

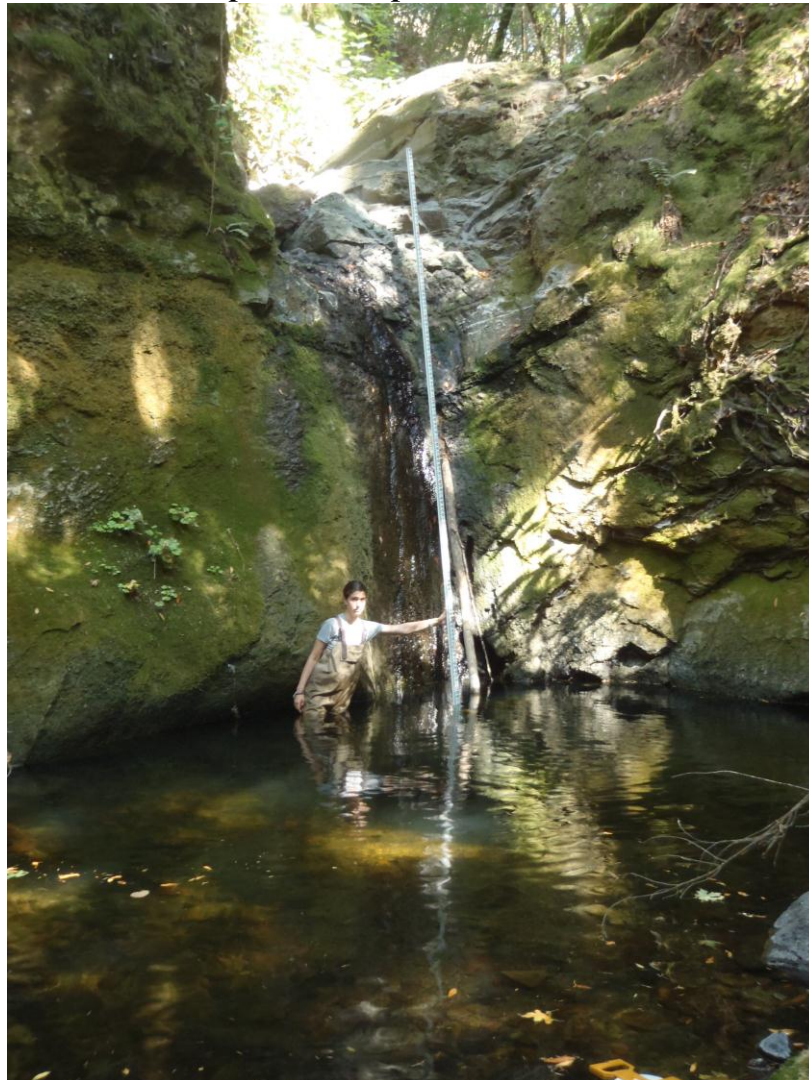


**California Department of Fish and Wildlife
Sonoma County
Russian River Watershed
Stream Habitat Assessment Reports**

Weeks Creek

Surveyed 2012

Report Completed in 2013



Weeks Creek

STREAM INVENTORY REPORT

Weeks Creek

INTRODUCTION

A stream inventory was conducted 8/20/2012 to 8/21/2012 on Weeks Creek. The survey began at the confluence with Mark West Creek and extended upstream 2.2 miles.

The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Weeks 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

Weeks Creek is located in Sonoma County, California (Map 1). It is a tributary to Mark West Creek, which flows into Russian River, which flows into Pacific Ocean. Weeks Creek's legal description at the confluence with Mark West Creek is T08N R07W Sec.29. Its location is 38.5089 north latitude and 122.6482 west longitude, LLID number 1226482385089. Weeks Creek is a second order stream and has approximately 3.2 miles of blue line stream according to the USGS National Hydrology Dataset (NHD). Weeks Creek drains a watershed of approximately 2.3 square miles. Elevations range from about 673 feet at the mouth of the creek to 2,047 feet in the headwater areas. Grasslands and herbaceous vegetation dominates the watershed. The watershed is entirely privately owned, which accounts for 100% of the land area. One hundred percent of the land is considered natural. Vehicle access exists via Calistoga Rd out of Santa Rosa, CA near the intersection with St. Helena Rd. Further access along the creek can be found off of Cleland Rd.

METHODS

The habitat inventory conducted in Weeks Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The 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

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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 Weeks 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". Weeks 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

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the cobble that is surrounded or buried by fine sediment. In Weeks 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 such as 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 Weeks 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 densimeters as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Weeks 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 Weeks 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:

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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 Weeks 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 Weeks 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

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- 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 8/20/2012 to 8/21/2012, was conducted by C. Neill, D. Dela Vega (WSP). The total length of the stream surveyed was 11,539 feet with no additional feet of side channel.

Stream flow was not measured on Weeks Creek.

Weeks Creek is a B3 channel type for 10,382 feet of the stream surveyed (Reach 1), an A1 channel type for 1,157 feet of the stream surveyed (Reach 2). B3 channels are moderately entrenched, moderate gradient, riffle dominated channel with infrequently spaced pools, very stable plan and profile, stable banks, and cobble-dominant substrates. A1 channels are steep, narrow, cascading, step-pool, high energy debris transporting channels associated with depositional soils, and stable bedrock-dominant substrates.

Water temperatures taken during the survey period ranged from 56 to 69 degrees Fahrenheit. Air temperatures ranged from 64 to 83 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 36% pool units, 33% dry units, 13% flatwater units, 12% riffle units, and 7% culvert units (Graph 1). Based on total length of Level II habitat types, there were 76% dry units, 12% pool units, 6% riffle units, 5% flatwater units, and 1% culvert units (Graph 2).

Thirteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were 33% dry units, 23% mid-channel pool units, and 8% run units (Graph 3). Based on percent total length, there were 76% dry units, 6% step pool units and 5% mid-channel pool units.

A total of 31 pools were identified (Table 3). Main channel pools were the most frequently encountered at 81% (Graph 4), and comprised 87% 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. Eleven of the 31 pools (35%) had a residual depth of two feet or greater (Graph 5).

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The depth of cobble embeddedness was estimated at pool tail-outs. Of the 31 pool tail-outs measured, 17 had a value of 1 (55%), 12 had a value of 2 (39%), 1 had a value of 3 (3%), 1 had a value of 4 (3%) (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 5, flatwater habitat types had a mean shelter rating of 10, and pool habitats had a mean shelter rating of 16 (Table 1). Of the pool types, the main channel pools had a mean shelter rating of 18, and scour pools had a mean shelter rating of 7 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Weeks Creek. Graph 7 describes the pool cover in Weeks Creek. Boulders are the dominant pool cover type, followed by undercut banks.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel substrate was observed in 84% of pool tail-outs; and small cobble substrate was observed in 10% of pool tail-outs.

The mean percent canopy density for the surveyed length of Weeks Creek was 85%. Of the canopy present, the mean percentages of hardwood and coniferous trees were 97% and 3%, respectively. Fifteen percent of the canopy was open. Graph 9 describes the mean percent canopy in Weeks Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 84%. The mean percent left bank vegetated was 80% (Table 7). The dominant elements composing the structure of the stream banks consisted of 65% cobble/gravel, 17% boulder, 13% bedrock, and 5% sand/silt/clay (Graph 10). Deciduous trees were the dominant vegetation type observed in 78% of the units surveyed. Additionally, 19% of the units surveyed had brush as the dominant vegetation type, and 3% had grass as the dominant vegetation type (Graph 11).

DISCUSSION

Weeks Creek is a B3 channel type for 10,382 feet of the stream surveyed, and an A1 channel type for 1,157 feet of the stream surveyed. The suitability of B3 and A1 channel types for fish habitat improvement structures is/are as follows: B3 channel types are excellent for plunge weirs, boulder clusters and bank-placed boulders, single and opposing wing-deflectors, and log cover; and A1 channels are generally not suitable for fish habitat improvement projects.

The water temperatures recorded on the survey days 8/20/2012 to 8/21/2012, ranged from 56 to 69 degrees Fahrenheit. Air temperatures ranged from 64 to 83 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.

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Flatwater habitat types comprised 5% of the total length of this survey, riffles 6%, and pools 12%. The pools are relatively shallow, with 11 of the 31 (35%) pools having a maximum residual depth greater than two feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In first and second order streams, a primary pool is defined to have a maximum residual depth of at least two 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.

Twenty-nine of the 31 pool tail-outs measured had embeddedness ratings of 1 or 2. Two of the pool tail-outs had embeddedness ratings of 3 or 4. Zero 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 Weeks Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Twenty-nine of the 31 pool tail-outs measured had gravel and small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter rating for pools is 16. The shelter rating in the flatwater habitats is 10. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by boulders in Weeks Creek. Boulders are the dominant cover type in pools, followed by undercut banks. 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 85%. Reach 1 had a canopy density of 82.2%, and Reach 2 had a canopy density of 93.7%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 84% and 80%, 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

Weeks 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

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remove woody debris from the stream, except under extreme buildup and only under guidance by a fishery professional.

RECOMMENDATIONS

- 1) 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.
- 2) 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.
- 3) Access for migrating salmonids should be assessed at all road crossings and dams. Sites of particular concern include all the identified ford crossings which exist throughout the surveyed watershed, all in-stream private property boundary fences and associated debris catchment racks. Sites also include the Cleland Ranch Road culvert and the Dam site at habitat unit 058. 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.
- 4) The majority of Reaches 1 and 2 of Weeks Creek are being impacted from livestock in the riparian zone. Livestock in streams generally inhibit the growth of new trees, exasperate erosion, and reduce summertime survival of juvenile fish by defecating in the water. Alternatives to limit cattle access, control erosion and increase canopy, should be explored with the landowner, and developed if possible.
- 5) Increase the canopy on Weeks Creek particularly in Reach 1, by planting appropriate native vegetation like willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels. The reaches above this survey section should be inventoried and treated as well, since the water flowing here is affected from upstream. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.

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	Habitat Unit #	Memo
0	0001.00	Start of survey at the confluence of Weeks Creek with Mark West Creek. Way point (WP)# 15

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Position	Habitat Unit #	Memo
		N38.5089 W122.6493
0	0001.00	100 ft into the unit is a foot bridge with an attached pipe. 423 ft into the unit is a cobble wall on the left bank. 15 ft tall at the highest point, followed by rip rap for the next 73 ft. The total wall length = 118 ft. 100's of chorus frogs were observed. 929 ft into unit is a ford being built out of cobble and cement across the creek. The plunge is 1 ft on both the upstream and downstream side. The walls are 1 ft wide. Likely a barrier to juvenile and adult salmonids.
1,223	0002.00	Bridge 1 is Calistoga Rd, made out of concrete, with length =61', height =8', width =24', and the height from the sill to the water level = 0'. The bridge is not retaining gravel, there is no associated downcutting, and it is not a barrier. There is a concrete support wall in middle in the middle of the creek. The left bank side of the bridge is clear and the right bank side has a 1.5' layer of gravel on the bottom. There is rip rap on the right and left bank on both the upstream and downstream side. WP 016 N38.50567, W 122.65013.
1,284	0003.00	Sheep on the left bank have access to creek throughout the property. 560 feet into the unit is an old ford crossing. It is unknown if the crossing is still in use, the channel does not look impacted from crossing.
1,284	0003.00	Left bank tributary 1 is 138' into the unit. The channel is dry. The water temperatures = N/A. The crew checked 200 ft up and determined the tributary is accessible to fish. The estimated slope = 1-2%. The tributary has no canopy for approximately the first 1000 feet because it runs through a pasture. WP 17 N 38.50522, W122.65017
2,198	0007.00	12 feet into the unit is a debris catch/ property line fence through the creek. It is an electric fence.
2,333	0008.00	The water quality looks poor.
2,357	0009.00	Left bank tributary 2 is 91' into unit. The tributary is unnamed and is dry. The water temperatures = N/A. The crew checked 75' up and determined it is accessible to fish. The estimated slope 1-2% for the first 300' then increases to an estimated 4-10%. The tributary is overgrown with blackberry and grass. WP

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Position	Habitat Unit #	Memo
		18, N 38.50243 W122.65039
2,762	0015.00	Unidentified fish observed
2,817	0017.00	Pacific Giant Salamander observed. A culvert from Calistoga Road is on the right bank near the top of the unit. The culvert is a corrugated metal pipe (CMP) and is 1 ft in diameter.
3,174	0023.00	2+ salmonid observed
3,226	0025.00	Five 1+ salmonids observed
3,347	0027.00	One 2+ and two 1+ salmonids observed
3,427	0028.00	There is a trail to the creek near the top of the unit. The trail follows along the left bank of the creek. There is a road further up on the left bank.
3,546	0030.00	Left bank tributary # 3 is at the top of unit. It is unnamed and is dry. The water temperature upstream = 60F, downstream = N/A, and in the tributary = N/A. The crew checked 300' up and determined it is accessible to fish. The estimated slope= 2%. The channel is moderately entrenched. The dominant substrate is gravel and cobble. The channel is overgrown after 150'. WP 21 N 38.49924 W122.64947
4,084	0037.00	Bridge # 2 is Calistoga Rd, which is made of concrete, with length =45', height =11', width =31', and the height from the water to sill = 0.5'. The bridge is not retaining gravel and there is no associated downcutting. The channel under the bridge has a natural bottom, The right bank sill was removed and part of the channel is covered in concrete 4.5' wide and 30' long from the downstream side. WP 22 N38.49916 W122.64880
4,298	0041.00	Left bank tributary #4 enters at the top of the unit. It is dry. The water temperatures = N/A. The crew checked 150' up and determined it is accessible to fish for the first 125'. The estimated slope = 2-4%. 125' up the tributary is a culvert with 4' plunge. Gravel is the dominant substrate. WP 24 N38.49883 W122.64831
4,647	0047.00	Four young-of-the-year (YOY) salmonids observed. The stream is drying up and is only 0.3 feet deep.
4,657	0048.00	375 feet into the unit is a CMP, approximately 1 foot in diameter, on the left bank from a road drainage.

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Position	Habitat Unit #	Memo
4,657	0048.00	Left bank tributary # 5 is 450' into unit. It is dry. The water temperatures = N/A. The crew checked 100 ft up to where a fence crosses the creek. The tributary is not accessible to fish. The estimated slope = 4-6%. The channel is slightly overgrown. The gradient increases after the fence crossing. WP 25 N38.49794 W122.64636
6,182	0050.00	The first 14 feet is a ford crossing. There is a spring feeding the crossing on the right bank.
6,238	0051.00	180 feet into the unit is a property fence spanning the creek.
7,070	0053.00	Left bank tributary # 6 is 205' in unit. It is dry. The water temperatures = N/A. The crew checked 200' up and determined it is accessible to fish. The estimated slope = 2-4%, 75' up is a culvert under a dirt rd. The dominant substrate is gravel and cobble. The tributary flows through a pasture. There is no access to the creek. WP 27 N38.49485 W122.64099
7,450	0058.00	Dam 1 has length =4', height =7', width(o)=32', width (d)=N/A, and the height from water to sill= 2'. There are partial flashboards in place. There is downcutting with height = 2.8'. The dam is retaining gravel and it is a possible barrier to juveniles and adults. There is one 1' tall flashboard installed in the dam. WP28 N38.49490 W122.64053, Pictures 9 and 10 taken
7,454	0059.00	There is a bare slope on the right bank and a house upslope of the right bank.
7,523	0060.00	Bridge 3 is a private footbridge made of wood, with length =10', height =5', and width =35'. The bridge is not retaining gravel, there is no associated down cutting, and there is no sill. The bridge is not a barrier and it has a natural stream bottom. There is rip rap on the right bank and a cement retaining wall on the left bank stabilizing bridge WP 29 N38.49492 W122.64009
7,951	0062.00	Bridge 4 is a private driveway/road made of concrete and steel, with length =15', height =5', width =25', and the height from the water to sill = 0'. The sill is level with the channel. It is not retaining gravel, there is no downcutting, and it is not a possible barrier. WP 30 N38.49466 W122.63861
7,951	0062.00	Left bank tributary 7 is at the top unit. It is wet with

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Position	Habitat Unit #	Memo
		discharge =0cfs. The water temperatures = N/A. The crew checked 150' up and determined it is accessible to fish. The estimated slope = 2-4%. 75' up the tributary are 2 culverts half full of gravel. On the right bank of the tributary 75' up are 2 large water tanks, one is providing water to the tributary through a pvc pipe. The tributary is overgrown. WP # 30 N38.49466 W122.63861
9,318	0066.00	Four unidentified fish observed
9,371	0069.00	Bridge 5 is Cleland Ranch Road. It is made of wood and steel with length =23', height =9.5', width =50', and the height from the water to sill = 2'-3'. The bridge is retaining gravel, there is associated downcutting, and it is a possible barrier to salmonids. There is a partially intact sill on the downstream end of the bridge with a 3-5' plunge. The sill is slanted and the spill way under the bridge sill is broken out. The old wood bridge remnants are left under the functional railroad bridge. WP 32 N38.49426 W122.63420
9,394	0070.00	10' downstream from the top of the unit is a property boundary fence spanning the creek.
9,394	0070.00	Left bank tributary 8 is 46 ft into the unit. It is dry. The water temperatures = N/A. The crew checked 150' up and determined the tributary is accessible to fish. The estimated slope = 4-10%. The dominant substrate is gravel and cobble. Overall the gradient is steep and the channel is entrenched. WP 32 taken 48 ft downstream of the tributary. N38.49426 W122.63420 Right bank tributary # 9 is 338' into unit. It is dry. The water temperatures = N/A. The crew checked 200' up and determined it is accessible to fish. The estimated slope 1-4%. The dominant substrate is gravel and cobble substrate. 25' up the tributary is a trail crossing. The channel is overgrown. WP 33 N38.49413 W122.63314. Left bank tributary 10 is 644' into unit. It is dry. The water temperatures = N/A. The crew checked 200' up and determined it was accessible to fish. The estimated slope = 1-3%. 75' into the tributary is a trail crossing. The trail is extremely overgrown with vegetation. The dominant substrate is cobble and gravel. WP 34 N38.49415

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Position	Habitat Unit #	Memo
10,274	0071.00	At the top of the unit is a 2" diameter pvc pipe spanning the channel
10,382	0072.00	One unidentified fish and many pacific chorus frogs observed. 66' into the unit is an old ford crossing.
10,471	0073.00	Many salmonid YOY observed throughout the unit. Water begins to flow starting at this unit.
10,941	0077.00	Salmonid YOY observed
11,060	0078.00	One sculpin observed
11,060	0078.00	Right bank tributary 11 is 22' into the unit. It is dry with discharge = 0cfs. The water temperatures = N/A. The crew checked 100' up and determined it is not accessible to fish. The estimated slope >10%. The dominant substrate is boulder and bedrock. The channel is steep from the confluence up. WP 36 N38.49499 W122.62897
11,105	0079.00	One 1+ salmonid and one YOY observed
11,163	0081.00	At the top of the unit on the right bank is an animal trail.
11,213	0082.00	The grade of the unit is approximately 4-10%
11,213	0082.00	At top of unit on the left bank is a landslide, approximately 55' x40' x4'.
11,351	0083.00	The left bank landslide extends into this unit
11,539	0086.00	End of survey due to a large water fall, which is a barrier to anadromous fish. Previous surveys concluded that no fish are present above the natural barrier. WP 38 N38.49509 W122.62760

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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.

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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}

ADDITIONAL UNIT DESIGNATIONS

Dry	(DRY)	[7.0]	
Culvert	(CUL)	[8.0]	
Not Surveyed	(NS)	[9.0]	
Not Surveyed due to marsh	(MAR)	[9.1]	

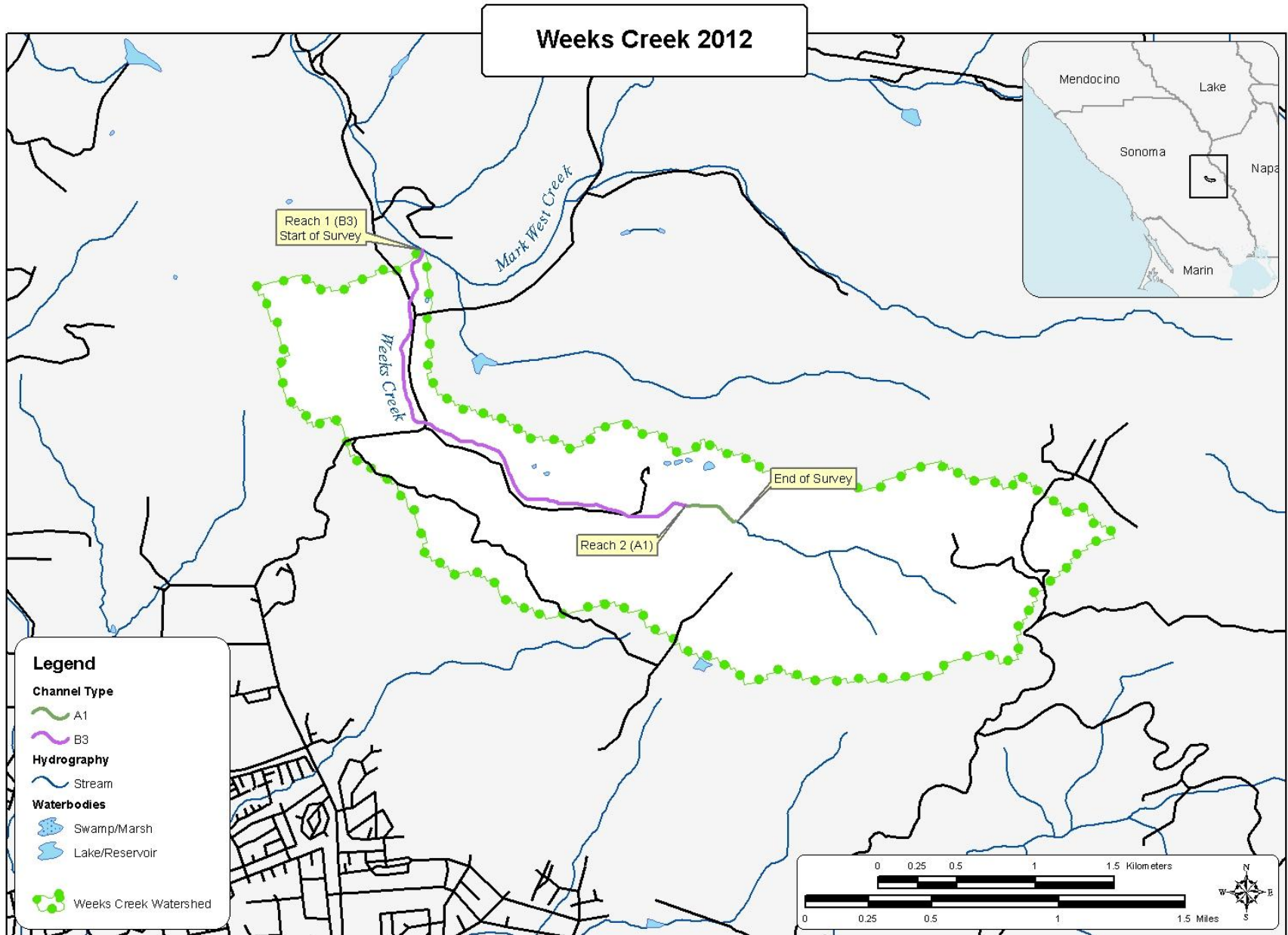


Table 1 - Summary of Riffle, Flatwater, and Pool Habitat Types

Stream Name: Weeks Creek

LLID: 1226482385089

Drainage: Russian River - Middle

Survey 8/20/2012 to 8/21/2012

Confluence Location: Quad: MARK WEST SPRINGS

Legal Description: T08NR07WS29

Latitude: 38:30:32.0N

Longitude: 122:38:54.0W

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
6	0	CULVERT	7.0	26	158	1.4									
28	0	DRY	32.6	313	8770	76.0									
11	7	FLATWATER	12.8	51	566	4.9	3.6	0.4	0.8	151	1656	66	725		10
31	31	POOL	36.0	45	1386	12.0	7.5	0.9	1.7	255	7919	321	9943	307	16
10	5	RIFFLE	11.6	66	659	5.7	2.0	0.2	0.5	75	746	16	164		5
Total Units	Total Units Fully Measured				Total Length (ft.)						Total Area (sq.ft.)		Total Volume (cu.ft.)		
86	43				11539						10321		10832		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Weeks Creek

LLID: 1226482385089

Drainage: Russian River - Middle

Survey 8/20/2012 to 8/21/2012

Confluence Location: Quad: MARK WEST SPRINGS

Legal Description: T08NR07WS29

Latitude: 38:30:32.0N

Longitude: 122:38:54.0W

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 (%)
3	2	LGR	3.5	52	157	1.4	2.0	0.1	0.3	45	135	5	14		0	86
2	1	HGR	2.3	70	139	1.2	2.0	0.2	0.4	53	107	11	21		5	96
2	1	CAS	2.3	117	234	2.0	3.0	0.3	0.8	166	331	50	99		15	90
3	1	BRS	3.5	43	129	1.1	2.0	0.2	0.8	64	191	13	38		5	96
7	4	RUN	8.1	31	220	1.9	3.0	0.4	1.1	86	605	41	286		8	71
4	3	SRN	4.7	86	346	3.0	4.0	0.4	1.0	236	944	99	397		13	79
20	20	MCP	23.3	28	555	4.8	7.0	0.8	2.9	191	3830	193	3854	181	21	85
5	5	STP	5.8	131	656	5.7	7.0	0.8	2.6	474	2370	564	2820	535	7	93
3	3	CRP	3.5	32	96	0.8	7.0	0.9	2.3	276	828	380	1139	380	7	60
1	1	LSL	1.2	34	34	0.3	7.0	1.7	2.4	238	238	405	405	405	5	90
2	2	PLP	2.3	22	45	0.4	16.0	2.3	4.6	327	654	863	1725	830	8	94
28	0	DRY	32.6	313	8770	76.0										87
6	0	CUL	7.0	26	158	1.4										
Total Units	Total Units Fully Measured				Total Length (ft.)						Total Area (sq.ft.)		Total Volume			
86	43				11539						10233		10799(cu.ft.)			

Table 3 - Summary of Pool Habitat Types

Stream Name: Weeks Creek

LLID: 1226482385089

Drainage: Russian River - Middle

Survey 8/20/2012 to 8/21/2012

Confluence Location: Quad: MARK WEST SPRINGS

Legal Description: T08NR07WS29

Latitude: 38:30:32.0N

Longitude: 122:38:54.0W

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
25	25	MAIN	81	48	1211	87	7.0	0.8	248	6200	252	6306	18
6	6	SCOUR	19	29	175	13	10.0	1.5	287	1720	534	3204	7
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)		Total Volume (cu.ft.)	
31	31				1386					7919		9510	

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

Stream Name: Weeks Creek

LLID: 1226482385089

Drainage: Russian River - Middle

Survey: 8/20/2012 to 8/21/2012

Confluence Location: Quad: MARK WEST SPRINGS

Legal Description: T08NR07WS29

Latitude: 38:30:32.0N

Longitude: 122:38:54.0W

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 Occurrence	3 < 4 Feet Maximum Residual Depth	3 < 4 Feet Percent Occurrence	>= 4 Feet Maximum Residual Depth	>= 4 Feet Percent Occurrence
20	MCP	65	5	25	11	55	4	20	0	0	0	0
5	STP	16	0	0	2	40	3	60	0	0	0	0
3	CRP	10	1	33	1	33	1	33	0	0	0	0
1	LSL	3	0	0	0	0	1	100	0	0	0	0
2	PLP	6	0	0	0	0	0	0	1	50	1	50
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
31			6	19	14	45	9	29	1	3	1	3
Mean Maximum Residual Pool Depth (ft.):			2									

Table 5 - Summary of Mean Percent Cover By Habitat

Stream Name: Weeks Creek **Dry Units:** 28 **LLID:** 1226482385089 **Drainage:** Russian River - Middle
Survey 8/20/2012 to 8/21/2012

Confluence Location: Quad: MARK WEST SPRINGS **Legal Description:** T08NR07WS29 **Latitude:** 38:30:32.0N **Longitude:** 122:38:54.0W

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
3	2	LGR	0	0	0	0	0	0	0	0	0
2	1	HGR	0	0	0	0	0	0	0	100	0
2	1	CAS	0	0	0	0	0	0	0	100	0
3	1	BRS	0	0	0	0	0	0	0	100	0
10	5	TOTAL RIFFLE	0	0	0	0	0	0	0	60	0
7	4	RUN	13	0	0	13	25	25	0	25	0
4	3	SRN	0	0	0	13	0	0	0	87	0
11	7	TOTAL FLAT	7	0	0	13	14	14	0	51	0
20	20	MCP	15	6	4	15	11	0	0	38	3
5	5	STP	6	6	14	6	8	0	0	60	0
3	3	CRP	0	3	0	0	20	0	0	77	0
1	1	LSL	40	60	0	0	0	0	0	0	0
2	2	PLP	0	0	0	0	0	0	0	25	75
31	31	TOTAL POOL	12	7	5	10	10	0	0	43	6
6	0	CUL									
86	43	TOTAL	10	5	3	10	10	2	0	47	5

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Weeks Creek **Dry Units:** 28 **LLID:** 1226482385089 **Drainage:** Russian River - Middle
Survey 8/20/2012 to 8/21/2012

Confluence Location: Quad: MARK WEST SPRINGS **Legal Description:** T08NR07WS29 **Latitude:** 38:30:32.0N **Longitude:** 122:38:54.0W

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
3	2	LGR	0	0	50	0	50	0	0
2	1	HGR	0	0	0	0	100	0	0
2	1	CAS	0	0	0	0	0	100	0
3	1	BRS	0	0	0	0	0	0	100
7	4	RUN	0	0	25	50	25	0	0
4	3	SRN	0	0	33	33	33	0	0
20	20	MCP	0	15	60	15	0	5	5
5	5	STP	0	0	40	0	40	20	0
3	3	CRP	0	0	67	33	0	0	0
1	1	LSL	0	0	100	0	0	0	0
2	2	PLP	0	0	0	0	50	0	50
6	0	CUL	0	0	0	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Weeks Creek

LLID: 1226482385089

Drainage: Russian River - Middle

Survey 8/20/2012 to 8/21/2012

Confluence Location: **Quad:** MARK WEST SPRINGS **Legal Description:** T08NR07WS29 **Latitude:** 38:30:32.0N **Longitude:** 122:38:54.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
85	3	97	0	84	80

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 Weeks Creek LLID: 1226482385089 Drainage Russian River - Middle
 Survey Dates: 8/20/2012 to 8/21/2012 Survey Length (ft.): 11539 Main Channel (ft.): 11539 Side Channel (ft.): 0
 Confluence Location: Quad MARK WEST Legal Description: T08NR07WS29 Latitude: 38:30:32.0N Longitude: 122:38:54.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: B3	Canopy Density (%): 82.2	Pools by Stream Length: 7.9
Reach Length (ft.): 10382	Coniferous Component (%): 2.4	Pool Frequency (%): 35.2
Riffle/Flatwater Mean Width (ft.): 3.1	Hardwood Component: 97.6	Residual Pool Depth (%):
BFW:	Dominant Bank: Hardwood Trees	< 2 Feet Deep: 72.0
Range (ft.): 6.00 to 23.00	Vegetative Cover (%): 88.3	2 to 2.9 Feet Deep: 28.0
Mean (ft.): 16.49	Dominant: Boulders	3 to 3.9 Feet Deep: 0.0
Std. Dev.: 4.63	Dominant Bank Substrate: Cobble/Gravel	>= 4 Feet Deep: 0.0
Base Flow (cfs):	Occurrence of LWD (%): 4.2	Mean Max Residual Pool Depth: 1.46
Water (F): 0 - 69 Air (F): 64 - 83	LWD per 100 ft.:	Mean Pool Shelter: 18
Dry Channel (ft.): 8725	Riffles: 0	
	Pools: 1	
	Flat: 0	
Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 0.0 Gravel: 88.0 Sm Cobble: 8.0 Lg Cobble: 0.0 Boulder: 0.0 Bedrock: 4.0		
Embeddedness Values (%): 1. 60.0 2. 32.0 3. 4.0 4. 4.0 5. 0.0		

STREAM REACH: 2

Channel Type: A1	Canopy Density (%): 93.7	Pools by Stream Length: 48.7
Reach Length (ft.): 1157	Coniferous Component (%): 5.0	Pool Frequency (%): 40.0
Riffle/Flatwater Mean Width (ft.): 2.5	Hardwood Component: 95.0	Residual Pool Depth (%):
BFW:	Dominant Bank: Hardwood Trees	< 2 Feet Deep: 33.3
Range (ft.): 6.00 to 15.00	Vegetative Cover (%): 61.8	2 to 2.9 Feet Deep: 33.3
Mean (ft.): 9.60	Dominant: Boulders	3 to 3.9 Feet Deep: 16.7
Std. Dev.: 4.41	Dominant Bank Substrate: Bedrock	>= 4 Feet Deep: 16.7
Base Flow (cfs): 0	Occurrence of LWD (%): 1.0	Mean Max Residual Pool Depth: 2.51
Water (F): 60 - 69 Air (F): 80 - 83	LWD per 100 ft.:	Mean Pool Shelter: 8
Dry Channel (ft.): 45	Riffles: 0	
	Pools: 0	
	Flat: 4	
Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 0.0 Gravel: 66.7 Sm Cobble: 16.7 Lg Cobble: 16.7 Boulder: 0.0 Bedrock: 0.0		
Embeddedness Values (%): 1. 33.3 2. 66.7 3. 0.0 4. 0.0 5. 0.0		

Table 9 -Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Weeks Creek **LLID:** 1226482385089 **Drainage:** Russian River - Middle
Survey: 8/20/2012 to 8/21/2012
Confluence Location: **Quad:** MARK WEST SPRINGS **Legal Description:** T08NR07WS29 **Latitude:** 38:30:32.0N **Longitude:** 122:38:54.0W

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	5	6	12.8
Boulder	7	8	17.4
Cobble/Gravel	28	28	65.1
Sand/Silt/Clay	3	1	4.7

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	0	3.5
Brush	9	7	18.6
Hardwood	31	36	77.9
Coniferous	0	0	0.0
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 2

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

Stream Name: Weeks Creek

LLID: 1226482385089

Drainage: Russian River - Middle

Survey 8/20/2012 to 8/21/2012

Confluence Location: Quad: MARK WEST SPRINGS

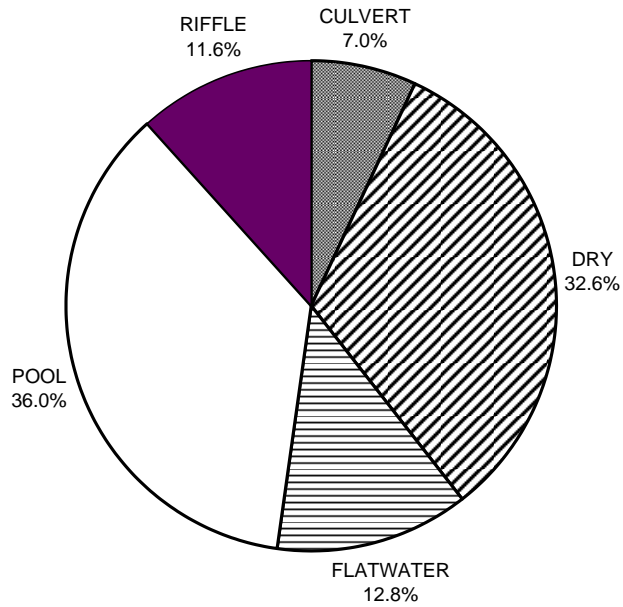
Legal Description: T08NR07WS29

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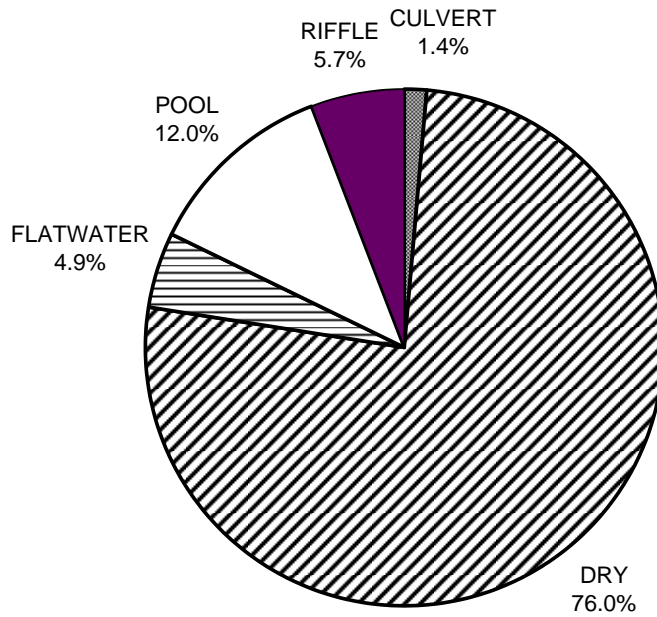
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	7	12
SMALL WOODY DEBRIS (%)	0	0	7
LARGE WOODY DEBRIS (%)	0	0	5
ROOT MASS (%)	0	13	10
TERRESTRIAL VEGETATION	0	14	10
AQUATIC VEGETATION (%)	0	14	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	60	51	43
BEDROCK LEDGES (%)	0	0	6

**WEEKS CREEK 2012
HABITAT TYPES BY PERCENT OCCURRENCE**



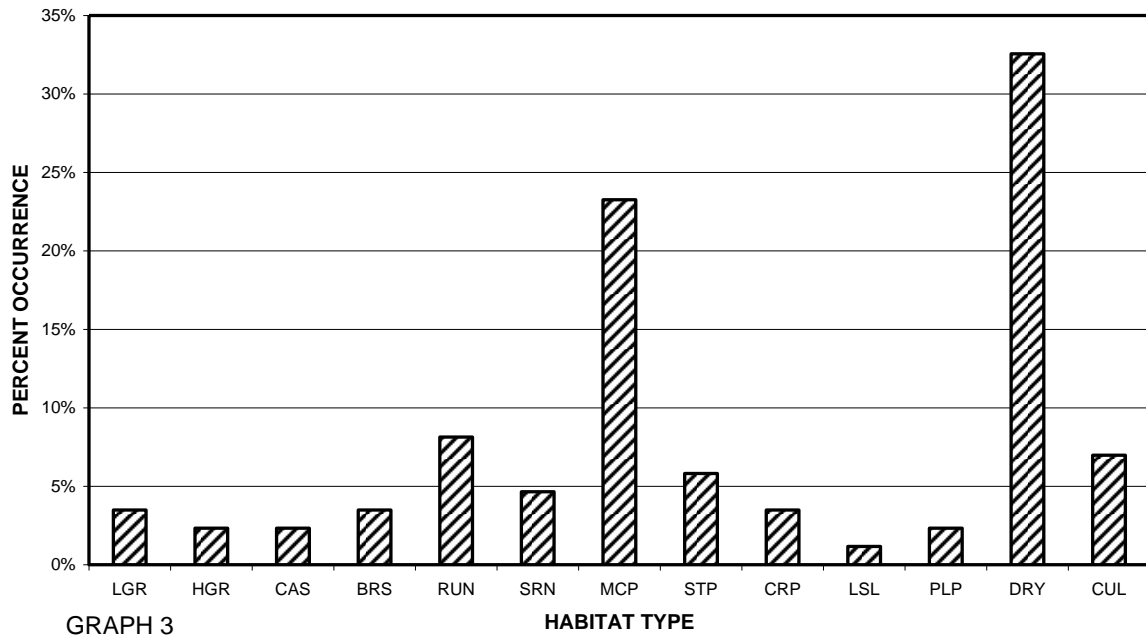
GRAPH 1

**WEEKS CREEK 2012
HABITAT TYPES BY PERCENT TOTAL LENGTH**



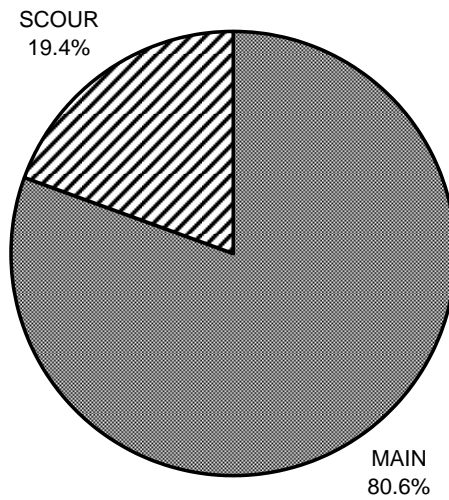
GRAPH 2

**WEEKS CREEK 2012
HABITAT TYPES BY PERCENT OCCURRENCE**



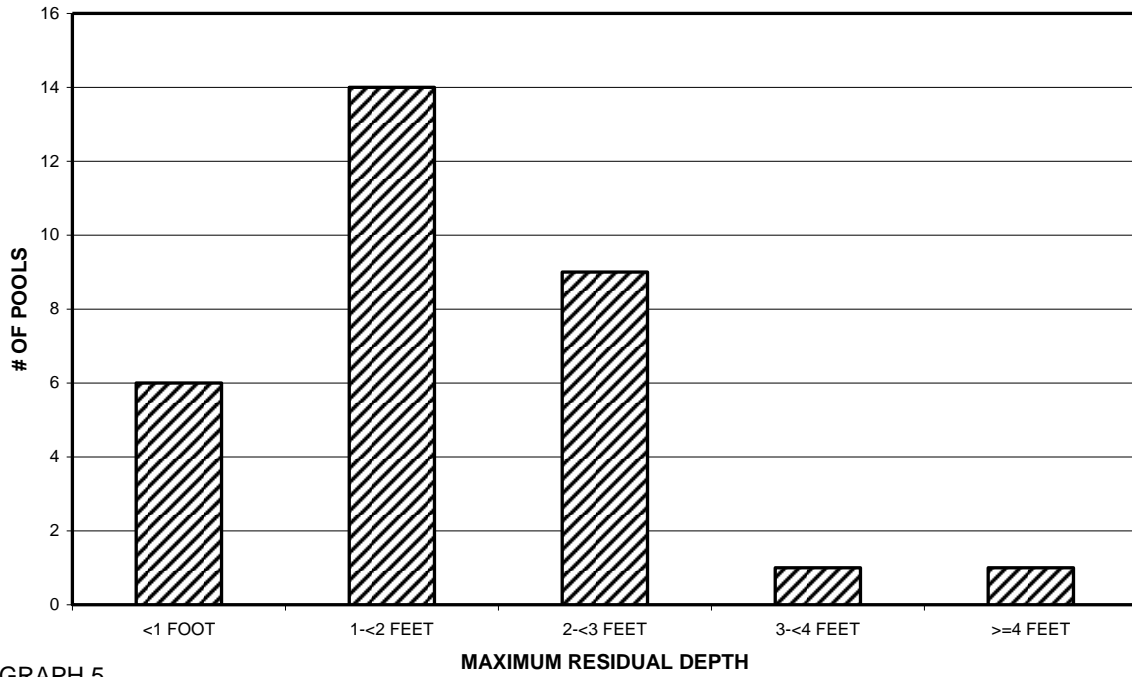
GRAPH 3

**WEEKS CREEK 2012
POOL TYPES BY PERCENT OCCURRENCE**



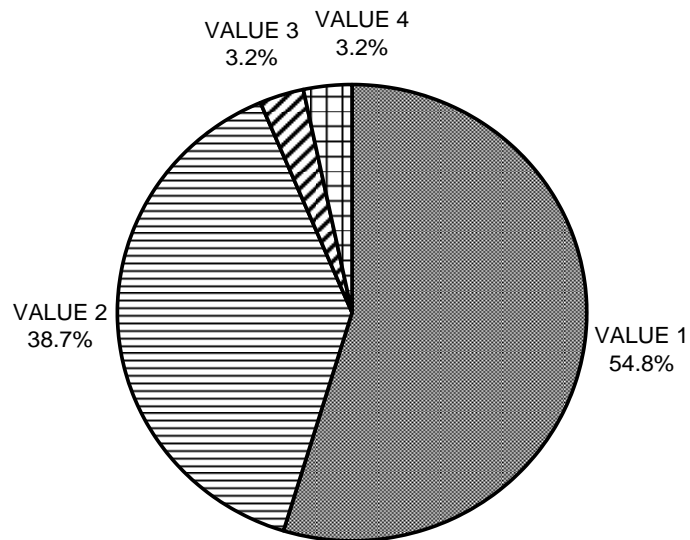
GRAPH 4

**WEEKS CREEK 2012
MAXIMUM DEPTH IN POOLS**



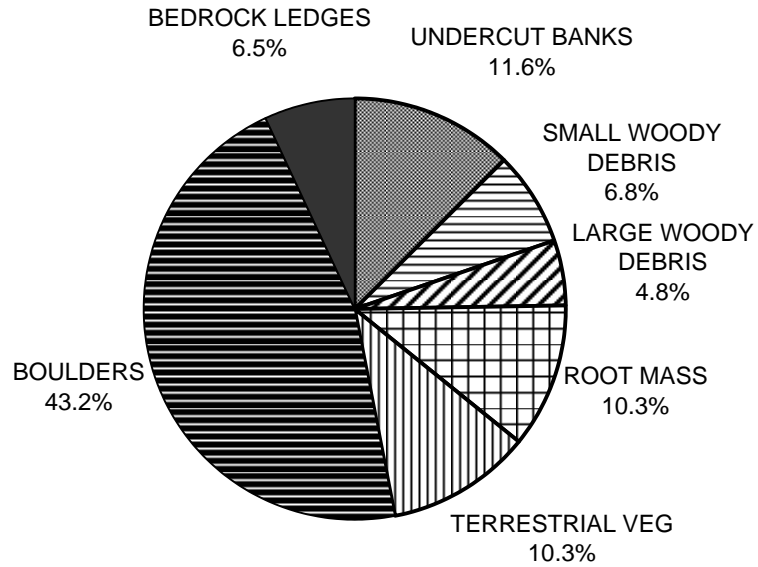
GRAPH 5

**WEEKS CREEK 2012
PERCENT EMBEDDEDNESS**



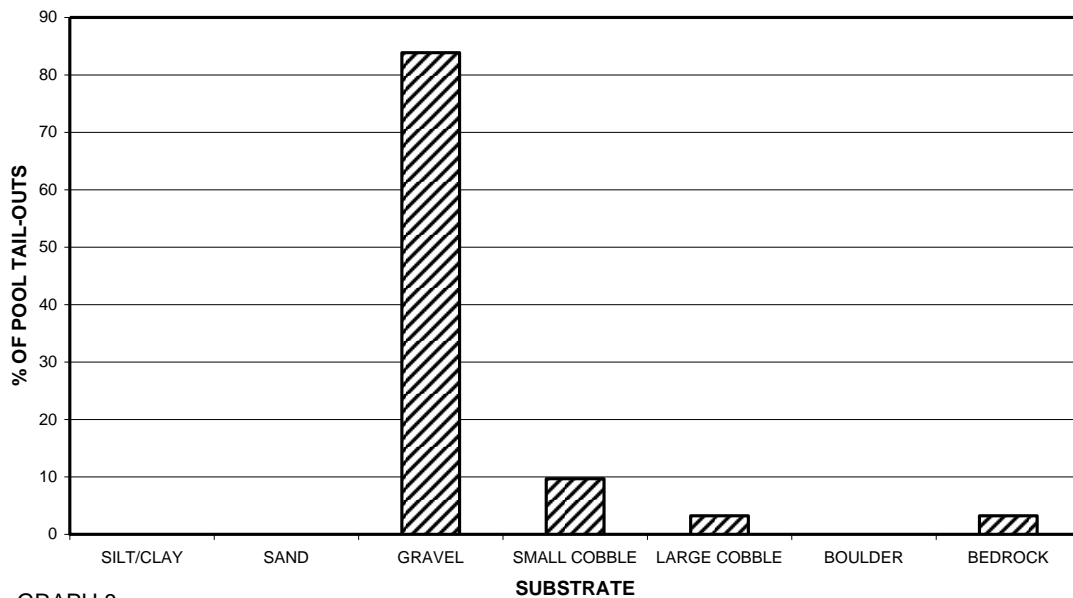
GRAPH 6

WEEKS CREEK 2012 MEAN PERCENT COVER TYPES IN POOLS



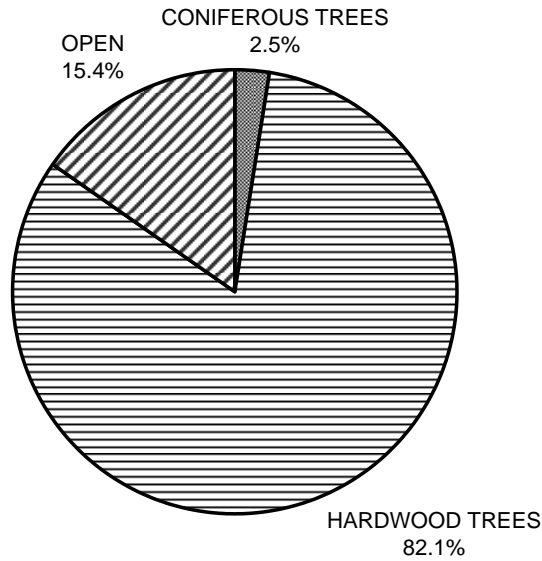
GRAPH 7

WEEKS CREEK 2012 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



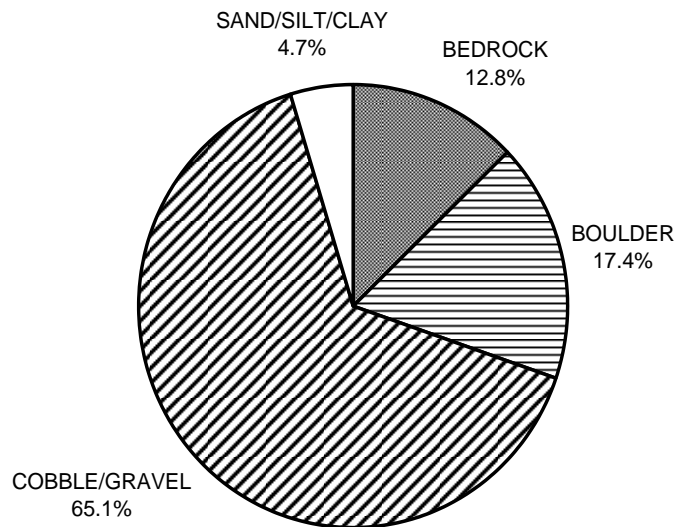
GRAPH 8

**WEEKS CREEK 2012
MEAN PERCENT CANOPY**



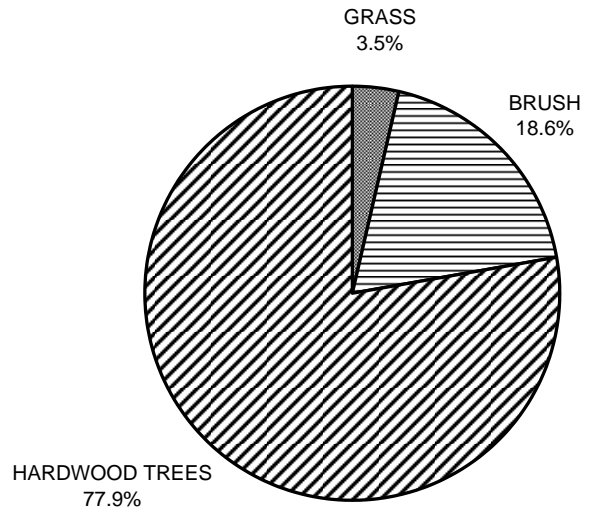
GRAPH 9

**WEEKS CREEK 2012
DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10

**WEEKS CREEK 2012
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11