POLE CREEK

STREAM INVENTORY REPORT

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February 15, 2008

Table of Contents

List of Tables

List of Graphs

Stream Inventory Report

Pole Creek

INTRODUCTION

A stream inventory of Pole Creek was conducted by Department of Fish and Game and Pacific States Marine Fisheries Commission staff with the assistance of staff from Ventura County Watershed Protection District and the United Water Conservation District from December 10 to December 12, 2007. The survey began approximately 2.0 miles upstream the confluence with Santa Clara River and extended upstream 3.35 miles (Map 1). The starting location was approximately 130 feet upstream of the uppermost Fillmore residential property and terminated at a 40-foot waterfall. North Fork (N.F.) of Pole Creek was surveyed approximately 300 feet upstream of its confluence with Pole Creek. Habitat conditions were not suitable for trout; therefore, no habitat typing surveys were conducted. The County of Venture's Watershed Protection District collected and analyzed water quality samples at two locations in Pole Creek and one in N.F. Pole Creek near the confluence with Pole Creek. A plant list was also compiled of the riparian and the lower upland vegetation throughout the habitat typing survey.

The objective of the habitat inventory was to document the current habitat conditions, determine suitability of the habitat for steelhead trout (*Oncorhynchus mykiss*) and recommend options for the potential enhancement of habitat in Pole Creek for steelhead trout. Recommendations for habitat improvement activities were based upon target habitat values suitable for steelhead/rainbow trout in California's south coast streams. This survey also provided insight to the natural progression of Pole Creek's recovery from the 2004/2005 winter rain events that impacted the riparian, streambed, and its banks. Massive volumes of sediments scoured and recontoured the channel. Riparian trees were uprooted and, in some cases, carried downstream during these rain events.

The Natural Marine Fisheries Society (NMFS) federally listed the Southern California Steelhead Evolutionary Significant Unit (ESU) as Endangered from Point Conception south to Malibu Creek in 1997. In 2002, NMFS expanded the range of the ESU to include all coastal creeks and rivers to the Mexican border. In 2006 NMFS determined that the ESU designation of steelhead was not appropriate and reclassified the steelhead populations within the State as Distinct Population Segments. These actions did not alter the listing status of endangered for southern steelhead.

Southern California Coast Steelhead are winter-run steelhead that typically enter the streams from December to April with high winter flows. After spawning, the adults may either die, or if conditions permit, return to the ocean to spawn again the following year. The offspring can become resident in freshwater coastal streams or anadromous (migratory) and thus emigrate to the ocean to mature. A single stream can have both resident and migratory forms and often with some interbreeding between these forms (Swift 2003). The anadromous form can vary in the amount of time spent in freshwater, but usually spend one to two years rearing in the freshwater stream before going to the ocean. Adult fish may return to the stream they originated, or they may stray to other streams and re-colonize streams that have been extirpated for some years due

Map 1


Falls - End of Survey
Start of Survey
Pole Creek
North Fork Pole Creek
Fillmore
(BM 469)
Union HS
Reservoir
Water Tank
Oil Tanks
Oil Sump
SESPE
Extent Location
within Santa Clara River Basin
Santa Clarita
Ventura
5
101
Pole Creek
CDFG Habitat Survey
December 2007
Surveyed Area
Streams
0
0.25
0.5 Miles
N
S
W
E
CA Dept. of Fish and Game
Coastal Watershed Planning
and Assessment Program
K. Pettit 01/2009
Data Sources: CDFG, USGS,

to prolonged drought, devastating fires, or other adverse effects (Swift 2003).

WATERSHED OVERVIEW

Pole Creek, located in Ventura County, California (Map 1), is a tributary to Santa Clara River, which is a tributary to Pacific Ocean. Pole Creek's legal description at the confluence with Santa Clara River is T4N R19W S29. Its location is (34:23:22.0N) 34°23'13" north latitude and (118:54:08.0W) 118°54'05" west longitude, LLID number 1189023343894. Pole Creek is a second order stream and has approximately 5.8 miles of intermittent blue line stream according to the USGS Fillmore 7.5 minute quadrangle. Pole Creek drains a watershed of approximately 8.6 square miles. Elevations range from about 440 feet at the mouth of the creek to 4050 feet in the headwater areas (average elevation of headwaters, not highest point). Grasslands used for cattle grazing dominate the lower watershed, while chaparral/oak woodland composes much of the middle to upper watershed area. The watershed is primarily privately owned and is managed for rangeland. The headwaters are within the Hopper Mountain Wildlife Refuge. Vehicle access is limited above the City of Fillmore and exists only through a few private dirt roads.

METHODS

The habitat inventory conducted in Pole Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The California Department of Fish and Game and the Pacific States Marine Fisheries Commission (PSMFC) biologists/fisheries technician that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). Pam Lindsey, watershed ecologist from Ventura County Watershed Protection District (District) and Steve Howard, biologist from United Water Conservation District assisted with the survey. This inventory was conducted by two, two-person teams with one team habitat typing the lower reach to the confluence of N.F. Pole Creek and the other team surveying from the confluence of the N.F. to the waterfall, which was the end of anadromous habitat.

SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach. All habitat units included in the survey are classified according to habitat type and their lengths are measured. All pool units are measured for maximum depth, depth of pool tail crest (measured in the thalweg), dominant substrate composing the pool tail crest, and embeddedness. Habitat unit types encountered for the first time are measured for all the parameters and characteristics on the field form. Additionally, from the ten habitat units on each field form page, one is randomly selected for complete measurement.

HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the *California Salmonid Stream Habitat Restoration Manual*. This form was used in Pole Creek to record measurements and observations. There are eleven components to the inventory form and are presented below:

1. Flow:

Flow was estimated in cubic feet per second (cfs) near the bottom of the stream survey reach. This estimate was arrived through consensus of the survey members and based on their previous experience with stream flow measurements.

2. Channel Type:

Channel typing is conducted according to the classification system developed and revised by David Rosgen (1994). This methodology is described in the *California Salmonid Stream Habitat Restoration Manual*. Channel typing is conducted simultaneously with habitat typing and follows a standard form to record measurements and observations. There are five measured parameters used to determine channel type: 1) water slope gradient, 2) entrenchment, 3) width/depth ratio, 4) substrate composition, and 5) sinuosity. Channel characteristics are measured using a clinometer, hand level, hip chain, tape measure, and a stadia rod.

3. Temperatures:

Both water and air temperatures are measured and recorded at every tenth habitat unit. The time of the measurement is also recorded. Both temperatures are taken in degrees Fahrenheit in shade, within one foot of the water surface. The water temperature was always recorded in flowing water.

4. Habitat Type:

Habitat typing uses the 24 habitat classification types defined by McCain and others (1990). Habitat units are numbered sequentially and assigned a type identification number selected from a standard list of 24 habitat types. Dewatered units are labeled "dry". Pole Creek habitat typing used standard basin level measurement criteria. These parameters require that the minimum length of a described habitat unit must be equal to or greater than the stream's mean wetted width. All measurements are in feet to the nearest tenth. Habitat characteristics are measured using a hip chain and stadia rod.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Pole Creek, embeddedness was ocularly estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3) and 76 - 100% (value 4). Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate like bedrock, log sills, boulders or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide juvenile salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow separation of territorial units to reduce density related competition for prey. The shelter rating is calculated for each fully-described habitat unit by multiplying shelter value and percent cover. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All cover is then classified according to a list of nine cover types. In Pole Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:

Substrate composition ranges from silt/clay sized particles to boulders and bedrock elements. In all fully-described habitat units, dominant and sub-dominant substrate elements were ocularly estimated using a list of seven size classes and recorded as a one and two, respectively. In addition, the dominant substrate composing the pool tail-outs is recorded for each pool.

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Pole Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of approximately every third unit in addition to every fully-described unit, giving an approximate 30% sub-sample.

In addition, the area of canopy was estimated ocularly into percentages of coniferous or hardwood trees.

9. Bank Composition and Vegetation:

Bank composition elements range from bedrock to bare soil. However, the stream banks are usually covered with grass, brush, or trees. These factors influence the ability of stream banks to withstand winter flows. In Pole Creek, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully-described unit were selected from the habitat inventory form. Additionally, the percent of each bank covered by vegetation (including downed trees, logs, and rootwads) was estimated and recorded.

10. Average Bankfull Width:

Bankfull width can vary greatly in the course of a channel type stream reach. This is especially true in very long reaches. Bankfull width can be a factor in habitat components like canopy density, water temperature, and pool depths. Frequent measurements taken at riffle crests (velocity crossovers) are needed to accurately describe reach widths. At the first appropriate velocity crossover that occurs after the beginning of a new stream survey page (ten habitat units), bankfull width is measured and recorded in the appropriate header block of the page. These widths are presented as an average for the channel type reach.

BIOLOGICAL INVENTORY

Biological sampling during the stream inventory is used to determine fish species and their distribution in the stream. Fish presence/absence was observed from the stream banks in Pole Creek. The presence/absence of macro-invertbrates was observed through examining cobbles and gravels located in the wetted portion of the streambed channel throughout the survey.

WATER QUALITY MONITORING

Water quality sampling was measured in three locations within the watershed: in Pole Creek just upstream the confluence with the North Fork Pole Creek; Pole Creek, approximately 1.5 miles from the confluence with Santa Clara River; and in North Fork Pole Creek, just upstream the confluence with Pole Creek. Water quality samples were collected in the field to be taken to a laboratory for later testing. Using a Beckman Model 255, pH was recorded, and dissolved oxygen was measured using an YSI Model 85.

DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 2.0.19, a Visual Basic data entry program developed by Karen Wilson, PSMFC in conjunction with the California Department of Fish and Game. This program processes and summarizes the data, and produces the following ten tables:

- Riffle, Flatwater, and Pool Habitat Types
- Habitat Types and Measured Parameters
- Pool Types
- Maximum Residual Pool Depths by Habitat Types
- Mean Percent Cover by Habitat Type
- Dominant Substrates by Habitat Type
- Mean Percent Vegetative Cover for Entire Stream
- Fish Habitat Inventory Data Summary by Stream Reach (Table 8)
- Mean Percent Dominant Substrate / Dominant Vegetation Type for Entire Stream
- Mean Percent Shelter Cover Types for Entire Stream

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Pole Creek include:

- Riffle, Flatwater, Pool Habitat Types by Percent Occurrence
- Riffle, Flatwater, Pool Habitat Types by Total Length
- Total Habitat Types by Percent Occurrence
- Pool Types by Percent Occurrence
- Maximum Residual Depth in Pools
- Percent Embeddedness
- Mean Percent Cover Types in Pools
- Substrate Composition in Pool Tail-outs
- Mean Percent Canopy
- Dominant Bank Composition by Composition Type
- Dominant Bank Vegetation by Vegetation Type

HABITAT INVENTORY RESULTS

* ALL TABLES AND GRAPHS ARE LOCATED AT THE END OF THE REPORT *

The habitat inventory of 12/10/2007 to 12/12/2007, was conducted by D. Kajtaniak (PSMFC), K. Snyder (PSMFC), C. McKibben (DFG), P. Lindsey (District), and S. Howard (United Water Conservation District). The total length of the stream surveyed was 16,070 feet, or 3.04 miles, with an additional 1,708 feet (0.32 miles) of side channel.

Stream flow was estimated to be 1.5 cfs during the survey period. The stream displayed adequate flows considering very little precipitation had occurred prior to the survey dates and the fact that the 2006/2007 water year was one of the driest years on record.

Pole Creek is a C4 channel type for 7,226.00 feet of the stream surveyed (Reach 1), a B4 channel type for 6,444.60 feet of the stream surveyed (Reach 2), and a B1 channel type for 2,399.00 feet of the stream surveyed (Reach 3). The survey concluded at a 40-foot waterfall, a natural barrier to all upstream migration.

C4 channels are meandering point-bar riffle/pool alluvial channels with broad well defined floodplain on low gradients and gravel dominant substrates. B4 channels are moderately entrenched riffle dominated channels with infrequently spaced pools, very stable plan and profile, stable banks on moderate gradients with low width /depth ratios and gravel dominant substrates; B1 channels differ from B4 channels based on dominant substrates. B1 channels have bedrock as their dominate substrate type.

Water temperatures taken during the survey period ranged from 41 to 53 degrees Fahrenheit. Air temperatures ranged from 38 to 64 degrees Fahrenheit. Weather only varied slightly over the course of the survey from cool, partly cloudy days to cool, sunny days.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 41% flatwater units, 38% riffle units, 19% pool units, 1% no survey units, 1% dry units, (Graph 1). Based on total length of Level II habitat types there were 42% flatwater units, 44% riffle units, 9% pool units, 1% no survey units, 5% dry units (Graph 2). The five percent of the survey length classified as dry were all units occupying side channel habitat. The main channel was flowing for the entire length of the survey.

Thirteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were 36% Low Gradient Riffle units, 34% Run units, and 15% Mid-Channel Pool units (Graph 3). Based on percent total length, the habitat types were as follows: 43% Low Gradient Riffle units, 36% Run units, 6% Mid-Channel Pool units, and 5.5% Step Run units.

A total of 69 pools were identified (Table 3). Main Channel pools were the most frequently encountered, at 94% (Graph 4), and comprised 95% of the total length of all pools (Table 3).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Seventeen of the 65 pools (26%) measured had a maximum residual depth of two feet or greater (Graph 5); therefore, the remaining 48 pools had a maximum residual pool depth of less than two feet.

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 60 pool tail-outs measured, 2 had a value of 1 (3.3%); 7 had a value of 2 (11.7%); 15 had a value of 3 (25%); 11 had a value of 4 (18.3%); and 25 had a value of 5 (41.7%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst. Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate such as bedrock, boulders, or other considerations. Most of the value 5 ratings were a result of boulders and bedrock located at the pool tail-out.

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Riffle habitat types had a mean shelter rating of 41, flatwater habitat types had a mean shelter rating of 29, and pool habitats had a mean shelter rating of 61 (Table 1). Of the pool types, the Main Channel pools had a mean shelter rating of 59, Scour pools had a mean shelter rating of 70 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Aquatic Vegetation is the dominant cover types in Pole Creek. Graph 7 describes the pool cover in Pole Creek. Boulders are the dominant pool cover type followed by aquatic vegetation.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. These dominant substrate types were gravel, composing 50% of pool tail-outs, and bedrock occupying 17% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Pole Creek was 47%; therefore, 53 percent of the canopy was open. Of the canopy present, it was composed completely of hardwood trees. It is important to note that at the time of the survey, a portion of the trees had already dropped their leaves; therefore, the percentage of canopy would be greater if surveyed during the period when the trees retained their leaves. In addition, canopy cover is expected to increase in the future in some areas due to the regeneration of willows and sycamores along the creek, which were substantially impacted in the 2005 scour event. Graph 9 describes the mean percent canopy in Pole Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 66%. The mean percent left bank vegetated was 53%. The dominant elements composing the structure of the stream banks consisted of 66% cobble/gravel, 18% sand/silt/clay, 9% bedrock, and 7% boulder (Graph 10). Deciduous trees were the dominant vegetation type observed in 67% of the units surveyed. Additionally, 31% of the units surveyed had brush as the dominant vegetation type, and only 1% had grass as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

No species of fish were seen through bank observation during the entire survey. Low flow conditions were present and turbidity levels were low. However, considering the time of year, late fall, and the cold water temperatures, it is not unusual for fish, even if present, to go undetected under these type of conditions. In addition, there were numerous deep pools with sufficient cover in the upper reach that made it impossible to view the entire pool. Electrofishing and snorkeling of deeper pools in the spring/summer should be performed to verify the absence of fish.

The presence of macroinvertbrates was noted throughout the survey. In general, numbers of macroinvertebrates seemed to increase approximately 1 mile upstream from the beginning of the survey. One California tree frog (*Hyla cadaverina)* was observed, but no other amphibians or reptiles were noted.

WATER QUALITY SAMPLING RESULTS

Reference values for steelhead habitat needs can vary depending on the different life cycle stages, season, and subregional variability, which fish may have adapted to localized condition. In general, water quality measurements taken in Pole Creek (Figure 1) are within the suitable range for southern California steelhead. Dissolve oxygen levels, pH, salinity, and water temperatures are all suitable conditions for fish considering the time of the year. However, the N.F. of Pole Creek had several values that are not suitable for trout. The dissolved oxygen level of 1.96 mg/L is well below the Los Angeles Regional Water Quality Control Board reference value of 7.0 mg/L for spawning periods (Kier and Associates and NMFS 2008). Salinity levels in the N.F. also appear rather high for freshwater conditions.

Figure 1. Water quality field measures results from each of the three sites. Data collected on December 11, 2007

Location	pH	DO %	mg/L	EC	Salinity (ppt)	Water Temp (C)
Upper Pole Creek	7.96	90.6	10.70	1140	0.9	7.9
Lower Pole Creek	8.06	90.1	10.54	1247	0.9	8.3
N.F. Pole Creek	7.71	17.1	1.96	2811	2.1	9.4

Abbreviations: pH – measure of acidity or alkalinity; DO – dissolve oxygen; mg/L – milligrams per Liter; EC – electrical conductivity;

Nutrients do not directly affect salmonids, but impact them indirectly by stimulating the growth of algae and aquatic macrophyts to nuisance levels. These nuisance levels can adversely impact water quality (dissolve oxygen and pH) in streams as well as reducing living space for rearing juvenile steelhead or in extreme cases restrict the movement of adults (Kier and Associates and NMFS 2008). Although results from the one-day, December 11, 2007, water quality sampling performed by the District generally indicate inorganic metals were within established water quality criteria, further sampling is needed to discuss overall water quality conditions in Pole Creek. There is a concern with that the presence of cows and their uninhibited access to the creek and riparian areas may contribute to elevated nutrient levels in the stream. For example, phosphorus present in fecal matter, poses a potential problem because most of it is in the soluble form and readily available for growth of aquatic weeds and algae.

DISCUSSION

Presence of steelhead in the watershed and historical survey review

Although there is very limited historical information on the presence of steelhead or rainbow trout in Pole Creek, it seems likely that steelhead historically used Pole Creek as a spawning and rearing stream. An article in the Santa Paula Chronicle, dated May 17, 1906, described, in general, people fishing in Pole Creek: "Fishing is fine up Poll (Pole) creek, they say. Several of the young people went up the creek to fish,…". Considering steelhead trout were one of only three native fish [Pacific lamprey and partially armored threespine stickleback being the others (Swift 2003)] from the area and the only sport fish, it is probable that these fish were trout. Furthermore, steelhead have been well documented in three major tributaries of the Santa Clara River, located near Pole Creek: Santa Paula Creek, Sespe Creek, and Piru Creek. Pole Creek is located immediately upstream of Sespe Creek and downstream of Piru Creek. Hopper Creek, the watershed immediately upstream of Pole Creek has resident, naturally reproducing rainbow trout with the potential to be steelhead (Swift 2003).

Several previous habitat surveys have been conducted in Pole Creek to determine habitat suitability of Pole Creek for trout. These surveys varied in their level of detail, but generally concluded that Pole Creek could support a spawning and rearing habitat for steelhead trout. The following are excerpts from these reports on the habitat quality of Pole Creek:

1. Titus et al. 2000. History and Status of Steelhead in California Coastal Drainages South of San Francisco Bay. *In preparation*. California Department of Fish and Game.

   "Department stocking records indicate intermediate trout stocking from 1940 to 1944. The Department's stocking policy required pool habitat, abundant riparian cover and appropriate water temperatures."

2. Parmenter, S. and D. McEwan. 1999. 1992 Stream Surveys of Several Ventura and Los Angeles County Streams. California Department of Fish and Game.

   "Trout habitat above the concrete channel is generally good. Thick riparian vegetation exists, along with abundant spawning gravel throughout Pole Creek."

3. Stoecker, M. and E. Kelley, Ph.D. 2005. Santa Clara River Steelhead Trout Assessment and Recovery Opportunities. Prepared for the Santa Clara Trustee Concil and the Nature Conservancy. Pages 135-127. [Survey conducted fall 2004}:

   > There is a high amount of channel alteration in the lower creek due to the presence of a flood control channel….Dense native riparian vegetation occurs in the upper reach. Spawning gravel was absent in the flood control channel and estimated to occur in medium abundance throughout the upper reach. Pole Creek had the second highest average percent canopy closure, the lowest estimated average maximum water depth, the shortest surveyed habitat at 4.7 miles and an average habitat

> quality of 3.75. This currently inaccessible tributary appears to contain a limited amount of adequate salmonid habitat that likely has the potential to support a small steelhead population if fish passage is provided to the upper drainage.

It should be noted that Stoecker and Kelley did not physically survey the stream. Due to access issues, they used a helicopter to approximate the condition of the creek. As noted in their narrative, the riparian canopy was second highest of all the tributaries to the Santa Clara surveyed, which would seem to indicate they were not able to see the entire stream and relied on breaks in the canopy.

Under historic conditions, prior to the development of the City of Fillmore, Pole Creek may have flowed to either Sespe Creek or the Santa Clara River at a point further west of its present outlet. This area is an alluvial fan, which may have caused water to flow subsurface during low water years; however, under slightly less than average to more than average rainfall water years, streams in the Santa Clara basin provided sufficient flows for all stages of the steelhead life history. Moreover, southern California steelhead have distinct ecological and physiological adaptations to survive periodic unsuitability of habitat in an unstable environment. Among these adaptations include the ability to rapidly recolonize affected habitat when suitable conditions are reestablished.

Present survey discussion

At the time of the survey, Pole Creek appeared to be recovering from the 2004/2005 rain events that impacted the streambed and riparian. These events caused massive volumes of sediment, particularly in the lower portion of Pole Creek, to scour and recontour the channel. The creek geomorphology has recovered nicely after the “reset” event as the stream has been down-cutting through the aggraded streambed. Instead of the monotonous gravel bed observed in the spring of 2005, the creek now has a series of step-pool and riffle complexes suitable for many forms of aquatic wildlife. Riparian areas along the stream that were impacted by these rain events [a brief site visit in the spring of 2005 noted a decrease in canopy levels of those describe by Stoecker and Kelley in the fall of 2004 (Mary Larson *pers. comm.*)] are also recovering as dense stands of willow and mulefat saplings were coming in along the lower reach. Numerous sycamore sprouts were also observed.

Although designated an intermittent stream on the USGS 7.5 *Fillmore Quadrangle*, flows in Pole Creek appear adequate to support a small population of trout. Considering the survey was conducted prior to any significant precipitation and the 2006/2007 water year was one of the driest on record, the estimated stream flow of 1.5 cfs throughout the survey, was a possible indication of consistent surface flows. In speaking with longtime (20+ years), creekside residents, immediately downstream of the surveyed area, they described the creek as flowing year-around and very rarely witnessing it completely dewatered. Several seeps and springs were noted along the stream as well as a couple of tributaries that were trickling into the mainstem. N.F. Pole Creek was the largest of the tributaries and had a slow flow (less than 0.5 cfs) of water running into the mainstem.

Water temperatures recorded on the survey days ranged from 41 to 53 degrees Fahrenheit. These temperatures are within the suitable range for trout, but to make any further conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling would need to be conducted. Macro-invertebrates were present in most of the surveyed area, providing a potential food source for rearing fish. While their numbers may have not been abundant in some areas, this is typical for late fall/winter surveys when presence of macro-invertebrates seems to decrease with cooler water temperatures. To obtain a more accurate representation of the species and overall abundance of macro-invertebrates, focused surveys would need to be performed in the late spring or early summer after the hatch period.

Flatwater habitat types comprised 42% of the total length of this survey, riffles 44%, and pools 9%. The main channel was flowing for the entire length of the survey. The pools in Reach 1 and 2 are relatively shallow, with only 7 of the 46 (15%) pools having a maximum residual depth greater than 2 feet. However, the percent of pools by stream length increases in the upper reaches, with the upper reach (Reach 3) comprising 23% of the survey reach. Reach 3 also has greater percentage of pools over two feet deep, 50%, and a greater mean maximum pool depth of 2.24 feet. In general, Reach 1 contained less potential pool-forming, hard structures (i.e. boulders and bedrock). Installing structures in Reach 1 that will increase or deepen pool habitat could enhance overall stream habitat conditions and provide resting pools and needed cover for potential migrating fish. These would be recommended for locations where their installation will not be threatened by high stream energy. The suitability of C4 channel types, Reach 1, for fish habitat improvement structures is as follows: excellent for bank-placed boulders; good for plunge weirs; boulders clusters; and if available log cover. The suitability of a B4 channel types, Reach 2, for fish habitat improvement structures is as follows: excellent for low-stage plunge weirs; boulder clusters; bank place boulders; and log cover.

The shelter rating in the flatwater habitats was 29, and as expected, the rating was higher in pools at 61. As the number of pools increased in the upper reaches so did the shelter rating, as Reach 3 had a mean pool shelter rating of 80. A pool shelter rating of approximately 100 is desirable. The amount of cover that presently exists is being provided primarily by aquatic vegetation in Pole Creek. Throughout the survey, boulders were the dominant cover type in pools followed by aquatic vegetation. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

Eight of the 63 pool tail-outs measured had embeddedness ratings of 1 or 2. Twenty eight of the pool tail-outs had embeddedness ratings of 3 or 4. Twenty seven of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning; the majority of these 5 rating are a result of the location of bedrock or boulders at the pool tail-outs. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for steelhead. Although there are few pool tail-outs that had an embeddedness rating of a 1 or 2, numerous riffles and runs with additional potential spawning gravel beds were observed throughout the survey. Thirty-five of the 64 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids. Sediment sources in Pole Creek should be mapped and rated according to their potential sediment yields, and control measures should be considered.

The mean percent canopy density for the stream was 47%. Reach 1 had a canopy density of 58%, Reach 2 had a canopy density of 34%, Reach 3 had a canopy density of 46%. At the time of the survey, most of the trees had already dropped a portion or all of their leaves; therefore, the percentage of canopy would most likely increase if surveyed during the summer when the trees are in full canopy. As mentioned earlier, numerous saplings of willow and mulefat were observed along the streambanks, especially in the lower reach. This vegetation, the observed sycamore sprouts and additional recruitment of willows and mulefat, will further improve overall stream canopy, which in turn, will stabilize stream banks, moderate water temperatures, and potentially increase macro-invertebrate populations and diversity.

The percentage of right and left bank covered with vegetation was moderate at 66% and 53%, respectively. Stream bank erosion is accelerated by the fact cows have access to most of the surveyed area. These cows also reduce the overall water quality by defecating near or in the mainstem Pole Creek and its tributaries. In areas of stream bank erosion or where bank vegetation is sparse, cattle fencing and planting endemic hardwood tree species, in conjunction with bank stabilization, is recommended.

Conclusions

Based on the overall observed habitat conditions and the results of the habitat typing survey, Pole Creek could support a small population of steelhead/rainbow trout. Adequate flow regimes appear to exist in the stream and it offers moderate to good conditions for rearing fish. Spawning gravels, while limited at pool tail-outs, are otherwise moderately abundant in other habitat types throughout the stream. Pools are sparse and relatively shallow in the lower reach, but increase in frequency, depth, and cover in the upper reaches. These conclusions are generally consistent with previous habitat surveys conducted on Pole Creek. Further studies are needed to determine if water temperatures are suitable for trout during the temperature extremes of the summer months as well as a bioassessment to determine relative health of Pole Creek in relation to macro-invertebrate population numbers and diversity.

In order to better understand the viability of native aquatic species in Pole Creek, the Department is investigating the feasibility of re-seeding the creek with native aquatic species and will coordinate with the appropriate federal agencies (Natural Marine Fisheries Society and U.S. Fish and Wildlife Service). Prior to any stocking, Pole Creek should have biological sampling performed during the seasonally period of late spring to late summer to determine presence/absence of any fish species that may currently populate the stream. Due to the current federal listing status of steelhead as endangered, the Department will not stock hatchery trout in areas that have been designated as critical habitat.

RECOMMENDATIONS

1) Pole Creek could support steelhead trout and should be managed as an anadromous, natural production stream. Designing and implementing fish passage improvement projects in the lower channelized streambed would provide steelhead trout access to the habitat located in the surveyed portions of Pole Creek. Several efforts are currently underway in California to address fish passage in channelized streams. Two local efforts are the City of Santa Barbara’s Mission Creek Fish Passage Project and in the City of

Goleta the San Jose Creek Channel Modification Project (pers. comm. Larson). Replicating the fish passage design of these and other similar concrete-lined flood channels (see Corte Creek Flood Control Channel, M. Love and Associates and J. Anderson and Associates, 2007), amendments could be made to the Pole Creek flood control channel to potentially allow for the passage of migrating adults and juvenile steelhead. This potential design would maintain the current concrete channel but obtain sufficient water depth (at least 0.6 feet deep) for passage by creating a cut in the center of the channel with additional resting areas. A sediment transport study could ensure the functionality of the flood control channel and maintain the resting pools for the fish. Both Federal and State funding are available to assist with this type of effort.

2) The limited water temperature data available suggest that maximum temperatures are within/above the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the summer and early fall temperature extreme period should be performed for 3 to 5 years.

3) This survey was conducted during a period in which fish species are typically dormant and are therefore difficult to observe. In order to ascertain the presence/absence of any fish species in Pole Creek, it would be advised to electrofish appropriate sections of each stream reach and snorkel deeper pools located in the upper reach during the summer months.

4) There are sections where the stream is being impacted by cattle moving through and grazing the riparian zone and impacting water quality through their fecal matter. Alternatives, such as off-creek water troughs and riparian fencing, should be explored with the grazing operator and developed if possible.

5) Perform macro-invertebrate sampling to determine the community assemblage, species richness and relative abundance at least quarterly for 3 years.

6) Where feasible, design and engineer pool enhancement structures to increase the number of pools in the lower reach. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

7) Active and potential sediment sources related to the road system need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.

8) Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediments entering the stream. Planting of native hardwoods would assist in stream bank erosion control in some of these areas.

9) The reaches above this survey section could be investigated to determine general influences of upland areas, since the water flowing in the survey area is affected by land use practices in the upstream areas, above the waterfall.

COMMENTS AND LANDMARKS

The following landmarks and possible problem sites were noted. All distances are approximate and taken from the beginning of the survey reach.

Position (ft.)	Habitat Unit #	Comments:
0	0001.00	Start of Survey: Began survey 130 ft upstream of Harms property.
1150	0019.00	General Comment: Great potential spawning gravels; picture
1792	0036.00	General Comment: Abundant spawning gravel
1927	0040.00	General Comment: Flash flood gully on right bank, picture
2279	0049.00	General Comment: Large amount of willow roots in mainstem
2455	0053.01	General Comment: Stream has milky-like color;
3108	0062.00	General Comment: 4 pictures takes of sediment and culvert from previous storm
3197	0064.00	General Comment: seeps entering from right bank; photo; 1 photo of habitat
3276	0065.00	General Comment: Large down oak in channel
3420	0068.00	General Comment: Nice pool
3494	0071.00	Structures: Old dam photo
4180	0081.00	General Comment: Road traveled in on to access creek, cows present in riparian area
4320	0086.00	General Comment: Good spawning gravels; more macro- invertebrates
4896	0096.00	General Comment: Photo of willow riparian
5156	0101.00	General Comment: Algal mat
5212	0102.00	General Comment: Large root masses in the stream; algal mat
5237	0103.00	General Comment: Milky-like water, possibly from mineral content of underlying geology; photo; macro- invertebrates
6010	0112.00	General Comment: Good spawning gravels
6047	0113.00	General Comment: Good spawning gravels
6061	0114.00	General Comment: Good spawning gravels
6077	0115.00	General Comment: Good spawning gravels
6311	0120.00	General Comment: Channel type change

6343	0120.01	General Comment: Channel has down cut
6697	0127.00	General Comment: Photos of milky-like water (calcium sulfate?)
7130	0138.00	General Comment: Confl. with N.F.
7226	0139.00	General Comment: Began survey with confl. of NF Pole Creek; large amount of algae
7429	0144.00	General Comment: No fish seen; large amount of aquatic veg
7662	0149.00	General Comment: Tree frog picture
7700	0150.00	General Comment: Sulfur seep; 33 25.059N 118 53.022W
7914	0154.00	General Comment: Road crossing; 33 25.059N 118 52.927
8239	0165.00	General Comment: Road crossing; 34 25.114 118 37.074
8329	0168.00	General Comment: Silt bed; sulfur sweep
9120	0184.00	General Comment: Spring left bank
11318.6	0218.00	General Comment: See picture of Chris/wall
11512.6	0229.00	Tributaries: Left bank tributary; 34 25 38.4 118 53 07.0W; has small flow
16069.6	0338.00	End of Survey: 40 ft waterfall; end of survey

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LEVEL III and LEVEL IV HABITAT TYPES

RIFFLE			
Low Gradient Riffle	(LGR)	[1.1]	{ 1}
High Gradient Riffle	(HGR)	[1.2]	{ 2}
CASCADE			
Cascade	(CAS)	[2.1]	{ 3}
Bedrock Sheet	(BRS)	[2.2]	{24}
FLATWATER			
Pocket Water	(POW)	[3.1]	{21}
Glide	(GLD)	[3.2]	{14}
Run	(RUN)	[3.3]	{15}
Step Run	(SRN)	[3.4]	{16}
Edgewater	(EDW)	[3.5]	{18}
MAIN CHANNEL POOLS			
Trench Pool	(TRP)	[4.1]	{ 8 }
Mid-Channel Pool	(MCP)	[4.2]	{17}
Channel Confluence Pool	(CCP)	[4.3]	{19}
Step Pool	(STP)	[4.4]	{23}
SCOUR POOLS			
Corner Pool	(CRP)	[5.1]	{22}
Lateral Scour Pool - Log Enhanced	(LSL)	[5.2]	{10}
Lateral Scour Pool - Root Wad Enhanced	(LSR)	[5.3]	{11}
Lateral Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{12}
Lateral Scour Pool - Boulder Formed	(LSBo)	[5.5]	{20}
Plunge Pool	(PLP)	[5.6]	{ 9 }
BACKWATER POOLS			
Secondary Channel Pool	(SCP)	[6.1]	{ 4 }
Backwater Pool - Boulder Formed	(BPB)	[6.2]	{ 5 }
Backwater Pool - Root Wad Formed	(BPR)	[6.3]	{ 6 }
Backwater Pool - Log Formed	(BPL)	[6.4]	{ 7 }
Dammed Pool	(DPL)	[6.5]	{13}
<u>ADDITIONAL UNIT DESIGNATIONS</u>			
Dry	(DRY)	[7.0]	
Culvert	(CUL)	[8.0]	
Not Surveyed	(NS)	[9.0]	
Not Surveyed due to a marsh	(MAR)	[9.1]	

TABLES AND GRAPHS

Table 1 - Summary of Riffle, Flatwater, and Pool Habitat Types

Stream Name: Pole Creek **LLID:** 1189023343894 **Drainage:** Sespe

Survey Dates: 12/10/2007 to 12/12/2007

Confluence **Quad:** FILLMORE **Legal** T4N R19W S29 **Latitude:** 34:23:22.0N **Longitude** 118:54:08.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Mean Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating
5	0	DRY	1.4	165	826	4.6									
147	28	FLATWATER	40.8	51	7440	41.9	6.7	0.5	0.9	236	34727	122	17228		29
2	0	NOSURVEY	0.6	60	119	0.7									
69	15	POOL	19.2	22	1537	8.6	5.7	0.5	1.3	126	8666	150	9665	89	61
137	21	RIFFLE	38.1	57	7855	44.2	6.1	0.4	0.8	241	33066	125	17190		41

Total	Total Units Units	Total Fully Measured	Total Area Length (ft.)	Total Volume (sq.ft.)	(cu.ft.)
	360	64	17777	76460	44082

Table 2 - Summary of Habitat Types and Measured Parameters

Summary of Habitat Types and Measured Parameters

Stream Name: Pole Creek **LLID:** 1189023343894 **Drainage:** Sespe

Survey Dates: 12/10/2007 to 12/12/2007

Confluence **Quad:** FILLMORE **Legal** T4N R19W S29 **Latitude:** 34:23:22.0N **Longitude** 118:54:08.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Mean Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating	Mean Canopy (%)
128	16	LGR	35.6	60	7665	43.1	6.0	0.5	0.7	270	34524	142	18120		39	52
6	2	HGR	1.7	24	142	0.8	8.0	0.4	1.1	300	1800	157	940		45	63
1	1	CAS	0.3	23	23	0.1	3.0	0.7	1.3	69	69	48	48		140	
2	2	BRS	0.6	12	25	0.1	4.0	0.1	0.4	42	84	4	8		8	28
2	2	POW	0.6	44	88	0.5	12.0	0.5	1.4	481	961	266	532		60	44
122	18	RUN	33.9	52	6375	35.9	6.0	0.5	0.8	187	22827	94	10847		24	45
23	8	SRN	6.4	42	977	5.5	6.0	0.5	1.3	286	6571	144	3303		31	52
1	1	TRP	0.3	22	22	0.1	3.0	1.3		66	66	86	86	40	30	
53	6	MCP	14.7	19	997	5.6	6.0	1.3	1.8	88	4658	136	7204	109	61	45
11	5	STP	3.1	39	434	2.4	6.0	1.1	1.5	168	1849	127	1120	78	61	26
2	1	LSBk	0.6	16	31	0.2	5.0	1.2	1.6	52	105	52	105	37	75	26
2	2	PLP	0.6	26	53	0.3	7.0	1.3	2.0	199	398	319	638	240	60	50
5	0	DRY	1.4	165	826	4.6										20
2	0	NS	0.6	60	119	0.7										

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
360	64	17777	73911	42952

Table 3 – Summary of Pools

Stream Name: Pole Creek **LLID:** 1189023343894 **Drainage:** Sespe

Survey Dates: 12/10/2007 to 12/12/2007

Confluence **Quad:** FILLMORE **Legal** T4N R19W S29 **Latitude:** 34:23:22.0N **Longitude** 118:54:08.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Residual Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Residual Pool Vol (cu.ft.)	Estimated Total Resid. Vol (cu.ft.)	Mean Shelter Rating
65	12	MAIN	94	22	1453	95	5.6	1.3	119	7766	66	3929	59
4	3	SCOUR	6	21	84	5	6.3	1.3	150	600	172	688	70

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
69	15	1537	8366	4617

Table 4 - Summary of Maximum Residual Pool Depths By Pool Habitat Types

Stream Name: Pole Creek **LLID:** 1189023343894 **Drainage:** Sespe

Survey Dates: 12/10/2007 to 12/12/2007

Confluence **Quad:** FILLMORE **Legal** T4N R19W S29 **Latitude:** 34:23:22.0N **Longitude** 118:54:08.0W

Habitat Units	Habitat Type	Habitat Occurrence (%)	< 1 Foot Maximum Residual Depth	< 1 Foot Percent Occurrence	1 < 2 Feet Maximum Residual Depth	1 < 2 Feet Percent Occurrence	2 < 3 Feet Maximum Residual Depth	2 < 3 Feet Percent Occurence	3 < 4 Feet Maximum Residual Depth	3 < 4 Feet Percent Occurrence	>= 4 Feet Maximum Residual Depth	>= 4 Feet Percent Occurrence
51	MCP	78	1	2	35	54	9	14	3	5	1	2
1	TRP	2	0	0	1	2	0	0	0	0	0	0
2	LSBk	3	0	0	2	3	1	2	0	0	0	0
8	STP	12	0	0	7	10	1	2	0	0	0	0
3	PLP	5	0	0	1	2	2	3	0	0	0	0

Total Units	Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1< 2 Feet Max Resid. Depth	Total 1< 2 Feet % Occurrence	Total 2< 3 Feet Max Resid. Depth	Total 2< 3 Feet % Occurrence	Total 3< 4 Feet Max Resid. Depth	Total 3< 4 Feet % Occurrence	Total >= 4 Feet Max Resid. Depth	Total >= 4ft % Occurrenc
65	1	2	47	72	13	21	3	5	1	2

Mean Maximum Residual Pool Depth (ft.): 1.8

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Pole Creek **LLID:** 1189023343894 **Drainage:** Sespe

Survey Dates: 12/10/2007 to 12/12/2007

Confluence **Quad:** FILLMORE **Legal** T4N R19W S29 **Latitude:** 34:23:22.0N **Longitude** 118:54:08.0W

Habitat Units	Units Fully Measured	Habitat Type	Mean % Undercut Banks	Mean % SWD	Mean % LWD	Mean % Root Mass	Mean % Terr. Vegetation	Mean % Aquatic Vegetation	Mean % White Water	Mean % Boulders	Mean % Bedrock Ledges
128	17	LGR	0	16	0	0	20	26	6	32	0
6	2	HGR	0	8	0	0	10	78	0	5	0
1	1	CAS	10	10	0	0	10	0	20	50	0
2	2	BRS	0	0	0	0	3	48	50	0	0
2	2	POW	0	18	0	0	20	43	0	20	0
122	17	RUN	0	5	1	3	11	33	9	38	0
23	8	SRN	0	6	0	0	12	39	11	32	0
1	1	TRP	0	0	0	0	0	45	5	0	50
53	8	MCP	0	7	0	1	18	26	11	38	0
11	5	STP	1	3	0	0	5	24	14	41	12
2	2	LSBk	0	25	0	5	0	53	15	3	0
2	1	PLP	0	0	0	0	0	20	0	80	0
2	0	NS									

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Pole Creek **LLID:** 1189023343894 **Drainage:** Sespe

Survey Dates: 12/10/2007 to 12/12/2007

Confluence **Quad:** FILLMORE **Legal** T4N R19W S29 **Latitude:** 34:23:22.0N **Longitude** 118:54:08.0W

Habitat Units	Units Fully Measured	Habitat Type	% Total Silt/Clay Dominant	% Total Sand Dominant	% Total Gravel Dominant	% Total Small Cobble Dominant	% Total Large Cobble Dominant	% Total Boulder Dominant	% Total Bedrock Dominant
128	18	LGR	0	11	28	44	11	0	6
6	2	HGR	0	0	50	50	0	0	0
1	1	CAS	0	0	0	0	100	0	0
2	2	BRS	0	0	0	0	0	0	100
2	2	POW	0	0	0	100	0	0	0
122	19	RUN	0	5	37	37	16	5	0
23	8	SRN	0	0	38	50	13	0	0
1	1	TRP	0	100	0	0	0	0	0
53	9	MCP	0	33	11	44	0	11	0
11	5	STP	0	0	20	60	0	0	20
2	2	LSBk	50	0	0	0	0	0	50
2	2	PLP	0	0	0	100	0	0	0
2	0	NS	0	0	0	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Pole Creek **LLID:** 1189023343894 **Drainage:** Sespe

Survey Dates: 12/10/2007 to 12/12/2007

Confluence **Quad:** FILLMORE **Legal** T4N R19W S29 **Latitude:** 34:23:22.0N **Longitude** 118:54:08.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
47	0	99	0	66	53

Note: Mean percent conifer and hardwood for the entire reach are means of canopy components from units with canopy values greater than zero.

Open units represent habitat units with zero canopy cover.

Table 8 - Fish Habitat Inventory Data Summary

Stream Name: Pole Creek LLID:1189023343894 Drainage:Sespe
Survey Dates: 12/10/2007 to 12/12/2007 Survey Length (ft.): 17777.4
Main Channel (ft.): 16069.6 Side Channel (ft.): 1707.8
Confluence Location: Quad: FILLMORE Legal Description: T4N R19W S29 Latitude: 34:23:22.0N Longitude: 118:54:08.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: C4
Reach Length (ft.): 7226
Riffle/Flatwater Mean Width (ft.): 7.7
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 1.5
Water (F): 44 - 51 Air (F): 15 - 64
Dry Channel (ft.): 0

Canopy Density (%): 58.1
Coniferous Component (%): 0.0
Hardwood Component (%): 100.0
Dominant Bank Vegetation: Hardwood Trees
Vegetative Cover (%): 48.9
Dominant Shelter: Boulders
Dominant Bank Substrate Type: Cobble/Gravel
Occurrence of LWD (%): 0.0
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 4.0
Pool Frequency (%): 10.1
Residual Pool Depth (%):
< 2 Feet Deep: 80.0
2 to 2.9 Feet Deep: 20.0
3 to 3.9 Feet Deep: 0.0
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth (ft.): 1.65
Mean Pool Shelter Rating: 27

Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 13.3 Gravel: 60.0 Sm Cobble: 6.7 Lg Cobble: 6.7 Boulder: 0.0 Bedrock: 13.3

Embeddedness Values (%): 1. 0.0 2. 20.0 3. 40.0 4. 13.3 5. 26.7

STREAM REACH: 2

Channel Type: B4
Reach Length (ft.): 6444.6
Riffle/Flatwater Mean Width (ft.): 5.1
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 1.5
Water (F): 43 - 53 Air (F): 51 - 61
Dry Channel (ft.): 0

Canopy Density (%): 33.7
Coniferous Component (%): 0.0
Hardwood Component (%): 100.0
Dominant Bank Vegetation: Brush
Vegetative Cover (%): 72.1
Dominant Shelter: Aquatic Vegetation
Dominant Bank Substrate Type: Cobble/Gravel
Occurrence of LWD (%): 0.4
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 10.3
Pool Frequency (%): 24.1
Residual Pool Depth (%):
< 2 Feet Deep: 87.1
2 to 2.9 Feet Deep: 12.9
3 to 3.9 Feet Deep: 0.0
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth (ft.): 1.6
Mean Pool Shelter Rating: 57

Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 7.1 Gravel: 53.6 Sm Cobble: 7.1 Lg Cobble: 0.0 Boulder: 25.0 Bedrock: 7.1

Embeddedness Values (%): 1. 7.7 2. 11.5 3. 34.6 4. 7.7 5. 38.5

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

Channel Type: B1
Reach Length (ft.): 2399
Riffle/Flatwater Mean Width (ft.): 6.5
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 1.5
Water (F): 41 - 46 Air (F): 46 - 56
Dry Channel (ft.): 0

Canopy Density (%): 45.9
Coniferous Component (%): 0.0
Hardwood Component (%): 100.0
Dominant Bank Vegetation: Hardwood Trees
Vegetative Cover (%): 57.2
Dominant Shelter: Aquatic Vegetation
Dominant Bank Substrate Type: Cobble/Gravel
Occurrence of LWD (%): 0.0
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 23.3
Pool Frequency (%): 31.3
Residual Pool Depth (%):
< 2 Feet Deep: 50.0
2 to 2.9 Feet Deep: 30.0
3 to 3.9 Feet Deep: 15.0
>= 4 Feet Deep: 5.0
Mean Max Residual Pool Depth (ft.): 2.24
Mean Pool Shelter Rating: 80

Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 21.1 Gravel: 36.8 Sm Cobble: 0.0 Lg Cobble: 0.0 Boulder: 5.3 Bedrock: 36.8

Embeddedness Values (%): 1. 0.0 2. 5.3 3. 0.0 4. 36.8 5. 57.9

Table 9 -Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Pole Creek **LLID:** 1189023343894 **Drainage:** Sespe

Survey Dates: 12/10/2007 to 12/12/2007

Confluence **Quad:** FILLMORE **Legal** T4N R19W S29 **Latitude:** 34:23:22.0N **Longitude** 118:54:08.0W

Mean Percentage of Dominant Stream Bank Substrate

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percentage (%)
Bedrock	4	9	9.0
Boulder	6	4	6.9
Cobble/Gravel	50	45	66.0
Sand/Silt/Cla	12	14	18.1

Mean Percentage of Dominant Stream Bank Vegetation

Dominant Class of Vegetation	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percentage (%)
Grass	1	1	1.4
Brush	20	25	31.3
Hardwood Trees	51	46	67.4
Coniferous Trees	0	0	0.0
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness 4

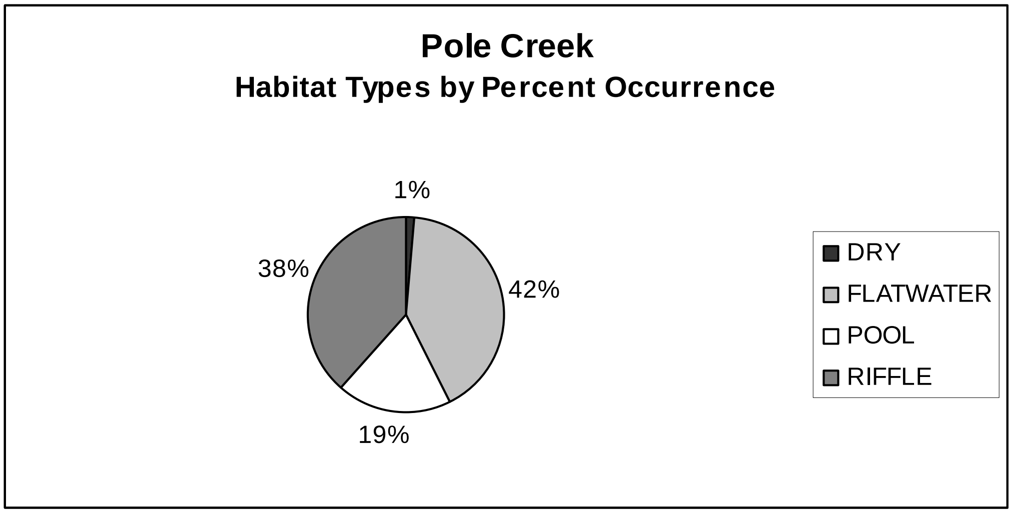
Table 10 - Mean Percent of Shelter Cover Types For Entire Stream

Stream Name: Pole Creek **LLID:** 1189023343894 **Drainage:** Sespe Creek

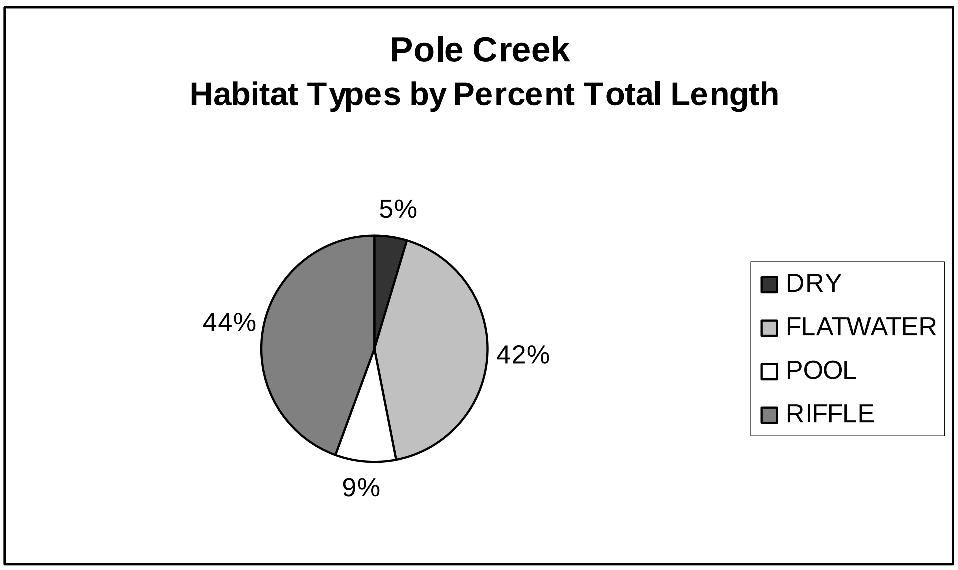
Survey Dates: 12/10/2007 to 12/12/2007

Confluence **Quad:** FILLMORE **Legal** T4N R19W S29 **Latitude:** 34:23:22.0N **Longitude** 118:54:08.0W

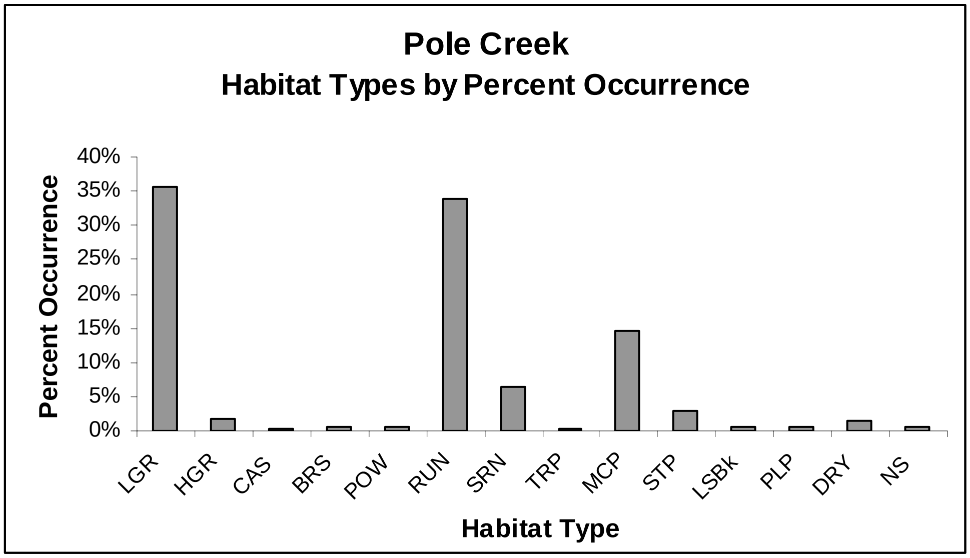
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	0	0
SMALL WOODY DEBRIS (%)	14	6	7
LARGE WOODY DEBRIS (%)	0	0	0
ROOT MASS (%)	0	2	1
TERRESTRIAL VEGETATION (%)	17	12	10
AQUATIC VEGETATION (%)	31	36	29
WHITEWATER (%)	10	9	11
BOULDERS (%)	28	35	35
BEDROCK LEDGES (%)	0	0	6



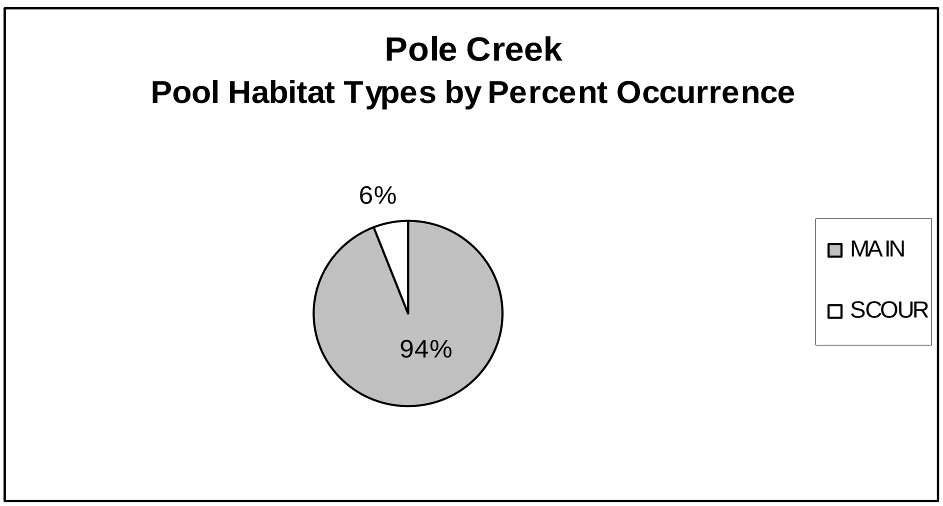
Graph 1 Habitat types by percent occurrence



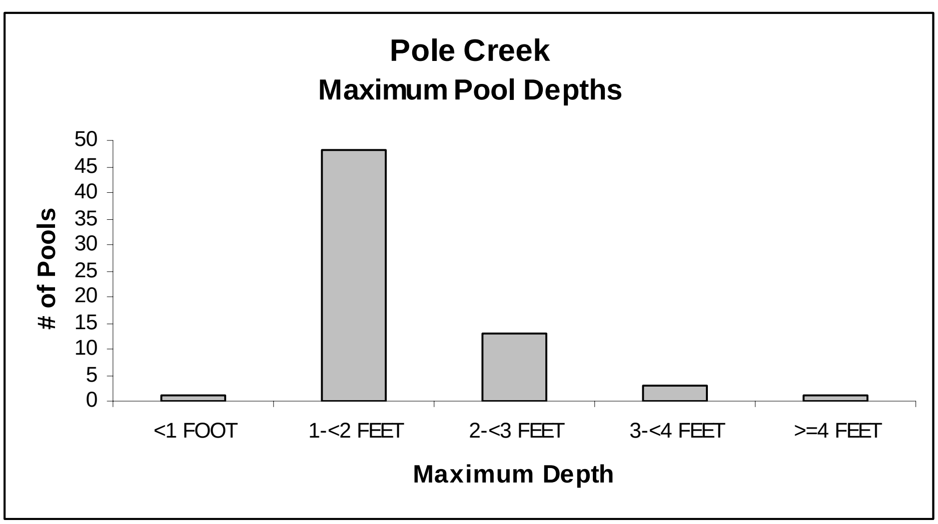
Graph 2 Habitat type by percent of total survey length



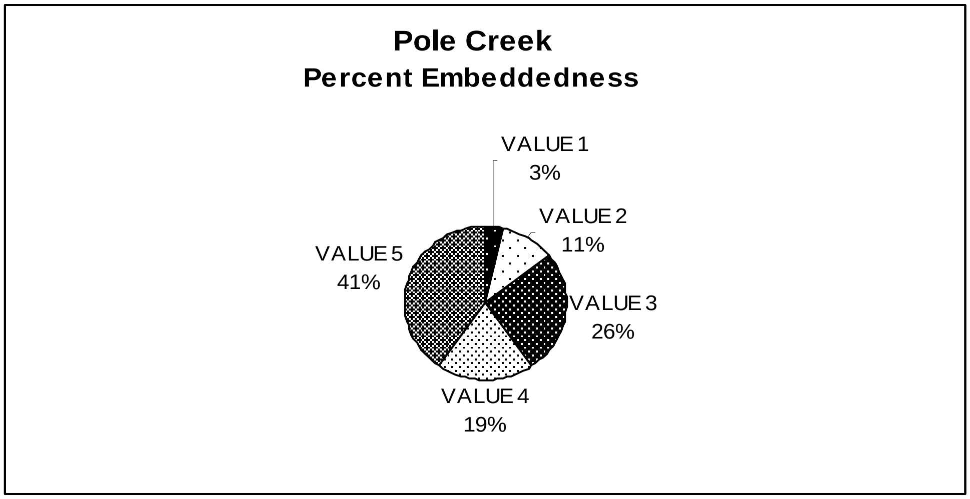
Graph 3 Habitat Types by Percent Occurrence



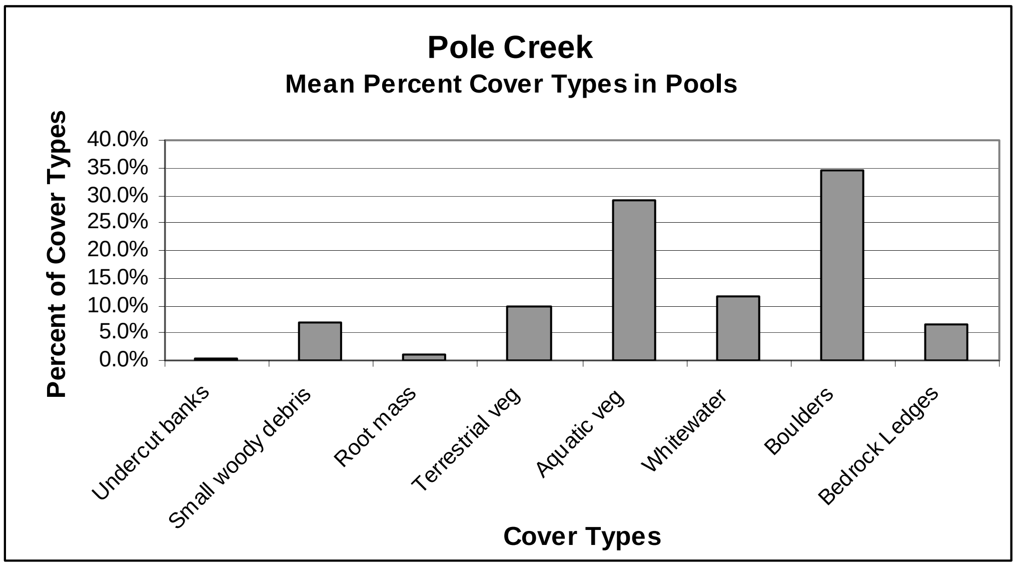
Graph 4 Pool habitat types by percent occurrence



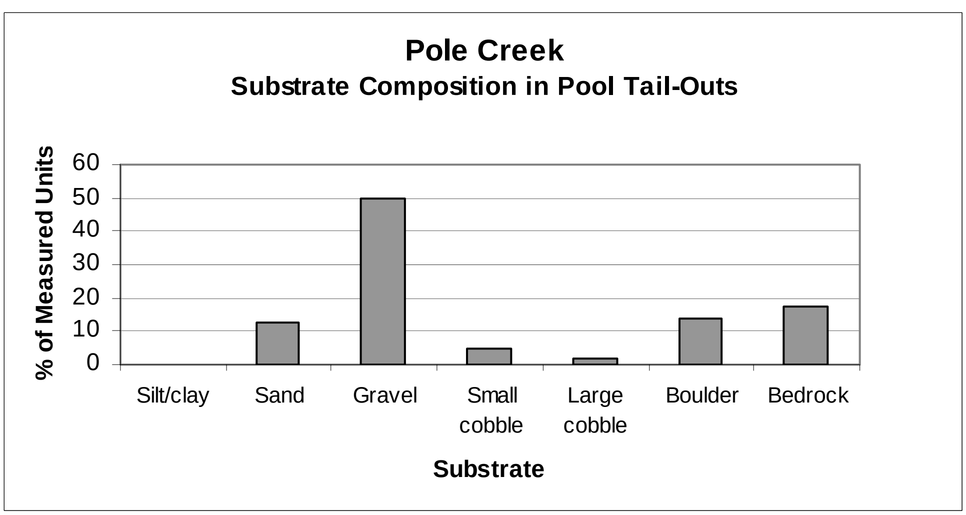
Graph 5 Maximum pool depths

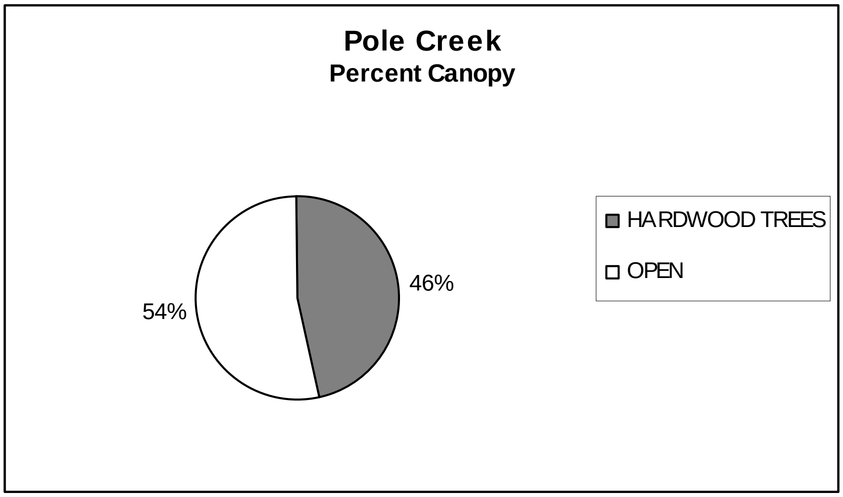


Graph 6 Percent Embeddedness

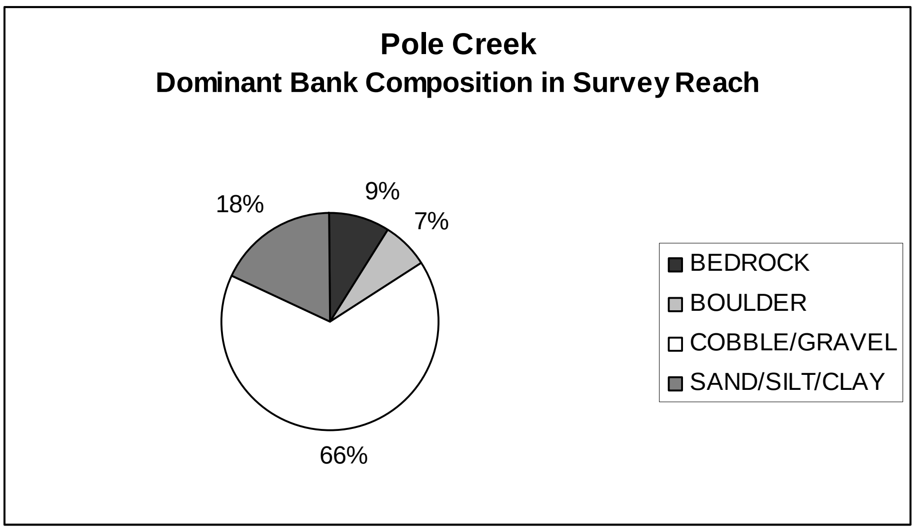


Graph 7 Mean percent cover types in pools

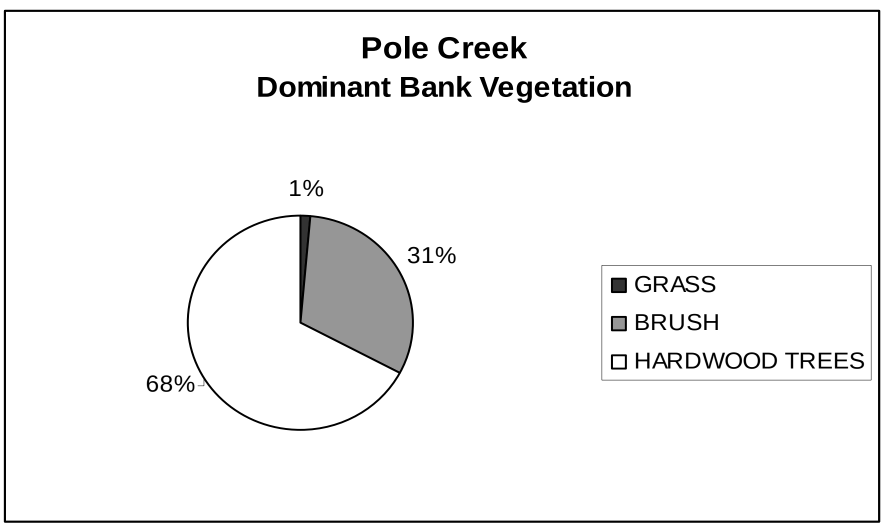




Graph 9 Percent canopy



Graph 10 Dominant bank composition in survey



Graph 11 Dominant bank vegetation

Plant List from Pole Creek December 2007

SCIENTIFIC NAME	COMMON NAME	TYPE
Achillea millefolium	Yarrow	Native Herb
Acer sp.	Maple	Native Tree
Adiantum sp.	Maiden-hair Fern	Native Herb
Amaranthus albus	Tumbling Pigweed	Non-Native Herb
Ambrosia acanthicarpa	Annual Burweed	Native Herb
Ambrosia psilostachya	Western Ragweed	Native Herb
Anagallis arvensis	Scarlet Pimpernel	Non-Native Herb
Apium graveolens	Celery	Non-Native Herb
Artemisia californica	California Sagebrush	Native Shrub
Artemisia douglasiana	Mugwort	Native Shrub
Avena spp.	Oats	Non-Native Grass
Astragalus sp.	Milkvetch	Native Herb
Azolla sp.	Mosquitofern	Native Herb
Baccharis pilularis	Coyote Brush	Native Shrub
Baccharis salicifolia	Mule Fat	Native Shrub
Brassica spp.	Mustards	Non-Native Herb
Brickellia californica	California Brickelbush	Native Shrub
Bromus diandrus	Ripgutgrass	Non-Native Grass
Bromus hordaceus	Soft Chess	Non-Native Grass
Bromus madritensis ssp. *rubens*	Foxtail Chess	Non-Native Grass
Calystegia macrostegia ssp. *intermedia*	Morning-glory	Native Herb
Ceanothus spinosus	Greenbark Ceanothus	Native Shrub
Centaurea melitensis	Tocalote	Non-Native Herb
Cercocarpus betuloides var. *betuloides*	Mountain Mahogany	Native Shrub
Chenopodium californicum	California Goosefoot	Native Herb
Chenopodium murale	Nettle-leaved Goosefoot	Non-Native Herb
Clematis sp.	Virgin’s Bower	Native Vine
Conyza canadensis	Horseweed	Native Herb
Corethrogyne filaginifolia	Sand-aster	Native Herb
Cuscuta sp.	Witch’s Hair	Native Herb
Cyperus esculentus	Nutsedge	Native Herb
Dudleya lanceolata	Lance-Leaf Live-Forever	Native Herb
Encelia californica	Bush Sunflower	Native Shrub
Epilobium ciliatum	Willow Herb	Native Herb
Ericameria sp.	Goldenbush	Native Shrub
Erigeron sp.	Fleabane Daisy	Native Herb
Eriogonum fasciculatum	California Buckwheat	Native Shrub
Eriophyllum confertiflorum	Golden Yarrow	Native Shrub
Erodium spp.	Filarees	Non-Native Herb
Gnaphalium californicum	California Everlasting	Native Herb
Gutierrezia californica	California Matchweed	Native Shrub
Hazardia squarrosa	Saw-Toothed Goldenbush	Native Shrub
Helenium puberulum	Sneezeweed	Native Herb
Heteromeles arbutifolia	Toyon	Native Shrub
Heterotheca grandiflora	Telegraph Weed	Native Herb
Hirschfeldia incana	Mustard	Non-Native Herb
Hordeum spp.	Barley	Non-Native Grass
Isocoma menziesii	Coast Goldenbush	Native Shrub
Juglans californica	California Black Walnut	Native Tree
Juncus phaeocephalus	Rush	Native Herb
Keckiella cordifolia	Climbing Penstemon	Native Shrub

SCIENTIFIC NAME	COMMON NAME	TYPE
Lactuca serriola	Prickly Lettuce	Non-Native Herb
Lessingia filiginifolia	Cudweed Aster	Native Herb
Leymus condensatus	Giant Wild Rye	Native Grass
Lolium perenne	Perennial Ryegrass	Non-Native Grass
Lotus scoparius	California Broom	Native Shrub
Malacothamnus fasciculatus	Bush Mallow	Native Shrub
Malacothrix saxatilis	Cliff-aster	Native Herb
Malosma laurina	Laurel Sumac	Native Shrub
Malva parviflora	Cheeseweed	Non-Native Herb
Marah sp.	Wild Cucumber	Native Vine
Marrubium vulgare	Horehound	Non-Native Herb
Medicago polymorpha	Bur-clover	Non-Native Herb
Melilotus indica	Sourclover	Non-Native Herb
Mentha spicata	Spearmint	Non-Native Herb
Mimulus aurantiacus	Bush Monkeyflower	Native Shrub
Mimulus cardinalis	Scarlet Monkeyflower	Native Herb
Mimulus guttatus	Monkeyflower	Native Herb
Nicotiana glauca	Tree Tobacco	Non-Native Shrub
Opuntia littoralis	Coast Prickly Pear	Native Shrub
Pellaea mucronata	Bird's-foot Fern	Native Herb
Phacelia cicutaria	Catarpillar Phacelia	Native Herb
Picris echioides	Bristly Ox-tongue	Non-Native Herb
Piptatherum milliaceum	Smilo Grass	Non-Native Grass
Platanus racemosa	Western Sycamore	Native Tree
Polygonum aviculare	Common Knotweed	Non-Native Herb
Polypogon monspeliensis	Annual Beard Grass	Non-Native Grass
Populus trichocarpa	Black Cottonwood	Native Tree
Quercus agrifolia	Coast Live Oak	Native Tree
Quercus sp.	Oak	Tree???
Rhamnus californica	Coffeeberry	Native Shrub
Rhamnus crocea	Redberry	Native Shrub
Rhus integrifolia	Lemonadeberry	Native Shrub
Rhus ovata	Sugar bush	Native Shrub
Ribes sp.	Currant	Native Shrub
Rorippa sp.	Watercress	Non-Native Herb
Rubus ursinus	California Blackberry	Native Vine
Salix exigua	Narrow-leaved Willow	Native Shrub
Salix laevigata	Red Willow	Native Tree
Salix lasiolepis	Arroyo Willow	Native Tree
Salvia apiana	White Sage	Native Shrub
Salvia mellifera	Black Sage	Native Shrub
Sambucus mexicana	Elderberry	Native Shrub
Schismus spp.	Schismus	Non-Native Grass
Silybum marianum	Milk Thistle	Non-Native Herb
Solanum douglasii	White Nightshade	Native Herb
Sonchus spp.	Sow Thistle	Non-Native Herb
Stachys sp.	Hedge Nettle	Native Herb
Toxicodendron diversilobum	Poison Oak	Native Vine
Typha latifolia	Broadleaved Cattail	Native Herb
Urtica dioica ssp. *holosericea*	Nettle	Native Herb
Verbena lasiostachys	Verbena	Native Herb
Yucca whipplei	Yucca/Our Lord's Candle	Native Shrub
Zauschneria californica	California Fuchsia	Native Shrub

List compiled by Pam Lindsey, Watershed Ecologist for the Ventura County Watershed Protection District

SURVEY PHOTOS

Photo 1. View of Pole Creek flowing into retention basin.

Photo 1. View of lower Pole Creek

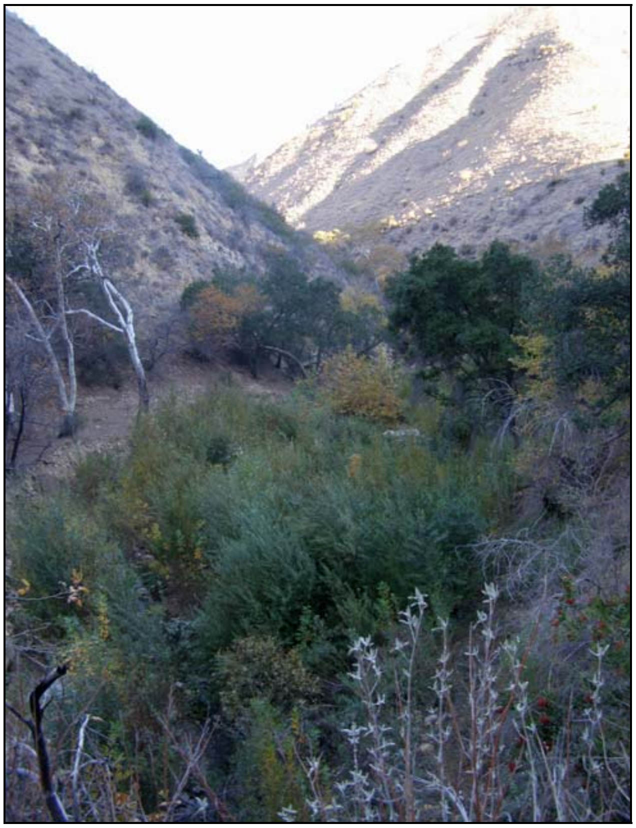


Photo 2. View of Pole Creek downstream of confluence with N.F. Pole Creek

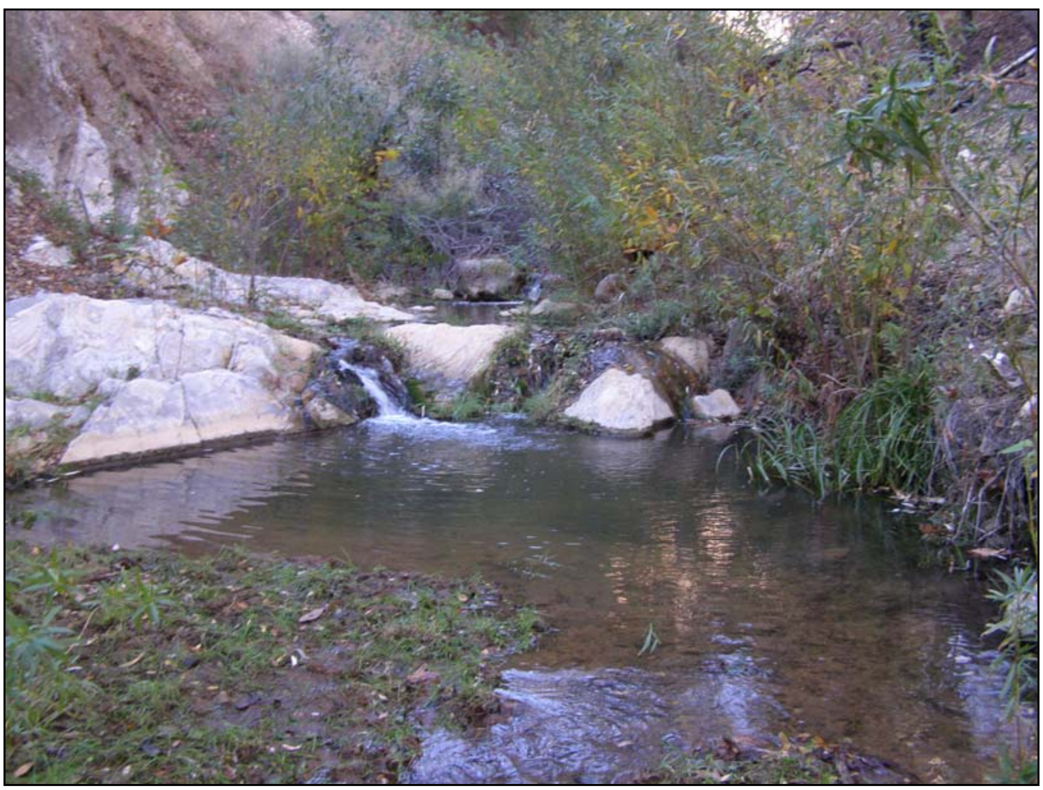


Photo 3. View of Pole Creek (mid to upper portion of the survey).

Photo 4: Pole Creek, end of survey at 40 foot waterfall.

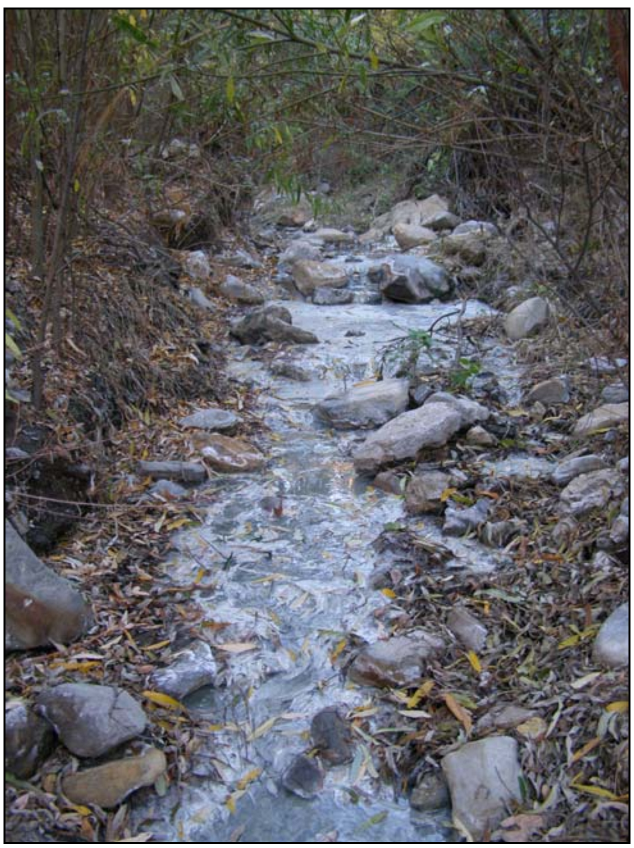


Photo 5. North Fork Pole Creek near the confluence with Pole Creek