

CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT
Unnamed tributary to West Slough
Report Completed March 20, 2007
Assessment Completed 2006

INTRODUCTION

A stream inventory was conducted during 8/23/2006 to 8/28/2006 on the unnamed tributary to West Slough. The survey began at the confluence with West Slough and extended upstream 1.4 miles. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in the unnamed tributary to West Slough.

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

The unnamed tributary to West Slough is a tributary to West Slough, a tributary to Dry Creek, a tributary to Russian River, a tributary to Pacific Ocean located in Sonoma County, California (Map 1). The unnamed tributary to West Slough's legal description at the confluence with West Slough is T09N R09W S17. Its location is 38°37'35.0" north latitude and 122°53'00.0" west longitude and its LLID number is 1228834386264. The unnamed tributary to West Slough is a third order stream and has approximately 1.7 miles of blue line stream according to the USGS Geyserville 7.5 minute quadrangle. The unnamed tributary to West Slough drains a watershed of approximately 5.3 square miles. Elevations range from about 100 feet at the mouth of the creek to 200 feet in the headwater areas. Mixed hardwood forest dominates the watershed. The watershed is located primarily on privately owned agriculture land. Vehicle access exists via Hwy 101 to Dry Creek Rd near Healdsburg.

METHODS

The habitat inventory conducted in The unnamed tributary to West Slough 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. All pool units are measured for maximum depth, depth of pool tail crest (measured in the thalweg), dominant substrate composing the pool tail crest, and embeddedness. Habitat unit types encountered for the first time are measured for all the parameters and characteristics on the field form. Additionally, from the ten habitat units on each

Unnamed tributary to West Slough 2006
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 the unnamed tributary to West Slough 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". The unnamed tributary to West Slough 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 the unnamed tributary to West Slough, 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 The unnamed tributary to West Slough, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:

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

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densimeters as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In The unnamed tributary to West Slough, 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 The unnamed tributary to West Slough, 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

Unnamed tributary to West Slough 2006

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 the unnamed tributary to West Slough. In addition, two 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 The unnamed tributary to West Slough include:

- Riffle, Flatwater, Pool Habitat Types by Percent Occurrence
- Riffle, Flatwater, Pool Habitat Types by Total Length

Unnamed tributary to West Slough 2006

- 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 8/23/2006 to 8/28/2006 was conducted by Mitsuko Terry, Henning Fett, and Russell Spangler (WSP). The total length of the stream surveyed was 7,392 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.027 cfs on 8/28/06.

The unnamed tributary to West Slough is an F4 channel type for all 7,392 feet of the stream surveyed (Reach 1). F4 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 57 to 62 degrees Fahrenheit. Air temperatures ranged from 53 to 77 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 41% flatwater units, 16% riffle units, 5% culvert units, 5% nosurvey units, 30% pool units and 3% dry units (Graph 1). Based on total length of Level II habitat types there were 43% flatwater units, 3% riffle units, 2% culvert units, 28% nosurvey units, 10% pool units, and 14% dry units (Graph 2).

Ten Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were 27% Run units, 16% Low Gradient Riffle units, and 14% Glide units (Graph 3). Based on percent total length, the most frequent habitat types were 34% Run units, 28% Not Surveyed units, and 14% Dry units.

A total of 22 pools were identified (Table 3). Scour pools were the most frequently encountered, at 82%, and comprised 82% 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. Seven of the 22 pools (32%) had a residual depth of two feet or greater, while just 1 of the 22 pools (5%) had a residual depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 22 pool tail-outs

Unnamed tributary to West Slough 2006

measured, 1 had a value of 1 (4.5%); 10 had a value of 2 (45.5%); 4 had a value of 3 (18.2%); 2 had a value of 4 (9.1%); and 5 had a value of 5 (22.7%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst. Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate such as bedrock, log sills, boulders, or other considerations.

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Riffle habitat types had a mean shelter rating of 0, flatwater habitat types had a mean shelter rating of 10, and pool habitats had a mean shelter rating of 53 (Table 1). Of the pool types, the scour pools had a mean shelter rating of 57 while the main channel pools had a mean shelter rating of 36 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Terrestrial vegetation and small woody debris are the dominant cover types in The unnamed tributary to West Slough. Graph 7 describes the pool cover in The unnamed tributary to West Slough. Root Mass is the dominant pool cover type followed by small woody debris.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Sand substrate types were observed in 23% of pool tail-outs, and gravel substrate types were observed in 55% of pool tail-outs.

The mean percent canopy density for the surveyed length of The unnamed tributary to West Slough was 70%. The mean percentages of hardwood and coniferous trees were 97% and 3%, respectively. Thirty percent of the canopy was open (Table 7). Graph 9 describes the mean percent canopy in The unnamed tributary to West Slough.

For the stream reach surveyed, the mean percent right bank vegetated was 70%. The mean percent left bank vegetated was 73%. The dominant elements composing the structure of the stream banks consisted of 2% bedrock, 2% boulder, 16% cobble/gravel, and 81% sand/silt/clay (Graph 10). Brush was the dominant vegetation type observed in 62% of the units surveyed. Additionally, 33% of the units surveyed had deciduous trees as the dominant vegetation type, 2% had grass as the dominant vegetation and 3% had no vegetation (Graph 11).

HABITAT INVENTORY RESULTS FOR UNNAMED TRIBUTARY TO UNNAMED TRIBUTARY TO WEST SLOUGH

An unnamed tributary to the unnamed tributary to West Slough was surveyed on August 28, 2006. The entire 3625 feet surveyed was dry.

BIOLOGICAL INVENTORY RESULTS

Two sites were electrofished for species composition and distribution in the unnamed tributary to West Slough on September 26 and 27, 2006. Water temperatures taken during the 9/26/2006 electrofishing period 08:40 – 09:40 ranged from 56 to 56 degrees Fahrenheit. Air temperatures ranged from 56 to 58 degrees Fahrenheit. Water temperatures taken during the 9/27/2006 electrofishing period 10:15 – 11:15 ranged from 57 to 57 degrees Fahrenheit. Air temperatures ranged from 59 to 57 degrees Fahrenheit. The sites were sampled by Mitsuko Terry (DFG) and

Table 1. Biological sampling data for the unnamed tributary to West Slough.

<u>Site</u>	<u>Species</u>	<u>Minimum Number Observed</u>
Middle	roach	228
Middle	sculpin	24
Lower	sculpin	51
Lower	roach	104
Lower	stickleback	10
Lower	green sunfish	1
Lower	bluegill sunfish	5
Lower	steelhead (1+)	1
Lower	Steelhead (0+)	1

DISCUSSION

The unnamed tributary to West Slough is an F4 channel type for the entire 7,392 feet of stream surveyed. According to the California Salmonid Stream Habitat Restoration Manual, the suitability of F4 channel types for fish habitat improvement structures is graded good for bank-placed boulders. F4 types are also graded fair for plunge weirs, single and opposing wing-deflectors, channel constrictors and log cover. F4 types are rated poor for boulder clusters.

The water temperatures recorded on the survey days 8/23/2006 to 8/28/2006, ranged from 57 to 62 degrees Fahrenheit. Air temperatures ranged from 53 to 77 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 43% of the total length of this survey, riffles 3%, and pools 10%. The pools are relatively shallow, with only 1 of the 22 (5%) pools having a maximum residual depth greater than 3 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In 3rd and 4th order streams, a primary pool is defined to have a maximum residual depth of at least 3 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.

Eleven of the 22 pool tail-outs measured had embeddedness ratings of 1 or 2. Six of the pool tail-outs had embeddedness ratings of 3 or 4. Five 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 The unnamed tributary to West Slough should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Sixteen of the 22 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

Unnamed tributary to West Slough 2006

The mean shelter rating for pools was 53. The shelter rating in the flatwater habitats was 10. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists in The unnamed tributary to West Slough is being provided primarily by Terrestrial Vegetation, followed by small woody debris. Root mass is the dominant cover type in pools followed by small woody debris. 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 70%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was moderate at 70% and 72%, 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 MANAGEMENT RECOMMENDATIONS

The unnamed tributary to West Slough 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. The unnamed tributary to West Slough 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.
2. 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.
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 Root Mass. Adding high quality complexity with woody cover in the

Unnamed tributary to West Slough 2006

pools is desirable.

5. Increase the canopy on the unnamed tributary to West Slough by planting appropriate native vegetation like willow, alder, cottonwood, and redwood along the stream where shade canopy is not at acceptable levels. The reaches above this survey section should be inventoried and treated as well, since the water flowing here is affected from upstream. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.

COMMENTS AND LANDMARKS

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

Position (ft.)	Habitat #	Unit	Comments
0	0001.00	Start of Survey:	Start of Survey on Trib to West Slough
88	0002.00	General Comment:	Bedrock = Concrete bags
135	0003.00	Structures:	retaining wall on right bank
296	0005.00	Structures:	Culvert #1, Dry Creek Road, WP 060 Double Box, creek in right bank box L40 W10.5 H5.9 No down cutting Retaining gravel, Ht.: 0.6
800	0009.00	General Comment:	trail right bank erosion left bank Arundo right bank
940	0011.00	General Comment:	Fence left bank Erosion left bank
1544	0017.00	Structures:	Right bank retaining wall 4' tall
1873	0018.00	General Comment:	Erosion left bank
1908	0019.00	Tributaries:	Trib on left bank, dry
3308	0021.00	General Comment:	(2) springs on right bank erosion on right bank includes separate corner pool
3380	0022.00	General Comment:	Conifers !
3475	0023.00	General Comment:	erosion on right bank
3593	0025.00	Structures:	Culvert #2

Unnamed tributary to West Slough 2006

Position (ft.)	Habitat #	Unit	Comments
		L42 W11 H6.9	No down cutting, Retaining gravel, Ht.: 0.3
3724	0027.00	General Comment: Tire in Creek	House on right bank
3856	0028.00	General Comment: Fence on left bank	
3894	0029.00	General Comment: Spring on right bank	
4039	0030.00	General Comment: Boulders = concrete blocks	
4039	0030.00	Structures: Bridge over unit	Bridge #1 H7 W37 L10
4098	0032.00	General Comment: left bank tree/root mass erosion filled with concrete blocks	
4249	0036.00	General Comment: Gully on left bank	Erosion on left bank Fern
4287	0037.00	General Comment: Two pools in a row	
4443	0043.00	General Comment: Gully on left bank	
4493	0046.00	General Comment: Wet gully on right bank	
4560	0049.00	General Comment: Erosion on right bank	Spring on right bank Fence lost in creek
4747	0054.00	General Comment: Erosion on right bank	
4872	0057.00	General Comment: Pools separated by a 1' riffle	Erosion on left bank
4894	0058.00	General Comment: Erosion on left bank	
5002	0061.00	General Comment: Erosion on left bank	
5036	0062.00	General Comment: Erosion on left bank	
5093	0063.00	General Comment: Erosion on right bank: See form	Metal fence post in creek also on corner
5116	0064.00	General Comment: WP: 076	Start of dry trib on left bank
5357	0066.00	Structures: Bridge #2 at 63'	H8 W30 L10
5680	0068.00	General Comment: Gully on left bank	
5680	0068.00	Structures: Bridge #3	H4.6 W22 L9
6076	0070.00	General Comment: Retaining wall on left bank	

Unnamed tributary to West Slough 2006

Position (ft.)	Habitat Unit #	Comments
6076	0070.00	Structures: Check dam at 266'
6342	0071.00	Structures: Retaining wall on left bank, ends at next unit
6575	0072.00	Structures: Culvert #3 L20 W3 H3 No down cutting Not retaining gravel
7375	0074.00	Structures: Culvert #4 L17 W3 H3 No down cutting; Not retaining gravel
7392	0074.00	End of Survey: WP: 073 End of survey for unnamed tributary to West Slough

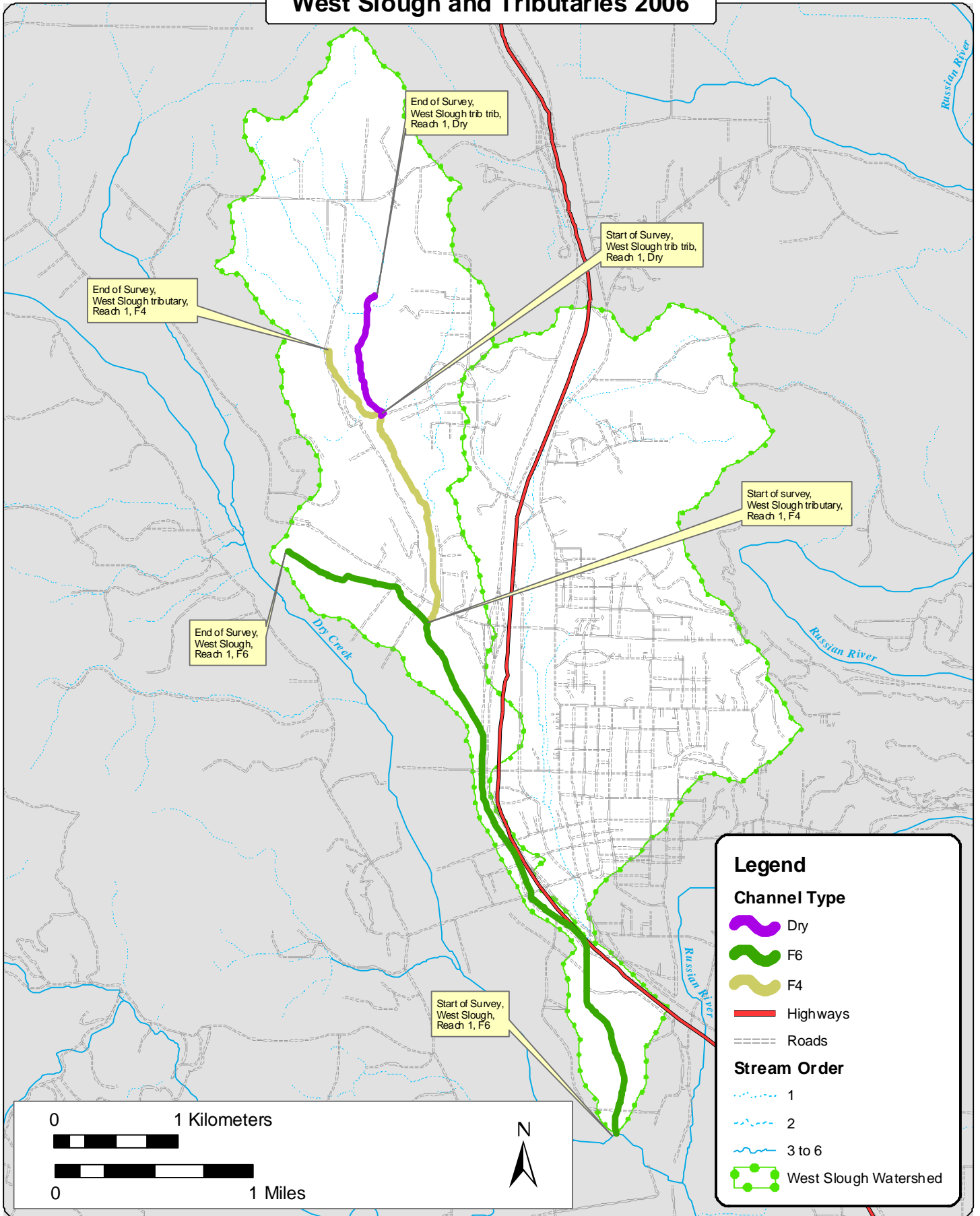
REFERENCES

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.

West Slough and Tributaries 2006



Legend

Channel Type

-  Dry
-  F6
-  F4
-  Highways
-  Roads

Stream Order





-  1
-  2
-  3 to 6
-  West Slough Watershed

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

Stream Name: The unnamed tributary to West Slough

LLID: 1228834386264

Drainage: Russian River - Middle

Survey Dates: 8/23/2006 to 8/28/2006

Confluence Location: Quad: GEYSERVILLE

Legal Description: T09N R09W S17

Latitude: 38:37:35.0N

Longitude: 122:53:00.0W

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
4	2	CULVERT	5.4	30	119	1.6	7.3	0.2	0.3	294	1176	59	235		0
2	0	DRY	2.7	506	1013	13.7									
30	8	FLATWATER	40.5	107	3213	43.5	5.5	0.6	1.1	643	19292	398	11942		10
4	0	NOSURVEY	5.4	518	2072	28.0									
22	22	POOL	29.7	34	747	10.1	7.0	1.0	1.9	232	5096	277	6096	238	53
12	2	RIFFLE	16.2	19	228	3.1	4.0	0.2	0.4	98	1177	18	219		0
Total Units	Total Units Fully Measured				Total Length (ft.)						Total Area (sq.ft.)		Total Volume (cu.ft.)		
74	34				7392						26741		18492		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: The unnamed tributary to West Slough

LLID: 1228834386264

Drainage: Russian River - Middle

Survey Dates: 8/23/2006 to 8/28/2006

Confluence Location: Quad: GEYSERVILLE

Legal Description: T09N R09W S17

Latitude: 38:37:35.0N

Longitude: 122:53:00.0W

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 (%)
12	2	LGR	16.2	19	228	3.1	4.0	0.2	0.6	98	1177	18	219		0	74
10	3	GLD	13.5	72	725	9.8	5.0	0.6	1.9	391	3912	235	2347		8	74
20	5	RUN	27.0	124	2488	33.7	6.0	0.6	1.3	794	15884	496	9921		11	68
4	4	MCP	5.4	34	137	1.9	8.0	1.2	2.5	255	1019	336	1344	303	36	74
6	6	CRP	8.1	36	213	2.9	7.0	1.1	2.2	236	1414	302	1812	260	55	74
3	3	LSL	4.1	40	121	1.6	9.0	1.2	3.0	343	1028	412	1236	355	110	78
7	7	LSR	9.5	32	221	3.0	7.0	1.0	2.1	192	1347	214	1497	182	46	78
1	1	LSBo	1.4	41	41	0.6	6.0	0.4	1.3	221	221	155	155	89	40	0
1	1	PLP	1.4	14	14	0.2	5.0	0.7	1.5	67	67	53	53	47	10	70
2	0	DRY	2.7	506	1013	13.7										0
4	2	CUL	5.4	30	119	1.6	7.0	0.2	0.4	294	1176	59	235		0	
4	0	NS	5.4	518	2072	28.0										
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)		Total Volume (cu.ft.)				
74	34				7392					27244		18819				

Table 3 - Summary of Pool Types

Stream Name: The unnamed tributary to West Slough

LLID: 1228834386264

Drainage: Russian River - Middle

Survey Dates: 8/23/2006 to 8/28/2006

Confluence Location: Quad: GEYSERVILLE

Legal Description: T09N R09W S17

Latitude: 38:37:35.0N

Longitude: 122:53:00.0W

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
4	4	MAIN	18	34	137	18	7.8	1.2	255	1019	303	1212	36
18	18	SCOUR	82	34	610	82	6.9	1.0	226	4076	224	4030	57
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)		Total Volume (cu.ft.)	
22	22				747					5096		5242	

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

Stream Name: The unnamed tributary to West Slough

LLID: 1228834386264

Drainage: Russian River - Middle

Survey Dates: 8/23/2006 to 8/28/2006

Confluence Location: Quad: GEYSERVILLE

Legal Description: T09N R09W S17

Latitude: 38:37:35.0N

Longitude: 122:53:00.0W

Habitat Units	Habitat Type	Habitat Occurrence (%)	< 1 Foot Maximum Residual Depth	< 1 Foot Percent Occurrence	1 < 2 Feet Maximum Residual Depth	1 < 2 Feet Percent Occurrence	2 < 3 Feet Maximum Residual Depth	2 < 3 Feet Percent Occurrence	3 < 4 Feet Maximum Residual Depth	3 < 4 Feet Percent Occurrence	>= 4 Feet Maximum Residual Depth	>= 4 Feet Percent Occurrence
7	LSR	32	0	0	5	71	2	29	0	0	0	0
6	CRP	27	0	0	4	67	2	33	0	0	0	0
3	LSL	14	0	0	2	67	0	0	1	33	0	0
1	LSBo	5	0	0	1	100	0	0	0	0	0	0
4	MCP	18	0	0	2	50	2	50	0	0	0	0
1	PLP	5	0	0	1	100	0	0	0	0	0	0
Total Units			Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1 < 2 Feet Max Resid. Depth	Total 1 < 2 Feet % Occurrence	Total 2 < 3 Feet Max Resid. Depth	Total 2 < 3 Feet % Occurrence	Total 3 < 4 Feet Max Resid. Depth	Total 3 < 4 Feet % Occurrence	Total >= 4 Feet Max Resid. Depth	Total >= 4 Feet % Occurrence
22			0	0	15	68	6	27	1	5	0	0

Mean Maximum Residual Pool Depth (ft.): 2

Unnamed tributary to West Slough 2006

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: The unnamed tributary to West Slough

LLID: 1228834386264

Drainage: Russian River - Middle

Survey Dates: 8/23/2006 to 8/28/2006

Confluence Location: Quad: GEYSERVILLE

Legal Description: T09N R09W S17

Latitude: 38:37:35.0N

Longitude: 122:53:00.0W

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
12	2	LGR	0	0	0	0	0	0	0	0	0
10	3	GLD	0	27	0	0	40	0	0	0	0
20	5	RUN	0	40	0	0	60	0	0	0	0
4	4	MCP	5	38	13	0	20	0	0	0	0
6	6	CRP	37	22	1	8	31	2	0	0	0
3	3	LSL	3	33	40	20	3	0	0	0	0
7	7	LSR	3	10	6	71	10	0	0	0	0
1	1	LSBo	0	20	0	0	50	0	0	30	0
1	1	PLP	0	0	90	0	10	0	0	0	0
4	1	CUL	0	0	0	0	0	0	0	0	0
4	0	NS									

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: The unnamed tributary to West Slough

LLID: 1228834386264

Drainage: Russian River - Middle

Survey Dates: 8/23/2006 to 8/28/2006

Confluence Location: Quad: GEYSERVILLE

Legal Description: T09N R09W S17 **Latitude:** 38:37:35.0N

Longitude: 122:53:00.0W

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
12	2	LGR	0	0	100	0	0	0	0
10	3	GLD	100	0	0	0	0	0	0
20	5	RUN	20	60	20	0	0	0	0
4	4	MCP	0	100	0	0	0	0	0
6	6	CRP	0	67	33	0	0	0	0
3	3	LSL	0	33	67	0	0	0	0
7	7	LSR	0	71	29	0	0	0	0
1	1	LSBo	0	100	0	0	0	0	0
1	1	PLP	0	0	100	0	0	0	0
4	1	CUL	0	0	100	0	0	0	0
4	0	NS	0	0	0	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: The unnamed tributary to West Slough

LLID: 1228834386264

Drainage: Russian River - Middle

Survey Dates: 8/23/2006 to 8/28/2006

Confluence Location: Quad: GEYSERVILLE

Legal Description: T09N R09W S17

Latitude: 38:37:35.0N

Longitude: 122:53:00.0W

Habitat Units	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
70	3	97	4	70	73

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

Open units represent habitat units with zero canopy cover.

Unnamed tributary to West Slough 2006

Table 8 - Fish Habitat Inventory Data Summary

Stream Name: The unnamed tributary to West Slough LLID: 1228834386264 Drainage: Russian River - Middle
 Survey Dates: 8/23/2006 to 8/28/2006 Survey Length (ft.): 7392 Main Channel (ft.): 7392 Side Channel (ft.): 0
 Confluence Location: Quad: GEYSERVILLE Legal Description: T09N R09W S17 Latitude: 38:37:35.0N Longitude: 122:53:00.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: F4	Canopy Density (%): 70.1	Pools by Stream Length (%): 10.1
Reach Length (ft.): 7392	Coniferous Component (%): 3.3	Pool Frequency (%): 29.7
Riffle/Flatwater Mean Width (ft.): 5.2	Hardwood Component (%): 96.7	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Brush	< 2 Feet Deep: 68.2
Range (ft.): 6 to 13	Vegetative Cover (%): 71.3	2 to 2.9 Feet Deep: 27.3
Mean (ft.): 11.2972972972973	Dominant Shelter: Terrestrial Veg.	3 to 3.9 Feet Deep: 4.5
Std. Dev.: 1.89401425356184	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0.0
Base Flow (cfs): 0.027	Occurrence of LWD (%): 9.2	Mean Max Residual Pool Depth (ft.): 1.85
Water (F): 57 - 62 Air (F): 53 - 77	LWD per 100 ft.:	Mean Pool Shelter Rating: 53
Dry Channel (ft.): 1013	Riffles: 0	
	Pools: 2	
	Flat: 0	
Pool Tail Substrate (%): Silt/Clay: 4.5 Sand: 22.7 Gravel: 54.5 Sm Cobble: 18.2 Lg Cobble: 0.0 Boulder: 0.0 Bedrock: 0.0		
Embeddedness Values (%): 1. 4.5 2. 45.5 3. 18.2 4. 9.1 5. 22.7		

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: The unnamed tributary to West Slough **LLID:** 1228834386264 **Drainage:** Russian River - Middle
Survey Dates: 8/23/2006 to 8/28/2006
Confluence Location: Quad: GEYSERVILLE **Legal Description:** T09N R09W S17 **Latitude:** 38:37:35.0N **Longitude:** 122:53:00.0W

Mean Percentage of Dominant Stream Bank

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percentage (%)
Bedrock	1	0	1.6
Boulder	1	0	1.6
Cobble/Gravel	7	3	15.6
Sand/Silt/Clay	23	29	81.3

Mean Percentage of Dominant Stream Bank

Dominant Class of Vegetation	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percentage (%)
Grass	0	1	1.6
Brush	22	18	62.5
Hardwood Trees	9	12	32.8
Coniferous Trees	0	0	0.0
No Vegetation	1	1	3.1

Total Stream Cobble Embeddedness 3

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

Stream Name: The unnamed tributary to West Slough

LLID: 1228834386264

Drainage: Russian River - Middle

Survey Dates: 8/23/2006 to 8/28/2006

Confluence Location: Quad: GEYSERVILLE

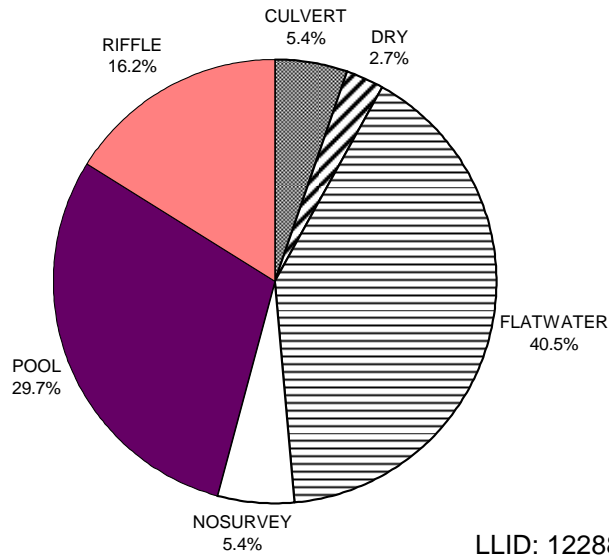
Legal Description: T09N R09W S17

Latitude: 38:37:35.0N

Longitude: 122:53:00.0W

	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	0	12
SMALL WOODY DEBRIS (%)	0	35	21
LARGE WOODY DEBRIS (%)	0	0	14
ROOT MASS (%)	0	0	28
TERRESTRIAL VEGETATION (%)	0	53	18
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	0	0	1
BEDROCK LEDGES (%)	0	0	0

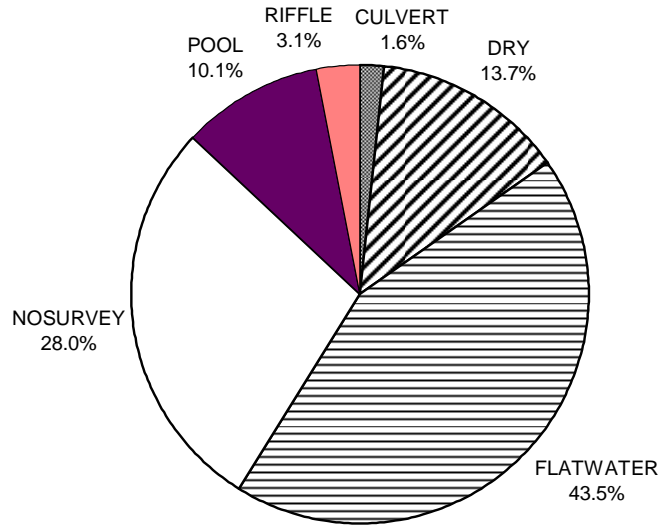
**WEST SLOUGH TRIBUTARY 2006
HABITAT TYPES BY PERCENT OCCURRENCE**



GRAPH 1

LLID: 1228834386264

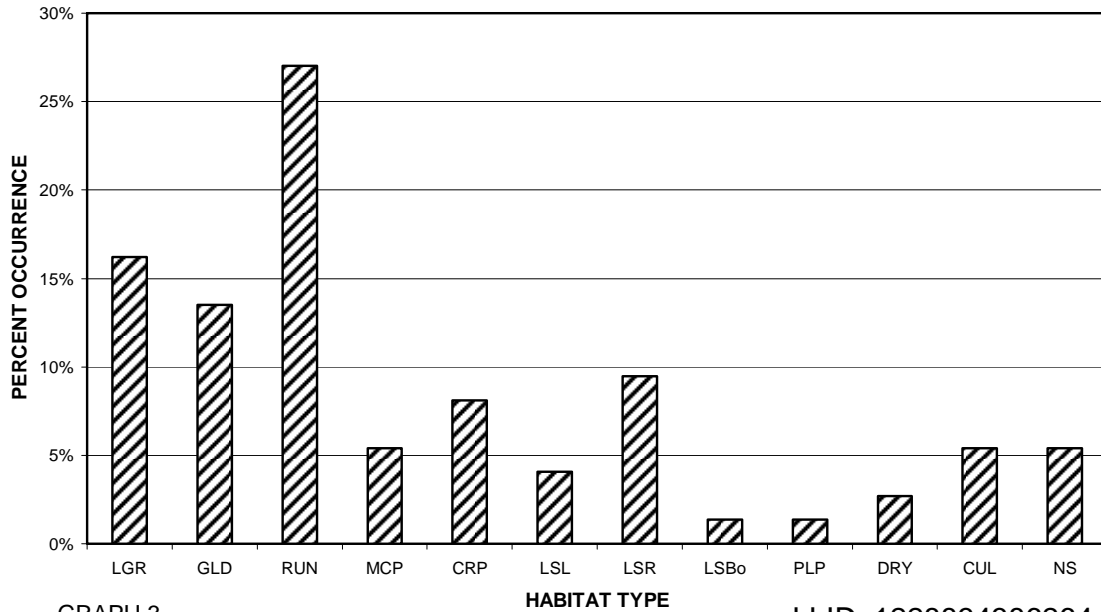
**WEST SLOUGH TRIBUTARY 2006
HABITAT TYPES BY PERCENT TOTAL LENGTH**



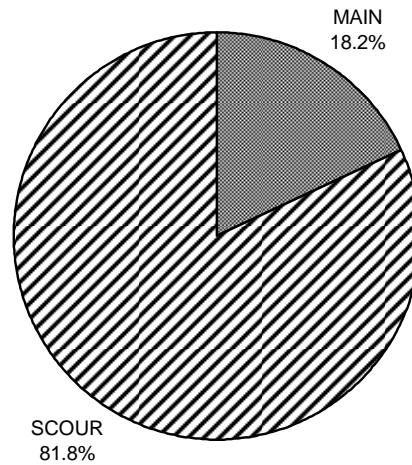
GRAPH 2

LLID: 1228834386264

WEST SLOUGH TRIBUTARY 2006 HABITAT TYPES BY PERCENT OCCURRENCE



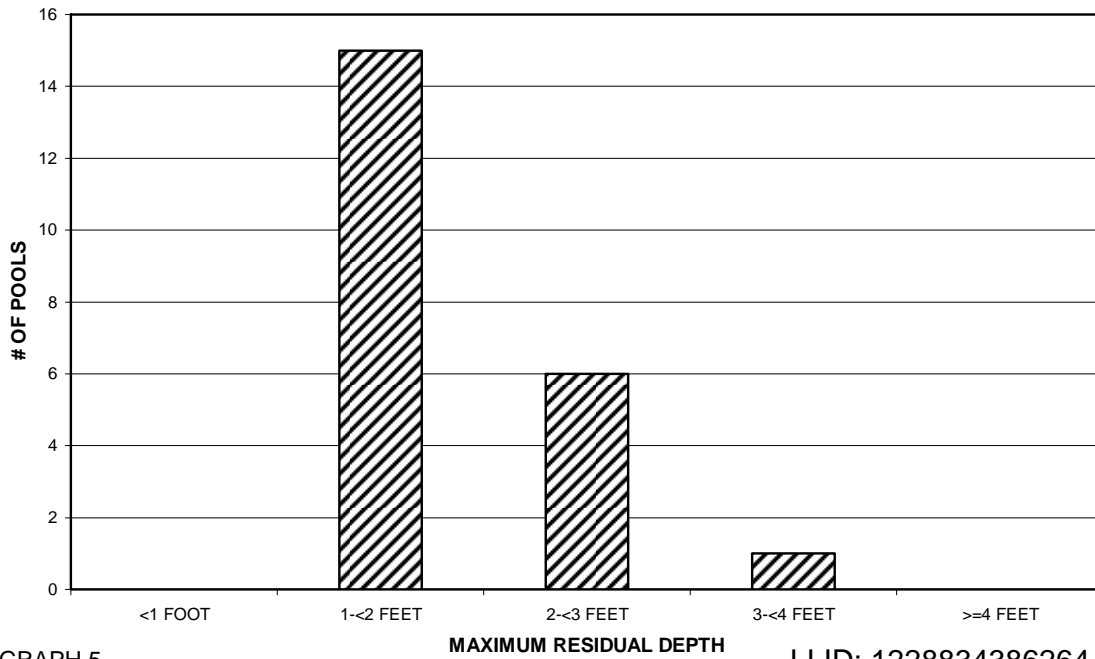
WEST SLOUGH TRIBUTARY 2006 POOL TYPES BY PERCENT OCCURRENCE



GRAPH 4

LLID: 1228834386264

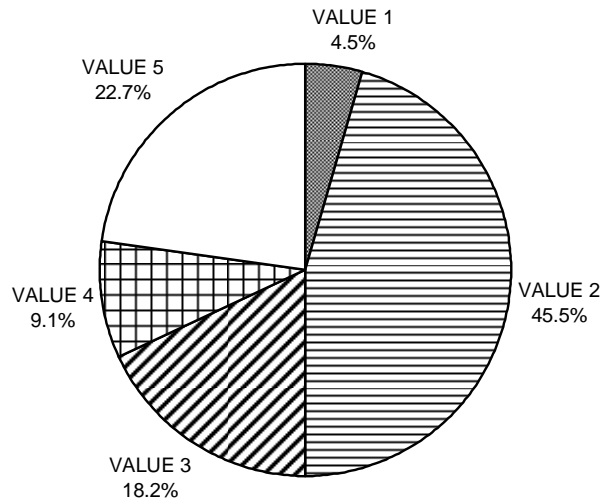
WEST SLOUGH TRIBUTARY 2006 MAXIMUM DEPTH IN POOLS



GRAPH 5

LLID: 1228834386264

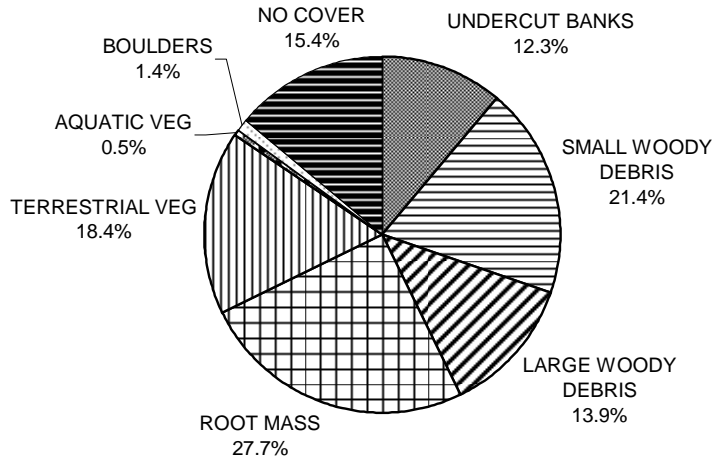
WEST SLOUGH TRIBUTARY 2006 PERCENT EMBEDDEDNESS



GRAPH 6

LLID: 1228834386264

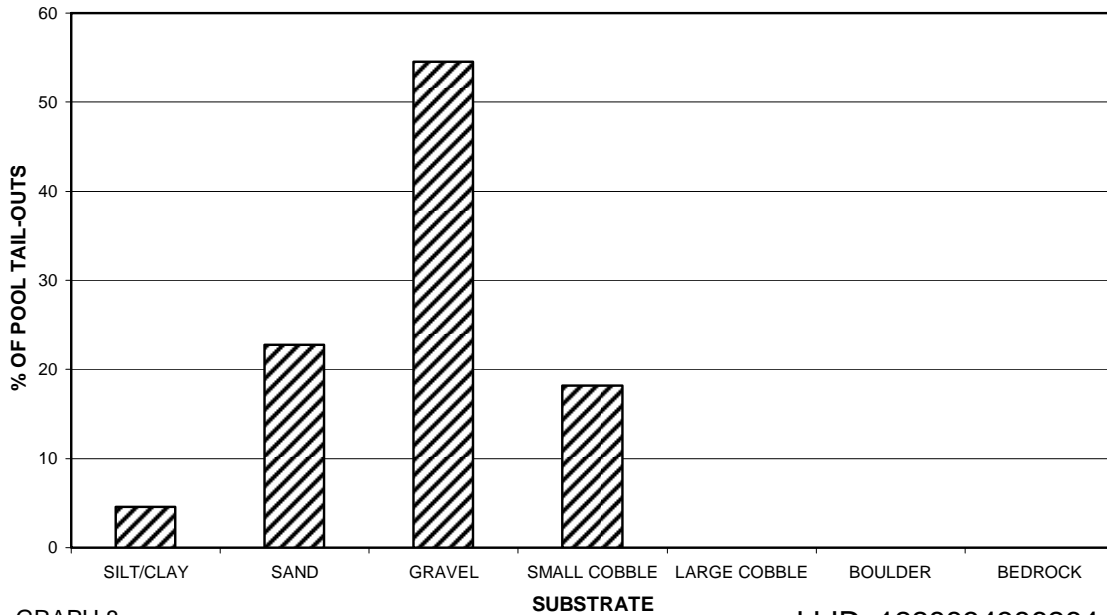
WEST SLOUGH TRIBUTARY 2006 MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

LLID: 1228834386264

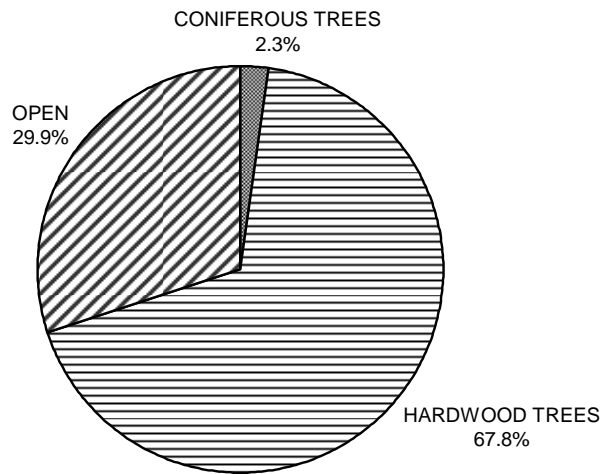
WEST SLOUGH TRIBUTARY 2006 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



GRAPH 8

LLID: 1228834386264

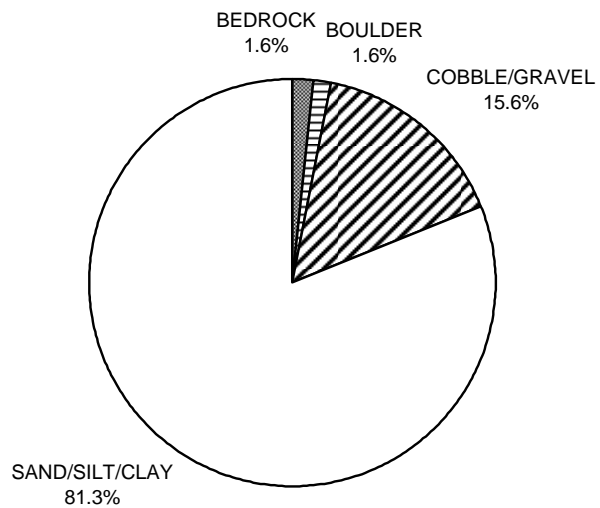
**WEST SLOUGH TRIBUTARY 2006
MEAN PERCENT CANOPY**



GRAPH 9

LLID: 1228834386264

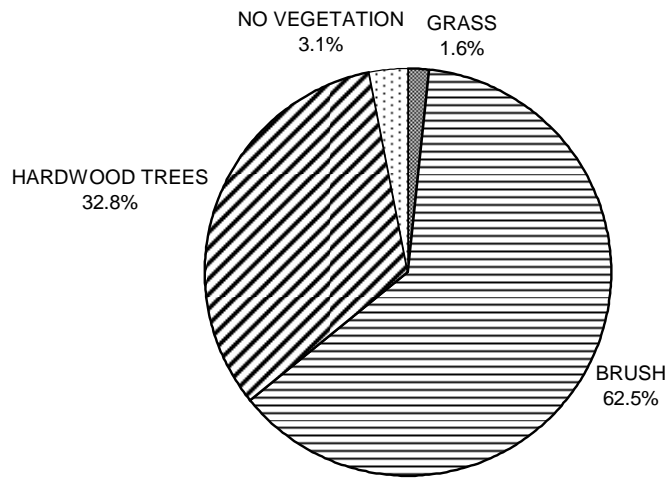
**WEST SLOUGH TRIBUTARY 2006
DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10

LLID: 1228834386264

**WEST SLOUGH TRIBUTARY 2006
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11

LLID: 1228834386264

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]	