Steelhead Migration Barrier Assessment and

Recovery Opportunities for the Sisquoc River, California

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Photographic Note: All barrier photographs within this report taken by Jim and Matt Stoecker.

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Many individuals contributed to making this project possible. Many thanks to: Michael Bowen and Mary Travis at the State Coastal Conservancy for their support and commitment to preserving California's coastal resources. Bob Thiel of the Community Environmental Council for his encouragement and efforts to help revive watersheds in Santa Barbara County. Bob Stoecker for his generously donated piloting time high above. Shaw Allen for hauling supplies deep within the San Rafael Wilderness to support extended surveying efforts. Thanks to the following individuals for who provided valuable information throughout the course of this project: Rob Almy, Darcy Aston, E. R. Blakely, Annie Buma, Mark Capelli, Jon Caramitsos, Maurice Cardenas, Richard Chenoweth, Bryant Chesney, Paul Collins, Kevin Cooper, Scott Cooper, Gerald Czarnecki, Jamie Dostal, Christina Dueben, Joe Duran, Jim Edmonson, Scott Engblom, Craig Fusaro, Tom Gaffney, George Gross, Barry Hecht, Ed Henke, Larry Hunt, Bud Laurent, Mary Larson, Tom Lockhart, Jonathon Mann, Dennis McEwan, Megan McGrath, Fran Smith, Jerry Smith, John Storrer, Camm Swift, Ross Taylor, Bob Theil, Donna Toth, Dave Weaver, Chris Webb, Marcin Whitman.

Many thanks also to those who read these pages and work to see the dream of thousands of adult steelhead returning from the Pacific Ocean to the Sisquoc River become a reality.

-Matt and Jim Stoecker

1.0 Introduction and Project Objectives

1.1 Introduction

The number of adult steelhead annually returning to Southern California streams to spawn is estimated to be less than 1% of the historical size. The National Marine Fisheries Service listed the Southern California steelhead Evolutionarily Significant Unit (ESU) as endangered in 1997 due to this dramatic decline. This endangered listing includes the steelhead population of the Santa Maria River watershed and the Sisquoc River. The southern steelhead is currently identified as the most endangered steelhead ESU in the entire state of California and many scientists believe it to be the most endangered ESU population in all of North America. In the 1940's the Santa Maria River watershed was reported to have the second largest run of steelhead in Santa Barbara County, behind the Santa Ynez River (Shapovalov, 1945). Prior to the construction of Cachuma Dam, but after the construction of Gibraltar Dam upstream, the size of the adult steelhead run on the Santa Ynez River was estimated to be as high as 25,000 fish. The annual run of steelhead up the Santa Ynez River was likely much higher than this estimate prior to the construction of any dams on the system. Although size estimates of the historic adult steelhead run up the Santa Maria River are not reported, based on estimated run sizes of other large river systems to the south (Santa Ynez River, Ventura River, Santa Clara River) and comparison of habitat quality and quantity, it is likely that during wetter years several thousand to over 10,000 adult steelhead may have ran up this watershed. Annual run sizes of steelhead are highly variable in watersheds throughout their range from season to season. This variability was likely even more pronounced in the relatively flashy river systems of Southern California. Prior to human water extraction operations, it is likely that during exceptionally dry years many streams and rivers in Southern California did not connect with the ocean to allow upstream steelhead migration. Annual run sizes up the Santa Maria River prior to human developments may have fluctuated from zero fish during dry years to many thousands of steelhead during wetter years.

The construction of migration barriers, intensive water extraction, and alteration of riparian and aquatic habitats has eliminated many steelhead populations in Southern California and has lead to the near extinction of the unique southern steelhead. Major dams on the Santa Ynez, Ventura, and Santa Clara Rivers prevent steelhead from accessing hundreds of miles of habitat and have drastically reduced the steelhead runs. The construction of Twitchell Dam on the Cuyama River in the late 1950's blocked at least 264 miles of stream and more than 60% of the Santa Maria River watershed and tributary habitat found upstream.

Historically, the majority of the Santa Maria River steelhead population was believed to migrate up the Sisquoc River to spawn and rear (Shapovalov, 1945). Because no major dams occur for the entire length of the Santa Maria and Sisquoc River the watershed has the potential to support a large run of steelhead properly managed water releases from Twitchell Dam and several fish passage improvement projects for barriers identified in this report that impede or block upstream steelhead passage on the Sisquoc River and tributaries. The majority of the Sisquoc River watershed remains in a relatively unaltered natural state and is protected within the San Rafael Wilderness, Sisquoc Wild and Scenic River Corridor, and other public lands of the Los Padres National Forest. Improving steelhead access to spawning and rearing habitat is a high priority and an essential first step for steelhead recovery in the watershed.

Field surveys conducted for this project provided information about salmonid habitat conditions, current salmonid population status, and the location and impact of migration barriers. An extensive data collection and interviewing effort, along with salmonid surveying efforts in the field, resulted in a table of historical and contemporary salmonid documentation for the Sisquoc River. Both natural and anthropogenic migration barriers were identified. The anthropogenic barriers were ranked and prioritized for fish passage improvement benefits. Site-specific recommended actions, barrier information, and photographs are detailed for individual barriers. Migration barriers were also

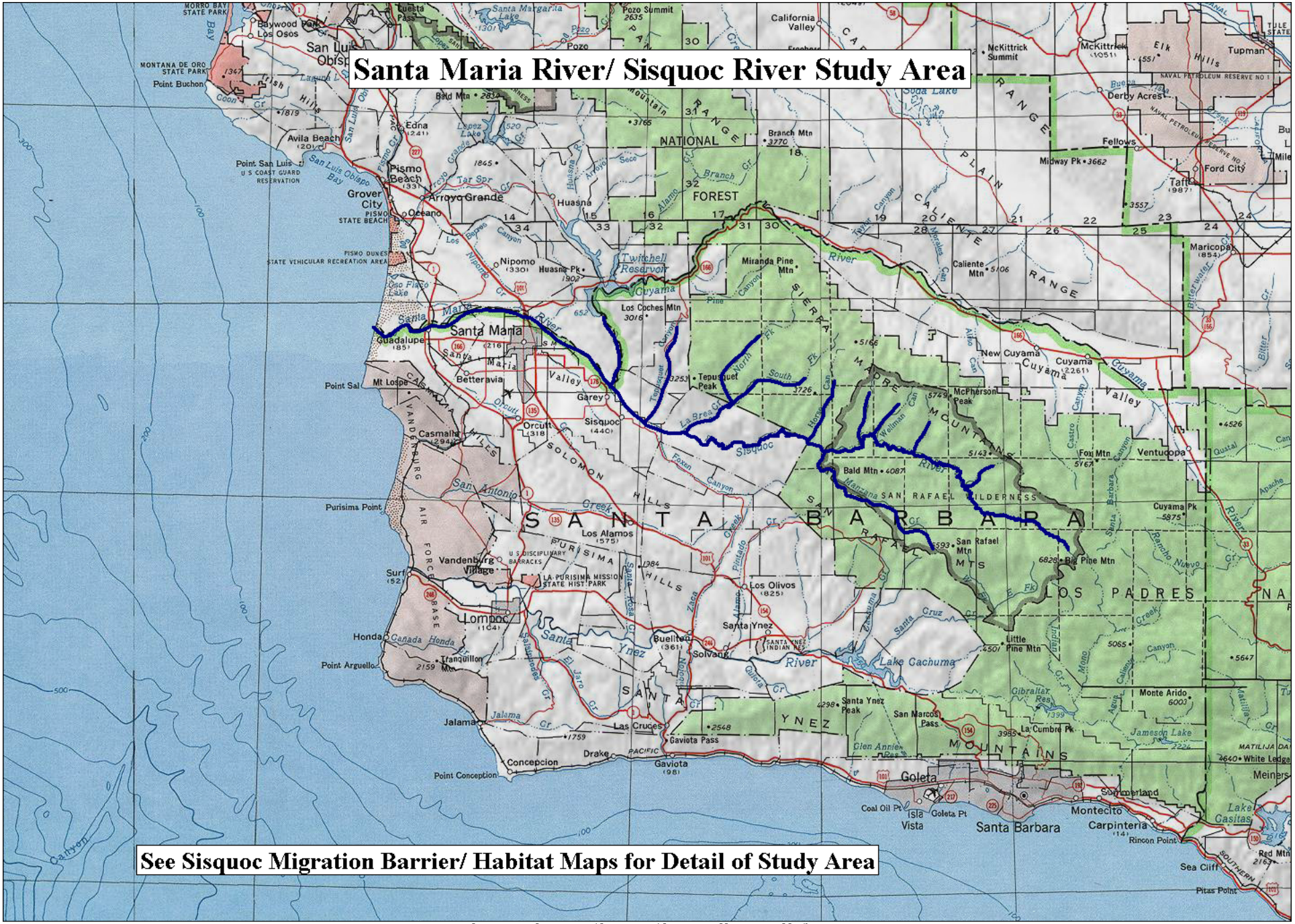
entered into the Pacific States Marine Fisheries Commission Fish Passage Assessment Database for inclusion into a statewide steelhead migration barrier assessment. Road crossing barriers, small dams, and water releases from Twitchell Dam are identified as the main migration barriers within the Santa Maria/Sisquoc River system. Improving existing conditions to ensure unimpeded steelhead access between the ocean and the productive habitat of the Sisquoc River and its tributaries is essential to restoring a wild, self-sustainable steelhead population to the watershed.

1.2 Project Objectives

The objective of the project is to identify and assess steelhead migration barriers on the Sisquoc River, and significant tributaries, and to provide that data to the California State Coastal Conservancy (SCC) in a form consistent with the Pacific States Marine Fisheries Commission (PSMFC) Fish Passage database. In addition, migration barrier restoration actions will be prioritized and general habitat and steelhead population information collected. A report compiling this information will be completed.

1.3 Study Area

The study area of this project consisted of the entire length of the Sisquoc River, as well as significant tributaries upstream from, and including, Tepusquet Creek. In addition, an aerial assessment of the entire length of the Santa Maria River and the Cuyama River, downstream from Twitchell Dam, was conducted. The study area occurs in northern Santa Barbara County and southern San Luis Obispo County. The boundary line between Santa Barbara and San Luis Obispo County roughly follows both the Santa Maria River stream channel and Cuyama River downstream from Twitchell Dam. Tributaries of the Sisquoc River drain the Sierra Madre Mountains to the northeast and the San Rafael Mountains to the south. The headwaters of the Sisquoc River and many of its tributaries are protected within the San Rafael Wilderness and Los Padres National Forest. The Sisquoc River drains west to the town of Garey, where the Cuyama River joins it to form the Santa Maria River. The Santa Maria River continues in a westerly direction past the cities of Santa Maria and Guadalupe before emptying into the Pacific Ocean approximately 5 miles north of Point Sal.


Santa Maria River/ Sisquoc River Study Area
See Sisquoc Migration Barrier/ Habitat Maps for Detail of Study Area
TN 14° MN
0 5 10 15 20 25 miles
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Printed from TOPO! ©2001 National Geographic Holdings (www.topo.com)

2.0 Surveying Access and Effort

2.1 Surveying Access

A huge percentage of the Sisquoc River watershed occurs within the Los Padres National Forest. Access to survey stream reaches within the Los Padres National Forest are limited only in their remoteness and relative inaccessibility. Extended backpacking/surveying expeditions into the wilderness were conducted in November and early December of 2002. An administration pass was provided by the Los Padres National Forest for extended parking within the forest boundaries.

A significant amount of stream on the lower Sisquoc River, La Brea Creek, and Tepusquet Creek exist on privately owned land. Attempts were made to gain permission from key landowners for access stream reaches on private property. The Santa Barbara County Assessor's Parcel database was used to identify landowners who would need to be contacted. The parcels database was overlaid with a stream layer to identify parcels that were adjacent to, or that contained, stream reaches of interest. The contact information for these parcels was extracted from the database. Permission was not obtained to ground survey private property along the lower Sisquoc River and La Brea Creek. Field surveying of Tepusquet Creek was not included within the scope of original work, but roadside observations and aerial surveying techniques were utilized to identify migration barriers within this tributary. Several stream reaches, where access to conduct field surveys was restricted, were surveyed from the air. This surveying technique focused on identification of migration barriers and general salmonid habitat conditions if possible.

2.2 Surveying Effort

A field survey effort value was assigned to each stream reach and is identified on the Salmonid Habitat Summary Table to show the level of survey effort conducted. The date of the main survey effort is provided. The following survey effort codes and descriptions are provided.

1= Ground surveyed.
2= Partial ground survey of accessible stream reaches and from publicly owned roads and land, as well as aerial surveying.
3= Partial ground survey of accessible stream reaches and from publicly owned roads and land.
4= No ground survey due to access restrictions. Remote surveying techniques utilized from publicly accessible locations, in addition to aerial surveying.
5=No ground surveying due to access restrictions.

3.0 Salmonid Habitat Assessment and Scoring

3.1 Salmonid Habitat Quality

A relatively quick salmonid habitat field surveying technique was used to summarize key habitat characteristics that affect salmonid productivity. Habitat reaches were defined in the field when noticeable changes in aquatic and/or riparian habitat conditions occurred. Relative values were determined by comparing the poorest salmonid habitat quality found to the most ideal salmonid habitat conditions observed in the system and other stream previously studied in Santa Barbara County (Stoecker 2002). Determined habitat quality values are displayed visually on maps within Section 5.0 along with migration barriers.

3.2 Salmonid Habitat Quality Scoring Method

Reach habitat scores were developed in order to aid in the prioritization of migration barriers for fish passage projects. Habitat reaches were assigned a habitat quality score based on the sum of selected watershed attribute scores. These attributes are identified in the following sections. The reaches total habitat score was determined by multiplying a given stream reaches habitat quantity by a habitat quality multiplier. This method of multiplying habitat quantity by habitat quality to obtain a habitat score is consistent with the habitat scoring method developed by Ross Taylor for the California Department of Fish and Game's "Priority Ranking of Culverts for Treatment". Several habitat attributes have been added to the CDFG method in order to estimate habitat quality values utilizing field surveying techniques. The maximum possible habitat quality score is 10. Once this habitat quality score was determined, the number was divided by 10 to convert the determined score into a final habitat quality 'multiplier', which has a value between 0-1.0. The habitat quality score was then assigned to the entire habitat reach. The following habitat attribute scores combine to produce the habitat quality score.

3.2.1 Abundance of Spawning Substrate

The relative abundance of adequately sized spawning substrate (small to medium sized gravel) within a given stream reach was identified. Particular attention was paid to spawning substrate abundance in ideal locations, such as the tail-out of a significant pool upstream from a downstream run or riffle, where ideal water depth and velocity occurs.

0= Adequately sized spawning substrate scarce or absent.
0.5= Low abundance of adequately sized spawning substrate present.
1.0= Moderate abundance of adequately sized spawning substrate present.
1.5= High abundance of adequately sized spawning substrate present.

3.2.2 Substrate Embeddedness

The average percentage of substrate embeddedness that occurred in a habitat reach was determined by sampling the embeddedness of adequately sized spawning substrate in fine, deposited sediment such as silt and sand.

0= Greater than 75%
0.5= 75%-50%
1.0= 49%-25%
1.5= Less than 25%

3.2.3 Surface Flow

The extent and duration of surface water flows can be highly variable in stream reaches from year to year due to fluctuations in annual precipitation, water extractions, and other factors. Stream reaches that sustain some surface water throughout the year are critical for salmonids because they reside in freshwater for at least the first year of their lives. It is difficult to assign accurate surface flow duration values to particular stream reaches after only limited site visits. In this report, surface flow values for habitat reaches were assigned based on field observations during the late fall and early winter dry conditions (November- mid December 2002).

0.0= Dry
Prolonged dry streambed conditions generally occur in this reach during drier months of a typical rainfall year or throughout the year during years with low rainfall. Some reaches that are dry for extended periods may provide temporary spawning and rearing habitat when flows are present and will receive points elsewhere for other characteristics such as substrate embeddedness and abundance.

1.0= Variable
Seasonally variable surface flow conditions are believed to occur in this reach. Areas of dry streambed may occur, along with isolated pools, and/or low surface flows during drier periods of a year. The availability of summer and fall surface flows in this reach may be dependent on constantly changing climatic, geologic, and human-influenced factors. This reach may retain perennial surface flow conditions during wetter years while drying up during low precipitation years and during droughts the entire reach may dry up.

2.0= Perennial
Surface flows are believed to exist continuously throughout the year in this reach, although factors mentioned above may alter the perennial designation of the stream reach or sections of it.

3.2.4 Pool Abundance

The relative abundance of pools (greater than 2 feet in depth) was identified during field surveys and from aerial surveys.

0= Pools scarce or absent.
0.5= Relatively low abundance of pools present.
1.0= Relatively moderate abundance of pools present.
1.5= Relatively high abundance of pools present.
2.0= Relatively high abundance of pools present with multiple “refuge pools” (greater than 5 feet deep) present.

3.2.5 In-stream Cover

The relative amount of in-stream cover provided by large substrate, bedrock ledges, large woody debris, roots, undercut banks, and other features providing protected areas of cover was determined.

0= Scarce or Absent
0.5= Low

1.0= Moderate
1.5= High

3.2.6 Riparian Canopy Cover

Some areas within the stream reach may have had significantly higher or lower percentages of riparian canopy cover. The average percentage of riparian canopy cover was determined for the entire identified stream reaches.

0= Less than 25%
0.5= 25%-49%
1.0= 50%-75%
1.5= Greater than 75%

3.2.7 Habitat Reach Quantity

The length of described stream reaches was determined by identification of upstream and downstream habitat locations in the field and utilization of the National Geographic TOPO! Software program. This software program allowed the blue-line streams and habitat reaches to be measured.

3.3 Habitat Quality Scoring Limitations and Additional Information

Values for habitat quality attributes on stream reaches that were not ground surveyed were estimated based on adjacent stream reaches surveyed and aerial surveying. The survey date and survey effort for habitat reaches are listed on the Salmonid Habitat Summary Table. Habitat quality values and habitat reach scores were not applied to the Santa Maria River estuary for several reasons. The habitat ranking criteria is designed for stream habitat and does not work for the very unique habitat conditions encountered in estuaries. The quality of estuary habitat is highly variable from season to season and dependent on a variety of factors that demand extensive multi-year studies in order to understand and determine their value to salmonids (pers. comm. Dr. J. Smith). The assessment of the estuary was beyond the scope of this project and was not essential to determining priorities for upstream migration barriers although the importance of estuaries to steelhead cannot be understated. This transitional habitat plays a critical role in the steelhead productivity of a watershed. Estuaries provide productive rearing habitat, important salt and freshwater acclimation habitat for steelhead migrating between these water types, and an abundance of available prey for rapid salmonid growth. The habitat quality value applies to the quality of that reach for salmonids only and should not be interpreted as the ecological condition of that reach or the quality of that reach to other species. Water quality sampling was not included in the scope of this study.

See Appendix A for more information about steelhead ecology, life history, and habitat requirements. Additional habitat information for many different components of the watershed can be found in a comprehensive report, *Sisquoc Watershed Analysis*, completed in 2000 by the Los Padres National Forest. The report is online www.r5.fs.fed.us/LosPadres/news/reports_ea_eis_analysis/watersheds_2000.html

3.4 Salmonid Habitat Scoring Results

The following Salmonid Habitat Summary Table lists identified habitat reaches and summarizes habitat quality attributes and scores that were recorded while conducting field surveys during November and December of 2002. The overall habitat quality multiplier was

determined and multiplied by the reach quantity to obtain the reaches salmonid habitat score. A total of 234.27 miles of stream are identified with an average habitat score of 0.513 out of maximum possible score of 1.0. These numbers include the Santa Maria River and the Cuyama River downstream from Twitchell Dam. For the Sisquoc River and its tributaries, a total of 202.16 miles of stream are identified with an average habitat quality value of 0.527. This overall habitat quality reflects a wide range of habitat conditions from extremely poor (0.05) to excellent (1.0).

Sisquoc River Salmonid Habitat Summary Table

STREAM NAME AND HABITAT REACH	DOWNSTREAM LOCATION	UPSTREAM LOCATION	SURVEY DATE	SURVEY EFFORT	Abundance of Spawning Substrate (0.00 - 1.50)	Substrate Embeddedness (0.00 - 1.50)	Surface Flows (0.00 - 2.00)	Pool Abundance (0.00 - 2.00)	In-stream Cover (0.00 - 1.50)	Riparian Canopy Cover (0.00 - 1.50)	Reach Habitat Quality Multiplier (0-1.0)	Reach Habitat Quantity (Miles)	Reach Habitat Score
Santa Maria	Upstream from estuary	Sisquoc River	12/30/2002	4	0.50	0.00	0.00	0.50	0.00	0.00	0.10	24.22	**2.42**
Cuyama	Santa Maria River	Twitchell Dam	12/30/2002	4	0.50	0.00	1.00	0.50	0.50	0.00	0.25	7.89	**1.97**
Sisquoc #1	Santa Maria River	Tepusquet Creek confluence	12/30/2002	4	0.50	0.00	0.00	0.00	0.00	0.00	0.05	4.60	**0.23**
Sisquoc #2	Tepusquet Creek confluence	La Brea Creek confluence	12/30/2002	4	0.50	0.50	1.00	0.50	0.50	0.00	0.30	3.01	**0.90**
Sisquoc #3	La Brea Creek confluence	Water Creek confluence	12/5-6,12/30/02	2	0.50	0.50	1.00	1.00	1.00	0.00	0.40	20.53	**8.21**
Sisquoc #4	Water Creek confluence	South Fork Sisquoc River confluence	12/6-12/12/02	1	1.00	1.00	2.00	2.00	1.00	0.50	0.75	17.35	**13.01**
Sisquoc #5	South Fork Sisquoc River confluence	Barrier SC_7, Elevation 4760'	12/12-12/14/02	2	1.50	1.00	2.00	2.00	1.50	1.00	0.90	9.73	**8.76**
Tepusquet	Sisquoc River confluence	Waterfall (Barrier SC_TT_25)	12/18/2002	2	1.00	0.50	1.00	1.00	1.00	1.00	0.55	7.30	**4.02**
Colson	Tepusquet Creek confluence	Upstream barriers on Colson Creek	12/18/2002	2	1.00	1.00	2.00	1.00	0.50	1.00	0.65	5.96	**3.87**
La Brea	Sisquoc River confluence	North Fork/South Fork La Brea Creek confluence	12/30/2002	4	0.50	0.50	1.00	1.00	1.00	0.50	0.45	7.05	**3.17**
North Fork La Brea	South Fork La Brea Creek confluence	Upstream barriers on North Fork tributaries	12/30/2002	4	1.00	1.00	2.00	1.00	1.00	0.50	0.65	29.11	**18.92**
Sorth Fork La Brea	North Fork La Brea Creek confluence	Upstream barriers on Sorth Fork tributaries	12/30/2002	4	1.00	0.50	1.00	1.00	1.00	0.50	0.50	17.23	**8.62**
Horse #1	Sisquoc River confluence	Elevation 1800'	12/5/2002	1	0.50	0.00	1.00	0.50	0.50	0.50	0.30	4.56	**1.37**
Horse #2	Elevation 1800'	Upstream barriers on Horse Creek tributaries	12/30/2002	4	1.00	1.00	1.00	1.00	1.00	0.50	0.55	8.35	**4.59**
Manzana #1	Sisquoc River confluence	Elevation 1280'	11/16/2002	1	0.50	0.50	0.00	0.50	0.50	0.00	0.20	2.29	**0.46**
Manzana #2	Elevation 1280'	Fish Creek confluence	1/17 - 11/18/02	1	1.00	1.00	1.00	1.00	1.00	1.00	0.60	9.69	**5.81**
Manzana #3	Fish Creek confluence	Elevation 2320'	11/19/2002	1	0.50	0.50	0.00	0.00	0.00	0.00	0.10	1.80	**0.18**
Manzana #4	Elevation 2320'	Manzana Campsite	11/20/2002	1	1.00	1.50	2.00	1.00	1.50	1.50	0.85	1.20	**1.02**
Manzana #5	Manzana Campsite	Elevation 3080'	11/20/2002	1	1.50	1.50	2.00	2.00	1.50	1.50	1.00	0.77	**0.77**
Manzana #6	Elevation 3080'	Elevation 3400'	11/20/2002	1	1.50	1.50	1.00	0.50	0.50	1.00	0.60	1.00	**0.60**
Manzana #7	Elevation 3400'	Elevation 4600' (Barrier SC_MA_22)	11/20/2002	2	1.50	1.50	2.00	1.50	1.00	1.50	0.90	2.14	**1.93**
Dry	Manzana Creek confluence	Barrier SC_MA_DY_3	11/15/2002	1	1.00	1.00	1.00	0.50	0.50	1.00	0.50	1.08	**0.54**
Turtle Bowl	Manzana Creek confluence	Barrier SC_MA_TB_1	11/17/2002	1	0.50	1.00	2.00	0.50	0.50	0.50	0.50	0.20	**0.10**
Davy Brown #1	Manzana Creek confluence	Elevation 2000'	11/14/2002	1	1.00	1.00	2.00	1.00	1.00	0.50	0.65	1.27	**0.83**
Davy Brown #2	Elevation 2000'	Upstream barriers on Davy Brown Creek	11/14/2002	1	1.50	1.50	2.00	1.00	1.00	1.50	0.85	1.36	**1.16**
Fish	Manzana Creek confluence	Upstream barriers on Fish Creek	11/18/2002	1	1.00	1.00	2.00	1.00	1.00	1.00	0.70	1.89	**1.32**
Sulphur Spring	Manzana Creek confluence	Barrier SC_MA_SS_1	11/21/2002	1	0.50	1.50	1.00	0.50	0.50	0.00	0.40	2.08	**0.83**
Tributary 1	Manzana Creek confluence	Barrier SC_MA_T1	11/19/2002	1	0.00	0.50	0.00	0.00	0.00	0.50	0.10	0.01	**0.00**
Tributary 2	Manzana Creek confluence	Barrier SC_MA_T2	11/19/2002	1	0.50	0.50	1.00	0.50	0.50	1.00	0.40	0.17	**0.07**
Tributary 3	Manzana Creek confluence	Barrier SC_MA_T3	11/20/2002	1	1.00	1.50	2.00	1.00	1.00	1.00	0.75	0.19	**0.14**
Manzana Trail	Manzana Creek confluence	Barrier SC_MA_MT_1	11/20/2002	1	0.50	0.50	0.00	0.00	0.00	0.50	0.15	0.15	**0.02**
Burro	Sisquoc River confluence	Barrier SC_BO_1	12/6/2002	1	0.50	1.00	0.00	0.00	0.00	0.00	0.20	0.05	**0.01**
Water #1	Sisquoc River confluence	Elevation 1840'	12/6/2002	1	1.00	1.00	1.00	1.00	0.50	0.50	0.50	2.64	**1.32**
Water #2	Elevation 1840'	Upstream barriers on Water Creek	12/30/2002	4	1.00	1.50	2.00	1.50	1.00	0.50	0.75	2.61	**1.96**
Wellman	Sisquoc River confluence	Barrier SC_WN_1	12/7, 12/30/02	2	0.50	1.50	1.00	0.50	0.50	0.50	0.45	2.70	**1.22**
Abel	Sisquoc River confluence	Upstream barriers on Abel Creek	12/8, 12/30/02	2	1.00	1.50	1.00	1.50	1.00	1.00	0.70	7.31	**5.12**
Mine	Sisquoc River confluence	Barrier SC_ME_1	12/9,12/30/02	2	1.00	0.50	1.00	0.50	0.50	0.50	0.40	0.73	**0.29**
Big Bend	Sisquoc River confluence	Upstream barriers on Big Bend Creek	12/9/2002	1	0.50	1.00	1.00	0.50	0.50	0.00	0.35	1.88	**0.66**
Foresters Leap	Sisquoc River confluence	Upstream barriers on Foresters Leap	12/10/2002	3	1.00	1.00	1.00	1.00	1.00	0.50	0.55	5.20	**2.86**
Pocket	Sisquoc River confluence	Barrier SC_PT_1	12/12/2002	1	0.50	0.50	1.00	0.50	0.50	0.00	0.30	0.09	**0.03**
Sweetwater	Sisquoc River confluence	Barrier SC_SR_1	12/12/2002	2	0.50	1.00	1.00	0.50	0.50	0.50	0.40	2.50	**1.00**
South Fork Sisquoc #1	Sisquoc River confluence	White Ledge Creek confluence	12/15/2002	1	1.50	1.00	1.00	1.50	1.50	1.00	0.75	0.52	**0.39**
South Fork Sisquoc #2	White Ledge Creek confluence	Barrier SC_SF_1	12/15/2002	1	1.50	1.50	2.00	2.00	1.50	1.50	1.00	1.13	**1.13**
White Ledge	South Fork Sisquoc River confluence	Upstream barriers on White Ledge Creek	12/15-12/16/02	2	1.00	1.00	1.00	1.00	1.00	1.00	0.60	1.82	**1.09**
Maiden Hair	Sisquoc River confluence	Barrier SC_MH_1	12/13/2002	1	0.50	0.50	1.00	0.50	0.50	1.50	0.45	0.30	**0.14**
Cliff	Sisquoc River confluence	Barrier SC_CF_1	12/13/2002	3	1.00	1.00	1.00	0.50	0.50	1.00	0.50	1.70	**0.85**
Fall	Sisquoc River confluence	Barrier SC_FA_1	12/11/2002	1	0.50	1.00	1.00	1.00	1.00	1.50	0.60	0.22	**0.13**
Rattlesnake	Sisquoc River confluence	Barrier SC_RE_1	12/13/2002	1	0.50	1.00	1.00	0.50	1.00	1.00	0.50	0.15	**0.08**
Logan	Sisquoc River confluence	Barrier SC_LN_1	12/13/2002	3	1.00	1.00	1.00	0.50	0.50	1.00	0.50	1.21	**0.61**
Judell	Sisquoc River confluence	Upstream barriers on Judell Creek	12/14/2002	3	1.00	1.00	1.00	0.50	0.50	1.00	0.50	6.30	**3.15**
Big Pine	Sisquoc River confluence	Upstream barriers on Big Pine Creek	12/14/2002	3	1.00	1.00	1.00	0.50	0.50	1.00	0.50	1.03	**0.52**
											0.513 Average	**234.27 Total**	**113.98 Total**

4.0 Salmonid Population Status

Knowledge about the historic and contemporary status of salmonids within the watershed is an important factor in protecting known salmonid populations and assessing fish passage improvement projects. Project objectives were to identify existing salmonid populations in the field as well as compile historical documentation through data collection and personal communication. All the salmonid documentation collected during this study was compiled in order to document known historical salmonid presence and current population presence and distribution.

4.1 Salmonid Sampling Techniques

This project utilized non-capture salmonid sampling techniques while conducting field surveys in order to provide a rough assessment of current salmonid presence, distribution, and population status within the study area. Electroshocking and trapping methods that cause unnecessary stress, and often mortality, to salmonids were not used. Observations were made from the stream bank and underwater. Stream bank observation techniques included surveying streams in an upstream manner, wearing polarized glasses, using binoculars, and thoroughly observing pools and runs where salmonids are likely to occur. Underwater snorkeling methods were also used to identify salmonids with greater accuracy in deeper runs and pools. These techniques are an effective and safe way to identify the size and quantity of salmonids present. Only positively identified *O. mykiss* are reported in the Salmonid Documentation Table.

4.2 Data Collection and Interviews

An intensive document search was conducted in November and December of 2002 to collect recorded observations of salmonids within the study area. Data was colleted from CDFG, LPNF files, Santa Maria Historical Museum, Santa Barbara Natural History Museum, Cachuma Resource Conservation District, biological consultants, the Mark Capelli Steelhead Archives at University of California, Santa Barbara library, and personal communication with knowledgeable individuals. Dozens of individuals were interviewed throughout the course of the study, providing historical and contemporary salmonid sighting information. These sources of information are listed with each salmonid observation identified in the Salmonid Documentation Table.

4.3 Salmonid Documentation Results

The following Salmonid Documentation Table summarizes the historical salmonid documentation collected for the Santa Maria and Sisquoc River systems. Contemporary observation of salmonids made by Matt and Jim Stoecker during November and December 2002 surveying of the study area are also summarized.

Salmonid Documentation Table

Steelhead Migration Barrier Assessment and Recovery Opportunities for the Sisquoc River, Ca. Stoecker and Stoecker 2003.

Stream(s)	Location	# of Salmonids Observed or Documented	Fish Size- Total Length in Inches (Weight in Pounds)	Date of Observation (YEAR-MO-DY)	Observer(s)	Affiliation	Source of Information	Observation / Documentation Notes
Santa Maria River and Suey Creek								
Santa Maria River	Cook Street in downtown Santa Maria during a major river flood	5	Unknown	1941, Feb. 13	Local Newspaper Reporter in Santa Maria	Santa Maria Newspaper	Article in Santa Maria newspaper titled; "Rain, Rain, and More Rain", in Historical Bits Column.	"When the 'steelhead are running' in Cook Street, Santa Maria sportsmen just can't resist the temptation to try their luck…It was also reported that anglers had caught five steelhead…"An accomapying photograph shows anglers fishing on the flooded street.
Santa Maria River	Santa Maria River	1+	N/A	1941-1943	N/A	N/A	Titus, et al. 2000 NMFS California Anadromous Fish Distributions, Southern California Steelhead ESU, Historic Stream Habitat Distribution	"Steelhead used the main river primarily as a migratory route to the tributaries. The last sizable run of steelhead was in 1941 with a few adults reported in 1942-43."
Suey Creek	Suey Creek (Bull Canyon)	1+	N/A	1940's - 1950's	Local Santa Maria anglers	Santa Maria Area residents	pers. comm. Gerald Czarnecki, District Manager, Cachuma Resource Conservation District 1-02-02	"Old timers from Santa Maria that used to fish the Sisquoc River reported caughting rainbow trout in Suey Creek in the 1940's and 1950's before Twitchell Dam was built." Suey Creek was reportedly also known as Bull Canyon Creek.
Santa Maria River	Santa Maria River	1+	N/A	1944 and prior	N/A	N/A	Shapavolov, *Preliminary Report of the Fisheries of the Santa Maria River System, Santa Barbara, San Luis Obispo, and Ventura counties*, California, Bureau of Fish Conservation, California Division of Fish and Game,1944	The following excerpts reference Shapavolov's report concerning the Santa Maria River and it's tributaries. "The only native fish of which records are at hand is the steelhead. Resident steelhead, which are derivatives of the anadromous form, and possibly various strains of interior-stock rainbow trout and crosses between the two, are also present, especially in headwaters portions. Steelhead as adults enter the river following the first heavy rains of the wet season. The largests numbers enter during the period December-March. No data regarding the size of the run are available."

Santa Maria River	Santa Maria River	N/A	N/A	N/A	N/A	N/A	California Coastal Commission, Letter to Greg Fuz of County of Santa Barbara Planning and Development in response to the Coast Roack/ S.P.Milling EIS/EIR with attached comments, 1996.	"The size, timing and frequency of these runs of anadromous fishes has not been systematically studied in the Santa Maria River system, and as a result they are not well understood. However, it should be noted that even periodic (as distinct from annual) runs can be an important mechanism for naturally re-stocking the upstream tributaries with native fishes when populations periodically become depressed as a result of natural perturbations (e.g., wildfires, floods, and droughts) or man-induced perturbations (e.g., minimg, cattle grazing, water extractions) of the habitat."
Santa Maria River	Santa Maria River, Cuyama River and tributaries, excluding the Sisquoc River and it's tributaries.	N/A	N/A	N/A	N/A	N/A	Henke, Ed, Letter to Dennis McEwan, Associate Fisheries Biologist, CDFG regarding Final 'Steelhead Restoration and Management Plan for California', July 18, 1996	In this letter, Ed Henke reports having historical documentation of 105 different "creeks/fords/tributaries and mainstem" salmonid streams draining into the Santa Maria and Cuyama Rivers, excluding the Sisquoc River and it's tributaries . Documentation of salmonids are reported for the following salmonid forms and number of unique streams: 5 Salmon, 21 Steelhead, and 24 Native/ Resident Trout.

Sisquoc River								
Sisquoc River	Location vague: Probably near the old Tunnel Cabin on the north end of the existing Sisquoc Ranch. Near the LPNF boundary.	1000's	Average of one pound	1879 - 6-28, 6-30, 7-8	Stephen Bowers	Pioneer California Archeolgist	Benson, Arlene. The Noontide Sun: The Field Journals of the Reverand Stephen Bowers, Pioneer California Archeologist. Ballena Press. 1997. Pg 136.	**June 28.** "In a clear pool of water in the river today I saw nearly 1000 trout. Brown caught 150 one day here and at another time 55. **June 30**. "The stream is full of mountain trout. I am confident that we saw in some places more than 500 at one sight. We were disappointed in the remembrance of leaving our hooks with the wagons, but had no difficulty in capturing all we wanted with our hands, averaging a pound each." **July 8.** "Caught a fine mess of trout."
Sisquoc River	Sisquoc River	General	N/A	1890-1964	Shapovalov 1944; Richardson 1959; Whallls 1964; Swift, pers. Comm/	N/A	NMFS California Anadromous Fish Distributions, Southern California Steelhead ESU, Historic Stream Habitat Distribution,	"Used more heavily by steelhead for spawning that the Cuyama River. Historically know for its sports fishery of trout and steelhead. Local newspaper articles from 1890 commented on plentiful 'trout'. 1959 survey indicated self-sustaining population of trout and therefore suitable stream conditions for steelhead although none were mentioned. A 1964 survey during the low flow period indicated fewer trout were found due to poor water conditions, and the upstream movement of anadromous fish was not possible because of intensified water use. SH juveniles planted in 1930."

Stream(s)	Location	# of Salmonids Observed or Documented	Fish Size- Total Length in Inches (Weight in Pounds)	Date of Observation (YEAR-MO-DY)	Observer(s)	Affiliation	Source of Information	Observation / Documentation Notes
Sisquoc River	Tunnell Cabin at North Boundary of Sisquoc Ranch. Downstream from the LPNF boundary.	5-6	20"- 30"	Late 1800's - 1934	Early homesteaders	Early homesteaders	Blakely, E.R. and Barnette, Karen *Historical Overview of Los Padres National Forest*, 1985. pg. 39. Pers. comm. Blakely 1-11-03. Pers. comm. Cooper 12-17-02	"Across the river at the location of the ranch, a riffle of white rock formed numerous pools, so the area was long know for its good fishing. On the wall at the back porch of the house are the outlines of large fish together with the names and dates of the anglers who caught them." Blakely noted that at least 3 charcaol sketches of steelhead measuring over 24 inches in length occur. Cooper reported that 5-6 sketches occur of steelhead ranging from 20-30 inches in length and were sketched as recently as 1934.
Sisquoc River	From Santa Maria River confluence upstream into LPNF	1+	0+ -24"	1900's - 1998	Gerald Czarnecki	District Manager, Cachuma Resource Conservation District	pers. comm. Gerald Czarnecki 1-02-02	"Have observed 4 to 5 age classes of rainbow trout while on the Sisquoc Ranch and within the LPNF in the past decade. During high water local resident in the town of Garey have reported catching rainbow trout within the last 5 years that get trapped in the gravel pits near town. Local anglers have also reported catching adult steelhead during high water years during the 1900's up to 24 inches long in the lower Sisquoc River."
Sisquoc River	Upper Sisquoc River	112	4" - 15"	1916	Elwood, Bryant, Ralph, Goodchild.	Local resident and anglers	Santa Maria Historical Society Image is on display at the Santa Maria Historical Society Museum, 616 S. Broadway, Santa Maria, CA. 93454 (805) 922-3130	This photograph shows four anglers with a fullstringer of approximately 112 juvenile steelhead / rainbow trout ranging from approximately 4-15 inches. Written on the back of this photo is the following: "Fish for rainbow trout, Upper Sisquoc River, L. to R.: Elwood, Bryant, Ralph, Goodchild, 1916, Louise Studio, Santa Maria , CAL."
Sisquoc River	Downstream from the South Fork about 200 yards	30	7 RBT over 6"; 29 RBT under 6"; 4 Brown Trout over 4"	1959 6-16/17/18	William M. Richardson, Fisheries Manager	Department of Fish and Game	Intraoffice correspondence from William M. Richardson, Fisheries Manager III, Department of Fish and Game, 8 pgs, July 16, 1959	"In past high rainfall years there is a history of steelhead migration from the sea; however, without connection to the ocean or a large reservoir, there is no reason to believe that behavior of the resident trout differs from trout in similar streams."
Sisquoc River	About 1 mile above Heath Camp	45	14 RBT over 6"; 22 RBT under 6"; 9 Brown Trout over 6"	1959 6-16/17/18	William M. Richardson, Fisheries Manager	Department of Fish and Game	Intraoffice correspondence from William M. Richardson, Fisheries Manager III, Department of Fish and Game, 8 pgs, July 16, 1959	
Sisquoc River	Near Cottonwood Camp	99	6 RBT over 6"; 91 RBT under 6"; 2 Brown Trout over 6"	1959 6-16/17/18	William M. Richardson, Fisheries Manager	Department of Fish and Game	Intraoffice correspondence from William M. Richardson, Fisheries Manager III, Department of Fish and Game, 8 pgs, July 16, 1959	
Sisquoc River	Approximately one mile upstream from Skunk Camp	51	1 RBT over 6"; 48 RBT under 6"; 2 Brown Trout over 4"	1959 6-16/17/18	William M. Richardson, Fisheries Manager	Department of Fish and Game	Intraoffice correspondence from William M. Richardson, Fisheries Manager III, Department of Fish and Game, 8 pgs, July 16, 1959	

Sisquoc River	From immediately below the corral at the South Fork Guard Station to approximately 200 yards above the confluence with the south Fork.	3	1 RBT over 6"; 2 RBT under 6":	1959 6-16/17/18	William M. Richardson, Fisheries Manager	Department of Fish and Game	Intraoffice correspondence from William M. Richardson, Fisheries Manager III, Department of Fish and Game, 8 pgs, July 16, 1959	"The sampling indicated good spawning success of the rainbows, and I fear there is an excellent distribution of year classes in the population. Fish up to 13 1/3 inches in length were taken, indicating good survival of adults to provide a spawning broodstock."
Sisquoc River	From the vicinity of South Fork Station upstream.	Many	0+-15"	1970's	Mark Capelli	National Marine Fisheries Service	pers. comm. Capelli 12-17-02	Many rainbow trout were caught during the early 1970's up to 15 inches long near the South Fork Station and upstream.
Sisquoc River	From Cottonwood Camp upstream	1+	6"-8"	1970's - 1980's	E.R. (Jim) Blakely Sr.	Former LPNF, Historian	pers. comm. Blakely 1-11-03	Blakely reported catching native rainbow trout in the 6"-8" range during this period.
Sisquoc River	Near Mormon Camp	1+	18"-20"	1980- early	Horseback Riders at Manzana Schoolhouse	Horseback Riders at Manzana Schoolhouse	Matt Stoecker personal communication with two horseback riders at Manzana School House on 11-16-2002	During a stream survey of Manzana Creek Matt and Jim Stoecker talked with two horseback riders who reported large rainbow trout (over 20") near Mormon Camp on the main Sisquoc River about 20 years ago. One trout caught was reportedly 18 inches long
Sisquoc River	South Fork Station downstream to the Manazana/Sisquoc confluence	100's	0+ - 12"	1983 08-1 08-2 08-3	Don Edwards; Scott Hillman	United States Forest Sevice	Cardenas, Maurice. *Upper Sisquoc River Survey.* US Forest Service Surveys for 1983 and 1993, Compiled by Maurice Cardenas, California Dept. of Fish and Game.	"Five miles downstream from South Fork… is the last of any good RBT populations. 3 to 4 RBT 8" - 12" noted in every pool."
Sisquoc River	Judell Canyon (Heath Camp Stream Elevation 3400 ft.) down stream to South Fork Station at 2600 ft.	100's	0+ - 12"	1983 08-1 08-2 08-3	Don Edwards; Scott Hillman	United States Forest Sevice	Cardenas, Maurice. *Upper Sisquoc River Survey.* US Forest Service Surveys for 1983 and 1993, Compiled by Maurice Cardenas, California Dept. of Fish and Game.	"…good depth to hold RBT 0+ - 16"…Rattlesnake was very impressive with… many 0+ - 12" RBT with good spawning gravels. Chubs are becoming more populated to pools as we move down stream now with RBT still dominating pools.""
Sisquoc River / Big Pine Creek	From Judell Canyon upstream to Alamar Saddle Headwaters to stream elevation 5346 feet.	Abundant	0+ - 12"	1983 08-1 08-2 08-3	Don Edwards; Scott Hillman	United States Forest Sevice	Cardenas, Maurice. *Upper Sisquoc River Survey.* US Forest Service Surveys for 1983 and 1993, Compiled by Maurice Cardenas, California Dept. of Fish and Game.	"(Rainbow Trout) noted 0+ - 12", Brown Trout 4" - 12". The density of Brown Trout decreased downstream as the (Rainbow Trout) increased in density. Big Pine Canyon… showing excellent RBT population with good to excellent food source."
Sisquoc River	Upper Sisquoc River	N/A	N/A	1989/1990	N/A	N/A	California Coastal Commission, Letter to Greg Fuz of County of Santa Barbara Planning and Development in response to the Coast Roack/ S.P.Milling EIS/EIR with attached comments, 1996.	"The upper Sisquoc River historically has been the principal steelhead spawning and rearing tributary in the Santa Maria River system."
Sisquoc River	Near Foresters Leap Creek	10+	6"- 20"	1992-1998	George Gross	California Department of Fish and Game	pers. comm. Gross 1-2-02	"Has caught many rainbow trout as small as 6 inches and steelhead up to 16 inches in length in this rocky area during this period. The largest steelhead observed in this reach were 20 inches in length. The larger fish were silvery in color, had steelhead charateristics, with not much color. George has photos.

Stream(s)	Location	# of Salmonids Observed or Documented	Fish Size- Total Length in Inches (Weight in Pounds)	Date of Observation (YEAR-MO-DY)	Observer(s)	Affiliation	Source of Information	Observation / Documentation Notes
Sisquoc River	Two Sections Surveyed: Section 1 - Heath Camp to .6 miles upstream of Heath Camp; Section 2 - Cottonwood Camp to .25 miles upstream of Cottonwood Camp	60	4" - 14"	1993 May	Maurice Cardenas	California Department of Fish and Game	Cardenas, Maurice. *Upper Sisquoc River Survey.* US Forest Service Surveys for 1983 and 1993, Compiled by Maurice Cardenas, California Dept. of Fish and Game.	
Sisquoc River	From the confluence of the Manzana River upstream 8 miles.	4	Avg. 270 mm	1993 7-22	Unkown	Unknown	I page document found in U.S. Forest Service Files.	"A total of four trout were sighted - two of which were caught by rod and reel. Both of these were very large, helathy trout. The other trout were comparable. No fry or juveniles were seen. "
Sisquoc River	Sisquoc River	1+	N/A	1995-1996	Department of Fish and Game	Department of Fish and Game	Letter to NMFS from Timothy C. Farley, DFG Inland Fisheries Division, regarding LSA's request for removal of the Santa Maria River from Southern California ESU.	"Fish populatin surveys made by Department personnel in 1995 and 1996... show that a healthy population of rainbow trout continues to inhabit the Sisquoc River and tributaries. We do not know if these fish include progeny of steelhead, however, given suitable flow conditions through the lower Santa Maria River, steelhead could still access the upper portions of the Sisquoc River."
Sisquoc River	General Information	1+	20"-28"	1998- likely	Titus	N/A	Titus, et al. 2000 NMFS California Anadromous Fish Distributions, Southern California Steelhead ESU, Current Stream Habitat Distribution,	"Large pools on USFS lands held 20" - 28" Steelhead adults in recent years, particularily in El Nino years. Good rearing habitat in upper reach, middle reach has intermittent pools, and lower reach is dry. Rainbow Trout reported common with several size classes present. Genetic steelhead/Rainbow Trout studies reveal 'native' gene pool is still present."
Sisquoc River	From the confluence of Foresters Leap Creek upstream to the South Fork Sisquoc.	3+	up to 22"-24"	1998	Maurice Cardenas, other CDFG personel	Department of Fish and Game	pers. comm. Cardenas 12-2-02	"Three steelhead ranging from 22-24 inches in length were caught and others in this range and smaller were also observed throughout this reach."

Sisquoc River	Between Manzana Schoolhouse and Water Canyon	75-100	18"-25"	1998-05	Kevin Cooper, other LPNF personel	Wildlife Biologist, Los Padres National Forest Service	pers. comm. Cooper 12-17-02	Within this 4 mile reach, approximately 50 adult steelhead ranging from 18-22 inches were caught and released. At least twice as many were observed in the pools as were caught. Approximately 75 to 100 steelhead were observed in this reach with the largest observed approximately 25 inches in length. Many smaller rainbow trout were also observed. The large steelhead all had adipose fins (indicating wild fish) and were very clean looking with healthy fins and only slight residual looking coloration. These observation were made following an extremely wet El Nino year that connected flows from the ocean up to the Sisquoc River for a long duration. Several photographs of these fish were taken and are in K. Coopers possession (~25). Later that summer Cooper observed some of these large fish all the way up to the South Fork Sisquoc.
Sisquoc River	Near Water Canyon	1+	22"	1999-06	Kevin Cooper, other LPNF personel	Wildlife Biologist, Los Padres National Forest Service	pers. comm. Cooper 12-17-02	"Very thin, snakey trout that were likely over-summering steelhead were observed in pools near Water Canyon."
Sisquoc River	Sisquoc River and tributaries	N/A	N/A	N/A	N/A	N/A	Henke, Ed, Letter to Dennis McEwan, Associate Fisheries Biologist, CDFG regarding Final 'Steelhead Restoration and Management Plan for California', July 18, 1996	In this letter, Ed Henke reports having historical documentation of 79 different "creeks/fords/tributaries and mainstem" salmonid streams draining into the Sisquoc River and it's tributaries . Documentation of salmonids are reported for the following salmonid forms and number of unique streams: 3 Salmon, 34 Steelhead, and 54 Native/ Resident Trout.
Sisquoc River	Sisquoc River	1+	up to 36 cm.	N/A	N/A	N/A	Titus, R. G., D. C. Erman, and W.M. Snider. History and status of steelhead in California coastal drainages south of San Francisco Bay. *Hilgardi,* 1997	"In addition to having been an important spawning and rearing area for Santa Maria River steelhead, the Sisquoc River has also been managed for a resident rainbow trout fishery. In the CDFG files, pools in the main stem Sisquoc River were noted as providing good habitat for rainbows up to 36 cm which were well-fed on chubs."
Tepusquet Creek								
Tepusquet Creek	Tepusquet Creek	1+	N/A	1988 and prior	Kathryn Donovan	Tepusquet Canyon Resident	Santa Barbara News Press 7-10-1988	An article titled "Tepusquet" reports that long-time resident Kathryn Donovan's son catches trout in the [Tepusquet] Creek, that flows through their property.
Tepusquet Creek	Middle reaches	1+	6"-10"	1993	Maurice Cardenas	Department of Fish and Game	pers. comm. Cardenas 12-2-02	Rainbow trout were observed in the middle reaches of Tepusquet Creek and natural reproduction was thought to be occuring.
Tepusquet Creek	Pool below upstream barrier: Waterfall at SC_TT_25	1+	6" - 8"	1900's late-2001	Local resident	Long-time resident near waterfall in Tepusquet Canyon.	Matt Stoecker conversation with local resident 12-02.	Local resident reported that he has seen rainbow trout for many years in Tepusquet Creek up to waterfall barrier (SC_TT_25) as they migrate upstream during the spring.

Stream(s)	Location	# of Salmonids Observed or Documented	Fish Size- Total Length in Inches (Weight in Pounds)	Date of Observation (YEAR-MO-DY)	Observer(s)	Affiliation	Source of Information	Observation / Documentation Notes
La Brea Creek								
La Brea Creek	La Brea Creek	1+ , (6000 hatchery rainbow trout)	N/A	1900's-1932	N/A	N/A	Titus, R. G., D. C. Erman, and W.M. Snider. History and status of steelhead in California coastal drainages south of San Francisco Bay. *Hilgardi,* 1997	"The sisquoc tributary, La Brea Creek, was a known spawning area for steelhead (Shapovalov 1944b). The creek was also a famous fishing stream before forest fires in the 1920's destroyed the watershed. La Brea was stocked with 6,000 hatchery rainbow trout in 1932."
La Brea Creek	Near Goodchild Ranch and South and North Fork La Brea Creeks	1+	N/A	1900's early to late 1990's	Goodchilds	Former owners of private inholdings near the confluence of the North and South Forks of La Brea Creek.	pers. comm. Cooper 12-17-02, Wildlife Biologist, LPNF	Cooper was told by ranchers (Goodchilds) that many adult steelhead migrated up La Brea Creek and it's tributaries in the early 1900's and that excellent pools, up to 15 feet deep, used to occur. Following large fires, the pools have filled in with sediment and now there are not many trout.
La Brea Creek	North Fork and upper reaches	1+	N/A	1980's late - 1990's	Goodchilds	Former owners of private inholdings near the confluence of the North and South Forks of La Brea Creek.	pers. comm. Gerald Czarnecki, District Manager, Cachuma Resource Conservation District 1-02-02	" Goodchilds reported that during wet years in the late 1980's and 1990's, large rainbow trout and possibly steelhead were caught in the upper reaches of La Brea Creek and especially the upper North Fork of La Brea Creek."
Manzana Creek								
Manzana Creek/ Davy Brown Creek	Manzana Creek/Davy Brown Creek	100,000+ hatchery trout and Santa Ynez River steelhead transplant sand observations	Some 15-20 cm	1930-1956	CDFG personel, others	CDFG, personel, others	Titus, R. G., D. C. Erman, and W.M. Snider. History and status of steelhead in California coastal drainages south of San Francisco Bay. *Hilgardi,* 1997	"The Manzana Creek drainage, in the headwaters of the Sisquoc, had perennial flow, unlike most portions of the Santa Maria system (Shapovalov 1944b). CDFG stocking records for Manzana Creek date back to 1930 when 15,000 hatchery-reared steelhead were planted. Some 10,000 hatchery rainbow trout were also planted in 1930, and about 4,500 during 1941-1942. The creek also recieved a total of 47,240 juvenile steelhead rescued from the Santa Ynez River during 1940-44. The Manzana tributary, Davey Brown Canyon Creek, recieved about 1,900 hatchery raibow trout during 1941-42, and 103,600 Santa Ynez steelhead during 1940-44. In June 1956, CDFG personnel found a high abundance of 15-20 cm rainbow trout in Manzana Creek."
Manzana Creek	Upstream of Manzana Camp	1+	6"-8"	1970's late-1980's	E.R. (Jim) Blakely Sr.	LPNF, Historian	pers. comm. Blakely 1-11-03	Blakely reported catching "native" rainbow trout in the 6"-8" range during this period.

Manzana Creek	From headwaters to 1.5 miles below Manzana Camp	25 per 100 ft. in Lower section; 3 per 100 ft. in middle section; 20 per 100 ft. in upper section	1" - 16"	1980-11-8/9	Kelley Stater, Celeste Anacker	United States Forest Sevice	USDA Stream Survey Report	"Upper Manzana Creek maintains a good trout fishery. The shallow pools with gravel bottoms and the presence of fingerlings would indicate the section of creek is self-sustaining. The uneasy access of upper Manzana serves to keep this area wild and unchanged."
Manzana Creek	From 1.5 miles below Manzana Camp downstream to Nira Camp	3 per 100 ft in Lower Section; 1 per 100 ft. in middle section	3" - 6"	1980-10-26/27	Kelley Stater Celeste Anacker	United States Forest Sevice	USDA Stream Survey Report	"The lack of pools and intermittant flow of water have contributed to the poor conditions of Middle Manzana Creek and the noticable absence [decline] of Rainbow Trout."
Davey Brown	From the confluence of Manzana Creek to 3 miles upstream	3 per 100 ft in lower section; 1 per 100 ft. in upper section.	3" - 6"	1980 - 10-25	Kelley Stater	United States Forest Sevice	USDA Stream Survey Report	"The low number of trout observed in this stream was undoubtedly due to the heavy fishing pressures. But, other factors are also contributing to the deterioration of this stream. These factors include livestock in the stream bed and on the bank, litter, and the large populatin of chubs."
Munch Creek	From Davey Brown Creek confluence to 1.5 miles upstream from confluence	5 per 100ft.	2" - 6"	1980- 10-25	Kelley Stater	United States Forest Sevice	USDA Stream Survey Report	"Munch Canyon provides an excellent recreational area for fishing, hiking and observing nature. It is heavily used and must be watched so irreversible damage is headed off."
Manzana Creek	From confluence of Davey Brown upstream 805.85 m	80	21mm - 320 mm	1999 - 7-14	Chris Medak	Tom Wallace, Chris Medak, Nik Krautzman, Dan Chua, Tracy Weddle	Los Padres National Forest Stream Habitat and TES Occupancy Surveys	2 Rainbow trout were reported at 300 - 320 mm.
Munch Creek	From Confluence of Munch and Davey Brown Creek to 656 meters upstream	327	21mm - 260 mm	1999 - 7-15	Dan Chua	Tom Wallace, Chris Medak, Nik Krautzman, Dan Chua, Tracy Weddle	Los Padres National Forest Stream Habitat and TES Occupancy Surveys	

Abel Creek

Abel Creek	Upstream from Sisquoc River	1+	0+ - 10"	1990's-present	Kevin Cooper	Wildlife Biologist, Los Padres National Forest	pers. comm. Cooper	"A small population of rainbow trout have been observed in Abel Creek for several years."

Stream(s)	Location	# of Salmonids Observed or Documented	Fish Size- Total Length in Inches (Weight in Pounds)	Date of Observation (YEAR-MO-DY)	Observer(s)	Affiliation	Source of Information	Observation / Documentation Notes
South Fork Sisquoc River								
South Fork Sisquoc River	Adjacent to Lonnie Davis Camp, approximately .5 miles above confluence with main river	25	6 RBT over 6"; 19 RBT under 6"	1959 6-16/17/18	William M. Richardson, Fisheries Manager	Department of Fish and Game	Intraoffice correspondence from William M. Richardson, Fisheries Manager III, Department of Fish and Game, 8 pgs, July 16, 1959	
South Fork Sisquoc River	From the confluence bout 50 yards upstream	32	9 RBT over 6"; 18 RBT under 6"; 5 Brown Trout over 4"	1959 6-16/17/18	William M. Richardson, Fisheries Manager	Department of Fish and Game	Intraoffice correspondence from William M. Richardson, Fisheries Manager III, Department of Fish and Game, 8 pgs, July 16, 1959	
South Fork Sisquoc River	From confluence of Sisquoc River to .2 miles upstream on the South Fork of Sisquoc River	12 per 100 ft.	2" - 18"	1980 - 9-17	Kelley Stater	United States Forest Service	USDA Stream Survey Report	"South Fork is a steep, well-shaded creek with cold clear water. The fork of the Sisquoc supports a good Rainbow trout fishery…The South Fork is a spawning grounds where Rainbow Trout leave the river to reproduce in large and medium size pools. These pools, formed by bedrock and boulders, hold enough sand and gravel for spawning to occur. Fingerlings and medium size trout were common, with large trout (12" - 16") predominantly in the bigger pools. "
White Ledge Creek Unamed tributary	From White Ledge Canyon to .75 miles upstream from White Ledge	Ave.: 10 per 100 ft.	3" - 20"	1980 - 9-17	Kelley Stater	United States Forest Service	USDA Stream Survey Report	"This narrow, bedrock-lined creek has a surprising trout fishery for the poor canopy and low flow. This creek is an important water source for wildlife and supports a fair trout fishery. Medium size pools and even larger pools appeared overcrowded and aquatic food is just adequate. The trout were fat and healthy in appearance.Table 1 does not indicate location of fish capture. 70 individual fish were identified with lengths ranging from 45mm to 293mm, presumably using electroshocking methods."
South Fork Sisquoc River	South Fork Sisquoc River	70	1.75-11.5	1994	CDFG Personnel	California Department of Fish and Game	McEwan. 1994. Table 1. Fish Population Data	This table does not indicate the location of the fish capture. 70 individual fish were identified with lengths ranging from 45mm to 293mm, presumably using electroshocking methods.

Sisquoc River Salmonid Observations During Nov/Dec 2002 Surveying.

Stream(s)	Location	# of Salmonids Observed or Documented	Fish Size- Total Length in Inches (Weight in Pounds)	Date of Observation (YEAR-MO-DY)	Observer(s)	Affiliation	Source of Information	Observation / Documentation Notes
Sisquoc River								
Sisquoc River	Upstream from Abel Creek confluence	1	9"	2002-12-10	Matt and Jim Stoecker	Consulting Biologists	Field Surveying Notes Nov-Dec 2002	Isolated observation of this *O. mykiss* which may persist in this location during the drier part of the season due to the adequate, perenial flows and habitat on Abel Creek.
Sisquoc River	500' Downstream of South Fork Confluence	1	9"	2002-12-12	Matt and Jim Stoecker	Consulting Biologists	Field Surveying Notes Nov-Dec 2002	This fish was observed while masking a pool.
Sisquoc River	Downstream from Fall Creek	3	2 @ 8" 1 @ 10"	2002 -12-11	Matt and Jim Stoecker	Consulting Biologists	Field Surveying Notes Nov-Dec 2002	Large pools occur in this reach with dense riparian canopy cover.
Sisquoc River	Between 50' and 600' upstream from Cottonwood Camp	14	1 @8" 10 @ 3-6" 3 @ 8-12"	2002 -12-14	Matt and Jim Stoecker	Consulting Biologists	Field Surveying Notes Nov-Dec 2002	First location on Sisquoc River upstream from the LPNF Boundary where moderate to high densities of *O. mykiss* have been observed. Diversity of age classes indicates that natural reproduction is occuring in this reahc and upstream.
Sisquoc River	Half-way between Judell confluence and Big Pine Creek confluence	21	11 @ 0-4" 5 @ 5-8" 5 @ 8-14"	2002-12-14	Matt and Jim Stoecker	Consulting Biologists	Field Surveying Notes Nov-Dec 2002	Several large *O. mykiss* observed in this reach where good pool habitat and spawing gravels occur along with moderate to high densities of salmonids. Some larger individuals appeared very thick and silvery in coloration, similar to smolting steelhead juveniles.
Manzana Creek								
Manzana Creek	From 200' below Coldwater Camp upstream to Davey Brown confluence	4	2 @ 8" 2@ 10-11"	2002-11-17	Matt and Jim Stoecker	Consulting Biologists	Field Surveying Notes Nov-Dec 2002	Adequate pool habitat and spawning gravel size occur in this reach along with low numbers of *O. mykiss* .
Manzana Creek	From Nira Camp upstream to Fish Creek	3	8"-9"	2002-11-17	Matt and Jim Stoecker	Consulting Biologists	Field Surveying Notes Nov-Dec 2002	
Fish Creek	From Confluence of Manzana upstream to Natural Limit	7	2 @ 6" - 8" 5 @ 7 -10"	2002-11-18	Matt and Jim Stoecker	Consulting Biologists	Field Surveying Notes Nov-Dec 2002	Good spawning and rearing habitat occur on Fish Creek and it's East Fork Tributary where *O. mykiss* occur and natural reproduction is likely occuring.
Manzana Creek	From Confluence of Fish Creek Upstream to Natural Limit	72	34 @ 2 -4" 17 @ 5 -7" 21 @ 8-11"	2002-11-18/19/20	Matt and Jim Stoecker	Consulting Biologists	Field Surveying Notes Nov-Dec 2002	Habitat conditions improve dramatically downstream from Manzana Camp where deep pools and ideal spawning substrate conditions occur upstream through the Narrow. *O. mykiss* densities are among the highest in the entire Sisquoc watershed in this reach.

Stream(s)	Location	# of Salmonids Observed or Documented	Fish Size- Total Length in Inches (Weight in Pounds)	Date of Observation (YEAR-MO-DY)	Observer(s)	Affiliation	Source of Information	Observation / Documentation Notes
Davey Brown	Between concrete road crossings (Barriers SC_MA_DB_1 and SC_MA_DB_2)	8	7" - 9"	2002-11-14	Matt and Jim Stoecker	Consulting Biologists	Field Surveying Notes Nov-Dec 2002	Moderate densities of *O. mykiss* occur in this reach where adequate spawning and rearing habitat occurs and perenial stream flows exist.
Davey Brown	Upstream of road crossing (Barrier SC_MA_DB_2)	19	1 @ 4" 18 @ 7" - 10"	2002-11-14	Matt and Jim Stoecker	Consulting Biologists	Field Surveying Notes Nov-Dec 2002	Moderate to high abundance of *O. mykiss* occur in this reach where habitat conditions are good to excellent with several deep rearing pools and clean, adequately-sized spawning gravels present.
South Fork Sisquoc River								
South Fork Sisquoc River	From confluence with Sisquoc River upstream to Lonnie Davis Campground	1	4"	2002-12-15	Matt and Jim Stoecker	Consulting Biologists	Field Surveying Notes Nov-Dec 2002	Large boulders and moderate gradient are found at the confluence. Riparian cover is good with many sycamore's, alders, pine, and cottonwoods. Streambed is 25%-50% embedded. Good gravels in stream.
South Fork Sisquoc	From Lonnie Davis Campground upstream about 1400' to bedrock gorge.	12	5 @ 0-4" 4 @ 5-8" 3 @ 9-14"	2002-12-15	Matt and Jim Stoecker	Consulting Biologists	Field Surveying Notes Nov-Dec 2002	Excellent habitat conditions for spawing and rearing with several large pool with a wide range of size classes and natural redroduction occuring.
South Fork Sisquoc	From bedrock gorge upstream to natural barrier	24	7 @ 0-4" 13 @ 5-8" 4 @ 9-14"	2002-12-15	Matt and Jim Stoecker	Consulting Biologists	Field Surveying Notes Nov-Dec 2002	Excellent pools habitat, good in-stream cover, clean substrate conditions, and a high variability in size of *O. mykiss* indicating good natural reproduction.
Sisquoc River Tributaries								
Abel Creek	From confluence with Sisquoc River upstream 1.5 miles	19	9 @ 0-4" 10 @ 5-7"	2002-12-8	Matt and Jim Stoecker	Consulting Biologists	Field Surveying Notes Nov-Dec 2002	Several age classes of *O. mykiss* observed to be naturally reproducing in small pools with clean substrate and fair to good spawning and rearing habitat.

4.4 Salmonid Population Discussion

The current status of steelhead within the Santa Maria/Sisquoc River System has been a source of much debate. Limited information and the remote location of the Sisquoc River have contributed to a lack of understanding about this important population. A widely distributed draft document being prepared by CDFG, *History and Status of Steelhead in California Coastal Drainages South of San Francisco Bay* (Titus et al. 1994) came to the preliminary conclusion in their draft manuscript that, "The native Santa Maria River steelhead stock is most likely extinct". After recent discussions, both Dr. Titus and the CDFG agree, "there is no evidence to support this conclusion" (Coast Rock EIR CDFG Letter from T. Farley Chief, Inland Fisheries Division CDFG 1997). The CDFG letter goes on to state "a healthy population of rainbow trout continues to inhabit the Sisquoc River and tributaries" and "Steelhead use of the river system can not be ruled out". A second letter within the above mentioned EIR document from Margaret Boland, the Forest Supervisor of the Los Padres National Forest, states that "three out of five of the tissue samples from the Sisquoc River were genetic type "8" which is indicative of native southern steelhead ancestry". An additional letter within this EIR from Craig Fusaro, Central Coast Region Board Governor of California Trout, states that "Historical records on the Sisquoc River (see Shapovalov 1944, 1945) clearly indicate that the Sisquoc was second in importance in Santa Barbara County only to the Santa Ynez River with respect to steelhead".

The steelhead population that utilizes the Santa Maria and Sisquoc Rivers is not extinct. In fact, this watershed, including stream reaches upstream of Twitchell Dam on the Cuyama River, continues to support native *O. mykiss*. This population is composed of both native southern ESU type steelhead strains and introduced strains from other southern ESU streams and sources outside the region. Observations of adult steelhead in the Sisquoc River by LPNF and CDFG personnel prove that anadromous adult steelhead runs have continued to occur in the watershed as recently as 1998 (pers. comm. Cooper and Cardenas). In addition, natural reproduction of *O. mykiss* has continuously existed through the historical records within the Sisquoc River; it's tributaries, and tributaries of the Cuyama River. These populations must be considered a part of the watershed's overall steelhead population, as they are most likely responsible for producing a portion of the outmigrating smolts that return to the system as adult steelhead. Extensive salmonid sampling conducted for this project in November and December of 2002 found healthy, naturally reproducing populations of *O. mykiss* in the upper Sisquoc River and many of its tributaries.

4.5 Sisquoc River Salmonid Photographs

A stringer of steelhead/rainbow trout from the Upper Sisquoc River, 1916

Smaller steelhead caught during the 1998 spawning run. Sisquoc River. K. Cooper

Upper Sisquoc River/Big Pine Creek steelhead/rainbow trout. 1998 Courtesy K. Cooper

5.0 Migration Barrier Results and Recommended Actions

5.1 Migration Barrier Impacts on Steelhead

Rainbow trout and steelhead are highly mobile within their watershed; inhabiting different stream reaches as aquatic habitat conditions change throughout the season and from year to year. See Appendix A for more information regarding the ecology and life history behavior of steelhead. Steelhead utilize most accessible stream reaches within a watershed from the headwaters to the ocean, as both migration corridors and spawning and rearing habitat. Barriers to migration between these reaches lead directly to the fragmentation and loss of steelhead habitat and may completely eliminate adult steelhead from accessing a critical stream reach to spawn. Types of barriers include dams, culverts, diversions, flood control channels, flow releases, water quality, and natural features such as waterfalls.

Fragmentation of habitat reduces the amount of total available habitat and increases genetic isolation. The reduction of available habitat correlates directly to the reduction in population size of the species that uses that habitat. The lower mainstem of most streams is utilized as a migration corridor between the critical spawning and rearing habitat found in the headwaters and the ocean. The vast majority of the steelhead's freshwater life is typically spent in the upper reaches of a stream or tributary where suitable habitat exists for spawning and rearing. Genetic isolation encourages inbreeding within a population and can reduce the genetic diversity of a population and species. Ecological studies have shown that high genetic diversity within a species or population correlates to the ability of the population to both adapt to slow changes in environmental conditions and to survive environmental catastrophes common to southern California, such as fires, floods, and droughts. The reduction in genetic diversity through inbreeding also reduces the ability of steelhead populations to recover from disease.

5.2 Capabilities and Limitations for Steelhead Migration

Steelhead have physiological limitations that impede or prevent them from being able to migrate past certain natural and anthropogenic features and hydraulic conditions. It has been reported that 7 inches is the minimum water depth required for successful migration of adult steelhead (Thompson 1972, as cited in McEwan 2001). The distance fish must travel through shallow water areas is also critical. Water depth can be a significant barrier in streams that have been altered for flood control purposes (McEwan 2001). The CDFG Habitat Restoration Manual reports that an adult steelhead can maintain a maximum swim speed of 6.0 ft/sec. for 30 minutes until exhaustion and a maximum burst speed of 10.0 ft/sec. for 5 seconds until exhaustion. The maximum leap, or jump, speed is listed as 12 ft/sec. Jumping upstream of a structure becomes difficult or impossible when the jump pool depth becomes less than 1.25 times the jump height of the structure (measured from the pool surface to the top of the feature). For example, a barrier than has a vertical jump height of 4 feet above the surface of the downstream pool and has a jump pool depth of 5 feet, will be near the maximum jumping capability of an adult steelhead. Should the pool become shallower, the jump depth would decrease and the jump height would increase, likely resulting in an impassable structure.

5.3 Migration Barrier Identification and Locations

The principle objective of this project was to identify steelhead migration barriers in order to prioritize fish passage improvement projects. In addition to anthropogenic barriers, natural upstream barriers and limits to migration were identified in order to determine the amount of habitat available or potential available to steelhead. The term "barrier" in this report shall refer to any structure in the stream channel that impedes, with varying degrees of difficulty, or completely blocks upstream adult steelhead migration. Field surveys were conducted in an

upstream manner and all barriers were given a unique Barrier ID. This unique Barrier ID describes, in code, the stream location of the barrier and order in which it is encountered moving upstream on the Sisquoc River from the Cuyama River confluence. The Barrier ID is coded so that the stream location can be determined by the stream codes within the ID. For example, SC_1 is the first migration barrier identified on the Sisquoc River (SC). Barrier SC_MA_DB_1 is the first upstream barrier identified on Davy Brown Creek (DB), a tributary to Manzana Creek (MA).

The locations for many of these barriers were recorded in the field using a Global Positioning System (GPS). A GPS signal could not be acquired at certain locations due to signal interference with dense riparian canopy cover, confined canyon walls, or overcast conditions. Where private land was not accessible, barriers were identified through document research, interviews, aerial photographs, and/or aerial surveying techniques. Upstream natural limits were also estimated on some stream reaches, by locating a 10% to 15% sustained stream slope using CDFG barrier estimation methods and based on stream slope identification on USGS topographical maps. For barriers that were not mapped with the GPS, descriptions of their positions were given by approximate elevations or distances from known and recognizable points. Available GPS coordinates are listed on the barrier write-ups.

5.4 Migration Barrier Ownership/Interest

In some cases, multiple owners and interests are associated with an identified barrier, adjacent land, or easements and maintenance agreements. Any entity that has been identified as having an interest in a certain barrier was identified.

5.5 Migration Barrier Severity Ranking

Barrier severity was based on the degree of difficulty that a structure or natural feature would impose on the upstream migration of a healthy, adult steelhead during ideal migration flow conditions, assuming adequate upstream migration to the structure. For this project, previously developed severity values were used for inclusion into the Pacific States Marine Fisheries Commission Fish Passage Assessment Database. Barriers were given a severity value of Complete, Partial, Not a Barrier, or Unknown. The severity value was determined by measuring essential characteristics of both the structure and the adjacent stream configuration. An evaluation of steelhead migration capabilities along potential upstream migration routes past the structure was made based on these measurements, which are described and discussed in the migration barrier write-ups.

5.6 Migration Barrier Prioritization Ranking Limitations

Methods to prioritize steelhead migration barriers can be useful to sort steelhead migration barriers into a rough estimate of priorities, but should be considered adaptable. There are many ways to rank migration barriers, and establishing the criteria for doing this can be tailored to the needs of the individual or group conducting the ranking. The ranking method utilized for this project is primarily interested in the biological benefits of improved fish passage at barriers. This ranking does not include complex social and economic factors. These important factors need to be further assessed in the site-specific restoration planning phase for each structure. Barrier information provided in this report can be modified to include desired ranking criteria.

5.7 Migration Barrier Priority Ranking Method

The objective of the ranking method is to arrange the anthropogenic migration barriers within the study area in order from high to low restoration priority for improving or providing upstream adult steelhead passage. The highest priority barriers are those that partially or completely impede upstream migration and have the highest total habitat score upstream to the determined natural upstream limit(s). This method ensures that migration barriers in a watershed are ranked from the furthest downstream structure directly impacting anadromous steelhead to structures upstream that may impact steelhead in the future with adequate downstream access. This method allows migration barriers within the accessible "anadromous reach" of a watershed and the inaccessible "non-anadromous reach" to be ranked and prioritized. The barriers were ranked for distinct stream reaches or tributaries within the study area so that restoration planners can look at either components of the watershed or the whole watershed. For example, entities that are interested in restoring steelhead to the Tepusquet Creek tributary will not find other barriers within the watershed ranked with the Tepusquet Creek barriers. Because water releases from Twitchell Dam on the Cuyama River impede or prevent steelhead migration on the Santa Maria River, downstream from the Sisquoc River, this structures barrier influence is located on the Santa Maria River for this ranking. Barriers on the lower Sisquoc River and Santa Maria River impede access to the most habitat and as a group have the highest overall priority. Twitchell Dam was ranked as a barrier to adequate upstream and downstream steelhead migration along the Santa Maria River between the ocean and the Sisquoc River.

5.8 Migration Barrier Findings and Recommended Actions

5.8.1 Migration Barrier and Habitat Maps

5.8.2 Migration Barrier Prioritization Results

The following Migration Barrier Priority Ranking Table lists 61 anthropogenic migration barriers or potential impediments to steelhead and rainbow trout migration within the study area. A total of 31 barriers are ranked and prioritized for implementation of fish passage improvement projects based on ranking methods described previously. A total of 23 barriers have a letter "M" in the Barrier Ranking column indicating that "monitoring" of this site is needed to ensure that passage does not become negatively impacted in the future. A total of 7 barrier have a letter "A" in the Barrier Ranking column indicting that additional assessment of this structure is needed due to limited observations and/or inaccessibility to the site. See individual barrier descriptions and recommended actions in the next section.

Sisquoc River Migration Barrier Priority Ranking Table

Barrier Ranking	Barrier ID	Stream	Barrier Name/Type	Barrier Owner/Interest	Barrier Severity	Fish Passage Priority
Santa Maria / Sisquoc Rivers						
1	CA_6	Cuyama River	Twitchell Dam/Water Release		Complete/Partial	**Extremely High**
2	SC_2	Sisquoc River	Garey Bridge Check Dam	Coast Rock/ S.B. County P.W.	Partial	**High**
3	SC_3	Sisquoc River	Tepusquet Road Culvert Crossing	S.B.County Public Works	Partial	**High**
4	SC_4	Sisquoc River	Private Cuvlert Crossing	Unknown	Partial	**High**
5	SC_5	Sisquoc River	Private Cuvlert Crossing	Unknown	Partial	**Moderate**
M	SC_1	Sisquoc River	Gravel Extraction Operations	Coast Rock Prod./Kaiser Sand.	Partial	**Monitor**
M	SC_6	Sisquoc River	USGS Gaging Station	USGS/Sisquoc Ranch	Partial	**Monitor**
Horse Creek						
1	SC_HE_1	Horse Creek	Horse Creek Dam	S.B. County Flood Control/LPNF	Complete	**High**
Tepusquet Creek						
1	SC_TT_1	Tepusquet Creek	Hauling Rd. Culvert Crossing	Unknown	Complete	**High**
2	SC_TT_2	Tepusquet Creek	Culvert Crossing	Unknown	Complete	**Moderate**
3	SC_TT_3	Tepusquet Creek	Concrete Crossing	Unknown	Partial	**Moderate**
4	SC_TT_5	Tepusquet Creek	Culvert Crossing	Unknown	Partial	**Moderate**
5	SC_TT_6	Tepusquet Creek	Dam	Unknown	Complete	**Moderate**
6	SC_TT_7	Tepusquet Creek	Dam	Unknown	Complete	**Moderate**
7	SC_TT_8	Tepusquet Creek	Culvert Crossing	Unknown	Partial	**Moderate**
8	SC_TT_9	Tepusquet Creek	Concrete Crossing	Unknown	Partial	**Moderate**
9	SC_TT_10	Tepusquet Creek	Culvert Crossing	Unknown	Partial	**Moderate**
10	SC_TT_12	Tepusquet Creek	Concrete Crossing	Unknown	Unknown / Likely Partial	**Moderate**
11	SC_TT_CN_1	Colson Creek	Culvert Crossing	Unknown	Partial	**Moderate**
12	SC_TT_CN_2	Colson Creek	Culvert Crossing	Unknown	Partial	**Moderate**
13	SC_TT_13	Tepusquet Creek	Culvert Crossing	Unknown	Unknown / Likely Partial	**Moderate**
14	SC_TT_14	Tepusquet Creek	Culvert Crossing	Unknown	Unknown / Likely Partial	**Moderate**
15	SC_TT_15	Tepusquet Creek	Culvert Crossing	Unknown	Unknown / Likely Partial	**Moderate**
16	SC_TT_16	Tepusquet Creek	Culvert Crossing	Unknown	Unknown / Likely Partial	**Moderate**
17	SC_TT_17	Tepusquet Creek	Culvert Crossing	Unknown	Unknown / Likely Partial	**Moderate**
18	SC_TT_18	Tepusquet Creek	Culvert Crossing	Unknown	Unknown / Likely Partial	**Moderate**
19	SC_TT_19	Tepusquet Creek	Culvert Crossing	Unknown	Unknown / Likely Partial	**Moderate**
20	SC_TT_21	Tepusquet Creek	Culvert Crossing	Unknown	Unknown / Likely Partial	**Moderate**
21	SC_TT_22	Tepusquet Creek	Culvert Crossing	Unknown	Unknown / Likely Partial	**Moderate**
22	SC_TT_24	Tepusquet Creek	Culvert Crossing	S.B. County Public Works	Partial	**Moderate**
A	SC_TT_4	Tepusquet Creek	Bridge Crossing	Unknown	Unknown	**Assess**
A	SC_TT_11	Tepusquet Creek	Culvert Crossing	Unknown	Unknown	**Assess**
A	SC_TT_20	Tepusquet Creek	Unknown Crossing	Unknown	Unknown	**Assess**
A	SC_TT_23	Tepusquet Creek	Unknown Crossing	Unknown	Unknown	**Assess**
A	SC_TT_CN_3	Colson Creek	Unknown Crossing	Unknown	Unknown	**Assess**
A	SC_TT_CN_TR_1	Tyler Creek	Unknown Crossing	Unknown	Unknown	**Assess**
A	SC_TT_CN_TR_2	Tyler Creek	Reservoir	Unknown	Unknown	**Assess**
Manzana Creek						
1	SC_MA_DB_1	Davy Brown Creek	Concrete Crossing	Los Padres National Forest	Partial	**Moderate**
2	SC_MA_DB_2	Davy Brown Creek	Concrete Crossing	Los Padres National Forest	Partial	**Moderate**
3	SC_MA_DB_MH_1	Munch Creek	Concrete Crossing	Los Padres National Forest	Partial	**Moderate**
M	SC_MA_1-19	Manzana Creek	In-stream Crossings	Los Padres National Forest/Private	Not Barriers (currently)	**Monitor**
M	SC_MA_DY_1-2	Dry Creek	In-stream Crossings	Los Padres National Forest/Private	Not Barriers (currently)	**Monitor**

Barrier Ranking- "M"= Continue to monitor site. "A"= Further assess conditions. See individual barrier write-ups for more detail.

5.8.3 Migration Barrier Descriptions and Recommended Actions

5.8.3.1 Sisquoc River Migration Barriers (including mainstem Santa Maria River)

Barrier ID: SC_1
Stream: Santa Maria River and Sisquoc River
Barrier Type: Gravel Extraction Operations
Physical Location: Operations start 0.5 miles downstream from the Sisquoc River confluence and extend upstream to just downstream of the La Brea Creek confluence.
GPS Location: NA
Ownership/Interest: Coast Rock Products, Inc., Kaiser Sand and Gravel, Inc.
Surveyor(s) and Date: Matt and Jim Stoecker 12/17/02 (road) and 12/30/02 (air)

Gravel extraction operation, Santa Maria River, 0.5 miles downstream of the Sisquoc River

Description: Access to ground survey this stream reach was not obtained. Observations were made from the air and adjacent roads; and are limited in detail. Gravel extraction operations are present within the streambed of the upper Santa Maria River and lower Sisquoc River. Note: the term "gravel extraction" is used here to describe all extraction of streambed material from the river channel. This limited discussion applies to multiple gravel extraction operations that occur throughout the described reach. Please see the *Final Environmental Impact Report (96-EIR-004) Coast Rock Products, Inc. and Kaiser Sand and Gravel, Inc. Mining and Reclamation Plans and Santa Maria / Sisquoc Rivers Specific Plan* (1997) for more detail about this reach and the gravel operations. Long reaches of riverbed have been highly manipulated throughout this reach. Streambed substrate has been extracted and moved by heavy equipment. Heavy machinery also utilizes the streambed as a transportation route. Large gravel pits and elevation drops, where substrate material is extracted, have been dug in various locations along this reach. Surface flows become backed up and isolated in the dugout gravel pits. Piles of substrate have also been deposited in various locations and configurations. Hauling trucks travel in the streambed and multiple in-stream crossings and irregular tracks occur throughout the reach. Most crossings have natural bottoms and are close to streambed level, unless described elsewhere in this report. Some crossings have moderate berms on the upstream and/or downstream side and may impede steelhead migration at lower stream flows and/or act as small dams. The crossing pictured below occurs approximately 1.0 mile upstream of the Garey Bridge on the Sisquoc River and backs up surface flows.

Gravel operation hauling road crossing, Sisquoc River, approximately 1.0 mile upstream from Garey Bridge

Diagnosis: In their *National Gravel Extraction Policy (1996)* report, the NMFS lists impacts to anadromous fishes and their habitat from gravel extraction: "loss or degradation of spawning beds and juvenile rearing habitat; migration blockages; channel widening, shallowing, and ponding; loss of hydrologic and channel stability; loss of pool/riffle structure; increased turbidity and sediment transport; increased bank erosion and/or stream bed downcutting; and loss or degradation of riparian habitat" (Fusaro, 1996). In addition to gravel operation road crossings that may directly impede or block steelhead migration, other impacts may negatively impact both upstream and downstream steelhead migration. The extensive gravel pits and steep elevation changes in the streambed may negatively impact steelhead migration. Gravel pits in the streambed have been observed to trap rainbow trout as far downstream as Garey, where local anglers have fished for them in recent times (pers. comm. G. Czarnecki 2002). It is likely that some of these salmonids are out-migrating smolts and that adult steelhead are also occasionally trapped during out-migration.

Gravel extraction pit, Sisquoc River, 300 feet downstream from Garey Bridge

Stream flow duration is also likely affected. It seems possible that these major streambed disturbances would increase the permeability of the streambed. This would result in a higher rate of surface flow to groundwater percolation, leading to shorter durations of surface flow, reduced downstream extent of surface flow, and reduced aquatic habitat and migration opportunities for upstream and downstream migrating steelhead. According to the 1997 EIR mentioned previously, the gravel operations also pump ground water that would further reduce the amount of surface water flow. In addition to the hydraulic impacts that such activities have on steelhead migration, these activities may increase the river's turbidity and suspended sediment load during migration periods. This action may cause migration difficulties and/or direct physical harm to steelhead by

causing accumulation of fine particles in their gills, limiting their ability to obtain dissolved oxygen.

Recommended Action: This stream reach should be monitored on a yearly basis in the fall and early spring to ensure that all practices addressing impacts to steelhead outlined in the EIR are being complied with. Specifically, potential migration barriers to upstream migrating adult steelhead and out-migrating smolts associated with gravel extraction operations should be investigated with a bi-annual monitoring program as proposed above.

Barrier ID: SC_2
Stream: Sisquoc River
Barrier Type: Check Dam Structure
Physical Location: 75 feet downstream from old Santa Maria Mesa Road (Garey) Bridge
GPS Location: NA
Ownership/Interest: Coast Rock Products/ Santa Barbara County Public Works
Surveyor(s) and Date: Matt Stoecker 12/30/02

Description: A 'check dam' exists just downstream of the old Garey Bridge (Santa Maria Mesa Road) crossing. John Storrer identifies this structure as an "oil pipeline and check dam structure" in a report titled, *Natural Environmental Study Report- Garey Bridge Replacement Project Santa Barbara County, California* (Storrer 1994). See this report for a detailed description of the Garey Bridge, bridge replacement project, and surrounding environment. Santa Barbara County Public Works replaced the old Garey Bridge with a new one that now spans the Sisquoc River just upstream from the older decommissioned bridge. Access to ground survey this check dam was not obtained. Observations were made from the Garey Bridge and from the air and are limited in detail. This check dam structure is constructed of concrete slabs and boulder riprap that runs perpendicular across the river channel. Figure 2 in Storrer's report shows the check dam's total height measuring 8 feet tall from the downstream riverbed to the upstream substrate. The upstream substrate is backed up to the top of the check dam. The structure spans approximately 500 feet across the river channel. The 8-foot height of the dam occurs over an upstream to downstream distance of approximately 40 feet. The check dam's downstream-facing slope is approximately 16% overall. Hauling trucks associated with commercial aggregate processing facilities (Coast Rock) periodically travel beneath the bridge and across the river-right side of the check dam structure on an existing dirt road. This dam was illegally constructed by Coast Rock (see recommended action discussion below).

Diagnosis: This check dam is the most downstream anthropogenic structure on the Sisquoc River and the first impediment encountered by upstream migrating steelhead. During moderate migration flows, the rough, irregular surface of the check structure reduces water velocities enough to allow limited upstream migration. However, during low flows, shallow water depths over the structure prevent upstream migration. At this particular barrier, low flow conditions are

encountered leading up to or following a larger flow event, the latter being the most critical time for adequate adult steelhead migration upstream. Additionally, during high stream flows, upstream migration may also be limited or even prevented due to excessive water velocities and/or turbulence over the check dam.

Adult steelhead have been observed upstream from this structure as recently as the winter of 1998 when moderate to high stream flow conditions existed past the structure and provided extended durations of variable stream flow (pers. comm. Cooper 2002, see salmonid documentation table). While this structure is not a complete barrier to steelhead, its negative impact on the steelhead population is significant. The check dam limits the duration of adequate surface flow conditions for upstream migration and therefore reduces the window of opportunity for adult steelhead to migrate up the Sisquoc River. In a flashy watershed like the Sisquoc River, this window of opportunity for adult steelhead to quickly reach suitable spawning habitat far upstream and then return to the ocean is extremely short. Migration delays at a downstream location such as this one significantly reduces that already narrow window of opportunity to reach suitable upstream spawning habitat. During drier years, when only a short duration of surface flows exist at this location, all steelhead may be blocked from reaching adequate upstream spawning habitat. This situation could effectively prevent any adult steelhead from successfully spawning in a given year and jeopardizes the population over time. Without the check dam present, steelhead would be able to migrate past this location during almost all flow conditions, or at least until surface flows subsided.

Recommended Action:

Storrer's report states that:

> "Removal of the check dam structure downstream from the existing (old) bridge has been mandated by the ACOE (Army Corps of Engineers). The structure cannot presently be demolished because it provides some level of erosion protection for the bridge. However, once the new bridge has been constructed, the ACOE will require that the check dam be removed by Coast Rock Products, who installed the check dam without necessary federal permits" (Storrer 1994).

The new bridge has been constructed. Removal of this check dam should be carried out as mandated by the ACOE to ensure unimpeded upstream passage for steelhead throughout the widest possible range of stream flows. This project should be an extremely high priority for steelhead restoration on the Santa Maria/Sisquoc Watershed due to the fact that all significant salmonid habitat occurs upstream of this location.

Barrier ID: SC_3
Stream: Sisquoc River
Barrier Type: Culvert Crossing
Physical Location: Tepusquet Road Crossing
GPS Location: N 34* 51' 24.6" W 120* 14' 55.3"
Ownership/Interest: Santa Barbara County Public Works
Surveyor(s) and Date: Matt and Jim Stoecker 12/18/02; Matt Stoecker 12/30/02

Description: This culvert and earth fill crossing spans the Sisquoc River channel at the mouth of Tepusquet Canyon and is designed to blow out during high stream flows and then be rebuilt. Seven 4-foot diameter plastic culverts convey lower stream flows under the earth filled road crossing. The culverts are approximately 30-35 feet in length. The road fill is composed of local material (silt, sand, gravel, cobbles) as well as concrete slabs and boulders that surround the culverts. The plastic culverts are in good condition with moderate wear and tearing. The slope of the culverts is relatively flat and all are set at streambed grade. The inside of the culverts do not have well-developed corrugations, but rather a smooth plastic lining. Small deposits of substrate exist at the inlets and outlets of several culverts.

Diagnosis: Due to the flat slope of the culverts and lack of elevation drops at the outlets, steelhead could migrate through the culverts during low and moderate migration flows. During extremely low flow conditions, shallow water depth in the culverts will prevent or limit upstream migration. Higher stream flows will be accelerated through the culverts and may produce excessive velocities for upstream migration, especially because of the smooth, inside linings. At some point, high flows will exceed the capacity of the culverts and will overflow the road, blowing out the structure completely. Without the road present, steelhead will have unimpeded upstream access. This structure may reduce the window of opportunity for upstream steelhead passage by producing shallow flows through the culverts during low flows, while creating excessive velocities during moderate to high stream flows prior to the crossing blowing out. The failure of the crossing will also send a significant amount of suspended and bedload sediment downstream during migration flows that may negatively impact steelhead migrating downstream. Debris and/or sediment accumulation at the culvert inlets may also impede steelhead migration.

Recommended Action: Ideally, this crossing can be removed and replaced with a wide span bridge that does not impact the river channel or require periodic replacement of the seasonal crossing. A bridge would prevent downstream sedimentation, eliminate future streambed alterations, and allow unimpeded upstream migration for steelhead.

Barrier ID: SC_4
Stream: Sisquoc River
Barrier Type: Culvert Crossing
Physical Location: Approximately 0.4 miles upstream from the Tepusquet Road Crossing
GPS Location: NA
Ownership/Interest: Unknown
Surveyor(s) and Date: Matt Stoecker 12/30/02

Description: Access to ground survey this structure was not obtained. Observations were made from the air, and are limited in detail. This culvert and earth fill crossing is designed to blow out with high stream flows and appears to be associated with adjacent gravel extraction operations and utilized by hauling trucks. Five corrugated metal culverts of varying diameter convey low stream flows under the earth filled hauling road crossing. The culverts are approximately 20-25 feet in length. The road fill is composed of local material (silt, sand, gravel, cobbles). The culverts are set at, or near, streambed grade. The two culverts on the river-right side have vertical drops of less than 12 inches at the outlet. The slopes of the culverts could not be determined, but they appear to be relatively mild to moderate.

Diagnosis: Assuming the slope of the culverts is not excessive and they are in good condition, steelhead could migrate through the culverts during low to moderate migration flows. During extremely low flow conditions, shallow water depth in the culverts may prevent or limit upstream migration. Moderate to higher stream flows will be accelerated through the culverts and may produce excessive velocities that limit or prevent upstream migration. At some point, high flows will exceed the capacity of the culverts and will overflow the road and blow out the crossing. Without the road present, steelhead will have unimpeded upstream access. This structure reduces the window of opportunity for upstream steelhead passage by producing shallow flows through the culverts during lower flows and excessive velocities during moderate to high stream flows prior to the crossing blowing out. The failure of the crossing will also send a significant amount of suspended and bedload sediment downstream during migration flows that may negatively impact steelhead migrating downstream. Debris and/or sediment accumulation at the culvert inlets may also impede steelhead migration.

Recommended Action: *Policy BIO-XII (Fish Migration Protection) of the Santa Maria and Sisquoc Rivers Specific Plan 1998* prohibits the placement of any barriers to fish migration within the river channel or any tributaries capable of supporting fish within the project area. This crossing should be removed to allow unimpeded upstream migration for steelhead during all flow conditions. A natural bottom in-stream crossing similar to other hauling road crossings could continue to allow access most of the year.

Barrier ID: SC_5
Stream: Sisquoc River
Barrier Type: Culvert Crossing
Physical Location: 0.1 mile upstream from La Brea Creek
GPS Location: NA
Ownership/Interest: Sisquoc Ranch
Surveyor(s) and Date: Matt Stoecker 12/30/02

Description: Access to ground survey this structure was not obtained. Observations were made from the air, and are limited in detail. The culvert and earth fill portion of this crossing does not span the entire river and is designed to blow out with high stream flows. Three culverts convey low stream flows under the earth filled road crossing. An upstream berm has been built in the channel to direct flows into these culverts, preventing flows from going over the in-stream road crossing portion that passes across the Sisquoc River streambed. The culverts are approximately 10-15 feet in length. The road fill is composed of local material (silt, sand, gravel, cobbles). Water was observed to drop more than 12 inches vertically from the culvert outlets. The slope of the culverts could not be determined.

Diagnosis: This structure reduces the window of opportunity for upstream steelhead passage by producing shallow flows through the culverts during low flows and excessive velocities during moderate to higher stream flows. A moderately difficult jump is required for salmonids to access the culvert outlets. Debris and/or sediment accumulation at the culvert inlets may also impede steelhead migration. During moderate to high stream flows, the Sisquoc River will bypass the culverts and flow over the in-stream crossing portion at the middle of the river channel. The culverts will likely blow out during higher flows.

Recommended Action: If this crossing is associated with downstream gravel extraction operations, *Policy BIO-XII (Fish Migration Protection) of the Santa Maria and Sisquoc Rivers Specific Plan 1998,* "prohibits the placement of any barriers to fish migration within the river channel or any tributaries capable of supporting fish within the project area". These culverts should be removed to allow unimpeded upstream migration for steelhead during all flow conditions. The natural substrate in-stream crossing could be extended along the entire length of the stream channel to provide access. At the very least, the smaller culverts should be replaced with a large embedded culvert to allow unimpeded fish passage and facilitate vehicle access across the location that often has stream flow.

Barrier ID: SC_6
Stream: Sisquoc River
Barrier Type: USGS Gaging Station Weir
Physical Location: Approximately 3 miles upstream from La Brea Creek
GPS Location: NA
Ownership/Interest: USGS and Sisquoc Ranch
Surveyor(s) and Date: Matt Stoecker 12/30/02

Description: Access to ground survey this structure was not obtained. Observations were made from the air and are limited in detail. This old concrete weir is outfitted as a USGS gaging station and may have also served to divert surface flows. During observed low flow conditions, the total height of this structure above the downstream substrate was less than 12 inches along most of the weir. At several locations, water drops less than 4 inches to the downstream water surface. The weir appears to be 1-2 feet thick and spans the entire river channel. Deposited substrate has accumulated upstream of the weir to the top of the structure.

Condition: The concrete weir is in poor condition with major cracking and concrete wear. This structure will continue to erode over time and eventually break apart if not maintained.

Diagnosis: During the observed low flow situation, this small weir presents no significant problem for upstream salmonid migration due to the minimal jump height required to pass over the top. During higher flows, the weir may cause downstream scour that could produce a downstream drop that may inhibit or prevent upstream steelhead migration. This situation seems unlikely because flows are spread out across the structure and hydraulics is not confined to a particular location downstream.

Recommended Action: Work with the landowner, or observe during higher flows from the air to assess this structure during higher stream flows. No action is recommended now, but continue to monitor over time and discourage any modifications/improvements that would negatively impact fish passage.

Barrier ID: SC_7
Stream: Sisquoc River
Barrier Type: Bedrock Waterfall
Physical Location: Approximate elevation 4760'
GPS Location: N/A
Ownership/Interest: Los Padres National Forest

Description: This massive bedrock waterfall rises more than 150 feet in total height to almost 5000 feet in elevation.

Condition: Stable bedrock feature.

Diagnosis: Due to the excessive height of this natural feature, no further upstream steelhead migration is possible on the mainstem of the Sisquoc River.

Recommended Action: No recommended action for this natural feature.

5.8.3.2 Tepusquet Creek Migration Barriers

Barrier ID: SC_TT_1
Stream: Tepusquet Creek
Barrier Type: Culvert Crossing
Physical Location: Immediately upstream of Sisquoc River
GPS Location: N/A
Ownership/Interest: Unknown
Surveyor(s) and Date: Matt and Jim Stoecker 12/16; Matt Stoecker 12/30/02


View Looking North (upstream) at SC_TT_1 culvert

Description: Access was not obtained to survey this culvert from the ground. Observations were made from the air and adjacent roads; and are limited in detail. The natural alignment of Tepusquet Creek, immediately upstream from the confluence with the Sisquoc River, has been significantly altered by nearby roads. A dirt-hauling road utilized by gravel operation vehicles runs along the north river bank of the Sisquoc River and two separate culverts convey flows from Tepusquet Creek under this road into the Sisquoc. The primary stream channel appears to hit the earth fill of the hauling road and runs west along the north side of the road, under the Tepusquet Road bridge, and continues approximately 500 feet before crossing under the hauling road via a single corrugated metal culvert. This culvert passes under the hauling road and drops stream flow approximately 4-6 total feet onto several large boulders and natural substrate. No downstream pool was observed. The inlet configuration could not be observed due to thick vegetation. The overall length of the culvert is approximately 30 feet. The condition, slope, and inside configuration of the culvert could not be determined. A second culvert crosses under the same hauling road several hundred feet east of the Tepusquet Road crossing and into the Sisquoc River. Thick vegetation prevented observation of this second culvert, but it appears that it may serve as a secondary culvert or "overflow" when the primary culvert has exceeded its capacity.

Diagnosis: Due to the jump height of the primary culvert outlet and lack of adequate downstream pool depth, upstream steelhead migration would be at least extremely difficult and more likely impossible. This barrier complex likely prevents all upstream steelhead passage into Tepusquet Creek. Providing steelhead access into Tepusquet Creek is a high priority for reconnecting steelhead to perennial habitat found upstream. This barrier must be considered a first priority in addressing the rehabilitation of Tepusquet Creek as a viable steelhead tributary to the Sisquoc River.

Recommended Action: Work with the owners of the culverts and adjacent landowners to accurately determine the streambed configuration and culvert dimensions. Determine the feasibility of removing these culverts and establishing a natural streambed channel past the access road into the Sisquoc River that does not impede upstream steelhead passage or degrade the stream channel. This culvert crossing may be within the project area of the adjacent gravel extraction operations. *Policy BIO-XII (Fish Migration Protection) of the Santa Maria and Sisquoc Rivers Specific Plan 1998*, "prohibits the placement of any barriers to fish migration within the river channel or any tributaries capable of supporting fish within the project area." Tepusquet Creek is known to support salmonids into present times. Removal of this barrier is recommended.

Barrier ID: SC_TT_2
Stream: Tepusquet Creek
Barrier Type: Culvert Crossing
Physical Location: Approximately 0.1 mile upstream from the Sisquoc River
GPS Location: N/A
Ownership/Interest: Unknown
Surveyor(s) and Date: Matt Stoecker 12/30/02

Description: Access to ground survey this structure was not obtained. Observations of this culvert crossing were made from the air and are limited in detail. This private road crossing consists of a single metal culvert that conveys stream flows underneath the earthen road fill. A paved road crosses the stream on top of the road fill. The overall length of the culvert is approximately 60-80 feet. A vertical drop that appears to be over 5 feet in height occurs at the culvert outlet. The configuration of the culvert inlet could not be observed due to thick vegetation.

Condition: The entire crossing appears to be in fair condition with downstream scour likely. It is possible that this single culvert may not be adequately sized for a 100-flow event.

Diagnosis: Adequate conditions for upstream steelhead migration at this crossing are unlikely due to the excessive jump height at the culvert outlet, shallow water depth through the culvert during low flows, and excessive water velocities during higher stream flows. The length of the culvert adds to the severity of this structure. This crossing is almost certainly impassable during all stream flows.

Recommended Action: Work with the culvert owner to assess the possibility of removing the crossing and replacing it with a bridge that does not impact the stream channel and allows unimpeded passage for salmonids. It may be possible to provide improved access across the stream in coordination with adjacent landowners using a shared wide-span bridge.

Barrier ID: SC_TT_3
Stream: Tepusquet Creek
Barrier Type: Concrete Crossing
Physical Location: Approximately 0.3 miles upstream of the Sisquoc River
GPS Location: N/A
Ownership/Interest: Unknown
Surveyor(s) and Date: Matt Stoecker 12/30/02

Description: Observations of this crossing were made from the air and are limited in detail. This private road crossing appears to convey some stream flow across the top of a concrete crossing. The configuration of the crossing could not be observed completely due to thick vegetation and it is possible that one or more culverts are present underneath the structure and that blockages at the inlet have caused water to flow over the top.

Diagnosis: Despite limited visual observation through the riparian canopy, it appears that a moderate drop occurs at the downstream side of the crossing. It is likely that steelhead passage at this site would be limited to some degree and potentially blocked, depending on the exact configuration.

Recommended Action: Work with the culvert owner to further assess the dimensions of this crossing. Explore the possibility of removing the crossing and replacing it with a bridge that does not impact the stream channel and allows unimpeded passage for salmonids. It may be possible to provide improved access across the stream in coordination with adjacent landowners.

Barrier ID: SC_TT_4
Stream: Tepusquet Creek
Barrier Type: Bridge Crossing
Physical Location: Approximately .5 miles upstream from the Sisquoc River.
GPS Location: N/A
Ownership/Interest: Unknown
Surveyor(s) and Date: Matt Stoecker 12/30/02

Description: Observations of this crossing were made from the air and are limited in detail. The structural configuration underneath this private crossing could not be observed well due to thick vegetation. Bank stabilization protection has been constructed adjacent to the bridge.

Diagnosis: The streambed could not be observed underneath the bridge and potential impacts on fish passage are unknown.

Recommended Action: Work with the owner to further assess the dimensions of this crossing and streambed configuration in relation to fish passage. If unimpeded fish passage conditions occur, this could function as a shared crossing with adjacent landowners and help to eliminate nearby crossings that are barriers to fish migration.

Barrier ID: SC_TT_5
Stream: Tepusquet Creek
Barrier Type: Culvert Crossing
Physical Location: Approximately 0.4 miles upstream of Tepusquet road crossing "Gaging Station"
GPS Location: N/A
Ownership/Interest: Unknown
Surveyor(s) and Date: Matt Stoecker 12/30/02

Description: Observations of this culvert crossing were made from the air and are limited in detail. This private road crossing consists of a single metal culvert that conveys stream flows underneath an earthen road fill that crosses the channel. This large culvert appears to be set at, or close to, streambed level. The overall length of the culvert is approximately 20-25 feet. No significant drop was observed at the culvert outlet. The slope of the culvert appears to be moderate.

Condition: The culvert appears to be in good condition and the crossing appears to be fairly new.

Diagnosis: During moderate flow conditions it is likely that salmonids could access the culvert and swim upstream with a low to moderate degree of difficulty. During low and high flows, salmonids may be prevented from upstream migration due to shallow water depth or excessive water velocities, respectively. The culvert likely reduces the window of opportunity for upstream fish migration by restricting the duration of adequate stream flow at this site.

Recommended Action: Work with the culvert owner to assess the possibility of removing the crossing and replacing it with a bridge that does not impact the stream channel and allows unimpeded passage for salmonids. It may be possible to provide improved access across the stream in coordination with adjacent landowners.

Barrier ID: SC_TT_6, SC_TT_7
Stream: Tepusquet Creek
Barrier Type: Dams
Physical Location: Approximately 0.7 miles and 0.8 miles upstream of Tepusquet road crossing "Gaging Station"
GPS Location: **N/A**
Ownership/Interest: Unknown
Surveyor(s) and Date: Matt Stoecker 12/30/02


SC_TT_6


SC_TT_7

Description: Observations of these dams were made from the air and are limited in detail. Both earthen dams are constructed in a similar manner and contain one metal pipe set high on the dam. These pipes act as reservoir drains, preventing the reservoir's water level from reaching the top of the dam. Both pipes appear to be uncorrugated and smooth. The pipe on the lower dam (SC_TT_6) bends downward and drops water approximately four feet in height onto the downstream substrate. The upper dam pipe (SC_TT_7) drops flows approximately 2-3 feet into the reservoir downstream, which backs water up to the upper dam. Both pipes are greater than 15 feet in length. Both dams may also serve as vehicle crossings. These dams may be used to divert water to surrounding agricultural operations.

Condition: Both dams appear to be in fair to poor condition with observable erosion.

Diagnosis: The downstream dam and pipe would not allow upstream steelhead passage due to the excessive water velocities inside the smooth, confined pipe that has a steep slope at the downstream end. The smooth pipe at the upper dam is also considered impassable for the same reasons.

Recommended Action: Work with the dam owner(s) to assess the possibility of removing the dams and restoring the natural stream conditions. Water storage and diversion may be achieved utilizing an off-stream storage pond and diversion feature that does not impede fish passage. If access across the creek is required near this location it may be possible to utilize other crossings nearby.

Barrier ID: SC_TT_8
Stream: Tepusquet Creek
Barrier Type: Culvert Crossing
Physical Location: Approximately 0.9 miles downstream from Hudson Canyon
GPS Location: N/A
Ownership/Interest: Unknown
Surveyor(s) and Date: Matt Stoecker 12/30/02

Description: Observations of this culvert crossing were made from the air and are limited in detail. This private road crossing consists of a single metal culvert that conveys stream flows underneath a paved road. The culvert is set inside stone wingwalls downstream that force flows to the river-right. The overall length of the culvert is approximately 20-30 feet. A near vertical drop of approximately 2-3 feet occurs at the culvert outlet and conveys flow into a well-developed downstream pool. The diameter of the culvert appears to be 4 feet. The configuration of the culvert inlet could not be observed due to thick vegetation. The culvert appears to have a moderate to steep slope.

Condition: The entire crossing appears to be in fair condition with downstream undercutting of the crossing likely. It is possible that this single culvert may not be adequately sized for a 100-flow event.

Diagnosis: While the depth of the downstream pool could not be determined, it appears likely that steelhead could jump into the culvert outlet with a low to moderate degree of difficulty. Depending on the culvert slope and inlet condition, shallow water depth through the culvert during low flows and excessive water velocities during higher stream flows may limit or prevent upstream passage.

Recommended Action: Work with the crossing owner to assess the configuration of the culvert to fish passage. Explore the possibility of removing the crossing and replacing it with a bridge that does not impact the stream channel and allows unimpeded passage for salmonids. It may be possible to provide access across the stream in coordination with adjacent landowners and shared use of a wide-span bridge.

Barrier ID: SC_TT_9
Stream: Tepusquet Creek
Barrier Type: Concrete Crossing
Physical Location: Approximately 0.4 miles downstream of Colson Creek
GPS Location: N/A
Ownership/Interest: Unknown
Surveyor(s) and Date: Matt Stoecker 12/30/02

Description: Observations of this crossing were made from the air and are limited in detail. This private road crossing appears to convey all stream flow across the top of a concrete slab. Water flows over the smooth concrete surface and drops between 1-3 feet onto broken concrete slabs and downstream substrate. The slope of the crossing's surface appears to be mild.

Diagnosis: The concrete is in poor condition with noticeable cracking and undercutting on the downstream side.

Recommended Action: Work with the crossing owner to assess the possibility of removing the crossing and either maintaining a natural bottom in-stream crossing or replacing it with a bridge that does not impact the stream channel and allows unimpeded passage for salmonids.

Barrier ID: SC_TT_10
Stream: Tepusquet Creek
Barrier Type: Culvert Crossing
Physical Location: Approximately 0.2 miles downstream from Colson Creek
GPS Location: N/A
Ownership/Interest: Unknown
Surveyor(s) and Date: Matt Stoecker 12/30/02

Description: Observations of this culvert crossing were made from the air and are limited in detail. This private road crossing consists of a single metal culvert that conveys stream flows underneath an earthen road fill that crosses the channel. This large culvert appears to be set at streambed level. Concrete blocks have been placed around the culvert at the inlet and outlet. The overall length of the culvert is approximately 12-15 feet. No significant drop was observed at the culvert outlet. The slope of the culvert appears to be relatively flat to moderate.

Condition: The culvert appears to be in good condition.

Diagnosis: Due to the lack of an outlet drop and mild culvert slope, it is likely that salmonids could adequately swim upstream into the culvert with a low to moderate degree of difficulty during moderate flow conditions. During extremely low and high stream flows, migration may be limited due to shallow water depth or excessive water velocities, respectively. Overall, this culvert is not a serious impediment to upstream fish migration in its current configuration.

Recommended Action: Work with the culvert owner to assess the future possibility of replacing the culvert with a bridge that does not impact the stream channel and allows unimpeded passage for salmonids. An inexpensive railroad car crossing would likely work well at this confined streambank location.

Barrier ID: SC_TT_11
Stream: Tepusquet Creek
Barrier Type: Culvert Crossing
Physical Location: Approximately 0.15 miles downstream of Colson Creek
GPS Location: N/A
Ownership/Interest: Unknown
Surveyor(s) and Date: Matt Stoecker 12/30/02

Description: Observations of this culvert crossing were made from the air and an adjacent public road and are limited in detail. This private road crossing consists of a unique metal culvert that conveys stream flows underneath a paved driveway. This upside down U-shaped culvert has the appearance of a mineshaft that is approximately 8 feet wide at the base and 7 feet tall from the substrate bottom to the roof. Natural substrate conditions appear to pass through the entire bottom of the culvert. This substrate may be deposited on top of a metal bottom. Concrete blocks have been placed around the culvert at the inlet and outlet. The overall length of the culvert is approximately 15 feet. No drops were observed at the culvert outlet or inlet.

Diagnosis: Upstream salmonid passage appears to be adequate during most, or all, stream flow situations although access should be obtained to further assess the inside configuration of this culvert. During extremely high stream flows, excessive water velocities may occur inside the culvert as flows are confined through the structure. Overall, this culvert does not appear to be a serious impediment to upstream fish migration.

Recommended Action: Work with the culvert owner to ensure that adequate fish passage is possible at this site. Assess the future possibility of replacing the culvert with a bridge that does not impact the stream channel and allows unimpeded passage for salmonids during all flows.

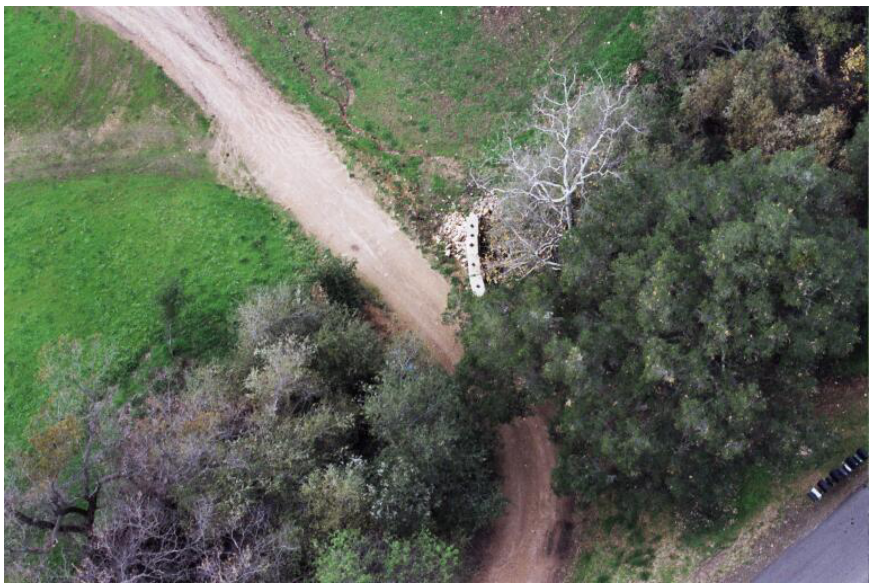
Barrier ID: SC_TT_12
Stream: Tepusquet Creek
Barrier Type: Concrete Crossing
Physical Location: Approximately 0.1 mile downstream of Colson Creek
GPS Location: N/A
Ownership/Interest: Unknown
Surveyor(s) and Date: Matt Stoecker 12/30/02

Description: Observations of this crossing were made from the air and are limited in detail. From observations made looking through the riparian vegetation it appears that this structure conveys stream flows through a large culvert. The inlet of the culvert appears to be set at streambed grade, though it is possible that the inside of the culvert has accumulated deposited substrate that has backed up to the inlet to give it this appearance. The dimensions and condition of the culvert could not be determined.

Diagnosis: The severity of this structure to fish passage is unknown. Most culverts negatively impact fish passage to some degree by producing shallow water conditions during low flows and excessive water velocities during higher flows.

Recommended Action: Work with the crossing owner to further assess the configuration of this crossing and impacts on fish passage. Discuss the possibility of replacing the crossing with a bridge that does not impact the stream channel and allows unimpeded passage for salmonids.

Barrier ID: SC_TT_13
Stream: Tepusquet Creek
Barrier Type: Concrete Crossing
Physical Location: Approximately 100' upstream of Colson Creek
GPS Location: N/A
Ownership/Interest: Unknown
Surveyor(s) and Date: Matt Stoecker 12/30/02



Description: Observations of this crossing were made from the air and are limited in detail. Through the riparian vegetation it appears that this structure conveys stream flows through a culvert. The dimensions and condition of the culvert could not be determined from the air. Concrete blocks have been placed at the upstream side of the crossing around the culvert.

Diagnosis: The severity of this structure to fish passage is unknown. Most culverts negatively impact fish passage to some degree by producing shallow water conditions during low flows and excessive water velocities during higher flows.

Recommended Action: Work with the crossing owner to further assess the configuration of this crossing and impacts on fish passage. Discuss the possibility of replacing the crossing with a bridge that does not impact the stream channel and allows unimpeded passage for salmonids.

Barrier ID: SC_TT_14
Stream: Tepusquet Creek
Barrier Type: Culvert Crossing
Physical Location: Approximately 0.3 miles upstream of Colson Creek
GPS Location: N/A
Ownership/Interest: Unknown
Surveyor(s) and Date: Matt Stoecker 12/30/02

Description: Observations of this culvert crossing were made from the air and are limited in detail. This private dirt road crossing consists of a single metal culvert that conveys stream flows underneath the earthen road fill that crosses the channel. This large culvert appears to set at, or close to, streambed level. The overall length of the culvert is approximately 20-25 feet. The outlet configuration could not be seen through the thick riparian vegetation. This crossing does not appear to be used often and another crossing exists just upstream (SC_TT_15).

Diagnosis: The severity of this structure to fish passage is unknown. Most culverts negatively impact fish passage to some degree by producing shallow water conditions during low flows and excessive water velocities during higher flows.

Recommended Action: Work with the culvert owner to assess the possibility of removing the crossing and determine the need for this secondary crossing. Replace the crossing with a bridge that does not impact the stream channel and allows unimpeded passage for salmonids. It may be possible to provide improved access across the stream in coordination with adjacent landowners by eliminating several crossings and consolidating access across a shared bridge.

Barrier ID: SC_TT_15
Stream: Tepusquet Creek
Barrier Type: Culvert Crossing
Physical Location: Approximately 0.35 miles upstream of Colson Creek
GPS Location: N/A
Ownership/Interest: Unknown
Surveyor(s) and Date: Matt Stoecker 12/30/02

Description: Access to ground survey this structure was not obtained. Observations of this culvert crossing were made from the air and are limited in detail. This private gravel road crossing consists of multiple culverts that convey stream flows underneath the road fill that crosses the channel. The overall length of the culverts is approximately 12-15 feet. The outlet configuration could not be seen through the thick riparian vegetation.

Diagnosis: The severity of this structure to fish passage could not be determined. Most culverts negatively impact fish passage to some degree by producing shallow water conditions during low flows and excessive water velocities during higher flows. These smaller diameter culverts confine flows more than large culverts, resulting in higher velocities and increased difficulty for fish passage.

Recommended Action: Work with the owner to assess the possibility of removing the crossing and replacing it with a bridge that does not impact the stream channel and allows unimpeded passage for salmonids. It may be possible to provide access across the stream in coordination with adjacent landowners while eliminating several barrier crossings and consolidating access across a shared bridge.

Barrier ID: SC_TT_16
Stream: Tepusquet Creek
Barrier Type: Culvert Crossing
Physical Location: Approximately 0.45 miles upstream of Colson Creek
GPS Location: **N/A**
Ownership/Interest: Unknown
Surveyor(s) and Date: Matt Stoecker 12/30/02

Description: Access to ground survey this structure was not obtained. Observations of this culvert crossing were made from the air and are limited in detail. This private, paved road crossing consists of a large culvert that conveys stream flows underneath the road fill that crosses the channel. The overall length of the culverts is approximately 15 feet. The outlet configuration and downstream pool could not be observed through the thick riparian vegetation.

Diagnosis: The severity of this structure to fish passage could not be determined. Most culverts negatively impact fish passage to some degree by producing shallow water conditions during low flows and excessive water velocities during higher flows.

Recommended Action: Work with the owner to assess the possibility of removing the crossing and replacing it with a bridge that does not impact the stream channel and allows unimpeded passage for salmonids. It may be possible to provide improved access across the stream in coordination with adjacent landowners while eliminating several barrier crossings and consolidating access across a shared bridge.

Barrier ID: SC_TT_17, SC_TT_18
Stream: Tepusquet Creek
Barrier Type: Crossings
Physical Location: Approximately 0.5 miles upstream of Colson Creek
GPS Location: N/A
Ownership/Interest: Unknown
Surveyor(s) and Date: Matt Stoecker 12/30/02


SC_TT_17

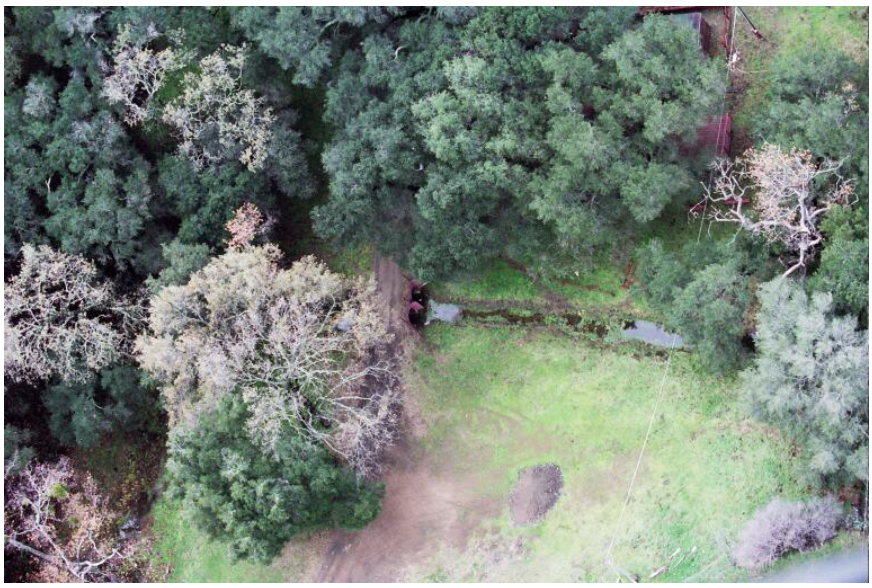

SC_TT_18

Description: Access to ground survey these structures was not obtained. Observations of these dirt crossings were made from the air and are limited in detail. Both crossings were obstructed from view by riparian vegetation, but are assumed to be culvert crossings with earthen fill, as no flow was observed passing over the top of the dirt roads. These crossings occur approximately one hundred feet apart from each other. The outlet configuration and downstream pool could not be seen through the thick riparian vegetation.

Diagnosis: The severity of these structures to fish passage could not be determined. Most culverts negatively impact fish passage to some degree by producing shallow water conditions during low flows and excessive water velocities during higher flows.

Recommended Action: Work with the owner to assess the possibility of removing the crossings and replacing them with one bridge that does not impact the stream channel and allows unimpeded passage for salmonids. It may be possible to provide improved access across the stream in coordination with adjacent landowners while eliminating several barrier crossings and consolidating access across a shared bridge.

Barrier ID: SC_TT_19
Stream: Tepusquet Creek
Barrier Type: Culvert Crossing
Physical Location: Approximately 0.8 miles upstream of Colson Creek
GPS Location: N/A
Ownership/Interest: Unknown
Surveyor(s) and Date: Matt Stoecker 12/30/02



Description: Access to ground survey this structure was not obtained. Observations of this culvert crossing were made from the air and are limited in detail. This private dirt road crossing consists of two culverts that convey stream flows underneath the road fill that crosses the channel. The overall length of the culverts is approximately 10-15 feet. The outlet configuration could not be seen through the thick riparian vegetation.

Diagnosis: The severity of this structure to fish passage could not be accurately determined from the air. The inlet of the culvert appears to be at streambed level and flows appear to enter the culverts with a low velocity. The slope of the culverts may be relatively mild and allow adequate upstream migration during moderate flows. Most culverts negatively impact fish passage to some degree by producing shallow water conditions during low flows and excessive water velocities during higher flows.

Recommended Action: Work with the owner to further assess the impact of this structure on fish passage. Also assess the possibility of removing the crossing and replacing it with a bridge that does not impact the stream channel and allows unimpeded passage for salmonids.

Barrier ID: SC_TT_20
Stream: Tepusquet Creek
Barrier Type: Crossing
Physical Location: Approximately 1.0 mile upstream of Colson Creek
GPS Location: N/A
Ownership/Interest: Unknown
Surveyor(s) and Date: Matt Stoecker 12/30/02

Description: Access to ground survey this structure was not obtained. Observations of this culvert crossing were made from the air and are limited in detail. No photograph was attained due to the thick riparian vegetation over this crossing and observations of the crossing configuration were not possible. The road was observed to cross the creek at this location and some crossing structure is likely.

Diagnosis: The severity of this crossing to fish passage could not be determined. It seems likely, based on adjacent crossings, that a culvert crossing may be present. Most culverts negatively impact fish passage to some degree by producing shallow water conditions during low flows and excessive water velocities during higher flows.

Recommended Action: Work with the owner to assess potential impacts of this crossing on fish passage. If a migration barrier is present, assess the possibility of removing the crossing and replacing it with a bridge that does not impact the stream channel and allows unimpeded passage for salmonids. It may be possible to provide improved access across the stream in coordination with adjacent landowners while eliminating barrier crossings and consolidating access across a shared bridge.