California Department of Fish and Wildlife
Contra Costa County
San Pablo Bay Watershed
Stream Habitat Assessment Reports

Wildcat Creek

Surveyed 2010

Report Completed in 2013

STREAM INVENTORY REPORT

Wildcat Creek

INTRODUCTION

A stream inventory was conducted during 8/16/2010 to 9/1/2010 on Wildcat Creek. The survey began at the confluence with Pacific Ocean and extended upstream 10.8 miles.

The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Wildcat Creek.

The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for Chinook salmon, coho salmon, and steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

WATERSHED OVERVIEW

Wildcat Creek is a tributary to the San Pablo Bay and Pacific Ocean, located in Contra Costa County, California (Map 1). Wildcat Creek's legal description at the confluence with Pacific Ocean is T01N R05W S2. Its location is 37°57'12.0" north latitude and 122°23'16.0" west longitude, LLID number 1223877379532. Wildcat Creek is a third order stream and has approximately 23.1 miles of blue line stream according to the USGS National Hydrography Dataset (NHD) San Quentin 7.5 minute quadrangle. Wildcat Creek drains a watershed of approximately 11.05 square miles. Elevations range from about 0 feet at the mouth of the creek to 1,913 feet in the headwater areas. Grassland, shrubland and evergreen and mixed forest dominates the watershed. The watershed is primarily urban and regional park and is managed for open space and recreation; 11 acres which accounts for 0.2% of the watershed land is state park and is managed for recreation. Vehicle access exists via multiple road crossings in the city of Richmond, including Highway 80.

METHODS

The habitat inventory conducted in Wildcat Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The California Conservation Corps (CCC) Technical Advisors and Watershed Stewards Project/AmeriCorps (WSP) Members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Wildlife (CDFW). This inventory was conducted by a two-person team.

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 fully measured. All other habitat unit types encountered for the first time in each reach 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 Wildcat Creek to record measurements and observations. There are eleven components to the inventory form.

1. Flow:

Flow is measured in cubic feet per second (cfs) near the bottom of the stream survey reach using a Marsh-McBirney Model 2000 flow meter.

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 at the middle of the habitat unit and within one foot of the water surface.

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". Wildcat 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 clinometer, 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 Wildcat 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 Wildcat 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 Wildcat 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 Wildcat 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. Large Woody Debris Count:

Large woody debris (LWD) is an important component of fish habitat and an element in channel forming processes. In each habitat unit all pieces of LWD partially or entirely below the elevation of bankfull discharge are counted and recorded. The minimum size to be considered is twelve inches in diameter and six feet in length. The LWD count is presented by reach and is expressed as an average per 100 feet.

11. 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 was observed from the stream banks in Wildcat Creek.

DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 2.0.18, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and Wildlife. 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 Wildcat Creek include:

- Riffle, Flatwater, Pool Habitat Types by Percent Occurrence

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- 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 8/16/2010 to 9/1/2010, was conducted by Bell C. and Griffin A. (WSP). The total length of the stream surveyed was 57,147 feet.

Because Wildcat creek was dry near the mouth, stream flow was not measured during the survey period.

Wildcat Creek is a F4 channel type for 24,723 feet of the stream surveyed (Reach 1), a F3 channel type for 22,519 feet of the stream surveyed (Reach 2), a NA channel type for 590 feet of the stream surveyed (Reach 3), a F4 channel type for 806 feet of the stream surveyed (Reach 4), a NA channel type for 210 feet of the stream surveyed (Reach 5), a F4 channel type for 6,450 feet of the stream surveyed (Reach 6), a NA channel type for 175 feet of the stream surveyed (Reach 7) and a F4 channel type for the last 1,674 feet of the stream surveyed (Reach 8).

F4 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates. F3 channels are characterized by entrenched riffle or pool channels often containing cobble; F3 channels occur on low gradients with high width/depth ratios.

Water temperatures taken during the survey period ranged from 57 to 61 degrees Fahrenheit. Air temperatures ranged from 60 to 75 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 7% dry units, 24% pool units, 37% flatwater units, 4% culvert units, 28% riffle units, <1% nosurvey units, (Graph 1). Based on total length of Level II habitat types there were 21% dry units, 12% pool units, 37% flatwater units, 5% culvert units, 24% riffle units, 2% nosurvey units (Graph 2).

Nineteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were 21% Glide units, 10% Run units, 27% Low Gradient Riffle units, (Graph 3). The most frequent habitat types based on percent total length were 22% Low

Wildcat Creek
Gradient Riffle units, 21% Dry units and 19% Glide units.

A total of 176 pools were identified (Table 3). Scour pools were the most frequently encountered, at 65%, and comprised 64% of the total length of all pools (Graph 4).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Ninety of the 175 pools (47%) had a residual depth of two feet or greater (Graph 5).
Fifty seven of the 175 pools (14%) had a residual depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 175 pool tail-outs measured, 28 had a value of 1 (16%); 36 had a value of 2 (20.6%); 16 had a value of 3 (9.1%); 8 had a value of 4 (4.6%); 87 had a value of 5 (49.7%) (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, log sills, boulders, or other considerations.

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 1 , flatwater habitat types had a mean shelter rating of 7 , and pool habitats had a mean shelter rating of 23 (Table 1). Of the pool types, the Main Channel pools had a mean shelter rating of 15, Scour pools had a mean shelter rating of 28, Backwater pools had a mean shelter rating of 30, (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover types in Wildcat Creek. Graph 7 describes the pool cover in Wildcat Creek. Boulders are the dominant pool cover type followed by root mass.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs with sand observed in 39% of pool tail-outs and gravel observed in 45% of pool tail-outs.

The mean percent canopy density for the surveyed length of Wildcat Creek was 88%. The mean percentages of hardwood and coniferous trees were 98% and 2%, respectively. Twelve percent of the canopy was open. Graph 9 describes the mean percent canopy in Wildcat Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 70%. The mean percent left bank vegetated was 73%. The dominant elements composing the structure of the stream banks consisted of 10% bedrock, 4% boulder, 1% cobble/gravel, 85% sand/silt/clay, (Graph 10). Hardwood trees were the dominant vegetation type observed in 88% of the units surveyed. Additionally, 10% of the units surveyed had brush as the dominant vegetation type, and 1% had coniferous trees as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

No electrofishing was conducted for Wildcat Creek; however, juvenile salmonids, sculpins and stickleback were observed from the stream banks of Wildcat Creek.

DISCUSSION

Wildcat Creek is a F4 channel type for the first 24,743 feet of stream surveyed and a F3 channel type for the next 22,519 feet and a NA channel type for the next 590 feet and a F4 channel type for the next 806 feet and a NA channel type for the next 210 feet and a F4 channel type for 6450 feet and a NA channel type for the next 175 feet and a F4 channel type for the remaining 1674 feet of the stream surveyed.

The suitability of F4 channel types for fish habitat improvement structures is as follows: good for bank-placed boulders and relatively fair for plunge weirs, single and opposing side-deflectors, channel constrictors, and log cover; however, F4 channels are poor for boulder clusters.

The suitability of F3 channel types for fish habitat improvements structures is as follows: Good for bank-placed boulders and single and opposing side-deflectors, and are relatively fair for plunge weirs, boulder clusters, channel constrictors, and log cover.

The water temperatures recorded on the survey days 8/16/2010 to 9/1/2010, ranged from 57 to 61 degrees Fahrenheit. Air temperatures ranged from 60 to 75 degrees Fahrenheit. 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.

Flatwater habitat types comprised 37% of the total length of this survey, riffles 24%, and pools 12%. The pools are relatively shallow, with only 82 of the 175 (47%) pools having a maximum residual depth greater than 2 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In third and fourth order streams, a primary pool is defined to have a maximum residual depth of at least three feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. Installing structures that will increase or deepen pool habitat is recommended for locations where their installation will not be threatened by high stream energy, or where their installation will not conflict with the modification of the numerous log debris accumulations (LDA's) in the stream.

Sixty four of the 175 pool tail-outs measured had embeddedness ratings of 1 or 2. Twenty four of the pool tail-outs had embeddedness ratings of 3 or 4. Eighty seven of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. Sediment sources in Wildcat Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Eighty Six of the 175 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter rating for pools was 23. The shelter rating in the flatwater habitats was 7. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by Boulders in Wildcat Creek. Boulders are the dominant cover type in pools followed by root mass. 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.

The mean percent canopy density for the stream was 88%. Reach 1 had a canopy density of 78.8%, Reach 2 had a canopy density of 89.4%, Reach 4 had a canopy density of 94.2%, Reach 6 had a canopy density of 92.5%, Reach 8 had a canopy density of 97.4%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 70% and 73%, respectively. In areas of stream bank erosion or where bank vegetation is sparse, planting endemic species of coniferous and hardwood trees, in conjunction with bank stabilization, is recommended.

GENERAL RECOMMENDATIONS

Wildcat Creek should be managed as an anadromous, natural production stream.

Winter storms often bring down large trees and other woody debris into the stream, which increases the number and quality of pools. This woody debris, if left undisturbed, will provide fish shelter and rearing habitat, and offset channel incision. Landowners should be sensitive about the natural and positive role woody debris plays in the system, and encouraged not to remove woody debris from the stream, except under extreme buildup and only under guidance by a fishery professional.

RECOMMENDATIONS

1) Access for migrating salmonids should be assessed at all road crossings and dams. Site of particular concern are numerous and include all identified in-stream culverts, and ford crossings (including the Tilden Natural Reserve Road crossing), as well as both the Jewel Lake Dam and the small man-made Dam located near the Environmental Education Center. The fish ladder in the lower section of Reach 1 should be continually checked for debris plugs and temporary or seasonal barriers, especially after high flow events. All fish passage assessments should be done according to Part 9 of the California Salmonid Stream Habitat Restoration Manual (Flosi et al, 1998). Where needed, crossings should be replaced or modified to improve fish passage.

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

3) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from Boulders. Adding high quality complexity with woody cover in the pools is desirable.

4) The limited water temperature data available suggest that maximum temperatures are above the acceptable range for juvenile salmonids. To establish more complete and

meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for 3 to 5 years.

5) Suitable size spawning substrate on Wildcat Creek is limited to relatively few reaches. Projects should be designed at suitable sites to trap and sort spawning gravel.

6) 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. 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.

7) Wildcat Creek would benefit from utilizing bio-technical vegetative techniques to re-establish floodplain benches and a defined low flow channel. This would discourage lateral migration of the base flow channel and decrease bank erosion.

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 at end tidal influence immediately downstream. WP143 N37.95843 W122.37299
1965	0011.00	Bridge #1 is Third Street road bridge. It is not retaining gravel and is not creating any downcutting. The bridge has a length=47’, a height=11', a width=80', and it is made of cement. It is not a barrier to salmonids. WP144 N37.96040 W122.36678.
3040	0016.00	Bridge #2 is a road bridge with a Width= 56', a Height= 13', and a Length=38'. It is made of cement, is not retaining gravel and is not creating downcutting. It is not a barrier to salmonids. WP145 N37.96084 W122.36317.
3522	0022.00	Dry channel is choked with cat tails
4098	0023.00	Concrete channel divided into 3 channels with 8' concrete walls with fish ladder in middle section. Fish ladder is filled with sediment (possible barrier).

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Position (ft.)	Habitat Unit #	Comments:
4254	0024.00	Bridge #3 is a railroad bridge with a Width=42', a Height= 7', and a Length= 49'. It is made of cement, is not retaining gravel and is not creating downcutting. It is not a barrier to salmonids. WP148 N37.96113 W122.35938.
4353	0026.00	Bridge #4 is a private driveway bridge with a Width= 40', a Height= 8', and a Length= 33'. It is made of cement and is Not creating downcutting and not retaining gravel. It is not a barrier to salmonids. No Waypoint was taken.
4386	0027.00	Concrete channel with fish ladder ends 90' into this unit.
4812	0028.00	Bridge #5 is a railroad bridge with a Width=103', a Height= 9', and a Length=22'. It is made ofwood, is not retaining gravel and is not creating downcutting. It is not a barrier to salmonids. No Waypoint was taken.
4834	0029.00	Arundo along right bank at top of unit
5561	0030.00	Bridge #6 is a road bridge with a Width=34', a Height= 8', and a Length= 83'. It is made of cement, and is retaining gravel. There is no downcutting. It is not a barrier to salmonids. WP149 N37.96188 W122.35570
5644	0031.00	First 200' of unit along the right bank is a 8' steel retaining wall and along the left bank is a 8' concrete retaining wall.
6511	0032.00	Bridge #7 is a Park access footbridge that has a Length=9', a Height=9', and a Width=47'. It is made of wood and steel and is not retaining gravel. It has no sill and is not creating any downcutting. It is not a barrier to salmonids. No WP was taken.
7201	0035.00	Culvert #1 is composed of 2 culverts are that made of concrete and runs under an athletic field. They have a Height=8', a Width=12', and a Length=514'.The maximum depth at the outlet=0.6'. The culverts are in good condition and have 0% slope. They may be a barrier to salmonids. WP150 N37.96181 W122.34879
7962	0038.00	Concrete utility crossing at top of unit.
8228	0041.00	Dense Fennel on left and right banks. Right bank has new plantings at top of unit.
8624	0042.00	Culvert #2 is diverting water under 23rd street. 2 culverts made of concrete have a Height=8', a Width=8', and a Length=92'. They are in good condition with no slope, and could be a possible barrier to salmonids. WP152 N37.96035 W122.34609 Dry creek bed.

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Position (ft.)	Habitat Unit #	Comments:
9556	0044.00	Bridge #8 is a road bridge madeof concrete with a Length=47', a Height=8', and a Width=36' It is not retaining gravel, has no sill, is not creating downcut, and is not a barrier. WP153 N37.95929 W122.34364.
9603	0045.00	New plantings on right bank.
10303	0049.00	Bridge #9 is a Public access footbridge with a Length=7',a Height=14', and a Width=27'. It is made of wood and steel, is not retaining gravel, and has no sill. It is not creating downcutting and is not a barrier to salmonids. No WP were taken.
10507	0051.00	Bridge #10 is a road bridge with a Length=97', a Height=10', and a Width=22'. It is made of concrete, and is retaining gravel. It has no sill, is not creating downcutting, and is not a barrier to salmonids. WP154 N37.95800 W122.34064.
10604	0052.00	On the right bank is a crumbling cement retaining wall.
12770	0053.00	Bridge #11 is a road bridge with a Length=61', a Height=10', and a Width=23'. It is made of concrete, and is not retaining gravel. It has no sill, is not creating downcutting, and is not a barrier to Salmonids. WP155 N37.95318 W122.33829.
13743	0057.00	Right bank tributary#1 is unnamed and is flowing with Discharge <1cfs, and contributes 100% of flow to the receiving stream. Water temps downstream=62F, and in the tributary=65F. Water temperature was not taken up stream. The Survey crew checked 30' up and found it is accessible to fish, with a slope= 1%. No fish were observed. WP156 N38.95213 W122.33556
13773	0058.00	500’ into the unit is a dumpster on the left bank overflowing into creek.
14391	0059.00	Culvert #3 runs under a large shopping center. 2 culverts are made of concrete with a Height=12', a Width=8', and a Length=975'. The culvert slope=0%. The culvert is a barrier to salmonids. WP157 N37.95148 W122.33049
15732	0061.00	Arundo on the right bank.
15828	0062.00	Bridge #12 is a road bridge with a Length=24', a Height=14', and a Width=64'. It is made of concrete and steel, is not retaining gravel, and has no sill. It is not creating downcutting, and is not a barrier to salmonids. WP158 N37.95114 W122.32903.
16215	0069.00	Concrete apron for bridge upstream

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Position (ft.)	Habitat Unit #	Comments:
16246	0070.00	Culvert #4 is diverting flow under Hwy 80. 2 culverts are made of concrete with a Height=8', a Width=10', and a Length=262'. The culvert is in good condition with a slope=0%. It is a possible barrier to salmonids. WP159 N37.95157 W122.32672
16689	0073.00	130' into unit large 15' tall cement structure spans channel. There is a 14' diameter hole in it.
16945	0076.00	Stickleback observed.
17395	0085.00	Old poured concrete on both banks. Utility crossing at top of the unit.
17395	0085.00	Stickleback observed.
17594	0088.00	Left bank stabilized with 55' gallon drums and cement 8' high
17809	0090.00	Bridge #13 has a Height=24', and a Width=72', and is made of wood and steel. It is not retaining gravel and has no sill. It is not creating downcutting and is not a barrier to salmonids. WP161 N37.95309 W122.32464
18255	0099.00	LDA anchored onto both banks with boulders on the right bank
18294	0100.00	Rock Weir half way into unit.
18364	0101.00	Rock Weir at top of unit.
18532	0103.00	Rock Weir at top of unit
18557	0104.00	LDA and boulders buried in left bank.
18614	0105.00	Bolder Weir at top of unit.
18643	0106.00	LDA and Boulders buried in the left bank.
19025	0110.00	Bridge #14 is the Alvarado Park multi-use access bridge, which has a Length=35', a Height=15', and a Width=19'. It is made of concrete and brick, and is not retaining gravel. The height from the water level to the top of the sill= 0.5'. It is not creating downcutting and is not a barrier to salmonids. WP163 N37.95217 W122.32188
19060	0111.00	2cm long unidentified Salamander larvae observed.
19095	0112.00	Banks armored with stone and mortar walls. There are boulders and LDA throughout Alvarado Park area which could be potential habitat restoration structures.
19122	0113.00	Bolder weir at top of unit.
19197	0116.00	LDA and boulders buried in LB and RB.
19510	0122.00	Rock Weir at top of unit.
19510	0122.00	Right bank erosion 10' above channel is 15' by 20'. Erosion is being controlled with tarps and plastic sheets.

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Position (ft.)	Habitat Unit #	Comments:
19601	0125.00	Stickleback observed
19978	0131.00	Culvert #5 is 2 culverts made of CMP with a Height=10', a Width=10', a Length=239', and a diameter=10'. The maximum depth at the outlet =0.3'. The culvert is in good condition with a slope=1%. It is a potential barrier to salmonids. WP165 N37.95178 W122.31860
20520	0137.00	1-2 cm salamander larvae and stickleback observed.
20539	0138.00	Rip rap on the right bank extends throughout the unit.
21055	0146.00	WP167 N37.95079 W122.31643 Wooden footbridge attached to upstream side of cement bridge.
21055	0146.00	Bridge #15 is road bridge with a Legnth=25', a Height=11', and a Width=21'. It is made of concrete and wood, is not retaining gravel, and has no sill. It is not creating downcutting and is not a barrier to salmonids. WP167 N37.95079 W122.31643
21080	0147.00	End of Alvarado Park /Beginning of private Property.
22472	0163.00	Right bank tributary #2 is an unnamed tributary which enters Wildcat Creek. It is dry with a discharge= 0 cfs. Contributes 0% of flow to stream est. Water temps d/s & u/s 60 & trib dryF. Accessible to fish, yes, checked 100' up trib. Slope, 5%. No fish observed. WP 170 N37.94915 W122.31432
23023	0172.00	Right bank Tributary #3 is an unnamed creek that enters Wildcat Creek. It is not flowing with a Discharge= 0, and Contributes 0% of flow to the receiving stream. Water temperature downstream and upstream= 60 and the tributary is dry. The survey crew checked 50’ upstream and found it is accessible to fish, with a slope <5%. No fish were observed. WP172 N37.94828 W122.31297
23468	0178.00	Unidentified fish observed
24257	0191.00	Stickleback Observed
25753	0221.00	Left bank Tributary #1 is unnamed and enters Wildcat Creek. It is not Flowing with a Discharge= 0, and Contributes 0% to receiving stream flow. Water temperature upstream an downstream= 58 and the tributary Is dry. The survey crew checked 50' up trib, and found it was not Accessible to fish. No fish were observed with a Slope of 10%. WP was taken 32' upstream at WP 177
25881	0224.00	Log blocks channel upstream, creating 2' plunge into pool.
26299	0232.00	Stickleback and other unidentified sunfish fish observed.

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Position (ft.)	Habitat Unit #	Comments:
28387	0271.00	Right bank Tributary #4 is unnamed and enters Wildcat Creek. It Is dry, with a Discharge= 0, and Contributes 0% of flow to the receiving stream. Water temperature downstream and upstream= 62 and the tributary is dry. The survey crew checked50' up , and found it was accessible to fish, with a slope= 2%. No fish were observed. WP183 N37.94230 W122.30514
28814	0279.00	Hiking footpath crosses stream at top of unit.
28944	0281.00	Left bank Tributary #2 is unnamed and enters Wildcat Creek. It is dry with a Discharge= 0, and contributes 0% of flow to the receiving stream Water temperature downstream= 62, upstream= 63 and was dry in the tributary. The survey crew checked 50' up and found it was accessible to fish, with a Slope, <5%. No fish were observed.
29326	0288.00	Large oak tree fallen across channel has recruiting small/ large wood debris but not retaining gravel. 7'H x 30'W x 8'L
31048	0314.00	EBRDP biologists electro-fishing site
31645	0322.00	Possible 1+ SH observed, unsure of identification.
32287	0336.00	Left bank Tributary #3 is unnamed and enters Wildcat Creek. It is Flowing, with a discharge <1cfs, and contributes <5% of flow to the receiving stream. Water temperature downstream and upstream= 63, and within the tributary=62F. The survey crew checked 50’ up and found it is accessible to fish, with a slope >5%. No fish were observed. WP004 N37.93685 W122.29811
33869	0366.00	Dark colored newt larvae observed, 1-2 cm long.
34532	0380.00	Left bank Tributary #4 is unnamed and enters Wildcat Creek. It is not Flowing with a discharge= 0, and contributes 0% of flow to the receiving stream. Water temperature downstream and upstream= 61 and is dry in the tributary. It is not Accessible to fish, with a Slope >5% No fish were observed. WP009 N37.93496 W122.29311
34913	0386.00	3' diameter culvert at dirt road crossing 20' upstream from confluence. WP010 N37.93481 W122.29239
34913	0386.00	Right bank Tributary #5 is unnamed and enters Wildcat Creek. It is not Flowing and has a discharge= 0, and contributes 0% of flow to the receiving stream. Water temperature downstream and upstream= 65 and the tributary is dry. The survey crew checked100' up, and found it was accessible to fish, with a slope, 2%. No fish observed. WP010 N37.93481 W122.29239
35652	0396.00	Large boulders placed on the left bank for the entire length of unit.
35936	0399.00	Right bank Tributary #6 is unnamed and enters Wildcat Creek. Flowing, Discharge, <1cfs. Contributes 40% of flow to stream est. Water temps d/s& u/s 65F & trib 65F. Accessible to fish,

Wildcat Creek

Position (ft.)	Habitat Unit #	Comments:
		checked 100' up trib. Slope, 2%est. No fish observed. N37.93409 W122.28925
36074	0402.00	Bridge #16 is an open space fire road bridge that has a Length=25',a Height=6', and a Width=7'. It is made of concrete, stone, and CMP and is not retaining gravel. Height of the water to the sill of the bridge= 0.5'. It is not creating any downcutting and is not a barrier to salmonids. WP013 N37.93390 W122.28895
36411	0408.00	1+ SH observed
36505	0410.00	Right Bank Tributary #7 is an unnamed creek that enters Wildcat Creek. It is not flowing, with a Discharge= 0, and contributes 0% of flow to the receiving stream. Water temps downstream and upstream= 64 & the tributary is dry. The survey crew checked 50’ upstream and found it is accessible to fish, with a Slope= 10%. No fish were observed. WP014 N37.93310 W122.28818
40442	0476.00	The Right Bank is erosive and silty with clay material. It is 15' high by 20’wide by 30’ long
41984	0494.00	Right bank tributary #8 is unnamed and enters Wildcat Creek. Flowing, no, dry. Discharge, 0. Contributes 0% of flow to stream est. Water temps d/s, u/s uk & trib dryF. Accessible to fish, yes, checked 50' up trib. Slope, <5% est. No fish observed. WP023 N37.92191 W122.27972
42813	0513.00	Right Bank Tributary #9 is unnamed and enters Wildcat Creek. It is not Flowing and has a Discharge=0 and contributes 0% of flow to the receiving stream. Water temperatures were not taken because it was dry. The survey crew checked 100’ upstream and found It is Accessible to fish, with a Slope= 2%. No fish were observed. WP026 N37.92017 W122.27863
44059	0540.00	Right Bank Tributary #10 is unnamed and enters Wildcat Creek. It is not Flowing with a Discharge= 0, and contributes 0% of flow to the receiving stream. Water temperatures were not taken because the streams were dry. The survey crew checked 50’ upstream and found it was accessible to fish, with a slope=10% est. No fish were observed. WP031 N37.91783 W122.27631
44333	0548.00	2 pools with bedrock outcrops at top of each unit create small 1' plunges.
44489	0552.00	On Right bank, oak tree has fallen in stream, exposing soil on bank. It has a 15' height by a 20' length at the top of the unit.

Wildcat Creek

Position (ft.)	Habitat Unit #	Comments:
44758	0556.00	Left bank tributary #5 is unnamed and enters Wildcat Creek. It is not Flowing, with a Discharge= 0, and contributes 0% of flow to the receiving stream. Water temperature downstream= 59, and upstream= 60. Water temperature was not taken in the tributary because it was dry. not Accessible to fish, Slope, 5% est. No fish observed. N37.91626 W122.27550
45532	0575.00	Unknown fish observed 1-2cm long.
45697	0578.00	Right bank Tributary #11 is unnamed and enters Wildcat Creek. It is not Flowing, with a Discharge= 0, and contributes 0% of flow to the receiving stream est. Water temperatures upstream and downstream=59; water temperature was not taken due to lack of water in the tributary. It is Accessible to fish, with a Slope <5%. No fish were observed. WP036 N37.91517 W122.27278
46094	0583.00	Right Bank Tributary #12 is unnamed and enters Wildcat Creek. The tributary Is not flowing. The crew checked 50’ upstream and found it was not accessible to Fish, with a slope >5%. No fish were observed. N37.91465 W122.27179
47004	0598.00	Plunge pool created by dam spill way with a plunge height= 8'. See photo.
47059	0599.00	Dam spillway for Jewel Lake
47218	0600.00	Bridge #17 is the Tilden Nat. Area footbridge; it has a Length=7', a Height=10', and a Width=26'. It is made of wood and is not retaining gravel. There is no sill, no downcutting and is not a barrier to fish passage. No WP was taken; see WP040 upstream for dam information.
47241	0602.00	WP040 N37.91292 W122.26945 Beginning no access.
47241	0602.00	Dam #1 has a Length =0.5', a Height=9', and a width=26'. No Flashboards Are installed but the dam is creating downcutting with a height= 8’. Sill to water level= 0’ and is retaining gravel. The dam is a possible barrier to juvenile and adult aslmonids. WP040 N37.91292 W122.26945
47241.5	0603.00	Jewel Lake. End of no access/ Survey continues at WP041 N37.91144 W122.26859
48166.5	0611.00	Yellow-legged frog observed
48442.5	0616.00	Right bank Tributary #13 is unnamed and enters Wildcat Creek. It is not Flowing, and has a Discharge= 0, and contributes 0% of flow to the receiving stream est. Water temperatures upstream and wonstream= 60. Water temperatures was not taken for the tributary because it was dry. It is accessible to fish, with a Slope= 1% No fish were observed.WP043 N37.91024 W122.26710

Wildcat Creek

Position (ft.)	Habitat Unit #	Comments:
48637.5	0618.00	Begin no access at WP044 N37.91022 W122.26673 due to extremely thick willows and deep water. End of no access at WP045 N37.90966 W122.26638
49285.5	0627.00	Culvert #6 is in stream diverting flow under Tilden Nat. Rec. Fire road. one culvert is made of a concrete box, with a Height=5', a Width=8', and a Length=60'. The Maximum Depth at the outlet of the culvert=6'. Culvert slope is estimated to be 0%. The culvert is flooded and is a potential barrier to juvenile and adults salmonids. WP046 N37.90918 W122.26514
49375.5	0629.00	Dam #2 has a Length=10', a Height=5', and a Width=25', and is constructed of boulders, LWD, and milled wood (see photo). Flashboards were not installed but dam is creating downcutting with a Height =5'. The sill is retaining gravel and the height of the water level to the sill= 0'. It is a possible barrier to juveniles and adult salmonids. No WP is taken
49963.5	0638.00	Right Bank Tributary #14 is unnamed and enters Wildcat Creek. It is not Flowing, And has a discharge= 0, and contributes 0% of flow to the receiving stream. Water temperature downstream and upstream= 60 and water temperature was not taken in the tributary. The survey crew checked 100' upstream and found it was accessible to fish, with a Slope= 5%. No fish were observed. WP 047 N37.90877 W122.26353
51126.5	0658.00	Left Bank tributary #6 is unnamed and enters Wildcat Creek. It is Flowing, with a discharge <1 cfs, and contributes 50% of flow to the receiving stream. Water temperatures upstream and downstream=61 & a water temperature of 60F within the tributary. The survey crew checked 150' upstream and found it was accessible to fish, with a Slope= 1% est. No fish were observed. WP051 N37.90646 W122.26277
51653.5	0668.00	Unidentified fish observed.
51669.5	0669.00	Right Bank tributary #15 is unnamed and enters Wildcat Creek. It is not Flowing, with a Discharge= 0, and contributes 0% of flow to the receiving stream. Water temperatures upstream and downstream= 60. Water temperature was not taken for the Tributary because it was dry. The survey crew checked 100' upstream and found it was accessible to fish with a Slope= 2%. No fish were observed. WP053 N37.90586 W122.26166
51767.5	0670.00	Culvert #7 is under Tilden Nat. Res. road. One Culvert is Made of a concrete box, With a Height=8', a Width=8', and a Length=57'. The maximum Depth at the outlet=0.1', with a culvert slope= 1%. It is in good condition and is a Possible barrier to juvenile and adult salmonids. No WP taken

Wildcat Creek

Position (ft.)	Habitat Unit #	Comments:
53010.5	0687.00	Right bank Tributary #16 is unnamed and enters Wildcat Creek. It is not Flowing, and has a Discharge= 0, and contributes 0% of flow to the receiving stream. Water temperature downstream and upstream= 58 and water temperature was not taken in The tributary because it was dry. The survey crew, checked 50' upstream and found it was accessible to fish, with a Slope= 5%. No fish were observed.WP055 N37.90364 W122.25871
53010.5	0687.00	Bottom 50' of unit on the right bank is very erosive and is roughly 10’ in height.
53010.5	0687.00	Gopher snake observed.
54554.5	0709.00	Right Bank tributary #17 is unnamed and enters Wildcat Creek. It is not Flowing, and has a Discharge= 0, and contributes 0% of flow to the receiving stream. Water temperature upstream and downstream =59 & the tributary water temperature was not taken Due to lack of water. The survey crew checked 50' upstream and found it was accessible to fish, with a Slope= 5% est. No fish were observed. WP058 N37.90317 W122.25507
55297.5	0722.00	Begin No access at WP060 N37.90170 W122.25399 due to very thick poison oak. End of no access at WP061 N37.90122 W122.25381
55555.5	0724.00	Possible salmonid observed
56111.5	0728.00	Large 6" fish observed, possibly a SH
56359.5	0732.00	Unknown fish observed. Possibly a SH
56544.5	0737.00	Bridge #18. is the Tilden Nat. Res. Road/ford crossing which has a Length=17', a Height=0', and a Width=20'. The bridge is made of concrete, and is Retaining gravel. The height form the water level to the sill= 0’. The bridge is creating Downcut and is considered a possible barrier to fish. WP063 N37.89876 W122.25246. 5' downcut made of cement.
56670.5	0741.00	Crayfish Observed
57146.5	0744.00	End of Survey at Lake Anza Dam spillway WP064 N37.89777 W122.25177

REFERENCES

Flosi, G., Downie, S., Hopelain, J., Bird, M., Coey, R., and Collins, B. 1998. *California Salmonid Stream Habitat Restoration Manual*, 3rd edition. California Department of Fish and Game, Sacramento, California.

McCain, M., D. Fuller, L. Decker and K. Overton. 1990. Stream habitat classification and inventory procedures for northern California. FHC Currents. No.1. U.S. Department of Agriculture. Forest Service, Pacific Southwest Region.

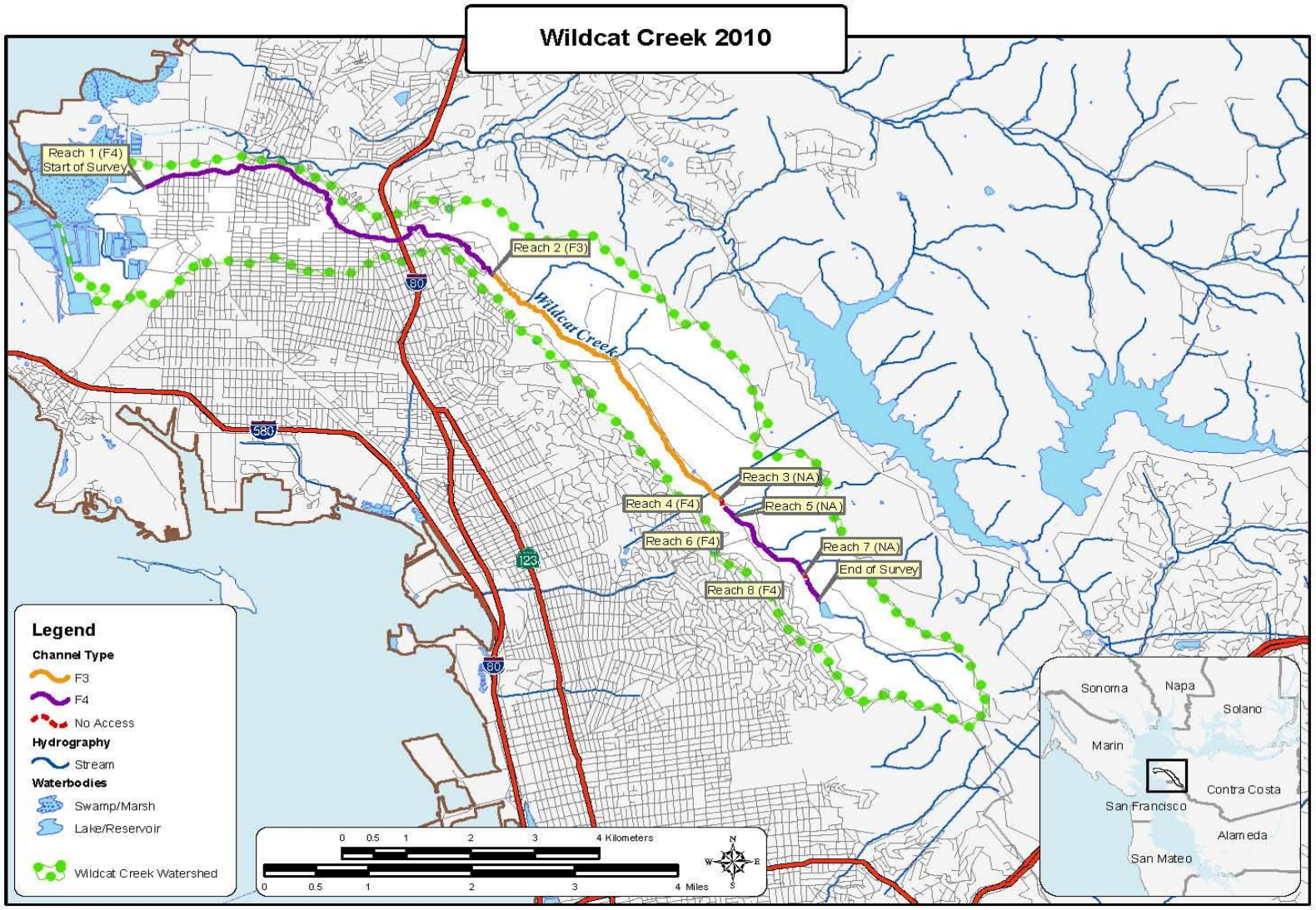
Rosgen, D.L., 1994. A Classification of Natural Rivers. Catena, Vol 22: 169-199, Elsevier Science, B. V. Amsterdam.

Wildcat Creek

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}
ADDITIONAL UNIT DESIGNATIONS			
Dry	(DRY)	[7.0]	
Culvert	(CUL)	[8.0]	
Not Surveyed	(NS)	[9.0]	
Not Surveyed due to a marsh	(MAR)	[9.1]	

Wildcat Creek



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Prepared by: Scott Webb, December 2010

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

Stream Name: Wildcat Creek **LLID:** 1223877379532 **Drainage:** Pinole

Survey 8/16/2010 to 9/1/2010

Confluence Location: **Quad:** SAN QUENTIN **Legal Description:** T01NR05WS2 **Latitude:** 37:57:12.0N **Longitude:** 122:23:16.0W

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
27	0	CULVERT	3.6	105	2847	5.0									
53	0	DRY	7.1	229	12158	21.3									0
273	272	FLATWATER	36.7	77	20915	36.6	7.4	0.5	1.0	541	147603	277	75600		7
3	0	NOSURVEY	0.4	325	975	1.7									
176	176	POOL	23.7	37	6581	11.5	9.7	0.9	2.1	367	64623	423	73671	382	23
212	212	RIFFLE	28.5	64	13671	23.9	6.4	0.2	0.4	314	66475	68	14464		1

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
744	660	57147	278701	163735

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Wildcat Creek **LLID:** 1223877379532 **Drainage:** Pinole

Survey 8/16/2010 to 9/1/2010

Confluence Location: Quad: SAN QUENTIN **Legal Description:** T01NR05WS2 **Latitude:** 37:57:12.0N **Longitude:** 122:23:16.0W

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 (%)
201	201	LGR	27.0	63	12565	22.0	6.0	0.2	0.9	308	61822	68	13573		1	88
4	4	HGR	0.5	162	649	1.1	8.0	0.3	0.9	464	1856	113	451		19	94
1	1	CAS	0.1	49	49	0.1	6.0	0.1	0.1	206	206	21	21		0	95
6	6	BRS	0.8	68	408	0.7	8.0	0.2	0.9	432	2591	70	419		0	93
155	154	GLD	20.8	69	10666	18.7	8.0	0.5	2.2	556	86160	323	50141		8	86
71	71	RUN	9.5	76	5372	9.4	6.0	0.4	2.0	438	31096	177	12535		4	88
47	47	SRN	6.3	104	4877	8.5	7.0	0.4	1.6	646	30362	276	12971		8	88
1	1	TRP	0.1	18	18	0.0	5.0	0.5	1.7	90	90	54	54	45	0	100
55	55	MCP	7.4	38	2067	3.6	9.0	0.9	5.7	332	18234	386	21219	346	15	92
4	4	CCP	0.5	32	129	0.2	10.0	1.1	3.7	311	1244	384	1536	353	18	93
1	1	STP	0.1	56	56	0.1	9.0	0.9	1.7	479	479	479	479	431	20	93
8	8	CRP	1.1	45	362	0.6	9.0	0.9	2.9	412	3294	411	3291	367	35	87
19	19	LSL	2.6	28	533	0.9	9.0	1.0	3.0	248	4715	277	5261	256	44	89
22	22	LSR	3.0	34	755	1.3	9.0	0.8	3.9	303	6671	296	6219	256	33	89
34	34	LSBk	4.6	41	1400	2.4	9.0	0.9	4.0	382	12993	389	13227	346	14	91
23	23	LSBo	3.1	41	939	1.6	11.0	0.8	3.7	436	10038	429	9443	374	23	92
8	8	PLP	1.1	26	212	0.4	15.0	1.5	4.7	455	3639	974	7795	910	43	93
1	1	DPL	0.1	110	110	0.2	26.0	1.8	3.0	2860	2860	5148	5148	5148	30	87
53	0	DRY	7.1	229	12158	21.3									0	70
27	0	CUL	3.6	105	2847	5.0										43
3	0	NS	0.4	325	975	1.7										

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume
744	660	57147	278349	163782

Table 3 - Summary of Pool Habitat Types

Stream Name: Wildcat Creek **LLID:** 1223877379532 **Drainage:** Pinole

Survey 8/16/2010 to 9/1/2010

Confluence Location: Quad: SAN QUENTIN **Legal Description:** T01NR05WS2 **Latitude:** 37:57:12.0N **Longitude:** 122:23:16.0W

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
61	61	MAIN	35	37	2270	34	9.1	0.9	329	20046	343	20918	15
114	114	SCOUR	65	37	4201	64	9.9	0.9	363	41350	361	40438	28
1	1	BACKWATER	1	110	110	2	26.0	1.8	2860	2860	5148	5148	30

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
176	176	6581	64256	66504

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

Stream Name: Wildcat Creek **LLID:** 1223877379532 **Drainage:** Pinole

Survey 8/16/2010 to 9/1/2010

Confluence Location: Quad: SAN QUENTIN **Legal Description:** T01NR05WS2 **Latitude:** 37:57:12.0N **Longitude:** 122:23:16.0W

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
1	TRP	1	0	0	1	100	0	0	0	0	0	0
55	MCP	31	0	0	37	67	12	22	4	7	2	4
4	CCP	2	0	0	0	0	3	75	1	25	0	0
1	STP	1	0	0	1	100	0	0	0	0	0	0
8	CRP	5	0	0	2	25	6	75	0	0	0	0
19	LSL	11	0	0	11	58	7	37	1	5	0	0
21	LSR	12	1	5	7	33	7	33	6	29	0	0
34	LSBk	19	0	0	17	50	13	38	3	9	1	3
23	LSBo	13	2	9	11	48	7	30	3	13	0	0
8	PLP	5	0	0	3	38	2	25	1	13	2	25
1	DPL	1	0	0	0	0	0	0	1	100	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 >= 4 Feet % Occurrence
175	3	2	90	51	57	33	20	11	5	3

Mean Maximum Residual Pool Depth (ft.): 2

Table 5 - Summary of Mean Percent Cover By Habitat

Stream Name: Wildcat Creek **Dry Units:** 53 **LLID:** 1223877379532 **Drainage:** Pinole

Survey 8/16/2010 to 9/1/2010

Confluence Location: Quad: SAN QUENTIN **Legal Description:** T01NR05WS2 **Latitude:** 37:57:12.0N **Longitude:** 122:23:16.0W

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
201	165	LGR	0	0	0	0	0	0	0	10	0
4	4	HGR	0	0	0	0	0	0	0	100	0
1	1	CAS	0	0	0	0	0	0	0	0	0
6	5	BRS	0	0	0	0	0	0	0	0	0
212	175	TOTAL RIFFLE	0	0	0	0	0	0	0	11	0
155	130	GLD	2	7	1	8	10	3	0	16	1
71	57	RUN	1	3	0	2	5	0	0	26	0
47	34	SRN	0	5	0	3	6	0	0	32	0
273	221	TOTAL FLAT	2	6	0	6	8	2	0	21	1
1	1	TRP	0	0	0	0	0	0	0	0	0
55	55	MCP	13	5	2	24	15	0	0	14	0
4	4	CCP	8	3	0	40	25	0	0	0	0
1	1	STP	0	0	0	0	90	0	0	0	10
8	8	CRP	14	11	0	29	23	9	0	3	0
19	19	LSL	1	39	17	10	24	0	0	2	2
22	22	LSR	25	10	1	42	10	4	0	8	0
34	34	LSBk	1	6	1	8	7	2	0	35	16
23	23	LSBo	5	7	4	12	5	1	0	62	0
8	8	PLP	6	9	4	11	23	0	0	43	5
1	1	DPL	0	0	0	0	20	80	0	0	0
176	176	TOTAL POOL	9	10	4	20	14	2	0	23	3
27	0	CUL									
3	0	NS									
744	576	TOTAL	3	5	1	8	7	1	0	19	1

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Wildcat Creek **Dry Units:** 53 **LLID:** 1223877379532 **Drainage:** Pinole

Survey 8/16/2010 to 9/1/2010

Confluence Location: **Quad:** SAN QUENTIN **Legal Description:** T01NR05WS2 **Latitude:** 37:57:12.0N **Longitude:** 122:23:16.0W

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
201	164	LGR	0	3	81	16	0	0	0
4	4	HGR	0	0	25	25	25	25	0
1	1	CAS	0	0	0	0	0	0	100
6	5	BRS	0	0	0	0	0	0	100
155	125	GLD	7	62	28	2	0	0	1
71	56	RUN	4	32	57	7	0	0	0
47	34	SRN	0	21	76	3	0	0	0
1	1	TRP	0	100	0	0	0	0	0
55	55	MCP	20	67	13	0	0	0	0
4	4	CCP	0	50	25	0	25	0	0
1	1	STP	0	100	0	0	0	0	0
8	8	CRP	0	100	0	0	0	0	0
19	19	LSL	21	63	16	0	0	0	0
22	22	LSR	14	82	5	0	0	0	0
34	34	LSBk	0	59	3	6	0	0	32
23	23	LSBo	0	78	9	4	0	0	9
8	8	PLP	38	25	0	25	13	0	0
1	1	DPL	100	0	0	0	0	0	0
27	0	CUL	0	0	0	0	0	0	0
3	0	NS	0	0	0	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Wildcat Creek **LLID:** 1223877379532 **Drainage:** Pinole

Survey 8/16/2010 to 9/1/2010

Confluence Location: **Quad:** SAN QUENTIN **Legal Description:** T01NR05WS2 **Latitude:** 37:57:12.0N **Longitude:** 122:23:16.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
88	2	98	0	70	73

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.

Wildcat Creek

Table 8 - Fish Habitat Inventory Data Summary

Stream Wildcat Creek LLID: 1223877379532 Drainage Pinole

Survey Dates: 8/16/2010 to 9/1/2010 Survey Length (ft.): 57147 Main Channel (ft.): 57147 Side Channel (ft.): 0

Confluence Location: Quad SAN QUENTIN Legal Description: T01NR05WS2 Latitude: 37:57:12.0N Longitude: 122:23:16.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: F4
Reach Length (ft.): 24723
Riffle/Flatwater Mean Width (ft.): 8.1
BFW:
Range (ft.): 12.00 to 29.00
Mean (ft.): 18.78
Std. Dev.: 4.13
Base Flow (cfs): 0
Water (F): 59 - 70 Air (F): 60 - 66
Dry Channel (ft.): 11090

Canopy Density (%): 78.8
Coniferous Component (%): 5.3
Hardwood Component 94.7
Dominant Bank Hardwood Trees
Vegetative Cover (%): 63.7
Dominant Boulders
Dominant Bank Substrate Sand/Silt/Clay
Occurrence of LWD (%): 0.8
LWD per 100 ft.:
Riffles: 0
Pools: 1
Flat: 0

Pools by Stream Length 4.7
Pool Frequency (%): 15.1
Residual Pool Depth (%):
< 2 Feet Deep: 66.7
2 to 2.9 Feet Deep: 23.3
3 to 3.9 Feet Deep: 6.7
>= 4 Feet Deep: 3.3
Mean Max Residual Pool Depth 1.99
Mean Pool Shelter 19

Pool Tail Substrate (%): Silt/Clay: 3.3 Sand: 20.0 Gravel: 76.7 Sm Cobble: 0.0 Lg Cobble: 0.0 Boulder 0.0 Bedrock: 0.0
Embeddedness Values (%): 1. 50.0 2. 23.3 3. 3.3 4. 0.0 5. 23.3

STREAM REACH: 2

Channel Type: F3
Reach Length (ft.): 22519
Riffle/Flatwater Mean Width (ft.): 7.0
BFW:
Range (ft.): 8.00 to 29.00
Mean (ft.): 17.15
Std. Dev.: 4.37
Base Flow (cfs): 0
Water (F): 58 - 69 Air (F): 60 - 75
Dry Channel (ft.): 1068

Canopy Density (%): 89.4
Coniferous Component (%): 0.0
Hardwood Component 100.0
Dominant Bank Hardwood Trees
Vegetative Cover (%): 71.8
Dominant Boulders
Dominant Bank Substrate Sand/Silt/Clay
Occurrence of LWD (%): 1.2
LWD per 100 ft.:
Riffles: 0
Pools: 1
Flat: 0

Pools by Stream Length 18.0
Pool Frequency (%): 26.1
Residual Pool Depth (%):
< 2 Feet Deep: 46.7
2 to 2.9 Feet Deep: 37.1
3 to 3.9 Feet Deep: 14.3
>= 4 Feet Deep: 1.9
Mean Max Residual Pool Depth 2.21
Mean Pool Shelter 24

Pool Tail Substrate (%): Silt/Clay: 3.8 Sand: 51.4 Gravel: 41.9 Sm Cobble: 1.9 Lg Cobble: 1.0 Boulder 0.0 Bedrock: 0.0
Embeddedness Values (%): 1. 11.4 2. 18.1 3. 11.4 4. 3.8 5. 55.2

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

Channel Type: NA
Reach Length (ft.): 590
Riffle/Flatwater Mean Width (ft.):
BFW:
Range (ft.): 10.00 to 10.00
Mean (ft.): 10.00
Std. Dev.: 0.00
Base Flow (cfs): 0
Water (F): 59 - 59 Air (F): 64 - 64
Dry Channel (ft.): 0

Canopy Density (%):
Coniferous Component (%):
Hardwood Component
Dominant Bank
Vegetative Cover (%): 0.0
Dominant
Dominant Bank Substrate
Occurrence of LWD (%):
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length 0.0
Pool Frequency (%): 0.0
Residual Pool Depth (%):
< 2 Feet Deep:
2 to 2.9 Feet Deep:
3 to 3.9 Feet Deep:
>= 4 Feet Deep:
Mean Max Residual Pool Depth
Mean Pool Shelter

Pool Tail Substrate (%): Silt/Clay: Sand: Gravel: Sm Cobble: Lg Cobble: Boulder Bedrock:
Embeddedness Values (%): 1. 2. 3. 4. 5. 0.0

STREAM REACH: 4

Channel Type: F4
Reach Length (ft.): 806
Riffle/Flatwater Mean Width (ft.): 5.0
BFW:
Range (ft.): 9.00 to 10.00
Mean (ft.): 9.50
Std. Dev.: 0.50
Base Flow (cfs): 0
Water (F): 59 - 59 Air (F): 64 - 65
Dry Channel (ft.): 0

Canopy Density (%): 94.2
Coniferous Component (%): 0.0
Hardwood Component 100.0
Dominant Bank Hardwood Trees
Vegetative Cover (%): 84.0
Dominant Undercut Banks
Dominant Bank Substrate Sand/Silt/Clay
Occurrence of LWD (%): 5.0
LWD per 100 ft.:
Riffles: 0
Pools: 1
Flat: 1

Pools by Stream Length 29.5
Pool Frequency (%): 35.7
Residual Pool Depth (%):
< 2 Feet Deep: 60.0
2 to 2.9 Feet Deep: 40.0
3 to 3.9 Feet Deep: 0.0
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth 1.88
Mean Pool Shelter 21

Pool Tail Substrate (%): Silt/Clay: 40.0 Sand: 60.0 Gravel: 0.0 Sm Cobble: 0.0 Lg Cobble: 0.0 Boulder 0.0 Bedrock: 0.0
Embeddedness Values (%): 1. 0.0 2. 0.0 3. 0.0 4. 0.0 5. 100.0

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 5

Channel Type: NA
Reach Length (ft.): 210
Riffle/Flatwater Mean Width (ft.):
BFW:
Range (ft.): 9.00 to 9.00
Mean (ft.): 9.00
Std. Dev.: 0.00
Base Flow (cfs): 0
Water (F): 59 - 59 Air (F): 65 - 65
Dry Channel (ft.): 0

Canopy Density (%):
Coniferous Component (%):
Hardwood Component
Dominant Bank
Vegetative Cover (%): 0.0
Dominant
Dominant Bank Substrate
Occurrence of LWD (%):
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length 0.0
Pool Frequency (%): 0.0
Residual Pool Depth (%):
< 2 Feet Deep:
2 to 2.9 Feet Deep:
3 to 3.9 Feet Deep:
>= 4 Feet Deep:
Mean Max Residual Pool Depth
Mean Pool Shelter

Pool Tail Substrate (%): Silt/Clay: Sand: Gravel: Sm Cobble: Lg Cobble: Boulder Bedrock:
Embeddedness Values (%): 1. 2. 3. 4. 5. 0.0

STREAM REACH: 6

Channel Type: F4
Reach Length (ft.): 6450
Riffle/Flatwater Mean Width (ft.): 5.3
BFW:
Range (ft.): 9.00 to 21.00
Mean (ft.): 14.46
Std. Dev.: 3.96
Base Flow (cfs): 0
Water (F): 57 - 61 Air (F): 60 - 65
Dry Channel (ft.): 0

Canopy Density (%): 92.5
Coniferous Component (%): 2.6
Hardwood Component 97.4
Dominant Bank Hardwood Trees
Vegetative Cover (%): 80.4
Dominant Terrestrial Veg.
Dominant Bank Substrate Sand/Silt/Clay
Occurrence of LWD (%): 1.9
LWD per 100 ft.:
Riffles: 0
Pools: 0
Flat: 0

Pools by Stream Length 15.5
Pool Frequency (%): 30.1
Residual Pool Depth (%):
< 2 Feet Deep: 54.8
2 to 2.9 Feet Deep: 29.0
3 to 3.9 Feet Deep: 9.7
>= 4 Feet Deep: 6.5
Mean Max Residual Pool Depth 2.2
Mean Pool Shelter 28

Pool Tail Substrate (%): Silt/Clay: 25.8 Sand: 16.1 Gravel: 35.5 Sm Cobble: 16.1 Lg Cobble: 3.2 Boulder 0.0 Bedrock: 3.2
Embeddedness Values (%): 1. 3.2 2. 29.0 3. 9.7 4. 12.9 5. 45.2

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 7

Channel Type: NA
Reach Length (ft.): 175
Riffle/Flatwater Mean Width (ft.):
BFW:
Range (ft.): 11.00 to 11.00
Mean (ft.): 11.00
Std. Dev.: 0.00
Base Flow (cfs): 0
Water (F): 60 - 60 Air (F): 63 - 63
Dry Channel (ft.): 0

Canopy Density (%):
Coniferous Component (%):
Hardwood Component
Dominant Bank
Vegetative Cover (%): 0.0
Dominant
Dominant Bank Substrate
Occurrence of LWD (%):
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length 0.0
Pool Frequency (%): 0.0
Residual Pool Depth (%):
< 2 Feet Deep:
2 to 2.9 Feet Deep:
3 to 3.9 Feet Deep:
>= 4 Feet Deep:
Mean Max Residual Pool Depth
Mean Pool Shelter

Pool Tail Substrate (%): Silt/Clay: Sand: Gravel: Sm Cobble: Lg Cobble: Boulder Bedrock:
Embeddedness Values (%): 1. 2. 3. 4. 5. 0.0

STREAM REACH: 8

Channel Type: F4
Reach Length (ft.): 1674
Riffle/Flatwater Mean Width (ft.): 6.9
BFW:
Range (ft.): 11.00 to 24.00
Mean (ft.): 13.36
Std. Dev.: 5.01
Base Flow (cfs): 0
Water (F): 60 - 60 Air (F): 63 - 65
Dry Channel (ft.): 0

Canopy Density (%): 97.4
Coniferous Component (%): 0.0
Hardwood Component 100.0
Dominant Bank Hardwood Trees
Vegetative Cover (%): 64.0
Dominant Boulders
Dominant Bank Substrate Sand/Silt/Clay
Occurrence of LWD (%): 0.0
LWD per 100 ft.:
Riffles: 0
Pools: 1
Flat: 0

Pools by Stream Length 7.5
Pool Frequency (%): 22.7
Residual Pool Depth (%):
< 2 Feet Deep: 100.0
2 to 2.9 Feet Deep: 0.0
3 to 3.9 Feet Deep: 0.0
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth 1.475
Mean Pool Shelter 10

Pool Tail Substrate (%): Silt/Clay: 50.0 Sand: 0.0 Gravel: 0.0 Sm Cobble: 25.0 Lg Cobble: 0.0 Boulder 25.0 Bedrock: 0.0
Embeddedness Values (%): 1. 0.0 2. 25.0 3. 0.0 4. 0.0 5. 75.0

Table 9 -Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Wildcat Creek **LLID:** 1223877379532 **Drainage:** Pinole

Survey 8/16/2010 to 9/1/2010

Confluence Location: **Quad:** SAN QUENTIN **Legal Description:** T01NR05WS2 **Latitude:** 37:57:12.0N **Longitude:** 122:23:16.0W

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	39	47	10.2
Boulder	13	18	3.7
Cobble/Gravel	5	6	1.3
Sand/Silt/Clay	365	351	84.8

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	3	4	0.8
Brush	35	46	9.6
Hardwood	375	366	87.8
Coniferous	5	3	0.9
No Vegetation	4	3	0.8

Total Stream Cobble Embeddedness Values: 4

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

Stream Name: Wildcat Creek **LLID:** 1223877379532 **Drainage:** Pinole

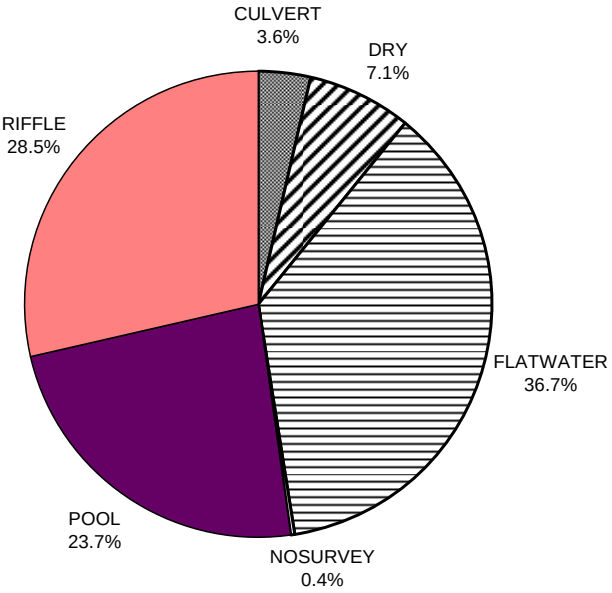
Survey 8/16/2010 to 9/1/2010

Confluence Location: **Quad:** SAN QUENTIN **Legal Description:** T01NR05WS2 **Latitude:** 37:57:12.0N **Longitude:** 122:23:16.0W

	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	2	9
SMALL WOODY DEBRIS (%)	0	6	10
LARGE WOODY DEBRIS (%)	0	0	4
ROOT MASS (%)	0	6	20
TERRESTRIAL VEGETATION	0	8	14
AQUATIC VEGETATION (%)	0	2	2
WHITEWATER (%)	0	0	0
BOULDERS (%)	11	21	23
BEDROCK LEDGES (%)	0	1	3

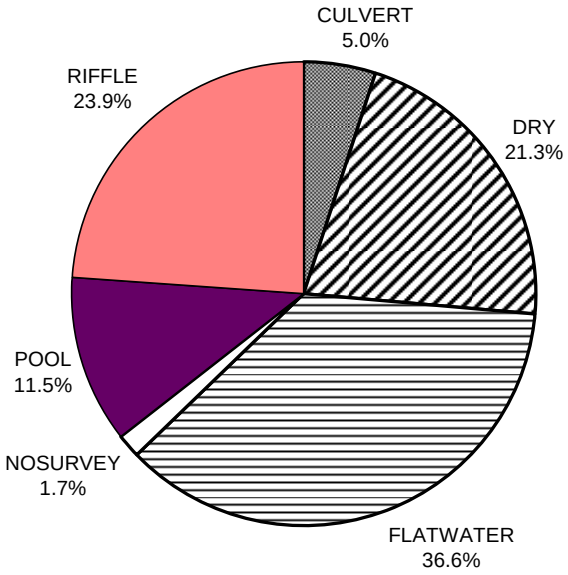
Wildcat Creek

WILDCAT CREEK 2010
HABITAT TYPES BY PERCENT OCCURRENCE



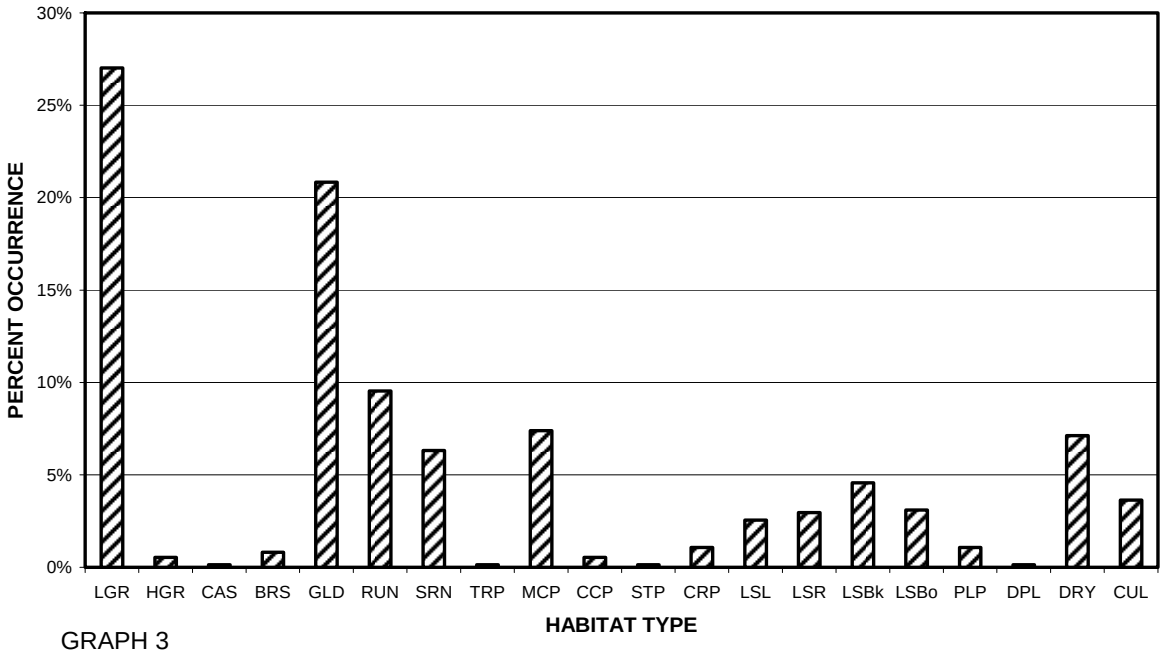
GRAPH 1

WILDCAT CREEK 2010
HABITAT TYPES BY PERCENT TOTAL LENGTH



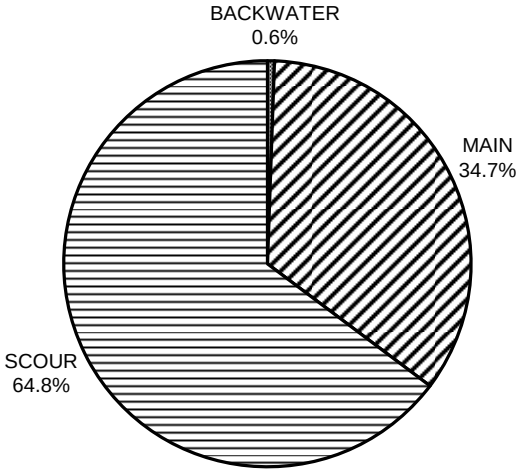
GRAPH 2

WILDCAT CREEK 2010
HABITAT TYPES BY PERCENT OCCURRENCE



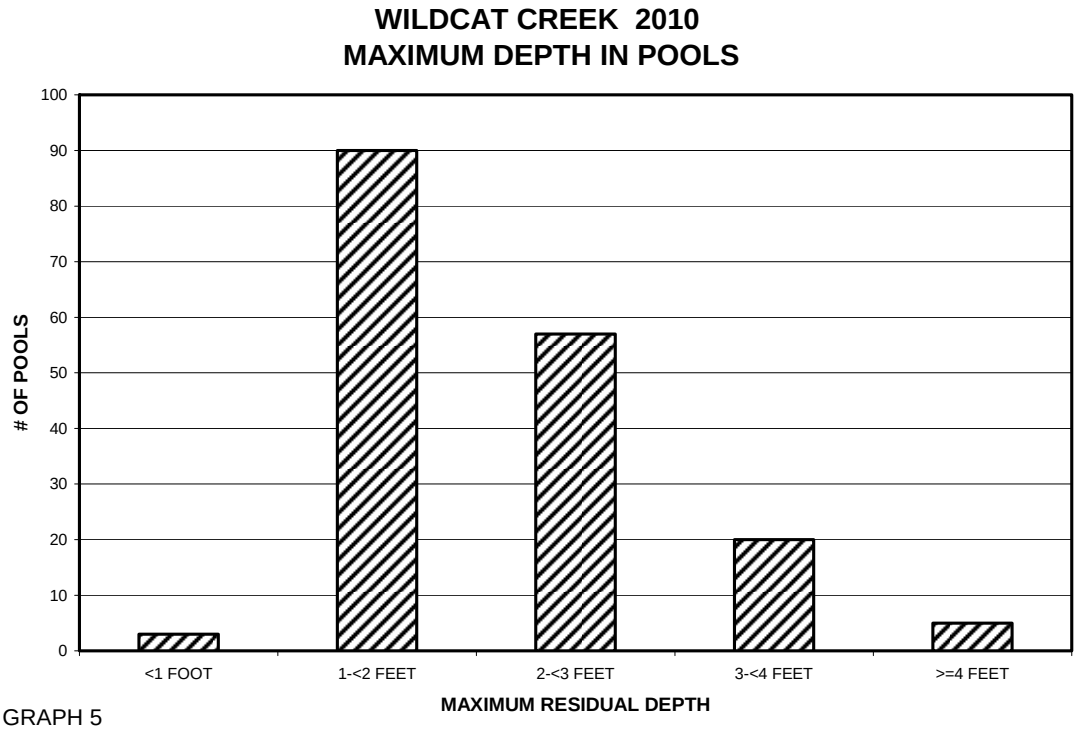
GRAPH 3

WILDCAT CREEK 2010
POOL TYPES BY PERCENT OCCURRENCE

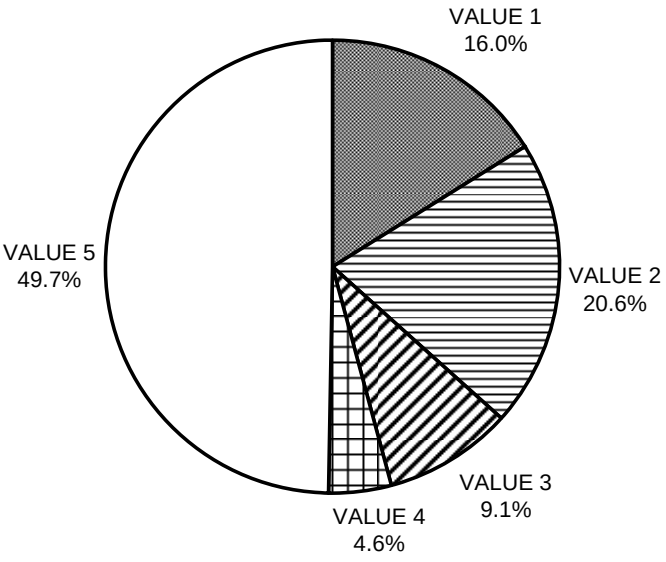


GRAPH 4

Wildcat Creek

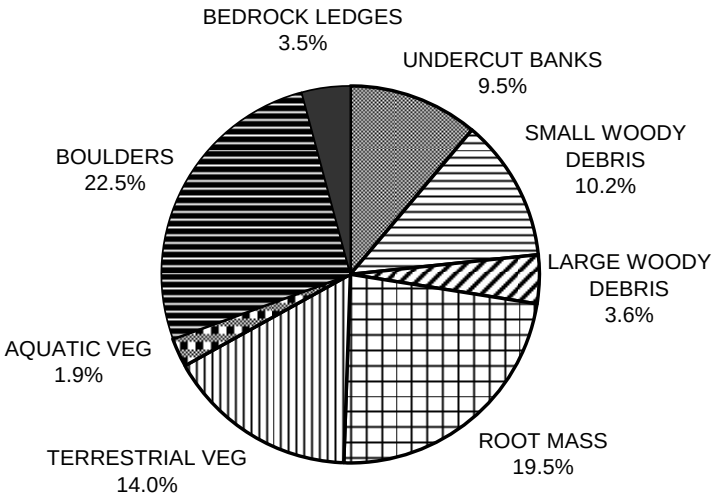


GRAPH 5



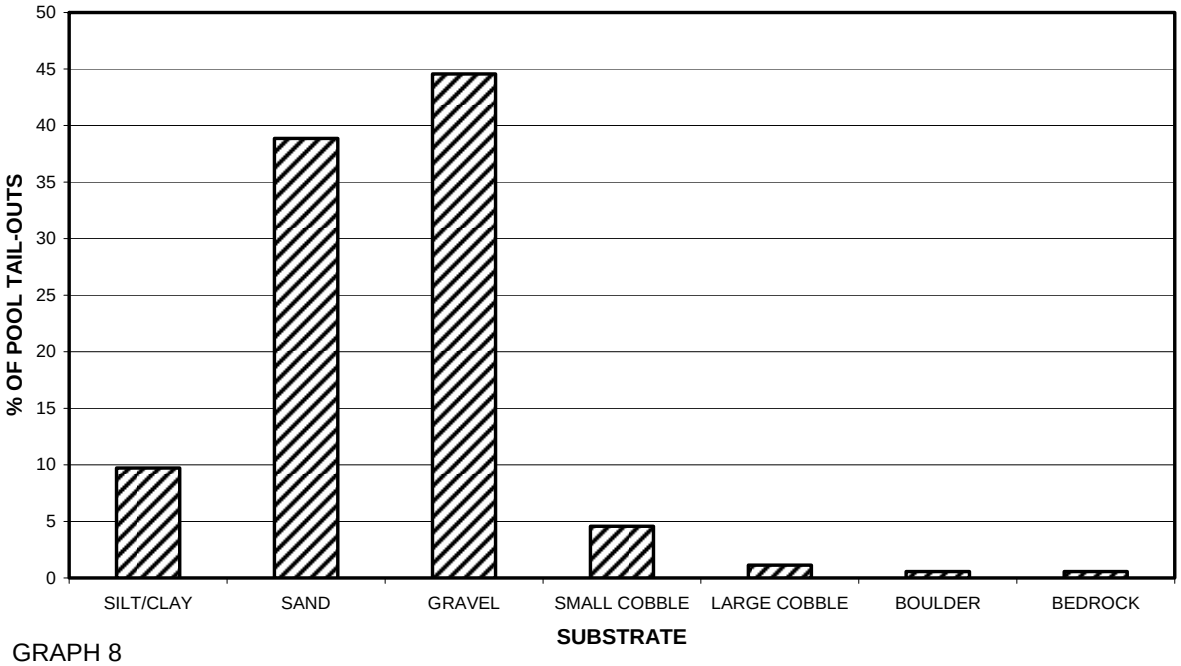
GRAPH 6

WILDCAT CREEK 2010
MEAN PERCENT COVER TYPES IN POOLS



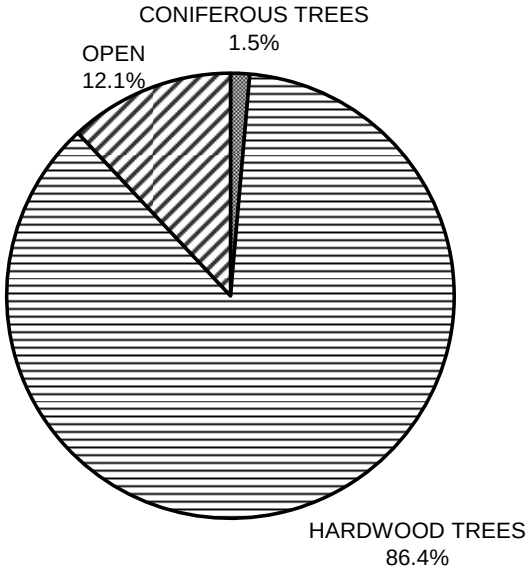
GRAPH 7

WILDCAT CREEK 2010
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



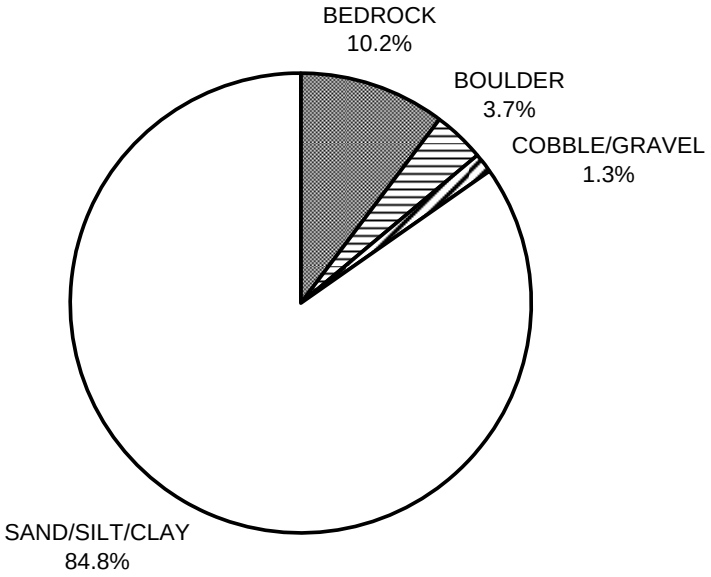
GRAPH 8

WILDCAT CREEK 2010
MEAN PERCENT CANOPY



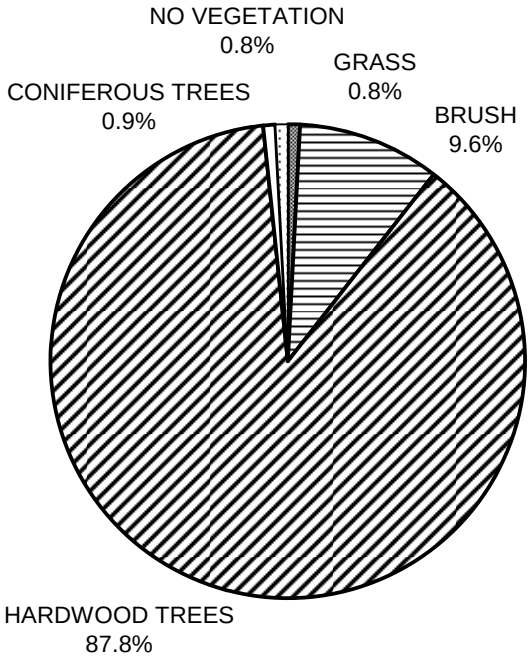
GRAPH 9

WILDCAT CREEK 2010
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

WILDCAT CREEK 2010
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11