California Department of Fish and Game
Walker Creek Watershed
Stream Habitat Assessment Reports

Walker Creek

STREAM INVENTORY REPORT

Walker Creek

Surveyed Summer 2008
Report Completed March 2009

INTRODUCTION

A stream inventory was conducted during 8/18/2008 to 9/10/2008 on Walker Creek. The survey began at the confluence with Pacific Ocean and extended upstream 16.4 miles.

The Walker Creek inventory was conducted in two parts: habitat inventory and biological inventory. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Walker Creek. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species.

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

Walker Creek is a tributary to Pacific Ocean, and is located in Marin County, California (Map 1). Walker Creek's legal description at the confluence with Pacific Ocean is T04N R10W S02. Its location is 38°13'17.0N" north latitude and 122°55'18.0" west longitude, LLID number 1229217382214. Walker Creek is a fourth order stream and has approximately 128.27 miles of blue line stream according to the USGS National Hydrography Datasheet (NHD). Walker Creek drains a watershed of approximately 74.76 square miles. Elevations range from Sea level at the mouth of the creek to 1,512 feet in the headwater areas. Mixed hardwood forest dominates the watershed. The watershed is primarily privately owned which accounts for 96.4% of the land area. The state owns 1.3% of the watershed. Ninety six percent of the land is considered natural, 3% is agricultural and 0.1% is urban. Vehicle access exists via HWY 1, Marshall Petaluma Road, Chileno Valley Rd and Hicks Valley Rd.

METHODS

The habitat inventory conducted in Walker 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 Game (DFG). 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. Habitat unit types encountered for the first time are measured for all the parameters and characteristics on the field form. Additionally, from the ten habitat units on each field form page, one is randomly selected for complete measurement. All pools are fully sampled.

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 Walker 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". Walker 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 Walker 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 Walker 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 Walker 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 Walker 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 Sulphur Creek. In addition, 3 sites were electrofished using a Smith-Root Model 12 electrofisher. These sampling techniques are discussed in the *California Salmonid Stream Habitat Restoration Manual*.

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 Game. This program processes and summarizes the data, and produces the following ten tables:

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

- Mean Percent Shelter Cover Types for Entire Stream

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

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

HABITAT INVENTORY RESULTS

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

The habitat inventory of 8/18/2008 to 9/10/2008 was conducted by H. Colton, T. Pool (WSP). The total length of the stream surveyed was 86,688 feet with an additional 1,047 feet of side channel.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 3.852 cfs on 8/18/2008.

Walker Creek is a NA channel type for the first 21,050 feet of the stream surveyed (Reach 1), a B4 channel type for the next 6,360 feet of the stream surveyed (Reach 2), a NA channel type for the next 13,470 feet of the stream surveyed (Reach 3), a F4 channel type for the next 33,001 feet of the stream surveyed (Reach 4), a NA channel type for the next 3,090 feet of the stream surveyed (Reach 5) and a F4 channel type for the final 10,764 feet of the stream surveyed (Reach 6).

F4 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates. B4 channels are moderately entrenched riffle dominated channels with infrequently spaced pools, very stable plan and profile, stable banks on moderate gradients with low width /depth ratios and gravel dominant substrates.

Water temperatures taken during the survey period ranged from 52 to 63 degrees Fahrenheit. Air temperatures ranged from 53 to 70 degrees Fahrenheit.

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Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 62% pool units, 29% flatwater units, and 8% riffle units (Graph 1). Based on total length of Level II habitat types there were 40% pool units, 28% no-survey units, and 14% Flatwater units (Graph 2).

Nineteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were 30% Mid-Channel Pool units, 15% Run units, and 13% Lateral Scour Pool - Log Enhanced units (Graph 3). Based on percent total length there was 23% Mid-Channel Pool units, 7% Lateral Scour Pool - Log Enhanced units, and 6% Glide units.

A total of 309 pools were identified (Table 3). Main Channel pools were the most frequently encountered, at 53%, 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 Forty nine of the 309 pools (16%) had a residual depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 309 pool tail-outs measured, 61 had a value of 2 (19.7%); 162 had a value of 3 (52.4%) and86 had a value of 4 (27.8%); (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 3 , flatwater habitat types had a mean shelter rating of 4 , and pool habitats had a mean shelter rating of 7 (Table 1). Of the pool types, the Main Channel pools had a mean shelter rating of 7, Backwater pools had a mean shelter rating of 9 and Scour pools had a mean shelter rating of 7 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Terrestrial Vegetation is the dominant cover types in Walker Creek. Graph 7 describes the pool cover in Walker Creek. Terrestrial Vegetation is 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 was observed in 64% of pool tail-outs and sand observed in 19% of pool tail-outs.

The mean percent canopy density for the surveyed length of Walker Creek was 73%. The mean percentages of hardwood and coniferous trees were 100% and 0%, respectively. Twenty seven percent of the canopy was open. Graph 9 describes the mean percent canopy in Walker Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 92%. The mean percent left bank vegetated was 91%. The dominant elements composing the structure of the stream banks consisted of 98% cobble/gravel 1% bedrock, 1% boulder, and 1% sand/silt/clay

(Graph 10). Deciduous trees were the dominant vegetation type observed in 96% of the units surveyed. Additionally, 2% of the units surveyed had grass as the dominant vegetation type, and 1% had brush as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Three sites were electrofished for species composition and distribution in Walker Creek on October 30, 2008. The sites were sampled by H. Colton (WSP), T. Pool (WSP), D. Acomb (DFG), and D. Resnik (DFG).

In the upper reach, one site was sampled. The reach sites yielded 14 young-of-the-year steelhead/rainbow trout (SH/RT), 1 age 1+ SH/RT and 1 age 2+ SH/RT, 1 three-spine stickleback and 1 amocete. Ten units were sampled including riffles, pools, and glides. In some areas the water velocity was high and reduced the effectiveness of the biological survey. This reach was approximately 327 feet long.

In the lower reach, one site was sampled starting approximately 300 feet below the road crossing The reach sites yielded 29 young-of-the-year SH/RT, 5 age 1+ SH/RT, 4age 2+ SH/RT and 2 sculpin. This reach included some riffle units and pool units. This reach was approximately 305 feet long and had boulders and terrestrial vegetation as the dominant shelter types.

In the reach below the confluence of Chileno Creek, one site was sampled. The reach site yielded 15 young-of-the-year SH/RT. This reach consisted of a long glide unit as well as a few pool units with terrestrial vegetation and undercut banks as the dominant shelter types. This reach was approximately 322 feet long.

2008 Walker Creek e-fish observations.

Date	Site #	Reference Point	Distance From Reference Point (ft.)	Steelhead/ Rainbow Trout			Coho Salmon	Non Salmonids
				0+	1+	2+	0+ and 1+	
10/30/2008	1	Barn	upstream	14	1	1	0	1 stickleback, 1 lampry
10/30/2008	2	Road Crossing	downstream	29	5	4	0	2 sculpin
10/30/2008	3	Chileno Confluence	downstream	15	0	0	0	0

DISCUSSION

Walker Creek is a NA channel type for the first 21,050 feet of stream surveyed and a B6 channel type for the next 6,360 feet and a NA channel type for the next 13,470 feet and a F4 channel type for the next 33,001 feet and a NA channel type for the next 3,090 feet and a F4 channel type for the remaining 15,184 feet.

The suitability of B6 channel types for fish habitat improvement structures is as follows: they are excellent for bank-placed boulders and log covers; good for plunge weirs, single and opposing wing deflectors and channel constrictors; and fair for boulder clusters.

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

The water temperatures recorded on the survey days 8/18/2008 to 9/10/2008, ranged from 52 to 63 degrees Fahrenheit. Air temperatures ranged from 53 to 70 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 14% of the total length of this survey, riffles 3%, pools 40% and no survey units 28%. The pools are relatively shallow, with only 144 of the 309 (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 one of the 309 pool tail-outs measured had embeddedness ratings of 1 or 2. Two hundred and forty eight of the pool tail-outs had embeddedness ratings of 3 or 4. None 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 Walker Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Two hundred and thirty eight of the 309 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 7. The shelter rating in the flatwater habitats was 4. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by Terrestrial Vegetation in Walker Creek. Terrestrial Vegetation is 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 73%. Reach 2 had a canopy density of 61%, Reach 4 had a canopy density of 74% and Reach 6 had a canopy density of 73%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was high at 92% and 91%, 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

Walker 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) There are sections where the stream is being impacted from cattle trampling the riparian zone. Alternatives to uncontrolled riparian grazing should be explored with the grazier and developed if possible.

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

2) Increase the canopy on Walker Creek 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.

3) 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.

4) Walker Creek would benefit from utilizing bio-technical vegetative techniques for bank

stabilization and 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.

5) 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.

6) The limited water temperature data available suggest that maximum temperatures are near the upper 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. A long term monitoring plan should be developed and implemented.

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 (feet)	Habitat Unit #	Comment:
0	0001.00	Start of Reach 1 (NA) Not surveyed
21050	0002.00	Start of Survey and Reach 2 (B4): Survey started approximately 21,050 feet upstream of the mouth due to lack of access and tidal influence. WP169
21050	0002.00	General Comment: Fish observed throughout reach.
27261	0050.00	General Comment: Channel Type changes Reach 2 (B4) to Reach 3 (NA)
40731	0051.00	General Comment: Channel Type changes Reach 3 (NA) to Reach 4 (F4).
45516	0107.00	General Comment: Salmonids observed.
45846	0110.01	General Comment: Roach observed.
46967	0125.00	General Comment: Road crossing: WP 211
48410	0143.00	General Comment: Cows in creek.
52275	0175.00	General Comment: Salmonids observed.
53087	0180.00	General Comment: Foot bridge crossing, old rims and wooden planks.
53461	0183.00	Tributaries: 357' into unit Left Bank dry tributary.
57484	0216.00	General Comment: Cow paths across creek.
57723	0219.00	Tributaries: Top of unit left bank dry tributary.
58003	0222.00	General Comment: Salmonids observed.
58365	0225.00	General Comment: Old weirs in channel no longer functioning.

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Position (feet)	Habitat Unit #	Comment:
60042	0238.00	Tributaries: top of unit right bank dry tributary. "Walker Creek Tributary 2" walked 250' up, lots of vegetation and erosion.
61712	0254.00	General Comment: LDA1: 6.1 feet tall, 23 feet wide, and 55 feet long with 8 pieces, water flowing through, visible gaps, and not retaining sediment. Fish were seen above LDA and it is not a barrier.
62792	0265.00	Structures: Bridge Unit: 68 feet wide, and 18 feet high. Concrete and metal bridge, non-barrier.
63262	0270.00	Tributaries: top of unit left bank dry tributary.
66217	0299.00	General Comment: Fence across creek.
68009	0319.00	Tributaries: top of unit left bank dry tributary.
70921	0343.00	Structures: Bridge Unit. Metal and wood Walker Creek bridge, not retaining gravel. 140 feet wide, 40 feet tall, and 10 feet long. non-barrier to fish passage.
72717	0360.00	General Comment: Wooden plank walkway across creek.
72844	0361.00	General Comment: Channel Type changes from Reach 4 (F4) to Reach 5 (NA) WP 192.
75934	0362.00	General Comment: Channel Type changes from Reach 5 (NA) to Reach 6 (F4).
76241	0363.00	Structures: Bridge unit. Concrete Marshall-Petaluma Rd crossing. 147 feet wide, 30 feet tall and 35 feet long. Non-barrier to fish with no down cutting. WP 193
77507	0381.00	Erosion Site: (Bank) Left bank erosion.
77842	0386.00	Tributaries: Left bank dry tributary at top of unit.
77842	0386.00	Erosion Site: (Bank) Erosion on tributary.
77981	0388.00	General Comment: Fence across creek, fish observed.
78335	0392.00	Erosion Site: (Bank) Left bank erosion.
78421	0394.00	General Comment: Road (wet) crossing.
78599	0395.00	General Comment: Frog observed, fish observed.
78809	0396.00	General Comment: Cows accessing creek
78809	0396.00	Erosion Site: (Bank) Erosion on right bank.
80077	0399.00	Tributaries: 50 feet into unit right bank dry tributary.
80486	0404.00	General Comment: Two possible old redds.
80710	0408.00	Tributaries: 100 feet into unit right bank dry tributary.
81048	0411.00	General Comment: Cows have been in creek.

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Position (feet)	Habitat Unit #	Comment:
81340	0416.00	General Comment: Fish observed.
81340	0416.00	Erosion Site: (Bank) Erosion left bank.
82330	0426.00	Erosion Site: (Bank) Left bank erosion.
82667	0431.00	Tributaries: 21 feet into unit, left bank dry tributary.
82986	0436.00	Erosion Site: (Bank) Left bank erosion.
83266	0439.00	Structures: Bridge. Private Driveway. 66 feet wide, 3.1 feet tall, and 9 feet long. Height from water to sill is 0.4 feet. Non-barrier, and no down cutting.
83472	0442.00	Tributaries: Right bank dry tributary.
83785	0445.00	Erosion Site: (Bank) Erosion on left bank 20+ feet tall.
83906	0446.00	Erosion Site: (Bank) Erosion on left bank, 20+ feet tall.
84052	0448.00	General Comment: Cows accessing creek.
84471	0453.00	Tributaries: 20 feet into unit left bank dry tributary.
85005	0459.00	Tributaries: Left bank dry tributary at top of unit.
85505	0464.00	General Comment: Old tires in the creek.
86147	0473.00	Structures: Road crossing.
86336	0478.00	General Comment: Open, no canopy and algae growing in water.
86484	0480.00	Tributaries: Bottom of unit, right bank tributary. Salmon Creek. WP 206. Flowing Water temp of creek down stream of tributary is 53ºF and water temp upstream of tributary is 54ºF and the water temp of the tributary is 53ºF. It is Accessible to fish, no fish were observed.
86688	0483.00	End of Survey: End of survey, end of Walker Creek at confluence of Arroyo Sausal and Salmon Creek.

REFERENCES

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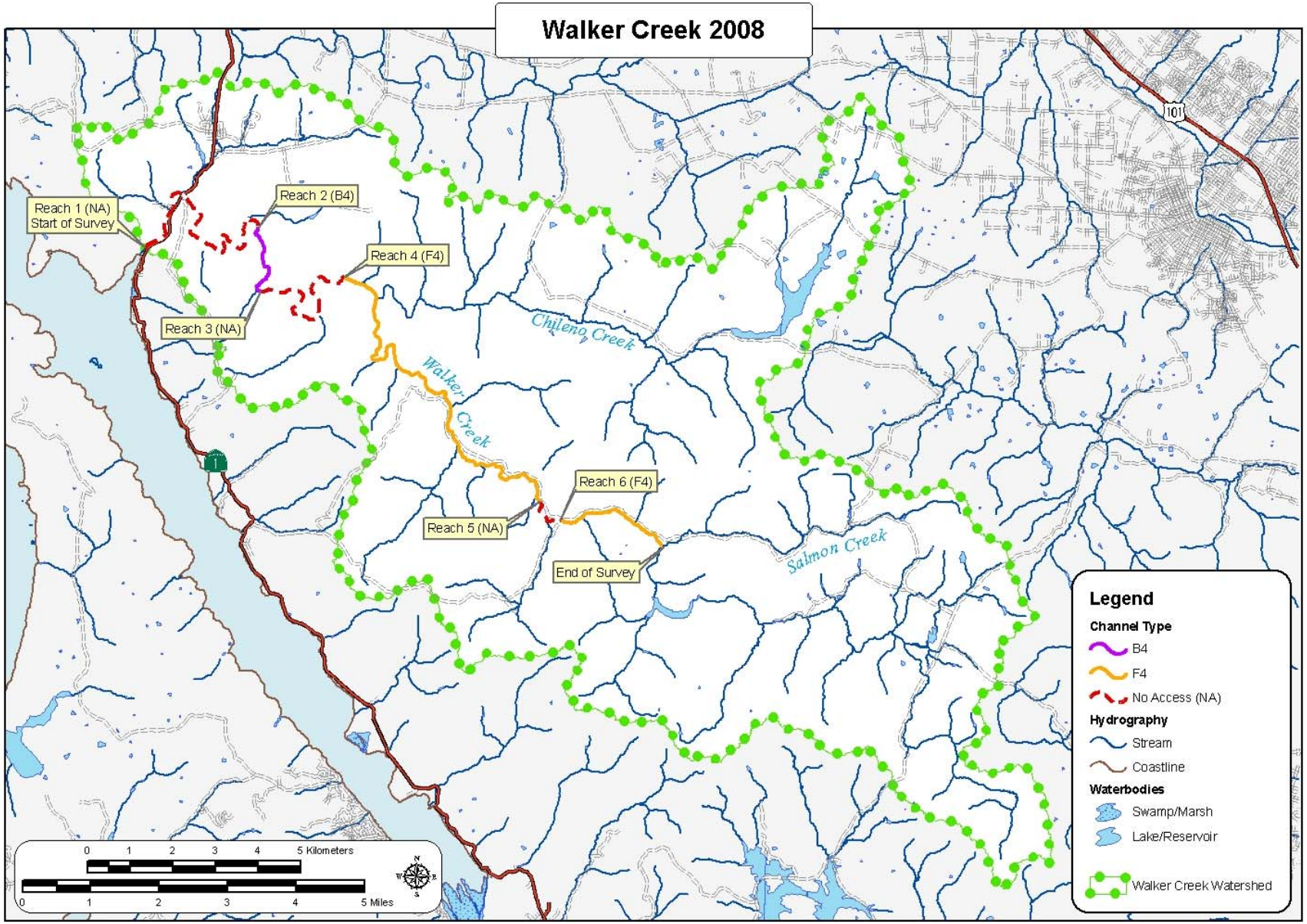

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Prepared by: Scott Webb, November 2008

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]	

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

Stream Name: Walker Creek **LLID:** 1229217382214 **Drainage:** Tomales Bay

Survey 8/18/2008 to 9/10/2008

Confluence Location: Quad: TOMALES **Legal Description:** T04NR10WS02 **Latitude:** 38:13:17.0N **Longitude:** 122:55:18.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Mean Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating
5	0	CULVERT	1.0	16	79	0.1									
1	0	DRY	0.2	67	67	0.1									
144	25	FLATWATER	28.7	85	12237	13.9	23.7	0.7	1.0	2143	308635	1475	212377		4
2	0	NOSURVEY	0.4	12070	24140	27.5									
1	0	NOSURVEY_MAR	0.2	13470	13470	15.4									
309	309	POOL	61.7	115	35515	40.5	23.3	1.5	2.0	3042	939985	6709	2073235	5515	7
39	10	RIFFLE	7.8	57	2227	2.5	18.9	0.3	0.5	1291	50349	397	15465		3

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
501	344	87735	1298969	2301078

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Walker Creek **LLID:** 1229217382214 **Drainage:** Tomales Bay

Survey 8/18/2008 to 9/10/2008

Confluence Location: Quad: TOMALES **Legal Description:** T04NR10WS02 **Latitude:** 38:13:17.0N **Longitude:** 122:55:18.0W

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 (%)
39	10	LGR	7.8	57	2227	2.5	19.0	0.3	0.8	1291	50349	397	15465		3	83
2	1	POW	0.4	136	272	0.3	29.0	1.1	1.3	3155	6309	3470	6940		5	82
63	12	GLD	12.5	92	5779	6.6	30.0	0.6	2.1	2685	169166	1560	98296		5	72
75	9	RUN	14.9	77	5797	6.3	17.0	0.8	2.4	1518	113822	1214	91062		3	68
4	3	SRN	0.8	97	389	0.4	16.0	0.9	1.2	1516	6063	1250	5001		3	77
150	150	MCP	29.9	139	20784	23.7	26.0	1.7	5.0	3995	599264	9616	1442422	8007	7	72
7	7	CCP	1.4	46	325	0.4	22.0	1.4	2.4	1163	8138	2333	16334	1982	4	64
6	6	STP	1.2	253	1518	1.7	26.0	1.5	3.3	6955	41732	13259	79551	11165	8	69
4	4	CRP	0.8	62	249	0.3	14.0	1.4	2.1	980	3919	1838	7353	1468	5	62
63	63	LSL	12.5	98	6200	7.1	24.0	1.3	3.4	2539	159982	4776	300868	3773	7	70
50	50	LSR	10.0	92	4592	5.2	18.0	1.2	3.2	1747	87355	2952	147604	2208	6	74
1	1	LSBk	0.2	141	141	0.2	37.0	3.2	3.8	5113	5113	18406	18406	16361	5	83
15	15	LSBo	3.0	81	1213	1.4	20.0	1.3	2.7	1692	25386	2812	42182	2221	7	79
1	1	PLP	0.2	87	87	0.1	26.0	1.9	2.8	2262	2262	4976	4976	4298	10	67
2	2	SCP	0.4	34	69	0.1	9.0	0.9	1.1	272	543	309	619	236	5	94
3	3	BPB	0.6	28	83	0.1	16.0	1.5	2.4	482	1446	642	1927	594	5	80
5	5	BPR	1.0	29	147	0.2	15.0	1.3	2.7	460	2300	666	3332	583	11	96
2	2	DPL	0.4	54	107	0.1	19.0	2.5	3.4	1272	2544	3831	7662	3714	13	94
1	0	DRY	0.2	67	67	0.1										
5	0	CUL	1.0	16	79	0.1										
2	0	NS	0.4	12070	24140	27.5										
1	0	MAR	0.2	13470	13470	15.4										

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
501	344	87735	1285694	2289999

Table 3 - Summary of Pool Habitat Types

Stream Name: Walker Creek **LLID:** 1229217382214 **Drainage:** Tomales Bay

Survey 8/18/2008 to 9/10/2008

Confluence Location: **Quad:** TOMALES **Legal Description:** T04NR10WS02 **Latitude:** 38:13:17.0N **Longitude:** 122:55:18.0W

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
163	163	MAIN	53	139	22627	64	25.7	1.7	3982	649135	7865	1281961	7
134	134	SCOUR	43	93	12482	35	21.0	1.3	2120	284017	3039	404167	7
12	12	BACKWATER	4	34	406	1	14.8	1.5	569	6833	1050	12599	9

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
309	309	35515	939985	1698726

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

Stream Name: Walker Creek **LLID:** 1229217382214 **Drainage:** Tomales Bay

Survey 8/18/2008 to 9/10/2008

Confluence Location: Quad: TOMALES **Legal Description:** T04NR10WS02 **Latitude:** 38:13:17.0N **Longitude:** 122:55:18.0W

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
150	MCP	49	5	3	56	37	48	32	33	22	8	5
7	CCP	2	0	0	4	57	3	43	0	0	0	0
6	STP	2	0	0	2	33	3	50	1	17	0	0
4	CRP	1	0	0	3	75	1	25	0	0	0	0
63	LSL	20	9	14	31	49	19	30	4	6	0	0
50	LSR	16	7	14	29	58	13	26	1	2	0	0
1	LSBk	0	0	0	0	0	0	0	1	100	0	0
15	LSBo	5	1	7	12	80	2	13	0	0	0	0
1	PLP	0	0	0	0	0	1	100	0	0	0	0
2	SCP	1	0	0	2	100	0	0	0	0	0	0
3	BPB	1	0	0	1	33	2	67	0	0	0	0
5	BPR	2	0	0	3	60	2	40	0	0	0	0
2	DPL	1	0	0	0	0	1	50	1	50	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
309	22	7	143	46	95	31	41	13	8	3

Mean Maximum Residual Pool Depth (ft.): 2

Table 5 - Summary of Mean Percent Cover By Habitat Types

Stream Name: Walker Creek **Dry Units:** 1 **LLID:** 1229217382214 **Drainage:** Tomales Bay

Survey 8/18/2008 to 9/10/2008

Confluence Location: Quad: TOMALES **Legal Description:** T04NR10WS02 **Latitude:** 38:13:17.0N **Longitude:** 122:55:18.0W

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
39	10	LGR	9	12	0	15	34	0	0	0	0
39	10	TOTAL RIFFLE	9	12	0	15	34	0	0	0	0
2	1	POW	10	0	0	0	30	0	0	60	0
63	12	GLD	24	7	0	4	48	0	0	8	0
75	9	RUN	8	0	0	10	26	0	0	12	0
4	3	SRN	10	7	0	7	27	0	0	17	0
144	25	TOTAL FLAT	16	4	0	6	37	0	0	13	0
150	150	MCP	21	11	1	11	47	2	0	5	1
7	7	CCP	13	13	0	13	30	3	0	0	0
6	6	STP	15	5	0	8	52	0	0	20	0
4	4	CRP	28	0	0	0	35	0	0	13	0
63	63	LSL	18	9	1	12	56	2	0	0	0
50	50	LSR	27	8	0	17	44	2	0	0	0
1	1	LSBk	0	0	0	0	0	0	0	100	0
15	15	LSBo	21	5	1	7	31	0	0	28	0
1	1	PLP	20	0	0	0	50	0	0	30	0
2	2	SCP	10	10	0	50	30	0	0	0	0
3	3	BPB	3	0	0	7	23	0	0	67	0
5	5	BPR	14	14	0	64	8	0	0	0	0
2	2	DPL	15	25	35	20	5	0	0	0	0
309	309	TOTAL POOL	21	9	1	13	46	2	0	5	0
5	0	CUL									
2	0	NS									
1	0	MAR									
501	344	TOTAL	20	9	1	12	45	1	0	6	0

Table 6 - Summary of Dominant Substrate By Habitat Types

Stream Name: Walker Creek **Dry Units:** 1 **LLID:** 1229217382214 **Drainage:** Tomales Bay

Survey 8/18/2008 to 9/10/2008

Confluence Location: **Quad:** TOMALES **Legal Description:** T04NR10WS02 **Latitude:** 38:13:17.0N **Longitude:** 122:55:18.0W

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
39	27	LGR	0	0	4	81	15	0	0
2	1	POW	0	0	0	0	0	100	0
63	12	GLD	0	17	8	58	17	0	0
75	9	RUN	0	0	0	67	11	22	0
4	3	SRN	0	0	0	67	33	0	0
150	150	MCP	1	19	13	54	11	3	0
7	7	CCP	0	14	0	86	0	0	0
6	6	STP	0	0	17	33	0	33	17
4	4	CRP	0	0	50	50	0	0	0
63	63	LSL	3	24	16	56	2	0	0
50	50	LSR	0	30	14	50	6	0	0
1	1	LSBk	0	0	0	100	0	0	0
15	15	LSBo	0	20	13	67	0	0	0
1	1	PLP	0	0	0	0	0	0	100
2	2	SCP	0	100	0	0	0	0	0
3	3	BPB	0	33	0	33	0	33	0
5	5	BPR	0	60	0	40	0	0	0
2	2	DPL	0	0	50	50	0	0	0
5	0	CUL	0	0	0	0	0	0	0
2	0	NS	0	0	0	0	0	0	0
1	0	MAR	0	0	0	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Walker Creek **LLID:** 1229217382214 **Drainage:** Tomales Bay

Survey 8/18/2008 to 9/10/2008

Confluence Location: **Quad:** TOMALES **Legal Description:** T04NR10WS02 **Latitude:** 38:13:17.0N **Longitude:** 122:55:18.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
73	0	100	4	92	91

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 Walker Creek LLID: 1229217382214 Drainage Tomales Bay

Survey Dates: 8/18/2008 to 9/10/2008 Survey Length (ft.): 87735 Main Channel (ft.): 86688 Side Channel (ft.): 1047

Confluence Location: Quad TOMALES Legal Description: T04NR10WS02 Latitude: 38:13:17.0N Longitude: 122:55:18.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: NA
Reach Length (ft.): 21050
Riffle/Flatwater Mean Width (ft.):
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs):
Water (F): Air (F):
Dry Channel (ft.):

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

Pools by Stream Length
Pool Frequency (%):
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.

STREAM REACH: 2

Channel Type: B4
Reach Length (ft.): 6360
Riffle/Flatwater Mean Width (ft.): 25.7
BFW:
Range (ft.): 30 to 67
Mean (ft.): 44.82
Std. Dev.: 12.57
Base Flow (cfs): 3.852
Water (F): 56 - 63 Air (F): 57 - 69
Dry Channel (ft.): 0

Canopy Density (%): 61.3
Coniferous Component (%): 0.0
Hardwood Component 100.0
Dominant Bank Hardwood Trees
Vegetative Cover (%): 91.3
Dominant Terrestrial Veg.
Dominant Bank Substrate Cobble/Gravel
Occurrence of LWD (%): 0.8
LWD per 100 ft.:
Riffles: 0
Pools: 0
Flat: 0

Pools by Stream Length 72.9
Pool Frequency (%): 60.0
Residual Pool Depth (%):
< 2 Feet Deep: 46.7
2 to 2.9 Feet Deep: 20.0
3 to 3.9 Feet Deep: 20.0
>= 4 Feet Deep: 13.3
Mean Max Residual Pool Depth 2.36
Mean Pool Shelter 8

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

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

Channel Type: NA
Reach Length (ft.): 13470
Riffle/Flatwater Mean Width (ft.):
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs):
Water (F): Air (F):
Dry Channel (ft.): 0

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

Pools by Stream Length
Pool Frequency (%):
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.

STREAM REACH: 4

Channel Type: F4
Reach Length (ft.): 32420
Riffle/Flatwater Mean Width (ft.): 21.8
BFW:
Range (ft.): 20 to 49
Mean (ft.): 33.14
Std. Dev.: 8.213
Base Flow (cfs): 3.852
Water (F): 52 - 63 Air (F): 54 - 70
Dry Channel (ft.): 67

Canopy Density (%): 74.5
Coniferous Component (%): 0.0
Hardwood Component 100.0
Dominant Bank Hardwood Trees
Vegetative Cover (%): 92.8
Dominant Terrestrial Veg.
Dominant Bank Substrate Cobble/Gravel
Occurrence of LWD (%): 0.9
LWD per 100 ft.:
Riffles: 0
Pools: 0
Flat: 0

Pools by Stream Length 70.7
Pool Frequency (%): 63.2
Residual Pool Depth (%):
< 2 Feet Deep: 51.7
2 to 2.9 Feet Deep: 35.5
3 to 3.9 Feet Deep: 10.8
>= 4 Feet Deep: 2.0
Mean Max Residual Pool Depth 2.01
Mean Pool Shelter 7

Pool Tail Substrate (%): Silt/Clay: 1.0 Sand: 17.2 Gravel: 63.1 Sm Cobble: 14.3 Lg Cobble: 2.0 Boulder 2.0 Bedrock: 0.5
Embeddedness Values (%): 1. 0.0 2. 21.2 3. 53.7 4. 25.1 5. 0.0

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 5

Channel Type: NA
Reach Length (ft.): 3090
Riffle/Flatwater Mean Width (ft.):
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs):
Water (F): Air (F):
Dry Channel (ft.):

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

Pools by Stream Length
Pool Frequency (%):
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.

STREAM REACH: 6

Channel Type: F4
Reach Length (ft.): 10447
Riffle/Flatwater Mean Width (ft.): 21.3
BFW:
Range (ft.): 21 to 46
Mean (ft.): 30.72
Std. Dev.: 7.90
Base Flow (cfs): 3.852
Water (F): 54 - 60 Air (F): 53 - 65
Dry Channel (ft.): 0

Canopy Density (%): 73.4
Coniferous Component (%): 0.0
Hardwood Component 100.0
Dominant Bank Hardwood Trees
Vegetative Cover (%): 89.4
Dominant Terrestrial Veg.
Dominant Bank Substrate Cobble/Gravel
Occurrence of LWD (%): 0.0
LWD per 100 ft.:
Riffles: 0
Pools: 0
Flat: 0

Pools by Stream Length 70.1
Pool Frequency (%): 59.8
Residual Pool Depth (%):
< 2 Feet Deep: 60.5
2 to 2.9 Feet Deep: 22.4
3 to 3.9 Feet Deep: 17.1
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth 1.91
Mean Pool Shelter 6

Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 14.5 Gravel: 69.7 Sm Cobble: 13.2 Lg Cobble: 0.0 Boulder 2.6 Bedrock: 0.0
Embeddedness Values (%): 1. 0.0 2. 23.7 3. 53.9 4. 22.4 5. 0.0

Table 9 -Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Walker Creek **LLID:** 1229217382214 **Drainage:** Tomales Bay

Survey 8/18/2008 to 9/10/2008

Confluence Location: **Quad:** TOMALES **Legal Description:** T04NR10WS02 **Latitude:** 38:13:17.0N **Longitude:** 122:55:18.0W

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	1	4	0.7
Boulder	1	5	0.9
Cobble/Gravel	341	332	97.8
Sand/Silt/Clay	1	3	0.6

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	6	11	2.5
Brush	3	1	0.6
Hardwood	333	329	96.2
Coniferous	0	0	0.0
No Vegetation	2	3	0.7

Total Stream Cobble Embeddedness Values: 3

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

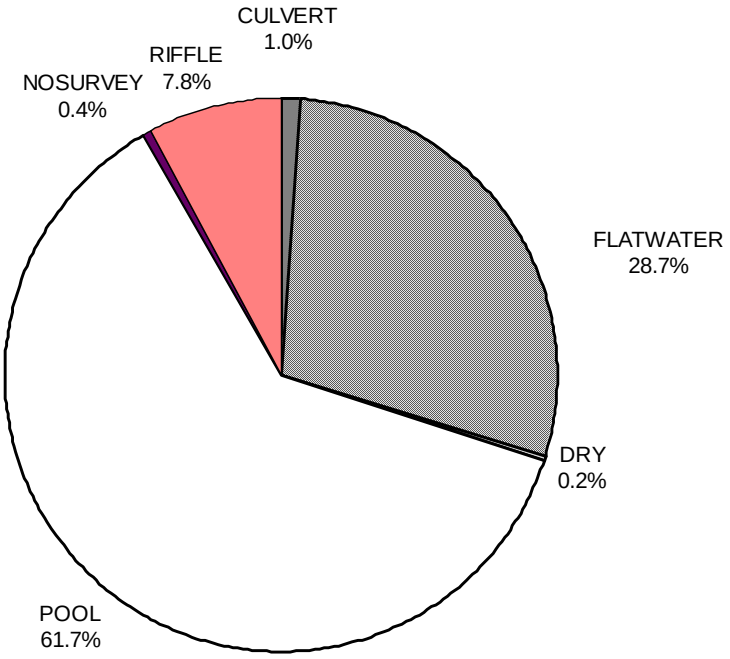
Stream Name: Walker Creek **LLID:** 1229217382214 **Drainage:** Tomales Bay

Survey 8/18/2008 to 9/10/2008

Confluence Location: Quad: TOMALES **Legal Description:** T04NR10WS02 **Latitude:** 38:13:17.0N **Longitude:** 122:55:18.0W

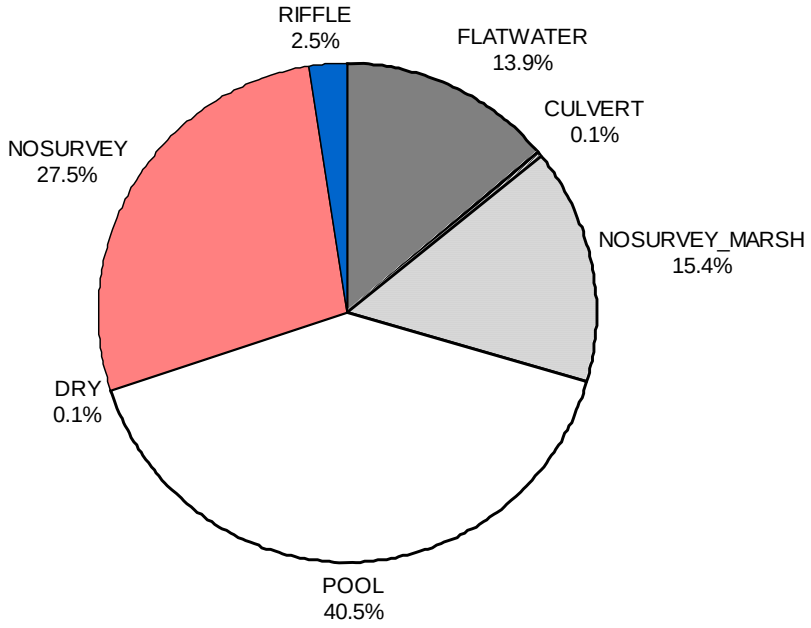
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	9	16	21
SMALL WOODY DEBRIS (%)	12	4	9
LARGE WOODY DEBRIS (%)	0	0	1
ROOT MASS (%)	15	6	13
TERRESTRIAL VEGETATION	34	37	46
AQUATIC VEGETATION (%)	0	0	2
WHITEWATER (%)	0	0	0
BOULDERS (%)	0	13	5
BEDROCK LEDGES (%)	0	0	0

WALKER CREEK 2008
HABITAT TYPES BY PERCENT OCCURRENCE



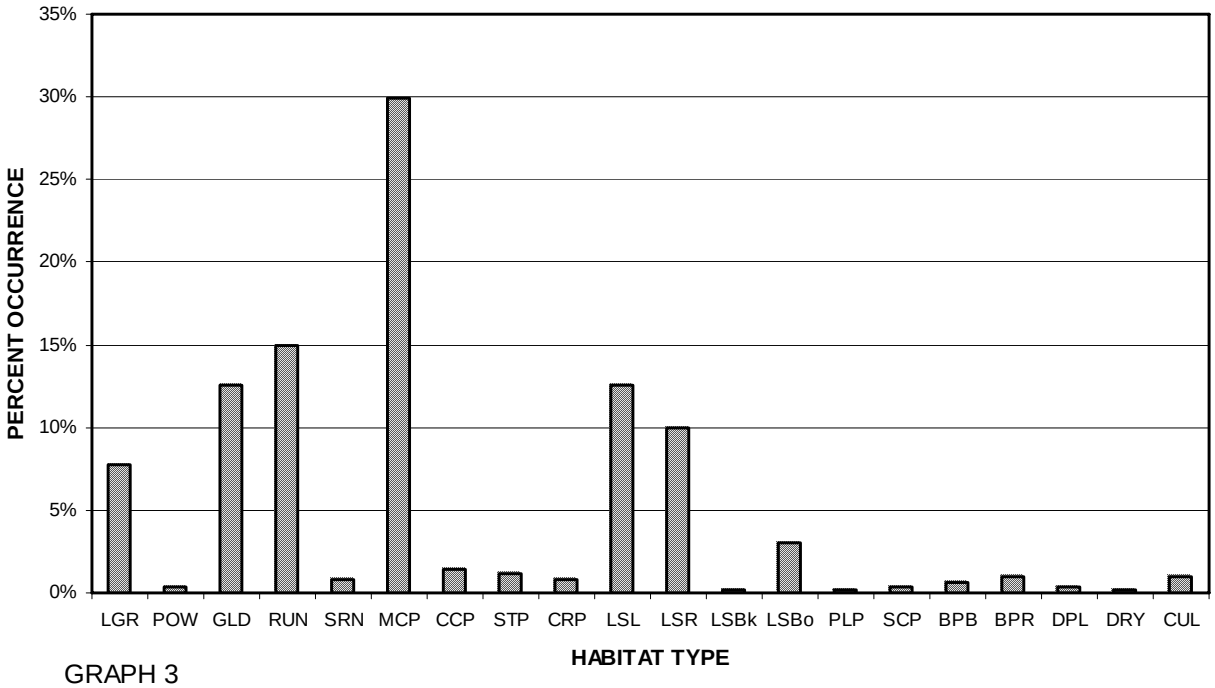
GRAPH 1

WALKER CREEK 2008
HABITAT TYPES BY PERCENT TOTAL LENGTH



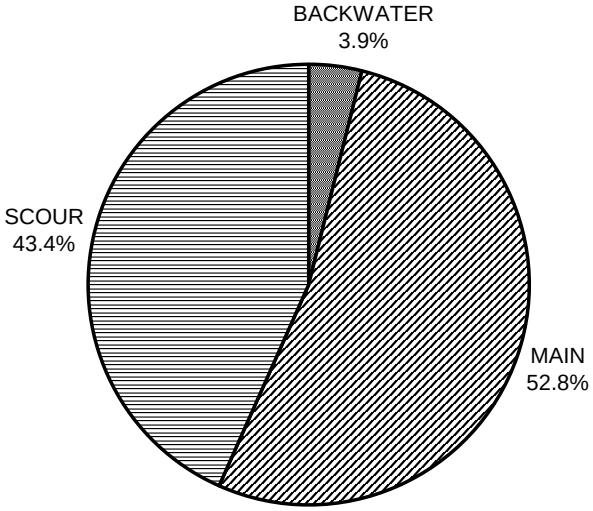
GRAPH 2

WALKER CREEK 2008
HABITAT TYPES BY PERCENT OCCURRENCE



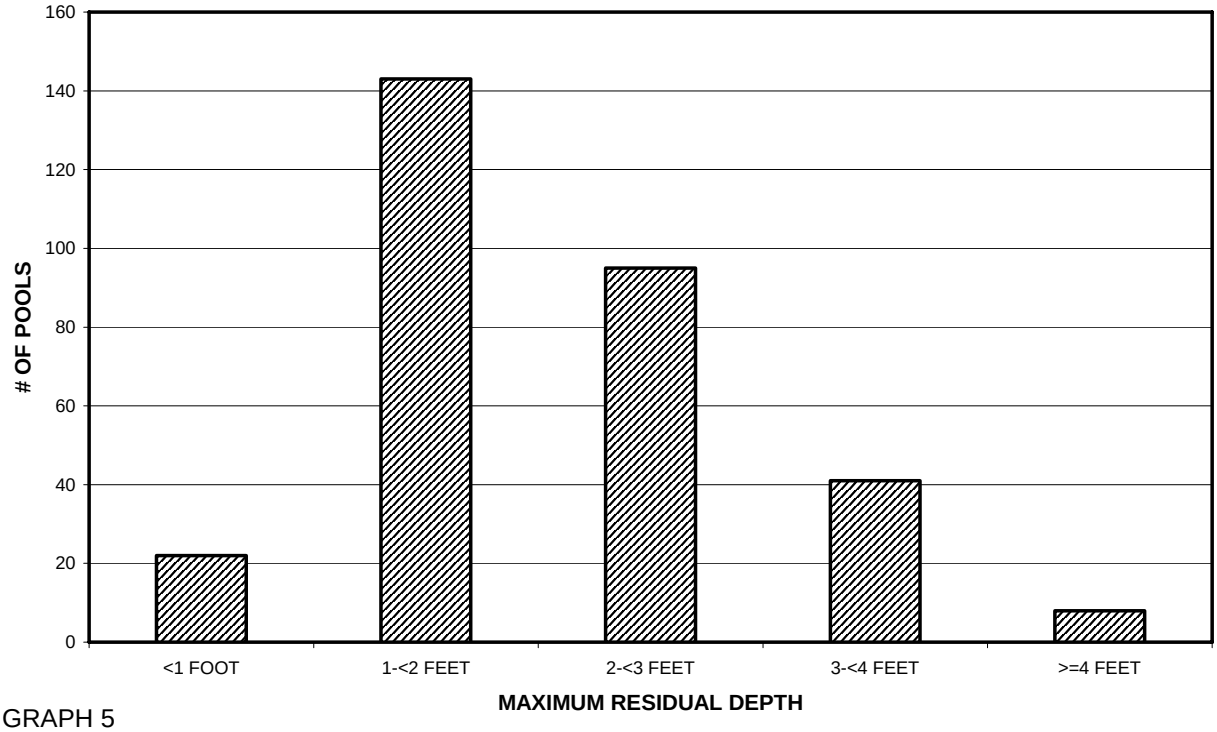
GRAPH 3

WALKER CREEK 2008
POOL TYPES BY PERCENT OCCURRENCE



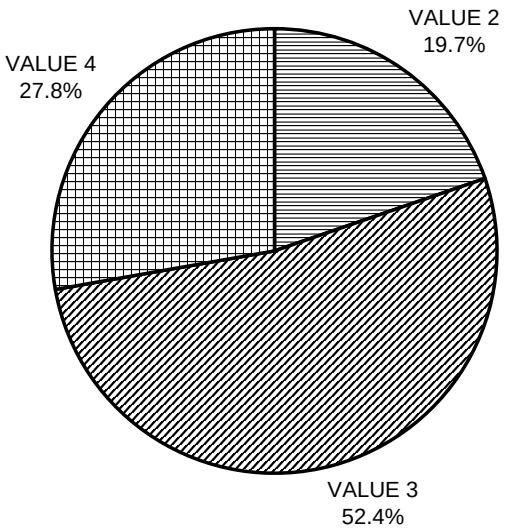
GRAPH 4

WALKER CREEK 2008
MAXIMUM DEPTH IN POOLS



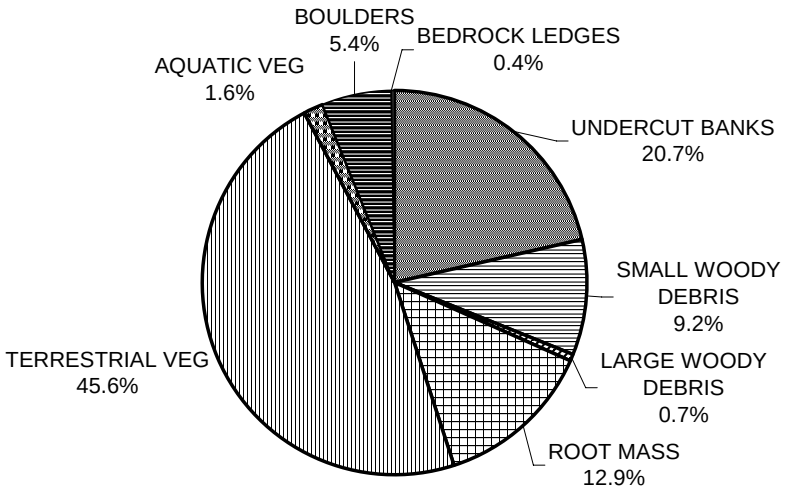
GRAPH 5

WALKER CREEK 2008
PERCENT EMBEDDEDNESS



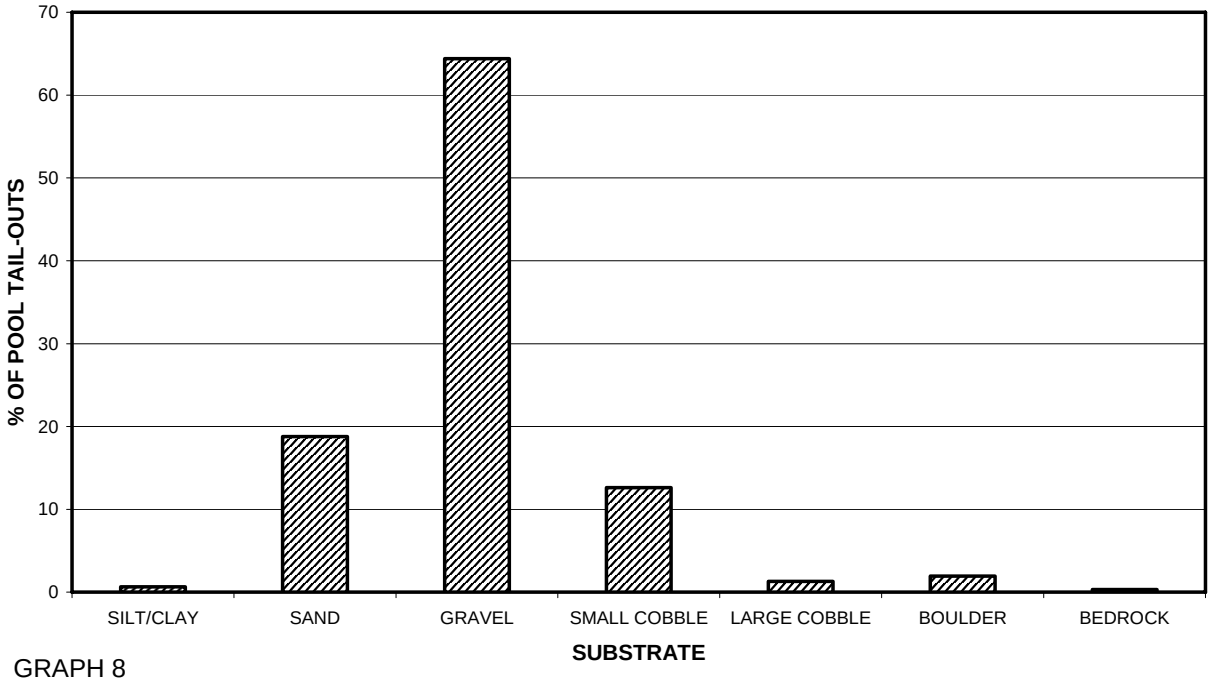
GRAPH 6

WALKER CREEK 2008
MEAN PERCENT COVER TYPES IN POOLS



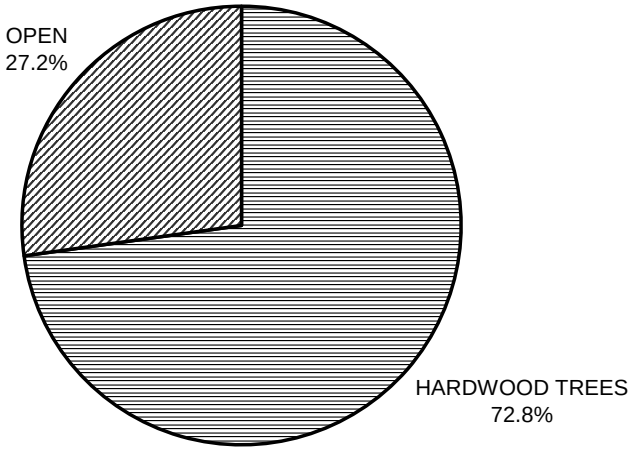
GRAPH 7

WALKER CREEK 2008
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



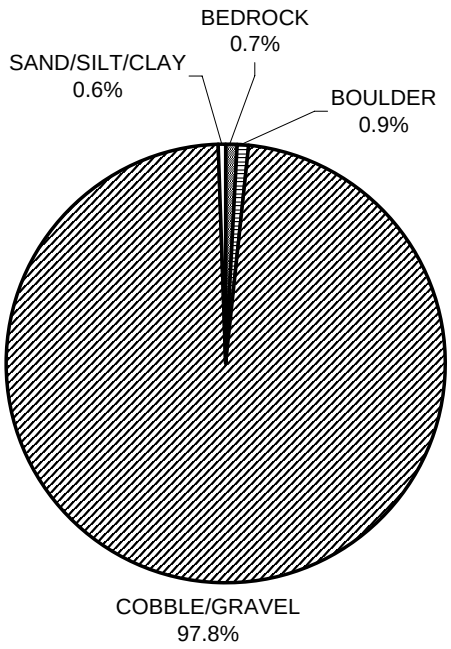
GRAPH 8

WALKER CREEK 2008
MEAN PERCENT CANOPY



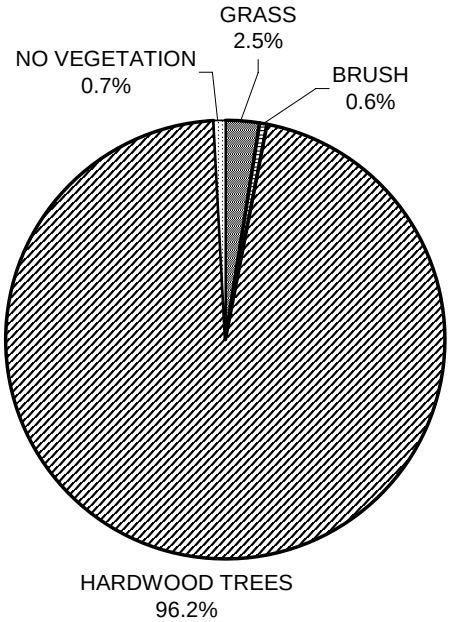
GRAPH 9

WALKER CREEK 2008
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

WALKER CREEK 2008
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11