shown to support steelhead with the annotation "(?)" in the inventory (DFG 1979b).

South Fork Big Sur River

The South Fork Big Sur River consists of about 5.9 stream miles. Downstream of the confluence of the North and South forks is referred to as Big Sur River. A 12-foot falls separates the south fork into “upper” and “lower” sections in stream surveys.

A 1979 DFG inventory of Monterey County streams indicates that steelhead and rainbow trout occur in the South Fork Big Sur River (DFG 1979b). Staff from USFS surveyed the South Fork in 1981 and observed *O. mykiss* between about four and eight inches in length. The survey report states, “The South Fork of the Big Sur River is the larger of the two forks, providing cool, clean water to the main river stem. This fork supports a large, healthy rainbow trout population” (USFS 1981f).

Mocho

Mocho Creek consists of about 1.1 stream miles and is tributary to the South Fork Big Sur River.
It flows northeast, entering the South Fork Big Sur downstream from Rainbow Campsite.

Staff from DFG surveyed Mocho Creek, probably in the 1950s and observed *O. mykiss*. The survey report notes that “Natural spawn and recently planted” rainbow trout are present with “good” success (DFG ca 1950).

Pick

Pick Creek consists of about 3.4 stream miles and is tributary to South Fork Big Sur River. It flows east, entering the South Fork Big Sur upstream from South Fork Campsite.

Pick Creek was stocked in 1938 and 1939 (DFG ca 1939).

Partington

Partington Creek consists of about 2.2 stream miles. It enters the Pacific Ocean south of Partington Point.

In a 1937 stream survey report, DFG staff notes that a long culvert may be a barrier to steelhead migration and conveys others’ observations of steelhead in a downstream pool (DFG 1937a).

A 1979 DFG inventory of Monterey County streams indicates that “SH/RT” occurs in Partington Creek (DFG 1979b). Staff from DPR sampled Partington Creek in 1988 and 1989 and observed multiple *O. mykiss* year classes at three sampling stations. The survey report states, “…it is the conclusion of DPR staff that these fish are resident rainbow trout…” (DPR 1990e, p. 6)

In 2002, NMFS conducted a systematic survey of historical steelhead streams in central and south coast streams and found *O. mykiss* in Partington Creek (NMFS 2003a).

Partington tributary 1

This unnamed creek consists of about 1.9 stream miles and is tributary to Partington Creek. It flows southwest, entering Partington Creek at about stream mile 0.7.

A 1979 DFG inventory of Monterey County streams indicates that rainbow trout occurs in the unnamed Partington Creek tributary (DFG 1979b). The basis for the determination is not provided.

Partington tributary 2

This unnamed creek consists of about 1.9 stream miles and is tributary to Partington Creek. It flows south, entering Partington Creek at about stream mile 0.8.

A 1979 DFG inventory of Monterey County streams indicates that rainbow trout occurs in the unnamed Partington Creek tributary (DFG 1979b). The basis for the determination is not provided.

McWay Canyon

McWay Canyon Creek consists of about 2.5 stream miles. It flows south, entering the Pacific Ocean southeast of McWay Rocks. A 40-foot waterfall occurs near the mouth of the creek.

Staff from DPR surveyed McWay Canyon Creek in 1988 and 1989 and did not observe fish. The survey report indicates that *O. mykiss* was observed in 1984 and previously in the creek. It states, however, "Fish noticed in the past, probably introduced rainbow trout, are presumed extirpated in 1985 (DPR 1990e, p. 8)".

Anderson Canyon

Anderson Canyon Creek consists of about 2.8 stream miles. It enters the Pacific Ocean north of Anderson Landing.

A 1937 stream survey report notes that falls near the mouth are impassable to steelhead (DFG 1937b). In 1952, the Division of Water Resources noted that juvenile steelhead were present in Anderson Creek (DWR 1952). The context of the document suggests that the authors meant Anderson Canyon Creek.

Staff from DPR surveyed Anderson Canyon Creek in 1988 and 1989 and did not observe *O. mykiss*. The resulting report states, "Rainbow trout have been caught in the past but none have been observed since the winter of 1985/86…(DPR 1990e, p. 9)". The report author's opinion was that *O. mykiss* in Anderson Canyon Creek were introduced.

Burns

Burns Creek consists of about 0.7 stream miles. It enters the Pacific Ocean south of Anderson Landing.

A 1979 DFG inventory of Monterey County streams indicates that steelhead and rainbow trout occur in Burns Creek (DFG 1979b). The basis for the determination is not provided.

Lime Creek

Lime Creek consists of about 1.6 stream miles. It enters the Pacific Ocean at the John Little State Reserve.

A 1963 DFG memo states, "Lime Creek supports a small steelhead run. The fish have been known to spawn in the one mile section above the mouth. In addition, young fish use this section as a nursery" (DFG 1963c). A 1979 DFG inventory of Monterey County streams indicates that steelhead and rainbow trout occur in Lime Creek (DFG 1979b).

A NMFS report regarding the range of steelhead in southern California involved reviewing passage in coastal watersheds. The report notes that a barrier exists on Lime Creek that is assumed to prevent steelhead access into the watershed (NMFS 2005).

Big

Big Creek consists of about five stream miles. It enters the Pacific Ocean south of Square Black Rock. According to a 1946 DFG report, "High falls, impassable to upstream fish, are located at an altitude of 1,000 feet…" (DFG 1946).

A DFG report from 1946 includes the following description of steelhead resources in Big Creek:

"Good runs of steelhead ascend the stream from the sea and spawn in both forks below the falls. Resident fish of the steelhead-rainbow complex and possibly some survivors and descendants of stocked trout are present both above and below the falls in each fork" (DFG 1946).

In a 1961 DFG survey report for Devil's Canyon Creek DFG describes Big Creek, stating, "This watershed is by far the largest steelhead trout stream in the immediate Southern Monterey County area, being surpassed only by the Big Sur drainage on the north and the San Carpojo to the south, in San Luis Obispo County (DFG 1961e). The report from a 1961 survey of Big Creek states, "This stream provides approximately 1.5 miles of good to excellent steelhead waters… The crucial limiting factor is believed to be the lack of suitable spawning gravels" (DFG 1961f).

The steelhead population of the Big Creek watershed is the subject of on-going research by staff at NMFS. Sampling during August 2005, May and October 2006, and May and October 2007 produced observations of YOY, and 1+ and 2+ year classes in lower Big Creek. Otolith analyses indicate that the population contains progeny of both anadromous and resident females (Rundio pers. comm.).

According to the resident director of the Big Creek Reserve, the undeveloped nature of the watershed has led to few habitat impacts in the watershed. Poor maintenance in portions of the road adjacent to Big Creek may produce excess sedimentation in some proximate stream reaches (Merg pers. comm.). Also, an instream road crossing on private property should be addressed to improve fish passage.

Devils Canyon (South Fork Big)

Devils Canyon Creek is formed by the confluence of the Middle and South forks of Devil's Canyon Creek. It is tributary to Big Creek. A natural falls located about 0.5 miles upstream from the North Fork confluence is considered the upstream limit of anadromy (Rundio pers. comm.).

In a 1961 DFG survey report for Devils Canyon Creek DFG staff states, "It provides approximately 1-1/2 to 1-3/4 miles of good spawning and nursery area for fish moving upstream from the ocean" (DFG 1961e). Based on a survey in 1981, USFS staff deemed there was a "good size rainbow trout fishery" in Devil's Canyon Creek (USFS 1981g).

In 2004, staff from NMFS observed *O. mykiss* upstream from the falls cited above. The ancestry of resident *O. mykiss* upstream from the natural falls has not been determined. Sampling during August 2005, May and October 2006, and May and October 2007 produced observations of YOY, and 1+ and 2+ year classes in Devils Canyon Creek (Rundio pers. comm.).

North Fork Devils Canyon

The North Fork Devil's Canyon Creek consists of about 2.6 stream miles. It is tributary to Devil's Canyon Creek.

North Fork Devil's Canyon Creek appears in a 1979 DFG stream inventory in which fish species present in various creeks is noted. The creek is shown to support rainbow trout in the inventory (DFG 1979b).

Middle Fork Devils Canyon

Middle Fork Devil's Canyon Creek consists of about 4.3 stream miles. It flows southwest out of the Santa Lucia Range and may be considered the headwaters of the mainstem Devil's Canyon Creek.

Middle Fork Devil's Canyon Creek appears in a 1979 DFG stream inventory in which fish species present in various creeks is noted. The creek is shown to support rainbow trout in the inventory (DFG 1979b). During a survey in 1981, USFS staff observed multiple *O. mykiss* year classes in Middle Fork Devil's Canyon Creek (USFS 1981g).

South Fork Devils Canyon

South Fork Devil's Canyon Creek consists of about 6.8 stream miles. It flows northwest and joins the Middle Fork to form Devil's Canyon Creek.

South Fork Devil's Canyon Creek appears in a 1979 DFG stream inventory in which fish species present in various creeks is noted. The creek is shown to support steelhead and rainbow trout in the inventory (DFG 1979b). In 2004, staff from NMFS observed *O. mykiss* in the lower portion of South Fork Devils Canyon Creek. The ancestry of resident *O. mykiss* upstream from the natural falls has not been determined (Rundio pers. comm.).

Vicente

Vicente Creek consists of about four stream miles. It flows west, entering the Pacific Ocean south of Gamboa Point.

A 1961 field note indicates that steelhead cannot access the creek due to a ten foot bedrock falls immediately upstream from the mouth (DFG 1961g). The inspection by DFG staff in 1961 found rainbow trout in Vicente Creek "not in great numbers" in pools beneath the Highway 1 bridge (DFG 1961g).

In the late 1990s, DFG staff observed *O. mykiss* comprising two year classes in Vicente Creek upstream from the Highway 1 crossing and upstream from the bedrock falls. The origin of the fish was unknown (Highland pers. comm.).

In 2002, NMFS conducted a systematic survey of historical steelhead streams in central and south coast streams. *Oncorhynchus mykiss* was observed in Vicente Creek near the mouth (NMFS 2003a).

Limekiln

Limekiln Creek consists of about 4.1 stream miles. It enters the Pacific Ocean at Rockland Landing.

According to a 1961 survey report, Limekiln Creek and its tributaries have combined about two stream miles accessible to steelhead. The survey report states, "Fish appear to be very scarce in this drainage", which DFG staff attributed to the lack of suitable spawning gravel (DFG 1961h).

In 2002, NMFS conducted a systematic survey of historical steelhead streams in central and south coast streams and found multiple *O. mykiss* year classes in lower Limekiln Creek (NMFS 2002c). In 2006, a 17-inch individual with "silver coloration" was observed in the lower portion of Limekiln Creek (Stoecker pers. comm.).

Hare Canyon

Hare Canyon Creek consists of about 3.7 stream miles and is tributary to Limekiln Creek. It flows southwest, entering Limekiln Creek at about stream mile 0.3.

Hare Canyon Creek appears in a 1979 DFG stream inventory in which fish species present in various creeks is noted. The creek is shown to support steelhead and rainbow trout in the inventory (DFG 1979b).

In a 1981 survey, USFS staff observed "few" *O. mykiss* in Hare Canyon Creek representing multiple year classes (USFS 1981h). The survey report attributes low productivity to heavy mineralization and states, "Hare Canyon has a very low improvement potential" (USFS 1981h). A stream inventory involving surveys of more than 100 Hare Creek stream reaches was conducted in 1990. Staff from USFS observed *O. mykiss* YOY and individuals to about ten inches in length (USFS 1990).

According to a 1993 USFS survey report, the creek is perennial (USFS 1993). Staff from NMFS surveyed Hare Canyon Creek in 2002 and observed two *O. mykiss* year classes (NMFS 2002d).

West Fork Limekiln

West Fork Limekiln Creek is tributary to Limekiln Creek and consists of about 4.1 stream miles. It flows south, entering Limekiln Creek at about stream mile 0.4.

West Fork Limekiln Creek appears in a 1979 DFG stream inventory in which fish species present in various creeks is noted. The creek is shown to support steelhead and rainbow trout in the inventory (DFG 1979b).

In 2002, NMFS conducted a systematic survey of historical steelhead streams in central and south coast streams and found multiple *O. mykiss* year classes in West Fork Limekiln Creek (NMFS 2002e).

Mill

Mill Creek consists of about four stream miles and has a watershed of about 6.2 square miles. It reaches the Pacific Ocean south of Rockland Landing. The concrete apron under the Highway 1 bridge is considered a passage barrier at some flows (Highland pers. comm.).

Staff from DFG surveyed Mill Creek in 1961 and observed multiple *O. mykiss* year classes. The survey report states, "Silt from erosion will hamper use of approximately 80 percent of the coarse sand used for spawning… This is estimated to have been a good steelhead stream, in past years" (DFG 1961i).

Staff from USFS surveyed Mill Creek in 1992. The survey report noted, "Young-of-the-year trout were seen in perennial reaches of Mill Creek. Adult trout…were seen in the upper reaches of Mill Creek" (USFS 1992). Additionally, the report cites streambank erosion due to grazing and low woody debris recruitment from past logging as limiting the productivity of the stream.

In 2002, NMFS conducted a systematic survey of historical steelhead streams in central and south coast streams and found multiple *O. mykiss* year classes in Mill Creek. The creek was described as "fishy," likely indicating high potential productivity (NMFS 2002f).

Prewitt

Prewitt Creek consists of about 4.5 stream miles and drains a watershed of about 7.4 square miles. In enters the Pacific Ocean near the town of Gorda. A waterfall at about stream mile 1.8 was identified as the upstream limit of anadromy in a 1997 survey.

Prewitt Creek appears in a 1979 DFG stream inventory in which fish species present in various creeks is noted. The creek is shown to support steelhead and rainbow trout in the inventory (DFG 1979b).

Staff from USFS surveyed Prewitt Creek in 1981 and observed "common" *O. mykiss* between one and eight inches in length. The surey report states, "Prewitt Creek is a small but significant steelhead spawning stream. It is in serious danger of deterioration by livestock which are destroying the stream bed, lower banks, and riparian vegetation" (USFS 1981i).

Staff from DFG surveyed Prewitt Creek in 1997. Two stations were sampled and *O. mykiss* between about 2.2 and 5.3 inches in length were observed. The survey report indicates that fine sediment was not problematic at the time and water diversions were not noted (DFG 1997). As part of a larger study of streams of the Los Padres National Forest, USFS staff surveyed Prewitt Creek in 1999 and 2000. Multiple *O. mykiss* year classes were observed (USFS 1999a).

In 2002, NMFS conducted a systematic survey of historical steelhead streams in central and south coast streams and found multiple *O. mykiss* year classes in Prewitt Creek (NMFS 2002g).

South Fork Prewitt

South Fork Prewitt Creek consists of about 2.0 stream miles and is tributary to Prewitt Creek. It flows southwest, entering Prewitt Creek at about stream mile 1.4. A waterfall is located at about stream mile 0.15.

Staff from DFG surveyed South Fork Prewitt Creek, presumably in 1997. *Oncorhynchus mykiss* fry were observed throughout the reach downstream from the waterfall (Nelson pers. comm.).

Plaskett

Plaskett Creek consists of about 1.5 stream miles. It flows west, entering the Pacific Ocean near the town of Plaskett.

Staff from USFS surveyed Plaskett Creek in 1993 and observed perennial flow and "few" *O. mykiss* representing multiple year classes. The survey report notes, "[Plaskett Creek] is being quickly deteriorated by grazing livestock that threaten its small fishery" (USFS 1981j).

As part of a larger study of streams of the Los Padres National Forest, USFS staff surveyed Plaskett Creek in 1999 and 2000. Multiple *O. mykiss* year classes were observed (USFS 1999a).

In 2002, NMFS conducted a systematic survey of historical steelhead streams in central and south coast streams and found *O. mykiss* in Plaskett Creek (NMFS 2003a).

Willow

Willow Creek consists of about six stream miles. It enters the Pacific Ocean north of Cape San Martin.

A report on a DFG survey in 1961 offered this assessment of Willow Creek:

"Fairly large numbers of steelhead are reported to utilize this drainage during normal years. These fish, moving upstream, have approximately 7 to 8 miles of stream available for spawning. This stream is one of the better steelhead streams of the Southern Monterey County Coastal area" (DFG 1961j).

The report noted, "Large steelhead spawning and nursery areas have recently been lost due to water being diverted to other uses" (DFG 1961j). Also in 1961 DFG staff stated, "…the size of the steelhead run…is probably of moderate size which might number anywhere from 100 to 1,000 fish" (DFG 1961k).

Staff from USFS surveyed Willow Creek in 1981 and observed "common" rainbow trout. The report states, "The streambed is being degraded by bank erosion from mining, debris barriers, and natural massing" (USFS 1981k).

As part of a larger study of streams of the Los Padres National Forest, USFS staff surveyed Willow Creek in 1999. Multiple *O. mykiss* year classes were observed, and the associated estuary was deemed "uniquely productive habitat" (USFS 1999a).

According to a 2003 report on steelhead distribution, *O. mykiss* was documented in 2001 in Willow Creek by NMFS staff (NMFS 2003a).

North Fork Willow

North Fork Willow Creek is tributary to Willow Creek. It flows southwest, entering Willow Creek at about stream mile 2.7. A 1961 survey report notes a steelhead barrier 200 yards upstream from the Willow Creek confluence.

Staff from DFG surveyed North Fork Willow Creek in 1961. Multiple *O. mykiss* year classes were observed (DFG 1961l).

Alder

Alder Creek consists of about 3.7 stream miles. The headwaters of this coastal watershed are on Alder Peak.

Staff from DFG surveyed Alder Creek in 1961 and observed multiple *O. mykiss* year classes. The survey report states, "This stream appears to be a good trout stream although low water conditions have rendered the fish vulnerable to predators" (DFG 1961m). The report notes that steelhead enter the lower reaches during wet years.

A 1981 USFS survey of Alder Creek found "few" *O. mykiss* and concluded, "Surprisingly, there is a small rainbow trout fishery, and small to moderate steelhead runs up this creek are anticipated (USFS 1981l).

In 2002, NMFS conducted a systematic survey of historical steelhead streams in central and south coast streams and found multiple *O. mykiss* year classes in Alder Creek (NMFS 2003a).

Villa

Villa Creek consists of about 4.3 stream miles. It flows southwest to the Pacific Ocean from headwaters north of Silver Peak. A 1981 USFS survey report indicates that a 20 foot high barrier near the mouth is a total barrier to upstream migration of steelhead (USFS 1981m).

Staff from DFG surveyed Villa Creek in 1961 and observed multiple *O. mykiss* year classes and referred to the fish as "rainbow and steelhead trout." The survey report noted "limited" spawning area in the creek (DFG 1961o).

Staff from USFS surveyed Villa Creek in 1981 and observed multiple *O. mykiss* year classes. The survey report indicates that the "good fishery of rainbow trout" occurring in the creek is of hatchery origin as the creek is not accessible to steelhead (USFS 1981m).

In 2002, NMFS conducted a systematic survey of historical steelhead streams in central and south coast streams and found multiple *O. mykiss* year classes in Villa Creek (NMFS 2003a).

Redwood Gulch

Redwood Gulch Creek consists of about 2.3 stream miles. This creek flows southwest to the Pacific Ocean.

Redwood Gulch Creek appears in a 1979 DFG stream inventory in which fish species present in various creeks is noted. The creek is shown to support steelhead/rainbow trout in the inventory (DFG 1979b).

Salmon

Salmon Creek consists of about 4.4 stream miles. In enters the Pacific Ocean north of the Monterey and San Luis Obispo counties border. A waterfall near the mouth of the creek is believed to be a passage barrier (Nelson pers. comm.).

Staff from DFG surveyed Salmon Creek in 1961 and observed multiple *O. mykiss* year classes. The report states, "This stream appears to be one of the better streams in the area", although only a "small portion of the stream [is] accessible to steelhead during normal years" (DFG 1961n).

Staff from USFS surveyed Salmon Creek in 1999 and observed "several small trout" (USFS 1999e). In 2002, NMFS conducted a systematic survey of historical steelhead streams in central and south coast streams and found multiple *O. mykiss* year classes in Salmon Creek (NMFS 2003a).

Staff from DFG observed *O. mykiss* likely to be resident in "great" habitat in Salmon Creek in June 2005. The population included YOY and larger individuals to about 12 inches in length and was noted to be of unknown origin (Nelson pers. comm.).

Other Monterey County information

As part of the 1965 state fish and wildlife plan, DFG prepared an inventory of anadromous salmonids. The major steelhead streams of Monterey County were said to include the Salinas, Carmel, Little Sur, and Big Sur rivers. Steelhead habitat in these systems combined was estimated at about 540 stream miles, including a substantial amount of "very poor quality" habitat in the Salinas River watershed. The combined steelhead run in these streams was estimated at about 2,750 individuals. According to the inventory, "There are about 121 miles of steelhead habitat in the minor streams of Monterey County" (DFG 1965a, p. 410). The combined spawning population in the minor streams was estimated to be about 3,000 steelhead individuals. Thus, the 1965 DFG estimate for the average annual run in streams of Monterey County was almost 6,000 individuals. The estimation method could not be determined.

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Table 3. Distribution status of *O. mykiss* in coastal streams of Monterey County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Salinas River	Salinas River	DF	DF	Y	Y	1
Salinas River	Gabilan	DF	DF		Y	3
Salinas River	Natividad	PS	PS		UN	0
Salinas River	Pilarcitos Canyon	PS	UN		UN	0
Salinas River	El Toro	PS	PA		UN	0
Salinas River	Watson	PS	PA		UN	0
Salinas River	Limekiln	PS	UN		UN	0
Salinas River	Arroyo Seco	DF	DF	Y	Y	3
Salinas River	Reliz	PB	UN		UN	0
Salinas River	Vaqueros	DF	DF		UN	2
Salinas River	Sweetwater	PS	UN		UN	0
Salinas River	Horse	PS	UN		UN	0
Salinas River	Piney	DF	DF		Y	2
Salinas River	Rocky	PS	UN		UN	0
Salinas River	Santa Lucia	DF	DF		Y	3
Salinas River	Tassajara	DF	DF		Y	3
Salinas River	Willow	DF	DF		Y	3
Salinas River	Lost Valley	DF	DF		Y	2
Salinas River	ZigZag	DF	UN		UN	0
Salinas River	Higgins	DF	DF		Y	2
Salinas River	San Antonio River	DF	DF	Y	N	3
Salinas River	Bear Canyon	DF	UN	Y	N	0
Salinas River	North Fork San Antonio River	DF	UN	Y	N	0
Salinas River	Rattlesnake	DF	UN	Y	N	0
Salinas River	Pinal	DF	UN	Y	N	0
Salinas River	Santa Lucia (Sycamore)	DF	DF	Y	N	3
Salinas River	Carrizo	DF	UN	Y	N	0
Salinas River	Wizard Gulch	PB	UN		N	0
Salinas River	Salsipuedes	DF	UN	Y	N	0

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 3. Distribution status of *O. mykiss* in coastal streams of Monterey County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Salinas River	San Antonio River tributary	DF	UN	Y	N	0
Salinas River	Nacimiento River	DF	DF	Y	N	3
Salinas River	Dip	PS	UN		N	0
Salinas River	Las Tablas	DF	UN	Y	N	0
Salinas River	Little Burnett	PB	UN		N	0
Salinas River	Tobacco	PB	UN		N	0
Salinas River	Stony	PS	UN		N	0
Salinas River	San Miguel	PS	UN		N	0
Salinas River	Negro Fork Nacimiento River	DF	DF	Y	N	3
Salinas River	Huerhuero	PS	PA		N	0
Salinas River	Paso Robles	DF	DF		Y	3
Salinas River	Santa Rita	DF	DF		Y	2
Salinas River	Rocky	PB	UN		UN	0
Salinas River	Sheepcamp	PB	UN		UN	0
Salinas River	Jack	DF	UN	Y	UN	0
Salinas River	Graves	DF	PA		UN	0
Salinas River	Atascadero	DF	DF		Y	3
Salinas River	Eagle	DF	DF		UN	3
Salinas River	Hale	DF	DF	Y	UN	3
Salinas River	Kathleen Valley	DF	DF		UN	3
Salinas River	Santa Margarita	DF	DF		Y	2
Salinas River	Trout	DF	UN		UN	0
Salinas River	Tassajera	DF	DF		Y	3
Salinas River	Rinconada	DF	UN		UN	0
Carmel River	Carmel River	DF	DF	Y	Y	3
Carmel River	Potrero Canyon	DF	DF		Y	2
Carmel River	Robinson Canyon	DF	DF		Y	3
Carmel River	Las Garzas	DF	DF	Y	Y	3
Carmel River	Hitchcock Canyon	DF	DF		Y	2

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 3. Distribution status of *O. mykiss* in coastal streams of Monterey County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Carmel River	Tularcitos	DF	UN		UN	0
Carmel River	Chupines	DF	UN		UN	0
Carmel River	San Clemente	DF	DF	Y	Y	3
Carmel River	Black Rock	DF	UN	Y	UN	0
Carmel River	South Fork Black Rock	DF	UN	Y	UN	0
Carmel River	Pine	DF	UN	Y	UN	0
Carmel River	Cachagua	DF	DF	Y	Y	3
Carmel River	Boronda	UN	UN			0
Carmel River	Conejo	PS	UN		UN	0
Carmel River	Finch	PB	UN		UN	0
Carmel River	Danish	DF	DF	Y	UN	2
Carmel River	Rattlesnake	PS	UN		UN	0
Carmel River	Miller Fork Carmel River	DF	DF	Y	N	3
Carmel River	Bruce Fork	PS	UN		UN	0
Carmel River	Hiding Canyon	DF	UN		UN	0
Carmel River	Carmel River tributary	DF	UN	Y	UN	0
San Jose	San Jose	DF	DF	Y	Y	3
San Jose	Seneca	DF	DF	Y	Y	3
San Jose	Williams Canyon	DF	DF	Y	Y	3
Gibson	Gibson	PS	UN		N	0
Malpaso	Malpaso	DF	DF	Y	Y	2
Garrapata	Garrapata	DF	DF	Y	Y	3
Garrapata	Joshua	DF	DF	Y	Y	2
Garrapata	Wildcat Canyon	DF	DF	Y	UN	2
Rocky	Rocky	DF	DF		Y	2
Bixby	Bixby	DF	DF	Y	Y	2
Little Sur River	Little Sur River	DF	DF	Y	Y	3
Little Sur River	South Fork Little Sur River	DF	DF		Y	3
Big Sur River	Big Sur River	DF	DF	Y	Y	3
Big Sur River	Pheneger	PB	UN		UN	0

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 3. Distribution status of *O. mykiss* in coastal streams of Monterey County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Big Sur River	Juan Higuera	DF	DF	Y	Y	3
Big Sur River	Juan Higuera tributary	PB	UN		UN	0
Big Sur River	Pfeiffer-Redwood	PS	PA		UN	0
Big Sur River	Post	DF	DF	Y	Y	3
Big Sur River	Ventana	DF	UN		UN	0
Big Sur River	Terrace	PS	PA		UN	0
Big Sur River	Lion	DF	UN		UN	0
Big Sur River	North Fork Big Sur River	DF	DF		Y	3
Big Sur River	Redwood	PS	UN		UN	0
Big Sur River	South Fork Big Sur River	DF	UN		UN	0
Big Sur River	Mocho	DF	UN		UN	0
Big Sur River	Pick	UN	UN		UN	0
Partington	Partington	DF	DF	Y	UN	2
Partington	Partington tributary 1	PS	UN		N	0
Partington	Partington tributary 2	PS	UN		N	0
McWay Canyon	McWay Canyon	UN	UN		UN	0
Anderson Canyon	Anderson Canyon	UN	UN		UN	0
Burns	Burns	PS	UN		UN	0
Lime	Lime	DF	UN	Y	N	0
Big	Big	DF	DF		Y	3
Big	Devils Canyon (South Fork Big)	DF	DF		UN	3
Big	North Fork Devils Canyon	PS	UN		UN	0
Big	Middle Fork Devils Canyon	DF	UN		UN	0
Big	South Fork Devils Canyon	DF	DF		UN	3

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 3. Distribution status of *O. mykiss* in coastal streams of Monterey County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Vicente	Vicente	DF	DF		UN	3
Limekiln	Limekiln	DF	DF		Y	3
Limekiln	Hare Canyon	DF	DF		Y	3
Limekiln	West Fork Limekiln	DF	DF		Y	3
Mill	Mill	DF	DF	Y	Y	3
Prewitt	Prewitt	DF	DF	Y	Y	3
Prewitt	South Fork Prewitt	DF	DF		Y	2
	Plaskett	DF	DF	Y	Y	3
Willow	Willow	DF	DF	Y	Y	3
Willow	South Fork Willow	UN	UN		UN	0
Willow	North Fork Willow	DF	UN		UN	0
Alder	Alder	DF	DF		Y	3
Villa	Villa	DF	DF		UN	3
Redwood Gulch	Redwood Gulch	PS	UN		UN	0
Salmon	Salmon	DF	DF		N	3

[1]Please see Methods section for an explanation of titles and values used in this table.

FPO - figure 8

FPO - figure 9

FPO - figure 10

FPO - figure 11

FPO - figure 12

FPO - figure 13

San Carpoforo (San Carpojo)

San Carpoforo Creek (San Carpojo Creek) consists of more than ten stream miles. It flows southwest, entering the Pacific Ocean at Ragged Point.

Staff from DFG surveyed San Carpoforo Creek in 1961 and observed *O. mykiss*, with highest population density in the lower one mile of the creek. The survey report relays information from local residents and DFG staff including an estimate of "…155 adult steelhead in three holes between the mouth of the stream and the mine" in the late 1950s (DFG 1961a). The creek was deemed, "…a good steelhead nursery and spawning area" (DFG 1961a). In a 1966 letter DFG states, "San Carpojo and Arroyo de la Cruz Creeks are the best steelhead waters in San Luis Obispo County" (DFG 1966a).

A 1973 draft report on the effects of potential water developments included estimates of steelhead run size in several San Luis Obispo County creeks. The estimated adult run in San Carpoforo Creek was 500 individuals (Macias 1973).

Staff from DFG surveyed San Carpoforo Creek in 1995 and observed "numerous" young of the year, age 1+ and age 2+ steelhead (DFG 1995a). The survey report indicates that the surveyed stream reach usually becomes intermittent by the end of summer. In 1999, USFS staff surveyed San Carpoforo Creek and observed "lots of trout" including fry and adults (USFS 1999a).

Staff from NMFS performed systematic surveys of south coast streams in 2002-2003 to determine steelhead presence/absence. The survey report form for San Carpoforo Creek indicates multiple *O. mykiss* year classes were observed (NMFS 2002a). The form also noted that the creek was not connected to the ocean in June 2002. Also at that time, DFG staff rescued 12 stranded adult steelhead from the lagoon and returned them to the ocean (Highland pers. comm.). According to staff from NMFS, limiting factors to steelhead are largely natural due mainly to lower intensity land ownership in the watershed (*i.e.*, Hearst Ranch and USFS) (Capelli pers. comm.).

Information concerning steelhead resources in the San Carpoforo Creek watershed was not made available to the authors of this report. "The continued use and management of the property is monitored twice a year by the California Rangeland Trust to verify that the conservation values of the property are being protected in compliance with the [2006] conservation easement and to ensure that the steelhead habitat and other conservation values are being protected" (Cepkauskas pers. comm.). About 26 adult steelhead ranging from 26 to 30 inches in length were observed returning to the ocean from the lagoon in June 2008 (Highland pers. comm.).

Estrada

Estrada Creek consists of about 3.7 stream miles and is tributary to San Carpoforo Creek. It flows west, entering San Carpoforo Creek south of Windy Point.

Staff from DFG surveyed Estrada Creek in 1961 and observed "scarce" *O. mykiss* (DFG 1961b). The survey report states, "It is doubtful this is an important spawning tributary to the San Carpojo drainage but it may produce a few fish and it may have a small resident trout population" (DFG 1961b).

Dutra

Dutra Creek consists of about 3.3 steam miles and is tributary to San Carpoforo Creek. It flows southeast, entering San Carpoforo Creek between the San Carpoforo Campsite and Baldwin Ranch.

Staff from USFS surveyed Dutra Creek in 1999. Field notes from the survey indicate the observation of "lots of trout of various sizes" including fry and adults (USFS 1999b). Since the confluence of Dutra and San Carpoforo creeks is upstream from a 30 foot waterfall on San Carpoforo Creek, it appears unlikely that *O. mykiss* observed in Dutra Creek are of anadromous origin (Nelson pers. comm.).

Arroyo de los Chinos

Arroyo del los Chinos consists of about 3.7 stream miles. It flows west from headwaters on Pine Top Mountain and enters the Pacific Ocean north of Point Sierra Nevada.

A message sent to NMFS staff indicated that multiple *O. mykiss* year classes were observed in Arroyo de los Chinos surveys in 2001 (Siepel 2002). During a 2004 site visit regarding a proposed Caltrans project at the Highway 1 crossing, DFG staff observed one age 1+ *O. mykiss* upstream from the culvert (Highland pers. comm.).

Information concerning steelhead resources in the Arroyo de los Chinos watershed was not made available to the authors of this report. "The continued use and management of the [Hearst Ranch] property is monitored twice a year by the California Rangeland Trust to verify that the conservation values of the property are being protected in compliance with the [2006] conservation easement and to ensure that the steelhead habitat and other conservation values are being protected" (Cepkauskas pers. comm.).

Arroyo de la Cruz

Arroyo de la Cruz consists of about 9.6 stream miles and drains a watershed of approximately 41 square miles. It is formed by the confluence of Burnett and Marmolejo creeks and flows west to enter the Pacific Ocean south of Point Sierra Nevada.

In a 1960 field note DFG staff reported a ten foot high dam with a non-functioning fishway located about 3.25 miles upstream from Green Canyon. In a 1966 letter DFG states, "San Carpojo and Arroyo de la Cruz Creeks are the best steelhead waters in San Luis Obispo County" (DFG 1966a).

A 1973 draft report on the effects of potential water developments included estimates of steelhead run size in several San Luis Obispo County creeks. The estimated adult run in Arroyo de la Cruz was 2,200 individuals (Macias 1973). A 1978 DFG report notes, "the lagoon area provided excellent habitat for numerous silvery juvenile" (DFG 1978). The survey report summarized, "Perennial waters and the excellent pooling characteristics of upper Arroyo de la Cruz Creek make it one of the better Coastal steelhead streams in San Luis Obispo County… [T]he upper 2 miles of Arroyo de la Cruz represent the prime nursery habitat…" (DFG 1978).

A consulting firm studied Arroyo de la Cruz steelhead in 1985. The study report summarizes steelhead resources in the watershed:

"Age 0+ fish are spawned and rear in the perennial reach, while age 1+ and older fish reside in the lagoon. Age group separation may represent an adaptation to the environmental conditions of Arroyo de la Cruz; *i.e.* limited habitat exists in both the perennial reach (during summer) and the lagoon (year-round); and a dry stream reach exist between the lagoon and perennial reach for about 5 months each year" (JSA 1986).

The study included a population estimate for the lagoon of 424 individuals, including many juveniles undergoing smoltification.

A population assessment and habitat evaluation was conducted on Arroyo de la Cruz in 1993. Trapping in the lower-most part of the creek indicated smolt production and kelt out-migration. At the time of the survey only the uppermost 1.5 miles of the arroyo was wetted, where at least four *O. mykiss* year classes were observed. An estimate of the total *O. mykiss* population in mainstem Arroyo de la Cruz was more than 2,100 individuals. According to the resulting report, "Spawning and rearing habitat in the perennial reach is abundant and in relatively good condition…" (DFG 1994a, p. 7). The resulting report recommended avoiding additional diversion in the watershed during low flow periods and using off-stream storage for diversions during high flow regimes.

A steelhead range contraction study was published by NMFS in 2005. The report cites M. Stoecker for data confirming juvenile *O. mykiss* presence in Arroyo de la Cruz downstream from Highway 1 in 1998 (NMFS 2005).

Information concerning steelhead resources in the Arroyo de la Cruz watershed was not made available to the authors of this report. "The continued use and management of the [Hearst Ranch] property is monitored twice a year by the California Rangeland Trust to verify that the conservation values of the property are being protected in compliance with the [2006] conservation easement and to ensure that the steelhead habitat and other conservation values are being protected" (Cepkauskas pers. comm.).

Green Canyon

Green Canyon Creek consists of about 3.6 stream miles and is tributary to Arroyo de la Cruz. It flows south, entering the arroyo at Chileno Camp.

A 1960 field note reported juvenile steelhead trout in Green Canyon Creek (DFG 1960a). A 1973 survey report states, "Green Creek…appeared to have an over abundance of young-of-the-year SH-RT" (DFG 1973a).

Burnett

Burnett Creek consists of about 6.3 stream miles and is the major tributary to Arroyo de la Cruz. It flows south, entering Arroyo de la Cruz north of the Hearst Castle. A weir and fishway is located at stream mile 1.3.

A 1973 survey reports a non-functioning fishway at a weir located about one mile upstream from the Arroyo de la Cruz confluence (DFG 1973a). A 1978 DFG report notes, "…the lower 3 miles of Burnett Creek represent the prime nursery habitat for the [Arroyo de la Cruz] drainage system" (DFG 1978).

As part of a study of the Arroyo de la Cruz watershed, Burnett Creek was surveyed in 1993. Staff from DFG observed fry and age 1+ steelhead throughout the survey reach as well as "numerous small spawning areas" and "abundant" rearing habitat. An estimate of the total *O. mykiss* population in the creek was over 2,3000 individuals (DFG 1994a). The resulting report recommended removing a weir in the creek, avoiding additional diversion during low flow periods, using off-stream storage for diversions during high flow regimes, and reducing the impact of cattle grazing.

Spanish Cabin

Spanish Cabin Creek consists of about 2.2 stream miles and is tributary to Burnett Creek. It flows west, entering Burnett Creek at about stream mile 1.4.

Staff from DFG surveyed Arroyo de la Cruz and its tributaries in 1973. *Oncorhynchus mykiss* was observed in Spanish Cabin Creek (DFG 1973a).

Marmolejo

Marmolejo Creek consists of about five stream miles and is tributary to Arroyo de la Cruz. It flows west to its confluence with Burnett Creek, which forms the headwaters of the arroyo.

Staff from DFG surveyed Arroyo de la Cruz and its tributaries in 1973. *Oncorhynchus mykiss* was observed in Marmolejo Creek (DFG 1973a).

As part of a study of the Arroyo de la Cruz watershed, Marmolejo Creek was surveyed in 1993. Staff from DFG observed fry and age 1+ and 2+ steelhead "and/or resident rainbow trout in the survey reach as well as "numerous spawning sites" and "abundant" rearing habitat (DFG 1994a). The resulting report recommended avoiding additional diversion during low flow periods and using off-stream storage for diversions during high flow regimes.

Oak Knoll

Oak Knoll Creek appears as an intermittent stream on USGS maps. It flows southwest to enter the Pacific Ocean about two miles northwest of San Simeon Point.

No fisheries information was found for Oak Knoll Creek. However, A tributary may have provided habitat historically.

Information concerning steelhead resources in the Oak Knoll Creek watershed was not made available to the authors of this report. "The continued use and management of the [Hearst Ranch] property is monitored twice a year by the California Rangeland Trust to verify that the conservation values of the property are being protected in compliance with the [2006] conservation easement and to ensure that the steelhead habitat and other conservation values are being protected" (Cepkauskas pers. comm.).

Arroyo Laguna

Arroyo Laguna consists of about 2.9 stream miles and is tributary to Oak Knoll Creek. It flows southeast, entering Oak Knoll Creek at about stream mile 1.2.

A 1999 assessment of habitat and species conservation issues on USFS lands cites the presence of steelhead in Arroyo Laguna. The basis for the determination is not provided (USFS 1999c).

Arroyo del Puerto

Arroyo del Puerto consists of about four stream miles. It flows south to San Simeon Bay.

A 1999 assessment of habitat and species conservation issues on USFS lands cites the presence of steelhead in Arroyo del Puerto. The basis for the determination is not provided (USFS 1999c).

Information concerning steelhead resources in the Arroyo del Puerto watershed was not made available to the authors of this report. "The continued use and management of the [Hearst Ranch] property is monitored twice a year by the California Rangeland Trust to verify that the conservation values of the property are being protected in compliance with the [2006] conservation easement and to ensure that the steelhead habitat and other conservation values are being protected" (Cepkauskas pers. comm.).

Little Pico

Little Pico Creek consists of about 3.7 stream miles. It flows southwest, entering the Pacific Ocean southeast of the town of San Simeon.

Little Pico Creek appears on a 1982 DFG list of "known" steelhead runs (DFG 1982). The basis for inclusion is not presented in the memo.

Information concerning steelhead resources in the Little Pico Creek watershed was not made available to the authors of this report. "The continued use and management of the [Hearst Ranch] property is monitored twice a year by the California Rangeland Trust to verify that the conservation values of the property are being protected in compliance with the [2006] conservation easement and to ensure that the steelhead habitat and other conservation values are being protected" (Cepkauskas pers. comm.).

Pico

Mainstem Pico Creek is formed by the confluence of North Fork and South Fork Pico Creek about 1.1 stream miles upstream from the mouth. The creek drains a watershed of about 20 square miles and flows southwest, entering the Pacific Ocean about 3.5 southeast of the town of San Simeon.

Staff from DFG surveyed Pico Creek and its upstream forks in 1960 and did not observe *O. mykiss*. The survey report includes the following summary:

"During the summer the stream dries up below the confluence of the north and south forks. A good part of the south fork also dries up in the summer. The north fork appears to be the main part of the stream suitable for fishlife. It contains adequate spawning grounds, good cover, good pool development and enough shading to keep summer temperatures down. Mr. Junge claims that steelhead do go upstream and that at times in the spring he has seen as many as 50 to 100 fish in a single pool. These are adult fish and they have gathered there prior to their going back to the ocean" (DFG 1960b).

A DFG memo from 1960 states about Pico Creek steelhead, "The run has been estimated by Warden Needham of the Dept. of Fish and Game to be about 3,000 adult fish" (DFG 1960c).

Pico Creek was sampled in 1993 as part of a steelhead genetics study. *Oncorhynchus mykiss* was observed in the creek (USFS 1996).

Information concerning steelhead resources in the Pico Creek watershed was not made available to the authors of this report. "The continued use and management of the [Hearst Ranch] property is monitored twice a year by the California Rangeland Trust to verify that the conservation values of the property are being protected in compliance with the [2006] conservation easement and to ensure that the steelhead habitat and other conservation values are being protected" (Cepkauskas pers. comm.).

North Fork Pico

North Fork Pico Creek consists of about 8.3 stream miles. It flows southwest to its confluence with South Fork Pico Creek.

North Fork Pico Creek appears on a list of "Known Steelhead Runs, San Luis Obispo County" (DFG 1982). The basis for inclusion is not provided.

South Fork Pico

South Fork Pico Creek consists of about 5.8 stream miles. It flows southwest to its confluence with North Fork Pico Creek.

South Fork Pico Creek appears on a list of "Known Steelhead Runs, San Luis Obispo County" (DFG 1982). The basis for inclusion is not provided.

San Simeon

San Simeon Creek consists of about ten stream miles draining a watershed of about 35 square miles. The creek has two main forks, the north and south, which converge at about stream mile 6.2. The mouth of the stream is about four miles north of Cambria.

During a 1945 visit to San Simeon Creek DFG observed, "San Simeon Creek lagoon had one school of estimated 500 young steelhead" (DFG 1949). Staff from DFG surveyed San Simeon Creek in 1960 and did not observe *O. mykiss*. The survey report includes the following summary:

"Little known permanent water occurs below the junction of the north and south fork. In the north fork of the stream water may be present in most years above its confluence with the south fork. The south fork is reported to be dry beginning late in June" (DFG 1960d).

The report also notes, "…this stream provides some of the better steelhead fishing for the San Luis Obispo area…" (DFG 1960d).

Staff from DFG surveyed San Simeon Creek in 1973 and observed *O. mykiss* "…in all sections of the main stream including the lagoon…" (DFG 1973b). The survey report provides the following estimate:

"San Simeon Creek has been one of San Luis Obispo County's best SH-RT streams. It still has great potential that cannot be fully realized until the gravel removal has ceased. The reduction of spawning habitat and addition of silt due to the work is detrimental to the production of the maximum number of SH-RT" (DFG 1973b).

A 1973 draft report on the effects of potential water developments included estimates of steelhead run size in several San Luis Obispo County creeks. The estimated adult run in San Simeon Creek was 300 individuals (Macias 1973).

Staff from DFG and volunteers conducted fish rescues in the 1990s in mainstem San Simeon Creek. Rescued fish were held in a pond on Van Gordon Creek for the summer and released in the winter when San Simeon Creek had confluence with the ocean (Highland pers. comm.).

Sampling was performed in 1993 to characterize the steelhead population and habitat of San Simeon Creek. Ten smolts between 6.7 and about eight inches in length were collected immediately upstream from the lagoon, and *O. mykiss* including YOY and individuals to about 12.2 inches in length were collected at ten sampling stations. The resulting report states, "Within the perennial reach, spawning areas were sparse, small in size and the substrate was either embedded or consisted of sand. Rearing areas were more abundant and contained adequate cover, but were shallow" (DFG 1995b).

The 1993 study also compared results to those from sampling in 1965 and concluded, "The 1993 sampling suggests a steelhead density of about 10% of that sampled in 1965" (DFG 1995b, p. 16). Staff from DFG concluded, "…lack of adequate perennial stream flow is the primary constraint on steelhead abundance in San Simeon Creek" (DFG 1995b, p. 16). Management recommendations included no additional diversion in the spring, summer, and fall low-flow periods, off-stream storage of high flow winter diversion, and cattle exclusion, re-vegetation, and other erosion control projects.

A consulting firm produced juvenile *O. mykiss* population estimates for the “perennial reach” of San Simeon Creek in multiple years. The estimates ranged between 2,430 and 5,600 individuals between 1995 and 2000 (Alley 2001a). A 2001 report by the consultants summarizes:

“…San Simeon Creek juveniles of smolt size (larger) may increase considerably after wet winters, but are still threatened with very low juvenile production during drier years… The persistence of the San Simeon Creek steelhead population remains tenuous, with the continued small production of larger juveniles…and continued sedimentation…, combined with low summer baseflow” (Alley 2000).

Staff from DFG observed adult steelhead in lower San Simeon Creek in May 2002 (DFG 2002a). The stranded fish were moved to the ocean (Highland pers. comm.).

Staff from DFG has observed *O. mykiss* upstream to the waterfall comprising the limit of anadromy. A self-sustaining population was noted upstream from the waterfall that may be descended from individuals of anadromous ancestry that were moved. According to DFG staff, instream flows, excessive sedimentation, loss of riparian vegetation, and the effects of gravel mining are limiting to the San Simeon Creek *O. mykiss* population (Nelson pers. comm.).

Van Gordon

Van Gordon Creek consists of about 4.8 stream miles and is tributary to San Simeon Creek. It flows southwest, entering San Simeon Creek in the lagoon portion of the system.

A local landowner relayed accounts of adult steelhead in Van Gordon Creek in the 1960s through the early 1970s to DFG staff (Highland pers. comm.). In the early 1990s, a local landowner installed a flashboard dam in Van Gordon Creek. The impoundment served as habitat for steelhead juveniles rescued from drying portions of San Simeon and Steiner creeks.

A consulting firm sampled the “perennial habitat in Van Gordon Creek” between 1997 and 1999 and observed multiple *O. mykiss* year classes (Alley 2001b). The resulting report states, “Densities of steelhead were in general lower in Van Gordon Creek than in [lower San Simeon and Santa Rosa creeks], which is to be expected for a smaller tributary” (Alley 2001b, p. 58).

Field notes from DFG staff indicate multiple *O. mykiss* year classes observed in Van Gordon Creek on several occasions between 1996 and 2002 (DFG 2002b). According to DFG staff, instream flows have been reduced by groundwater pumping and likely are limiting to the Van Gordon Creek *O. mykiss* population (Nelson pers. comm.). The San Simeon Road crossing of the creek may present a total passage barrier, although habitat appears to be minimal upstream from the culvert (Nelson pers. comm.).

Steiner

Steiner Creek consists of about eight stream miles and is tributary to San Simeon Creek. It flows northwest to enter San Simeon Creek at about stream mile 4.1 (Palmer Flats).

In documenting damage to Steiner Creek in 1965, DFG staff produced a juvenile *O. mykiss* population density estimate. According to the report, "At the low flow period, Steiner Creek contains 3.5 miles of flowing water supporting fishlife" (DFG 1965a). Fish counts indicated 900 fish per 100 yards of stream.

A 1995 fish rescue involved steelhead juveniles from Steiner Creek (DFG 1995c).

North Fork San Simeon

North Fork San Simeon Creek consists of about 3.5 stream miles. It flows south to its confluence with South Fork San Simeon Creek, which creates San Simeon Creek.

North Fork San Simeon Creek appears on a list of "Known Steelhead Runs, San Luis Obispo County" (DFG 1982). The basis for inclusion is not provided.

South Fork San Simeon

South Fork San Simeon Creek consists of about four stream miles. It flows west to its confluence with North Fork San Simeon Creek, thus forming San Simeon Creek.

South Fork San Simeon Creek appears on a list of "Known Steelhead Runs, San Luis Obispo County" (DFG 1982). The basis for inclusion is not provided.

Santa Rosa

Santa Rosa Creek drains the west slope of the San Simeon Mountains and enters the Pacific Ocean west of the town of Cambria. The creek consists of about 11 stream miles, and its watershed is about 47 square miles. A fishway is located at Ferrasci Road.

Staff from DFG surveyed Santa Rosa Creek in 1960 and did not observe *O. mykiss*. The survey report stated, "The lower 9 miles of this stream appeared to be rather poor for fishlife due to low flows and poor pool development" (DFG 1960e). A letter to DFG cites a Santa Rosa Creek study from 1969-1970 wherein the adult steelhead run in the creek was estimated to be 600 individuals (Seldon 1972). A 1970 DFG memo includes an estimate of 6,800 juvenile steelhead in the Santa Rosa Creek lagoon (DFG 1970).

A 1973 study found that the relative abundance of steelhead in Santa Rosa Creek were the highest among the nine watersheds sampled in Santa Cruz, Monterey, and San Luis Obispo counties (Bailey 1973). Anecdotal evidence from fishermen indicates that "…the numbers of adult fish that entered the creek from 1987 through 1991…declined significantly" (Rathbun 1991, p. 10). A 1991 status report states. "[T]he principal cause of the declines [of steelhead] is the loss of instream flow and perennial standing water in the lower portions of the arroyo, including its lagoon" (Rathbun 1991, p. 12).

Staff from DFG comprehensively studied the steelhead resources of Santa Rosa Creek in 1993. The report noted several land use activities with adverse impacts on the creek including encroachment in the riparian area, grazing, agriculture, road building, and dumping. The report states, "The most severe human impact within the drainage is water diversion by local landowners with riparian or appropriative rights and by Cambria Community Services District" (DFG 1994b). In response, DFG staff recommended addressing water rights issues, including "provisions to protect instream flow during low water years" (DFG 1994b, p. 79).

A consulting firm again studied fishery resources of Santa Rosa Creek between 1997 and 1999. Multiple *O. mykiss* year classes were observed throughout the system (Alley 2001b). Field notes from DFG staff indicate adult steelhead observed in Santa Rosa Creek between 2000 and 2003 (DFG 2003a). "Many" adult steelhead were observed by DFG staff moving upstream in February and March 2008. About eight individuals ranging between 26 and 32 inches in length were seen returning from the lagon to the ocean in June 2008, while eight carcasses were recovered when the lagoon dried in August (Highland pers. comm.).

Perry

Perry Creek consists of about nine stream miles and is tributary to Santa Rosa Creek. It flows northwest, entering Santa Rosa Creek just east of Cambria.

In response to reports of problems at the Ferrasci Road fishway, DFG staff visited the site in 1997. Juvenile steelhead were observed in lower Perry Creek during the visit (DFG 2003a).

Green Valley

Green Valley Creek consists of about 6.3 stream miles and is tributary to Perry Creek. It flows west, entering Perry Creek at about stream mile three.

A 1999 assessment of habitat and species conservation issues on USFS lands cites the presence of steelhead in Green Valley Creek. The basis for the determination is not provided (USFS 1999c).

Villa

Villa Creek consists of about 16 stream miles and drains a watershed of about 10-12 square miles. It flows south, entering the Pacific Ocean east of Point Estero.

Field notes from DFG staff in 1953 describe a fishkill in lower Villa Creek. According to the notes about 250 steelhead including 25 to 30 adults (to 30 inches in length) were found in the stream. The notes state, "Villa Creek has always been a comparatively good steelhead water in this vicinity" (DFG 1953).

Staff from DFG surveyed Villa Creek in 1969 and observed multiple *O. mykiss* year classes in the drainage, with only YOY in the upper three mile portion of the stream. The survey report states, "Villa Creek is a good RT/SH spawning stream because of its easy access to upstream migrants and good winter spawning gravels. However, during dry years it has a limited nursery area because much of the stream dries up…" (DFG 1969a). In a 1969 memo DFG staff writes, "The stream has approximately eight miles of suitable steelhead spawning and nursery habitat and supports one of the southernmost annual runs of steelhead along our coast" (DFG 1969b).

Staff from NMFS surveyed Villa Creek in 2002 as part of a steelhead distribution study. The survey form indicates that *O. mykiss* was observed in the creek under difficult sampling conditions (NMFS 2002b). Staff from DFG observed juvenile *O. mykiss* in the creek several miles upstream from the ocean in 2004 (Highland pers. comm.).

Ellysly

Ellysly Creek consists of about four stream miles and is tributary to Villa Creek. It flows southeast, entering Villa Creek at about stream mile 0.8.

A 1999 assessment of habitat and species conservation issues on USFS lands cites the presence of steelhead in Ellysly Creek. The basis for the determination is not provided (USFS 1999c).

Cayucos

Cayucos Creek consists of about six stream miles and is tributary to the Pacific Ocean. Its mouth is located near the town of Cayucos.

According to 1962 field notes, “Cayucos Creek is thought to be of no value to fishlife from the absolute headwaters downstream to the earth dam on the Warren ranch” (DFG 1962a).

Cayucos Creek appears on a 1982 DFG list of “known” steelhead runs (DFG 1982). The basis for inclusion is not presented in the memo. In 1983, DFG protested an application to divert water from Cayucos Creek and a tributary saying, “Steelhead rainbow trout…are dependent upon the habitat supported by subject waters” (SWRCB ca 1983).

A 1999 assessment of habitat and species conservation issues on USFS lands cites the presence of steelhead in Cayucos Creek. The basis for the determination is not provided (USFS 1999c). In a steelhead range contraction study from 2005, NMFS lists the historical occurrence of steelhead in Cayucos Creek. The value in the current occurrence category is “extirpated” (NMFS 2005).

Little Cayucos

Little Cayucos Creek consists of about three stream miles and is tributary to the Pacific Ocean. Its mouth is located near the town of Cayucos.

A 1999 assessment of habitat and species conservation issues on USFS lands cites the historical presence of steelhead in Little Cayucos Creek and current status as extirpated. The basis for the determinations is not provided (USFS 1999c).

In a steelhead range contraction study from 2005, NMFS indicates that no records for the historical occurrence of steelhead were found for Little Cayucos Creek. The value in the current occurrence category is “absent” (NMFS 2005).

Old

Old Creek consists of about 11 stream miles. It flows southwest, entering the Pacific Ocean immediately south of the city of Cayucos. Whale Rock Dam, completed in 1960, is located about 0.8 miles upstream from the creek mouth.

Staff from DFG surveyed Old Creek in 1957 and observed fingerling *O. mykiss* throughout the lower six miles of the creek. The survey report states, "This stream is apparently a very good producer of steelhead each year. Spawning areas appear to be generally good along the entire creek and some sections provide fair nursery ground for the young. Although the lower and parts of the upper section go dry in early May, the midsection has running water (intermittent) all year with a good number of small pools" (DFG 1957a).

In another survey report from 1957 DFG staff relayed a local resident's account that "he had only seen 20 to 30 adult steelhead using the stream" (DFG 1957b). The report from this survey states, "This is a short, low flow, coastal steelhead stream with limited spawning area and only 3.8 mi. of main stream accessible to steelhead, except in unusually wet winters… This stream is not considered of much value as a fishery" (DFG 1957b). A 1959 memo noted that a "small" steelhead run formerly existed in Old Creek (DFG 1959a).

In a 1992 memo, DFG staff provided the following characterization of regarding steelhead resources in Old Creek:

"…a valuable steelhead trout fishery was lost on Old Creek as a result of construction of [Whale Rock] reservoir. Archive files document that a sizeable run of steelhead was present…

…terms were for the purpose of protecting the trout resources of the lake, not for maintenance of an ocean-run steelhead resource… Because of the location of the reservoir (less than one half mile from the ocean), releases to support a downstream steelhead fishery would be ineffective. The height of the spillway and the loss of stream habitat above the dam due to reservoir inundation precluded providing passage over the reservoir…

…The only use of this area by steelhead occurs on the rare years that the reservoir spills. During this time, straying steelhead trout may enter the creek mouth and migrate upstream of the base of the dam. Lack of spawning gravels prevent any successful reproduction during these events. Trout in the reservoir may spill downstream and enter the ocean, but essentially are lost from the Old Creek spawning population" (DFG 1992a).

Adult *O. mykiss* from the reservoir have been used in hatchery operations at various times between the 1970s and the early 2000s. Juveniles were returned to the reservoir for recreational fishing enhancement (Highland pers. comm.).

A 1998 NMFS letter indicated that steelhead spawned in Old Creek downstream from the dam. Recommendation was made for release of four cubic feet per second "…for the purpose of providing summer rearing space for juvenile steelhead" (NMFS 1998). Old Creek appears on a list of streams with "Resident, residualized, or stocked *O. mykiss* above barriers" (NMFS 2005).

Willow

Willow Creek consists of about three stream miles. It flows southwest, entering the Pacific Ocean at Morro Strand State Beach.

A 1959 memo regarding a water diversion application states, “Willow Creek has no fisheries value” (DFG 1959b). A small drainage basin and low creek flows were cited as the reason for the condition.

Field notes from DFG staff indicated the results of interviews with various biologists familiar with Willow Creek. The notes indicate that no steelhead use of the creek was known (DFG 1999a). A 2005 steelhead range contraction study by NMFS indicates that steelhead cannot access Willow Creek due to a passage barrier (NMFS 2005).

Toro

Toro Creek consists of about 12.5 miles of stream miles draining a watershed of about 13.4 square miles (CCC 2000a). It enters the Pacific Ocean about four miles north of the town of Morro Bay.

Staff from DFG surveyed Toro Creek in 1962 and observed *O. mykiss* in the upper portion of the stream. The survey report notes residents reports of “good steelhead runs in past years” and states, “The stream is potentially a good producer of steelhead; however, increased pumping for irrigation will tend to lower productivity” (DFG 1962b).

As part of a 1973 survey of Toro Creek, DFG staff produced a population estimate of 16,315 *O. mykiss* individuals in ten miles of the creek (DFG 1973c). The survey report states, “Toro Creek has the potential to sustain an excellent steelhead trout fishery in years of high flow” (DFG 1973c). Adult spawning steelhead were noted in that year.

A stream inventory was conducted by CCC staff in 2000 on Toro Creek to document habitat conditions. The resulting report recommends treating sources of stream bank erosion and states, “There are sections where the stream is being impacted from cattle in the riparian zone. Alternatives should be explored with the grazer and developed if possible” (CCC 2000a).

Staff from NMFS performed systematic surveys of south coast streams in 2002-2003 to determine steelhead presence/absence. The survey report form for Toro Creek indicates multiple *O. mykiss* year classes were observed (NMFS 2002c).

Morro

Morro Creek consists of about 11 stream miles draining a watershed of about ten square miles. It enters the Pacific Ocean north of Morro Rock.

A survey report, likely from the 1940s, states, “All the lower stream is pumped dry by June 1st. The stream is of doubtful value” (DFG ca 1934a). Staff from DFG surveyed Morro Creek in 1962 and did not observe *O. mykiss*. The survey report states, “The recent dry cycle and extensive pumping from the stream have greatly reduced the fishery potential of the stream. It is doubtful if the lower 4 miles will again support fishlife except for access to the upper areas” (DFG 1962c).

A 1973 survey notes a 20 foot high dam with a fishway located about two miles from the mouth of the creek. The survey also cites natural falls at stream mile seven as the upstream limit of access by steelhead, suggesting *O. mykiss* observed upstream of the falls are the descendants of planted fish (DFG 1973d). The report states, “Morro Creek could be a valuable SH-RT stream. However, the dam at Mile 2 and fluctuations in flow prevent fish from reaching upstream spawning areas and surviving through the dry periods” (DFG 1973d).

Staff from USFS surveyed Morro Creek in 1980 and observed *O. mykiss* between one and five inches in length. The survey report states, “Upper Morro Creek (East Fork) is narrow with little to no flow. The deterioration of this section from heavy use by man is very apparent” (USFS 1980a).

Staff from DFG observed *O. mykiss* YOY between 1996 and 2000 in Morro Creek (DFG ca 2000). Morro Creek near Cerro Alto Campground was surveyed by USFS staff in 1999 and 2000. Field notes state, “Along the entire stretch in most of the larger pools we found trout…” (USFS 1999d). The fish included fry and individuals to eight inches in length. Also, *O. mykiss* was found during presence/absence surveys by NMFS staff in 2002 (NMFS 2002d).

According to DFG staff a road crossing at about stream mile two constitutes a passage barrier. Efforts are underway to replace the road crossing and improve fish passage (Hill pers. comm.).

Chorro

Chorro Creek consists of about 14 stream miles draining a watershed of about 45 square miles. It enters the Pacific Ocean via Morro Bay. Chorro Creek Reservoir is located at about stream mile 12. According to a 2003 restoration study, a minimum bypass flow of one cubic foot per second is required when inflow into the reservoir is greater than two cubic feet per second (SHG 2003).

Staff from DFG surveyed Chorro Creek in 1958. The survey report states, “Chorro Creek has excellent spawning potential and of [sic] years of adequate rainfall has fair funs of steelhead” (DFG 1958a). According to a 1975 report, “Previous fishery data, collected by Dr. Lee A. Barclay in 1975, indicate that as many as 175 adult steelhead may utilize this drainage for spawning” (DFG 1976a).

In a 1976 report DFG states, “The resident rainbow trout population, found above Chorro Creek dam, is most probably the progeny from both planted fish and those steelhead which historically utilized the upper reaches of Chorro Creek prior to the construction of Chorro Creek dam” (DFG 1976a, p. 3). It adds, “Steelhead rainbow trout utilize the riffles in Chorro Creek below the dam for spawning from the late fall to early spring months” (DFG 1976a, p. 3). Habitat is characterized in the report as follows:

“Chorro Creek is an intermittent creek with many of the lower sections becoming dry in the summer and fall months. There are, however, several sections in the mid and upper reaches of Chorro Creek which contain water all year and serve as valuable nursery habitat for steelhead… Pools provide the majority of the available habitat during the dry months…” (DFG 1976a, p. 6)

Finally, the report indicates that the three-mile section of Chorro Creek downstream from the sewage treatment plant comprises “a significant percentage of summer nursery habitat in the drainage” and “approximately 60 percent of the juvenile steelhead population” (DFG 1976a). Water appropriation was noted to cause steelhead strandings and fishkills in the creek.

In a 1976 memo DFG reports studies to assess the impact of Chorro Creek Dam. The memo states, "Using stream survey information taken on both Chorro and Stenner creeks, considerations pertaining to stream flows, temperature, and habitat were made to estimate an annual adult migration of 160 fish in Chorro Creek" (DFG 1976b).

In notes from a 1978 workshop DFG staff is quoted as saying, "…there is data that the creek and its tributaries could support up to as many as 1,200 adult spawning steelhead a year" and "…today it would be lucky if from 150 to 400 adult spawning steelhead use that creek and it is a result of the type of watershed modification" (CCRWQCB 1978). The notes also indicate DFG staff's concern that gravels were not being replenished due to the dam decreased bedload movement.

Field notes from DFG staff in 1992 indicate fish, including *O. mykiss*, were observed "when water was present" (DFG 1992b). The author also notes that the stream was degraded by sedimentation and dumping. A 1995 DFG letter states, "The Department believes that, with proper management, including the maintenance of stream flow, the Chorro Creek drainage could support a basin run of at least 450 adults" (DFG 1995d).

Chorro Creek was sampled in 2001 as part of a consultants' study of Morro Bay tributaries and *O. mykiss* was observed. The resulting report notes that YOY were not observed and states, "[the size range] suggests that young-of-year steelhead do not rear in Chorro Creek" (Payne 2001, p. 10). A stream inventory from 2001 documented habitat conditions and recommended management options for Chorro Creek. Recommendations included identifying and treating erosion sources and undertaking riparian re-vegetation projects (CCC 2001a).

According to a 2003 restoration study, "During dryer years, releases from Chorro Reservoir may not be adequate to support downstream steelhead populations" (SHG 2003, p. 22). The report recommended establishing an unimpaired flow requirement for Chorro Reservoir from May to October. Staff from DFG observed a spawning pair of adult steelhead in lower Chorro Creek in the winter of 2006 (Highland pers. comm.).

San Bernardo

San Bernardo Creek consists of about 5.5 stream miles and is tributary to Chorro Creek. It flows southwest, entering Chorro Creek east of the town of Morro Bay.

Staff from DFG surveyed San Bernardo Creek in 1958 and observed very few *O. mykiss*. The survey report states, "A poor to fair SH stream depending on the winter rainfall. In most years becomes intermittent in flow d/s from the Caccio ranch. In a good water year may run 'permanently'" (DFG 1958b).

Chorro Creek and several tributaries were sampled for fish in 1975. Steelhead/rainbow trout were observed in San Bernardo Creek during the survey (Unknown 1975). Field notes from DFG staff in 1992 indicate fish, including *O. mykiss*, were observed in San Bernardo Creek (DFG 1992b).

A fish passage evaluation published in 2003 included analysis of San Bernardo Creek barriers. A private road crossing was deemed a total passage barrier. A bridge replacement was suggested (RTA 2003). According to a 2003 steelhead restoration planning project, "For [San Bernardo Creek], the primary limiting factor is ultimately summer streamflow" (SHG 2003, p. 25).

San Luisito

San Luisito Creek consists of about five stream miles and is tributary to Chorro Creek. It flows southwest, entering Chorro Creek north of Hollister Peak.

Staff from DFG surveyed San Luisito Creek in 1958 but could not confirm the presence of *O. mykiss*. The survey report states, "It serves primarily as a spawning and nursery water for the steelhead run that utilizes the Chorro Creek drainage" (DFG 1958c). Chorro Creek and several tributaries were sampled for fish in 1975. Steelhead/rainbow trout were observed in San Luisito Creek during the survey (Anonymous 1975).

Field notes from DFG staff in 1992 indicate impacts from debris dumping on San Luisito Creek (DFG 1992b). Juvenile *O. mykiss* were observed down- and upstream from the Adobe Road crossing in the 1990s (Highland pers. comm.).

Additional field notes from DFG staff in 2003 indicate *O. mykiss* were observed in San Luisito Creek (DFG 2003b). A fish passage evaluation published in 2003 included analysis of San Luisito Creek barriers. The Highway 1 and the Adobe Road crossings received the third and fourth highest rank for priority in streams tributary to Morro Bay due to high quality habitat upstream and poor passage conditions at the culverts. Retrofits were suggested (RTA 2003). An adult steelhead was observed upstream from the Adobe Road crossing by county staff in winter 2006 (Highland pers. comm.).

Sampling was conducted in 2006 during an assessment of fish populations and habitat in San Luisito Creek (Payne 2007). Multiple year classes of *O. mykiss* were found in most of the pools surveyed and high quality habitat was observed. The report notes, "…because the barriers at both Highway 1 and Adobe Road were judged as impassable…it is likely that the *O. mykiss* counted in pools were resident trout derived from steelhead ancestors" (Payne 2007, p. 22).

Pennington

Pennington Creek consists of about 5.2 miles and is tributary to Chorro Creek. It flows southwest, entering Chorro Creek near Cuesta College.

A fishkill including *O. mykiss* was reported on Pennington Creek in 1982. Staff from DFG indicates that *O. mykiss* YOY and older fish have been observed throughout Pennington Creek between the 1990s and the present (Highland pers. comm.).

The creek was sampled in 2001 as part of a study of Morro Bay tributaries. Multiple *O. mykiss* year classes were observed (Payne ca 2001). A stream inventory from 2001 documented habitat conditions and recommended management options for Pennington Creek. Recommendations included identifying and treating erosion sources and undertaking riparian revegetation projects (CCC 2001b).

A fish passage evaluation published in 2003 included analysis of Pennington Creek barriers. The Highway 1 crossing received the highest rank for priority in streams tributary to Morro Bay due to high quality habitat upstream and poor performance of previous modifications to the crossing. A retrofit was suggested (RTA 2003). According to a 2003 steelhead restoration planning project, "For [Pennington Creek], the primary limiting factor is ultimately summer streamflow" (SHG 2003, p. 25).

Dairy

Dairy Creek consists of about 4.5 stream miles and is tributary to Chorro Creek. It flows southwest, entering Chorro Creek in Camp San Luis Obispo. The watershed is about four square miles.

Staff from DFG surveyed Dairy Creek in 1973 and observed *O. mykiss* in two locations. The survey report states, "Dairy Creek is relatively untouched since it has been closed to the public since the 1940's. It has the potential to produce many more SH-RT than were seen" (DFG 1973e).

Field notes from DFG staff in 1992 indicate fish, including *O. mykiss*, were observed in Dairy Creek (DFG 1992b). Juvenile *O. mykiss* also was observed in 1999 (DFG 1999b).

Dairy creek was sampled in 2001 as part of a study of Morro Bay tributaries. Multiple *O. mykiss* year classes were observed (Payne ca 2001). A stream inventory from 2001 documented habitat conditions and recommended management options for Dairy Creek. Recommendations included identifying and treating erosion sources, including "two large [road] headcuts," undertaking riparian revegetation projects, and excluding cattle from the riparian zone (CCC 2001c).

A fish passage evaluation published in 2003 included analysis of Dairy Creek barriers. The Highway 1 crossing received the second highest rank for priority in streams tributary to Morro Bay due to high quality habitat upstream and poor passage conditions at the culvert. A retrofit was suggested (RTA 2003). According to a 2003 steelhead restoration planning project, "For [Dairy Creek], the primary limiting factor is ultimately summer streamflow" (SHG 2003, p. 25).

Los Osos

Los Osos Creek consists of about ten stream miles and is tributary to the Pacific Ocean. It flows northwest, entering Morro Bay north of the town of Los Osos.

Field notes from DFG staff indicate *O. mykiss* YOY and older fish present in Los Osos Creek between 1998 and 2001 (DFG 2001). Los Osos Creek was sampled in 2001 as part of a consultants' study of Morro Bay tributaries and multiple *O. mykiss* year classes were observed (Payne ca 2001). Juvenile *O. mykiss* were relocated from the upper reach of Los Osos Creek as part of a bank stabilization project in 2003 (Highland pers. comm.).

According to a 2003 steelhead restoration planning project, "For…Los Osos Creek, the primary limiting factor is ultimately summer streamflow" (SHG 2003, p. 25). According to the CCRB, water quality in the creek is impaired by low dissolved oxygen from agriculture, grazing, urban runoff, and natural sources (CCRB 2006).

Islay

Islay Creek consists of about 7.5 stream miles. It flows generally west to enter the Pacific Ocean in Montana de Oro State Park.

A 1967 letter from the Department of Parks and Recreation asks that Islay Creek be closed to fishing. The letter states, "The Steelhead of Islay Creek cannot support a sport fishery of any magnitude without seriously jeopardizing the resource" (Mott 1967).

Staff from NMFS performed systematic surveys of south coast streams in 2002-2003 to determine steelhead presence/absence. The survey report form for Islay Creek indicates multiple *O. mykiss* year classes were observed (NMFS 2002e). The form also noted that the creek was "very fishy," likely indicating high habitat quality. Several redds were observed by DFG staff in lower Islay Creek in 2004, as well as a stranded adult steelhead (Highland pers. comm.).

Coon

Coon Creek consists of about 8.9 stream miles. It flows west, entering the Pacific Ocean north of Point Buchon.

An inventory and assessment of aquatic resources from 1990 includes discussion of Coon Creek. Multiple *O. mykiss* year classes were observed during the associated surveys. The report noted impacts from grazing (Moock 1990).

Field notes by DFG staff indicate multiple *O. mykiss* year classes present in Coon Creek in 1994 and 1995 (DFG 1995e). Coon Creek habitat was evaluated by consultants in 2000 and multiple *O. mykiss* year classes were observed. The resulting report states, "Coon Creek was found to provide a significant amount of high quality habitat suitable for rearing steelhead" (Payne 2000, p. 21).

Staff from NMFS performed systematic surveys of south coast streams in 2002-2003 to determine steelhead presence/absence. The survey report form for Coon Creek indicates multiple *O. mykiss* year classes were observed (NMFS 2002e). A culvert replacement and channel improvement project was completed recently. Several hundred fish representing multiple *O. mykiss* year classes have been observed by DFG and city of San Luis Obispo staff since project completion (Highland pers. comm.).

Diablo Canyon

Diablo Canyon Creek consists of about 4.6 stream miles and is tributary to the Pacific Ocean. The mouth is located on the north side of the Diablo Canyon Power Plant.

An inventory and assessment of aquatic resources from 1990 includes discussion of Diablo Canyon Creek. The report noted "a population of rainbow trout in the upper section of the stream" as well as use of the lower section in spring (Moock 1990).

Staff from NMFS performed systematic surveys of south coast streams in 2002-2003 to determine steelhead presence/absence. The survey report form for Diablo Canyon Creek indicates *O. mykiss* was observed (NMFS 2002f).

San Luis Obispo

San Luis Obispo Creek consists of about 17.4 stream miles draining a watershed of about 84 square miles. It flows south, entering the Pacific Ocean at Avila Beach.

A 1958 DFG survey report states, "…the stream may be lowered to almost intermittent flows if everybody irrigates at once – an[d] in 'normal' water year may be dried" (DFG 1958d). As part of a 1975 DFG study, the *O. mykiss* standing crop was estimated and used to determine the adult run size. According to the study report, "An estimated total of 1,005 sea-run adults are produced annually" (DFG 1975).

In notes from a 1978 workshop DFG staff is quoted as saying, "San Luis Obispo Creek itself is now merely a transportation corridor for steelhead to get to spawning tributaries [whereas] in the past, the creek itself was one of the major spawning and nursery habitats. He noted the creek has been degraded not only from erosion, but from other pollutants as well" (CCRWQCB 1978).

Field notes by DFG staff indicate various observations of *O. mykiss* YOY and juveniles in San Luis Obispo Creek between 1997 and 2002. Steelhead in-migrants also have been observed recently (DFG 2000a; DFG 2002c).

San Luis Obispo Creek was studied between 2000 and 2002 in terms of steelhead downstream migration and abundance. The resulting paper notes that wastewater discharge comprises "most, if not all, of the dry-season living space for juvenile steelhead" (Spina 2005).

In 2003, a basin-wide survey was carried out to determine the distribution and abundance of steelhead in the San Luis Obispo Creek watershed. The resulting study report estimates the number of fry and juvenile steelhead in the watershed to be or the order of 10,000 individuals (Payne 2004). The estimated density in lower San Luis Obispo Creek was similar to that determined for the years 2000 and 2001, but represented less than 50 percent of the 2002 estimate (Payne 2004). The mainstem was deemed one of the three greatest contributors to the *O. mykiss* population in the watershed.

Recent restoration projects on San Luis Obispo Creek include fish passage improvements at the Highway 101 culvert, a dam removal in the upper watershed, a bank stabilization project, and modifications to the Marre Dam for fish passage (Highland pers. comm.). Four steelhead carcasses ranging from about 25 to 31 inches in length were recovered by DFG staff from San Luis Obispo Creek in summer 2008 (Highland pers. comm.).

Harford Canyon

Harford Canyon Creek consists of about 2.7 stream miles and is tributary to San Luis Obispo Creek. It flows south, entering San Luis Obispo Creek immediately upstream from the mouth.

Staff from DFG surveyed Harford Canyon Creek in 1960 and observed *O. mykiss* between one and four inches in length. The survey report states, "The stream appears to be a fair spawning area, good nursery providing at least a few fish to San Luis Obispo Creek fishery" (DFG 1960f).

See Canyon

See Canyon Creek consists of about 4.5 stream miles and is tributary to San Luis Obispo Creek. It flows southeast, entering San Luis Obispo Creek northeast of the town of Avila Beach. See Canyon Creek was stocked in 1932 (CCSE 1994).

A 1960 DFG survey of See Canyon Creek states, “According to local residents the stream has as many as several hundred adult steelhead in wet years however only a few during dry years” (DFG 1960g). It is deemed, “…the most important spawning tributary of the San Luis Obispo Creek drainage” (DFG 1960g). Field notes from 1961 indicate that a population estimate of 750 *O. mykiss* per mile was made for the lower areas of the stream (CCSE 1994).

A 1975 study of the San Luis Obispo Creek steelhead resource notes, “See Canyon Creek possesses the greatest abundance of amenable habitat and was found to produce the greatest number of juvenile steelhead” (DFG 1975). Sampling in 1983 produced density estimates of between about 1,300 and 11,200 individuals per mile at six sampling stations (CCSE 1994).

In 2003, a basin-wide survey was carried out to determine the distribution and abundance of steelhead in the San Luis Obispo Creek watershed. The resulting report emphasizes the importance of this creek to steelhead production in the watershed based on relatively high densities of fry and juveniles (Payne 2004). The creek was deemed one of the three greatest contributors to the *O. mykiss* population in the watershed.

Davis Canyon

Davis Canyon Creek consists of about three stream miles and is tributary to See Canyon Creek. It flows southeast and its mouth is located at about stream mile 2.2 on See Canyon Creek.

A 1975 DFG draft report analyzed the effects of the flood control project being proposed at the time. A map in the report indicated that Davis Canyon Creek was considered to be “steelhead spawning and nursery habitat” (DFG 1975). Field notes and reports from DFG staff indicate multiple *O. mykiss* year classes in Davis Canyon Creek observed in 2003 to 2006 (DFG 2003c; Hill pers. comm.).

Castro Canyon

Castro Canyon Creek consists of about 1.8 stream miles and is tributary to San Luis Obispo Creek. It flows southeast, entering San Luis Obispo Creek at about stream mile 4.2.

Staff from DFG surveyed Castro Canyon Creek in 1960 and did not observe fish. However, the survey report relates steelhead observations in the creek and states, “Provides some winter flow and spawning area to San Luis Obispo Creek drainage primarily during wet years” (DFG 1958e).

Davenport

Davenport Creek consists of about 5.9 stream miles and is tributary to San Luis Obispo Creek. It flows west, entering San Luis Obispo Creek at about stream mile 5.4.

A 1976 DFG memo describes field investigations of Davenport Creek. It states, “Davenport Creek supports viable steelhead amphibian and reptile populations…” (DFG 1976c).

Froom

Froom Creek consists of about 3.5 stream miles and is tributary to San Luis Obispo Creek. It flows east, entering San Luis Obispo Creek near the city of San Luis Obispo.

A 1975 DFG draft report analyzed the effects of the flood control project being proposed at the time. A map in the report indicated that the middle portion of Froom Creek was considered to be "steelhead spawning and nursery habitat" (DFG 1975).

In 2003, a basin-wide survey was carried out to determine the distribution and abundance of steelhead in the San Luis Obispo Creek watershed. The resulting report notes that Froom Creek has a short length of wetted channel and a relatively low overall steelhead density (Payne 2004).

Prefumo

Prefumo Creek is tributary to San Luis Obispo Creek near the city of San Luis Obispo. The watershed area is about 12 square miles. In 1961, Prefumo Creek was diverted to flow into Laguna Lake. The creek is referred to as "Perfumo" in some reports. A fishway at Los Osos Valley Road is considered to be poorly designed and constructed and not operating properly.

A 1966 DFG memo states, "Perfumo Creek is an important tributary of the San Luis Obispo Creek system. It produces steelhead and contributes a significant flow to San Luis Obispo Creek" (DFG 1966b). In 1967, DFG staff noted that steelhead were moved past a migration barrier at the Laguna Lake inlet of Prefumo Creek (DFG 1967).

In 2003, a basin-wide survey was carried out to determine the distribution and abundance of steelhead in the San Luis Obispo Creek watershed. The resulting report notes that Prefumo Creek has less than 0.5 miles of wetted channel during the study, leading to relatively low steelhead density estimates (Payne 2004). Excessive groundwater pumping likely contributes to low flows in the creek (Highland pers. comm.). Staff from DFG observed juvenile *O. mykiss* in isolated pools upstream from Laguna Lake in 2004 (Highland pers. comm.).

Stenner

Stenner Creek consists of about six stream miles and is tributary to San Luis Obispo Creek. It flows south, entering San Luis Obispo Creek in downtown San Luis Obispo.

Staff from DFG surveyed Stenner Creek in 1960. The report notes "fairly good" spawning areas throughout the creek that are "best in the middle section" (DFG 1960h). A 1973 survey report states, "There are probably four miles of good steelhead habitat on the stream…" (DFG 1973f). The report adds that the creek "…provides good spawning areas for steelhead, and even in low-flow years has sustained pool-type habitat" (DFG 1973f).

In a 1976 memo DFG states, "Recent studies indicate that approximately 4,000 juvenile steelhead rainbow trout are produced per mile. Extrapolation of these data yield [sic] an annual adult migration of approximately 250 fish in Stenner Creek" (DFG 1976b).

In 2003, a basin-wide survey was carried out to determine the distribution and abundance of steelhead in the San Luis Obispo Creek watershed. The resulting report notes that the lower portion of Stenner Creek was relatively important habitat in terms of its production of fry and juvenile steelhead (Payne 2004). The creek was deemed one of the three greatest contributors to the *O. mykiss* population in the watershed.

Old Garden

Old Garden Creek is tributary to Stenner Creek and flows through urbanized northwest San Luis Obispo. It appears to consist of about two stream miles originating on the southeast flank of Bishop Peak.

Staff from DFG surveyed Old Garden Creek in 1974. Rainbow trout between five and 13 inches were observed (DFG 1974). Field notes from DFG staff indicates multiple year *O. mykiss* year classes observed in Old Garden Creek in 2000 (DFG 2000b).

Brizzolara

Brizzolara Creek consists of about three stream miles and is tributary to Stenner Creek. It flows southwest, entering Stenner Creek in the northern portion of the city of San Luis Obispo. This creek formerly was referred to as Brizziolari Creek.
Staff from DFG surveyed Brizzolara Creek in 1973. The survey report states, “This stream is intermittent in dry years, but though it does stop flowing it still sustains pool-type habitat as evidenced by the presence of 1971-1972 spawn in the stream. It will never be a major fishery but does provide good steelhead spawning habitat” (DFG 1973g).

In 1994, DFG staff observed a stranded steelhead adult several miles upstream from the Stenner Creek confluence (Highland pers. comm.). Field notes from DFG staff indicate the presence of multiple *O. mykiss* year classes and adult steelhead in Brizzolara Creek between 1998 and 2000 (DFG 2000c).

In 2003, a basin-wide survey was carried out to determine the distribution and abundance of steelhead in the San Luis Obispo Creek watershed. The resulting report notes that Brizzolara Creek was of relatively lesser importance in terms of its production of fry and juvenile steelhead (Payne 2004).

Reservoir Canyon

Reservoir Canyon Creek consists of about three stream miles and is tributary to San Luis Obispo Creek. It flows northwest, entering San Luis Obispo Creek about one mile north of the city of San Luis Obispo. A dam is located at about stream mile 1.0.

A DFG survey report, apparently from the 1940s, indicates that natural propagation in Reservoir Canyon Creek was poor due to lack of flow. The report states, “Although a small stream, it is the best part of San Luis Creek system…” (DFG ca 1934b).

Staff from DFG surveyed Reservoir Canyon Creek in 1960. The survey report states, “The lower section (1/2 mile) of stream could be a minor producer of steelhead (DFG 1960i).

A 1975 DFG draft report analyzed the effects of the flood control project being proposed for San Luis Obispo Creek at the time. A map in the report indicated that Reservoir Canyon Creek was considered to be “steelhead spawning and nursery habitat”

(DFG 1975). The report states that the creek, in combination with See Canyon, Stenner, and mainstem San Luis Obispo creeks, supported "…the majority of the juvenile fish population" in the watershed (DFG 1975).

According to DFG staff juvenile *O. mykiss* of unknown origin occur upstream from the dam on Reservoir Canyon Creek, while fish downstream from the dam are assumed to be of anadromous ancestry (Highland pers. comm.). In 2003, a basin-wide survey was carried out to determine the distribution and abundance of steelhead in the San Luis Obispo Creek watershed. The sampling results from Reservoir Canyon Creek "suggest little productivity" due largely to the small length of wetted channel (Payne 2004). The report noted, however, that the limited sample size precluded conclusive interpretation of the stream's relative importance to the watershed.

A 2006 stream restoration project required DFG staff to collect *O. mykiss* from the project site. Approximately 140 juveniles were captured from a 100-yard section of San Luis Obispo Creek (Hill pers. comm.).

Pismo

Pismo Creek consists of about five stream miles and enters the Pacific Ocean at the city of Pismo Beach. The confluence of West Corral de Piedra and East Corral de Piedra creeks near Edna form the headwaters of Pismo Creek. A fishway is located at the railroad crossing of Pismo Creek. Efforts are being made to improve passage at the site as the fishway regularly suffers from clogging by bedload and debris (Highland pers. comm.).

A 1958 DFG memo states that Pismo Creek supports "…a reasonably good run of steelhead" (DFG 1958f). Notes from a 1978 meeting indicate the opinion of DFG staff that land uses surrounding Pismo Creek "…have caused some significant additional bedload movement in the creek and have further reduced the creek's ability to carry a sustained steelhead stock" (CCRWQCB 1978).

Field notes from DFG staff indicate continuing efforts in 1996 and 2002 to clear the Pismo Creek fishway. Multiple *O. mykiss* year classes were observed during the site visits (DFG 1997; DFG 2002d). Notes on sampling by NMFS staff in 2002 indicate multiple year classes in Pismo Creek and point out high turbidity (NMFS 2002g).

Staff from DFG observed YOY and age 1+ and 2+ *O. mykiss* throughout mainstem Pismo Creek in 2005. The surveyor noted that excessive sedimentation and water withdrawals, as well as water quality issues, are limiting to the population (Nelson pers. comm.). Sampling in the Pismo Creek lagoon in May 2005 produced one "smolt-sized steelhead" (HES 2005).

West Corral de Piedra

West Corral de Piedra Creek consists of about seven stream miles and is tributary to Pismo Creek. A reservoir formed by Righetti dam is located at about stream mile 4.5. Bypass flows for the dam were stipulated in a 1958 memo (DFG 1958g).

A 1958 DFG memo notes that West Corral de Piedra Creek supports "…a reasonably good run of steelhead" (DFG 1958f). The author indicated that insufficient flow existed during the low flow period to allow for diversion without harming fishlife. A 1962 memo regarding the application for a dam on West Corral de Piedra Creek states, "…steelhead spawned in the stream near the proposed dam site last winter, and young RT-SH are common in the permanent section of the stream this summer" (DFG 1962d).

Field notes from DFG staff indicate that multiple *O. mykiss* year classes were rescued from the channel downstream from Righetti dam in 1997. Young of the year also were observed in 1999 (DFG 1999c). According to DFG staff, current reservoir operations do not allow for adequate in-migration into downstream reaches (Highland pers. comm.).

Staff from DFG observed *O. mykiss* YOY and age 1+ individuals in wetted portions of the one-quarter mile reach of West Corral de Piedra Creek downstream from the dam in a recent survey. It did not appear that bypass flows from the reservoir were being released. Upstream from the reservoir, YOY and age 1+ *O. mykiss*, possibly of wild ancestry, were observed. (Nelson pers. comm.)

East Corral de Piedra

East Corral de Piedra consists of about 5.5 stream miles and is tributary to Pismo Creek. It flows west from headwaters on Slide Hill.

A 1985 DFG memo indicated that a fishway on East Fork Corral de Piedra was non-functional. The memo states, "This barrier to the migration of steelhead should be afforded the highest priority as it has had a serious deleterious effect on the population" (DFG 1985). According to DFG staff, the fishway in question may be located in mainstem Pismo Creek immediately downstream from the East Corral de Piedra confluence (Highland pers. comm.).

Arroyo Grande

Arroyo Grande consists of about 20 stream miles and drains a watershed of about 155 square miles. It enters the Pacific Ocean west of the town of Oceano. Lopez Dam, constructed in 1968, is located at about stream mile 13.

Since construction of Lopez Dam, an average of 2,330 acre-feet of water has been released into Arroyo Grande between April and October to recharge ground water pumped for agricultural use downstream. Reservoir releases occur at a rate of about 1 to 11 cfs. Historically, reservoir releases for fisheries have not occurred (SEI 2004).

Staff from DFG surveyed Arroyo Grande in 1960. The survey report states, "This stream ranks with the better streams of the San Luis Obispo area which enter the Pacific Ocean. Long sections of this stream contain permanent water throughout the entire year" (DFG 1960j).

In a 1960 report on the proposed Lopez dam DFG staff summarizes the effect on the steelhead fishery of the Arroyo Grande watershed:

"The proposed dam would block off approximately 17 miles of steelhead spawning grounds and approximately 14 miles of nursery grounds used by the young of this species. All three miles of spawning grounds in Arroyo Grande Creek, three miles of spawning and nursery areas in Lopez Canyon Creek, and one mile of spawning and nursery area in Wittenberg Creek would be inundated by the proposed reservoir. Thus, six out of 21 miles of spawning water and four out of 14 miles of nursery water would be lost due to inundation by the reservoir" (DFG 1960k).

The report also notes, "…it can be anticipated that winter flows which normally attract and enable steelhead to ascend on their spawning migration would be reduced by storage at this time. This can be critical in a small stream as is this one" (DFG 1960k).

A 1961 DFG letter on the proposed Lopez Dam project includes a run size estimate of "about 1,000 adult fish" (DFG 1961c). A memo from that year reported on the run size estimate produced through interviews with local residents and concluded, "1. The steelhead runs in Arroyo Grande Creek averaged at least 1000 fish annually 20 years ago. 2. Since 1940 the runs have decreased to an average of approximately 100-200 fish annually for the past 10 years" (DFG 1961d).

A 1996 consulting firm study of Arroyo Grande included a population estimate of juvenile steelhead below Lopez Dam of 7,000 individuals (Alley 1997). Habitat surveys were performed on Arroyo Grande in 1999 and 2000. A report discussing the survey results states, "Spawning gravel quality and availability…is a potential limiting factor affecting steelhead abundance and reproductive success within Arroyo Grande… Although good and excellent habitat was present within various areas of the creek, overall habitat conditions for juvenile steelhead rearing were only fair" (SEI 2004, p. 1-49).

During a 2000 DFG survey of habitat downstream from the dam, multiple *O. mykiss* year classes were observed including individuals having "the appearance of smolts" (DFG 2000d). The survey noted lack of riparian vegetation, sedimentation, and passage problems in the reach. The resulting report recommends, "Assure adequate stream flows for adult and juvenile passage, summer and fall rearing, sediment flushing during winter and spring and high water quality during the summer and fall" (DFG 2000d).

As part of a multi-year evaluation of the Arroyo Grande fishery, the most downstream one half mile reach was sampled several times between 2003 and 2005. A resulting report states, "It appears the most significant potential impact to the fishery, including sensitive species such as steelhead, relates to the seasonality of surface flow. Lagoon water quality usually degrades during closed periods, especially if inflow is low, and poor water quality and lack of access to and from the ocean can impact steelhead… In 2004, severe dewatering was likely due to local agricultural groundwater pumping that exceeded the recharge available from the creek" (Rischbieter 2004). Juvenile *O. mykiss* were abundant in one location at one sampling event in 2005, leading researchers to conclude, "…high flow events appeared to be associated with the outmigration of numerous steelhead smolts" (Rischbieter 2006).

Arroyo Grande was sampled in 2003 as part of a study of *O. mykiss* genetic structure in southern California. A resulting 2006 paper states, "…differences between above and below barrier groups were not significantly different from zero for the…Arroyo Grande [drainage]" (Girman and Garza 2006, p. 16). The population upstream from Lopez Dam is of coastal steelhead ancestry (Garza pers. comm.).

A stream inventory report for Arroyo Grande was conducted in 2004 and including documenting habitat conditions and recommending enhancement options. The resulting report states, "Suitable size spawning substrate on Arroyo Grande Creek is limited to relatively few reaches" (CCC 2004, p. 13).

A watershed management plan for Arroyo Grande, including geomorphic and hydrologic analyses, was published in 2004. The report states, "The lack of vegetated buffer strips along roads, poor stream crossings, and unmaintained ditch and culvert systems present a significant erosion hazard during peak storm events. Farm fields, roads, and agricultural ditches also lack buffering vegetation, resulting in direct, unmanaged release of fine sediment to nearby stream channels" (SHG 2004, p. 35). In 2006, a distribution and abundance survey was conducted, incorporating 30 sampling locations in lower Arroyo Grande. *Oncorhynchus mykiss* was observed in 26 locations "in relatively low numbers" (Swanson 2006). A draft report states, "The lack of channel flushing high flows [due to capture in Lopez Reservoir] has resulted in a narrow channel that lacks complexity and the presence of silt in the substrate" (Swanson 2006).

The lower half mile of Arroyo Grande Creek, including its lagoon, was sampled during four events in 2006. The resulting report states, "High flow events appeared to be associated with downstream migration of numerous juvenile steelhead…" (DPR 2007a). A survey report from 2007 states, "…it is also apparent that both water quality and habitat area/volume are diminishing due to reduced inflow. As in recent past years, this inflow cessation seems to be caused by agricultural irrigation groundwater withdrawals from the alluvial plains near the lower miles of Arroyo Grande Creek" (DPR 2007b).

In 2007 approximately 30 fish, some of which were identified as small steelhead, were found dead in Arroyo Grande following a chemical spill from the Lopez Lake water treatment plant (Sneed 2007). Staff from DFG observed about 12 steelhead carcasses ranging from about 25 to 28 inches in length in lower Arroyo Grande after a sudden drying of the creek (Highland pers. comm.).

Los Berros

Los Berros Creek consists of about 13 stream miles and is tributary to Arroyo Grande. It flows west, entering Arroyo Grande at about stream mile 3.2 on the eastern side of the city of Oceano.

A 1999 DFG survey of Arroyo Grande refers to Los Berros Creek as "perennial" (DFG 2000d). Los Berros Creek was sampled in 2003 as part of a study of *O. mykiss* genetic structure in southern California. Staff from NMFS observed individuals between about 2.4 and 6.7 in length and tissue samples were collected from 63 individuals. A resulting 2006 paper states, "…differences between above and below barrier groups were not significantly different from zero for the…Arroyo Grande [drainage]" (Girman and Garza 2006, p. 16). Staff from DFG observed juvenile *O. mykiss* in Arroyo Grande between 2004 and 2006 (Hill pers. comm.).

Tar Spring

Tar Spring Creek consists of about 8.5 stream miles and is tributary to Arroyo Grande Creek. It flows west, entering Arroyo Grande northeast of the city of Arroyo Grande.

Staff from DFG surveyed Tar Spring Creek in 1961 and did not observe *O. mykiss*. The field note states, "In general, the drainage is a marginal spawning area; probably providing some spawning area during very wet winters and none during most years" (DFG 1961e).

Lopez Canyon

Lopez Canyon Creek consists of about seven stream miles and is tributary to Arroyo Grande. Lopez Reservoir fills the lower portion of Lopez Canyon.

The 1894-1895 bulletin of the U.S. Fish Commission called Lopez Creek, "the best-known trout stream in San Luis Obispo County" (USFC 1895). It notes that Arroyo Grande watershed resident and ocean run trout "are but forms or states of the same fish" (USFC 1895).

Staff from DFG surveyed Lopez Canyon Creek in 1961 and observed multiple *O. mykiss* year classes. The survey report states, "This stream is a valuable south coast stream due to its permanent waters and its contribution to the spawning and nursery area of Grande Creek drainage. The potential of this stream is believed by local wardens to be equal to steelhead streams further north such as Santa Rosa and San Carpoforo Creek" (DFG 1961f).

A 1976 DFG report states, "Lopez Creek supports a self-sustaining population of rainbow trout" (DFG 1976d). Staff from USFS surveyed Lopez Canyon Creek upstream from the reservoir in 1980 and observed multiple *O. mykiss* year classes. The survey report states, "Lopez Creek is a steady flowing stream…" and "The habitat is good enough to support a larger fishery" (USFS 1980b).

Staff from DFG observed YOY and age 1+ *O. mykiss* in Lopez Canyon Creek upstream from the Big Falls Canyon Creek confluence in the mid 1990s (Highland pers. comm.). Two *O. mykiss* year classes were observed in the upper portion of the creek in 2004. These fish are of unknown origin are may be a resident population (Highland pers. comm.).

Lopez Canyon Creek was sampled in 2003 as part of a study of *O. mykiss* genetic structure in southern California. A resulting 2006 paper states, "…differences between above and below barrier groups were not significantly different from zero for the Arroyo Grande" (Girman and Garza 2006, p. 16).

Vasquez

Vasquez Creek consists of about 6.2 stream miles and is tributary to Lopez Canyon Creek. The historical confluence of the creeks is under Lopez Reservoir.

Staff from DFG surveyed Vasquez Creek in 1961 and observed "very scarce" *O. mykiss*. Low natural production was attributed to past dry years. The survey report states, "The stream is probably a fair to good spawning tributary when steelhead are able to get into Lopez Canyon" (DFG 1962e). Field notes from 1962 relay reports of steelhead spawning in the creek (DFG 1962f).

Little Falls

Little Falls Creek consists of about 2.5 stream miles and is tributary to Lopez Canyon Creek. It flows south, entering Lopez Canyon Creek east of Bald Mountain. A natural falls at about stream mile 0.5 appears to be the migratory limit for steelhead.

Staff from USFS surveyed Little Falls Creek in 1999. Trout fry and adults to 11.8 inches in length were observed downstream from the first falls (USFS 1999e).

Big Falls Canyon

Big Falls Canyon Creek consists of about 2.6 stream miles and is tributary to Lopez Canyon Creek. It flows south, entering Lopez Canyon Creek northwest of Bald Mountain.

Staff from DFG visited Big Falls Canyon Creek in 1954 and observed “many young steelhead” in the lower reach. The field note states, “The flow was very small and probably dries up or nearly dries up in summer” (DFG 1954).

Staff from USFS surveyed Big Falls Canyon Creek in 1999. The survey report states, “There were numerous trout along the survey zone above and below both falls” (USFS 1999f).

Wittenberg

Wittenberg Creek consists of about six stream miles and is tributary to Arroyo Grande. The lowest mile of the historical streambed is under Lopez Reservoir.

A 1959 field note states, “This small stream contains good permanent flow throughout the lower 3/4 mile just above mouth” (DFG 1959c). The note relays an anecdotal report of resident rainbow occurring in the headwaters area. The note also relays a local resident’s report, “…steelhead used to run up the stream in large numbers in the early days and now they are seldom seen…” (DFG 1959c).

Huffs Hole

Huffs Hole Creek consists of about 4.3 stream miles and is tributary to Wittenberg Creek. The confluence is located at the high pool mark of Lopez Reservoir.

A 1959 field note states, “Huff Hole Creek likewise contains a small amount of permanent water in the extreme headwaters” (DFG 1959c). The note relays an anecdotal report of resident rainbow trout occurring in the headwaters area.

Staff from USFS surveyed Huffs Hole Creek 1980 and observed multiple *O. mykiss* year classes. The survey report states, ““Huff’s Hole Creek has a low flow but serves as an important spawning creek for rainbow trout leaving Lopez Lake” (USFS 1980c).

San Luis Obispo County Summary

As part of the 1965 state fish and wildlife plan, DFG staff prepared an inventory of anadromous salmonids. No major steelhead streams were noted for San Luis Obispo County. However, about 391 stream miles of steelhead habitat estimated to exist in the minor streams (DFG 1965b). The combined spawning population in the minor streams was estimated to be about 20,000 steelhead. The plan states, “The primary limiting factor is lack of water. Problems facing the steelhead are water projects, diversions, and siltation” (DFG 1965b, p. 411).

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Table 4. Distribution status of *O. mykiss* in coastal streams of San Luis Obispo County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
San Carpoforo	San Carpoforo (San Carpojo)	DF	DF		Y	3
San Carpoforo	Estrada	DF	UN		UN	0
San Carpoforo	Dutra	DF	DF		N	3
Arroyo de los Chinos	Arroyo de los Chinos	DF	DF		Y	3
Arroyo de la Cruz	Arroyo de la Cruz	DF	DF	Y	Y	3
Arroyo de la Cruz	Green Canyon	DF	UN		UN	0
Arroyo de la Cruz	Burnett	DF	DF	Y	Y	3
Arroyo de la Cruz	Spanish Cabin	DF	UN		UN	0
Arroyo de la Cruz	Marmolejo	DF	DF	Y	Y	3
Oak Knoll	Oak Knoll	PS	UN		UN	0
Oak Knoll	Arroyo Laguna	PS	PS		UN	0
Arroyo del Puerto	Arroyo del Puerto	PS	PS		UN	0
Little Pico	Little Pico	DF	DF		Y	0
Pico	Pico	DF	DF		Y	1
Pico	North Fork Pico	DF	DF		Y	0
Pico	South Fork Pico	PS	UN		UN	0
San Simeon	San Simeon	DF	DF	Y	Y	3
San Simeon	Van Gordon	DF	DF	Y	Y	3
San Simeon	Steiner	DF	DF	Y	Y	2
San Simeon	North Fork San Simeon	PS	UN		N	0
San Simeon	South Fork San Simeon	PS	UN		N	0
Santa Rosa	Santa Rosa	DF	DF	Y	Y	3
Santa Rosa	Perry	DF	DF	Y	Y	2
Santa Rosa	Green Valley	PS	PS		UN	0
Villa	Villa	DF	DF		Y	3
Villa	Ellysly	PS	PS		UN	0
Cayucos	Cayucos	PS	PA		UN	0
Little Cayucos	Little Cayucos	PS	PA		UN	0
Old	Old	DF	DF	Y	N	2
Willow	Willow	UN	PA		N	0

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 4. Distribution status of *O. mykiss* in coastal streams of San Luis Obispo County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Toro	Toro	DF	DF	Y	Y	3
Morro	Morro	DF	DF	Y	Y	3
Chorro	Chorro	DF	DF	Y	Y	2
Chorro	San Bernardo	DF	DF	Y	Y	1
Chorro	San Luisito	DF	DF	Y	N	3
Chorro	Pennington	DF	DF	Y	Y	3
Chorro	Dairy	DF	DF	Y	Y	3
Los Osos	Los Osos	DF	DF	Y	Y	3
Islay	Islay	DF	DF		Y	3
Coon	Coon	DF	DF	Y	Y	3
Diablo	Diablo Canyon	DF	DF		UN	3
San Luis Obispo	San Luis Obispo	DF	DF	Y	Y	3
San Luis Obispo	Harford Canyon	DF	UN		UN	0
San Luis Obispo	See Canyon	DF	DF		Y	3
San Luis Obispo	Davis Canyon	DF	DF		Y	3
San Luis Obispo	Castro Canyon	PB	UN		UN	0
San Luis Obispo	Davenport	DF	UN		UN	0
San Luis Obispo	Froom	DF	DF		Y	2
San Luis Obispo	Prefumo	DF	DF	Y	Y	2
San Luis Obispo	Stenner	DF	DF		Y	3
San Luis Obispo	Old Garden	DF	DF		Y	3
San Luis Obispo	Brizzolara	DF	DF		Y	3
San Luis Obispo	Reservoir Canyon	DF	DF	Y	Y	2
Pismo	Pismo	DF	DF	Y	Y	3
Pismo	West Corral de Piedra	DF	DF	Y	Y	3
Pismo	East Corral de Piedra	UN	UN		UN	0
Arroyo Grande	Arroyo Grande	DF	DF	Y	Y	3
Arroyo Grande	Los Berros	DF	DF		Y	3
Arroyo Grande	Tar Spring	PS	UN		UN	0
Arroyo Grande	Lopez Canyon	DF	DF	Y	N	3
Arroyo Grande	Vasquez	DF	UN	Y	N	0

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 4. Distribution status of *O. mykiss* in coastal streams of San Luis Obispo County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Arroyo Grande	Little Falls	DF	DF	Y	N	3
Arroyo Grande	Big Falls Canyon	DF	DF	Y	N	3
Arroyo Grande	Wittenberg	DF	UN	Y	N	0
Arroyo Grande	Huffs Hole	DF	UN	Y	N	0

[1]Please see Methods section for an explanation of titles and values used in this table.

FPO - figure 14

FPO - figure 15

FPO - figure 16

FPO - figure 17

Santa Maria River

The Santa Maria River is formed by the junction of the Cuyama and Siquoc rivers approximately 25 miles east of the mouth. Its watershed consists of about 1,790 square miles. Operations of Twitchell Reservoir on the Cuyama River substantially affect the hydrology of the Santa Maria River. Currently, water releases are made based primarily on water supply considerations and do not include "fish flows."

A 1945 DFG report noted a "spawning run of steelhead" in the Santa Maria River. The report indicates that the run was supplemented with rescued juvenile *O. mykiss* from the Santa Ynez system (DFG 1945).

A 1975 study of southern California streams notes, "The Santa Maria and Cuyama rivers, for the most part, are intermittent. The Santa Maria River is dry at Highway 1, Bonita School Road and Suey Crossing" (Swift 1975).

A 2003 NMFS report notes that *O. mykiss* is present in the Santa Maria drainage. A 2002 personal communication is cited (NMFS 2003). A 2005 report on the steelhead population of the Sisquoc River watershed recommends revising the manual that governs releases for Twitchell Dam to "…include provision of passage of adult steelhead from the ocean through the mainstem of the Santa Maria River…and provision of passage of juvenile steelhead (smolts) from lower Sisquoc River to the ocean" (Stoecker 2005, p. 31).

Suey

Suey Creek consists of about 9.5 stream miles and is tributary to the Santa Maria River. It flows south, entering the Santa Maria in the northeast portion of the city of Santa Maria.

A 1975 survey of southern California streams describes Suey Creek as "dry" (Swift 1975). As part of a study of the Sisquoc River system, a consulting biologist assembled historical information related to steelhead observations in Suey Creek. According to the study report, local residents caught *O. mykiss* in the creek prior to the construction of Twitchell Reservoir (Stoecker 2003).

Cuyama River

The Cuyama River consists of about 106 stream miles and is tributary to the San Maria River. Twitchell Dam, located at about stream mile 7.7, was constructed in late 1950s.

A 1975 study of southern California streams notes, "The Santa Maria and Cuyama rivers, for the most part, are intermittent… Most of the upper Cayuma also is dry…" (Swift 1975).

Alamo

Alamo Creek consists of about six stream miles and is tributary to the Cuyama River. The three mile portion of the creek upstream from the mouth was inundated by Twitchell Reservoir.

Field notes on Alamo Creek from DFG staff from 1947 state, "…native trout are up in the stream" (DFG 1947). An Alamo Creek reach immediately upstream from the reservoir was sampled monthly between November 1969 and June 1970. The resulting paper notes that rainbow trout were observed "rarely" (Greenfield and Deckert 1973). Staff from DFG and USFS surveyed Alamo Creek in 1975 and did not observe *O. mykiss*. The survey report states, "The headwater area of Alamo Creek flows intermittently, …[with] no flow with several spring fed pools during late summer and fall" (DFG 1975a).

Kelly Canyon

Kelly Canyon Creek consists of about six stream miles and is tributary to the Cuyama River. It flows north, entering the Cuyama about 38 miles upstream from Twitchell Dam.

Staff from DFG surveyed Kelly Canyon Creek, probably in the 1930s and did not observe *O. mykiss*. The survey report states, "There are only a few holes near the head of this stream which carry water during the summer" (DFG ca 1934a).

Santa Barbara Canyon

Santa Barbara Canyon Creek consists of about 15 stream miles and is tributary to the Cuyama River. It flows north, entering the Cuyama northwest of the community of Ventucopa.

Staff from USFS surveyed Santa Barbara Canyon Creek in 1980 and did not observe *O. mykiss*. The survey report noted that most of the canyon was dry with only a few pools and no fish (USFS 1980a). However, a USFS document, apparently also from 1980, indicates that a fishery for "RBT" exists in Santa Barbara Canyon Creek, and that stocking had not occurred (Unknown 1980).

Alamo Canyon

Alamo Canyon Creek consists of about 4.5 stream miles and is tributary to Santa Barbara Canyon Creek. The creek enters Santa Barbara Canyon from the west upstream from Cox Flat.

Staff from USFS surveyed Alamo Canyon Creek in 1980 and did not observe *O. mykiss*. The survey report states, "The habitat conditions of this creek are not suitable for fish because of the low-flow, heavy minerals and high water temperatures" (USFS 1980b).

Tinta

Tinta Creek is tributary to the Cuyama River. It flows southeast, entering the Cuyama west of the entrance to Castle Canyon.

No fisheries information was collected for Tinta Creek. However, *O. mykiss* was observed in a tributary as described below.

Rancho Nuevo

Rancho Nuevo Creek consists of about ten stream miles and is tributary to Tinta Creek. It flows east, entering Tinta Creek at about stream mile 0.5.

No fisheries information was collected for Rancho Nuevo Creek. However, *O. mykiss* was observed in a tributary as described below.

Deal Canyon

Deal Canyon Creek consists of about 4.7 stream miles and is tributary to Rancho Nuevo Creek. It flows north, entering Rancho Nuevo Creek near Deal Junction Campsite.

Staff from USFS surveyed Deal Canyon Creek in 1980 and observed *O. mykiss*. The survey report states, "The fishery in this creek is poor because of low water flow and poor habitat" (USFS 1980c).

Reyes

Reyes Creek consists of about six stream miles and is tributary to the Cuyama River. It flows northwest through Camp Scheideck before entering the Cuyama.

Regarding Reyes Creek DFG staff in a 1949 letter states, "A fairly good wild fish population is present" (DFG 1949a). The creek was said to offer about seven miles of trout habitat. This figure apparently refers to the mainstem as well as Reyes Creek tributaries.

As part of a study of freshwater fishes and habitat, Reyes Creek was surveyed in 1975 and *O. mykiss* between 1.6 and 8.9 inches in length was observed. The resulting report states, "Numerous pools result from small, man-made dams" (Swift 1975, p. 59). Reyes Creek was surveyed in 1979 and *O. mykiss* was observed. The survey report indicates that more than three miles of "trout fishery" existed in the creek (Moore 1980).

Alamo

Alamo Creek consists of about six stream miles and is tributary to the Cuyama River. It flows west, entering the Cuyama south of the entrances to Sulphur Spring and Dry canyons.

No fisheries information was collected for Alamo Creek. However, *O. mykiss* was observed in a tributary as described below.

Beartrap

Beartrap Creek consists of about six stream miles and tributary to Alamo Creek. It flows northwest, entering Alamo Creek northeast of Camp Scheideck.

Beartrap Creek was surveyed in 1979 and multiple *O. mykiss* year classes were observed. The survey report states, "Overall trout habitat: fair to good (in places containing numerous pools)" (DFG 1979).

Sisquoc River

The Sisquoc River consists of about 45 stream miles and is tributary to the Santa Maria River. It flows east and joins the Cuyama River east of the city of Santa Maria.

Surveyors from DFG and USFS sampled the Sisquoc River in 1959. The survey report noted good natural propagation of resident *O. mykiss* in the stream (DFG 1959).

Staff from DFG surveyed two sections of the upper Sisquoc River in 1995 and in 1996. In the studies, multiple *O. mykiss* age classes were observed in both sections (DFG 1996a; DFG 1996b). Staff from USFS also observed multiple year classes in the Sisquoc in 1999 (USFS 1999).

A steelhead trout population survey of the Sisquoc watershed was conducted in 2005 and included characterizing the *O. mykiss* population and density. A 20-inch steelhead was observed in the lower Sisquoc River, though the section had the lowest steelhead density in the watershed (Stoecker 2005). Relatively high densities of YOY *O. mykiss* in the upper Sisquoc River were found to be "…indicative of the importance of higher gradient habitat in the upper reaches of watersheds for spawning and rearing" (Stoecker 2005, p. 14). Multiple *O. mykiss* year classes and individuals to 15 inches were observed in upper Sisquoc River.

Tepusquet

Tepusquet Creek consists of about nine stream miles and is tributary to the Sisquoc River. It flows south, entering the Sisquoc River east of the town of Sisquoc.

As part of a study of the Sisquoc River system, a consulting biologist assembled historical information related to steelhead observations in Tepusquet Creek. According to the study report, local residents and DFG staff have observed *O. mykiss* in the creek, and reproduction is believed to occur (Stoecker 2003).

La Brea

La Brea Creek consists of about five stream miles and is tributary to the Sisquoc River. It is formed at the confluence of the North Fork and the South Fork, from where it flows southwest to the Sisquoc River.

Anecdotal accounts indicate the use of La Brea Creek by steelhead in the early 1900s (Stoecker 2003). According to a DFG stream survey report, probably from the 1940s, "Originally the stream was a natural spawning ground of steelhead. In later years it was stocked with rainbow and steelhead [and] was a famous fishing stream" (DFG ca 1934b).

A USFS trip report from 1999 noted impacts from heavy grazing on La Brea Creek tributaries. *Oncorhynchus mykiss* was not observed during the visit (Slaughter 1999).

North Fork La Brea

North Fork La Brea Creek consists of about 12 stream miles and is tributary to La Brea Creek. It flows southwest to the confluence with South Fork La Brea Creek, which forms La Brea Creek.

Anecdotal accounts indicate the use of North Fork La Brea Creek by steelhead in the early 1900s (Stoecker 2003).

Staff from USFS surveys were performed in 1999, when *O. mykiss* was not observed. The creek was surveyed in 2001 and *O. mykiss* was not observed (USFS 2001).

Horse Canyon

Horse Canyon Creek consists of more than nine stream miles and is tributary to the Sisquoc River. It flows southeast, entering the Sisquoc approximately 1.5 miles downstream from the Manzana Campsite.

No fisheries information was found for Horse Canyon Creek. However, a dam on the creek was removed in 2007 in hopes of providing access for trout and other fish.

Manzana

Manzana Creek consists of about 15 stream miles and is tributary to the Sisquoc River. It flows northwest, entering the Sisquoc River at the Manzana Campsite.

In a 1944 report Manzana Creek was said to be perennial in the five miles downstream from the headwaters and the two miles upstream from the mouth (DFG 1944a). Staff from DFG surveyed Manzana Creek, probably in the 1940s, and observed "steelhead" and "rainbow" (DFG ca 1934c). Natural production was deemed "limited" because only a small portion of the creek in the lower and upper sections had water during the summer months (DFG ca 1934c).

As part of a study of freshwater fishes and habitat, Manzana Creek was surveyed in 1975 and trout were observed (Swift 1975). Staff from USFS surveyed Manzana Creek in 1980 and observed multiple *O. mykiss* year classes. The survey report states, "The lack of pools and intermittent flow of water have contributed to the poor conditions of Middle Manzana Creek and the noticeable absence of rainbow trout" (USFS 1980d).

In the 2005 steelhead trout population survey of the Sisquoc River watershed, multiple *O. mykiss* year classes were observed in Manzana Creek (Stoecker 2005). Individuals to 19 inches also were noted. According to the survey report, "This section is both an important spawning and rearing area as well as a refuge for larger steelhead" (Stoecker 2005, p. 25). Staff from the USFS observed adult *O. mykiss* likely to be anadromous in Manzana Creek in 2005 (Stoecker 2005).

Davy Brown (Fir Canyon)

Davy Brown Creek consists of about four stream miles and is tributary to Manzana Creek. It flows north through Fir Canyon.

In a 1944 report Davy Brown Creek was said to be perennial in the one mile upstream from the mouth (DFG 1944a). A survey report, probably from the 1940s, notes "rainbow" and "steelhead" in the creek (DFG ca 1934d). Staff from DFG surveyed Davy Brown Creek in 1950 and observed juvenile *O. mykiss* with "fair" natural propagation (DFG 1950a).

Staff from USFS surveyed Davy Brown Creek in 1980 and observed multiple *O. mykiss* year classes. The survey report notes adverse effects of livestock on the riparian vegetation and bank stability (USFS 1980e). In a 1993 memo staff from USFS indicate that *O. mykiss* in Davy Brown Creek are "…most likely escapes from upstream put-and-take" (Peckham 1993).

In the 2005 steelhead trout population survey of the Sisquoc River watershed, multiple *O. mykiss* year classes were observed in Davy Brown Creek (Stoecker 2005). Individuals to 11 inches were noted. Staff from the USFS observed adult *O. mykiss* likely to be anadromous in Davy Brown Creek in 2005 (Stoecker 2005).

Munch Canyon

Munch Canyon Creek consists of about 2.5 stream miles and is tributary to Davy Brown Creek. It enters Davy Brown Creek near the Davy Brown campsite.

A 1980 USFS report notes the presence of *O. mykiss* in Munch Canyon Creek. It also indicates that past stocking occurred in the creek (Unknown 1980).

Observations made by M. Stoecker between 1994 and 2005 indicate that a reproducing *O. mykiss* population occurs in Munch Canyon Creek (Stoecker 2005). Staff from the USFS observed adult *O. mykiss* likely to be anadromous in Munch Canyon Creek in 2005 (Stoecker 2005).

Sunset Valley

Sunset Valley Creek consists of about three stream miles and is tributary to Munch Canyon Creek. A natural falls appears to be the upstream limit of *O. mykiss* distribution in the creek.

In a 1944 report Sunset Valley Creek was said to be perennial between the mouth and a natural falls 0.75 miles upstream (DFG 1944a). Staff from DFG surveyed Sunset Valley Creek, probably in the 1940s, and observed "steelhead" and "rainbow" with "limited and fair" natural propagation (DFG ca 1934e).

Fish Creek

Fish Creek consists of about three stream miles and is tributary to Manzana Creek. It flows northeast, entering Manzana Creek at Fish Creek campsite.

Staff from the USFS observed adult *O. mykiss* likely to be anadromous in Fish Creek in the 1950s and 1960s during wet years (Stoecker 2005). A 1980 USFS report notes the presence of *O. mykiss* in Fish Creek (Unknown 1980).

Consulting biologists observed *O. mykiss* in Fish Creek in 2002. A subsequent report states, "Good spawning and rearing habitat occur on Fish Creek and its East Fork… [*O. mykiss*] natural reproduction is likely occurring" (Stoecker 2003).

Abel Canyon

Abel Canyon Creek consists of about 6.5 stream miles and is tributary to the Sisquoc River. It flows south from headwaters on Peak Mountain.

A USFS biologist reports observing a small rainbow trout population in Abel Canyon Creek over the course of several years preceding 2002 (Stoecker 2003). Consulting biologists observed multiple *O. mykiss* year classes in Abel Canyon Creek in 2002. A subsequent report notes "fair to good spawning and rearing habitat" (Stoecker 2003).

South Fork Sisquoc River

The South Fork Sisquoc River consists of about three stream miles and is tributary to the Sisquoc River. It flows north, entering the Sisquoc River at the South Fork Campsite.

In a 1944 report South Fork Sisquoc River was said to be perennial (DFG 1944a). Staff from DFG surveyed South Fork Sisquoc River in 1959 and observed multiple *O. mykiss* year classes (DFG 1944a).

Staff from USFS surveyed South Fork Sisquoc River in 1980 and observed multiple *O. mykiss* year classes with individuals to 18 inches. The survey report notes, "This fork of the Sisquoc supports a good RB trout fishery and provides water…" (USFS 1980f).

In the 2005 steelhead trout population survey of the Sisquoc River watershed, multiple *O. mykiss* year classes were observed in South Fork Sisquoc River (Stoecker 2005). Individuals to 12 inches were noted. According to the survey report, "The South Fork Sisquoc River contained the highest overall steelhead density of any sections surveyed within the Sisquoc River watershed, a density almost three times higher than the next highest section surveyed (Davy Brown Creek) (Stoecker 2005, p. 22).

White Ledge Canyon

White Ledge Canyon Creek consists of about 3.5 stream miles and is tributary to South Fork Sisquoc River. It flows east, entering the South Fork Sisquoc at Lonnie Davis campsite. An unnamed tributary flows east, entering White Ledge Creek at White Ledge campsite.

Staff from USFS surveyed an unnamed tributary to White Ledge Canyon Creek in 1980 and observed multiple *O. mykiss* year classes, including individuals to 20 inches length (USFS 1980g). The survey report states, "This creek is an important water source…and supports a fair trout fishery… The trout were fat and healthy in appearance" (USFS 1980g).

Rattlesnake Canyon

Rattlesnake Canyon Creek consists of about three stream miles and is tributary to the Sisquoc River. It flows north, entering the Sisquoc River downstream of the Cottonwood Campsite. A falls is located approximately 1,000 feet upstream of the mouth.

Staff from USFS surveyed Rattlesnake Canyon Creek in 1983. The creek was called "very impressive" and multiple *O. mykiss* year classes were noted (Stoecker 2003). The survey likely covered only the most downstream 0.2 miles of the creek.

In the 2005 steelhead trout population survey of the Sisquoc River watershed, multiple *O. mykiss* year classes were observed in Rattlesnake Creek (Stoecker 2005). Individuals to seven inches were noted. According to the survey report, "…it is likely that this tributary is not highly used for spawning and rearing" (Stoecker 2005).

Big Pine Canyon

Big Pine Canyon Creek consists of about 2.5 stream miles and is tributary to the Sisquoc River. It flows northwest, entering the Sisquoc upstream from Heath campsite.

A 1980 USFS report indicates that *O. mykiss* was not found during surveys of Big Pine Canyon Creek in 1979. The report states, "…good fishing historically did exist" (Moore 1980). A 1983 USFS report indicates the presence of an "excellent" rainbow trout population in the creek (Stoecker 2003).

A recent report concerning restoration opportunities in the Sisquoc River system includes a photo of an *O. mykiss* individual taken in 1998 in the vicinity of the Big Pine Creek confluence with the Sisquoc River (Stoecker 2003).

San Antonio

San Antonio Creek consists of about 32 stream miles. It flows west, entering the Pacific Ocean north of Purisima Point.

Several streams of Vandenberg Air Force Base were studied in 1999 and 2000. The resulting report notes that San Antonio Creek "…is large enough to support steelhead" (Swift 2000a, p. 1). The report recommended surveys of tributaries for habitat resources, analysis of fish passage at Barka Slough, and channel improvements including modification of the El Rancho Road and Lompoc-Casmalia Road crossing. A total passage barrier was noted about 100 feet downstream of the Highway 1 crossing, at approximately stream mile 9.0.

San Antonio Creek was surveyed in 2002 as part of a steelhead distribution study. *Oncorhynchus mykiss* was determined to be "absent" from the drainage (NMFS 2003).

Santa Ynez River

The mainstem Santa Ynez River consists of about 90 stream miles and drains a watershed of about 900 square miles. Its headwaters are in the San Rafael Mountains and it flows west to enter the Pacific Ocean west of the city of Lompoc.

Bradbury Dam, which forms Lake Cachuma, was completed in 1953 and is located at about stream mile 49. As part of the operations of Bradbury Dam, a water supply line delivers water to Hilton Creek, which then returns to mainstem Santa Ynez River. The Hilton Creek Watering System was constructed to provide habitat for steelhead/rainbow trout within Hilton Creek.

Gibraltar Dam, constructed in 1920, is located at about stream mile 72. Juncal Dam, which forms Jameson Lake, was constructed in 1933 and is located at about stream mile 87. The reservoir stores water to be carried through the Santa Ynez Range via the Doulton Tunnel.

A 1944 memorandum relays a fisheries professional's estimate that the Santa Ynez steelhead run "at least equaled the steelhead runs at Benbow Dam" (*i.e.*, approximately 13,000 to 14,500 individuals) (Unknown 1944). The memo states, "He said that some sea-run steelhead spawn in practically every tributary of the Santa Ynez from the mouth to Gibralter Dam, but that heaviest spawning takes place above Buellton. [The fisheries professional Carl] Tegen stated that during the 1943-44 season hundreds of Steelhead spawned in practically every tributary of this area" (Unknown 1944). A 1950 DFG memo states, "The Santa Ynez River is the only steelhead stream of major importance in Southern California" (DFG 1950b).

A 1975 DFG memo describes the impact of Bradbury Dam construction by saying, "About 11 miles of good spawning area remained below the dam. However, due to lack of water releases for fishery maintenance that area is also lost for fish production" (DFG 1975b).

A 1999 fish management plan identified "priority habitats" downstream of Bradbury Dam including lower Hilton Creek, El Jaro Creek, and portions of the lower mainstem Santa Ynez River (SYRTAC 1999). The plan provided for flows releases into Hilton Creek and the Santa Ynez River for improvement of steelhead habitat.

In a 1937 report on Gibraltar Reservoir, the Santa Ynez River upstream of the reservoir was said to dry early in the season at least in some years (Curtis 1937). However, a 1944 report relays reports of spawning in mainstem Santa Ynez River upstream from the reservoir (DFG 1944b). According to the 1944 report, between 39,500 and 1,036,980 juvenile steelhead were rescued from the drying bed of the main Santa Ynez River in the years between 1939 and 1944 (DFG 1944b).

Staff from USFS prepared a draft study regarding steelhead habitat in the Santa Ynez watershed in 1997. Regarding the lower mainstem Santa Ynez River, the draft report states, "Only the uppermost section from Bradbury Dam to Solvang (14 miles) is thought to be currently capable of supporting spawning and rearing steelhead" (USFS 1997). The study report notes, however, "high observed fry densities" in the mainstem Santa Ynez (Juncal Canyon Creek) upstream from Jameson Lake.

According to a NMFS biological opinion, "Steelhead appear to persist in the mainstem from 0-10 miles downstream of Bradbury Dam over the summers of some of the years observed…" (NMFS 2000a, p. 21). The opinion also notes occasional downstream observations between 1995 and 1998.

The mainstem Santa Ynez River between Gibralter and Bradbury dams was sampled in 2003 as part of a study of the genetic structure of southern California *O. mykiss*. As only 12 individuals were collected, the resulting paper did not discuss the genetics of the population. Staff from the Cachuma Conservation Release Board note that the section of the Santa Ynez between Gilbralter and Bradbury dams continues to be heavily stocked with rainbow trout for a put and take fishery (Robinson pers. comm.).

According to the Regional Quality Control Board, water quality in the river downstream from Cachuma Lake is impaired by sedimentation from agriculture, urban runoff, and resource extraction (CCRB 2006). At least two steelhead adults were captured on mainstem Santa Ynez River in February and March 2008. The individuals measured about 24 and 27 inches in length. Additional migrants were captured in Santa Ynez tributaries in 2008 as described below.

San Miguelito

San Miguelito Creek consists of about 9.5 stream miles and is tributary to the Santa Ynez River. It flows north, entering the Santa Ynez north of the city of Lompoc. A concrete channel and debris basin have been constructed on lower San Miguelito Creek that are considered to act as a total barrier to steelhead in-migration (Robinson pers. comm.).

A researcher located a newspaper account from 1875 that indicated the presence of trout in San Miguelito Creek. The fish were noted to be as long as 15 inches (Swift 2000b).

As part of a fish management plan for the Santa Ynez River, surveys were conducted in stream reaches downstream of Bradbury Dam between 1995 and 1998. According to the management plan, San Miguelito Creek has "good" spawning and "fair to good" rearing habitat upstream from passage barriers (SYRTAC 1999).

Trapping was conducted on San Miguelito Creek between 1997 and 1999. One *O. mykiss* juvenile was sampled in 1997 and one in 1999 (Unknown 1999). "Numerous" observations of redds and *O. mykiss* to about eight inches in length have been made between 1997 and 2001 in San Miguelito Creek (Robinson pers. comm.).

Salsipuedes

Salsipuedes Creek consists of about ten stream miles and is tributary to the Santa Ynez River. It flows north, entering the Santa Ynez east of Lompoc.

Staff from DFG surveyed Salsipuedes Creek in 1953 and did not observe *O. mykiss*. The survey report states, "It is evident no natural reproduction of RT occurs" (DFG 1953a). Summer water temperature was proposed as the factor limiting production.

As part of a study of freshwater fishes and habitat, Salsipuedes Creek was surveyed in 1975 and *O. mykiss* was observed. The resulting report notes perennial flow in the creek (Swift 1975, p. 34).

In a 1986 memo DFG staff states, "I believe there still exists a small run of SH in the Salsipuedes-El Jaro Creek. I base this on my observations of many fingerling 'Rainbow Trout' (RT) in the creek during some years" (Sasaki 1986).

Staff from USFS prepared a draft study regarding steelhead habitat in the Santa Ynez watershed in 1997. Regarding habitat resources downstream from Bradbury Dam the draft report states, "Of the tributaries to the lower Santa Ynez, Salsipuedes Creek currently has the highest potential for steelhead spawning and rearing" (USFS 1997).

As part of a fish management plan for the Santa Ynez River, surveys were conducted in stream reaches downstream of Bradbury Dam between 1995 and 1998. According to the management plan, "Spawning habitat in Salsipuedes and El Jaro Creeks is moderate, due to the presence of fine sediments and sand in the stream, with some areas of good habitat" (SYRTAC 1999). The plan notes that upper Salsipuedes Creek has "good" rearing habitat when flow is present (SYRTAC 1999). Staff at the Cachuma Conservation Release Board notes, "Flow is always present in upper Salsipuedes Creek" (Robinson pers. comm.).

Trapping has been conducted on Salsipuedes Creek since 1999. In 1999, adult steelhead in-migrants and kelts, and *O. mykiss* juveniles, were sampled (Unknown 1999). Also, smolt production has been observed consistently during Salsidpuedes Creek trapping conducted between 1999 and 2008 (Robinson pers. comm.).

Salsipuedes Creek was sampled in 2003 as part of a study of *O. mykiss* genetic structure in southern California. A resulting 2006 paper states, "The genetic similarity of [above- and below-dam] populations indicates that there has not been substantial divergence of trout populations breeding in streams above dam reservoirs…" (Girman and Garza 2006, p. 16). Salsipuedes Creek was found to contain *O. mykiss* in 2004 during a study of migration barriers in the Santa Ynez River system (Stoecker 2004).

At least five steelhead believed to be anadromous were captured in Salsipuedes Creek in February and March 2008. Individuals ranged between about 20 and 28 inches in length.

El Jaro

El Jaro Creek consists of about 13 stream miles and is tributary to Salsipuedes Creek. It flows northwest, entering Salsipuedes Creek south of the city of Lompoc.

As part of a study of freshwater fishes and habitat, El Jaro Creek was surveyed in 1975 and *O. mykiss* between 1.2 and 7.3 inches in length were observed. The resulting report notes perennial flow and states, "The banks are trampled by livestock" (Swift 1975, p. 34).

A 1993 survey report noted severe sedimentation in El Jaro Creek (DFG 1993a). As part of a fish management plan for the Santa Ynez River, surveys were conducted in stream reaches downstream of Bradbury Dam between 1995 and 1998. According to the management plan, "Spawning habitat in Salsipuedes and El Jaro Creeks is moderate, due to the presence of fine sediments and sand in the stream, with some areas of good habitat" (SYRTAC 1999). The creek also was surveyed in 1999, and multiple *O. mykiss* year classes were observed (Unknown 1999).

Los Amoles

Los Amoles Creek is an intermittent stream about 3.5 miles in length. It runs north from the confluence of headwater forks to enter El Jaro Creek at about stream mile four.

During surveys in 2006 and 2008, redds believed to be made by *O. mykiss* were observed in Los Amoles Creek. Based on the size of the redds, the life history form (*i.e.*, resident or anadromous) of the spawning individuals was indeterminate (Robinson pers. comm.).

Ytias

Ytias Creek is an intermittent stream about 4.2 miles in length. It runs southwest from the confluence of headwater forks to enter El Jaro Creek at about stream mile 5.2.

A snorkel survey of Ytias Creek in September 2002 yielded observations of 89 "steelhead/rainbow trout" representing multiple age classes and individuals to about nine inches in length. A July 2006 snorkel survey produced observations of 162 *O. mykiss* again representing multiple age classes, with individuals to 12 inches in length (Robinson pers. comm.).

Zaca

Zaca Creek consists of about 16 stream miles and is tributary to the Santa Ynez River. It flows south, entering the Santa Ynez River near Buellton.

Field notes from 1947 to 1949 indicate reports of *O. mykiss* fingerlings in Zaca Creek. However, DFG staff states, "Zaca Creek is of no value to fish life and is intermittent in nature" (DFG 1949b).

Consultants visited Zaca Creek in 1991 as part of a study of mitigation or enhancement sites. The creek was said to be one of several that "…are in areas extensively developed for agriculture and cattle or equestrian ranching, contain extensive alluvial fill, and do not support surface waters" (Payne 1991).

Nojoqui

Nojoqui Creek consists of about eight stream miles and is tributary to the Santa Ynez River. It flows north, entering the Santa Ynez south of the town of Buellton.

Consultants visited Nojoqui Creek in 1991 as part of a study of mitigation or enhancement sites. The creek was said to exhibit "serious limitations" on aquatic habitat from intensive land uses practices (Payne 1991). Nojoqui Creek was surveyed in 1995 and *O. mykiss* was not observed (Unknown 1995). However, *O. mykiss* was trapped migrating into the creek in 1997 (Stoecker 2004). According to the 1999 management plan for the Santa Ynez, "While Nojoqui Creek appears to have some good habitat elements, the lack of fish suggests otherwise" (SYRTAC 1999).

According to staff at the Cachuma Conservation Release Board, groundwater pumping may be limiting to aquatic habitat in Nojoqui Creek. Excessive pumping may cause "a significant portion" of the stream to dry (Robinson pers. comm.).

Alisal

Alisal Creek consists of about 7.5 stream miles and is tributary to the Santa Ynez River. It flows northwest, entering the Santa Ynez south of the town of Solvang. The dam forming Alisal Lake is located at about stream mile 3.5.

A 1944 report includes Alisal Creek in a list of "Streams known to be utilized for spawning by sea-run Steelhead" (DFG 1944b). According to the 1944 report, 26,000 juvenile steelhead were rescued from the drying bed of Alisal Creek in 1941 (DFG 1944b). A 1944 memo relays a report that "...one day two boys speared 17 and 18 adult Steelhead in Alisal Creek..." (Unknown 1944).

A 1994 consultant firm's report on fish resources of the Santa Ynez River watershed notes "some potential spawning habitat depending on flows in the creek" in lower Alisal Creek (Entrix 1994). The report states, "Upstream in Alisal Creek habitat quality is poor as a result of livestock grazing" (Entrix 1994).

As part of a fish management plan for the Santa Ynez River, surveys were conducted in stream reaches downstream of Bradbury Dam between 1995 and 1998. According to the management plan, juvenile juvenile *O. mykiss* were not observed in Alisal Creek, but adults were "present but in low numbers" downstream from Alisal Lake (SYRTAC 1999). The management plan notes that upper Alisal Creek has "good" spawning and "fair to good" rearing habitat upstream from passage barriers (SYRTAC 1999). According to staff at the Cachuma Conservation Release Board, this statement better characterizes habitat conditions in upper Alisal Creek over time than the 1994 statement cited above (Robinson pers. comm.).

Alamo Pintado

Alamo Pintado Creek consists of about 18.5 stream miles and is tributary to the Santa Ynez River. It flows south, entering the Santa Ynez southeast of the town of Solvang.

Consultants visited Alamo Pintado Creek below Birabent Canyon in 1991 as part of a study of mitigation or enhancement sites. The creek reach was said to be one of several local waterways that "…are in areas extensively developed for agriculture and cattle or equestrian ranching, contain extensive alluvial fill, and do not support surface waters" (Payne 1991).

Staff from USFS visited Alamo Pintado Creek in Birabent Canyon in 1993 and observed multiple *O. mykiss* year classes. The resulting memo states, "Probably some reproduction going on in lower sections (below Forest) – no evidence upstream, though my feeling was that it should" (Peckham 1993). Staff from the Cachuma Conservation Release Board indicates, "...a large section of the creek is perennial particularly the section from the town of Solvang and upstream to Highway 150" (Robinson pers. comm.).

Quiota

Quiota Creek consists of about 6.5 stream miles and is tributary to the Santa Ynez River. It flows northwest, entering the Santa Ynez southeast of the town of Solvang.

A consulting firm inspection of Quiota Creek noted highly degraded habitat, largely caused by grazing. The resulting report states, "Under the existing conditions, successful spawning and rearing of steelhead/rainbow trout could not occur in this portion of the tributary" (Entrix 1994).

Quiota Creek was surveyed in 1995 and two *O. mykiss* individuals were observed, one of which was 16 inches in length and was constructing a redd (Unknown 1995). Monitoring since 1995 has produced regular observations of juvenile *O. mykiss* over-summering and numersous "small" redds (Robinson pers. comm.).
The 1999 management plan for the lower Santa Ynez River watershed notes that "good" spawning and rearing habitat exists in mid-to-upper Quiota Creek (SYRTAC 1999). Staff from NMFS observed *O. mykiss* in Quiota Creek in 2001 (NMFS 2002).

Quiota tributary

This unnamed creek consists of about 1.6 stream miles and is tributary to Quiota Creek. It flows north, entering Quiota Creek at about stream mile 3.5.

A stream habitat distribution table for southern California steelhead was prepared in 2006. This table and a 1995 consultants' report on steelhead in the Santa Ynez system note successful reproduction and a "healthy" resident population in the unnamed tributary of Quiota Creek (Entrix 1995; NMFS 2000b).

Zanja de Cota (Santa Cota)

Zanja de Cota Creek consists of about four stream miles and is tributary to the Santa Ynez River. It flows southwest, entering the Santa Ynez south of the town of Santa Ynez. A small reservoir is located on Zanja de Cota about 0.25 miles upstream from its mouth. This facility and a catchment basin are total passage barriers (Robinson pers. comm.).

Staff from DFG surveyed Santa Cota Creek, probably in the 1930s, and observed *O. mykiss*. The survey report states, "…this stream is ideal as a holding stream for trout while waiting for the fall rains… Annually there is a good run of steelhead into this creek" (DFG ca 1934f).

San Lucas

San Lucas Creek consists of about five stream miles and is tributary to the Santa Ynez River. It flows north, entering the Santa Ynez about 2.3 miles downstream from Bradbury Dam.

Consulting biologists visited San Lucas Creek in 1991 as part of a habitat mapping project. A memo describing the results of the visit states, "Of the streams examined, San Lucas Creek was one of the few which retained discharge to the lowest point in the watershed and drained predominantly through undisturbed chaparral rather than impacted meadows" (Payne 1991).

Hilton

Hilton Canyon Creek consists of about 4.2 stream miles and is tributary to the Santa Ynez River. It flows north, entering the Santa Ynez immediately downstream from Bradbury Dam. Water is introduced to Hilton Creek as part of the operations of Bradbury Dam. The Hilton Creek Watering System includes two release locations, located approximately 1,300 feet and 3,200 feet upstream from the mouth (Robinson pers. comm.).

Consulting biologists visited Hilton Creek in 1991 as part of a habitat mapping project. A memo describing the results of the visit states, "Hilton Canyon Creek was dry and appeared to be too small to contain much potential for fisheries development" (Payne 1991).

Migrant trapping was performed in Hilton Creek in 1994 and 1999. During this period, between zero and 52 adult steelhead were observed annually (NMFS 2000a).

A fish rescue program was conducted in Hilton Creek in 1998. During three days of rescue activities, *O. mykiss* YOY were relocated to habitat with less likelihood of drying. A small number of adults were captured, including one individual 19 inches in length (Engblom 1998). The 1999 management plan for the lower Santa Ynez River watershed notes that "good" spawning habitat exists in Hilton Creek, and that the lower portion of the creek has "good" rearing habitat when flow is present (SYRTAC 1999).

Hilton Creek was sampled in 2003 as part of a study of *O. mykiss* genetic structure in southern California. Analysis of samples from this event and other samples taken in previous years resulted in a 2006 paper that states, “The genetic similarity of [above- and below-dam] populations indicates that there has not been substantial divergence of trout populations breeding in streams above dam reservoirs…” (Girman and Garza 2006, p. 16).

In sampling from 2005 and 2008, between 1,300 and 2,700 *O. mykiss* (mostly YOY) have been counted in Hilton Creek (Robinson pers. comm.). At least seven steelhead believed to be anadromous were captured in Hilton Creek in 2008. Individuals ranged in size between about 22 and 27 inches in length. Additionally, at least four *O. mykiss* believed to be “resident” and ranging in size between about 17 and 19 inches in length were captured in 2008.

Cachuma

Cachuma Creek consists of about 15 stream miles draining a watershed of about 20 square miles. The lower 1.75 miles of Cachuma Creek was inundated by Lake Cachuma.

A letter from a long-time Ventura County resident discusses steelhead resources of the Santa Ynez watershed. It states, “During the winters of average rainfall, you couldn’t imagine how many big steelhead would migrate back to…the upper-most reaches of [Cachuma Creek]…” (Unknown 1970).

A 1944 report states includes Cachuma Creek in a list of “Streams known to be utilized for spawning by sea-run Steelhead” (DFG 1944b). Field notes from 1948 confirm this premise and state, “There is permanent water reported in the upper part” (DFG 1950c).

Staff from DFG surveyed Cachuma Creek in 1954 and observed *O. mykiss*, including individuals to 16 inches in length. The survey report notes that natural propagation was expected to occur only in years with above average rainfall (DFG 1954a). The survey report adds, “The stream, according to local residents, does support a few small trout in its headwaters…” (DFG 1954a).

In a 1956 letter DFG staff states, “Annually, heavy spawning runs migrate upstream” (DFG 1950d). The runs mentioned in the letter originated from an adfluvial population in Lake Cachuma.

After a 1993 visit to Cachuma Creek USFS staff stated, “…very unlikely that self-sustaining population has existed in [the Creek] for some time – usual reasons (naturally unstable geology, mining, recreation, long history of grazing and fire protection, water uses up and downstream)” (Peckham 1993).
In 2004, a study of migration barriers was conducted for the Santa Ynez River system. Cachuma Creek was found to contain *O. mykiss* (Stoecker 2004).

Lion Canyon

Lion Canyon Creek consists of about 2.3 stream miles and is tributary to Cachuma Creek. It flows southwest, entering Cachuma Creek at about stream mile 9.3.

After a 1993 visit to Lion Canyon Creek USFS staff stated, "…very unlikely that self-sustaining population has existed in [Lion Canyon Creek] for some time – usual reasons (naturally unstable geology, mining, recreation, long history of grazing and fire protection, water uses up and downstream)" (Peckham 1993).

In 2003, surveys were performed as part of a study of migration barriers in the Santa Ynez River system. Lion Canyon Creek was found to contain *O. mykiss* (Stoecker 2004).

Tequepis Canyon

Tequipis Canyon Creek consists of about four stream miles and is tributary to the Santa Ynez River. The historical confluence was inundated by Lake Cachuma.

A 1944 report states includes Tequepis Canyon Creek in a list of "Streams known to be utilized for spawning by sea-run Steelhead" (DFG 1944b). According to the 1944 report, 3,660 juvenile steelhead were rescued from the drying bed of Tequepis Canyon Creek in 1941 (DFG 1944b).

A 1956 DFG memo indicated that the reservoir *O. mykiss* population used Tequepis Canyon Creek for spawning (DFG 1950d). Staff from DFG constructed a barrier dam on Tequepis Creek in 1956. A memo states the dam was, "For the purposed of stopping the spawning run of rainbow trout from out of Lake Cachuma to the headwaters of this stream" (DFG 1956).

According to a 2004 migration barrier study for the Santa Ynez watershed, Tequepis Canyon Creek is a "known rainbow trout, and former steelhead, spawning and rearing tributary" (Stoecker 2004).

Santa Cruz

Santa Cruz Creek consists of about 15 stream miles and is tributary to the Santa Ynez River. The lower 1.8 miles of the creek were inundated by Lake Cachuma. The creek is formed by the confluence of the West and East forks about 1.5 miles upstream from the Black Canyon Creek confluence.

A letter from a long-time Ventura County resident discusses steelhead resources of the Santa Ynez watershed. It states, "During the winters of average rainfall, you couldn't imagine how many big steelhead would migrate back to…the upper-most reaches of [Santa Cruz Creek]…" (Unknown 1970).

A 1944 report states includes Santa Cruz Creek in a list of "Streams known to be utilized for spawning by sea-run Steelhead" (DFG 1944b). According to the 1944 report, 10,000 juvenile steelhead were rescued from the drying bed of Santa Cruz Creek in 1940 (DFG 1944b).

Staff from DFG surveyed Santa Cruz Creek in 1954 and observed multiple *O. mykiss* year classes, including individuals to 16 inches in length. The survey report states, "…it is obvious that the Santa Cruz can play an extremely important part in the over-all Cachuma management plan" (DFG 1954b). A 1956 DFG memo indicated that a reservoir *O. mykiss* population used Santa Cruz Creek for spawning (DFG 1950d). The memo also indicates the presence of naturally reproducing resident rainbow trout in the headwaters of the creek.

After a 1993 visit to Santa Cruz Creek USFS staff stated, "Section represents some of the best med-low gradient small stream RBT habitat I have seen" (Peckham 1993). Multiple *O. mykiss* year classes were observed. A subsequent memo states, "Stocking does occur, though this population appears to be self-sustaining and wild" (Peckham 1993).

In 2004, a study of migration barriers was conducted for the Santa Ynez River system. Santa Cruz Creek was found to contain multiple *O. mykiss* year classes (Stoecker 2004). The resulting report noted that Santa Cruz Creek had, "Arguably the highest quality salmonid habitat observed in the entire watershed" (Stoecker 2004).

Santa Cruz Creek was sampled in 2003-2004 as part of a study of *O. mykiss* genetic structure in southern California. A resulting 2006 paper states, "The genetic similarity of [above- and below-dam] populations indicates that there has not been substantial divergence of trout populations breeding in streams above dam reservoirs…" (Girman and Garza 2006, p. 16).

Peachtree Canyon

Peachtree Canyon Creek consists of about 5.5 stream miles and is tributary to Santa Cruz Creek. It flows south, entering Santa Cruz Creek at about stream mile seven.

Field notes from DFG staff state, "Steelhead cannot gain access to Peachtree Creek due to falls on the upper Santa Cruz Creek" (DFG 1948a). However, the notes indicated that stocked trout were present in constructed pools in the creek.

A 1993 sampling effort found *O. mykiss* juveniles in Peachtree Canyon Creek (USFS 1993). A subsequent memo notes that the fish may be of hatchery origin, but that "…the population appears to be self-sustaining and wild" (Peckham 1993).

Santa Cruz tributary (Little Pine Spring)

An unnamed creek consists of about three stream miles and is tributary to Santa Cruz Creek, If flows northwest, entering Santa Cruz Creek downstream from the Santa Cruz campsite.

In 2004, a study of migration barriers was conducted for the Santa Ynez River system. Little Pine Spring Creek was found to contain multiple *O. mykiss* year classes (Stoecker 2004). The resulting report states, "Excellent salmonid habitat was observed throughout this small perennial tributary" (Stoecker 2004).

Black Canyon

Black Canyon Creek consists of about 3.7 stream miles and is tributary to Santa Cruz Creek. It flows southeast, entering Santa Cruz Creek downstream from the West Fork confluence.

Staff from USFS surveyed Black Canyon Creek in 1980 and did not observe *O. mykiss*. The survey found "poor habitat conditions" but the biologists speculated that the creek could support spawning in high water months (Edwards ca 1980).

West Fork Santa Cruz

West Fork Santa Cruz Creek consists of about 5.7 stream miles and is tributary to Santa Cruz Creek. It flows southeast to the confluence with the East Fork.

Staff from USFS surveyed West Fork Santa Cruz Creek in 1980 and observed *O. mykiss*. In the survey report, abundance was characterized as “few” and reproduction was deemed “fair” (USFS 1980h).

Cachuma Conservation Release Board staff sampled West Fork Santa Cruz Creek in 2003-2004 and noted multiple *O. mykiss* year classes and “good” habitat (Robinson pers. comm.). In 2004, a study of migration barriers was conducted for the Santa Ynez River system. West Fork Santa Cruz Creek was found to contain multiple *O. mykiss* year classes, including individuals to 13 inches in length (Stoecker 2004). The resulting report noted there was, “…high quality spawning and rearing habitat” in the creek (Stoecker 2004).

Coche

Coche Creek consists of about 4.4 stream miles and is tributary to West Fork Santa Cruz Creek. It flows southwest, entering West Fork Santa Cruz Creek at about stream mile two.

Staff from DFG surveyed Coche Creek in 1964 and observed multiple *O. mykiss* year classes. The survey report states, “Coche “Creek appears to have a sufficient quantity and quality of water to maintain a limited trout population year around…” (DFG 1964).

Staff from USFS surveyed Coche Creek in 1980 and observed multiple *O. mykiss* year classes, with the largest individuals to 10 inches in length. The survey report states, “…small pools provide habitat for a moderate trout fishery estimated to be at optimum productivity at present” (USFS 1980i).

Cachuma Conservation Release Board staff visited Coche Creek in 2004, noting multiple *O. mykiss* year classes and “some of the best habitat in the entire Santa Cruz Creek basin” (Robinson pers. comm.). In 2004, a study of migration barriers was conducted for the Santa Ynez River system. Coche Creek was found to contain multiple *O. mykiss* year classes (Stoecker 2004). The resulting report deemed Coche Creek to have “excellent” habitat.

East Fork Santa Cruz

East Fork Santa Cruz Creek consists of about 7.3 stream miles and is tributary to Santa Cruz Creek. It flows southwest to its confluence with North Fork Santa Cruz Creek.

Staff from USFS surveyed East Fork Santa Cruz Creek in 1980 and observed multiple *O. mykiss* year classes, including individuals to 15 inches in length. The survey report notes the biologist’s opinion that the creek provides “…some of [Santa Barbara County’s] best rainbow trout habitat” (USFS 1980j).

Sampling was performed November 2004 in East Fork Santa Cruz Creek. Biologists observered multiple *O. mykiss* year classes (Robinson pers. comm.).

Grapevine

Grapevine Creek consists of about four stream miles and is tributary to East Fork Santa Cruz Creek. It flows south, entering East Fork Santa Cruz Creek at about stream mile 2.5.

Staff from USFS surveyed Grapevine Creek in 1980 and observed multiple *O. mykiss* year classes, with individuals to 12 inches in length. The survey report states, "Grapevine Creek is an important watershed that contains cool, clear water…and supports a surprisingly large fishery" (USFS 1980k).

Staff from USFS prepared a draft study regarding steelhead habitat in the Santa Ynez watershed in 1997. Regarding Grapevine Creek, the draft report states, "Trout are found throughout in relatively high densities but small sizes" (USFS 1997).

Staff from the Cachuma Conservation Release Board visited Grapevine Creek in 2004 and noted multiple *O. mykiss* year classes in the lowermost portion of the creek. "Small trout" also were observed in a short wetted reach in the upper portion of the drainage (Robinson pers. comm.).

Kelly

Kelly Creek consists of about 4.1 stream miles and is tributary to the Santa Ynez River. It flows northwest, entering the Santa Ynez about two miles upstream from the eastern extent of Lake Cachuma.

A DFG stream survey report, probably from the 1930s, indicates that Kelly Creek was used by spawning steelhead (DFG ca 1934g).

Bear

Bear Creek consists of about three stream miles and is tributary to Kelly Creek. It flows north, entering Kelly Creek about 0.3 stream miles from its mouth.

A 1956 memo includes Bear Creek as a "miscellaneous" tributary. The memo notes about these creeks, "Only occasionally have upstream RT migrants been reported in these waters" (DFG 1950d).

In 2004, a study of migration barriers was conducted for the Santa Ynez River system. Bear Creek was found to contain *O. mykiss* (Stoecker 2004). The resulting report noted, "Observed good spawning and rearing habitat, pools, and perennial flow" (Stoecker 2004).

Paradise Canyon

Paradise Canyon Creek consists of about 2.5 stream miles and is tributary to the Santa Ynez River. It flows north, entering the Santa Ynez at Paradise campground.

Staff from USFS prepared a draft study regarding steelhead habitat in the Santa Ynez watershed in 1997. The study states, "Paradise [Canyon Creek is] generally too small and quick to dry to support a significant number of spawning or rearing steelhead" (USFS 1997).

Oso Canyon

Oso Canyon Creek consists of about 4.7 stream miles and is tributary to the Santa Ynez River. It flows southwest, entering the Santa Ynez at Lower Oso campsite.

Staff from USFS prepared a draft study regarding steelhead habitat in the Santa Ynez watershed in 1997. The study states, "Oso [Canyon Creek is] generally too small and quick to dry to support a significant number of spawning or rearing steelhead" (USFS 1997).

Arroyo Burro

Arroyo Burro consists of about 2.6 stream miles and is tributary to the Santa Ynez River. It flows north, entering the Santa Ynez east of the entrance to Oso Canyon.

In a 1995 letter, a researcher described the results of a study of historical steelhead distribution in streams of the Santa Ynez watershed. The letter indicates the existence of "historical spawning/ nursery area habitat" for steelhead and for "native [resident] trout" in Arroyo Burro (Henke 1995). As part of a 2002 study, *O. mykiss* observations were summarized for the southern Santa Barbara County area. Several anecdotal accounts of *O. mykiss* occurring historically in the watershed are provided (Stoecker *et al.* 2002). A 2005 NMFS technical memorandum indicates that *O. mykiss* occurred historically in the Arroyo Burro drainage, but does not cite specific observations (Boughton *et al.* 2005).

Devils Canyon

Devils Canyon Creek consists of about 2.7 stream miles and is tributary to the Santa Ynez River. It flows northwest, entering the Santa Ynez immediately downstream from Gibraltar Dam. According to a 1997 draft USFS report, "All fish passage is blocked at a falls a mile upstream from the diversion" (USFS 1997).

A 1994 USFS letter discusses the impact of the Santa Barbara Water Tunnel diversion on Devils Canyon Creek. The letter states, "A comprehensive review of the river ecosystem indicates that Devils Canyon Creek is the only spring-fed and largely perennial tributary to the Santa Ynez between Gibraltar Dam and Lake Cachuma. Devils Canyon presents the only good spawning and rearing tributary for resident trout within this section of the Santa Ynez" (USFS 1994a). Staff from USFS surveyed Devil's Canyon Creek in 1995 and observed *O. mykiss*, including an individual 15 inches in length. A biologist familiar with the system speculated that this fish may have been a spawner from Lake Cachuma (Stoecker 2004).

Devil's Canyon Creek was sampled in 2003 as part of a study of the genetic structure of southern California *O. mykiss*. As only three individuals were collected, the resulting paper did not discuss the genetics of the population.

Gidney

Gidney Creek consists of about 4.2 stream miles and is tributary to the Santa Ynez River. It flows northwest, entering Gibraltar Reservoir.

In a 1937 report on Gibraltar Reservoir, the Gidney Creek spawning run was characterized as "conspicuous" (Curtis 1937). The report notes juveniles from two to five inches in length in this creek.

According to a 1980 USFS report, "The major spawning stream for rainbow trout in Gibraltar Lake is Gidney Creek" (USFS 1980l).

Staff from USFS prepared a draft study regarding steelhead habitat in the Santa Ynez watershed in 1997. The study states, "Trout are only found within the lower reach" (USFS 1997).

As part of a genetics study, Santa Ynez tributaries were sampled between 2000 and 2001. *Oncorhynchus mykiss* was collected from Gidney Creek (Greenwald 2001).

Camuesa

Camuesa Creek consists of about 6.3 steam miles and is tributary to the Santa Ynez River. It flows southeast, entering Gibraltar Reservoir.

In a 1937 report on Gibraltar Reservoir, Camuesa Creek was said to dry early in the season at least in some years (Curtis 1937). Interviews, presumably with individuals having expertise in the Gibraltar Reservoir fishery, indicated that *O. mykiss* spawning did not occur in this creek.

Staff from USFS prepared a draft study regarding steelhead habitat in the Santa Ynez watershed in 1997. The study states, "Camuesa Creek only has seasonal and isolated pockets of intermittent flow, not enough to support a year-round fishery and limited access and qualities for spawning habitat" (USFS 1997).

As part of a genetics study, Santa Ynez tributaries were sampled between 2000 and 2001. *Oncorhynchus mykiss* was collected from Camuesa Creek (Greenwald 2001).

Mono

Mono Creek consists of about 22 stream miles and is tributary to the Santa Ynez River. It flows south, entering Gibraltar Reservoir at the reservoir's eastern extent. A dam was constructed in 1935 on lower Mono Creek to control silt input to Gibraltar Reservoir.

In a 1937 report on Gibraltar Reservoir, Mono Creek was said to dry early in the season at least in some years (Curtis 1937). However, a 1944 report relays accounts of spawning in Mono Creek downstream from the debris dam (DFG 1944b).

Staff from USFS surveyed Mono Creek in 1980 and observed multiple *O. mykiss* year classes, including individuals to 14 inches in length. The survey report notes that the fishery is "limited in many areas by poor summer holding water" (USFS 1980m). However, successful reproduction was noted in wet years.

Staff from USFS prepared a draft study regarding steelhead habitat in the Santa Ynez watershed in 1997. The study states, "Mono Creek holds a good but lesser number of trout than Indian Creek… Most of the reaches are intermittent but retain year-round isolated pools" (USFS 1997).

Indian

Indian Creek consists of about 14.3 stream miles and is tributary to Mono Creek. It flows south, entering Mono Creek upstream from the debris dam.

A 1944 report conveyed information from DFG staff that "…Indian Creek trout survived the summers in The Narrows, a canyon below Loma Pelona…[where] there was more than a mile of good-sized pools with running water" (DFG 1944b). The report states, "Prior to construction of Gibraltar Dam, sea-run Steelhead spawned in a number of streams above the dam site, including Indian and Alamar creeks" (DFG 1944b).

Staff from USFS surveyed Indian Creek in 1980 and observed multiple *O. mykiss* year classes, including individuals to 14 inches in length. The creek was deemed to have "medium" productivity in the survey report (USFS 1980n).

Staff from USFS prepared a draft study regarding steelhead habitat in the Santa Ynez watershed in 1997. The study states, "Trout abundance is moderate to moderately high particularly within the canyon reaches" (USFS 1997).

During the 2003 migration barrier study, biologists observed multiple *O. mykiss* year classes in Indian Creek (Stoecker 2004). The resulting report noted the presence of "excellent, deep-pool habitat" (Stoecker 2004). Indian Creek was sampled in 2003 as part of a study of the genetic structure of southern California *O. mykiss*. As only two individuals were collected, the resulting paper did not discuss the genetics of the population.

Buckhorn

Buckhorn Creek consists of about 5.3 stream miles and is tributary to Indian Creek. It flows southeast, entering Indian Creek at about stream mile 5.2.
Staff from USFS surveyed Buckhorn Creek in 1980 and observed multiple *O. mykiss* year classes and individuals to 12 inches in length. The survey report states, "Buckhorn Creek has a fair trout fishery which is surviving at a high productivity rate for the amount of water and food available" (USFS 1980o).

During the 2003 migration barrier study, biologists observed multiple *O. mykiss* year classes in Buckhorn Creek (Stoecker 2004). The resulting report noted the presence of "excellent perennial pool habitat" (Stoecker 2004).

Alamar Canyon

Alamar Canyon Creek consists of about nine stream miles and is tributary to Mono Creek. It flows south, entering Mono Creek upstream from The Narrows.

An undated DFG stream survey was conducted soon after a widespread 1933 fire. The mud and gravel debris flow following the fire eliminated all rearing and spawning habitat. No fish were found. The report states, "Originally the Alamar was stocked by natural spawning of steelhead (this was before the building of Gibraltar Dam). Later some of the fish from the lake also ascended this stream" (DFG ca 1934h).

A DFG report from 1944 states, "Prior to construction of Gibraltar Dam, sea-run Steelhead spawned in a number of streams above the dam site, including Indian and Alamar creeks" (DFG 1944b).

Blue Canyon

Blue Canyon Creek consists of about six stream miles and is tributary to the Santa Ynez River. It flows northwest, entering the Santa Ynez about two miles upstream from the eastern extent of Gibraltar Reservoir.

In a 1996 survey, *O. mykiss* fry and adult spawners to 16-18 inches were observed. Spawning habitat was deemed "excellent" in the section of the creek called "middle lower" to "middle" (Unknown 1996).

Staff from USFS prepared a draft study regarding steelhead habitat in the Santa Ynez watershed in 1997. The study states, "Only the upper most section…[supports] year-round flows, pools of any significance, and adult trout. Phenomenal numbers of fry are observed in the mid to lower reaches, however, and large size spawning trout have been seen utilizing the area" (USFS 1997).

During the 2003 migration barrier study, biologists observed multiple *O. mykiss* year classes in Blue Canyon Creek (Stoecker 2004). The resulting report noted the presence of "high quality habitat and perennial stream flow" (Stoecker 2004).

Escondido Canyon

Escondido Canyon Creek consists of about two stream miles and is tributary to Blue Canyon Creek. It flows north, entering Blue Canyon Creek upstream from the Upper Blue Canyon campsite.

Staff from USFS visited Escondido Canyon Creek in 1994 and observed spawning trout 12 to 16 inches in length (USFS 1994b). The creek was said to contribute the majority of the flow in Blue Canyon Creek below the confluence.
During the 2003 migration barrier study, biologists observed *O. mykiss* in Escondido Canyon Creek. The resulting report noted the presence of "high quality habitat and perennial flow" (Stoecker 2004).

Agua Caliente Canyon

Agua Caliente Canyon Creek consists of about seven stream miles and is tributary to the Santa Ynez River. It flows south, entering the Santa Ynez at the Middle Santa Ynez campground. A dam was constructed in 1937 on lower Agua Caliente Canyon Creek to control silt input to Gibraltar Reservoir.

Staff from USFS prepared a draft study regarding steelhead habitat in the Santa Ynez watershed in 1997. The study states, "…water temperatures are too warm from the hot springs to support trout" (USFS 1997).

Santa Ynez tributaries were sampled as part of a genetics study in 2000 and 2001. *Oncorhynchus mykiss* was collected from Agua Caliente Creek (Campton 2005).

Fox (Pipeline)

Fox Creek consists of about 1.5 stream miles and is tributary to the Santa Ynez River. It flows north, entering the Santa Ynez upstream from Juncal campground and a pumping station. According to a draft 1997 USFS report, "A diversion dam prevents fish movement about a half a mile upstream. A large waterfall is situated a short distance beyond the diversion" (USFS 1997).

Staff from USFS surveyed Fox Creek in 1980 and observed multiple *O. mykiss* year classes. The survey report notes adverse impacts from road crossings and water diversions.

Staff from USFS visited Fox Creek again in 1994 and observed fry and spawning trout to 20 inches in length (USFS 1994c). The resulting report also noted likely adverse impacts on trout from a water diversion on the creek. A 1997 draft USFS study places Fox Creek in a group of about six creeks in the Santa Ynez watershed that exhibit the highest juvenile trout densities (USFS 1997).

During the 2003 migration barrier study, biologists observed *O. mykiss* in Fox Creek downstream from the diversion dam. The resulting report noted areas with "excellent habitat" (Stoecker 2004).

Alder

Alder Creek consists of about three stream miles and is tributary to the Santa Ynez River. It flows northwest, entering the Santa Ynez downstream from Juncal Dam. A draft 1997 USFS report notes the presence of a 20 foot waterfall marking the limit of upstream access for fish.

Staff from USFS prepared a draft study regarding steelhead habitat in the Santa Ynez watershed in 1997. The study states, "…fry have been observed in the lower reach. A short section below and immediately above the remaining man-made barrier supports year-round adult trout" (USFS 1997). The report also notes, "The highest densities of juvenile trout [in the Santa Ynez watershed] are found within seasonal intermittent reaches such as…Alder Creek" (USFS 1997).
Alder Creek was sampled in 2000 for purposes of gathering tissue samples. "Many trout were observed in the lower section of Alder Creek. Drying habitat with hundreds of y.o.y. was observed near the confluence with the Santa Ynez River (Robinson

pers. comm.). During the 2003 migration barrier study, biologists observed multiple *O. mykiss* year classes in Alder Creek. The resulting report noted the presence of “excellent habitat” (Stoecker 2004).

Franklin

Franklin Creek consists of about one stream mile and is tributary to Alder Creek. It flows northeast, entering Alder Creek at the Alder Creek Campsite.

As part of a genetics study, sampling was performed in Franklin Creek in 1994. The *O. mykiss* individuals collected from the creek were determined to be predominantly of “indigenous stock” (USFS 1996).

North Fork Juncal

North Fork Juncal Creek consists of about 4.5 stream miles. It enters Jameson Lake from the north directly, as the historical confluence with the south fork is inundated by the reservoir. The Santa Ynez River upstream from Jameson Lake may be referred to as Juncal Canyon Creek.

Staff from USFS surveyed Juncal Creek in 1994 and observed *O. mykiss* in low density. The survey report states, “The Rainbow trout present on the upper Juncal/Santa Ynez may have migrated from Jameson Lake during high winter and spring flows…” (USFS 1994d).

Staff from USFS prepared a draft study regarding steelhead habitat in the Santa Ynez watershed in 1997. The study states, “Spawning runs of good sized fish are observed into [North Fork Juncal Creek]” (USFS 1997). North Fork Juncal Creek was sampled in 2000 for purposes of gathering tissue samples. “Multiple size classes of trout” were observed, and spawning was observed in May when discharge was about 5 cfs (Robinson pers. comm.).

During the 2003 migration barrier study, biologists observed *O. mykiss* in North Fork Juncal Creek. The resulting report states, “Excellent salmonid habitat conditions occur [downstream from a bedrock waterfall]” (Stoecker 2004). North Fork Juncal Creek was sampled in 2003 as part of a study of *O. mykiss* genetic structure in southern California. A resulting 2006 paper states, “The genetic similarity of [above- and below-dam] populations indicates that there has not been substantial divergence of trout populations breeding in streams above dam reservoirs…” (Girman and Garza 2006, p. 16).

Santa Ynez River tributary (Steelhead)

An unnamed tributary to the Santa Ynez River consists of about one stream mile. It enters the Santa Ynez from the north at Upper Santa Ynez campsite.

During the 2003 migration barrier study, biologists observed *O. mykiss* in a headwater tributary to the Santa Ynez they named Steelhead Creek. The resulting report noted the presence of “high quality habitat and perennial stream flow” (Stoecker 2004).

Cañada Honda

Cañada Honda Creek consists of about four stream miles. It enters the Pacific Ocean north of Point Pedernales.

Staff from DFG visited Cañada Honda in 1948 and did not observe fish in the creek (DFG 1948b). Staff from NMFS surveyed Cañada Honda in 2002. The resulting report indicates that *O. mykiss* is "absent" from the creek (NMFS 2003).

Jalama

Jalama Creek consists of about nine stream miles. It enters the Pacific Ocean at Jalama Beach Park.

A 1974 letter to the RWQCB discusses steelhead in Jalama Creek. The letter states, "A recent interview with the proprietor of the Jamala Store, revealed that the last known steelhead run was in 1969…" (Gantt 1974). A fisheries consultant observed *O. mykiss* in Jalama Creek in 1970, and several specimens were preserved at the Natural History Museum of Los Angeles County (Stoecker *et al.* 2002).

An assessment of southern California steelhead recovery opportunities includes documentation of *O. mykiss* observations throughout the 1970s and 1980s, including individuals to 26 inches in length (Stoecker *et al.* 2002). Observers include DFG staff, the Jalama County Park ranger, several anglers and long-time residents, and others.

During a survey of Jalama Creek in 1994, a 14 inch steelhead was observed (Bustillos 1994). Several streams of Vandenberg Air Force Base were studied in 1999 and 2000. The resulting report states, "Conditions of the small portion of the stream found on Vandenberg AFB were mostly good to excellent for steelhead" (Swift 2000a, p. 40). The report recommended improving the condition of the lagoon for nursery purposes.

Staff from NMFS surveyed Jalama Creek in 2002. The resulting report indicates that steelhead is "absent" from the creek, but notes the presence of "above barrier" *O. mykiss* (NMFS 2003).

Cañada del Cojo

Cañada del Cojo Creek consists of about 2.6 stream miles. It enters the Pacific Ocean east of the town of Drake.

Streams of the Hollister Ranch, including Cañada del Cojo Creek, were surveyed in 1994 in part to determine possible use by steelhead. A long-time resident was interviewed and stated that the creek had perennial flow and good canopy, and would be most likely to offer habitat of the Hollister Ranch streams (DFG 1994d).

Cañada de Santa Anita (Santa Anita)

Cañada de Santa Anita Creek consists of about 3.4 stream miles. It enters the Pacific Ocean west of the town of Drake.

A review of historical information was performed as part of the Conception Coast project in 2002. That report cites Ken Sasaki as confirming the presence of *O. mykiss* in Cañada de Santa Anita Creek in the 1970s. An observation from 2001 was made to the report author anonymously (Stoecker *et al.* 2002).

Cañada del Sacate

Cañada del Sacate consists of about 2.6 stream miles. It flows south, entering the Pacific Ocean about 3.7 miles west of the community of Port Orford.

A study of the range of steelhead published in 2005 includes discussion of Cañada del Sacate. The basin is shown as having historical steelhead presence although the basis for the determination is not provided (NMFS 2005).

Cañada de la Gaviota (Gaviota)

Cañada de la Gaviota Creek consists of about six stream miles. It enters the Pacific Ocean at Gaviota Beach State Park.

Staff from DFG surveyed Gaviota Creek, probably in the mid 1930s. The survey report notes, "A few steelheads enter stream in winter" (DFG ca 1934i). The surveyor deemed the creek to have low importance as a trout fishery.

In a 1986 memo DFG staff states, "SH adults probably use this creek almost every year considering the reports of observations, but I would anticipate the numbers in the runs to be very low" (Sasaki 1986).

Cañada de la Gaviota Creek was surveyed in 1992, 1993 and 1995 and multiple *O. mykiss* year classes were observed, including individuals to about eight inches in length. A 1993 survey report notes likely impacts on the creek from poor grazing practices in the watershed of an upstream tributary, Cañada de las Cruces Creek (DFG 1993b). A memo describing the 1993 survey notes successful reproduction of steelhead and possibly resident "wild trout" (DFG 1994a). It states, "The scarcity of viable spawning and rearing streams for the declining southern steelhead trout suggests that Gaviota Creek should be provided with full protection from livestock grazing and further human development throughout its watershed (DFG 1994a).

As part of a 2002 study, *O. mykiss* observations were summarized for the southern Santa Barbara County area. The report cites numerous *O. mykiss* observations in Gaviota Creek between 1997 and 2001, including YOY and individuals to about 22 inches in length (Stoecker *et al.* 2002).

Cañada de San Onofre (San Onofre)

Cañada de San Onofre Creek consists of about 2.5 stream miles. It enters the Pacific Ocean east of the town of Gaviota.

A review of historical information was performed as part of the Conception Coast project in 2002. That report cites J. Hollister as confirming the presence of *O. mykiss* in Cañada de San Onofre in the 1970s and 80s (Stoecker *et al.* 2002). The report also cites Brian Trautwein as having observed *O. mykiss* in San Onofre Creek until 1991.

As part of a steelhead presence/absence study in 2002, NFMS staff surveyed Cañada de San Onofre Creek. Steelhead was deemed “absent” from the drainage.

Arroyo Hondo

Arroyo Hondo consists of about 2.2 stream miles. It enters the Pacific Ocean east of the town of Lento. Arroyo Hondo passes through a culvert under Highway 101 before entering the Pacific Ocean. In the summer of 2007, a series of concrete baffles was installed to improve fish passage.

A review of historical information was performed as part of the Conception Coast project in 2002. That report cites J. Hollister as confirming the presence of *O. mykiss* in Arroyo Hondo beginning in the 1960s (Stoecker *et al.* 2002).

Arroyo Hondo was surveyed in 1994 and *O. mykiss* was observed. Sampling notes indicate that high juvenile trout density existed and the fish were in good condition (Unknown 1994).

Surveys in 2001 produced observations of *O. mykiss* in Arroyo Hondo including multiple year classes and an individual estimated to be about 24 inches in length (Stoecker *et al.* 2002). Cachuma Conservation Release Board staff surveyed Arroyo Hondo three times each year between 2006 and 2008. Multiple *O. mykiss* year classes were observed in the lagoon and in the reach between the estuary and about stream mile two (Robinson pers. comm.).

Arroyo Quemado

Arroyo Quemado consists of about 3.1 stream miles. It enters the Pacific Ocean about 5.7 miles west of El Capitan Beach State Park.

A review of historical information was performed as part of the Conception Coast project in 2002. That report cites Arve Sjovold as confirming the presence of *O. mykiss* in Arroyo Quemado in the 1960s and 70s (Stoecker *et al.* 2002). Additional observations are noted from the early and mid 1980s.

Arroyo Quemado was surveyed in 1995. No fish were observed (Cardenas 1995). A culvert located near the mouth of Arroyo Quemado is a total passage barrier to steelhead (Stoecker *et al.* 2002).

Field notes, probably from the early 2000s, indicate the presence of *O. mykiss* in Arroyo Quemado Creek downstream from a large culvert. Individual four to eight inches in length were observed (Unknown ca 2000).

Tajiguas

Tajiguas Creek consists of about 4.4 stream miles. It enters the Pacific Ocean about 4.5 miles west of El Capitan Beach State Park.

A review of historical information was performed as part of the Conception Coast project in 2002. That report cites Arve Sjovold as confirming the presence of *O. mykiss* in the Tajiguas Creek lagoon in 1959 (Stoecker *et al.* 2002).

Staff from DFG inspected Tajiguas Creek in 1985 and did not observe *O. mykiss*. The resulting memo notes that rainbow trout "may be expected to be present" in the headwater sections of the creek (DFG 1982).

According to a study of streams of the Conception Coast, a culvert located near the mouth of Tijiguas Creek is a total passage barrier to steelhead (CCP 2002). A study of the range of southern California steelhead published in 2005 indicates that an *O. mykiss* population is present upstream from an impassible barrier. The observation source was reviewed as part of this study but did not appear to have evidence for the determination (Stoecker *et al.* 2002).

Cañada del Refugio (Refugio)

Cañada del Refugio Creek consists of about 5.5 stream miles. It enters the Pacific Ocean at Refugio Beach State Park.

Staff from DFG surveyed Cañada del Refugio Creek, probably in 1934, and observed *O. mykiss*. The survey report notes that natural propagation does not occur in the creek, and attributes the lack of spawning habitat to siltation resulting from poor agricultural practices. The survey report states, "Steelhead annually make the run up the stream…" (DFG ca 1934j). In field notes from 1947 DFG staff states, "In wet years a few steelhead enter the stream… The stream is exceedingly small" (DFG 1953b).

A 1971 DFG memo noted that construction of a creek crossing at the state park likely created a passage barrier for in-migrating steelhead (DFG 1971). As part of a 2002 study, *O. mykiss* observations were summarized for the southern Santa Barbara County area. The report cites Brian Trautwein as observing a 12-13 inch *O. mykiss* individual in 1990 in the upper Refugio Creek watershed (Stoecker *et al.* 2002).

Staff from NMFS surveyed Cañada del Refugio Creek in 2002. The species was determined to be "absent" from the drainage (NMFS 2003).

Cañada del Venadito

Cañada del Venadito Creek consists of about 3.5 stream miles. It enters the Pacific Ocean west of the town of Capitan. According to a report on steelhead distribution in Southern California, a long cement culvert near the mouth of Cañada del Venadito Creek is a complete barrier to spawning (NMFS 2003).

A study of the range of southern California steelhead notes that the species historically occurred in the Cañada del Venadito basin (NMFS 2003). The basis for the determination is not provided.

Cañada del Corral

Cañada del Corral Creek consists of about 4.9 stream miles. It enters the Pacific Ocean near the town of Capitan.

A review of historical information was performed as part of the Conception Coast project in 2002. That report cites several local residents as confirming the presence of *O. mykiss* in Cañada del Corral Creek from the 1930s to 1980s (Stoecker *et al.* 2002).

Cañada del Corral Creek was surveyed in 1995. No fish were observed (Cardenas 1995). According to a report on steelhead distribution in Southern California, a cement culvert near the mouth of Cañada del Corral Creek is a complete barrier to spawning (NMFS 2003).

Cañada del Capitan (Capitan)

Cañada del Capitan Creek consists of about 4.9 stream miles. It enters the Pacific Ocean at El Capitan Beach State Park. The culvert under Highway 101 is considered impassable to steelhead (Stoecker *et al.* 2002).

A review of historical information was performed as part of the Conception Coast project in 2002. That report cites Tom Williams Jr. as confirming the presence of *O. mykiss* in Cañada del Capitan Creek in the 1930s and 40s (Stoecker *et al.* 2002).

Staff from NMFS surveyed Cañada del Capitan Creek in 2002. The species was determined to be "absent" from the drainage (NMFS 2003).

Gato Canyon

Gato Canyon Creek consists of about 5.1 stream miles. It enters the Pacific Ocean about two miles northwest of the town of Naples.

A review of historical information was performed as part of the Conception Coast project in 2002. That report cites Steve Rowe as confirming the presence of *O. mykiss* in Gato Canyon Creek in the 1970s (Stoecker *et al.* 2002).

Dos Pueblos Canyon

Dos Pueblos Canyon Creek consists of about 6.4 stream miles. It enters the Pacific Ocean west of the town of Naples.

A review of historical information was performed as part of the Conception Coast project in 2002. That report cites Phil Beguhl as confirming the presence of *O. mykiss* in Dos Pueblos Canyon Creek in 1969 (Stoecker *et al.* 2002).

Numerous "resident" *O. mykiss* were observed in Dos Pueblos Canyon Creek in the early 1990s downstream from the Highway 1 bridge. An individual approximately 15-16 inches in length also was observed (Trautwein pers. comm.). A DFG memo from 1994 records the presence of steelhead and rainbow trout in Dos Pueblos Canyon Creek. The density was noted as "1" on a five point scale with five indicating "many" individuals (DFG 1994b).

As part of a 2002 study, *O. mykiss* observations were summarized for the southern Santa Barbara County area. The report cites numerous several *O. mykiss* in 2001 and 2002, including individuals between two and about 13 inches in length (Stoecker *et al.* 2002). According to a report on steelhead distribution in Southern California, channelization in the lower portion of Dos Pueblos Canyon Creek create a complete barrier to spawning steelhead (NMFS 2003).

Eagle Canyon

Eagle Canyon Creek consists of about 3.1 stream miles. It enters the Pacific Ocean about 1.7 miles east of the town of Naples.

As part of a 2002 study, *O. mykiss* observations were summarized for the southern Santa Barbara County area. The report cites a 1984 environmental report as documenting “a small number of steelhead” entering local streams including sightings in Eagle Canyon Creek (Stoecker *et al.* 2002). A study of the range of southern California steelhead notes that the species historically occurred in the Eagle Canyon Creek basin (NMFS 2003). The basis for the determination is not provided.

Tecolote Canyon

Tecolote Canyon Creek consists of about 6.5 stream miles. It enters the Pacific Ocean west of the town of Isla Vista.

As part of a steelhead restoration project in the 1970s, a UCSB student researched steelhead in Tecolote Canyon Creek. A local resident provided photographs of juvenile steelhead taken near the mouth of the creek in 1931 and 1937 (Gantt 1973).

A 1974 letter to the RWQCB discusses steelhead in Tecolote Canyon Creek. The letter states, “Tecolote Creek…was stocked with steelhead smolt in April of 1973. Some two year old steelhead returned in march of 1974 to spawn. Offspring from these fish are presently abundant in the stream. Thousands of young trout were observed in May of this year. The suitability of Tecolote Creek for trout is evidenced by the facts that offspring are present and that a year round trout fishery has been reestablished” (Gantt 1974).

According to a report on steelhead distribution in Southern California, a long culvert and concrete apron near the mouth of Tecolote Canyon Creek create a complete barrier to spawning steelhead (NMFS 2003).

Bell Canyon

Bell Canyon Creek consists of about one stream mile. The creek is formed by the confluence of Winchester Canyon and Ellwood Canyon creeks. It enters the Pacific Ocean west of the town of Ellwood. According to a report on steelhead distribution in Southern California, a long culvert near the mouth of Bell Canyon Creek creates a complete barrier to spawning steelhead (NMFS 2003).

As part of a 2002 study, *O. mykiss* observations were summarized for the southern Santa Barbara County area. The report cites a 1984 environmental report as documenting “a small number of steelhead” entering local streams including sightings in Ellwood Creek (Stoecker *et al.* 2002). A study of the range of southern California steelhead notes that the species historically occurred in the Bell Canyon Creek basin (NMFS 2003). The basis for the determination is not provided.

Tecolotito (Glen Annie Canyon)

Flows in Tecolotito Creek originate in Glen Annie Canyon and are tributary to the Goleta Slough complex south of the city of Goleta. Upstream from approximately the Highway 101 crossing, the creek is referred to as Glen Annie Creek. The dam forming Glen Annie Reservoir is located about three miles upstream from this crossing.

A review of historical information was performed as part of the Conception Coast project in 2002. That report cites Dougal House as observing *O. mykiss* in Glen Annie Creek in 1970 (Stoecker *et al.* 2002).

San Jose

San Jose Creek consists of about ten stream miles. It flows south, entering the Pacific Ocean via the Goleta Slough complex south of the city of Goleta.

Field notes from 1948 indicated DFG staff's opinion that San Jose Creek had "a total of 6 to 7 miles of good trout stream" (DFG 1949c). The author noted *O. mykiss* in the creek, although the origin (*i.e.*, native or stocked) was not provided.

A DFG memo from 1994 records the presence of rainbow trout in upper San Jose Creek. The density was noted as "4" on a five point scale with five indicating "many" individuals (DFG 1994b).

As part of a 2002 study, *O. mykiss* observations were summarized for the southern Santa Barbara County area. The report cites numerous *O. mykiss* observations from the 1980s to 2003 in San Jose Creek, including multiple year classes and individuals to about 14 inches in length (Stoecker *et al.* 2002).

San Pedro

San Pedro Creek consists of about 4.7 stream miles and is tributary to San Jose Creek. It enters San Jose Creek immediately upstream from the Goleta Slough complex mouth at Goleta Beach Park.

According to 1996 letter from staff of the Santa Barbara Urban Creeks Council, juvenile steelhead were observed near the base of natural falls in San Pedro Creek in 1992 (Trautwein 1996). The letter noted that adult steelhead were observed in the creek in 1985 and in 1995 (Trautwein 1996). A steelhead was observed in San Pedro Creek in March 2008 that was estimated to be about 26 inches in length (Capelli pers. comm.).

Atascadero

Atascadero Creek consists of about 6.3 stream miles. It flows southwest, entering the Pacific Ocean south of the city of Goleta.

A review of historical information was performed as part of the Conception Coast project in 2002. That report cites Phil Beguhl as confirming the presence of *O. mykiss* in Atascadero Creek in 1969 or 1970 (Stoecker *et al.* 2002). In the late 1980s, a resident *O. mykiss* approximately seven inches in length was observed near Holister Avenue (Trautwein pers. comm.).

Maria Ygnacio

Maria Ygnacio Creek consists of about 6.8 stream miles. It flows south, entering Atascadero Creek about 1.3 miles upstream from Atascadero Creek's mouth.

A 1974 letter to the RWQCB discusses steelhead in Santa Barbara County streams. The letter includes Maria Ygnacio Creek in a list of streams "having historical runs of anadromous trout" (Gantt 1974). The basis for this determination is not provided in the letter.

A review of historical information was performed as part of the Conception Coast project in 2002. That report cites Phil Beguhl as confirming the presence of *O. mykiss* in Maria Ygnacio Creek from 1954-1967 (Stoecker *et al.* 2002).

A grade stabilization structure at the railroad crossing is a passage barrier downstream from habitat resources in the watershed. In 2000, a 27-inch steelhead was observed downstream from the structure (SBCDPW 2001). Conceptual designs have been prepared to modify the barrier.

San Antonio

San Antonio Creek consists of about 6.2 stream miles and is tributary to Maria Ygnacio Creek. It flows southwest, entering Maria Ygnacio Creek east of the town of Goleta.

A 1974 letter to the RWQCB discusses steelhead in Santa Barbara County streams. The letter includes San Antonio Creek in a list of streams "having historical runs of anadromous trout" (Gantt 1974). The basis for this determination is not provided in the letter.

An 18 inch steelhead was seen downstream from a (debris basin) passage barrier in the late 1970s or early 1980s (Trautwein pers. comm.). Also, a "handful" of *O. mykiss* individuals between about four and seven inches in length were observed in San Antonio Creek in 1984.

Arroyo Burro

Arroyo Burro consists of about four stream miles. It flows south, entering the Pacific Ocean at Arroyo Burro Beach Park.

A review of historical information was performed as part of the Conception Coast project in 2002. That report cites Santa Barbara Public Works personnel as confirming the presence of *O. mykiss* in Arroyo Burro in the early 1980s (Stoecker *et al.* 2002).

According to a report on steelhead distribution in Southern California, a grade control structure near the mouth of Arroyo Burro creates a complete barrier to spawning steelhead (NMFS 2003).

Mission

Mission Creek consists of about 7.8 stream miles. It flows south, entering the Pacific Ocean at the Santa Barbara Harbor. The lower portion of Mission Creek is concrete-lined and is considered impassable to spawning steelhead.

A 1986 study of Rattlesnake Creek reports that a steelhead was caught in lower Mission Creek in the late 1950s and states, "It seems probable that steelhead did historically run up most local streams, including Mission and Rattlesnake Creeks, before dams were built by Spanish Colonists" (UCSB 1986), A review of historical information was performed as part of the Conception Coast project in 2002. That report cites Brian Combs and Charles Woodhouse as confirming the presence of *O. mykiss* in Mission Creek in 1984.

A small number of *O. mykiss* individuals have been observed in lower Mission Creek in recent years, including 2000, 2003, 2005, 2006, and 2008 (Fusaro pers. comm.; Capelli pers. comm.). Based on their large size (*i.e.*, over 20 inches in length), the fish are considered anadromous adult steelhead. Designs have been developed to improve fish passage in the lower portion of Mission Creek. A one mile reach of the stream that was previously channelized would be modified to create a "natural streambed" (Trautwein 2006).

According to staff at the Cachuma Conservation Release Board, Mission Creek has multiple *O. mykiss* year classes persisting in its headwaters (Robinson pers. comm.). However, a record of observation of this population could not be located. About 30 smolts were observed in the Mission Creek lagoon in 2007 (Keller pers. comm.).

Rattlesnake Canyon

Rattlesnake Canyon Creek consists of about 3.4 stream miles and is tributary to Mission Creek. If flows southwest, entering Mission Creek less than a mile upstream from the Santa Barbara Mission.

A 1986 study of the biology of Rattlesnake Canyon Creek states, "Local residents maintain that Rattlesnake Creek has historically contained a native rainbow trout population" (UCSB 1986, p. 148). Sampling was conducted in 1982, 1983, and 1984 as part of this study and *O. mykiss* were found in all three years. The report indicates that the creek was stocked with rainbow trout in 1975 and 1984 (UCSB 1986).

Rattlesnake Canyon Creek was surveyed in 1994 as part of a survey of Mission Creek and its tributaries. Surveyors observed *O. mykiss* in the creek with one individual measuring over 12 inches in length (Carrillo 1994).

Montecito

Montecito Creek consists of about 3.5 stream miles and is formed by the confluence of Cold Spring Canyon and Hot Springs Canyon creeks. It flows south, entering the Pacific Ocean south of the town of Montecito.

A review of historical information was performed as part of the Conception Coast project in 2002. That report cites Brian Trautwein as confirming the presence of *O. mykiss* in Montecito Creek in the 1980s (Stoecker *et al.* 2002).

The Conception Coast project includes observations of *O. mykiss* juveniles and individuals to about 11 inches in length in Montecito Creek between 1997 and 2002 (Stoecker *et al.* 2002).

Oak

Oak Creek consists of about 2.7 stream miles. It flows south, entering the Pacific Ocean near the town of Montecito.

Staff from NMFS surveyed Oak Creek in 2002 as part of a study of steelhead distribution in southern California. The creek was found to be dry, indicating "absence" of steelhead from the system (NMFS 2003).

San Ysidro

San Ysidro Creek consists of about 3.5 stream miles. It flows south through Montecito, entering the Pacific Ocean west of Fernald Point.

As part of a 2002 study, *O. mykiss* observations were summarized for the southern Santa Barbara County area. The report cites surveys in 2001 that produced observations of *O. mykiss* YOY and individuals to 13 inches in length in San Ysidro Creek. The report also cites Karl Treiber as observing "several" juvenile *O. mykiss* in 2002 (Stoecker *et al.* 2002).

Romero

Romero Creek consists of about 4.6 stream miles. It flows southwest, entering the Pacific Ocean at Fernald Point.

A 1974 letter to the RWQCB discusses steelhead in Santa Barbara County streams. The letter includes Romero Creek in a list of streams "having historical runs of anadromous trout" (Gantt 1974). The basis for this determination is not provided in the letter.

An 11 inch *O. mykiss* individual was observed in the Romero Creek lagoon in 2001 (Stoecker *et al.* 2002). In 2006, *O. mykiss* was observed by NMFS staff in Romero Creek, although a record of this observation could not be obtained.

Arroyo Paredon

Arroyo Paredon consists of about 5.3 stream miles. It flows south, entering the Pacific Ocean at the town of Serena.

As part of a 2002 study, *O. mykiss* observations were summarized for the southern Santa Barbara County area. The report cites Karl Treiberg as observing "rainbow trout averaging 4-6 inches" downstream from the Highway 192 bridge in 2000 (Stoecker *et al.* 2002).

Santa Monica

Santa Monica Creek flows south about five miles from headwaters in Santa Monica Canyon. It enters the Pacific Ocean at Sandyland Cove via the Carpinteria Salt Marsh complex.

As part of a 2002 study, *O. mykiss* observations were summarized for the southern Santa Barbara County area. The report cites Irving Treloar as having caught rainbow trout in Santa Monica Creek,
likely in the 1930s or 1940s (Stoecker *et al.* 2002).

Franklin

Franklin Creek flows south about three miles, entering the Pacific Ocean at Sandyland Cove via the Carpinteria Salt Marsh complex. The lowermost portion is noted as being conveyed in a ditch on USGS maps.

As part of a 2002 study, *O. mykiss* observations were summarized for the southern Santa Barbara County area. The report cites Irving Treloar as having caught rainbow trout in Franklin Creek, likely in the 1930s or 1940s (Stoecker *et al.* 2002).

Carpinteria

Carpinteria Creek consists of about 6.5 stream miles. It flows southwest, entering the Pacific Ocean at the city of Carpinteria.

A review of historical information was performed as part of the Conception Coast project in 2002. That report cites George Bliss as confirming the presence of *O. mykiss* in Carpinteria Creek in 1942 (Stoecker *et al.* 2002).

A 1974 letter to the RWQCB discusses steelhead in Santa Barbara County streams. The letter includes Carpinteria Creek in a list of streams “having historical runs of anadromous trout” (Gantt 1974). The basis for this determination is not provided in the letter.

Carpinteria Creek was surveyed in 1994 and 1995. Multiple *O. mykiss* year classes were observed, including individuals to about 12 inches in length (Cardenas 1995). The rainbow trout density in upper Carpinteria Creek was noted as “3” on a five point scale with five indicating “many” individuals (DFG 1994b).

Carpinteria Creek was surveyed in 2004 as part of a steelhead habitat and population study. Multiple *O. mykiss* year classes were observed and the study report notes 3.4 miles of “high quality steelhead habitat” in upper Carpinteria Creek (ECI 2004). The study estimated that the Carpinteria Creek rainbow trout population consisted of “perhaps 2,000 to 5,000” (ECI 2004). Two steelhead measuring about 26 inches were observed in lower Carpinteria Creek in March 2008, along with seven or eight *O. mykiss* ranging in size between about three and six inches (Capelli pers. comm.). The observer noted an at-grade stream crossing that likely prevented upstream migration at lower flows.

Gobernador

Gobernador Creek consists of about 3.2 stream miles and is tributary to Carpinteria Creek. It flows west, entering Carpinteria Creek at about stream mile 2.2.

A 1974 letter to the RWQCB discusses steelhead in Santa Barbara County streams. The letter includes Gobernador Creek in a list of streams “having historical runs of anadromous trout” (Gantt 1974). The basis for this determination is not provided in the letter.

Gobernador Creek was surveyed in 1992. One *O. mykiss* year class was observed (Unknown 1993).

Gobernador Creek was surveyed in 2004 as part of a steelhead habitat and population study. Multiple *O. mykiss* year classes were observed and the study report notes “excellent habitat conditions” and 2.3 miles of “high quality steelhead habitat” (ECI 2004).

Eldorado

Eldorado Creek consists of about 3.5 stream miles. Its confluence with Steer Creek is the headwaters of Gobernador Creek.

A review of historical information was performed as part of the Conception Coast project in 2002. That report cites Arve Sjovold as confirming the presence of *O. mykiss* in Eldorado Creek in 1959.

Eldorado Creek was surveyed in 2004 as part of a steelhead habitat and population study. Multiple *O. mykiss* year classes were observed and the study report notes “excellent habitat conditions” and 1.9 miles of “high quality steelhead habitat” (ECI 2004).

Steer

Steer Creek consists of about 3.5 stream miles. Its confluence with Eldorado Creek is the headwaters of Gobernador Creek.

A review of historical information was performed as part of the Conception Coast project in 2002. That report cites Arve Sjovold as confirming the presence of *O. mykiss* in Steer Creek in 1959.

Staff from DFG surveyed Steer Creek in 1994 and observed multiple *O. mykiss* year classes. The survey report notes a “dense” population and states, “Age estimates difficult due to the emaciated condition of the trout” (DFG 1994c).

Steer Creek was surveyed in 2004 as part of a steelhead habitat and population study. Multiple *O. mykiss* year classes were observed and the study report notes 1.5 miles of “high quality steelhead habitat” (ECI 2004).

Sutton Canyon

Sutton Canyon Creek consists of about 2.9 stream miles and is tributary to Carpinteria Creek. It flows southeast, entering Carpinteria Creek west of Snowball Mountain.

Sutton Canyon Creek was surveyed in 2004 as part of a steelhead habitat and population study. Multiple *O. mykiss* year classes were observed [confirm] and the study report notes 2.0 miles of “high quality steelhead habitat” (ECI 2004).

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Table 5. Distribution status of *O. mykiss* in coastal streams of Santa Barbara County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Santa Maria River	Santa Maria River	DF	DF	Y	Y	1
Santa Maria River	Suey	PB	UN		UN	0
Santa Maria River	Cuyama River	DF	UN	Y	UN	0
Santa Maria River	Alamo	DF	UN	Y	N	0
Santa Maria River	Kelly Canyon	UN	UN		N	0
Santa Maria River	Santa Barbara Canyon	PS	UN		N	0
Santa Maria River	Alamo Canyon	UN	UN		N	0
Santa Maria River	Tinta	UN	UN		N	0
Santa Maria River	Rancho Nuevo	UN	UN		N	0
Santa Maria River	Deal Canyon	DF	UN		N	0
Santa Maria River	Reyes	DF	UN		N	0
Santa Maria River	Alamo	UN	UN		N	0
Santa Maria River	Beartrap	DF	UN		N	0
Santa Maria River	Sisquoc River	DF	DF	Y	Y	3
Santa Maria River	Tepusquet	DF	DF		Y	2
Santa Maria River	La Brea	DF	UN	Y	UN	0
Santa Maria River	North Fork La Brea	DF	UN		UN	0
Santa Maria River	Horse Canyon	UN	UN		UN	0
Santa Maria River	Manzana	DF	DF		Y	3
Santa Maria River	Davy Brown (Fir Canyon)	DF	DF	Y	Y	3
Santa Maria River	Munch Canyon	DF	DF		Y	3
Santa Maria River	Sunset Valley	DF	UN		UN	0
Santa Maria River	Fish	DF	DF		Y	2
Santa Maria River	Abel Canyon	DF	DF		Y	3
Santa Maria River	South Fork Sisquoc River	DF	DF		Y	3
Santa Maria River	White Ledge Canyon	DF	UN		UN	0
Santa Maria River	Rattlesnake Canyon	DF	DF		Y	3
Santa Maria River	Big Pine Canyon	DF	PB		UN	0
San Antonio	San Antonio	UN	PA		UN	0
Santa Ynez River	Santa Ynez River	DF	DF	Y	Y	3

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 5. Distribution status of *O. mykiss* in coastal streams of Santa Barbara County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Santa Ynez River	San Miguelito	DF	DF	Y	N	2
Santa Ynez River	Salsipuedes	DF	DF	Y	Y	3
Santa Ynez River	El Jaro	DF	DF	Y	Y	3
Santa Ynez River	Los Amoles	PB	PB		UN	0
Santa Ynez River	Ytias	DF	DF		Y	3
Santa Ynez River	Zaca	DF	UN	Y	UN	0
Santa Ynez River	Nojoqui	DF	DF	Y	Y	1
Santa Ynez River	Alisal	DF	DF	Y	Y	1
Santa Ynez River	Alamo Pintado	DF	DF	Y	Y	3
Santa Ynez River	Quiota	DF	DF	Y	Y	3
Santa Ynez River	Quiota tributary	DF	DF		Y	3
Santa Ynez River	Zanja de Cota (Santa Cota)	DF	UN		UN	0
Santa Ynez River	San Lucas	UN	UN		UN	0
Santa Ynez River	Hilton	DF	DF		Y	3
Santa Ynez River	Cachuma	DF	DF	Y	N	1
Santa Ynez River	Lion Canyon	DF	DF	Y	N	1
Santa Ynez River	Tequepis Canyon	DF	DF	Y	N	3
Santa Ynez River	Santa Cruz	DF	DF	Y	N	3
Santa Ynez River	Peachtree Canyon	UN	UN		N	0
Santa Ynez River	Santa Cruz tributary (Little Pine Spring)	DF	DF	Y	N	3
Santa Ynez River	Black Canyon	UN	UN		N	0
Santa Ynez River	West Fork Santa Cruz	DF	DF	Y	N	3
Santa Ynez River	Coche	DF	DF	Y	N	3
Santa Ynez River	East Fork Santa Cruz	DF	DF	Y	N	3
Santa Ynez River	Grapevine	DF	DF	Y	N	3
Santa Ynez River	Kelly	DF	UN	Y	N	0
Santa Ynez River	Bear	DF	DF	Y	N	2
Santa Ynez River	Paradise Canyon	UN	UN		N	0
Santa Ynez River	Oso Canyon	UN	UN		N	0

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 5. Distribution status of *O. mykiss* in coastal streams of Santa Barbara County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Santa Ynez River	Arroyo Burro	PS	UN		N	0
Santa Ynez River	Devils Canyon	DF	DF	Y	N	3
Santa Ynez River	Gidney	DF	DF	Y	N	2
Santa Ynez River	Camuesa	DF	DF	Y	N	1
Santa Ynez River	Mono	DF	DF	Y	N	2
Santa Ynez River	Indian	DF	DF	Y	N	3
Santa Ynez River	Buckhorn	DF	DF	Y	N	3
Santa Ynez River	Alamar Canyon	DF	UN	Y	N	0
Santa Ynez River	Blue Canyon	DF	DF	Y	N	3
Santa Ynez River	Escondido Canyon	DF	DF	Y	N	2
Santa Ynez River	Agua Caliente Canyon	DF	DF	Y	N	1
Santa Ynez River	Fox (Pipeline)	DF	DF	Y	N	3
Santa Ynez River	Alder	DF	DF	Y	N	3
Santa Ynez River	Franklin	DF	DF	Y	N	1
Santa Ynez River	North Fork Juncal	DF	DF	Y	N	3
Santa Ynez River	Satna Ynez River tributary (Steelhead)	DF	DF	Y	N	1
Cañada Honda	Cañada Honda	UN	PA		UN	0
Jalama	Jalama	DF	PA		UN	0
Cañada del Cojo	Cañada del Cojo	UN	UN		UN	0
Cañada de Santa Anita	Cañada de Santa Anita	DF	UN		UN	0
Cañada del Sacate	Cañada del Sacate	UN	UN		UN	0
Cañada de la Gaviota (Gaviota)	Cañada de la Gaviota (Gaviota)	DF	DF	Y	Y	3
Cañada de la Gaviota (Gaviota)	Las Canovas	DF	DF		UN	1
Cañada de San Onofre	Cañada de San Onofre	DF	PA		UN	0
Arroyo Hondo	Arroyo Hondo	DF	DF		Y	3
Arroyo Quemado	Arroyo Quemado	DF	DF	Y	UN	2
Tajiguas	Tajiguas	DF	UN	Y	N	0

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 5. Distribution status of *O. mykiss* in coastal streams of Santa Barbara County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Cañada del Refugio (Refugio)	Cañada del Refugio (Refugio)	DF	PA	Y	N	0
Cañada del Venadito	Cañada del Venadito	UN	UN		N	0
Cañada del Corral	Cañada del Corral	DF	UN	Y	N	0
Cañada del Capitan	Cañada del Capitan	DF	PA	Y	N	0
Gato Canyon	Gato Canyon	DF	UN		UN	0
Dos Pueblos Canyon	Dos Pueblos Canyon	DF	DF	Y	N	3
Eagle Canyon	Eagle Canyon	UN	UN		UN	0
Tecolote Canyon	Tecolote Canyon	DF	DF	Y	N	0
Bell Canyon	Bell Canyon	PS	PA		N	0
Goleta Sough complex	Tecolotito (Glen Annie Canyon)	DF	UN		UN	0
Goleta Sough complex	San Jose	DF	DF		UN	3
Goleta Sough complex	San Pedro	DF	DF		Y	2
Goleta Sough complex	Atascadero	DF	DF		Y	2
Goleta Sough complex	Maria Ygnacio	DF	DF	Y	Y	2
Goleta Sough complex	San Antonio	DF	UN		UN	0
Arroyo Burro	Arroyo Burro	DF	UN		N	0
Mission	Mission	DF	DF	Y	Y	3
Mission	Rattlesnake Canyon	DF	DF	Y	UN	3
Montecito	Montecito	DF	DF		Y	3
Oak	Oak	UN	PA		UN	0
San Ysidro	San Ysidro	DF	DF		Y	2
Romero	Romero	DF	DF		UN	1
Arroyo Paredon	Arroyo Paredon	DF	DF		UN	1
Carpinteria Salt Marsh complex	Santa Monica	PB	PA		UN	0
Carpinteria Salt Marsh complex	Franklin	PB	PA		UN	0
Carpinteria	Carpinteria	DF	DF		Y	3
Carpinteria	Gobernador	DF	DF		Y	3

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 5. Distribution status of *O. mykiss* in coastal streams of Santa Barbara County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Carpinteria	Eldorado	DF	DF		Y	3
Carpinteria	Steer	DF	DF		Y	3
Carpinteria	Sutton Canyon	DF	DF		Y	3

[1]Please see Methods section for an explanation of titles and values used in this table.

FPO - figure 18

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Rincon

Rincon Creek consists of about 9.7 stream miles. It flows southwest, entering the Pacific Ocean at Rincon Point. The culvert at the Highway 101 crossing is a total passage barrier (Stoecker *et al.* 2002).

A watershed plan prepared for Rincon Creek includes a review of historical steelhead information. The review notes *O. mykiss* stocking occurred in the 1940s and subsequently. Anecdotal accounts of trout observations from the 1950s to the 1980s also are included (Tetra Tech 2007; Stoecker *et al.* 2002).

Rincon Creek was surveyed in 1993 and no fish were observed. The survey report states, "Sediment inputs from Casitas Creek are destroying downstream habitat" (Unknown 1993). A 1994 DFG memo relayed the results of surveys from that year. The memo states, "The Wheeler Fire [in 1985] could have been the event that eradicated rainbow trout from Rincon Creek, although there is anecdotal information from a landowner along Rincon Creek that suggests that the population was extirpated as early as the 1960's" (DFG 1994a). The memo adds, "It appears that the Highway 101 culvert has prevented the recolonization of rainbow trout/steelhead in Rincon Creek" (DFG 1994a).

Consultants surveyed Rincon Creek as part of a steelhead study, and observed *O. mykiss* likely representing one year class in 2001 (Stoecker *et al.* 2002). A 2002 memo from NMFS staff states, "Rincon Creek provides approximately 4 miles of steelhead spawning and rearing habitat…" (NMFS 2002a). A 2002 study report notes water quality impacts on Rincon Creek from the large sediment load carried by Casitas Creek, a tributary (Stoecker *et al*. 2002).

A 2006 survey found seven trout in Rincon Creek upstream from the Casitas Creek confluence (Bates pers. comm.). Survey and other information was used to prepare a watershed plan in 2007. The plan notes reaches of "fair" and "good" steelhead habitat between the Highway 101 culvert and the Casitas Creek confluence, and "good" and "very good" habitat upstream to the rock quarry (Tetra Tech 2007). The plan recommends erosion control, non-native plant control, riparian re-vegetation, and channel re-configuration projects to address factors limiting steelhead habitat in the Rincon Creek watershed.

Ventura River

The Ventura River consists of about 16.5 stream miles and drains a watershed of about 228 square miles. Its headwaters are the confluence of Matilija Creek and North Fork Matilija Creek near the town of Ojai. It flows south, entering the Pacific Ocean west of the city of Ventura. The Robles Diversion Dam, located at about stream mile 14.5, was constructed in the mid 1950s and was used to convey Ventura River flows to Lake Casitas for storage beginning in 1959. The operating agreement for Ventura River diversions stipulates a 30 cfs flow during steelhead migration season. Immediately after storm events, 50 cfs is discharged and ramped down to 30 cfs to mimic the natural hydrograph (NHI 2006; Lewis pers. comm.).

A 1946 DFG correspondence concerning the then-proposed Matilija Dam included an estimate of the Ventura River watershed steelhead run of about 4,000 to 5,000 individuals (DFG 1946b). The estimating method is not described in the correspondence. The document states, "It is our belief that 48 percent of the adult steelhead spawn in the ten miles below the Matilija dam site…" (DFG 1946b). In a 1973 DFG letter staff states, "As recently as in the 1950s, the Ventura River steelhead run involved an estimated 2,500 to 3,000 fish" (DFG 1973). The source of this estimate is not provided in the letter.

A DFG survey report from 1934 noted that the Ventura River was "of no [habitat] value except for SH run in winter" due largely to water diversion (DFG 1934). The California Fish and Game journal from 1938 states about the Ventura, "This is a trout stream right down to the ocean" (DFG 1938).

A 1946 issue of the journal notes, "The Division of Fish and Game reports large and consistent runs into [the] Ventura…" (DFG 1946c). In 1947 DFG staff noted, "An estimated 250-300 adult steelhead were found to be present in scattered pools throughout the [lower] 5 miles…" (DFG 1947a). The 1947 memo adds, "In general the adult steelhead averaged 24-26 inches in length and weighed an estimated 5-6 pounds" (DFG 1947a). Staff from DFG proposed that during a dry year about two miles of the lower Ventura River was suitable for spawning that could support a run of about 1,000 individuals.

As part of a study of freshwater fishes and habitat, the Ventura River was surveyed in 1975 at Foster Park and immediately downstream from the Mitilija Creek confluence. One *O. mykiss* individual about 7.9 inches in length was observed at the downstream location, while individuals between about 2.3 and 6.5 inches in length were observed upstream (Swift 1975).

The Ventura River was studied in 1976-1977 as part of a water resources planning process and juvenile *O. mykiss* was observed. The report states, "…the Casitas Springs trout population is a mixture of resident rainbow trout and steelhead" (EDAW 1981). The investigators estimated the average run size at about 100 individuals and concluded that the population was limited primarily by "the quantity and quality of the summer juvenile rearing habitat" (EDAW 1981).

An EPA memo documents observations of adult steelhead in-migrants in the upper Ventura River estuary in 1991 (EPA 1991). Staff from DFG observed multiple *O. mykiss* year classes, with individuals to about 13.8 inches in length upstream from the diversion dam in 1992 (DFG 1999). The survey report states noted "very good spawning habitat and good rearing habitat" upstream from the dam and "generally poor" habitat downstream from the dam (DFG 1999).

A fish survey crew observed adult steelhead between about 22 and 25 inches in the lower Ventura River in July 2007 and NMFS staff made additional observations of two adult steelhead in August 2007 (NFMS 2007). Two adult steelhead estimated to be about 21 and 25 inches in length were recorded on video in the Robles Diversion Fish Passage Facilities in February 2008 (Capelli pers. comm.).

Coyote

Coyote Creek consists of about 13.3 stream miles and is tributary to the Ventura River. The El Rancho Cola Dam was constructed in the early 1950s at about stream mile 2.7. Casitas Dam, forming Lake Casitas, was completed in 1959 at about stream mile 2.5.

A letter written by a long-time Ventura County resident describes steelhead resources of the Ventura River system. The letter states, "As kids [in the late 1930s through the mid 1940s] we fished the headwaters of [Coyote Creek] during the summer trout season and caught a good number of land-locked steelhead up to 30 inches in length" (Unknown 1970).

In a 1951 DFG memo staff refers to Coyote Creek flows as "permanent though limited". The memo states, "Anadromous fishes reportedly have had access to the first 2 1/2 miles of stream above El Rancho Cola Dam where further progress is blocked by a falls. No tributaries of any importance are found in this 2 1/2 mile section which contains excellent spawning areas" (DFG 1951a).

Coyote Creek was stocked in 1976 (Moore 1980a). Staff from USFS surveyed Coyote Creek in 1979 and observed "abundant" *O. mykiss*, including YOY and individuals to 14 inches in length. The survey report states, "Coyote Creek at one time (prior to the construction of Casitas Dam, 1958) supported a "good" approx. 500 run of steelhead trout. I would presume that an unknown number of spawning rainbow trout from Lake Casitas currently utilize Coyote Creek for a portion of each winter/spring for spawning purposes, especially in the lowermost reaches of the stream" (Moore 1980a).

Santa Ana

Santa Ana Creek consists of about six stream miles and is tributary to Coyote Creek. The lower three miles of the creek was inundated by Lake Casitas.

A letter written by a long-time Ventura County resident describes steelhead resources of the Ventura River system. The letter states, "As kids [in the late 1930s through the mid 1940s] we fished the headwaters of [Santa Ana Creek] during the summer trout season and caught a good number of land-locked steelhead up to 30 inches in length" (Unknown 1970).

Staff from USFS surveyed Santa Ana Creek in 1979 and observed *O. mykiss*. A 1980 report recommends, "Stipulate conditions of diversion to insure sufficient surface flow [in Santa Ana Creek] for maintenance of fish below diversion in summer and fall and drought years" (Moore 1980a).

San Antonio

San Antonio Creek consists of about 8.5 stream miles draining an area of about 84 square miles. It flows southwest, entering the Ventura south of the town of Oak View.

Staff from DFG sampled San Antonio Creek in 1982 and noted two year classes of *O. mykiss* in the lower creek reach (DFG 1982). The creek was sampled again in 1992 when only one individual believed to be of hatchery origin was observed. The survey report states, "Habitat throughout San Antonio Creek is very good and this stream possesses the most abundant steelhead spawning areas presently available in the Ventura River system" (DFG 1999). In a 1993 survey of San Antonio Creek, no trout were observed (DFG 1994b).

Oncorhynchus mykiss was observed in an isolated pool in San Antonio Creek in 1999. The location was downstream from the Thacher Creek confluence (Padre Associates Inc. 2000). Staff from NMFS reported an observation of an adult steelhead in San Antonio Creek in 2001 (NMFS 2002b).

Ojai

Ojai Creek consists of about 3.6 stream miles and is tributary to San Antonio Creek. It flows south and is channelized for most of its length passing through the town of Ojai.

The California Fish and Game journal from 1946 states, "[Rainbow trout] was no doubt a native species in southern California. A specimen was collected in Ojai Creek, Ventura County, in 1875" (DFG 1946c).

Gridley Canyon

Gridley Canon Creek consists of about 3.1 stream miles and is a headwaters tributary of San Antonio Creek. If flows southeast to its confluence with Senior Canyon Creek.

A 1944 fish rescue report indicates that *O. mykiss* fingerlings were present in Gridley Canyon Creek (DFG 1944). In 1971, rainbow trout were moved from Matilija Creek to Gridley Creek (Moore 1980a). Staff from USFS surveyed Gridley Canyon Creek in 1979 and observed "common" *O. mykiss*. The survey report states, "Gridley Creek used to have a run of steelhead rainbow trout. This declined and vanished with the development of the Ojai Valley" (Moore 1980a).

Notes regarding steelhead sightings indicate that *O. mykiss* YOY were observed in 2001 (NMFS 2002c).

Matilija

Matilija Creek consists of about 14.8 stream miles. The confluence of Matilija Creek and North Fork Matilija Creek form the Ventura River. The creek flows southeast to join the North Fork Matilija upstream from Sopers Ranch. Matilija Dam, constructed in 1947, is located at stream mile 0.5.

A 1946 DFG correspondence concerning the then-proposed Matilija Dam included an estimate of the Matilija Creek steelhead run of about 2,000 to 2,500 individuals (DFG 1946b). The document states regarding the area affected by the dam, "This area comprises one of the best spawning grounds of the entire [Ventura] river system, and the distance above the dam represents approximately twelve miles of spawning area or one-half of the entire stream area of the Matilija-Ventura section" (DFG 1946b).

A DFG memo from 1956 indicated that successful *O. mykiss* reproduction occurred downstream from Matilija Dam. Regarding Matilija Creek upstream from Matilija Lake, the memo states, "This area supports and sustains a native trout population" (DFG 1956a).

As part of a study of freshwater fishes and habitat, Matilija Creek was surveyed in 1975 and *O. mykiss* was observed immediately upstream from the reservoir (Swift 1975). Staff from USFS surveyed Matilija Creek in 1979 and observed "common" *O. mykiss*. The survey report states, "Good summer holding water exists, high potential for excellent 'large' RBT fishery" (Moore 1980a). The report notes periodic stocking of the creek.

Matilija Creek was surveyed in 1992 between the North Fork confluence and Matilija Dam. Staff from DFG did not observe *O. mykiss* (DFG 1999). As part of a larger study of streams of the Los Padres National Forest, USFS staff surveyed Matilija Creek in 1999. Multiple *O. mykiss* year classes were observed at four sampling locations (USFS 1999).

Matilija Creek was sampled in 2003 as part of a study of the genetic structure of southern California *O. mykiss*. The resulting 2006 report notes that the Upper North Fork and Matilija creeks populations are most closely related to populations downstream from the Matilija Dam (Girman and Garza 2006). Steelhead habitat in the upper Matilija Creek basin was assessed in 2003. Four *O. mykiss* individuals were observed at one of the eight mainstem Matilija Creek survey reaches. The assessment states, "Most of the 'good' spawing and rearing habitat in the mainstem Matilija was located in the upper portions of the watershed, whereas the lower reaches typically contained little spawning habitat and only 'fair' or 'fair to good' rearing habitat…" (TRPA 2003, p. 21).

Matilija Dam removal is in an advanced state of planning and has been estimated to cost $130 million to more than $144 million. The project may occur in 2011 or 2012, according to staff from the Army Corps of Engineers (Biasotti 2007).

North Fork Matilija

North Fork Matilija Creek consists of about eight stream miles and is tributary to Matilija Creek. It flows southwest to join the mainstem, thus forming the headwaters of the Ventura River.

A 1946 DFG correspondence concerning the then-proposed Matilija Dam states, "The North Fork of the Matilija represents a very small portion of the available spawning area of the Ventura System due to the fact that water conditions are poor" (DFG 1946b).

As part of a study of freshwater fishes and habitat, North Fork Matilija Creek was surveyed in 1975 and *O. mykiss* between about 1.8 and 5.5 inches in length were observed (Swift 1975). Staff from USFS surveyed North Fork Matilija Creek in 1979 and observed "few" *O. mykiss*. The survey report states, "Intense angling pressure…has caused the elimination of the wild trout fishery…" (Moore 1980a). The report notes regular stocking of the creek.

North Fork Matilija Creek was surveyed in 1993 and multiple *O. mykiss* year classes were observed. The population appeared to be dominated by "wild rainbow trout" although individuals of hatchery origin also were present (DFG 1994b). Snorkel surveys conducted in 1999 and 2000 indicated that multiple *O. mykiss* year classes were present at two North Fork Matilija Creek sites (USFS 2006).

North Fork Matilija Creek was sampled in 2003 as part of a study of the genetic structure of southern California *O. mykiss*. The resulting report notes that the North Fork Matilija Creek population is more closely related to populations upstream from the Matilija Dam than to other populations considered in the study (Girman and Garza 2006). Steelhead habitat in the upper Matilija Creek basin was assessed in 2003. *Oncorhynchus mykiss* individuals were observed the two North Fork Matilija Creek survey reaches, and redds were noted in one of the reaches. The assessment states, "[The Lower North Fork] contained consistently good habitat throughout all mapped reaches" (TRPA 2003, p. 21).

Bear

Bear Creek consists of about three stream miles and is tributary to North Fork Matilija Creek. It flows west, entering North Fork Matilija Creek upstream from Wheeler Gorge.

Bear Creek was sampled in 2003 as part of a study of the genetic structure of southern California *O. mykiss*. Individuals between about three and seven inches in length were observed and tissue samples were collected (NMFS 2006). The resulting report notes that the Bear Creek population is more closely related to populations upstream from the Matilija Dam than to other populations considered in the study (Girman and Garza 2006).

Murietta Canyon

Murietta Canyon Creek consists of about 3.5 stream miles and is tributary to Matilija Creek. It flows east, entering Matilija Creek about five miles upstream from Lake Matilija.

Staff from USFS surveyed Murietta Creek in 1979 and observed "many" *O. mykiss*. The survey report notes periodic stocking and states, "Small but valuable and self sustaining RBT fishery" (Moore 1980a).

Murietta Canyon Creek was surveyed in 2003 as part of an assessment of steelhead habitat in the Matilija Creek basin. Two "rainbow trout" were observed during the surveys (TRPA 2003).

Upper North Fork Matilija

Upper North Fork Matilija Creek consists of about 6.7 stream miles and is tributary to Matilija Creek. It enters Matilija Creek from the north, opposite from Murietta Canyon Creek.

Staff from USFS surveyed Upper North Fork Matilija Creek in 1979 and observed "abundant" *O. mykiss*. The survey report notes stocking in that year and "Very poor habitat at base flows" (Moore 1980a).

Sampling was performed on Upper North Fork Matilija Creek as part of an academic study in 1993. One *O. mykiss* year class was recorded (Carpanzano 1996). Staff from USFS surveyed Upper North Fork Matilija Creek in 1996 and observed multiple *O. mykiss* year classes (USFS 2006).

Upper North Fork Matilija Creek was sampled in 2003 as part of a study of the genetic structure of southern California *O. mykiss*. The resulting 2006 report notes that the Upper North Fork and Matilija creeks populations are most closely related to populations downstream from the Matilija Dam (Girman and Garza 2006). Steelhead habitat in the upper Matilija Creek basin was assessed in 2003. *Oncorhynchus mykiss* individuals were observed at four of the four Upper North Fork Matilija Creek survey reaches. The assessment states, "[The Upper North Fork] contained consistently good habitat throughout all mapped reaches" (TRPA 2003, p. 21).

Upper North Fork Matilija tributary

An unnamed tributary to Upper North Fork Matilija Creek consists of about 2.5 stream miles. The creek flows southwest entering the Upper North Fork at about stream mile 2.6. A falls is located at about stream mile 0.8 on the tributary that is considered a total passage barrier (TRPA 2003).

Steelhead habitat in the upper Matilija Creek basin was assessed in 2003. Five *O. mykiss* individuals were observed at the Upper North Fork Matilija Creek tributary survey reach. The assessment states, "Overall the habitat quality rating for this tributary was judged as good" (TRPA 2003, p. 16).

Old Man Canyon

Old Man Canyon Creek consists of about three stream miles and is tributary to Matilija Creek. It flows east, entering Matilija Creek about 1.5 miles upstream from the Murietta Canyon and Upper North Fork Matilija creeks confluences.

Steelhead habitat in the upper Matilija Creek basin was assessed in March 2003. Two *O. mykiss* individuals were observed at one of the five Old Man Canyon Creek survey reaches (TRPA 2003).

Santa Clara River

The Santa Clara River drains a watershed of about 1,600 square miles and flows chiefly west, entering the Pacific Ocean south of the city of Ventura. The reach between the junction of Soledad and Aliso canyons and the mouth consists of about 75 stream miles.

The Vern Freeman Diversion Dam was constructed in 1991 at about stream mile ten. A fishway was provided at the facility that became operational in 1991. Additionally, several reservoirs are located in the basin on Santa Clara River tributaries.

A 1980 assessment of then-proposed improvements to the Vern Freeman Diversion included an estimate of the historical steelhead run in the Santa Clara River. Based on run size estimates for Matilija Creek and comparison of habitat information between Matilija Creek and the Santa Clara River watershed, the author projected a run of about 9,000 individuals (Moore 1980b, p. 15). The assessment report characterized the estimate as "reasonable" and "conservative" (Moore 1980b).

A 1946 issue of the DFG journal relays, "The Division of Fish and Game reports large and consistent [steelhead] runs into Ventura and Santa Clara rivers…" (DFG 1946c). Notes from 1947 state, "Below the intake the stream goes dry as all of the water is diverted… There are many small sand diversion dams across the stream and when the steelhead start running there is sufficient flow to wash out these diversions. It is difficult for the young steelhead returning" (DFG 1951b).

Field notes from DFG staff indicate the presence of multiple *O. mykiss* year classes in the Santa Clara River in 1951. A report from 1951 states, "The lower reaches of the Ventura and Santa Clara Rivers are of secondary importance as a means of access by which steelhead trout migrate upstream from the ocean to headwaters tributaries. With increased water development and reduced runoff to the oceans, these runs will unfortunately continue to diminish in size and importance" (DFG 1951c).

A 1974 DFG reference states, "…there is no fishery to speak of in the [Santa Clara] river now" although it notes that "…there are some [steelhead] now that come up during large flows" (DFG 1974). The mainstem Santa Clara was sampled in 1975 as part of a fish distribution study and *O. mykiss* was seen at one of 25 sampling stations. The investigator notes, "[*O. mykiss*] lives in the discharge of Fillmore Fish Hatchery" (Bell 1978). These fish likely were produced by the hatchery (McEachron pers. comm.).

To provide information for analyzing a water diversion application, DFG studied the lower Santa Clara River watershed in 1982-1984. The study indicated that a small number of adult steelhead spawned in the Santa Clara system and that the system supported smolt production (DFG 1985).

Trapping performed between 1994 and 1998 at the Freeman Diversion Dam indicated that a small number of adult steelhead, as well as juvenile *O. mykiss*, were present in the Santa Clara River watershed (Entrix 1998). The consulting biologists categorized the juvenile *O. mykiss* into four groups: wild smolts, wild resident rainbow trout, hatchery-reared rainbow trout, and hatchery-reared smolts. A 1998 report summarizing the results of five years of fish passage monitoring at the Vern Freeman Diversion noted that the 414 smolts captured in 1997 likely comprised "nearly all of the outmigrant steelhead" (Entrix 1998). Trapping results also suggested an emigration peak in April. According to NMFS, less than ten adult steelhead were observed during the period from 1994 to 2000 (NMFS 2000).

The Santa Clara River system was the subject of a 2005 assessment that included an analysis of steelhead recovery opportunities. The resulting report states, "While conditions are poor for spawning and sub-optimal for rearing in most reaches, the mainstem [Santa Clara] is a critical corridor for upstream and downstream steelhead movement" (Stoecker and Kelley 2005, p. 115).

Sampling was conducted in Santa Clara River tributaries in 2003 as part of a study of genetic structure of southern California *O. mykiss*. The resulting 2006 report states, "[The] results suggest that the Santa Clara River trout populations are the most distinct of the 5 basins studied" (Girman and Garza 2006, p. 22).

The current operating practice for the Vern Freeman Diversion Dam is to release 72 cfs through the fishway for ten days following major storm flows. The final biological opinion for operations of the diversion was issued in July 2008 and determined that proposed action would be "likely to destroy or adversely modify critical habitat for [steelhead]." The opinion provided a "reasonable and prudent alternative" for operations (NMFS 2008).

Santa Paula

Santa Paula Creek consists of about 15.5 stream miles and is tributary to the Santa Clara River. It flows south, entering the Santa Clara southeast of the city of Santa Paula. The Harvey Diversion Dam is located at about stream mile 3.8. A fishway is located at the upstream end of the channelization project in lower Santa Paula Creek. According to a 2005 assessment, "Fish ladder facilities at the Army Corps Channel near the mouth and at Harvey Dam were both damaged so severely [by high flows in 2004/2005] that fish passage at those sites is no longer possible and the entire drainage is effectively inaccessible to steelhead…" (Stoecker and Kelley 2005, p. 120).

An historial researcher noted a newspaper account of a ten pound trout caught in Santa Paula Creek in 1872 (Henke 2007) A field note from DFG staff in 1947 states, "Steelhead go up the Santa Paula, Sespe and Piru Creeks as well as up the main Santa

Clara" (DFG 1951b). In a 1979 survey of Santa Paula Creek, multiple *O. mykiss* year classes were present with individuals to 20 inches in length noted. The survey report indicates stocking of the lower portion of the creek (Moore 1980a).

Santa Paula Creek was surveyed in 1992 and two adult and one YOY *O. mykiss* were observed in a headwaters reach. The survey report noted high turbidity, "poor" habitat, and passage barriers in the lower creek (DFG 1999). In a 1993 survey multiple *O. mykiss* year classes were observed in Santa Paula Creek. The survey report indicates that hatchery fish are regularly planted in Santa Paula Creek (USFS 1993a).

A 1996 monitoring report notes, "…the Santa Paula Diversion blocks upstream access and reduces or eliminates flow downstream of the diversion during the dry season" (Entrix 1996, p. 10). According to the report, "The rainbow trout sampled in Santa Paula and Piru creeks were above barriers to upstream migration and represent a combination of self-sustaining wild and hatchery reared stocks" (Entrix 1996, p. A-3). According to a 1998 report, "A minimum release of 5 cubic feet per second (cfs) is maintained at the dam which may provide spawning and rearing habitat for steelhead in the lower creek" (Entrix 1998, p. 1-4).

As part of a larger study of streams of the Los Padres National Forest, USFS staff surveyed Santa Paula Creek in 1999. Multiple *O. mykiss* year classes were observed at three of four sampling locations (USFS 1999).

Santa Paula Creek was sampled in 2003 as part of a study of the genetic structure of southern California *O. mykiss*. The resulting 2006 report notes, "…population samples, both above and below dams, from the…Santa Clara River formed basin-specific lineages…" (Girman and Garza 2006). Sampling was conducted in Santa Paula Creek for an assessment of the Santa Clara River system in 2004. *Oncorhynchus mykiss* was present at five of 43 study sites and represented four year classes (Stoecker and Kelley 2005). The 2005 assessment includes an analysis of steelhead recovery opportunities in Santa Paula Creek and states, "Santa Paula Creek contained the most productive habitat in the study area for salmonids" (Stoecker and Kelley 2005, p. 4).

Sisar

Sisar Creek consists of about 7.4 stream miles and is tributary to Santa Paula Creek. It flows southeast, entering Santa Paula Creek near the town of Sulphur Springs.

As part of a study of freshwater fishes and habitat, Sisar Creek was surveyed in 1975 and *O. mykiss* between about 1.7 and 6.1 inches in length were observed (Swift 1975). Sisar Creek was surveyed in 1979 and multiple *O. mykiss* year classes were observed, including "abundant" YOY. The survey report states about the lower section, "…good summer holding water, abundant food, adequate cover, suitable water temps…" (Moore 1980a).

Sisar Creek was surveyed in 1992 and *O. mykiss* was not observed. The survey report states, "Sisar Creek has generally good trout habitat including adequate spawning areas" (DFG 1999). As part of a larger study of streams of the Los Padres National Forest, USFS staff surveyed Sisar Creek in 2000. One *O. mykiss* year class was observed (0+) at four sampling locations (USFS 2007).

Sampling was conducted in Sisar Creek for an assessment of the Santa Clara River system in 2004. *Oncorhynchus mykiss* was present at 19 of 36 study sites and represented four year classes (Stoecker and Kelley 2005). The 2005 assessment includes an analysis of steelhead recovery opportunities in Sisar Creek and states, "Sisar Creek accounts for 84% of the trout observed in the Santa Paula Creek drainage" (Stoecker and Kelley 2005, p. 4). Several passage barriers were noted on the creek.

East Fork Santa Paula

East Fork Santa Paula Creek consists of about 2.5 stream miles and is tributary to Santa Paula Creek. It flows west, entering Santa Paula Creek near the Big Cone Campsite.

East Fork Santa Paula Creek was surveyed in 1979 and *O. mykiss* was not observed. The survey report states, "Nevertheless, this stream has enough cover, low enough temperatures (much ground water input) and sufficient food to warrant the re-establishment of a RB trout population (USFS 1979a).

Willard Canyon

Willard Canyon Creek consists of about 2.5 stream miles and is tributary to the Santa Clara River. It flows north, entering the Santa Clara east of the city of Santa Paula.

A 1949 DFG stream survey report noted that stocking of Willard Creek had occurred and that "very few" *O. mykiss* were present. The report states, "This stream and the River of Doubt are the only good constant flowing streams in the Santa Clara River Drainage" (DFG 1949).

Sespe

Sespe Creek consists of about 55 stream miles draining a watershed of about 270 square miles. It flows east in its upper reaches and south in the lower, entering the Santa Clara River southwest of the town of Fillmore.

An account exists of photographs of steelhead caught in the upper Sespe Creek in 1936 (Henke 2007). Staff from DFG surveyed 48 miles of Sespe Creek in 1937 and observed "rare" YOY steelhead (DFG 1937). According to anecdotal accounts, fisherman caught steelhead weighing an estimated seven to eight pounds in upper Sespe Creek in the early 1940s (Henke 2007). A photograph of "a large steelhead kelt" caught near the Cherry Creek confluence also is reported to exist (Henke 2007).

A 1957 DFG analysis of a proposed water diversion states, "…even as late as the season of 1953-54 many steelhead were seen in all the spreading grounds [in the Santa Clara River]. There is evidence that some of these fish reach the upper Sespe and spawned, thus adding to the natural populations of the stream" (DFG 1957).

Sespe Creek was sampled in 1975 as part of a fish distribution study and *O. mykiss* was seen at six of ten sampling stations. The investigator notes, "[*O. mykiss*] almost certainly is native to Sespe Creek" (Bell 1978). Another 1975 study found *O. mykiss* between about 1.4 and 5.7 inches in length at three sampling sites (Swift 1975).

A 1979 survey report notes that Sespe Creek is stocked in its upper portion (Moore 1980a). Staff from USFS surveyed the lower section of Sespe Creek in 1979 and observed "abundant" *O. mykiss*, including individuals to 18 inches in length (Moore 1980a).

Sespe Creek was surveyed between 1981 and 1985. Four *O. mykiss* year classes and no anadromous adults were observed (DFG 1986).

Staff from USFS noted multiple *O. mykiss* year classes during surveys of four Sespe Creek sites in 1993. The resulting report indicated that exotic fish and bullfrogs constituted a management concern (USFS 1993b). The portion of Sespe Creek between Alder and Tar creeks was deemed "excellent" rainbow trout habitat.

In 1994, USFS staff determined that the Sespe Creek watershed was the highest priority of the 12 "anadromous fish watersheds on the Forest". The watershed analysis notes, "The most suitable spawning areas are the riffles of the mid to upper section of the Sespe, Lion, and Tule Creek…" It adds, "The best rearing areas appear to be within the same localities as the best spawning reaches" (USFS 1997a, p. 43). A 1994 memo states, "Though rainbow trout populations are abundant and represented by all age classes, their populations are limited by availability of oversummering habitat" (USFS 1994).

Researchers from the USFS examined rainbow trout habitat use in Sespe Creek in 1994. In a subsequent journal article, the authors noted that seeps likely were essential to *O. mykiss* survival during the summer months for their capacity to create temperature refugia in pools (Matthews 1997).

As part of a larger study of streams of the Los Padres National Forest, USFS staff surveyed Sespe Creek in 1999 and 2000. Multiple *O. mykiss* year classes were observed at six sampling locations (USFS 1999).

A 2005 assessment of the Santa Clara system included an analysis of steelhead recovery opportunities in Sespe Creek. The resulting report states, "The greatest number of trout observed in the Santa Clara River watershed were in the Sespe Creek drainage…and the Sespe had the highest relative abundance of trout" (Stoecker and Kelley 2005, p. 122).

Coldwater Canyon

Coldwater Canyon Creek consists of about 2.2 stream miles and is tributary to Sespe Creek. It flows east, entering Sespe Creek upstream from Devils Gate.

A 1997 watershed analysis for Sespe Creek states, "Coldwater Creek had trout in the past but has become fishless due to severe flood damage and sedimentation within the last ten years" (USFS 1997a, p. 12).

West Fork Sespe

West Fork Sespe Creek consists of more than six stream miles and is tributary to Sespe Creek. It flows east, entering Sespe Creek west of Sulphur Peak.

Staff from USFS surveyed West Fork Sespe Creek in 1979 and observed "common" *O. mykiss*, including individuals to 12 inches in length (Moore 1980a). A 1980 USFS report notes regarding the creek, "The length of suitable Rainbow Trout [habitat] is limited. The cold spring water supplying the base flow is important for summering of young trout" (Moore 1980a).

A 1997 watershed analysis of Sespe Creek states, "Physical boulder or bedrock falls block fish from moving upstream into Coldwater, West Fork, Alder, and Bear Creeks. West Fork and Bear Creeks presently contain rainbow trout that are likely the descendants of fish stocked above the barriers during the 1970s" (USFS 1997a, p. 12).

Sampling was conducted in West Fork Sespe Creek for an assessment of the Santa Clara River system in 2004. *Oncorhynchus mykiss* was present at five of seven study sites and represented four year classes (Stoecker and Kelley 2005). The 2005 assessment included an analysis of steelhead recovery opportunities in West Fork Sespe Creek. The resulting report noted that the creek was important as one of nine streams in the watershed most likely "…to support significant *O. mykiss* stocks during critical low water years…" (Stoecker and Kelley 2005, p. 138).

Alder

Alder Creek consists of about 7.3 stream miles and is tributary to Sespe Creek. It flows south, entering Sespe Creek northeast of Devil's Heart Peak.

Staff from USFS surveyed Alder Creek in 1979 and observed "few" *O. mykiss*. The survey report states, "No evidence of reproduction. The few fingerlings below barrier (1/3 mile above Sespe Creek) believed to originate from Sespe Creek – as no spawning gravel exist in their stretch of stream" (Moore 1980a). The report adds, "Trout has existed in Alder Creek prior to the 1975-1976 drought years – either by stocking or natural occurrence. The total absence…suggests that the drought brought complete expiration [sic] to the inhabiting fish of Alder Creek" (Moore 1980a).

Staff from USFS noted *O. mykiss* during a survey of Alder Creek sites in 1993. Fish habitat was deemed to be "good" (USFS 1993b). A 1997 watershed analysis of Sespe Creek states, "Physical boulder or bedrock falls block fish from moving upstream into Coldwater, West Fork, Alder, and Bear Creeks" (USFS 1997a, p. 12).

Park

Park Creek consists of about 3.1 stream miles and is tributary to Sespe Creek. It flows northwest, entering Sespe Creek downstream from Ten Sycamore Flat.

A 1997 watershed analysis of Sespe Creek states, "Rainbow trout extend up most of the major tributaries of the Sespe including… Park [Creek]…" (USFS 1997a, p. 12).

Sampling was conducted in Park Creek for an assessment of the Santa Clara River system in 2004. *Oncorhynchus mykiss* was present at one of six study sites and represented four year classes (Stoecker and Kelley 2005).

Timber

Timber Creek consists of about four stream miles and is tributary to Sespe Creek. It flows north, entering Sespe Creek near Oak Flat Campsite.

Timber Creek was surveyed in 1979 and *O. mykiss* was observed. The survey report states, "Timber Canyon Creek offers a few trout of catchable size, but serves predominantly as a summer nursery for juveniles, for which the habitat is best suited" (Moore 1980a).

A 1997 watershed analysis of Sespe Creek states, "Rainbow trout extend up most of the major tributaries of the Sespe including… Timber [Creek]…" (USFS 1997a, p. 12).

Sampling was conducted in Timber Creek for an assessment of the Santa Clara River system in 2004. *Oncorhynchus mykiss* was present at four of 14 study sites and represented four year classes (Stoecker and Kelley 2005). The 2005 assessment included an analysis of steelhead recovery opportunities in Timber Creek. The resulting report noted that the creek was important as one of nine streams in the watershed most likely "…to support significant *O. mykiss* stocks during critical low water years…" (Stoecker and Kelley 2005, p. 138).

Bear Canyon

Bear Canyon Creek consists of about three stream miles and is tributary to Sespe Creek. It flows north, entering Sespe Creek near Bear Creek Campsite.

Bear Canyon Creek was surveyed by DFG staff, probably in the 1930s, and steelhead and rainbow trout were found to be present. The survey report notes that the creek's principal value "…is as [a] feeder for Sespe Cr." due to low dry season flows (DFG ca 1930s).

Bear Canyon Creek was surveyed in 1979 and multiple *O. mykiss* year classes were observed. The survey report notes "abundant" *O. mykiss* and the function of Bear Canyon Creek as a summer nursery for juvenile trout (Moore 1980a).

As part of a genetic study, Bear Canyon Creek was sampled in 1995. *Oncorhynchus mykiss* was collected at two sampling sites (USFS 1997b). A 1997 watershed analysis of Sespe Creek states, "Physical boulder or bedrock falls block fish from moving upstream into Coldwater, West Fork, Alder, and Bear Creeks. West Fork and Bear Creeks presently contain rainbow trout that are likely the descendants of fish stocked above the barriers during the 1970s" (USFS 1997a, p. 12).

Sampling was conducted in Bear Canyon Creek for an assessment of the Santa Clara River system in 2004. *Oncorhynchus mykiss* was present at seven of ten sampling sites, all of which showed multiple year classes (Stoecker and Kelley 2005). The 2005 assessment included an analysis of steelhead recovery opportunities in Bear Canyon Creek. The resulting report noted that the creek was important as one of nine streams in the watershed most likely "…to support significant *O. mykiss* stocks during critical low water years…" (Stoecker and Kelley 2005, p. 138).

Trout

Trout Creek consists of about 2.2 stream miles and is tributary to Sespe Creek. It flows south, entering Sespe Creek east of Thacher Cabin.

Trout Creek was surveyed in 1979 and multiple *O. mykiss* year classes were observed, including individuals to 12 inches in length (Moore 1980a). The survey report refers to the creek as a "spawning tributary to Sespe Creek" and states, "Small stream, good trout numbers considering stream size" (Moore 1980a).

As part of a genetic study, Trout Creek was sampled in 1995. *Oncorhynchus mykiss* was collected at five sampling sites (USFS 1997b).

Piedra Blanca

Piedra Blanca Creek consists of about nine stream miles and is tributary to Sespe Creek. It flows southeast, entering Sespe Creek near Thacher Cabin.

Piedra Blanca Creek was surveyed in 1979 and multiple *O. mykiss* year classes were observed. In the lower section, rainbow trout were "very abundant". The survey report states, "Piedra Blanca Creek is a major tributary to Upper Sespe Creek and serves as an important trout fishery/producer to Sespe drainage" (Moore 1980a). Periodic stocking of the upper canyon was noted.

Sampling was conducted in Piedra Blanca Creek for an assessment of the Santa Clara River system in 2004. *Oncorhynchus mykiss* was present at 16 of 22 study sites and represented four year classes, and the total number of individuals observed (2,189) far exceeded the numbers in other study streams in the watershed (Stoecker and Kelley 2005). The 2005 assessment included an analysis of steelhead recovery opportunities in Piedra Blanca Creek. The report noted that the creek was important as one of nine streams in the watershed most likely "…to support significant *O. mykiss* stocks during critical low water years…" (Stoecker and Kelley 2005, p. 138).

Lion Canyon

Lion Canyon Creek consists of about 6.2 stream miles and is tributary to Sespe Creek. It flows north, entering Sespe Creek near Lion Campground.

Lion Canyon Creek was surveyed by DFG staff, probably in the 1930s, and steelhead and rainbow trout were found to be present. The survey report notes the creek's "principal value as [a] feeder for Sespe Cr." (DFG ca 1934a).

Lion Canyon Creek was stocked in 1973 and in subsequent years (Moore 1980a). The creek was surveyed in 1979 and multiple *O. mykiss* year classes were observed, including abundant YOY and individuals to ten inches in length. The survey report notes "good" to "excellent" spawning and nursery habitat and states, "…[Lion Canyon Creek] serves as important spawning flood escape area for Sespe Creek Rainbow Trout" (Moore 1980a).

A 1997 Sespe Creek watershed analysis notes, "The most suitable spawning areas are the riffles of the mid to upper section of the Sespe, Lion, and Tule Creek…" It adds, "The best rearing areas appear to be within the same localities as the best spawning reaches" (USFS 1997a, p. 43).

Sampling was conducted in Lion Canyon Creek for an assessment of the Santa Clara River system in 2004. *Oncorhynchus mykiss* was present at 13 of 30 study sites and represented at four year classes (Stoecker and Kelley 2005). The 2005 assessment included an analysis of steelhead recovery opportunities in Lion Canyon Creek. The report noted that the creek was important as one of nine streams in the watershed most likely "…to support significant *O. mykiss* stocks during critical low water years…" (Stoecker and Kelley 2005, p. 138). The assessment cites a "current prolific *O. mykiss* population" in the creek.

Lion Canyon Creek was sampled in 2003 as part of a study of the genetic structure of southern California *O. mykiss*. The resulting 2006 report notes, "…population samples, both above and below dams, from the…Santa Clara River formed basin-specific lineages…" (Girman and Garza 2006).

Howard

Howard Creek consists of about 3.2 stream miles and is tributary to Sespe Creek. It flows north, entering Sespe Creek northwest of Rose Valley.

A 1944 DFG report notes the presence of *O. mykiss* YOY in Howard Creek (DFG 1944).

Howard Creek was surveyed in 1979 and multiple *O. mykiss* year classes were observed, including individuals to 10 inches in length. The survey report states, "Howard Creek is an important spawning-rearing habitat for its own small resident trout population and also an important cool water tributary to upper Sespe Creek" (Moore 1980a).

Sampling was conducted in Howard Creek for an assessment of the Santa Clara River system in 2004. *Oncorhynchus mykiss* was present at five of seven study sites and represented four year classes (Stoecker and Kelley 2005). The 2005 assessment includes an analysis of steelhead recovery opportunities in Howard Creek and notes that the creek is important as one of nine streams in the watershed most likely "…to support significant *O. mykiss* stocks during critical low water years…" (Stoecker and Kelley 2005, p. 138).

Rose Valley

Rose Valley Creek consists of about 3.1 stream miles and is tributary to Howard Creek. It flows northwest, entering Howard Creek less than one half mile from the mouth of Howard Creek.

Sampling was conducted in Rose Valley Creek for an assessment of the Santa Clara River system in 2004. *Oncorhynchus mykiss* was present at five of nine study sites and represented four year classes (Stoecker and Kelley 2005). A 2005 assessment includes an analysis of steelhead recovery opportunities in Rose Valley Creek and recommends eliminating reservoirs on the creek that may produce adverse effects on the native trout population of the creek (Stoecker and Kelley 2005, pp. 139, 198).

Rock

Rock Creek consists of about 4.4 stream miles and is tributary to Sespe Creek. It flows southeast, entering Sespe Creek west of Rainbow Ranch.

Historical references were reviewed as part of a study of the Santa Clara River watershed and indicate that Rock Creek was stocked in 1948 (Stoecker and Kelley 2005). A 1980 USFS report summarized the results of sampling in 1979. The document indicates one mile of Rock Creek "fishery" on USFS land and indicates the presence of *O. mykiss* in the creek (Moore 1980a).

A 1997 watershed analysis of Sespe Creek states, "Rainbow trout extend up most of the major tributaries of the Sespe including… Rock [Creek]…" (USFS 1997a, p. 12).

Tule

Tule Creek consists of about 4.7 stream miles and is tributary to Sespe Creek. It flows east, entering Sespe Creek near Faser Cold Springs Ranch.

Tule Creek was surveyed by DFG staff, probably in the 1930s, and steelhead and rainbow trout were found to be present. The survey report states regarding Tule Creek, "Small Sespe River feeder and not of great value" (DFG ca 1934b). A 2005 assessment notes Tule Creek stocking records date back to 1942 (Stoecker and Kelley 2005).

Tule Creek was surveyed in 1979 and multiple *O. mykiss* year classes were observed, including "very abundant" YOY and individuals to 12 inches in length. The survey report deems the lower section of Tule Creek "Good – Excellent overall habitat" and states, "This portion of Tule creek is an important spawning tributary to upper Sespe Creek fish" (Moore 1980a).

A 1997 watershed analysis notes, "The most suitable spawning areas are the riffles of the mid to upper section of the Sespe, Lion, and Tule Creek…" It adds, "The best rearing areas appear to be within the same localities as the best spawning reaches" (USFS 1997a, p. 43). A snorkel survey conducted in 2000 indicated that multiple *O. mykiss* year classes were present in one reach of Tule Creek (USFS 2000).

Potrero John

Potrero John Creek consists of about 3.8 stream miles and is tributary to Sespe Creek. It flows south, entering Sespe Creek upstream from the Sespe Gorge.

A 1980 USFS report summarized the results of sampling in 1979. The document indicates two miles of Potrero John Creek "fishery" on USFS land and indicates the presence of *O. mykiss* in the creek (Moore 1980a). The stream survey report indicates that Potrero John "…serves as important spawning-nursery habitat for [the] Upper Sespe [Creek] rainbow trout population" (USFS 1979b).

A 1997 watershed analysis of Sespe Creek states, "Rainbow trout extend up most of the major tributaries of the Sespe including… Potrero John [Creek]…" (USFS 1997a, p. 12).

Munson

Munson Creek consists of about 3.3 stream miles and is tributary to Sespe Creek. It flows south, entering Sespe Creek about 1.8 miles upstream from the confluence of Potrero John Creek.

Munson Creek was surveyed in 1994-1995, when "low abundance" of juvenile *O. mykiss* was observed. Results were presented in a 1997 watershed analysis of Sespe Creek that states, "Rainbow trout extend up most of the major tributaries of the Sespe including…Munson [Creek]…" (USFS 1997a, p. 12).

Chorro Grande Canyon

Chorro Grande Canyon Creek consists of about 3.1 stream mile and is tributary to Sespe Creek. It flows south, entering Sespe Creek near Fell Ranch.

Historical references were reviewed as part of a study of the Santa Clara River watershed and indicate that Chorro Grande Canyon Creek was stocked in 1942 (Stoecker and Kelley 2005).

A watershed analysis was prepared for the Sespe Creek basin in 1997 and included a map indicating *O. mykiss* distribution. Low abundance is shown for Chorro Grande Canyon Creek based on the results of USFS surveys in 1994-1995 (Stoecker and Kelley 2005).

Ladybug

Ladybug Creek consists of about 1.4 stream miles and is tributary to Sespe Creek. It flows north, entering Sespe Creek upstream from Fell Ranch.

A 1997 watershed analysis of Sespe Creek states, "Rainbow trout extend up most of the major tributaries of the Sespe including… Ladybug [Creek]…" (USFS 1997a, p. 12).

Sampling was conducted in Ladybug Creek for an assessment of the Santa Clara River system in 2004. *Oncorhynchus mykiss* was present at two of fives study sites and represented three year classes (Stoecker 2005).

Cherry

Cherry Creek consists of about 1.9 stream miles and is tributary to Sespe Creek. It flows north, entering Sespe Creek upstream from the entrance to Godwin Canyon.

Staff from USFS surveyed Cherry Creek in 1979 and observed "abundant" *O. mykiss*. The survey report states, "As the Sespe goes dry at this area, the cold, shallow perennial flow of Cherry Creek offers summering habitat for juvenile trout" (Moore 1980a). The report notes no stocking of the creek.

A 1997 watershed analysis for Sespe Creek states, "Cherry Creek is…important as the upper most tributary supporting a viable resident trout population (USFS 1997a, p. 58). As part of a larger study of streams of the Los Padres National Forest, USFS staff surveyed Cherry Creek in 1999. Multiple *O. mykiss* year classes were observed at a single sampling location (USFS 1999).

Sampling was conducted in Cherry Creek for an assessment of the Santa Clara River system in 2004. A small number of *O. mykiss* was present at two of six study sites representing two year classes (Stoecker and Kelley 2005).

Abadi

Abadi Creek consists of about 4.7 stream miles and is tributary to Sespe Creek. It flows east, entering Sespe Creek near Upper Hartman Ranch.

According to an anecdotal account, fisherman observed steelhead to 24 inches in length in pools in Abadi Creek in the early 1900s (Henke 2007). Historical references were reviewed as part of a study of the Santa Clara River watershed and indicate that Abadi Creek was stocked in 1942 and 1946 (Stoecker and Kelley 2005).

A watershed analysis was prepared for the Sespe Creek basin in 1997 and included a map indicating *O. mykiss* distribution. Low abundance is shown for Abadi Creek based on the results of USFS surveys in 1994-1995 (Stoecker and Kelley 2005).

Pole

Pole Creek consists of about 5.8 stream miles and is tributary to the Santa Clara River. It flows southwest, entering the Santa Clara southeast of the town of Fillmore.

[Is Moore 1979 anywhere?] A 1980 report indicates the author's opinion that Pole Creek "probably…served as spawning and rearing habitat for the historic steelhead run" (Moore 1980b). The opinion is based on the results of a 1979 survey.

Pole Creek was surveyed in 1992 and *O. mykiss* was not observed. The survey report notes impassable barriers downstream but states, "Trout habitat above the concrete channel is generally good. Thick riparian vegetation exists, along with abundant spawning gravel throughout Pole Creek" (DFG 1999).

A 2005 assessment of the Santa Clara system included an analysis of steelhead recovery opportunities in Pole Creek. The resulting report noted, "Pole Creek had both the lowest quality estimated habitat scores and the least habitat available of all Santa Clara mainstem tributaries measured…" (Stoecker and Kelley 2005, p. 4).

Hopper Canyon

Hopper Canyon Creek consists of about 12.2 stream miles and is tributary to the Santa Clara River. It flows south, entering the Santa Clara southeast of the town of Cavin.

A 1980 report indicates the author's opinion that Hopper Canyon Creek "probably...served as spawning and rearing habitat for the historic steelhead run" (Moore 1980b). The opinion is based on the results of a 1979 survey.

Hopper Canyon Creek was surveyed in 1992 and multiple *O. mykiss* year classes were observed. According to the survey report, "…fair to good spawning areas are located throughout the upper portions of Hopper Creek" (DFG 1999).

A 2005 assessment of the Santa Clara system included an analysis of steelhead recovery opportunities in Hopper Canyon Creek. The resulting report noted that the creek was important as one of nine streams in the watershed most likely "…to support significant *O. mykiss* stocks during critical low water years…" (Stoecker and Kelley 2005, p. 138).

Toms Canyon

Toms Canyon Creek consists of about 2.6 stream miles and is tributary to Hopper Canyon Creek. It flows southeast, entering Hopper Canyon Creek in the lower section of the canyon.

Toms Canyon Creek was surveyed in 1992 and *O. mykiss* was not observed. The survey report relays anecdotal information that the creek often goes dry in summer (DFG 1999).

Piru

Piru Creek consists of about 68 stream miles and is tributary to the Santa Clara River. It flows east in its upper section and then south in its lower. The mouth of the creek is south of the town of Piru.

Santa Felicia Dam, constructed in 1954, is located at about stream mile six and forms Lake Piru. Reservoir releases of five cubic feet per second or the natural flow of Piru Creek into Lake Piru, whichever is less, are required as part of the water district's water right. Pyramid Dam, located at about stream mile 29, forms Pyramid Lake. It was constructed in 1970.

Field notes from DFG staff from 1946 and 1947 indicate that Piru Creek's best habitat was considered to be between the Buck Creek and Lockwood Creek confluences. The notes state, "There are reports that steelhead come up Piru Creek occasionally as far as Snowy and Buck Creeks" (DFG 1951d). The notes also relay that steelhead strandings occurred in 1945 between spreading pools in the lower creek. It is unclear if the stranded fish were smolts or kelts.

Notes from 1951 indicate the presence of "…a fair number of good size trout" near the Fish Creek confluence (DFG 1951d). Piru Creek upstream from this area reportedly did not support trout. A 1951 report on several south coast watersheds notes that Piru Creek is the "principal" area supporting the *O. mykiss* population of the Santa Clara River watershed (DFG 1951c). It also states, "High summer water temperatures above the tolerance of trout also prevent trout development in otherwise suitable streams such as lower Piru Creek" (DFG 1951c).

Piru Creek was sampled in 1975 as part of a fish distribution study and *O. mykiss* was not observed at any of seven sampling stations. The investigator notes, "Rainbow trout are restricted to a few deep spots in the generally shallow Piru Creek" (Bell 1978). Another 1975 study included surveys of four Piru Creek locations. Rainbow trout between 4.9 and 7.5 inches in length were observed at the two more upstream sampling sites (Swift 1975).

A 1980 USFS report summarized the results of sampling in 1979. The document indicates 13 miles of Piru Creek "fishery" on USFS land and indicates the presence of *O. mykiss* in the creek (Moore 1980a).

Piru Creek downstream from Pyramid Lake was surveyed as part of a study of southern California streams in 1987. The survey estimated *O. mykiss* densities at between about 4,000 "naturally-reproduced" individuals per mile in this reach (DFG 1987). The population included "…large numbers of 6- and 7- in. fish" with substantially lower numbers of larger trout (DFG 1987, p. 28).

As part of a genetic study, Piru Creek was sampled in 1994. *Oncorhynchus mykiss* was collected at one sampling site (USFS 1997b). Historical references were reviewed as part of a study of the Santa Clara River watershed and indicate that DFG staff conducted fish population surveys in Piru Creek in 1996-1997. An abundance estimate of 437 individuals per mile was produced (Stoecker and Kelley 2005).

Piru Creek was sampled in 2003 as part of a study of the genetic structure of southern California *O. mykiss*. One site was located between Santa Felicia and Pyramid dams, while the other was located upstream of both dams. The resulting 2006 report notes that the Piru populations and the Lockwood Creek population "formed a well supported cluster" (Girman and Garza 2006). Sampling also was performed as part of a Santa Clara River watershed study published in 2005. Three *O. mykiss* size classes were observed in the Piru Creek surveys (Stoecker and Kelley 2005).

A 2008 biological opinion concerning Santa Clara River water diversions discussed Piru Creek *O. mykiss*. The opinion states, "Large adult *O. mykiss* leave Piru Lake (and Pyramid Lake) and undertake migrations during winter and spring in Piru Creek and spawn in upstream tributaries" (NMFS 2008).

Agua Blanca

Agua Blanca Creek consists of about 16.8 stream miles and is tributary to Piru Creek. It flows southeast, entering Piru Creek about 1.6 miles upstream from the northern extent of Lake Piru.

Agua Blanca Creek was surveyed by DFG staff, probably in the 1930s, and steelhead and rainbow trout were found to be present. The survey report states, "The stream is not of much value on account of extreme low water in the late summer" (DFG ca 1934c).

Staff from USFS surveyed Agua Blanca Creek in 1979 and observed multiple *O. mykiss* year classes, including YOY and individuals to 14 inches in length. The survey report indicates that the trout are "abundant" but that the fishery is limited by "…poor summer holding water, high temperatures, few coldwater spring inputs, [and] flood damage susceptibility…" (Moore 1980a).

A 2005 study notes that Agua Blanca Creek contains suitable habitat for *O. mykiss* and supports an adfluvial population (Stoecker and Kelley 2005).

Fish

Fish Creek consists of about six stream miles and is tributary to Piru Creek. It flows east, entering Piru Creek about ten miles upstream from the northern extent of Lake Piru.

Fish Creek was surveyed in 1979 and multiple year classes of *O. mykiss* were observed, including "abundant" YOY and individuals to 12 inches in length. The survey report states, "Fish Creek is the only spawning tributary available to trout in Piru Creek between Pyramid Lake and Agua Blanca Creek, and appears heavily used as such" (Moore 1980a).

A 2005 study notes that Fish Creek contains suitable habitat for *O. mykiss* and supports an adfluvial population (Stoecker and Kelley 2005, p. 132; Bloom 2005).

Buck

Buck Creek consists of about 5.5 stream miles and is tributary to Piru Creek. It flows east, entering Piru Creek about 1.6 miles upstream from the northwest extent of Pyramid Lake.

A 1953 memo from DFG staff indicates that trout taken by fishermen from Buck Creek likely were from Piru Creek stocking efforts (DFG 1953). The author's opinion was that the creek would not support reproduction due to typically low flows.

Snowy

Snowy Creek consists of about 7.1 stream miles and is tributary to Piru Creek. It flows northeast, entering Piru Creek about 1.3 miles upstream from Hardluck Campsite.

Field notes from the 1940s indicate that Snowy Creek supported angling. Like Buck Creek, Snowy Creek may have supported trout stocked in Piru Creek (DFG 1951d).

Lockwood

Lockwood Creek consists of about 11. 2 stream miles and is tributary to Piru Creek. It flows southeast, entering Piru Creek near Sunset Campground.

Notes from DFG staff from the 1940s indicate that Lockwood Creek was easily stocked and heavily fished (DFG 1951d). A 1946 stream survey states regarding Lockwood Creek, "An ideal little trout stream" (DFG 1946a).

A 1955 diversion protest by DFG states, "Rainbow trout are present and spawn naturally in Lockwood Creek…" (DPW 1955). As part of a study of freshwater fishes and habitat, Lockwood Creek was surveyed in 1975 and *O. mykiss* between about 4.4 and nine inches in length were observed. The resulting report notes intermittent flow and states, "[Rainbow trout] are aggregated in the few areas that provided suitable depth and cover" (Swift 1975, p. 77).

Historical references were reviewed as part of a study of the Santa Clara River watershed and indicate that DFG staff conducted fish population surveys in Lockwood Creek in 1996-1997. A total of 63 individuals were "recovered" from the creek (Stoecker and Kelley 2005).

Lockwood Creek was sampled in 2003 as part of a study of the genetic structure of southern California *O. mykiss*. The resulting 2006 report notes that the Piru populations and the Lockwood Creek population "formed a well supported cluster" (Girman and Garza 2006).

Seymour

Seymour Creek consists of about 7.5 stream miles and is tributary to Lockwood Creek. It flows southeast, entering Lockwood Creek near Snedden Ranch.

Field notes from the 1940s indicate that Seymour Creek supported some fishing (DFG 1951d). A note from 1946 expressed DFG staff's opinion that Lockwood Creek resident rainbow trout might use Seymour Creek for spawning (DFG 1946d).

Mutau

Mutau Creek consists of about 10. 7 stream miles and is tributary to Piru Creek. It flows northeast from headwaters near Thorn Point, entering Piru Creek about 2.2 miles upstream from the Lockwood Creek confluence.

Anglers have observed rainbow trout in Mutau Creek in recent years. The origin of the population is uncertain.

Castaic

Castaic Creek consists of about 23.4 stream miles and is tributary to the Santa Clara River. It flows south, entering the Santa Clara east of the town of Del Valle. The dam forming Castaic Lake was constructed at stream mile 7.3 on Castaic Creek.

Castaic Creek was surveyed in 1975 as part of a fish distribution study and *O. mykiss* was not observed at one sampling station (Bell 1978).

Elizabeth Lake Canyon

Elizabeth Lake Canyon Creek has headwaters in the San Andreas Rift zone. The creek flows southwest to enter the Castaic Creek system via Castaic Lake.

Field notes from USFS staff from 1947 indicate that "some fish" were caught in Elizabeth Lake Canyon Creek in the previous season (DFG 1952). The author noted that the creek was unlikely to support fish life throughout the year, presumably due to low flow.

Fish Canyon

Fish Canyon Creek consists of about 12.3 stream miles and is tributary to Castaic Creek. It flows southwest, entering Castaic Creek about 1.2 miles upstream from the northern extent of Castaic Lake.

A 1956 DFG stream inventory for Fish Canyon Creek states, "…some native fish reported in upper reaches" (DFG 1956b). It adds, "This is definitely a marginal water…" and "Stream is mostly well shaded, especially in the upper live areas" (DFG 1956b).

San Francisquito Canyon

San Francisquito Canyon Creek consists of about twenty stream miles and is tributary to the Santa Clara River. It flows south, entering the Santa Clara west of the town of Rancho Santa Clarita.

San Francisquito Canyon Creek was sampled in 1975 as part of a fish distribution study and *O. mykiss* was not observed at the one sampling station (Bell 1978).

Bouquet Canyon

Bouquet Canyon Creek consists of about and is tributary to the Santa Clara River. It flows southwest, entering the Santa Clara near the town of Rancho Santa Clarita.

According to DFG records, rainbow trout fry from the Shasta hatchery were planted in Bouquet Canyon Creek in 1943 (DFG 1943). A 1947 stream survey indicates that *O. mykiss* including a "few fingerlings" were observed in the creek but notes, "Fishing maintained only be frequent plantings" (DFG 1947b).

Big Sycamore Canyon

Big Sycamore Canyon Creek consists of about nine stream miles. It flows southwest, entering the Pacific Ocean northwest of Bass Rock.

Big Sycamore Canyon Creek was surveyed in 1989-1990 as part of a study of six streams originating in the Santa Monta Mountains. The resulting report does not indicate the presence of steelhead and states, "Streamflow volume appears to be the greatest limiting factor…" (Keegan 1990, 3-3).

As part of a study of steelhead distribution in southern California streams, staff from NMFS surveyed Big Sycamore Canyon Creek in 2002. The resulting report lists the steelhead population as "extirpated" (NMFS 2005).

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Table 6. Distribution status of *O. mykiss* in coastal streams of Ventura County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Rincon	Rincon	DF	DF	Y	N	1
Ventura River	Ventura River	DF	DF	Y	Y	3
Ventura River	Coyote	DF	UN	Y	UN	0
Ventura River	Santa Ana	DF	UN	Y	N	0
Ventura River	San Antonio	DF	DF		Y	2
Ventura River	Ojai	DF	PA		UN	0
Ventura River	Gridley Canyon	DF	DF	Y	UN	2
Ventura River	Matilija	DF	DF	Y	UN	3
Ventura River	North Fork Matilija	DF	DF	Y	UN	3
Ventura River	Bear	DF	DF		UN	2
Ventura River	Murrietta Canyon	DF	DF	Y	N	1
Ventura River	Upper North Fork Matilija	DF	DF	Y	N	3
Ventura River	Upper North Fork Matilija tributary	DF	DF	Y	N	1
Ventura River	Old Man Canyon	DF	DF	Y	N	1
Santa Clara River	Santa Clara River	DF	DF	Y	Y	3
Santa Clara River	Santa Paula	DF	DF	Y	UN	3
Santa Clara River	Sisar	DF	DF	Y	UN	3
Santa Clara River	East Fork Santa Paula	UN	UN		UN	0
Santa Clara River	Willard Canyon	UN	UN		UN	0
Santa Clara River	Sespe	DF	DF	Y	Y	3
Santa Clara River	Coldwater Canyon	DF	PA	Y	UN	0
Santa Clara River	West Fork Sespe	DF	DF		UN	3
Santa Clara River	Alder	DF	DF		UN	2
Santa Clara River	Park	DF	DF		UN	3
Santa Clara River	Timber	DF	DF		UN	3
Santa Clara River	Bear Canyon	DF	DF		UN	3
Santa Clara River	Trout	DF	DF		UN	3
Santa Clara River	Piedra Blanca	DF	DF		UN	3
Santa Clara River	Lion Canyon	DF	DF		UN	3

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 6. Distribution status of *O. mykiss* in coastal streams of Ventura County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Santa Clara River	Howard	DF	DF		UN	3
Santa Clara River	Rose Valley	DF	DF	Y	UN	3
Santa Clara River	Rock	DF	DF		UN	2
Santa Clara River	Tule	DF	DF		UN	3
Santa Clara River	Potrero John	DF	DF		UN	2
Santa Clara River	Munson	DF	DF		UN	1
Santa Clara River	Chorro Grande Canyon	DF	DF		UN	1
Santa Clara River	Ladybug	DF	DF		UN	3
Santa Clara River	Cherry	DF	DF		UN	3
Santa Clara River	Abadi	DF	DF		UN	1
Santa Clara River	Pole	PB	UN		UN	0
Santa Clara River	Hopper Canyon	DF	DF		UN	3
Santa Clara River	Toms Canyon	UN	PA		UN	0
Santa Clara River	Piru	DF	DF	Y	UN	3
Santa Clara River	Agua Blanca	DF	DF	Y	N	3
Santa Clara River	Fish	DF	DF	Y	N	3
Santa Clara River	Buck	UN	UN		N	0
Santa Clara River	Snowy	UN	UN		N	0
Santa Clara River	Lockwood	DF	DF	Y	N	3
Santa Clara River	Seymour	PB	UN		N	0
	Mutau	DF	DF	Y	N	3
Santa Clara River	Castaic	UN	UN		N	0
Santa Clara River	Elizabeth Lake Canyon	PS	UN		N	0
Santa Clara River	Fish Canyon	PB	UN		N	0
Santa Clara River	San Francisquito Canyon	UN	UN		UN	0
Santa Clara River	Bouquet Canyon	UN	UN		UN	0
Big Sycamore Canyon	Big Sycamore Canyon	UN	PA		N	0

[1]Please see Methods section for an explanation of titles and values used in this table.

FPO - figure 22

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FPO - figure 25

Arroyo Sequit

Arroyo Sequit consists of about 3.3 stream miles. The arroyo is formed by the confluence of the East and West forks, from where it flows south to enter the Pacific Ocean east of Sequit Point.

As part of a survey of 32 southern coastal watersheds, Arroyo Sequit was surveyed in 1979. The *O. mykiss* sampled were between about two and 6.5 inches in length. The survey report states, "Historically, small steelhead runs have been reported in this area" (DFG 1980). It also recommends, "…future upstream water demands and construction should be reviewed to insure that riparian and aquatic habitats are maintained" (DFG 1980).

Arroyo Sequit was surveyed in 1989-1990 as part of a study of six streams originating in the Santa Monta Mountains. The resulting report indicates the presence of steelhead and states, "Low streamflows are presently limiting fish habitat, particularly adult habitat, and potential fish passage problems exist…" (Keegan 1990a, p. 3-4).

Staff from DFG surveyed Arroyo Sequit in 1993 and captured *O. mykiss*, taking scale and fin samples for analysis. The individuals ranged in length between about 7.7 and 11.6 inches (DFG 1993). As reported in a distribution study, a 15-17 inch trout was observed in March 2000 in Arroyo Sequit (Dagit 2005).

Staff from NMFS surveyed Arroyo Sequit in 2002 as part of a study of steelhead distribution. An adult steelhead was observed during sampling (NMFS 2002a). Additional documentation of steelhead using the creek between 2000-2007 was provided by Dagit *et al.* (2005) and Dagit and Abramson (2007). The Santa Monica Steelhead Habitat Assessment noted "keystone" barrier projects in Arroyo Sequit including removing in-stream road crossings in the lower and upper campground, stabilizing creek banks in the lower creek, and replacing the Mulholland highway culvert to facilitate passage to the upper watershed (CalTrout 2006). Development of a watershed management plan for Arroyo Sequit also has been identified as a critical need (Dagit pers. comm.).

West Fork Arroyo Sequit

West Fork Arroyo Sequit consists of about 1.8 stream miles and is tributary to Arroyo Sequit. It flows southeast to join the East Fork and form Arroyo Sequit. A waterfall at about stream mile two comprises the upstream limit of anadromy.

Staff from the Coastal Commission visited West Fork Arroyo Sequit in 1992 and observed adult rainbow trout (CCC 1992).

East Fork Arroyo Sequit

East Fork Arroyo Sequit consists of about 2.6 stream miles. It flows southwest, joining the West Fork to form mainstem Arroyo Sequit.

As part of a study of steelhead distribution of streams of the Santa Monica Mountains, interviews were conducted with "local informants" regarding specific streams. The study cites Giles Manwaring as observing "several small trout or fry" and "one large trout" in East Fork Arroyo Sequit in 1992 (Dagit *et al.* 2005).

Zuma Canyon

Zuma Canyon Creek consists of about 6.6 stream miles. It flows south, entering the Pacific Ocean northwest of Point Dume.

As part of a survey of 32 southern coastal watersheds, Zuma Creek was surveyed in 1979. *Oncorhynchus mykiss* was not observed during the survey but the report states, "Reportedly, some fishing does exist in the upper reaches of Zuma Creek" (DFG 1980).

According to staff from the Santa Monica Mountains Resource Conservation District, steelhead were present in Zuma Creek historically and local residents observed *O. mykiss* in the creek in the 1970s and 1980s (Dagit 2007a).

An analysis of steelhead restoration opportunities in streams of the Santa Monica Bay area addressed Zuma Creek. The resulting report states, "Streamflow volume appears to be the greatest limiting factor…" (Keegan 1990a, p. 3-3). It also noted sediment impacts from urbanization, and passage problems and elimination of lagoon habitat by beach grooming.

Solstice Canyon

Solstice Canyon Creek consists of about 3.8 stream miles. It flows south, entering the Pacific Ocean at Dan Blocker State Beach.

A study of steelhead distribution in streams of the Santa Monica Bay region involved collecting historical observations. The report cites various observations from the 1920s and 1930s, and from 1956 to the late 19820s (Dagit *et al.* 2005). According to a 1999 NMFS memo, "Anecdotal reports indicate steelhead were present in the creek until mid 1940, when the Highway 1 culvert was installed at the creek mouth" (NMFS 1999, p. 2).

According to staff from the National Park Service, no steelhead have been reported in Solstice Canyon Creek in the last 50 years (Busteed 2007 pers. comm.). This period corresponds to the existence of the Highway 1 crossing of the creek.

Solstice Canyon Creek was surveyed in 1989-1990 as part of a study of six streams originating in the Santa Monta Mountains. The resulting report does not indicate the presence of fish and states, "Low streamflows are presently limiting fish habitat, particularly adult habitat, and potential fish passage problems exist…" (Keegan 1990a, p. 3-4).

Staff from NMFS conducted a habitat assessment of Solstice Canyon Creek in 1999. The resulting report states, "Two highway culverts, four Arizona crossings, and several other man-made structures preclude steelhead from the creek" (NMFS 1999, p. 2). It adds, "The habitat of Solstice Creek is relatively complex and appears suitable for juvenile steelhead ontogeny and survival" (NMFS 1999, p. 6).

Malibu

Malibu Creek consists of about 8.5 stream miles draining a watershed of about 105 square miles. It flows south from headwaters near Triunfo Canyon to enter the Pacific Ocean at Malibu Lagoon State Beach. Rindge Dam was constructed in the 1920s at about stream mile three.

Field notes from DFG staff from 1947 indicate the presence of steelhead in Malibu Creek (DFG 1953). The creek was surveyed in 1952. The survey report states, “SH can migrate upstream about 10-12 miles before they are stopped at Crags dam” (DFG 1952a).

A 1969 survey report states, “Steelhead have apparently been making runs into Malibu Creek in recent years and will probably continue to do so if water quality and flow are maintained. Steelhead could migrate up the creek as far as Rindge Dam; approximately 3 miles” (DFG 1969). A fish kill occurred in Malibu Creek in 1970 that was investigated by DFG and the Interior Department. According to a resulting report, an estimated 30 rainbow trout averaging six inches in length and 20 “small” steelhead trout were killed in a two mile reach downstream from a treatment works (Interior 1970).

According to a 1973 DFG report regarding the Ventura River, Malibu Creek supported the only southern California steelhead run besides that of the Ventura at the time (DFG 1973a). A 1974 DFG letter responding to an inquiry states, “We do not stock trout in Malibu Creek…in all probability the trout you saw caught in Malibu Creek were naturally propagated in the stream” (DFG 1974). A 1975 study of southern California fishes notes, “…a small but persistent run [of steelhead] still enters Malibu and Topanga canyon…” (Swift 1975, p. 343). In a 1979 report on fishes in Malibu Creek the author states, “…native rainbow trout are absent above Rindge Dam” (Soltz 1979).

As part of a survey of 32 southern coastal watersheds, Malibu Creek was surveyed in 1979. The *O. mykiss* sampled were between about five and 7.5 inches in length. The survey report notes the presence of perennial flow and states, “A much larger stream habitat and the presence of numerous predators probably accounted for the absence of young trout during the survey” (DFG 1980). It also recommends, “…future upstream water demands and construction should be reviewed to insure that riparian and aquatic habitats are maintained” (DFG 1980).

Rainbow trout were first stocked in lower Malibu Creek in 1984 (DFG 1985). In 1989, consultants carried out an investigation of steelhead in the creek. The study report states, “Good quality adult and juvenile steelhead habitat is found in the narrow gorge extending downstream from the dam…” (Keegan 1990b, p. 2-2). It further notes, “Since 65 percent of the available rearing habitat in Malibu Creek is currently inaccessible to juvenile steelhead, then at leas a three-fold increase in the juvenile stream-rearing population would result by providing passage for adults over Rindge Dam” (Keegan 1990b, p. 5-2).

In 1991, CalTrout staff estimated that the steelhead run in Malibu Creek consisted of about 60 individuals, depending on the water year type (Botham 1991). Staff from DFG surveyed Malibu Creek in 1992 and observed “several steelhead, one approximately 16 inches in length” downstream from Rindge Dam (DFG 1992a). Another survey from that year produced observations of multiple year classes, with individuals to about 14 inches in length (DFG 1999).

Notes from a 1992 meeting indicate DFG staff’s opinion that addresses passage issues in Malibu Creek “…can open up approximately 86% of the total potential spawning habitat of the system” (DFG 1992b, p. 6). Conference proceedings from 1993 indicate the results of genetics studies on California steelhead. The abstract states, “Malibu Creek, the southern most anadromous population, maintained anadromous and resident spawners carrying the dominant southern ‘wild’ type” (Gan 1993).

Staff from NMFS surveyed Malibu Creek in 2002 as part of a study of steelhead distribution. “Steelhead!” was observed during sampling (NMFS 2002b). According to a study of the genetic structure of southern California *O. mykiss*, fish from Malibu Creek “are clearly not [of hatchery ancestry]” (Girman and Garza 2006). As part of a study of steelhead distribution in streams of the Santa Monica Bay region, numerous *O. mykiss* observations were summarized (Dagit *et al.* 2005).

During 2006 snorkel surveys of Malibu Creek, researchers noticed “yellow” individuals in the *O. mykiss* population. Over the course of about four months the entire population, estimated at about 250 fish, died (Dagit pers. comm.). Investigators have not determined the cause of the die off (Orton pers. comm.). Additional snorkel and habitat surveys conducted between 2004 and 2007 indicate that significant suitable habitat is present in the reach below the dam that is still accessible to steelhead (Dagit 2007b). Identified limiting factors include high densities of exotic invasive fishes, the recent invasion of New Zealand Mud Snails, and continued water quality impairments (Dagit 2007b). In additional to Malibu Dam, the double culvert at Las Virgenes Creek-Crags Road and the dam at White Oak Farms present passage barriers (Abramson 2005). Water quality concerns include nutrients and sediment (Dagit pers. comm.).

Las Flores Canyon

Las Flores Canyon Creek consists of about 3.5 stream miles. It flows south, entering the Pacific Ocean at Las Flores.

Las Flores Canyon Creek was surveyed by DFG staff in 1997. The resulting report does not indicate the presence of fish but states, “…good steelhead stream…Good steelhead habitat” (DFG 1997).

A study published in 2005 examined the range of anadromous *O. mykiss*. The study report indicates that evidence was not found of historical use of Las Flores Canyon Creek by steelhead. The current occurrence value is “Absent” (NMFS 2005).

Topanga Canyon

Topanga Canyon Creek consists of about 8.7 stream miles. If flows south, entering the Pacific Ocean at Topanga Beach.

A 1974 DFG letter states, “A small population of trout manages to survive in…Topanga Canyon Creek. In years of good rainfall, and good water conditions, some steelhead are reported…, and it is probable that some of these successfully spawn” (DFG 1974). A 1975 study of southern California fishes notes, “…a small but persistent run [of steelhead] still enters Malibu and Topanga canyon…” (Swift 1975, p. 343).

As part of a survey of 32 southern coastal watersheds, Topanga Canyon Creek was surveyed in 1979. The *O. mykiss* sampled were between about four and 12.5 inches in length (DFG 1980). The survey report states, “…future upstream water demands and construction should be reviewed to insure that riparian and aquatic habitats are maintained” (DFG 1980). A 1982 DFG memo relays staff’s observations of juvenile *O. mykiss* in Topanga Canyon Creek (DFG 1982).

The *O. mykiss* population in Topanga Creek was monitored during the period 2001-2007. The resulting report indicates continuing reproduction, access by spawning steelhead, and smolt production (Dagit 2007c). In 2003, a dead gravid female steelhead about 19 inches in length was observed in Topanga Creek (Dagit 2003). A report produced in 2003 proposed restoration activities in the Toganga Creek watershed. These included improving conditions in the lagoon, restoring the channel at the Narrows and other locations, and developing a water budget for the creek (Dagit 2003).

The *O. mykiss* population's genetic structure was characterized recently based on samples from 18 individuals collected between 2002 and 2006: "The Topanga Creek fish sampled were a mixture of fish with either predominantly hatchery or native steelhead genotypes, as well as some that appear intermediate" (Girman and Garza 2006, p. 26).

The role of groundwater, seeps and springs in the steelhead resources of Topanga Canyon Creek has been studied, revealing that these year round water sources are directly correlated to distribution of steelhead in Topanga Creek (Tobias 2006). Also, the Santa Monica Mountains Steelhead Habitat Assessment (CalTrout 2006) and a recent monitoring report by Dagit, Reagan, and Tobias (2007) identify key issues related to steelhead including passage barriers, maintaining suitable water quality, preventing introduction of exotic invasive aquatic species (crayfish, bullfrogs, New Zealand Mud Snails, etc.), and addressing private development and road alignment encroachments in the upper watershed.

Los Angeles River

The Los Angeles River is channelized throughout its 52 mile length. It is formed by the confluence of Arroyo Calabasas and Bell Creek in Canoga Park and flows east in its upper portion before turning south. It enters the Pacific Ocean at San Pedro Bay.

The Los Angeles River is described here as fisheries information was found concerning several of its tributaries.

Rio Hondo

The historical alignment of Rio Hondo is difficult to determine. It has been culverted and flows southwest to enter the Los Angeles River at about stream mile 12.

A 1992 report on the Rio Hondo Channel indicates that *O. mykiss* was observed in Rio Hondo Creek during 1948 and 1951 surveys (Soltz 1992). The report states, "Steelhead trout (*Oncorhynchus mykiss*) migrated upstream to the headwaters to spawn and downstream to the Pacific Ocean as smolts before dams and diversions disrupted their passage through the drainage" (Soltz 1992, p. 4).

Mission

The historical Mission Creek channel could not be determined. A survey report states, "This is a seepage stream picking up water in the San Gabriel wash and emptying into Rio Honda Wash" (DFG ca 1934a). The creek is located downstream from Legg Lake.

Mission Creek was stocked with rainbow trout in 1930 and 1931. Staff from DFG surveyed Mission Creek, probably in the 1930s, and relayed observations of *O. mykiss*. The survey report states, "A good trout stream…" (DFG ca 1934a). Rainbow trout also were noted in a 1951 survey (DFG 1951a).

Eaton Canyon

Eaton Canyon Creek flows through about 5.3 stream miles before entering lower gradient area and becoming the Eaton Wash near the city of Altadena. The creek historically was tributary to Rio Hondo, with confluence in the vicinity of the Whittier Narrows Dam County Recreation Area.

Staff from DFG surveyed Eaton Canyon Creek in 1946 and observed *O. mykiss*. The survey report notes "fair" to "poor" natural propagation and states, "Fine deep pools which carry a limited trout population because of poor food" (DFG 1946a). Notes from 1949 indicate "not abundant" YOY as well as adult rainbow trout (DFG 1949a). The creek was historically stocked with rainbow trout (DFG 1956).

Arroyo Seco

Arroyo Seco consists of more than 12 stream miles before entering lower gradient area in the vicinity of Devils Gate Reservoir. The lower portion of Arroyo Seco is channelized throughout about 9.6 miles to its confluence with the Los Angeles River east of Dodger Stadium.

Field notes from DFG staff in 1947 indicate the presence of *O. mykiss* in Arroyo Seco. The notes state, "Natural reproduction is very much in evidence…" (DFG 1947a). A survey report from that year states, "This is one of the best trout streams in the Pasadena – Los Angeles area" (DFG 1947b).

Arroyo Seco was surveyed as part of a fisheries investigation in 2000. Multiple year classes of *O. mykiss* including YOY and individuals to 13 inches in length were observed in the upper portion of the arroyo (Stoecker 2001).

Bear Canyon

Bear Canyon Creek consists of about 3.4 stream miles and is tributary to Arroyo Seco. It flows west, entering Arroyo Seco north of Brown Mountain.

Field notes from DFG staff in 1947 indicate the presence of *O. mykiss* in Bear Canyon Creek, including fingerlings. The notes state, "…those [trout] in large pools should carry over" (DFG 1949b).

Bear Canyon Creek was surveyed as part of a fisheries investigation in 2000. Rainbow trout were observed in the lower portion of the creek (Stoecker 2001).

Little Bear Canyon

Little Bear Canyon Creek consists of about two stream miles and is tributary to Arroyo Seco. It flows west, entering Arroyo Seco downstream from Commodore Switzer Camground.

Field notes from DFG staff in 1947 indicate the presence of *O. mykiss* in Little Bear Canyon Creek. The notes state, "Trout run up this creek out of the Arroyo Seco and there are always fingerlings present up to the falls…" (DFG 1949c).

Little Bear Canyon Creek was surveyed as part of a fisheries investigation in 2000. Rainbow trout were observed in the lower portion of the creek (Stoecker 2001).

Big Tujunga

Big Tujunga Creek consists of about over 29 stream miles upstream of Hansen Lake. Downstream from the lake, the channelized Tujunga Wash is about 9.8 miles long and ends at the Los Angeles River channel confluence at Studio City. Big Tujunga Dam is located about 14.5 miles upstream from Hansen Lake.

Big Tujunga Creek was stocked with rainbow trout in 1942 and later years (DFG 1946b). Staff from DFG survey Big Tujunga Creek in 1947 and observed *O. mykiss*. The survey report notes "abundant" natural reproduction in middle portion of the creek and "excellent spawning areas" (DFG 1947c).

An angler observed rainbow trout fingerlings and juveniles in upper Big Tujunga Creek in 2004 and 2005. These trout are believed to be the progeny of recently stocked fish (Culver pers. comm.).

Mill

Mill Creek consists of about 8.3 stream miles and is tributary to Big Tujunga Creek. It flows southwest, entering Big Tujunga Creek in The Narrows section of Big Tujunga Canyon.

Rainbow trout were stocked in Mill Creek in 1944 and subsequent years (DFG 1944). Field notes from 1947 indicate the presence of *O. mykiss* fingerlings in Mill Creek (DFG 1954a). A 1971 DFG memo records observations of "good trout habitat" in Mill Creek (DFG 1971a).

San Gabriel River

The San Gabriel River runs over 58 miles from headwaters in the San Gabriel Mountains to its mouth at Long Beach. The river is channelized throughout the 30 mile section downstream from Santa Fe Dam near Irwindale. The San Gabriel Canyon portion of the river consists of almost 24 stream miles with Morris Dam located about 2.7 miles upstream from the mouth of the canyon and San Gabriel Dam located about six miles from this point. Morris Dam was completed in 1934, while San Gabriel Dam was finished in 1939. The portion of the San Gabriel River upstream from, and east of, San Gabriel Reservoir may be referred to as East Fork San Gabriel River on maps and in reports.

The San Gabriel River was stocked in 1930 and subsequent years (DFG 1939). Staff from DFG surveyed the San Gabriel, probably in the 1930s, and observed rainbow trout. The survey report notes "scant if any" natural propagation in the area between the West Fork and Cattle Canyon Creek confluences. The report states about the San Gabriel, "Does not support heavy fish population. Aged fish have best chance in this stream on account of more water than other L.A. streams" (DFG ca 1934b). An issue of the DFG journal from 1938 refers to the San Gabriel River as having "consistently good" trout fishing (DFG 1938).

Field notes from DFG staff in 1948 note the presence of adult rainbow trout and report a 22-inch individual caught in the upper San Gabriel River (DFG 1954b). A 1951 DFG stream survey report deemed natural propagation in the river to be “fair” (DFG 1951b).

A 1983 DFG letter states, “The upper portion of the [San Gabriel] river drainage presently supports a self-sustaining population of wild rainbow trout” (DFG 1983). The letter also indicated that stocking did not occur upstream from the Cattle Canyon Creek confluence. In 1984, DFG staff recommended including the San Gabriel River and its tributaries upstream from the Cattle Canyon Creek confluence in the department’s “Wild Trout program”. The memo on this topic stated, “Habitat destruction from recent and present mining activities was very evident” (DFG 1984).

In 1988, DFG opposed a sluicing project in the San Gabriel Reservoir on the grounds that it “…would destroy a fairly intense fishery for large rainbow trout which annually migrate from San Gabriel Reservoir to the north, west, and east forks of the San Gabriel river to spawn” (DFG 1988a). The letter from DFG also notes the presence of a “remnant trout” fishery downstream from Morris Dam.

A 1988 report describes DFG investigations on the West Fork between 1984 and 1986. The report states, “It is highly unlikely that remnants of the early steelhead stocks of the pre-dam era remain in the system today” (DFG 1988b, p. 5).

In 2000, a draft study presented the results of genetic analysis of 53 rainbow trout sampled in the East Fork (upper mainstem) San Gabriel River. According to the report, “The trout of the East Fork San Gabriel River do show genetic signatures indicative of [southern steelhead] diversity, but at very low levels and in mixtures that suggest significant impacts of out-of-basin rainbow trout introductions into this river” (Nielson 2000, p. 15).

According to an angler familiar with the streams of the San Gabriel River basin, a self-sustaining *O. mykiss* population occurs in the portion of the San Gabriel River immediately downstream from Morris Dam. Individuals to 17 inches in length have been observed in recent years (Yin pers. comm.).

An angler reports observing rainbow trout in upper East Fork (mainstem) San Gabriel River in 2005 and 2007. Multiple year classes occur, with individuals to about 11 inches in length. The fish are believed to be “wild” trout although the ancestry is uncertain (Nosek pers. comm.).

San Jose

The historical San Jose Creek channel could not be determined. In its present configuration, it appears to carry runoff from Thompson Wash beginning in the vicinity of the Los Angeles County Fairgrounds. The San Jose Creek channel runs west about 19.5 miles to join the San Gabriel channel in the vicinity of the Whittier Narrows Dam.

A 1991 DFG memo relays information from DFG surveys in the 1940s and 1950s regarding San Jose Creek. The original survey reports are not available. According to the memo, *O. mykiss* occurred in San Jose Creek historically (DFG 1991).

Walnut

Walnut Creek is tributary to the San Gabriel River. It flows west, entering the San Gabriel channel in the city of El Monte. Fisheries information was not available for the creek itself, but was available for some tributaries as described below.

Big Dalton Canyon

Big Dalton Canyon Creek consists of about 3.2 stream miles and flows into the Big Dalton Wash in the vicinity of the city of Glendora.

A letter to DFG from 1971 indicates that Big Dalton Reservoir "appears to have abundant fish life" (Brown 1971). Possible fish salvage activities were proposed as part of draining the reservoir, suggesting that "game" species such as rainbow trout might have been present.

Little Dalton Canyon

Little Dalton Canyon Creek consists of about 4.1 stream miles with the canyon. It flows into Little Dalton Wash, which has been channelized and conveys water to Big Dalton Wash when the channels join near the city of Irwindale.

Little Dalton Canyon Creek was stocked with *O. mykiss* in 1945.

San Dimas Canyon

San Dimas Canyon Creek consists of about 5.5 stream miles. It flows into San Dimas Wash, which has been channelized and conveys water to Big Dalton Wash when the channels join east of the city of Irwindale. San Dimas Dam is located less than one mile from the entrance to San Dimas Canyon.

An issue of the DFG journal from 1938 refers to San Dimas Canyon Creek as having "consistently good" trout fishing upstream from the dam (DFG 1938).

Santa Anita Canyon

Santa Anita Canyon Creek flows through about 5.5 stream miles before entering lower gradient area and becoming the Santa Anita Wash near the city of Santa Anita. The creek historically was tributary to the San Gabriel River, with confluence in the vicinity of the city of Arcadia.

Santa Anita Canyon Creek was stocked with rainbow trout in 1930 and later years (DFG 1945). Staff from DFG surveyed Santa Anita Canyon Creek, probably in the 1930s, and did not observe fish. The survey report states, "A few fish which go up stream early are caught each season" (DFG ca 1934c). An issue of the DFG journal from 1938 refers to Santa Anita Canyon Creek as having "consistently good" trout fishing upstream from the Santa Anita Reservoir (DFG 1938).

Field notes from DFG staff in 1947 indicate the presence of "common" fingerling trout in Santa Anita Canyon Creek, while notes from 1946 state, "Very few fish seem to hold over from one year to next" (DFG 1952b).

According to an angler familiar with the streams of the San Gabriel River basin, *O. mykiss* occurs in Santa Anita Canyon Creek. Individuals between about 7 and 14 inches in length have been observed in recent years (Yin pers. comm.).

Monrovia Canyon

Monrovia Canyon Creek consists of about three stream miles and appears to have drained into the Santa Anita Wash historically. It flows south from headwaters on the south flank of Rankin Peak to enter the wash area north of the town of Monrovia.

According to an angler, multiple year classes of rainbow trout and individuals to about 12 inches in length were observed in Monrovia Canyon Creek in recent years (Grubbs pers. comm.). He noted that flood control activities had led to severe habitat degradation in the creek's lower portion.

Winter

Winter Creek consists of about 2.3 stream miles and is tributary to Santa Anita Canyon Creek. It flows southeast, entering Santa Anita Canyon Creek about one mile upstream of Santa Anita Reservoir.

Winter Creek was stocked in 1947 and later years (DFG 1952c); (DFG 1956). Staff from DFG surveyed Winter Creek in 1946 and observed *O. mykiss*. The survey report notes "little" natural propagation (DFG 1946c).

Fish Canyon

Fish Canyon Creek consists of about 3.3 stream miles and is tributary to the San Gabriel River. It flows south, entering the San Gabriel immediately downstream from the entrance to San Gabriel Canyon.

Trout were stocked in Fish Canyon Creek in 1948 and subsequent years (DFG 1956). Field notes regarding Fish Canyon Creek from DFG in 1951 state, "A few native fish 4 [inches] in length were observed" (DFG 1951c).

An angler notes that *O. mykiss* move between the mainstem San Gabriel River and Fish Canyon Creek (Yin pers. comm.). The origin of the population is uncertain.

Roberts Canyon

Roberts Canyon Creek consists of about 3.4 stream miles and is tributary to the San Gabriel River. It flows south, entering the San Gabriel at the entrance to San Gabriel Canyon.

Staff from DFG surveyed Roberts Canyon Creek in 1947 and observed multiple *O. mykiss* year classes. Natural propagation was deemed "fair" in the creek (Ehlers 1947).

An angler notes that *O. mykiss* move between the mainstem San Gabriel River and Roberts Canyon Creek (Yin pers. comm.). The origin of the population is uncertain.

West Fork San Gabriel

West Fork San Gabriel River consists of about 19.3 stream miles and is tributary to the San Gabriel River. It flows east, entering the San Gabriel about 2.2 miles upstream from San Gabriel Dam. The San Gabriel Reservoir inundated the confluence of the West Fork and mainstem San Gabriel rivers. Cogswell Dam is located at about stream mile nine.

Staff from DFG surveyed the West Fork San Gabriel River in 1947 and multiple *O. mykiss* year classes were observed (DFG 1947d). Severe sedimentation impacts occurred from reservoir operations in the West Fork San Gabriel River in 1966 (DFG 1988b).

A 1971 DFG letter states, "The West Fork of the San Gabriel River below Cogswell supports substantial wild trout and catchable trout fisheries…" (DFG 1971b). Staff from DFG sampled West Fork San Gabriel River downstream from Cogswell Dam in 1975 and observed multiple *O. mykiss* year classes (DFG 1975).

Severe sedimentation impacts occurred from reservoir operations in the West Fork San Gabriel River in 1981 (DFG 1988b). A 1988 report describes DFG investigations on the West Fork between 1984 and 1986. The report states, "Until Morris Dam was completed (1934), steelhead trout migrated and spawned in the West Fork. When the downstream movement of steelhead was blocked, …fish movement occurred between Morris Dam and areas upstream" (DFG 1988b, p. 5).

A 1992 DFG letter states, "In January 1992, sever turbidity and sedimentation of the fisheries habitat occurred in the West Fork San Gabriel River" (DFG 1992c).

North Fork San Gabriel

North Fork San Gabriel River consists of about 4.7 stream miles and is tributary to West Fork San Gabriel River. It flows south, entering the West Fork about one mile upstream from the western extent of the San Gabriel Reservoir.

North Fork San Gabriel River was stocked in 1930 and subsequent years (DFG 1930a). Staff from DFG surveyed North Fork San Gabriel River in the 1930s and observed *O. mykiss*. The survey report deemed that the extent of natural propagation to be "Probably none" (DFG ca 1934d).

An angler notes observing rainbow trout in North Fork San Gabriel River in recent years (Yin pers. comm.). The origin of the population is uncertain.

Soldier

Soldier Creek consists of about 2.9 stream miles. It flows south to its confluence with Coldbrook Creek, which forms the headwaters of North Fork San Gabriel Creek.

Staff from DFG surveyed Soldier Creek in 1952. The survey report noted the presence of *O. mykiss* showing "poor" to "fair" natural propagation (DFG 1952d). A 1964 letter to DFG reports rainbow trout to 14 inches in length in Soldier Creek (DFG 1964). In response, DFG examined the creek and found "many" juvenile rainbow trout but unsatisfactory conditions for stocking (DFG 1964).

Bear

Bear Creek consists of about 9.3 stream miles and is tributary to West Fork San Gabriel River. It flows south, entering the West Fork about two miles upstream from the western extent of San Gabriel Reservoir.

Bear Creek was stocked in 1931 and in subsequent years (DFG 1931). Staff from DFG surveyed Bear Creek in the 1930s and observed *O. mykiss*. The survey deemed natural propagation not to occur in the creek, and called stocking "Problematical on account of stream being intermittent" (DFG ca 1934e).

A 1947 survey report notes "fair" natural propagation in Bear Creek (DFG 1947e). By 1948, DFG staff deemed natural spawning to be "good" in the creek and called it "…one of the best trout streams of the district" (DFG 1948a).

An angler reports observing rainbow trout in Bear Creek in 2005-2006. Multiple year classes occur, with individuals to 12 or 13 inches in length. Both "wild" trout and stocked fish are present in the creek (Lightner pers. comm.). The ancestry of the native fish is uncertain.

West Fork Bear

West Fork Bear Creek consists of about 4.5 stream miles and is tributary to Bear Creek. It flows southeast, entering Bear Creek between Lower and Upper Bear campgrounds.

Field notes from DFG staff indicate multiple *O. mykiss* year classes in West Fork Bear Creek in 1948. The notes state, "This stream no doubt goes dry so is unimportant to fishing" (DFG 1948b). A 1948 stream survey report finds "good" natural propagation in the creek and states, "This is a fine trout stream with abundant fingerlings" (DFG 1948c).

Chileno Canyon

Chileno Canyon Creek consists of about 3.2 stream miles and is tributary to West Fork San Gabriel River. It flows south, entering the West Fork near Glenn Trail Camp.

Staff from DFG surveyed Chileno Canyon Creek in 1947 and observed multiple *O. mykiss* year classes. Regarding the creek the field notes state, "A nice little stream…but lacks summer flow" (DFG 1952e).

Devils Canyon

Devil's Canyon Creek consists of about 9.6 stream miles and is tributary to West Fork San Gabriel River. It flows south, and its confluence with the West Fork was inundated by Cogswell Reservoir.

Field notes from 1947 notes rainbow trout in Devil's Canyon Creek, including "abundant" fingerlings. The notes indicate that successful spawning and over-summering occur in the creek, at least in some years (DFG 1947f).

Cattle Canyon

Cattle Canyon Creek consists of about 8.4 stream miles and is tributary to the San Gabriel River. It flows west, entering the San Gabriel downstream from the East Fork Station.

A 1933 survey report for Cattle Canyon Creek notes the natural propagation "probably" does not occur in the creek (DFG 1933a). Cattle Canyon Creek was stocked in 1931 and subsequent years (DFG 1930b).

An angler reports observing rainbow trout in Cattle Canyon Creek since the 1990s. Both "native" trout, ranging from about three to seven inches in length, and stocked fish are present in the creek (Kunitomi pers. comm.). The ancestry of the native fish is uncertain.

Coldwater Canyon

Coldwater Canyon Creek consists of about 5.5 stream miles and is tributary to Cattle Canyon Creek. It flows southwest, entering Cattle Canyon Creek at Thompson Flat.

Staff from DFG surveyed Coldwater Canyon Creek in 1981. Multiple *O. mykiss* year classes were observed (DFG 1981). An angler notes that this creek "has never shown any appreciable flow" (Kunitomi pers. comm.).

Devil Gulch

Devil Gulch Creek consists of about two stream miles and is tributary to the San Gabriel River. It flows east, entering the San Gabriel downstream from The Narrows section of the river.

Devil Gulch Creek was stocked in 1931 (DFG 1931). A 1930s survey report notes "light" natural propagation in Devil Gulch Creek (DFG ca 1934f).

Field notes from DFG staff in 1948 indicate the presence of *O. mykiss* fingerlings in lower "Devils Canyon Creek" (DFG 1954b). The context of the survey report suggests the author was referring to Devil Gulch Creek.

Iron Fork San Gabriel River

Iron Fork San Gabriel River consists of about 4.7 stream miles and is tributary to the San Gabriel River. It flows southeast, entering the San Gabriel in The Narrows portion of the San Gabriel Canyon.

Staff from DFG surveyed Iron Fork San Gabriel River in 1933 and observed *O. mykiss*. The survey report indicates that natural propagation “probably” does not occur in the stream (DFG 1933b).

A 1951 survey report called the Iron Fork “a good producer” of *O. mykiss*. Natural propagation was said to be “good” (DFG 1951d).

An angler reports observing rainbow trout in Iron Fork San Gabriel River between 2004 and 2007. Multiple year classes occur, with individuals to 12 or 13 inches in length. Both “wild” trout and stocked fish are present in the creek (Nosek pers. comm.). The ancestry of the native fish is uncertain.

Fish Fork San Gabriel River

Fish Fork San Gabriel River consists of about 6.5 stream miles and is tributary to the San Gabriel River. It flows west, entering the San Gabriel upstream from The Narrows section of the San Gabriel Canyon.

Staff from DFG surveyed Fish Fork San Gabriel River in 1951 and observed numerous *O. mykiss* fingerlings. The survey report recommends against stocking due to good natural production (DFG 1951e).

Staff from DFG surveyed “Upper Fish Canyon” in 1973. Based on the context of the resulting memo, the survey appears to have been of Fish Fork San Gabriel River. The memo states, “There now exists a good population of trout in the mainstream, which seem to be self-sustaining” (DFG 1973b).

An angler reports observing rainbow trout in lower Fish Fork San Gabriel River in 2005 and 2007. Multiple year classes occur, with individuals to about 9 inches in length. The fish are believed to be “wild” trout although the ancestry is uncertain (Nosek pers. comm.). Wild trout also occur in upper Fish Fork, according to the angler.

Prairie Fork San Gabriel River

Prairie Fork San Gabriel River consists of about six stream miles and constitutes the headwaters of the San Gabriel. It flows west to its confluence with Vincent Gulch Creek.

Prairie Fork was stocked, probably in the 1930s and subsequently, with rainbow trout. A stream survey report from 1951 notes that natural propagation is “poor” in the Prairie Fork. The surveyor noted the presence of *O. mykiss* (DFG 1951f). A letter to DFG, probably from 1981, indicates the presence of adult rainbow trout (Brubaker ca 1981).

An angler reports observing rainbow trout in Prairie Fork San Gabriel River between 2000 and 2004. Multiple year classes occur, with individuals to about 12 inches in length. The fish are believed to be “wild” trout although the ancestry is uncertain (Nosek pers. comm.).

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Table 7. Distribution status of *O. mykiss* in coastal streams of Los Angeles County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Arroyo Sequit	Arroyo Sequit	DF	DF	Y	Y	1
Arroyo Sequit	West Fork Arroyo Sequit	DF	DF		Y	1
Arroyo Sequit	East Fork Arroyo Sequit	DF	DF		Y	2
Zuma Canyon	Zuma Canyon	DF	UN		UN	0
Solstice Canyon	Solstice Canyon	DF	PA	Y	N	0
Malibu	Malibu	DF	DF	Y	UN	0
Las Flores Canyon	Las Flores Canyon	PS	PA		UN	0
Topanga Canyon	Topanga Canyon	DF	DF	Y	Y	3
Los Angeles River	Los Angeles River	DF	PA	Y	N	0
Los Angeles River	Rio Hondo	DF	PA	Y	N	0
Los Angeles River	Mission	DF	PA	Y	N	0
Los Angeles River	Eaton Canyon	DF	PA	Y	N	0
Los Angeles River	Arroyo Seco	DF	DF	Y	N	3
Los Angeles River	Bear Canyon	DF	DF	Y	N	3
Los Angeles River	Little Bear Canyon	DF	DF	Y	N	3
Los Angeles River	Big Tujunga	PS	PS		N	0
Los Angeles River	Mill	PS	UN		N	0
San Gabriel River	San Gabriel River	DF	DF	Y	N	3
San Gabriel River	San Jose	PB	UN		N	0
San Gabriel River	Walnut	UN	PA		N	0
San Gabriel River	Big Dalton Canyon	UN	PA		N	0
San Gabriel River	Little Dalton Canyon	UN	PA		N	0
San Gabriel River	San Dimas Canyon	PS	PS		N	0
San Gabriel River	Santa Anita Canyon	DF	DF		N	0
San Gabriel River	Monrovia Canyon	DF	DF		N	0
San Gabriel River	Winter	PS	UN		N	0
San Gabriel River	Fish Canyon	DF	DF	Y	N	0
San Gabriel River	Roberts Canyon	DF	DF	Y	N	0
San Gabriel River	West Fork San Gabriel River	DF	DF	Y	N	3

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 7. Distribution status of *O. mykiss* in coastal streams of Los Angeles County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
San Gabriel River	North Fork San Gabriel River	DF	DF	Y	N	3
San Gabriel River	Soldier	DF	UN	Y	N	0
San Gabriel River	Bear	DF	DF	Y	N	3
San Gabriel River	West Fork Bear	DF	UN	Y	N	0
San Gabriel River	Chileno Canyon	DF	UN	Y	N	0
San Gabriel River	Devils Canyon	DF	PS	Y	N	0
San Gabriel River	Cattle Canyon	DF	DF	Y	N	3
San Gabriel River	Coldwater Canyon	DF	UN	Y	N	0
San Gabriel River	Devil Gulch	DF	UN	Y	N	0
San Gabriel River	Iron Fork San Gabriel River	DF	DF	Y	N	3
San Gabriel River	Fish Fork San Gabriel River	DF	DF	Y	N	3
San Gabriel River	Prairie Fork San Gabriel River	DF	DF	Y	N	3

[1]Please see Methods section for an explanation of titles and values used in this table.

FPO - figure 26

FPO - figure 27

FPO - figure 28

FPO - figure 29

Santa Ana River

The Santa Ana River consists of about 95 stream miles. It is formed by the confluence of Coon and Heart Bar creeks and flows southwest to enter the Pacific Ocean at Huntington Beach State Park. In its lower 24 miles, downstream from the entrance to Santa Ana Canyon, the river is channelized. Prado Dam is located at about stream mile 31, near where the river enters Santa Ana Canyon. At about stream mile 70, the river leaves the San Bernadino Mountains and becomes a wash in the low gradient area downstream. Flows in the Santa Ana River are diverted into an aqueduct at a point near the Bear Creek confluence, and used to generate hydroelectric power.

In a survey report from the 1930s, DFG staff note the presence of rainbow trout in the San Bernadino Mountains portion of the Santa Ana River. The report states, "The Santa Ana is the best stream in Southern California" (DFG ca 1934a).

The lower Santa Ana River and the portion in San Bernadino County were stocked in 1930-1931 and subsequent years (DFG 1936a). A 1938 issue of the DFG journal indicates that fishing is "consistently good" in the portion of the Santa Ana River in the mountains (DFG 1938). A letter regarding steelhead distribution cites Evans (1950) as reporting that the lower reaches of the Santa Ana River contained a "good" steelhead run (DFG 1997).

The Santa Ana River upstream from the Bear Creek confluence was sampled in 1987 and *O. mykiss* was observed in two sections. The population was characterized as "apparently wild." A subsequent report states, "Trout reproduction appeared to be low, perhaps due to extensive sediment" (DFG 1990, p. 36).

The status review for steelhead completed in 2005 includes mention of the Santa Ana River. It cites Nehlsen *et al.* (1991) as listing the Santa Ana River steelhead stock as extinct (NMFS 2005). However, the status review notes *O. mykiss* as present in the upper Santa Ana River basin, upstream from an impassable barrier (NMFS 2005).

Santiago

Santiago Creek consists of about 29 stream miles and is tributary to the Santa Ana River. Its headwater are on the western flank of Santiago Peak and the most upstream reach, about five miles in length, is referred to as Santiago Canyon Creek. The creek flows west to enter the Santa Ana River in the city of Santa Ana.

Villa Park Dam is located on Santiago Creek in the low gradient wash near the mouth of Weir Canyon, while Santiago Dam is about two miles above the mouth of the canyon in which the creek flows.

An account of fishing in 1907 appeared in a local newspaper in 1918. An angler reported taking 19 trout between 13 and "[j]ust short of 17 inches" in Santiago Creek (Sleeper 2002). The angler noted that the trout had been stocked.

Notes from DFG staff in 1947 indicate that fingerling *O. mykiss* were observed in Santiago Creek in that year (DFG 1952a). A DFG stream inventory, probably from 1973, indicates the rainbow trout are present both downstream from Santiago Dam upstream from Santiago Reservoir (DFG ca 1973).

Silverado

Silverado Creek consists of about 8.5 stream miles and is tributary to Santiago Creek. It flows west, entering Santiago Creek about 2.6 miles upstream from the eastern extent of Santiago Reservoir.

A 1981 DFG memo states, "Due to the paucity of stream habitat in Orange County, the Department supports the practice of utilizing check dams for stocking catchable trout in Silverado, Trabuco, Holy Jim, and San Juan Creeks" (DFG 1981a).

Harding Canyon

Harding Canyon Creek consists of about 3.8 stream miles and is tributary to Santiago Creek. It flows southwest, entering Santiago Creek at the town of Modjeska. The dam forming Modjeska Reservoir is located less than one-half mile from the mouth of Harding Canyon.

Field notes from DFG staff in 1947 indicate the presence of rainbow trout in Modjeska Reservoir. The notes state, "The trout must be established in the upper canyon and work down into reservoir continually" (DFG 1947a).

Tissue samples from Harding Canyon fish were analyzed as part of a study of the genetic structure of southern California *O. mykiss* in 2003. The resulting report indicates that the population is of coastal steelhead ancestry (Girman and Garza 2006). In December 2007, a mudslide filled a substantial reach of Harding Canyon Creek and may have extirpated the *O. mykiss* population in the stream.

Chino

Chino Creek flows southeast and is tributary to the Santa Ana River. It enters the Santa Ana via the Prado Flood Control Basin. No fisheries information was found for Chino Creek. The creek is included to provide context for fisheries information applying to a tributary.

Cucamonga

Cucamonga Creek consists of about 21 stream miles and is tributary to Chino Creek. It flows about five miles through Cucamonga Canyon, in which it is called Cucamonga Canyon Creek, before entering the lower gradient area downstream. In its lower portion, the creek largely is channelized. The most downstream portion of the creek appears on maps as Mill Creek, which joins Chino Creek via the Prado Flood Control Basin.

Cucamonga Canyon Creek was stocked in 1930 and subsequent years (DFG 1936b). Staff from DFG surveyed Cucamonga Canyon Creek in the 1930s and noted the presence of rainbow trout. The survey report notes "slight if any" natural propagation (DFG ca 1934b).

In a 1948 survey, DFG staff observed rainbow trout fingerlings and individuals to seven inches in Cucamonga Creek. The report notes "good" natural propagation (DFG 1948a).

San Antonio Canyon

San Antonio Canyon Creek consists of about ten stream miles upstream from San Antonio Dam. The creek flows south from headwaters on the south flank of Mount San Antonio. The portion of the creek downstream from San Antonio Dam is in a lower gradient area and is channelized throughout about ten miles to its confluence with Chino Creek.

A 1938 issue of the DFG journal indicates that San Antonio Creek is a "consistently good stream" in terms of angling (DFG 1938). In a 1948 survey, DFG staff observed rainbow trout, including fingerlings, in San Antonio Creek. The report notes "fair" natural propagation (DFG 1948b).

According to an angler familiar with the streams of the Santa Ana River basin, *O. mykiss* occurs in San Antonio Canyon Creek. Individuals between about 7 and 14 inches in length have been observed in recent years (Yin pers. comm.).

Icehouse Canyon

Icehouse Canyon Creek consists of about three stream miles and is tributary to San Antonio Canyon Creek. It flows west, entering San Antonio Creek west of Sugarloaf Peak.

A creel survey from 1950 indicates the presence of rainbow trout in Icehouse Canyon Creek (DFG 1950a).

Temescal Wash

Temescal Wash drains the Temescal Valley. It flows northwest, entering the Santa Ana via the Prado Flood Control Basin. No fisheries information was found for Temescal Wash. The wash is included to provide context for fisheries information applying to a tributary.

Coldwater Canyon

Colderwater Canyon Creek flows northwest about three miles through Coldwater Canyon. The 2.3 mile section downstream from Glen Ivy Springs is low gradient and is tributary to the Temescal Wash.

Notes taken in 1931 by DFG staff state, "The stream has been stocked with rainbow trout for a number of years with fair success I am told" (DFG 1931a). Coldwater Creek was surveyed in 1947 and multiple *O. mykiss* year classes were observed (DFG 1947b). During a 1950 inspection of Coldwater Creek, staff from DFG again observed multiple *O. mykiss* year classes. The report notes, "Natural reproduction appears excellent" (DFG 1950b).

Staff from USGS observed *O. mykiss* in Coldwater Canyon Creek in recent years. Further investigation is suggested to improve the understanding of the origin of this population (Fisher pers. comm.).

Warm

Warm Creek originates on the southwest slope of McKinley Mountain and flows southwest through the town of Highland before entering the Santa Ana River near the town of Colton. Information concerning *O. mykiss* was not found for Warm Creek. It is cited here as context for fisheries information pertaining to tributary streams.

Lytle

Lytle Creek flows through about 17.3 miles between its headwaters forks and its confluence with Warm Creek in the southern portion of the city of San Bernardino. The upper five miles of the creek and the headwaters forks are in a high gradient area, while the lower, low gradient portion includes the Lytle Creek Wash and a channelized section.

Lytle Creek was stocked in 1930 and in subsequent years. Staff from DFG surveyed Middle Fork Lytle Creek in the 1930s and noted rainbow trout present. The report indicates that successful spawning was unlikely (DFG ca 1934c).

A 1948 survey of South Fork Lytle Creek noted the presence of rainbow trout. The survey report deems natural propagation to be “good” (DFG 1948c). The North Fork was surveyed in 1948 and *O. mykiss* was not observed. The survey report indicated that natural propagation did not occur in the creek (DFG 1948d).

Cajon Wash

The Cajon Creek Wash is the low gradient, alluvial product of flows from Cajon Canyon and is tributary to the Lytle Creek Wash. No fisheries information was found for this basin, but the feature is cited as context for its tributaries.

Cable

Cable Creek is formed by the confluence of West Fork Cable Canyon and East Fork Cable Canyon Creek, from where it flows about 5.7 stream miles into Cajon Wash. The creek appears to be channelized in its lower reaches.

A 1930s survey of Cable Canyon Creek noted the presence of rainbow trout. The survey report called natural propagation in the creek “problematical” (DFG ca 1934d).

City

City Creek consists of about 15.6 stream miles and is tributary to Warm Creek. The lower portion of the creek appears to have been re-routed to be tributary to the Warm Creek channel in the eastern portion of the city of San Bernardino. The creek has East Fork and West Fork City Creek tributaries in its headwaters.

City Creek was stocked in 1930 and in subsequent years (DFG 1936c). Staff from DFG surveyed East Fork and West Fork City Creek in the 1930s and noted the presence of rainbow trout. Natural propagation was not expected to occur in the creeks (DFG ca 1934e; DFG ca 1934f). A 1938 issue of the DFG journal indicates that fishing is “consistently good” in the portion of the

Santa Ana River in the mountains (DFG 1938). In a 1948 survey, staff from DFG observed rainbow trout fingerlings in West Fork City Creek and deemed natural propagation to be “fair” (DFG 1948e).

Mill

Mill Creek consists of about 17 stream miles and is tributary to the Santa Ana River. It flows west from headwaters in Mill Creek Canyon to its confluence with the Santa Ana in the northern portion of the city of Redlands. An aqueduct carries Mill Creek flows in the creek’s lower reach, from the downstream entrance of Mill Creek Canyon at about stream mile 5.3 to a powerhouse located in the creek’s outwash plain.

Mill Creek was stocked in 1930 and in subsequent years. A 1948 DFG letter stated, “Mill Creek, at one time was said to have been one of the best trout streams in southern California” (DFG 1948f). Another DFG letter from 1948 states, “Conditions are very poor for fish life and food” (DFG 1948g).

Mountain Home

Mountain Home Creek consists of about 3.7 stream miles and is tributary to Mill Creek. It flows south, entering Mill Creek at the town of Mountain Home Village.

Mountain Home Creek was stocked in 1930 and in subsequent years. A 1930s stream survey report deems that natural propagation does not occur and states about Mountain Home Creek, “Stream not very important” (DFG ca 1934g).

Falls

Falls Creek consists of about 3.7 stream miles and is tributary to Mill Creek. It flows southwest, entering Mill Creek near Big Falls Campground.

Staff from DFG surveyed Falls Creek in the 1930s and noted the presence of rainbow trout with “fair” natural propagation. The survey report states, “…most of the fish caught are previous years plant. This is the original home of the Gorgonio Trout” (DFG ca 1934h).

Falls Creek was stocked in 1942 and in subsequent years. Staff from DFG surveyed Falls Creek in 1948 and observed adult rainbow trout. The survey report ascribes “poor” natural propagation to the population (DFG 1948h).

Alder

Alder Creek consists of about 3.5 stream miles and is tributary to the Santa Ana River. It flows south, entering the Santa Ana southeast of Government Peak.

Alder Creek was stocked in the 1930 and in subsequent years (DFG 1932). A 1930s stream survey report indicates that natural propagation in the creek is “very light if any” (DFG ca 1934i).

Keller

Keller Creek consists of about 3.7 stream miles and is tributary to the Santa Ana River. It flows southwest, entering the Santa Ana less than one half mile upstream from the Alder Creek confluence.

Keller Creek was stocked in 1930 and in subsequent years (DFG 1930). A 1930s stream survey report indicates that natural propagation in the creek is "light, if any" (DFG ca 1934j).

Bear

Bear Creek consists of about nine stream miles. It flows from the dam forming Big Bear Lake to its confluence with the Santa Ana River. According to a 1987 DFG report regarding several southern California streams, "There are no established flow releases from Big Bear Lake" (DFG 1990, p. 15).

Bear Creek was stocked in 1930 and in subsequent years. Staff from DFG surveyed Bear Creek in the 1930s and noted rainbow trout in the creek. Natural propagation was deemed to be "very slight, if any." The survey report indicates that flows from Big Bear Lake allowed fish to over-summer. A 1938 issue of the DFG journal indicates that fishing is "consistently good" in Bear Creek (DFG 1938).

Staff from DFG sampled Bear Creek in 1986 and 1987 and observed multiple *O. mykiss* year classes (DFG 1990). A memo describing the sampling results states, "Bear Creek had the most abundant trout populations [of six southern California streams studied]" (DFG ca 1986). Bear Creek was designated a "wild trout water" in 1988 (DFG 1988). A 1989 management plan for the creek states, "It should be recognized that as little as a constant 1.0 cfs release could have significant benefits to the fishery in the upper reaches of Bear Creek…" (DFG 1989, p. 20).

A fish population survey was conducted on Bear Creek in 1992 and multiple *O. mykiss* year classes were observed. The survey report noted that rainbow trout were absent from the upper sections of the creek and "accounted for only 3% to 8% of the estimated [trout] population" in the lower section (Deinstadt 1992).

Siberia

Siberia Creek consists of about three stream miles and is tributary to Bear Creek. It flows west from headwaters at Bluff Lake, entering Bear Creek at about stream mile five.

Siberia Creek was stocked in 1930 and in subsequent years (DFG 1931b). A 1930s stream survey report indicates that natural propagation in the creek is "very slight" (DFG ca 1934k).

Grout

Grout Creek consists of about 2.7 stream miles and is tributary to Big Bear Lake. It flows east, entering the lake at Grout Bay.

Grout Creek was stocked prior to 1947. A stream survey report from that year notes the presence of rainbow trout. It states, “This stream is important only as a spawning stream for Big Bear Lake rainbow trout” (DFG 1947c).

Deer

Deer Creek consists of about 4.3 stream mile and is tributary to the Santa Ana River. It flows southwest, entering the Santa Ana approximately one mile south of Seven Pines Peak.

A 1930s stream survey report notes the presence of rainbow trout and states that the creek has been stocked with “fair success” (DFG ca 1934l). The report indicates that natural propagation in the creek is “very little, if any [on] account of heavy fishing.”

Forsee

Forsee Creek consists of about 5.4 stream miles and is tributary to the Santa Ana River. It flows northwest, entering the Santa Ana northeast of Pinezanita.

Forsee Creek was stocked in 1930 and subsequent years (DFG 1936d). Staff from DFG surveyed Forsee Creek in 1934 and noted the presence of rainbow trout. The survey report indicates that stocked fish over-summered but had limited available spawning habitat (DFG 1934).

Barton

Barton Creek consists of about 1.7 stream miles and is tributary to the Santa Ana River. It is formed by the confluence of the West Fork and East Fork Barton Creek and flows northwest, entering the Santa Ana west of Seven Oaks.

Barton Creek was stocked in 1930 and in subsequent years (DFG 1936e). Staff from DFG surveyed Barton Creek in 1934 and noted the presence of rainbow trout. The survey report indicates that natural propagation was “very slight” (DFG ca 1934m).

South Fork Santa Ana River

The South Fork Santa Ana River consists of about 3.9 stream miles and is tributary to the Santa Ana River. It flows north, entering the Santa Ana River near University Camp.

In a 1908 paper, researchers described a new species of trout from the headwaters of the South Fork Santa Ana River, at 8,200 feet altitude (DFG 1931c).

The South Fork Santa Ana River was stocked in 1930 and in subsequent years (DFG 1936f). Staff from DFG surveyed the South Fork in 1934 and noted the presence of rainbow trout exhibiting “quite extensive” natural propagation. The survey report states, “It is one of the original sources of the Gorgonio trout which is now apparently extinct” (DFG ca 1934n).

Sampling by DFG staff in 1987 indicated that the South Fork Santa Ana River did not support a standing crop of rainbow trout (DFG 1987). According to the resulting report, "There are no dams on the stream, but during the spring through early fall, significant amounts of water are diverted to fill Jenks Lake" (DFG 1990, p. 18).

Aliso

Aliso Creek's headwaters are north of the Portola Hills. The creek flows south approximately 19 miles, entering the Pacific Ocean in the vicinity of Laguna Niguel.

A long-time resident of southern California and angler reported fishing in Aliso Creek and relayed an account of another angler catching steelhead in the early 1900s. Steelhead weighing in the range of eight to ten pounds were taken in the 1950s and through 1967. The angler observed six pairs of spawning steelhead in lower Aliso Creek in 1993 (Selby pers. comm.).

San Juan

San Juan Creek consists of over 22 stream miles. It flows southwest, entering the Pacific Ocean at Doheny State Beach.

An account of an early survey of San Juan Creek appears in a study of the streams of Camp Pendleton: "...CDFG wardens Mayfield and E.D. Beeman described a survey of San Juan Creek conducted in February, 1940. In a 1 km section of stream, approximately 24 km upstream of the mouth, they found three pair of spawning steelhead" (Knight 1998,p. 20). A 1946 issue of the DFG journal relays reports of steelhead caught in the San Juan Creek estuary (DFG 1946).

Staff from USFWS reported capturing juvenile steelhead near the mouth of San Juan Creek in 1968. Surveys conducted after 1974 did not produce *O. mykiss* observations (Knight 1998).

A 1981 DFG memo states regarding San Juan Creek, "Water quality is generally poor except in wet years, when it supports catchable trout stocking for about 2 or 3 months" (DFG 1981b). A 1981 DFG memo states, "Due to the paucity of stream habitat in Orange County, the Department supports the practice of utilizing check dams for stocking catchable trout in Silverado, Trabuco, Holy Jim, and San Juan Creeks" (DFG 1981a).

A 2002 watershed management plan for San Juan Creek noted riverine and riparian habitat impacts from channel downcutting and other erosion problems, as well as poor water quality (USACE 2002). As part of a steelhead distribution study, staff from NMFS surveyed San Juan Creek in 2002. Four sites were sampled, and *O. mykiss* was found to be absent from the drainage (NMFS 2003). A 2004 memo from NMFS staff notes, "…steelhead are currently utilizing San Juan Creek and Arroyo Trabuco… (NMFS 2004). The memo adds, "…the amount and quality of habitat in the San Juan Creek and Trabuco Creek watersheds is capable of supporting steelhead…(NMFS 2004). The creek was surveyed by DFG staff in May 2006. The survey report notes 3-4 inch fish in one location that "appear to be juvenile wild *O. mykiss*" (DFG 2006). The report found "one, perhaps two" dams constituting total passage barriers.

A steelhead recovery watershed management plan was prepared for San Juan Creek in 2007. The plan states, "Specific factors on Trabuco Creek and San Juan Creek that negatively impact the habitat or conditions needed for Steelhead survival, growth, or reproduction include low or reduced flows in some sections due to groundwater pumping and creek diversions (with associated water temperature increases), water quality degradation from a variety of sources, invasive plant communities (such as Arundo and alyssum), competition with non-native fish, predation by non-native predators (such as the bullfrog), stream channelization and other forms of alterations, manmade and natural barriers, siltation of spawning habitat, degradation of riparian plant communities that provide cover, and temperature regulation of the stream" (CDM 2007, p. 3-34). According to the plan, the San Juan Creek lagoon "…is highly impacted by sediment loading…" (CDM 2007, p. 5-41). The plan notes the presence of perennial wetted pools in the upper watershed and adds, "It is important that the pristine condition of the upper watershed be preserved to facilitate steelhead recovery" (CDM 2007, p. 4-28). Preparing the plan included spring and fall surveys of a lower, middle, and upper San Juan Creek reach. No salmonids were observed during the surveys.

An adult salmonid between 18 and 24 inches in length was observed in lower San Juan Creek in March 2007. Staff from DFG stated, "…it was most likely a steelhead" (DFG 2007). A 25 inch steelhead was observed in the San Juan Creek estuary in February 2008 by staff at Doheny State Park (Capelli pers. comm.). An individual estimated to be 37 inches in length was observed in March 2008 in lower San Juan Creek that was re-located to the estuary by DFG staff.

Arroyo Trabuco (Trabuco)

Arroyo Trabuco consists of over 21 stream miles and is tributary to San Juan Creek. It flows south, entering San Juan Creek south of the city of San Juan Capistrano. A grade control structure at the I-5/Camino Capistrano crossing and another structure located at about stream mile 2.4 are total passage barriers (CDM 2007).

An interview with a local resident, Joseph Wilkes, produced an account of fishing in Arroyo Trabuco in the 1880s. "I got a trout seventeen and a half inches long, and we got any number of trout from twelve to fifteen inches in length" (Sleeper 2002). A 1939 DFG memo indicates that steelhead fingerlings rescued from San Mateo Creek were placed in upper Arroyo Trabuco (DFG 1939). An ichthyological note from 1939 describes collecting a single *O. mykiss* specimen from Arroyo Trabuco (Miller 1939). Notes from DFG staff in 1947 indicate that fingerling *O. mykiss* were observed in Arroyo Trabuco in that year (DFG 1952a). A 1981 DFG memo states, "Due to the paucity of stream habitat in Orange County, the Department supports the practice of utilizing check dams for stocking catchable trout in Silverado, Trabuco, Holy Jim, and San Juan Creeks" (DFG 1981a).

A 2002 San Juan Creek watershed management plan found "phenomenal degrees of erosion damage" in the previous 20 years in the lower reaches of Arroyo Trabuco (USACE 2002). A 2005 newspaper article describes plans to install a fish ladder on the culvert on Arroyo Trabuco under Interstate 5 (Lin 2005). The article states, "State biologists in May 2003 spotted what they believed were southern steelhead trout at the bottom of the culvert, the first sighting there in decades" (Lin 2005). A 2004 memo from NMFS staff notes, "…steelhead are currently utilizing San Juan Creek and Arroyo Trabuco…(NMFS 2004). The memo adds, "…the amount and quality of habitat in the San Juan Creek and Trabuco Creek watersheds is capable of supporting steelhead…(NMFS 2004).

A steelhead recovery watershed management plan was prepared for Trabuco Creek in 2007. Preparing the plan included spring and fall surveys of a lower, middle, and upper Arroyo Trabuco reach. Salmonids that "appeared to be rainbow trout, 1-2 year age class" were observed to be "relatively abundant in selected pools in upper reach" (CDM 2007, p. 4-25). The report notes in regards to the observed *O. mykiss*, "Possibly survivors from past stocking efforts."

Falls Canyon

Falls Canyon Creek consists of about 1.5 stream miles and is tributary to Arroyo Trabuco. It flows south, entering Arroyo Trubuco northeast of the town of Trabuco Canyon.

Field notes indicate that DFG staff observed rainbow trout in Falls Canyon Creek in 1947 and 1949 (DFG 1950c).

Holy Jim Canyon

Holy Jim Canyon Creek consists of about 2.8 stream miles and is tributary to Arroyo Trabuco. It flows south, entering Arroyo Trabuco in the upper portion of Trabuco Canyon.

Holy Jim Canyon Creek was stocked in 1948 and in subsequent years. Field notes were reviewed for the late 1940s and no record of observation of over-summering *O. mykiss* was found (DFG 1952b).

A creel census in 1951 indicates that Holy Jim Canyon Creek supported a rainbow trout fishery. The trout were believed to be of both wild and stocked ancestry (DFG 1951).

A 1981 DFG memo states, "Due to the paucity of stream habitat in Orange County, the Department supports the practice of utilizing check dams for stocking catchable trout in Silverado, Trabuco, Holy Jim, and San Juan Creeks" (DFG 1981a).

Hot Spring

Hot Spring Canyon Creek consists of more than seven stream miles and is tributary to San Juan Creek. It flows southwest from headwaters near Los Pinos Peak, entering San Juan Creek near San Juan Hot Springs.

A review of steelhead related information produced reports of *O. mykiss* in Hot Spring Canyon Creek. According to the reference, "Rainbow trout were present in Hot Springs Canyon Creek during a 1946 CDFG survey, and rainbow trout stocking records dated back to 1943" (Titus *et al.* in prep.).

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Table 8. Distribution status of *O. mykiss* in coastal streams of Orange County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Santa Ana River	Santa Ana River	DF	UN	Y	N	0
Santa Ana River	Santiago	DF	UN	Y	N	0
Santa Ana River	Silverado	UN	UN		N	0
Santa Ana River	Harding Canyon	DF	DF	Y	N	0
Santa Ana River	Chino	UN	UN		N	0
Santa Ana River	Cucamonga	DF	UN	Y	N	0
Santa Ana River	San Antonio Canyon	DF	DF	Y	N	3
Santa Ana River	Icehouse Canyon	DF	UN		N	0
Santa Ana River	Temescal Wash	UN	UN		N	0
Santa Ana River	Coldwater Canyon	DF	DF	Y	N	0
Santa Ana River	Warm	UN	UN		N	0
Santa Ana River	Lytle	DF	UN	Y	N	0
Santa Ana River	Cajon Wash	UN	UN		N	0
Santa Ana River	Cable	PS	UN		N	0
Santa Ana River	City	DF	UN	Y	N	0
Santa Ana River	Mill	DF	UN	Y	N	0
Santa Ana River	Mountain Home	UN	UN		N	0
Santa Ana River	Falls	DF	UN	Y	N	0
Santa Ana River	Alder	PS	UN		N	0
Santa Ana River	Keller	PS	UN		N	0
Santa Ana River	Bear	DF	DF	Y	N	3
Santa Ana River	Siberia	PS	UN		N	0
Santa Ana River	Grout	DF	UN		N	0
Santa Ana River	Deer	PB	UN		N	0
Santa Ana River	Forsee	PS	UN		N	0
Santa Ana River	Barton	PS	UN		N	0
Santa Ana River	South Fork Santa Ana River	DF	PA	Y	N	0
San Diego	San Diego	UN	UN		UN	0
Aliso	Aliso	DF	PS		UN	0
San Juan	San Juan	DF	DF	Y	UN	2

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 8. Distribution status of *O. mykiss* in coastal streams of Orange County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
San Juan	Arroyo Trabuco	DF	DF	Y	N	2
San Juan	Falls Canyon	DF	UN		UN	0
San Juan	Holy Jim Canyon	DF	UN		UN	0
San Juan	Hot Spring Canyon	DF	UN		UN	0

[1]Please see Methods section for an explanation of titles and values used in this table.

FPO - figure 30

FPO - figure 31

San Mateo

San Mateo Creek consists of about 22 stream miles. It flows southwest from headwaters in the southern Santa Ana and Elsinore Mountains, entering the Pacific Ocean at San Mateo Point.

A DFG record from 1939 indicates that *O. mykiss* YOY were rescued from San Mateo Creek and planted in the lagoon (DFG 1939a). A memo from that year describes the steelhead resources of the creek:

> "Reports from many sources indicate that there has been a heavy run of steelhead spawners in this stream every year. Number of fish running seems to be in the thousands with a reported length of from 18 to 24 inches… Spawners have been seen in the stream 12 miles from mouth 4 days after a storm" (DFG 1939b, p. 2).

The memo adds, "The live water area for this year seems to be that part of the stream for eight miles above the first 12, the lagoon and one tributary, Blue Water canyon… The total available spawning area of the stream and its tributaries is about 25 miles or more… Some 19,000 steelhead fingerlings were rescued from San Mateo creek this year" (DFG 1939b, p. 3).

San Mateo Creek was stocked in 1945 and in subsequent years (DFG 1945a). A 1946 DFG memo described a visit to San Mateo Creek and stated, "[in one pool]…I saw perhaps a couple of dozen steelhead fingerling, and counted 9 trout 9 to 12" long" (DFG 1946a, p. 2). According to an issue of the DFG journal from 1946, "[DFG warden E.H.] Glidden states that trout weighing up to about 20 pounds run far up the San Mateo, and that he has personally observed the runs in San Mateo and San Onofre creeks for 20 years" (DFG 1946b).

Staff from DFG surveyed San Mateo Creek in 1950 and observed multiple *O. mykiss* year classes, including individuals to 14 inches in length (DFG 1952). The notes from the survey state, "I believe the present resident population of RT is sufficient to reproduce the carrying potential of this stream whenever water conditions improve, and "…it is very likely from all reports that an ample steelhead population migrates considerable distance upstream…" (DFG 1952).

Staff from USFWS conducted habitat surveys on creeks in Camp Pendleton in 1995 and 1996, including mainstem San Mateo Creek. The resulting report states, "The Santa Margarita River and San Mateo Creek provide a corridor to upstream habitat off-Base. Spawning and rearing habitat occurs on San Mateo Creek and Devils Canyon within the Cleveland National Forest" (Knight 1998, p. 1).

Staff from DFG collected *O. mykiss* in San Mateo Creek in 1999 and took tissue samples. According to subsequent a paper concerning the San Mateo steelhead, "The discovery… represents the first multiple record account of trout in the creek in over 50 years" (DFG 2004, p. 140). A memo addressing conservation of the population recommended habitat restoration, removal of exotic fish, and evaluation of groundwater use and lagoon management (DFG 1999).

In 2000, staff from DFG reported that *O. mykiss* sampled in San Mateo Creek in 1999 likely were the progeny of adult steelhead. The report states, "Field surveys yielded no evidence of a reproducing resident trout population…" (DFG 2000, p. 17). In 2004 DFG staff noted, "The higher water temperature [in San Mateo Creek than in Devil Canyon Creek] and presence of non-native fish species likely contributed to the extirpation of adult trout on SMC in 2000" (DFG 2004, p. 140).

A draft assessment for San Mateo Creek steelhead prepared in 2001 noted impacts from off-highway vehicles in the Wildomar area, non-native plants, and erosion of trails in the San Mateo Wilderness. The assessment cited several projects to reduce these impacts and other factors potentially affecting steelhead (USFS 2001).

Tissue samples from San Mateo Creek *O. mykiss* were analyzed as part of a study of genetic structure in southern California streams. The resulting report indicates that the fish "are clearly not [of hatchery ancestry]" (Girman and Garza 2006).

Devil Canyon

Devil Canyon Creek consists of about eight stream miles and is tributary to San Mateo Creek. It flows west, entering San Mateo Creek at about stream mile ten.

A 1998 USFWS report cites Dave Woelfel as confirming the presence of *O. mykiss* historically in Devil Canyon Creek based on reports from fishermen who caught steelhead there in the 1920s and 1930s (Knight 1998).

Staff from USFWS conducted habitat surveys on creeks in Camp Pendleton in 1995 and 1996, including Devils Canyon Creek. The resulting report states, "Spawning and rearing habitat occurs on San Mateo Creek and Devils Canyon within the Cleveland National Forest" (Knight 1998, p. 1).

Staff from DFG observed *O. mykiss* in Devil Canyon Creek during several years prior to 2002 (DFG 2002). A 2000 DFG report states, "Juvenile steelhead currently rear in…Devil Canyon Creek" (DFG 2000, p. 16). A 2004 paper notes, "Genetic and age analysis on specimens collected in 1999 and 2000 established that…successful, resident reproduction occurred in DCC in 2000" (DFG 2004).

San Onofre

San Onofre Creek consists of about 13 stream miles. It flows southwest from headwaters near Margarita Peak, entering the Pacific Ocean at San Onofre Beach.

According to an issue of the DFG journal from 1946, "…[DFG warden E.H. Glidden] has personally observed the runs in San Mateo and San Onofre creeks for 20 years" (DFG 1946b). The San Onofre Creek lagoon was surveyed in 1950 and juvenile steelhead were observed (DFG 1979)

Staff from USFWS conducted habitat surveys on creeks in Camp Pendleton in 1995 and 1996, including mainstem San Onofre Creek. The resulting report states, "The best steelhead habitat on the Base occurs within the upper San Onofre Creek drainage" (Knight 1998, p. 1).

As part of a steelhead distribution study, NMFS staff collected information on San Onofre Creek. The resulting 2005 report notes that the creek is dry, and therefore incapable of supporting *O. mykiss* (NMFS 2005). According to a naturalist and long-time resident, suitable steelhead habitat is available in the upper reaches and the lagoon (Greenwood pers. comm.).

Santa Margarita River

The Santa Margarita River consists of about 29.5 stream miles. It flows southwest from its headwaters at top of Temecula Canyon, entering the Pacific Ocean near Camp Del Mar. The diversion weir feeding O'Neil Lake is located at about stream mile 9.5. It was constructed in 1982.

Warden E.H. Glidden was reported to have rescued adult steelhead in the Santa Margarita River in the 1930s or 1940s (Knight 1998). Steelhead fry were collected in 1939 (Knight 1998).

Rainbow trout were stocked in the Santa Margarita River in 1941 and in subsequent years (Knight 1998, Table 5). A 1947 summary of stream surveys describes the Santa Margarita River. Staff from DFG states, "A constant flow is present in the section opposite Fallbrook but summer temperatures and shifting sand bottom make it unsuitable for trout" (DFG 1947a). A memo from 1949 notes, "…a few steelhead are known to enter the river on wet years and run upstream to slightly above the Fallbrook area" (DFG 1949a).

According to a 1964 news release, "the area between the lower reaches of the Temecula Gorge and the town of Fallbrook were planted with catchable-size rainbow trout" (DFG 1964a).

Staff from USFWS conducted habitat surveys on creeks in Camp Pendleton in 1995 and 1996, including mainstem Santa Margarita River. The resulting report states, "The Santa Margarita River and San Mateo Creek provide a corridor to upstream habitat off-Base" (Knight 1998, p. 1). It adds, "[The Santa Margarita River]…contained the least quantity and quality of steelhead habitat" (Knight 1998, p. 92).

A fish distribution study of the Santa Margarita watershed was conducted between 1997 and 1999 and *O. mykiss* was not observed. The resulting paper cites previous work in stating, "…steelhead, stickleback, and lamprey…have been extirpated since at least the 1940s" (Warburton 2000). The study indicates that steelhead rearing habitat is present in the Santa Margarita River "from about the De Luz Ford on the Base to the top of the gorge…" (Warburton 2000).

According to a 2003 NMFS report, the Santa Margarita River does not offer spawning habitat downstream from O'Neil Dam (NMFS 2003).

DeLuz

DeLuz Creek consists of about 12.9 stream miles and is tributary to the Santa Margarita River. It flows south, entering the Santa Margarita at about stream mile 2.3.

As part of a study of streams on Camp Pendleton, staff from USFWS reviewed information regarding the distribution of *O. mykiss*. Anecdotal accounts and photographs indicate that steelhead adults were present in DeLuz Creek until at least the 1940s

(Knight 1998). According to the USFWS report, DeLuz Creek was stocked in 1942 (Knight 1998). Staff from DFG examined smaller San Diego County streams, including DeLuz Creek, in 1947 with regards to stocking. The resulting memo states, "A few trout survive in the headwaters from year to year" (DFG 1947a). The memo characterizes habitat in the creek as "poor".

A 1998 USFWS report cites a 1974 San Diego Coast Regional Commission (SDCRC) report as confirming the presence of *O. mykiss* in DeLuz Creek in 1950-52 (Knight 1998).

Staff from USFWS conducted habitat surveys on creeks in Camp Pendleton in 1995 and 1996, including DeLuz Creek. The resulting report stated, "…DeLuz Creek contained the least quantity and quality of steelhead habitat" (Knight 1998, p. 92).

A fish distribution study of the Santa Margarita watershed was conducted between 1997 and 1999. The resulting paper indicates that suitable steelhead rearing habitat is present in upper DeLuz Creek (Warburton 2000).

Roblar

Roblar Creek consists of about 6.6 stream miles and is tributary to DeLuz Creek. If flows southeast, entering DeLuz Creek upstream from Camp De Luz.

Staff from DFG visited Roblar Creek in 1947 and recommended stocking (DFG 1946a). Based on the context of the letter, the recommendation indicates that suitable habitat was present.

A consulting biologist's report from 1991 discusses Roblar Creek. The report notes the presence of perennial water and suitable substrate, stating, "[Roblar Creek] may have suitable conditions to support steelhead at present" (Higgins 1991, p. 19).

Staff from USFWS conducted habitat surveys on creeks in Camp Pendleton in 1995 and 1996, including Roblar Creek. The resulting report states, "Small amounts of habitat…occur on Roblar Creek" (Knight 1998, p. 95).

Fern

Fern Creek consists of about one stream mile and is tributary to DeLuz Creek. It flows east, entering DeLuz Creek at De Luz.

According to a 1930 DFG survey report, "[Fern Creek] was first stocked in 1930 with poor results" (DFG ca 1932). The report noted that poor habitat made stocking "useless." Poor habitat quality also was reported in a 1947 survey report (DFG 1947a).

A 1998 USFWS report cites Allen Brain as confirming the presence of *O. mykiss* historically in Fern Creek based on a 1942 observation of steelhead (Knight 1998).

Rainbow

Rainbow Creek consists of about 4.5 stream miles and is tributary to the Santa Margarita River. It flows west, entering the Santa Margarita west of Red Mountain.

A consulting biologist's report from 1991 discusses Rainbow Creek. The report notes the presence of perennial water and suitable substrate, stating, "[Rainbow Creek] may have suitable conditions to support steelhead at present" (Higgins 1991, p. 19). A fish distribution study of the Santa Margarita watershed was conducted between 1997 and 1999. The resulting paper indicates that suitable steelhead rearing habitat is present in lower Rainbow Creek (Warburton 2000).

San Luis Rey River

The San Luis Rey River consists of over 50 stream miles downstream from Lake Henshaw. It flows in an overall westerly direction, entering the Pacific Ocean at the city of Oceanside. Lake Henshaw Dam was constructed in 1924. According to a 2003 NFMS report, the San Luis Rey River system is not accessible to steelhead spawners (NMFS 2003).

As part of a habitat study, staff from USFWS reviewed records concerning streams of Camp Pendleton. The resulting report relays accounts by Natives Americans that a steelhead run existed in the upper San Luis Rey River prior to construction of Henshaw Dam (Knight 1998, p. 19).

Records were given by Smith 1880 for "fresh water streams at Pala, and near Smith's [Palomar] Mountain, San Diego county" (DFG 1946b). In an 1881 paper, David Starr Jordan noted rainbow trout in the San Luis Rey River.

Regarding rainbow trout, a 1946 reference states, "It is abundant in the streams rising in Smith [Palomar] Mountain and emptying in to the San Luis Rey River" (DFG 1946b).

According to Carl L. Hubbs, "A specimen from Pala which I examined about 1913…was deep-bodied and unusually coarse-scaled and may have represented a slightly differentiated fresh-water race" (DFG 1946b).

A 1946 DFG memo indicates a successful stocking program in previous years on the San Luis Rey River (DFG 1946c). A 1946 DFG survey report states, "Live section near Pala often contains a few large trout washed downstream from tributaries but few trout in general" (DFG 1946d).

According to an issue of the DFG journal from 1946, "Local anglers have reported catching fish, thought to be steelhead trout, in San Luis Rey River…" (DFG 1946b). A 1947 summary of stream surveys characterizes the San Luis Rey River as having 11 miles of "trout water" (DFG 1947a).

Biologists observed an adult steelhead approximately 21-24 inches in length in the San Luis Rey River near Oceanside in May 2007. A survey report notes, "[The] reach lacked any possible spawning areas" (DFG 2007).

Gomez

Gomez Creek consists of about 5.5 stream miles and is tributary to the San Luis Rey River. It flows south, entering the San Luis Rey about 1.5 miles west of the town of Pala.

Consulting biologists observed two adult *O. mykiss* in Gomez Creek in September 2005. A 15-inch individual was examined, but ancestry was undetermined (Dudek 2005).

Pauma

Pauma Creek consists of about 7.4 stream miles and is tributary to the San Luis Rey River. It flows southwest, entering the San Luis Rey in Pauma Valley.

A letter describing genetic analysis of rainbow trout from Pauma Creek states, "Pauma Creek was planted with Klamath River steelhead…in 1893 or 1894" (Thorgaard ca 1983). The letter indicates the researcher's opinion that the population is "likely to be of an introduced or hybrid origin on the basis of the history of the plants and [the genetics analysis]" (Thorgaard ca 1983). In a 1996 interview, a member of the Pauma band described catching trout in Pauma Creek during his youth (Knight 1998).

Pauma Creek was stocked, probably in the 1940s, although specific stocking reports were not located. The creek was surveyed in 1946 and multiple *O. mykiss* year classes were observed. The survey report notes "fair" natural propagation and a largely self-sustaining population. It states, "This is one of the best natural trout streams in San Diego County" (DFG 1946e).

Samples were collected in a lower and an upper section of Pauma Creek in 1997 as part of an *O. mykiss* genetics study. Individuals were collected between about five and eight inches in length (DFG 1997). In a 1999 letter NMFS staff describe the results of genetic analysis of *O. mykiss* samples from California coastal streams. The letter states, "It seems more likely (though by no means certain) that [fish from Pauma Creek] are part of a native coastal *O. mykiss* lineage" (NMFS 1999).

Doane

Doane Creek consists of about 2.5 stream miles and is tributary to Pauma Creek. It flows northwest, joining French Creek to form Pauma Creek.

A 1947 memo indicates that Doane Creek was stocked (DFG 1947a). Staff from DFG surveyed Doane Creek in 1947 and observed *O. mykiss* fingerlings. The survey report notes "poor" natural propagation and states, "This stream is generally too small in size to support many trout" (DFG 1947b).

According to a naturalist familiar with the area, a "small" *O. mykiss* population occurs in Pauma Creek (Greenwood pers. comm). The naturalist believes that the fish are "natives" (*i.e.*, not of hatchery ancestry).

Cedar

Cedar Creek consists of about 3.8 stream miles and is tributary to the San Luis Rey River. It flows south, entering the San Luis Rey near La Jolla Amago.

Records of the DFG indicate that Cedar Creek was stocked in the 1940s. In a 1949 memo, DFG staff indicated that the creek was of low priority for stocking due to low flow levels (DFG 1949b).

West Fork San Luis Rey River

West Fork San Luis Rey River consists of about 8.7 stream miles and is tributary to the San Luis Rey River. It flows southeast, entering the San Luis Rey River at Lake Henshaw.

A letter describing genetic analysis of rainbow trout from West Fork San Luis Rey River states, "[the river] was believed to have been planted with Pit River fish…in the 1890's…and the chromosome results suggest that, although this could have had some impact, the fish there now aren't predominantly of that origin" (Thorgaard ca 1983).

A preliminary report concerning the fishery of the West Fork San Luis Rey notes rainbow trout to 14 inches in length in the creek in the 1970s. The report states, "The rainbow stock is completely wild and may be a unique wild strain as it was introduced into the canyon about 1900 by a local rancher" (Gould undated). The source of this information is not provided.

Staff from DFG surveyed the West Fork in 1997 and observed multiple *O. mykiss* year classes, including individuals to about inches in length. The survey report states, "The San Luis Rey river system formerly connected to the Pacific Ocean and the always present possibility that these fish are from steelhead genetics exists and should be explored in light of the endangered species status of southern California steelhead" (DFG 1993).

An undated letter from a research geneticist states, "Although we can't rule out the possibility that introductions could have had some impact…, it seems likely that the West Fork population is composed predominantly of native fish to the region" (Thorgaard undated). The letter recommends protecting the population "…as a potential genetic resource for the future".

San Dieguito River

The San Dieguito River consists of about more than 23 stream miles. It is formed by the confluence of Santa Ysabel and Santa Maria creeks, and flows southwest, entering the Pacific Ocean north of Del Mar. The dam forming Lake Hodges is located at about stream mile 12.

According to an issue of the DFG journal from 1946, "Local anglers have reported catching fish, thought to be steelhead trout, … in the estuary of San Dieguito River…" (DFG 1946b).

A 1947 summary of stream surveys describes the San Dieguito River. Staff from DFG states, "It was formerly stocked in the section below Hodges Dam with little success" (DFG 1947a).

Staff from NMFS collected information concerning steelhead distribution in southern California streams, including the San Dieguito River, in 2002. A subsequent report notes that Lake Hodges is a complete barrier to spawning and that the downstream reach was dry and therefore unsuitable as habitat (NMFS 2003, p. 12).

Santa Ysabel

Santa Ysabel Creek consists of about 33 stream miles and is tributary to the San Dieguito River. It flows southwest to becomes the San Dieguito downstream from the Santa Maria Creek confluence. The dam forming Sutherland Lake is located at about stream mile 16.5 and was constructed in the mid-1950s.

Field notes from 1947 record DFG staff's observations of rainbow trout upstream from the Witch Creek confluence. The notes also indicate that the creek was stocked.

Black Canyon

Black Canyon Creek consists of about 4.2 stream miles and is tributary to Santa Ysabel Creek. It flows south, entering Santa Ysabel Creek downstream from Sutherland Lake.

A creel census in 1955 indicates that Black Canyon Creek supported a rainbow trout fishery. The trout were stocked (DFG 1955).

San Diego River

The San Diego River consists of about 52 stream miles. It flows southwest from headwaters near Santa Ysabel, entering the Pacific Ocean at Mission Bay. El Capitan Dam is located at about stream mile 30 and was constructed in 1934. San Vicente Dam, constructed in 1943, impounds runoff from the San Vicente Creek basin.

According to an issue of the DFG journal from 1946, "[DFG warden E.H. Glidden] knows of steelheads having been caught in San Diego River…" (DFG 1946b). Field notes from DFG staff in 1949 indicate "good spawning areas for trout" upstream of the El Capitan Reservoir (DFG 1949c).

Staff from NMFS collected information concerning steelhead distribution in southern California streams, including the San Diego River, in 2002. A subsequent report notes that the river was dry at the time of survey and therefore unsuitable as habitat (NMFS 2003, p. 9). The report noted the possibility that upstream tributaries had water and possibly *O. mykiss*.

Conejos

Conejos Creek consists of about ten stream miles and is tributary to the San Diego River via El Capitan Reservoir. The creek flows southwest, entering El Capitan Reservoir toward its southern extent.

Staff from DFG surveyed Conejos Creek in 1946 and observed rainbow trout. (The origin of the fish is unclear, but likely to be stocking efforts based on the watershed context.) The extent of natural propagation was deemed to be "slight" (DFG 1946f).

Boulder

Boulder Creek consists of almost 12 stream miles between Cuyamaca Dam and its confluence with the San Diego River. It flows west, entering the San Diego upstream from El Capitan Reservoir.

Boulder Creek was stocked in 1930 (DFG 1933). A 1947 memo indicated that the creek did not have sufficient flow to support a fishery "except during periods of water release, once or twice a year" (DFG 1947a).

Hatchery *O. mykiss* were stocked in Boulder Creek in 1999 and in 2003 (Rodgers 2005). According to a naturalist familiar with the area, rainbow trout "from the lake access the little headwater streams and spawn in great numbers" and the creek supports a rainbow trout population throughout the year (Greenwood pers. comm.).

Cedar

Cedar Creek consists of about 12.4 stream miles and is tributary to the San Diego River. It flows southwest, entering the San Diego about one mile upstream from the Boulder Creek confluence.

Staff from DFG surveyed Cedar Creek in the 1930s and observed "very few trout". The survey report notes stocking between 1915 and 1932 with poor success and no resulting natural propagation (DFG ca 1934).

Cedar Creek was surveyed in 1945 and *O. mykiss* was observed, including YOY. The survey report states, "…fish of year prove spawning" (DFG 1945b). A 1947 summary of stream surveys characterizes Cedar Creek as having eight miles of "trout water" (DFG 1947a).

Hatchery *O. mykiss* were stocked in Cedar Creek in 1999 (Rodgers 2005). According to a naturalist familiar with the area, a "small resident population of rainbow trout" occurs in Cedar Creek. The population's ancestry is uncertain (Greenwood pers. comm.).

Sweetwater River

The Sweetwater River consists of over 57 stream miles. Its headwaters are in Upper Green Valley and it flows in an overall southwest direction, entering the Pacific Ocean at San Diego Bay. The dam forming Sweetwater Reservoir, located at about stream mile 8.5, was constructed in 1888. Sweetwater Falls Dam is located at about stream mile 28, forming Loveland Reservoir. The upper portion of the Sweetwater River flows through Green Valley, and may be referred to here and in references as Green Valley Creek.

The upper portion of the Sweetwater River was stocked in 1939 (DFG 1939a). Staff from DFG surveyed the upper river in 1946 and observed *O. mykiss* fingerlings and adults. The survey report states, "…the few adult trout present in the stream which carry over apparently spawn successfully each year. In spite of good reproduction, few trout appear to survive to the following season" (DFG 1946g, p. 4). The report indicated that the upper ten stream miles had perennial flow but had limited fishery potential due to summer water temperatures. The report states, "The extreme upper 4 miles…is the most desirable section of the entire river for establishment of trout" (DFG 1946g, p. 2).

Samples were collected in Sweetwater Creek in 1997 as part of an *O. mykiss* genetics study. Individuals were collected between about [68-198 convert] in length (DFG 1997). In a 1999 letter NMFS staff describe the results of genetic analysis of *O. mykiss* samples from California coastal streams. The letter states, "It seems more likely (though by no means certain) that [fish from Sweetwater Creek] are part of a native coastal *O. mykiss* lineage" (NMFS 1999).

Tissue samples from Sweetwater River *O. mykiss* were analyzed as part of a study of genetic structure in southern California streams. The seven samples indicated mixed hatchery and native origin and an indeterminate relationship with other coastal steelhead populations (Girman and Garza 2006).

In 2003 a wildfire destroyed the *O. mykiss* population and habitat in the upper Sweetwater River. In response a captive breeding program was initiated using *O. mykiss* that had been collected in 1997. This program was unsuccessful and the population may now be extirpated.

Cold Stream

Cold Stream consists of about 2.4 stream miles and is tributary to Sweetwater Creek. It flows southeast, entering Sweetwater Creek near the Cuyamaca Rancho State Park headquarters.

Cold Stream was stocked prior to 1946. Staff from DFG surveyed the upper Sweetwater River, included Cold Creek, in 1946 and observed *O. mykiss* fingerlings and adults. The survey report states, "Cold Creek…is flowing a small quantity of water the year around throughout most of its length" (DFG 1946g). The report also indicated that natural propagation occurred in the creek. Staff from DFG note, "Cold Creek…represents the only section of the Sweetwater River that is satisfactory for developing into a permanent trout stream" (DFG 1946g, p. 7).

Tijuana River

The Tijuana River downstream from the Cottonwood Creek confluence consists of about 26 stream miles. The river enters the Pacific Ocean at Border Field State Park.

According to an issue of the DFG journal from 1946, "[DFG warden E.H. Glidden]…saw two [steelhead] that were taken in the lower flowing part of Tijuana River, on the California side of the international border" (DFG 1946b).

A 2005 NMFS technical memorandum concerning steelhead distribution indicates that steelhead historically occurred in the Tijuana River. The river was considered inaccessible to researchers investigating current migration conditions to possible upstream habitat (NMFS 2005, p. 20).

Cottonwood

Cottonwood Creek consists of about 36 stream miles and is tributary to the Tijuana River. It flows southwest, entering the Tijuana at Marron Valley. Barrett Dam is located at about stream mile 12; Morena Dam is at about stream mile 21.

Staff from DFG surveyed Cottonwood Creek in 1946 and observed rainbow trout in the area between Barrett and Morena reservoirs. The survey report notes "little or no" natural propagation and states, "Middle Section is ideal for trout fishing" (DFG

1946h). Good conditions were credited to "constant flow from springs and Morena seepage". A 1947 summary of stream surveys characterizes Cottonwood Creek as having four miles of "trout water" (DFG 1946h).

Hatchery *O. mykiss* were stocked in Cottonwood Creek in 1999 and in 2003 (Rodgers 2005).

Pine Valley

Pine Valley Creek consists of about 25 stream miles and is tributary to Cottonwood Creek. It flows southwest, entering Cottonwood Creek at Barrett Lake.

Staff from DFG surveyed Pine Valley Creek in 1946 and observed rainbow trout, including fingerlings and adults. The survey report indicates stocking in 1945 and states, "Adequate spawning areas but few hold over to following year" (DFG 1946i). A 1947 summary of stream surveys characterizes Pine Valley Creek as having four miles of "trout water" (DFG 1947a).

According to a naturalist familiar with the area, an *O. mykiss* population occurs in Pine Valley Creek including individuals to 21 inches in length. While the existing population is believed to be of hatchery origin, the naturalist believes that the creek was accessed by wild steelhead prior to downstream dam construction (Greenwood pers. comm.).

Noble Canyon

Noble Canyon Creek consists of about 4.8 stream miles and is tributary to Pine Valley Creek. It flows southwest, entering Pine Valley Creek north of the town of Pine Valley.

A 1946 survey report for Pine Valley Creek indicates that Noble Canyon Creek was stocked in 1944 and 1945 (DFG 1946i). A 1964 DFG letter indicates that a resident rainbow trout population existed in Noble Canyon Creek that was supplemented in 1963 by stocking (DFG 1964b).

According to a naturalist familiar with the area, an *O. mykiss* population occurs in Noble Canyon Creek, and individuals as large as 24 inches in length have been observed. The existing population is believed to be of hatchery origin (Greenwood pers. comm.).

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Table 9. Distribution status of *O. mykiss* in coastal streams of San Diego County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
San Mateo	San Mateo	DF	DF	Y	Y	2
San Mateo	Devil Canyon	DF	DF		Y	2
San Onofre	San Onofre	DF	PA		UN	0
Santa Margarita River	Santa Margarita River	DF	PA	Y	UN	0
Santa Margarita River	DeLuz	DF	PA		UN	0
Santa Margarita River	Roblar	UN	PA		UN	0
Santa Margarita River	Fern	DF	PA		UN	0
Santa Margarita River	Rainbow	UN	PA		UN	0
San Luis Rey River	San Luis Rey River	DF	DF	Y	UN	1
San Luis Rey River	Gomez	DF	DF	Y	UN	1
San Luis Rey River	Pauma	DF	DF	Y	UN	1
San Luis Rey River	Doane	PB	PB		UN	0
San Luis Rey River	Cedar	UN	UN		UN	0
San Luis Rey River	West Fork San Luis Rey River	DF	DF	Y	N	3
San Dieguito River	San Dieguito River	PS	PA		N	0
San Dieguito River	Santa Ysabel	PS	UN		N	0
San Dieguito River	Black Canyon	PS	UN		N	0
San Diego River	San Diego River	PB	PA		UN	0
San Diego River	Conejos	PS	PA		N	0
San Diego River	Boulder	PS	PS		N	0
San Diego River	Cedar	PB	PS		N	0
Sweetwater River	Sweetwater River	DF	PA	Y	UN	0
Sweetwater River	Cold Stream	DF	PA	Y	UN	0
Otay River	Otay River	UN	PA		UN	0

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 9. Distribution status of *O. mykiss* in coastal streams of San Diego County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Tijuana River	Tijuana River	DF	PA		N	0
Tijuana River	Cottonwood	PB	UN		N	0
Tijuana River	Pine Valley	PB	UN		N	0
Tijuana River	Noble Canyon	PB	UN		N	0

[1]Please see Methods section for an explanation of titles and values used in this table.

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DISCUSSION

Our study examined 674 coastal California streams tributary to the Pacific Ocean south of the Golden Gate for which some type of steelhead or steelhead habitat information was available. Most of these streams are described sufficiently in the reports of biologists and other observers that we are able to designate the historical and current distribution status of steelhead/rainbow trout *(Oncorhynchus mykiss)*. Historically, steelhead appears to have used the vast majority of creeks, streams and rivers of the study area that maintained at least some cold water throughout the year for spawning and rearing prior to extensive development of the region. We found evidence sufficient to designate a definite historical run or population (DF) in 518 streams in the study area (Table 10). We designated an additional 29 streams as having probable runs or populations (PB) and 65 streams as having possible runs or populations (PS). We assume that virtually all streams supporting *O. mykiss* historically were hydrologically connected to the ocean at least in some years, and that the populations in these streams were of relatively recent anadromous ancestry.

Table 10. Summary of *O. mykiss* distribution and related features south of the Golden Gate, California.

	Historically Present		Currently Present		Anadromy evident		Decline evident
County	**Watersheds**	**Streams**	**Watersheds**	**Streams**	**Watersheds**	**Streams**	**Streams**
San Mateo	18	56	14	47	11	38	30
Santa Cruz	16	121	16	100	12	79	78
Monterey	21	90	20	62	16	44	43
San Luis Obispo	19	51	19	43	17	36	30
Santa Barbara	23	91	15	67	12	36	50
Ventura	3	44	3	39	2	4	22
Los Angeles	7	32	5	20	2	4	29
Orange	3	20	1	6	0	0	12
San Diego	6	13	2	6	1	2	8
Total	116	518	95	390	73	243	302

In 62 instances we could not find sufficient information to justify applying a status designations despite the existence of fish or aquatic habitat related information concerning a particular stream, leading to a designation of unknown (UN). An extremely small portion of the materials we reviewed suggested that steelhead historically did not use a specific watershed or stream. We chose the UN presence/absence status in these basins and tributaries rather than possibly absent (PA), as conditions regarding passage barriers or habitat suitability might have changed over time. (Please see the Methods section for further explanation of the presence/absence designations.) A large proportion of the remaining UN designations for historical status may be accounted for by streams draining small watersheds and sub-basins, particularly those in the most arid portions of the study area. We also agree with the position of Swift *et al.* (1993): "Spawning success south of the Los Angeles basin may have been sporadic" (p. 113), and therefore less likely to be observed. The confirmed occurrence of *O. mykiss* in many small, ephemeral tributaries suggests against assuming lack of historical use (*i.e.*, PA designation).

The current distribution of *O. mykiss* (within about the last ten years) is as follows: 390 study area streams are DF status (*i.e.*, 75 percent of historical DF streams), five streams are assigned PB status, and eight streams are PS status. Since genetics information is available for a small number of the *O. mykiss* observations we reviewed, we are unable to note streams supporting only *O. mykiss* of hatchery origin. As a result, some streams may be designated DF that no longer support *O. mykiss* derived from native, anadromous stocks. Recent research suggests that very few streams support only residualized, hatchery origin *O. mykiss* (Girman and Garza 2006).

Seventy two of the study area streams appear to have no run or population currently (PA). In 199 instances, sufficient uncertainty existed regarding the potential of the stream to support *O. mykiss* that we used the UN value. We hope that new information can be developed to complete the current status designations and to update our designations as necessary.

Of the 518 historical DF streams in the study area, there is sufficient evidence to conclude that 243 (47 percent) currently are capable of supporting the andromous *O. mykiss* form. (Streams are assumed not to support anadromy either because no population is present or a known total passage barrier exists downstream from suitable spawning and rearing habitat.) It appears that many, and possibly most, historical steelhead streams south of the Golden Gate no longer function to host the freshwater portion of the steelhead life cycle (*i.e.*, spawning through juvenile out-migration), including an unknown number of streams where "resident" *O. mykiss* populations continue to produce smolts that, should they survive their ocean phase, cannot access the habitat in which they were born. On-going research is clarifying the origin (*i.e.*, resident *O. mykiss* vs. steelhead parentage) of individuals comprising the steelhead run in at least one important California coastal watershed, and suggests that the resident-produced component is minimal (Hayes pers. comm.).

In a 2003 report, Boughton and Fish concluded that about 86 percent (31 of 36) of the drainages of the south-central Evolutionarily Significant Unit (ESU) with historical steelhead occurrence currently have steelhead. In the southern ESU, this proportion was determined to be about 37 percent (17 of 46). The current study's determinations of historical and current steelhead basins vary slightly from those of Boughton and Fish (2003). However, the ratios of basins with current steelhead occurrence to basins with historical steelhead occurrence for the two ESUs are highly consistent between the studies. Specifically, this study found evidence of steelhead occurrence in 83 percent (34 of 41) of basins of the south-central ESU and in 40 percent (17 of 42) of southern ESU basins. Our review suggests that steelhead currently occur in 73 of 116, or 63 percent, of the historically occupied coastal basins between the Golden Gate and the Mexican border.

Our review found very few abundance estimates for *O. mykiss* populations in streams of the study area. However, it is well established that current steelhead run sizes are a fraction of historical levels in virtually all streams in the region. Where we found reliable evidence of population decline or ability to function as steelhead habitat (*e.g.*, where a total passage barrier exists downstream), we cited this information and its source(s) in the description for the stream experiencing the decline and used a "Y" (for "yes") designation in the county summary table. We applied the Y value to 302 streams, or about 58 percent of the historical DF streams in our study area. Our approach to measuring this parameter is conservative, and logic suggests that the percentage of streams exhibiting evidence of population decline or habitat loss over time approaches 100 percent.

Persistence factors and restoration considerations

The most commonly-cited factors in decreased steelhead abundance in streams south of the Golden Gate were (in unranked order): construction of passage barriers including dams, grade control (or "drop") structures, road crossings, weirs, concrete channels, and other structures; increased sedimentation through hydrologic modification, land use changes, or other processes; habitat degradation through channel or lagoon modification, cattle grazing, deforestation, pollution, or water diversion; and overfishing. We do not attempt to rank these factors or otherwise quantify their impact on distribution and abundance of *O. mykiss* here. However, the potent effects of passage barriers and habitat degradation (including decreased migration opportunity) through water diversion implied in the materials we reviewed for this report merit some discussion.

Several known historical steelhead runs have been lost entirely or almost entirely to passage barriers existing downstream from major habitat resources, or to the effects of reducing flows through reservoir impoundment. A partial list of regionally important extirpated or dramatically decreased runs associated with major water projects includes: Pilarcitos Creek in San Mateo County; the Pajaro River in Santa Cruz (and Monterey) County; the Salinas River in Monterey County; Arroyo Grande in San Luis Obispo County; the Santa Maria and Santa Ynez rivers in Santa Barbara County; the Ventura and Santa Clara rivers in Ventura County; and Malibu Creek in Los Angeles County. An additional set of streams have experienced habitat restriction and decreased steelhead abundance through creation of partial or total passage barriers. Perhaps the most important example of this phenomenon is the Carmel River (San Clemente Dam) in Monterey County. In a previous study of San Francisco Estuary tributaries (Leidy *et al*. 2005), the authors noted several instances where construction of larger reservoirs had land-locked native *O. mykiss* populations that continued to reproduce in reservoir tributaries. Such adfluvial populations appear less common in the current study area although where they occur, they should be regarded as an important genetic resource that could be used in recovering the regional steelhead resource.

Barrier studies and modifications are on-going throughout the south coast of California, and may lead to re-opening of substantial habitat areas. Possible removal or modification of San Clemente Dam on the Carmel River, Matilija Dam on the Ventura River's major tributary, the Vern Freeman Diversion Dam on the lower Santa Clara River, and Malibu (Rindge) Dam on Malibu Creek are particularly encouraging indications that conditions for steelhead in-migration and access to habitat may improve in the near term. Many smaller barrier modifications have occurred in recent years or are in advanced stages of planning. Continued attention to the "fish friendly" design of flood control projects, road crossings and other channel modifications is necessary to ensure that new impediments are not created in migration corridors.

Water diversion may comprise both the most important factor in reducing steelhead abundance in study area streams over time and the most difficult to correlate with this effect. Watersheds with high degrees of impairment (*i.e*., significant diversion of water resources from streams) are expected to have reduced migration opportunities and decreased quality and extent of rearing habitat, and numerous examples of these phenomena exist in the study area. Recent research continues to highlight the importance to southern steelhead of dry season streamflow in that steelhead appears able to occupy relatively high water temperature habitat given the availability of sufficient food supply (see, for example, Smith 2003).

Major water supply features occur in several basins in the study area for which the effects of reduced flows are well documented. A greater number of watersheds, however, are subject to the cumulative effects of smaller diversions and groundwater pumping. Unfortunately, we are aware of very few examples where sophisticated analyses have been used to determine the relationship between streamflow and habitat in study area streams, and to establish appropriate schedules for the timing and magnitude of instream flows where diversion potential can harm steelhead populations. In some streams with flow recommendations or requirements, implementation remains problematic.

We suggest that the historical and current practice of ascribing low value to the use of water for fish habitat is incompatible with steelhead restoration in streams of the south coast. Amongst the anadromous salmonids, steelhead is uniquely adapted to succeed within the climatic constraints encountered in the region. In particular, the species' abilities to spawn repeatedly (i.e., iteropary), to maintain both resident and anadromous forms within a population, and to persist even in isolated habitats throughout the dry season make its extirpation from at least the region including and north of San Luis Obispo County unlikely. Nevertheless, we believe that water development has severely impacted steelhead resources by reducing available habitat, and that additional studies and resulting dedicated minimum "fish flows" providing both migration and rearing habitat will be necessary for recovery of steelhead in the study area.

Finally, our review of steelhead related references for watersheds south of the Golden Gate emphasizes the importance of estuarine areas such as seasonally closed lagoons to the regional steelhead population. Numerous streams of the study area offer estuarine rearing habitat, which appears to play a critical role in the robustness of steelhead runs. Studies in a Santa Cruz County watershed indicate that juvenile steelhead may grow several times faster in the estuary than in upstream habitats (Bond 2006) and that estuary-reared individuals comprise the vast majority of the returning adult population (Bond *et al.* 2008).

Anthropogenic impacts on estuarine areas include decreased quantity and quality of inflow, filling, channelization, road construction, artificial sandbar breaching, and others. This review identifies multiple examples of reduction in run size for important steelhead streams due at least in part to the effects of land and water resource activities on the size and function of estuarine habitat including: San Gregorio and Pescadero creeks (San Mateo County); Scott Creek, San Lorenzo River, and Soquel Creek (Santa Cruz County); Pajaro River (Santa Cruz and Monterey counties); Salinas and Carmel rivers (Monterey County); San Carpoforo Creek, Arroyo de la Cruz, San Simeon and Santa Rosa creeks, and Arroyo Grande (San Luis Obispo County); the Ventura River (Ventura County); and the San Juan River (Orange County). Protection of relatively healthy estuaries south of the Golden Gate and restoration of degraded lagoon habitats are clear priorities for regional steelhead recovery.

Steelhead restoration south of the Golden Gate

Restoring steelhead in south coast streams will require an aggressive approach to coordinated actions to mitigate the substantial loss of habitat that has resulted from human activities of the last 150 years. The authors suggest an approach of first identifying and protecting relatively healthy watershed areas throughout the region. Within these "anchor" watersheds, we recommend determining a set of "essential" streams, comprising the largest areas of rearing habitat. Restoration related studies, planning, and project implementation already are occurring in the majority of watersheds with important historical steelhead resources. However, additional analysis would be expected to provide funders, activists, agency staff, and the interested public with information to aid in decision-making regarding the effective use of financial and personnel resources. This step is necessary to minimize disagreement among stakeholders regarding disposition of these resources. Our preliminary review of the relative importance of south coast streams to steelhead indicates that focusing restoration efforts on 70 or fewer mainstem and tributary streams has the potential to address problems in the areas containing the majority of the critical over-summering habitat resource.[1]

1 Interested persons are encouraged to contact the lead author for more information regarding evaluating watersheds south of the Golden Gate.

For each of these important streams, available information should be reviewed to determine the factors limiting steelhead production and the stakeholder organizing, additional studies, and restoration projects needed to address them. (This process is well advanced in many south coast watersheds.) Typically, prescribed restoration activities consist of priority barrier modifications, land use changes, in-stream flow and water quality provisions, and re-vegetation and other projects necessary to meet restoration goals. Costs, responsibilities, and schedule must be assigned to the various elements of restoration action plans.

Near-historical steelhead abundance levels are unlikely to be regained, even through an aggressive recovery program. However, we believe the anchor watershed approach offers the highest chance of success in re-establishing viable populations. That this approach typically identifies larger watersheds should not be construed, however, as a lack of support for salmonid restoration projects in smaller watersheds, as such creek systems both contribute to the regional population and provide important opportunities for incremental re-colonization along the coast from "source" populations. Also, increasing the total number of watersheds carrying steelhead populations may increase resistance to stresses caused by stochastic events.

Our study revealed a paucity of data regarding *O. mykiss* distribution in many, if not most, of the study area streams. Reporting on the streams of the study area appeared similar to the extent documented by Leidy *et al.* (2005) for San Francisco Estuary streams (although it was not measured in the current study), wherein about one-third of the subject streams had two or fewer surveys. Also, like the record for the San Francisco Estuary streams, quantitative information that could be used to characterize *O. mykiss* population features such as relative abundance, reproduction, anadromy, and others was not available for many of the examined streams.

As part of a program to restore steelhead, monitoring data should be collected, stored, analyzed, and made publicly available for at least the set of streams deemed to offer the most promising habitat resources. For "essential" streams, we suggest bi-annual monitoring of spawning and out-migration to allow for trend analysis, for measuring the success of restoration activities, and for an adequate basis from which to perform adaptive management. Additionally, presence/absence surveys in other known "steelhead streams" at least every ten years would allow for improved understanding of changing distribution over time.
We cite biological, cultural, and political bases for optimism regarding the recovery of steelhead, particularly in the region north of San Luis Obispo County, inclusive. First, the presence of remnant *O. mykiss* populations throughout the region's streams reflects the species' vigor, particularly in terms of its ability to access remote spawning habitat and its temperature tolerance, as well as the effectiveness of maintaining individuals with different life history traits and a range of migratory behaviors within a population. While cultural processes have led to highly-altered lower watershed areas in most study area stream systems, the large amount of headwater area in national forest, watershed, and other low impact uses has led to a relatively high degree of protection that favors steelhead restoration. Finally, the existence of several steelhead restoration processes involving multi-million dollar packages of projects (e.g., in the Carmel River and others) indicates a political climate favorable to recovery of the species. We note, however, that obtaining water supply for habitat purposes likely will constitute a major obstacle to long-term steelhead recovery in the region.

Based on the information record, we are concerned about the continued existence of the species in the southern portion of the study area. In particular, the rarity of, and geographic separation between, healthy *O. mykiss* populations south of San Luis Obispo County appears to present a restoration challenge that existing planning processes and organizational structures are unlikely to surmount. Important populations may have been extirpated in the last ten years in Malibu Creek in Los Angeles County, in a Santa Ana River tributary in Orange County, and in the Sweetwater River in San Diego County. Continuing threats to steelhead in the southern-most portion of its range include increased demand for land and water resources, stochastic events, disease, and climate change, among others. We suggest that an immediate, intensive conservation program for existing habitat resources in several selected south coast watersheds, possibly in combination with supplementation efforts, offers the greatest potential to secure the continued presence of steelhead in the southern California counties.

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