California Department of Fish and Wildlife
East Marin County
San Francisco Bay Watersheds
Stream Habitat Assessment Reports

Sleepy Hollow Creek

Surveyed 2009

Report Completed in 2013

STREAM INVENTORY REPORT

Sleepy Hollow Creek

INTRODUCTION

A stream inventory was conducted 8/6/2009 to 8/21/2009 on Sleepy Hollow Creek. The survey began at the confluence with San Anselmo Creek and extended upstream 4.9 miles.

The Sleepy Hollow 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 Sleepy Hollow 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

Sleepy Hollow Creek is located in Marin County, California (Map 1). It is a tributary to San Anselmo Creek, which flows into Corte Madera Creek, which flows into San Francisco Bay, which flows into Pacific Ocean. Sleepy Hollow Creek's legal description at the confluence with San Anselmo Creek is T02N R07W Sec.25. Its location is (37:58:53.1N) 37.9814 north latitude and (122:34:10.9W) 122.5696 west longitude, LLID number 1225696379814. Sleepy Hollow Creek is a second order stream and has approximately 4.7 miles of blue line stream according to the USGS National Hydrology Dataset (NHD). Sleepy Hollow Creek drains a watershed of approximately 3.5 square miles. Elevations range from about 52 feet at the mouth of the creek to 1,585 feet in the headwater areas. Low Intensity Residential areas dominates the watershed. The watershed is primarily privately owned, which accounts for 90% of the land area. Sixty-six percent of the land is considered natural, and 34% is urban. Vehicle access exists via multiple residential and public roads throughout the town of Fairfax, California. Vehicle access to the confluence exists at Saunders Avenue just east of Sir Francis Drake Boulevard. Access to the upper reaches and headwaters exists via Butterfield Road which extends north of the Fairfax.

METHODS

The habitat inventory conducted in Sleepy Hollow 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 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 Sleepy Hollow 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. Additionally, a recording thermograph was deployed in Sleepy Hollow Creek from 08/06/2009 to 08/21/2009 to record temperatures on a 24 hour basis during warm summer months.

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". Sleepy Hollow 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 Sleepy Hollow 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 Sleepy Hollow 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 Sleepy Hollow 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 Sleepy Hollow 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 Sleepy Hollow Creek. In addition, 1 site was 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 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 Sleepy Hollow 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 between 8/6/2009 to 8/12/2009, was conducted by Macias T, Villalobos A, and Bell C. (WSP). The total length of the stream surveyed was 25,806 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.016cfs on August 12, 2009.

Sleepy Hollow Creek is a F4 channel type for 25,806 feet of the stream surveyed (Reach 1). F4 channel types are entrenched meandering riffle/pool channels on low gradients with high width to depth ratios, and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 60 to 70 degrees Fahrenheit. Air temperatures ranged from 56 to 94 degrees Fahrenheit.
Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 31% flatwater units, 22% dry units, 22% culvert units, 14% riffle units, 11% pool units (Graph 1). Based on total length of Level II habitat types, there were 54% dry units, 27% flatwater units, 8% riffle units, 6% pool units, 5% culvert units (Graph 2).

Fourteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were 22% dry units, 22% culvert units, 14% low gradient riffle units, 14%

glide units (Graph 3). Based on percent total length, 54% dry units, 11% glide units, 10% run units.

A total of 33 pools were identified (Table 3). Scour pools were the most frequently encountered at 55% (Graph 4), and comprised 61% 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. Fifteen of the 33 pools (45%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 33 pool tail-outs measured, 3 had a value of 1 (9%), 3 had a value of 2 (9%), 7 had a value of 3 (21%), 20 had a value of 4 (61%) (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 0, flatwater habitat types had a mean shelter rating of 14, and pool habitats had a mean shelter rating of 21 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating of 26, while main channel pools had a mean shelter rating of 15 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Sleepy Hollow Creek. Graph 7 describes the pool cover in Sleepy Hollow 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 was the dominant substrate observed in 64% of pool tail-outs; and sand substrate was observed in 33% of pool tail-outs.

The mean percent canopy density for the surveyed length of Sleepy Hollow Creek was 87%. Of the canopy present, the mean percentages of hardwood and coniferous trees were 100% and 0%, respectively. Thirteen percent of the canopy was open. Graph 9 describes the mean percent canopy in Sleepy Hollow Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 48%. The mean percent left bank vegetated was 52% (Table 7). The dominant elements composing the structure of the stream banks consisted of 68% sand/silt/clay, 18% bedrock, 13% boulder, 1% cobble/gravel (Graph 10). Deciduous trees were the dominant vegetation type observed in 71% of the units surveyed. Additionally, 23% of the units surveyed had brush as the dominant vegetation type, and 5% had grass as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Sleepy Hollow Creek

Survey teams conducted an electrofishing survey at 1 site for species composition and distribution in Sleepy Hollow Creek on September 30, 2009. Water temperatures taken during the electrofishing period of 1530 to 1605 was 60 degrees Fahrenheit. Air temperatures ranged from 71 to 68 degrees Fahrenheit. The site was sampled by C Bell, T Macias (WSP), and D Resnik (CDFW).

In reach 1, 1 site was sampled. The reach site yielded 5 young-of-the-year steelhead/rainbow trout (SH/RT), 3 age 2+ SH/RT, and 18 three-spine stickleback.

The following chart displays the information yielded from these sites:

2009 Sleepy Hollow Creek electrofishing observations.

Date	Site #	Reference Point	Distance From Reference Point (ft.)	Steelhead/ Rainbow Trout			Non Salmonids Name species
				0+	1+	2+	
9/30/2009	732	Butterfield Road Crossing and in-stream Culvert	N/A	5	0	3	18 Three Spine Stickleback

DISCUSSION

Sleepy Hollow Creek is a F4 channel type for the entire 25,806 feet of the stream survey.. The suitability of F4 channel types for fish habitat improvement structures is/are as follows: F4 channel types are good for bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover.

The water temperatures recorded on the survey days August 6 to August 21, 2009, ranged from 60 to 70 degrees Fahrenheit. Air temperatures ranged from 56 to 94 degrees Fahrenheit. This is a poor water temperature for salmonids. 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 27% of the total length of this survey, riffles 8%, and pools 6%. The pools are relatively deep, with 15 of the 33 (45%) 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.

Six of the 33 pool tail-outs measured had embeddedness ratings of 1 or 2. Twenty-seven 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 Sleepy Hollow Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Twenty-one of the 33 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 21. The shelter rating in the flatwater habitats is 14. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by boulders in Sleepy Hollow 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 87%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 48% and 52%, 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

Sleepy Hollow 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) Due to the high gradient of the stream located just downstream, of the Deer Hollow Road crossing, access for migrating salmonids is an ongoing potential problem. This barrier has potentially been created by failed unnatural erosion control structures and must be assessed. Good water temperature and flow regimes exist in the stream and it

offers good conditions for rearing fish. Fish passage should be monitored and improved in locations of concern.

2) Access for migrating salmonids should be assessed at all road crossings and dams. Particular sites of concern include, but are not limited to, the Taylor Street road bridge, Saunders Avenue road bridge, Sir Francis Drake Boulevard road bridge Mountain View Avenue road bridge, Morningside Road bridge, Deer Hollow Road bridge, and the Broadmore Avenue road bridge. In the headwaters of Sleepy hollow Creek are numerous private residential access road bridges (particularly #45, #47, and #54) and ford crossings that may impede fish passage; these specific sites are located upstream of the Green Valley Court road crossing and extend upstream throughout the creek until the end of anadromy. The Fawn Drive, Butterfield Road, and San Dominico School Building and Driveway in-stream culverts are also sites of concern for salmonid fish passage. 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.

3) 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.

4) 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.

5) 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.

6) Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediments entering the stream. Active and potential sediment sources related to the road system need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.

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

8) Increase the canopy on Sleepy Hollow 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.

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

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	The survey was started at the confluence with San Anselmo Creek. There is a large concrete barrier at the mouth of the creek.
436	0010.00	Bridge #1 is the Taylor St road bridge, which is 15 ft wide, 10 ft high, and 35 ft long. The water to sill height is 0.2 ft. It is made of concrete. It was not retaining gravel but was downcutting. The bridge could be a potential barrier to salmonids.
815	0018.00	Bridge #2 made of concrete is a road bridge on Saunders Ave. It is 10 ft wide, 11 ft high, and 41 ft long. It was not downcutting or retaining gravel. It is not a barrier to salmonids.
1,089	0022.00	Bridge #3 is a concrete public school footbridge, which is 50 ft wide, 15 ft high, and 18 ft long. It was not retaining gravel. It has a natural bottom and is not a barrier to salmonid passage.
1,210	0026.00	There is a willow mat on the left bank.
1,472	0030.00	Pennyroyal needs removal at this location.
1,559	0031.00	There is concrete on the right bank.
1,717	0032.00	Bridge #4 made of concrete is the Sir Francis Drake Blvd county road bridge. It is 10 ft wide, 11 ft high, and 63 ft long. It has a natural bottom. It was not retaining gravel or downcutting and is not a barrier to salmonids.
2,544	0042.00	Bridge #5 made of concrete is Mountain View Ave, a public road. The width is 15 ft, the height is 7 ft, and the length is 38 ft. The water to sill height is 0.5 ft. It was not retaining gravel or downcutting. The bridge is not a barrier to salmonids.

Position	Habitat Unit #	Memo
2,822	0046.00	Bridge #6 made of concrete is Morningside Dr, a public road. The width is 14 ft, the height is 8 ft, and the length is 39 ft. The water to sill height was 0.3 ft. It was not retaining gravel or downcutting. The bridge is not a barrier to salmonids.
3,263	0050.00	Bridge #7 made of concrete is Broadmore Ave, a public road. The width is 14 ft, the height is 8 ft, and the length is 49 ft. The water to sill height was 1.0 ft. It was not retaining gravel or downcutting. The bridge is not a barrier to salmonids.
4,580	0066.00	There is Arundo on the left bank at this location.
4,970	0071.00	Bridge #8 is a private footbridge made of wood. The width is 18 ft, the height is 10 ft, and the length is 6 ft. The water to sill height was 0 ft. It was not retaining gravel or down cutting. The bridge is not a barrier to salmonids.
5,131	0076.00	Bridge #9 is a private footbridge made of wood. The width is 25 ft, the height is 12 ft, and the length is 9 ft. The water to sill height is not applicable. It was not retaining gravel or downcutting. The bridge is not a barrier to salmonids.
5,303	0080.00	Bridge #10 is a private driveway made of steel and brick. The width is 30 ft, the height is 11 ft, and the length is 16 ft. It has a natural bottom. It was not retaining gravel (it has a natural bottom) or downcutting. The bridge is not a barrier to salmonids.
5,424	0082.00	Bridge #11 made of concrete is the local fire department driveway. The width is 34 ft, the height is 10 ft, and the length is 37 ft. It has a natural bottom. It was not retaining gravel (it has a natural bottom) or downcutting. The bridge is not a barrier to salmonids.
5,533	0084.00	Bridge #12 made of concrete is Arroyo Ave, a public road. The width is 12 ft, the height is 9 ft, and the length is 40 ft. The water to sill height is not applicable. It was not retaining gravel (it has a natural bottom) or downcutting. The bridge is not a barrier to salmonids.
5,776	0087.00	Bridge #13 is a Private footbridge with a 12' hieght, 5' length, and a 27' width. It is not retaining gravel or creating downcutting. It has a natural bottom. It is made out of wood and is not a barrier to salmoids.
5,846	0089.00	Bridge #14 is a Private footbridge eith a 40' width, a

Position	Habitat Unit #	Memo
		10' hieght, and a 5 length. It is not retaining gravel and has a natural bottom. It is made of wood is not creating any downcutting, and is not a barrier to salmonids.
5,879	0091.00	Bridge #15 is a Private footbridge that is 34' wide, 11' high, and 5' long. It is not retaining gravel or creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
5,897	0093.00	Right bank tributary #1 is unnamed and not flowing. It is not accessible to fish.
6,297	0102.00	Bridge #16 is a private footbridge that is 18' wide, 11' high, and 5' long. It is not retaining gravel or creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
6,369	0104.00	Bridge #17 is a private footbridge that is 24' wide, 11' high, and 5' long. It is not retaining any gravel and is not creating any downcutting. It has a natural bottom and is made of wood.
6,411	0106.00	Bridge #18 is a private footbridge and is 37' wide, 13' high, and 5' long. It is not retaining gravel nor creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
6,451	0108.00	Bridge #19 is a private driveway and is 39' wide, 12' high, and 15' long. It is not retaining gravel and is not creating donwcutting. It is made of steel and has a natural bottom. It is not a barrier to salmonids.
6,580	0111.00	Bridge #20 is a private footbridge that is 30' wide, 12' high, and 5' wide. It is made of steel and concrete and has a natural bottom. It is not retaining gravel and is not creating any downcutting. It is not a barrier to salmonids.
6,647	0113.00	Bridge #21 is a private footbridge that is 23' wide, 12' high, and 5' long. It is made of wood and has a natural bottom. It is not retaining gravel nor creating downcutting. It is not a barrier to salmonids.
6,694	0115.00	Bridge #22 is a private footbridge that is 33' wide, 12' high, and 5' long It is not retaining gravel nor creating downcutting. It is made of wood and steel and has a natural bottom. It is not a barrier to salmonids.
6,774	0117.00	Bridge #23 is a private footbridge that is 17' wide, 11' high and 16' long. It is not retaining gravel and is not creating downcutting. It is made of wood and has a

Position	Habitat Unit #	Memo
		natural bottom. It is not a barrier to salmonids.
6,808	0119.00	Bridge #24 is a private driveway and is 18' wide, 12' high and12' long. It is not retaining gravel and is not creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
6,820	0120.00	Creek access off Butterfield Road.
6,894	0121.00	Bridge #25 is a private driveway that is 20' wide, 12' high, and 13' long. It is not retaining gravel nor creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
6,964	0123.00	Bridge #26 is a private driveway that is 15' wide, 12' high, and 13' long. It is not retaining gravel nor creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
7,009	0126.00	Bridge #27 is a private footbridge that is 13' wide, 13' high, and 6' long. It is not retaining gravel and is not creating downcutting. It is made of wood and is not a barrier to salmonids.
7,038	0128.00	Bridge #28 is a private footbridge that is 17' wide, 13' high, and 6' long. It is not retaining gravel and is not creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
7,073	0130.00	Priority e-fish spot, possible 4-6 inch steelhead (SH) observed.
7,083	0131.00	Bridge #29 is a private footbridge that is 17' wide, 15' high, and 6' long. I tis not retaining gravel and is not creating downcutting. It is made of wood and has anatural bottom. It is not a barrier to salmonids.
7,089	0132.00	4-6 inch SH observed.
7,130	0134.00	Young of the year (YOY) observed.
7,202	0136.00	Bridge #30 is a private footbridge that is 20' wide, 12' high, and 4' long. It is not retaining gravel and is not creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
7,370	0139.00	Bridge #31 is a private driveway that is 15' wide, 15' high, and 19' long. It is not retaining gravel and not creating downcutting. It is made of steel and had a natural bottom. It is not a barrier to salmonids.
7,429	0142.00	Bridge #32 is a private driveway that is 18' wide, 15' high, and 13' long. It is not retaining gravel and is not creating downcutting. It is made of wood and has a

Position	Habitat Unit #	Memo
		natural bottom. It is not a barrier to salmonids.
7,639	0148.00	Right bank Tributary #2 is a dry. The survey crew checked 25' upstream and found that it is accessible to fish. Roach was observed
7,934	0155.00	Bridge #33 is a private driveway that is 18' wide, 12' high, and 15' long. It is not retaining gravel nor creating downcutting. It is made of concrete and has a natural bottom. It is not a barrier to salmonids.
8,418	0168.00	Bridge #34 is the Caleta Avenue road bridge; it is 14' wide, 15' high, and 30' long. It is not retaining gravel nor creating downcutting. It is made of concrete and has a natural bottom. It is not a barrier to salmonids.
8,622	0171.00	YOY observed.
8,828	0176.00	Fifty feet into unit is a well on the left bank
9,459	0178.00	Urbanite rip rap 4 feet high in channel is a potential fish passage barrier.
9,475	0179.00	Fish barrier is 6 feet high.
9,505	0181.00	Bridge #35 is the Deer Hollow Road bridge; it is 13' wide, 11' high, 28' long and is made of cement. It is not retaining gravel but is creating a lot of downcutting with a large plunge (greater then 7' high) from the dam sill to the bottom of the channel. This is a potential fish passage barrier.
9,533	0182.00	Left bank tributary #3 is dry. The survey crew checked 5' upstream and found that it was accessible to fish.
10,203	0183.00	On the right bank is a 1-inch pipe pumping water from creek.
10,237	0184.00	Bridge #36 is a private footbridge that is 18' wide, 8' high, and 5' long. It is not retaining gravel and is not creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to saloonids.
10,247	0186.00	On the right bank is a 1-inch pipe pumping water from creek.
10,359	0188.00	On the right bank is yard waste in creek.
10,359	0188.00	Culvert #1 is an in-stream concrete box culvert located under the Fawn Drive road crossing. It is 8' high, 13' wide, and 49' long. It is not considered a fish passage barrier due to the shallow maximum depth at the outlet (0.3'). The slope of the culvert is unknown but it is in good condition

Position	Habitat Unit #	Memo
10,944	0192.00	Bridge #37 is a private driveway that is 10' wide, 10' high, and 27' long. It is not retaining gravel and is not creating downcutting. It is made of steel and has a natural bottom. It is not a barrier to salmonids.
11,036	0194.00	Bridge #38 is a private driveway that is 24' wide, 9' high, and 15' long. It is not retaining gravel nor creatin downcutting. It is made of wood and metal and has a natural bottom. It is not a barrier to salmonids.
11,137	0198.00	Bridge #39 is a private driveway that is 16' wide, 7' high, and 15' long. It is not retaining gravel nor is it creating downcutting. It is made of wood and steel and has a natural bottom. It is not a barrier to salmonids.
11,589	0201.00	Bridge #40 is a private footbridge that is 16' wide, 7' high, and 6' long. It is not retaining gravel nor is it creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
11,969	0203.00	Bridge #41 is a private footbridge that is 30' wide, 7' high, and 5' long. It is not retaining gravel and is not downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
12,037	0205.00	Bridge #42 is the Green Valley Court road bridge that is 12' wide, 7' high, and 29' long. It is not retaining gravel and is not creating donwcutting. It is made of cement and has a natural bottom. It is not a barrier to salmonids.
12,246	0207.00	Bridge #43 is a private driveway that is 40' wide, 7' high, and 12' long. It is not retaining gravel nor is it creating downcutting. It is made of cement and has a natural bottom. It is not a barrier to salmonids.
12,345	0209.00	Bridge #44 is a private driveway that is 28' wide, 9' high, and 11' long. It is not retaining gravel and is not creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
12,494	0211.00	7-inch steelhead and crawfish observed.
12,519	0212.00	Bridge #45 is a private driveway that is 37' wide, 10' high, and 11' long. It is retaining gravel due to the dam sill, which is also creating downcutting. This has created a greater then 2' plunge into the channel downstrem. It is not considered a barrier to salmonids.

Position	Habitat Unit #	Memo
12,677	0214.00	Bridge #46 is a private driveway that is 45' wide, 11' high, and 13' long. It is not retaining gravel and is not creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
12,764	0216.00	Bridge #47 is a private driveway that is 12' wide, 8' high, and 12' long. It is retaining gravel but is not creating downcutting. It is made of concrete and wood. There is a sill present on the dam but it is not creating a barrier.
12,819	0218.00	Bridge #48 is a private driveway that is 30' wide, 9' high, and 13' long. It is not retaining gravel nor is it creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
13,040	0225.00	Bridge #49 is a private footbridge that is 60' wide, 14' high, and 5' long. It is not retaining gravel nor is it creating downcutting. It is made of steel and has a natural bottom. It is not a barrier to salmonids.
13,229	0228.00	Bridge #50 is a private driveway that is 35' wide, 12' high, and 16' long. It is not retaining gravel and is not creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
13,296	0230.00	Culvert #2 is an instream concrete box culvert, that is under the Butterfield Road crossing. It is 6' high, 12' wide, and 76' long. It is in good condition. It has a plunge at the outlet that is 1.2' high. It is not considered a barrier to salmonids.
13,508	0232.00	Invasive pennyroyal choking channel.
13,625	0236.00	Invasive pennyroyal filling channel.
13,815	0238.00	Invasive pennyroyal on left bank.
14,148	0243.00	6" SH salmonid observed.
14,261	0245.00	Empty discarded fish hook package found on bank.
14,302	0246.00	Dam #1 is 15' long, 10' high, and 26' wide with a 13' apron extending downstream. The flashboards are currently installed and it is retaining gravel. The dam is creating downcutting and a 10' plunge to the stream bed downstream of the structure. This is a barrier to salmonids.
14,565	0251.00	Small dead feline in creek channel; could potentially be a bobcat carcass.
14,712	0255.00	Right Bank Tributary #4 is dry. The survey crew checked 100' upstream and found that it is accessible

Position	Habitat Unit #	Memo
		to fish. Left bank tributary #5 is dry. The survey crew checked 50' upstream and found it is accessible to fish. It is located 50 feet upstream of right bank tributary #4.
15,281	0264.00	Culvert #3 is an in-stream concrete box culvert, that is located under the Catrina Lane road crossing.It is 6' high, 18' wide, and 58' lomg. The culvert is in good condition. There is a 0.5' plunge at the outlet of the culvert but it is not considered a barrier to salmonids.
16,084	0280.00	Large pieces of broken concrete from old dam are scattered in the creek channel.
16,112	0281.00	Right bank Tibutary #6 is dry. It is accessible to fish.
17,193	0282.00	Culvert #4 is an in-stream plastic culvert, that is located under the Van Winkle Drive crossing. It is 5' high, 7' wide, and 48' long. It is in good condition and is not a barrier to salmonids.
17,380	0284.00	Bridge #51 is a private footbridge that is 10' wide, 6' hgh, and 4' long. It is not retaining gravel nor is it creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
17,479	0286.00	Bridge #52 is a private footbridge that is 13' wide, 6' high, and 7' long. It is not retaining gravel or creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
17,486	0287.00	Four blacktail deer observed.
17,730	0288.00	Bridge #53 is a private footbridge that is 16' wide, 4' high, 3' long. It is not retaining gravel nor creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
17,940	0290.00	Bridge #54 is a private footbridge that is 22' wide, 8' wide, and 11' long. It is not retaining gravel nor creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
18,000	0292.00	Bridge #55 is a private footbridge that is 28' wide, 6' high, and 13' long. It is retaining gravel and is not creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
18,013	0293.00	Right bank tributary #7 is dry. It is accessible to fish but no fish were observed.
18,993	0294.00	Bridge #56 is a ford crossing that is 32' wide and 10' long

Sleepy Hollow Creek

Position	Habitat Unit #	Memo
19,003	0295.00	50' into the unit is Left bank tributary #8 which is dry. The survey crew checked 50' upstream and found that it is accessible to fish. Left bank tributary #4 is dry and is 766 ' into unit. The survey crew checked 50' upstream and found it was accessible to fish.
19,838	0296.00	Culvert #5 is composed of two CMP culvert, that are loacted under the San Domenico School Building #26 driveway. It is 5' in diameter and is 33' long. It has a 1' plunge at the outlet. It is rusted out on the bottom. It is not considered a barrier to fish.
19,943	0298.00	Bridge #57 is the San Dominico School Hall of Arts private footbridge that is 20' wide, 6' high, and 4' long. It is not retaining gravel and not creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
19,947	0299.00	Utility crossing spans creekbed and is composed of 2' think concrete.
20,077	0300.00	Bridge #58 is the San Dominico School building 25 instream structure. It is 25' wide, 6' high, and 101' long. It is not retaining gravel nor is it creating downcutting.It is made of wood and concrete and has a natural bottom. It is not a barrier to salmonids.
20,649	0302.00	Bridge #59 is the San Doniminico School private footbridge which is 28' wide, 9' high, and 5' long. It is not retaining gravel and is not creating downcutting. It is made of wood and has a natural bottom. It is not a barrier to salmonids.
20,654	0303.00	On the left bank is a pipe disgorging soapy water into creek. Scotch broom infestation. 795' into the unit is yard waste in creek.
20,654	0303.00	Left Bank Tributary #10 is dry. The survey crew checked 100 upstream and found it was accessible to fish. 726' into the unit is Right bank Tributary #11 which is dry. The survey crew checked 50' upstream and found it is accessible to fish.
21,720	0304.00	Bridge #60 is a dry ford crossing which is 4' long and 35' wide.
21,724	0305.00	784' into the unit is a Left bank Tributary #12 which is dry. The survey crew checked 50' upstream and found it is not accessible to fish. 3803' into the unit is Left bank tributary #13 which is dry. It is not

Position	Habitat Unit #	Memo
		accessible to fish.
25,806	0305.00	End of survey. Survey crew encountered an impassable section of creek which is too steep to continue upstream.

REFERENCES

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

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

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

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]	

Sleepy Hollow Creek

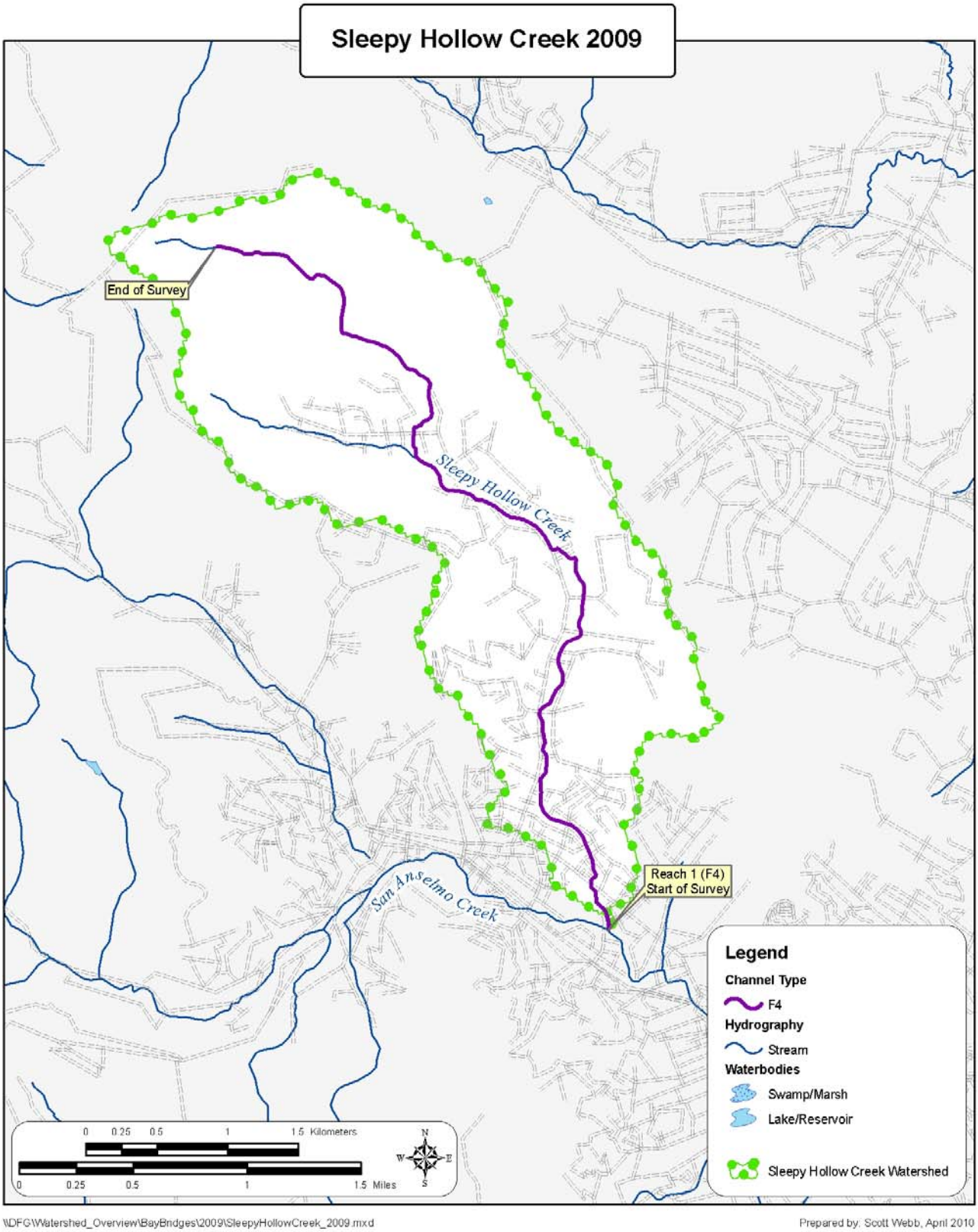


Table 1 - Summary of Riffle, Flatwater, and Pool Habitat Types

Stream Name: Sleepy Hollow Creek **LLID:** 1225696379814 **Drainage:** San Rafael

Survey 8/6/2009 to 8/12/2009

Confluence Location: Quad: SAN RAFAEL **Legal Description:** T02NR07WS25 **Latitude:** 37:58:52.8N **Longitude:** 122:34:14.8W

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
66	0	CULVERT	21.6	19	1270	4.9									
66	0	DRY	21.6	212	14020	54.3									
96	96	FLATWATER	31.5	72	6904	26.8	7.2	0.6	1.3	546	52456	439	42171		14
33	33	POOL	10.8	43	1435	5.6	8.2	0.9	2.1	354	11695	399	13176	359	21
44	44	RIFFLE	14.4	49	2177	8.4	4.8	0.2	0.4	218	9583	39	1707		0

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
305	173	25806	73734	57055

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Sleepy Hollow Creek **LLID:** 1225696379814 **Drainage:** San Rafael

Survey 8/6/2009 to 8/12/2009

Confluence Location: Quad: SAN RAFAEL **Legal Description:** T02NR07WS25 **Latitude:** 37:58:52.8N **Longitude:** 122:34:14.8W

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 (%)
44	44	LGR	14.4	49	2177	8.4	5.0	0.2	0.9	218	9583	39	1707		0	88
44	44	GLD	14.4	63	2791	10.8	8.0	0.6	4.0	569	25053	452	19877		20	86
36	36	RUN	11.8	70	2505	9.7	7.0	0.7	3.0	520	18714	502	18062		10	91
16	16	SRN	5.2	100	1608	6.2	6.0	0.4	2.0	543	8689	264	4232		6	90
1	1	TRP	0.3	86	86	0.3	4.0	1.0	1.5	344	344	378	378	344	10	86
14	14	MCP	4.6	33	467	1.8	8.0	0.8	2.8	260	3635	249	3485	219	15	89
5	5	CRP	1.6	52	260	1.0	9.0	1.1	2.9	430	2148	489	2445	434	19	93
2	2	LSL	0.7	37	74	0.3	6.0	1.0	2.6	243	486	268	536	244	25	96
1	1	LSR	0.3	84	84	0.3	9.0	1.2	3.0	756	756	983	983	907	5	95
3	3	LSBk	1.0	59	178	0.7	8.0	1.0	2.7	458	1374	526	1578	462	53	93
5	5	LSBo	1.6	45	223	0.9	9.0	0.9	2.1	400	2000	400	2000	360	28	76
2	2	PLP	0.7	32	63	0.2	13.0	1.4	4.2	476	952	886	1772	838	13	95
66	0	DRY	21.6	212	14020	54.3										70
66	0	CUL	21.6	19	1270	4.9										

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume
305	173	25806	73734	57055

Table 3 - Summary of Pool Habitat Types

Stream Name: Sleepy Hollow Creek **LLID:** 1225696379814 **Drainage:** San Rafael

Survey 8/6/2009 to 8/12/2009

Confluence Location: **Quad:** SAN RAFAEL **Legal Description:** T02NR07WS25 **Latitude:** 37:58:52.8N **Longitude:** 122:34:14.8W

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
15	15	MAIN	45	37	553	39	7.5	0.8	265	3979	227	3409	15
18	18	SCOUR	55	49	882	61	8.8	1.0	429	7716	468	8427	26

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
33	33	1435	11695	11836

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

Stream Name: Sleepy Hollow Creek **LLID:** 1225696379814 **Drainage:** San Rafael

Survey 8/6/2009 to 8/12/2009

Confluence Location: Quad: SAN RAFAEL **Legal Description:** T02NR07WS25 **Latitude:** 37:58:52.8N **Longitude:** 122:34:14.8W

Habitat Units	Habitat Type	Habitat Occurrence (%)	< 1 Foot Maximum Residual Depth	< 1 Foot Percent Occurrence	1 < 2 Feet Maximum Residual Depth	1 < 2 Feet Percent Occurrence	2 < 3 Feet Maximum Residual Depth	2 < 3 Feet Percent Occurence	3 < 4 Feet Maximum Residual Depth	3 < 4 Feet Percent Occurrence	>= 4 Feet Maximum Residual Depth	>= 4 Feet Percent Occurrence
1	TRP	3	0	0	1	100	0	0	0	0	0	0
14	MCP	42	1	7	8	57	5	36	0	0	0	0
5	CRP	15	0	0	2	40	3	60	0	0	0	0
2	LSL	6	0	0	1	50	1	50	0	0	0	0
1	LSR	3	0	0	0	0	0	0	1	100	0	0
3	LSBk	9	0	0	0	0	3	100	0	0	0	0
5	LSBo	15	0	0	3	60	2	40	0	0	0	0
2	PLP	6	0	0	1	50	0	0	0	0	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
33	1	3	16	48	14	42	1	3	1	3

Mean Maximum Residual Pool Depth (ft.): 2

Table 5 - Summary of Mean Percent Cover By Habitat

Stream Name: Sleepy Hollow Creek **Dry Units:** 66 **LLID:** 1225696379814 **Drainage:** San Rafael

Survey 8/6/2009 to 8/12/2009

Confluence Location: Quad: SAN RAFAEL **Legal Description:** T02NR07WS25 **Latitude:** 37:58:52.8N **Longitude:** 122:34:14.8W

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
44	14	LGR	0	0	0	0	0	0	0	0	0
44	14	TOTAL RIFFLE	0	0	0	0	0	0	0	0	0
44	20	GLD	1	0	0	0	6	12	0	17	0
36	16	RUN	4	0	0	3	0	9	0	15	0
16	8	SRN	13	0	0	0	10	0	0	15	0
96	44	TOTAL FLAT	4	0	0	1	5	8	0	16	0
1	1	TRP	0	0	0	0	45	45	0	10	0
14	14	MCP	11	5	0	10	4	9	0	36	4
5	5	CRP	18	12	0	10	0	10	0	30	0
2	2	LSL	0	30	0	0	50	0	0	20	0
1	1	LSR	0	0	0	95	5	0	0	0	0
3	3	LSBk	20	0	0	13	0	30	0	3	0
5	5	LSBo	30	0	0	6	2	18	0	40	4
2	2	PLP	70	0	0	0	0	0	0	10	20
33	33	TOTAL POOL	18	6	0	11	6	12	0	28	3
66	0	CUL									
305	91	TOTAL	8	2	0	4	5	9	0	18	1

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Sleepy Hollow Creek **Dry Units:** 66 **LLID:** 1225696379814 **Drainage:** San Rafael

Survey 8/6/2009 to 8/12/2009

Confluence Location: **Quad:** SAN RAFAEL **Legal Description:** T02NR07WS25 **Latitude:** 37:58:52.8N **Longitude:** 122:34:14.8W

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
44	14	LGR	7	57	7	0	0	7	21
44	20	GLD	15	55	30	0	0	0	0
36	16	RUN	6	63	31	0	0	0	0
16	8	SRN	0	25	75	0	0	0	0
1	1	TRP	0	0	100	0	0	0	0
14	14	MCP	14	57	29	0	0	0	0
5	5	CRP	0	40	40	0	0	0	20
2	2	LSL	0	0	100	0	0	0	0
1	1	LSR	0	0	100	0	0	0	0
3	3	LSBk	0	0	100	0	0	0	0
5	5	LSBo	0	20	80	0	0	0	0
2	2	PLP	0	50	50	0	0	0	0
66	0	CUL	0	0	0	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Sleepy Hollow Creek **LLID:** 1225696379814 **Drainage:** San Rafael

Survey 8/6/2009 to 8/12/2009

Confluence Location: **Quad:** SAN RAFAEL **Legal Description:** T02NR07WS25 **Latitude:** 37:58:52.8N **Longitude:** 122:34:14.8W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
87	0	100	1	48	52

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.

Sleepy Hollow Creek

Table 8 - Fish Habitat Inventory Data Summary

Stream Sleepy Hollow Creek LLID: 1225696379814 Drainage San Rafael

Survey Dates: 8/6/2009 to 8/12/2009 Survey Length (ft.): 25806 Main Channel (ft.): 25806 Side Channel (ft.): 0

Confluence Location: Quad SAN RAFAEL Legal Description: T02NR07WS25 Latitude: 37:58:52.8N Longitude: 122:34:14.8W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: F4

Reach Length (ft.): 25806

Riffle/Flatwater Mean Width (ft.): 6.5

BFW:

Range (ft.): 0.00 to 20.00

Mean (ft.): 14.84

Std. Dev.: 3.69

Base Flow (cfs): 0.028

Water (F): 60 - 70 Air (F): 56 - 94

Dry Channel (ft.): 14020

Canopy Density (%): 87.1

Coniferous Component (%): 0.5

Hardwood Component 99.5

Dominant Bank Hardwood Trees

Vegetative Cover (%): 49.6

Dominant Boulders

Dominant Bank Substrate Sand/Silt/Clay

Occurrence of LWD (%): 0.0

LWD per 100 ft.:

Riffles: 0

Pools: 0

Flat: 0

Pools by Stream Length 5.6

Pool Frequency (%): 10.8

Residual Pool Depth (%):

< 2 Feet Deep: 51.5

2 to 2.9 Feet Deep: 42.4

3 to 3.9 Feet Deep: 3.0

>= 4 Feet Deep: 3.0

Mean Max Residual Pool Depth 2.05

Mean Pool Shelter 21

Pool Tail Substrate (%): Silt/Clay: 3.0 Sand: 33.3 Gravel: 63.6 Sm Cobble: 0.0 Lg Cobble: 0.0 Boulder 0.0 Bedrock: 0.0

Embeddedness Values (%): 1. 9.1 2. 9.1 3. 21.2 4. 60.6 5. 0.0

Table 9 -Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Sleepy Hollow Creek **LLID:** 1225696379814 **Drainage:** San Rafael

Survey 8/6/2009 to 8/12/2009

Confluence Location: **Quad:** SAN RAFAEL **Legal Description:** T02NR07WS25 **Latitude:** 37:58:52.8N **Longitude:** 122:34:14.8W

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	19	15	18.5
Boulder	11	13	13.0
Cobble/Gravel	0	1	0.5
Sand/Silt/Clay	62	63	67.9

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	4	5.4
Brush	20	22	22.8
Hardwood	65	65	70.7
Coniferous	0	0	0.0
No Vegetation	1	1	1.1

Total Stream Cobble Embeddedness Values: 3

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

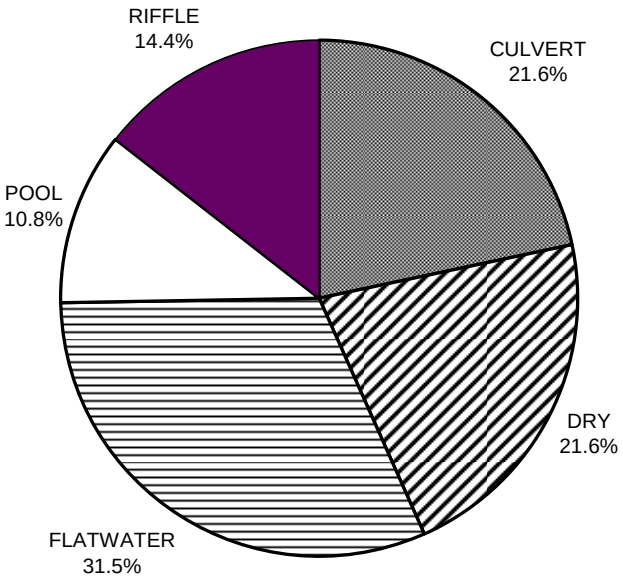
Stream Name: Sleepy Hollow Creek **LLID:** 1225696379814 **Drainage:** San Rafael

Survey 8/6/2009 to 8/12/2009

Confluence Location: **Quad:** SAN RAFAEL **Legal Description:** T02NR07WS25 **Latitude:** 37:58:52.8N **Longitude:** 122:34:14.8W

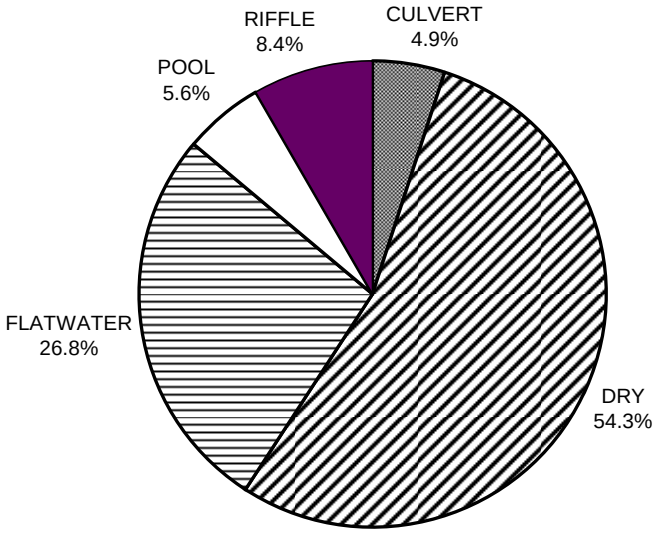
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	4	18
SMALL WOODY DEBRIS (%)	0	0	6
LARGE WOODY DEBRIS (%)	0	0	0
ROOT MASS (%)	0	1	11
TERRESTRIAL VEGETATION	0	5	6
AQUATIC VEGETATION (%)	0	8	12
WHITEWATER (%)	0	0	0
BOULDERS (%)	0	16	28
BEDROCK LEDGES (%)	0	0	3

SLEEPY HOLLOW CREEK 2009
HABITAT TYPES BY PERCENT OCCURRENCE



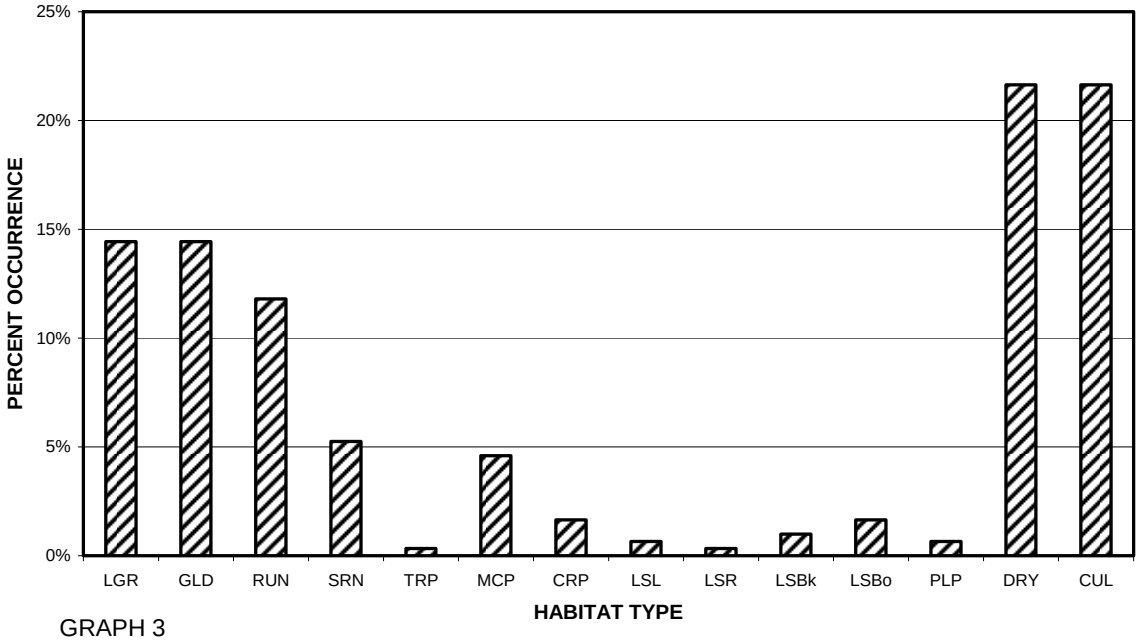
GRAPH 1

SLEEPY HOLLOW CREEK 2009
HABITAT TYPES BY PERCENT TOTAL LENGTH



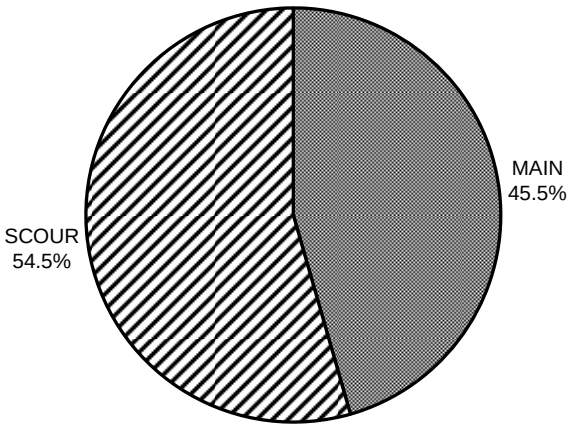
GRAPH 2

SLEEPY HOLLOW CREEK 2009
HABITAT TYPES BY PERCENT OCCURRENCE

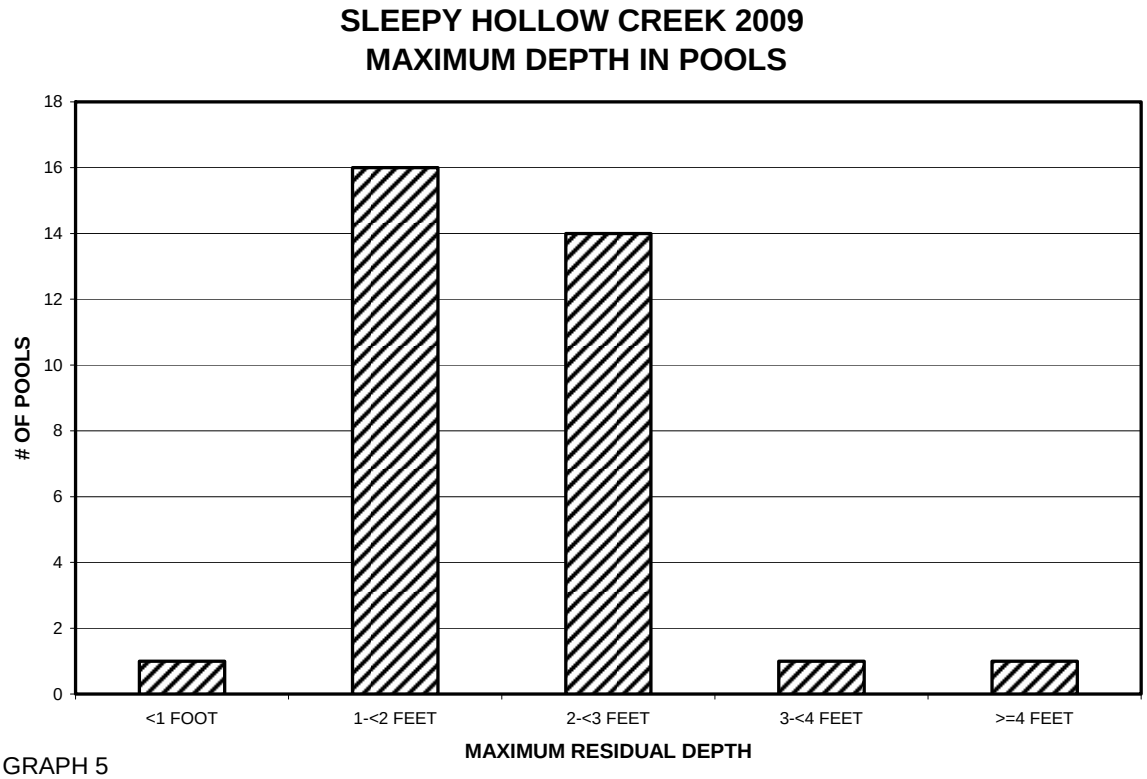


GRAPH 3

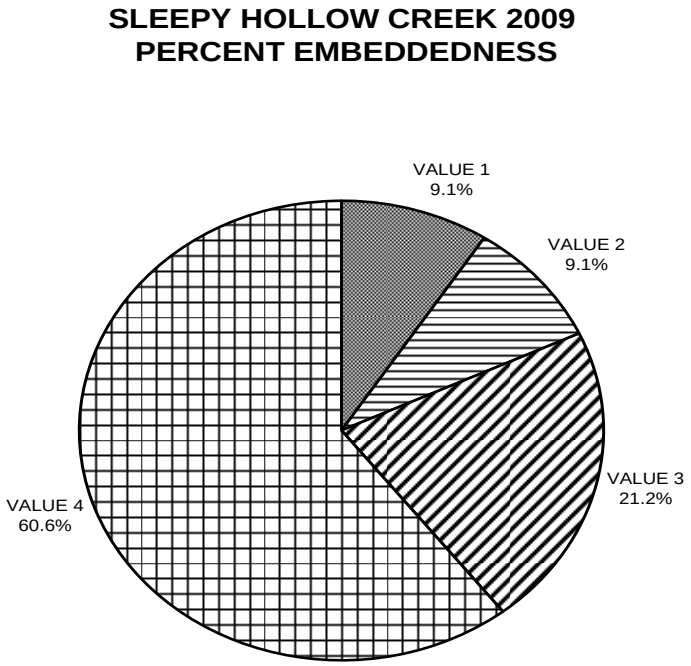
SLEEPY HOLLOW CREEK 2009
POOL TYPES BY PERCENT OCCURRENCE



GRAPH 4

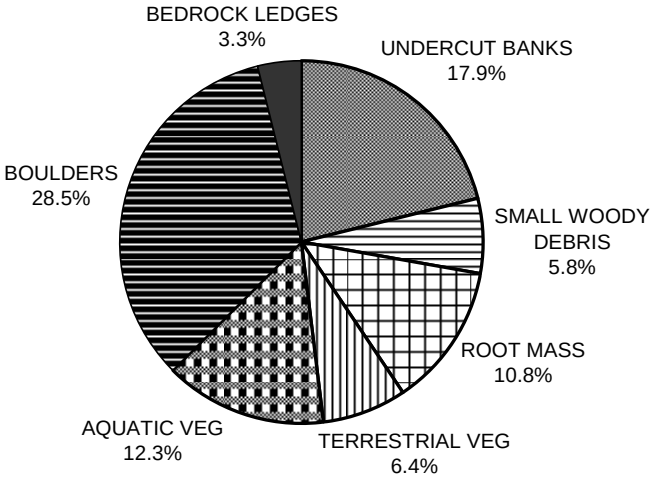


GRAPH 5



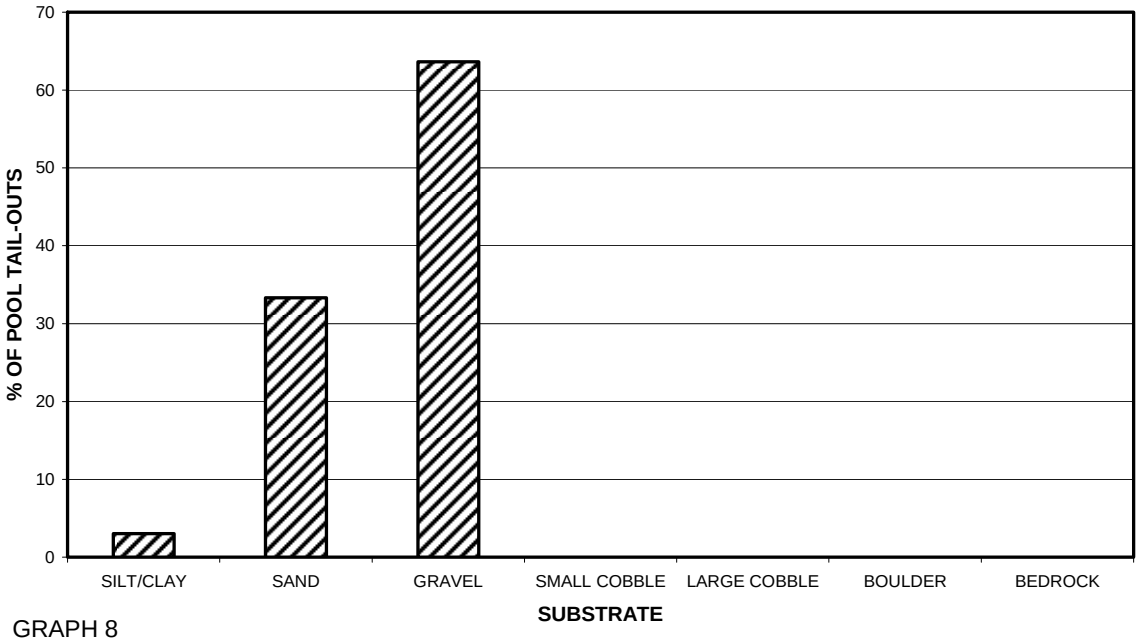
GRAPH 6

SLEEPY HOLLOW CREEK 2009
MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

SLEEPY HOLLOW CREEK 2009
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS

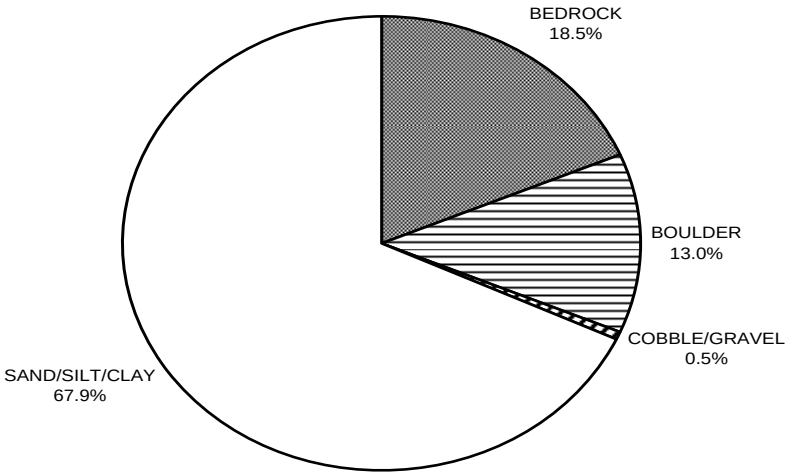


GRAPH 8

SLEEPY HOLLOW CREEK 2009
MEAN PERCENT CANOPY

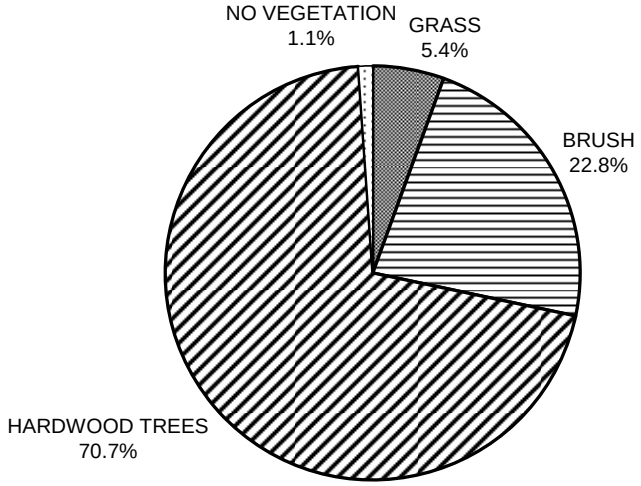
GRAPH 9

SLEEPY HOLLOW CREEK 2009
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

SLEEPY HOLLOW CREEK 2009
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11