

STREAM INVENTORY REPORT

Unnamed Tributary to Brush Creek

WATERSHED OVERVIEW

The unnamed tributary is a tributary to Brush Creek, which drains to the Pacific Ocean. It is located in Mendocino County, California (Map 1). The unnamed tributary's legal description at the confluence with Brush Creek is T13N R15W S29. Its location is 39°58'09" north latitude and 123°32'22" west longitude. The unnamed tributary is a second order stream and has approximately 0.9 miles of blue line stream according to the USGS Eureka Hill 7.5 minute quadrangle. The unnamed tributary drains a watershed of approximately 1.0 square mile. Elevations range from about 1,330 feet at the mouth of the stream to 1,635 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production and rangeland. Vehicle access exists via Mountain View Road to Piper Ranch Road.

HABITAT INVENTORY RESULTS

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

The habitat inventory of October 25, 2005, was conducted by Shaun Thompson (DFG) and Sarah Ganas (WSP). The total length of the stream surveyed was 2,678 feet.

Stream flow was not measured on the unnamed tributary.

The unnamed tributary is a B4 channel type for the entire 2,678 feet of the stream surveyed. B4 channels are moderately entrenched riffle dominated channels with infrequently spaced pools, very stable plan and profile, stable banks on moderate gradients with low width/depth ratios and gravel dominant substrates.

Water temperatures taken during the survey period ranged from 52 to 53 degrees Fahrenheit. Air temperatures ranged from 52 to 55 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 41% riffle units, 41% flatwater units, and 14% pool units (Graph 1). Based on total length of Level II habitat types there were 53% riffle units, 40% flatwater units, and 6% non surveyed units (Graph 2).

Seven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffles, 41%; step runs, 34%; and runs, 7% (Graph 3). Based on percent total length, low gradient riffles made up 53%, step runs 36%, and non surveyed units 6%.

A total of four pools were identified (Table 3). All pools encountered were scour pools (Graph 4).

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Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. All of the four pools (100%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the four pool tail-outs measured, two had a value of 2 (50%); one had a value of 3 (25%); and one had a value of 5 (25%) (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 like bedrock, log sills, and boulders.

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 7, flatwater habitat types had a mean shelter rating of 8, and pool habitats had a mean shelter rating of 66 (Table 1).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in the unnamed tributary. Graph 7 describes the pool cover in the unnamed tributary. Large woody debris is the dominant pool cover type followed by undercut banks.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 50% of pool tail-outs while small cobble was the next most frequently observed substrate type, at 25%.

The mean percent canopy density for the surveyed length of the unnamed tributary was 87%. The mean percentages of hardwood and coniferous trees were 45% and 55%, respectively. Thirteen percent of the canopy was open. Graph 9 describes the mean percent canopy in the unnamed tributary.

For the stream reach surveyed, the mean percent right bank vegetated was 49%. The mean percent left bank vegetated was 54%. The dominant elements composing the structure of the stream banks consisted of 28% cobble/gravel, and 72% sand/silt/clay (Graph 10).

Coniferous trees were the dominant vegetation type observed in 56% of the units surveyed. Additionally, 33% of the units surveyed had grass as the dominant vegetation type, and 11% had hardwood trees as the dominant vegetation type (Graph 11).

DISCUSSION

The unnamed tributary is a B4 channel type for the entire 2,678 feet of the stream surveyed. The suitability of B4 channel types for fish habitat improvement structures is as follows: excellent for low-stage plunge weirs, boulder clusters, bank placed boulder, sing and opposing wing-deflectors, and log cover.

The water temperatures recorded on October 25, 2005 ranged from 52 to 53 degrees Fahrenheit. Air temperatures ranged from 52 to 55 degrees Fahrenheit. To make any further conclusions, temperature need to be monitored throughout the warm summer months, and more extensive

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biological sampling needs to be conducted.

Flatwater habitat types comprised 40% of the total length of this survey, riffles 53%, and pools 2%. The pools are relatively deep, with all four (100%) pools having a maximum residual depth greater than 2 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In 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.

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

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

The mean shelter rating for pools was 66. The shelter rating in the flatwater habitats was 8. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by large woody debris in the unnamed tributary. Large woody debris is the dominant cover type in pools followed by undercut banks. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structures provide rearing fry with protection from predation, rest from water velocity, and also divide 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 low at 49% and 54%, 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.

RECOMMENDATIONS

- 1) Unnamed Left Bank Tributary to Brush Creek should be managed as an anadromous, natural production stream.
- 2) The limited water temperature data available suggest that maximum temperatures are within the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the July and

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August temperature extreme period should be performed for 3 to 5 years.

- 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.
- 5) 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.
- 6) 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.
- 9) There are several log debris accumulations present on Unnamed Left Bank Tributary to Brush Creek that are retaining large quantities of fine sediment. The modification of these debris accumulations is desirable, but must be done carefully, over time, to avoid excessive sediment loading in downstream reaches.
- 10) There are sections where the stream is being impacted from cattle trampling the riparian zone. Alternatives should be explored with the grazier and developed if possible.

COMMENTS AND LANDMARKS

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

Position (ft):	Habitat unit #:	Comments:
0	0001.00	Start of survey at the confluence with Brush Creek. Full sampling begins 152' upstream from the confluence with Brush Creek. There is a barbed wire fence across the stream at the end of the unit. There is erosion on the left and right banks throughout this unit. A hose diverting water from this stream ends at the last unit. Large debris accumulation (LDA) measures 30' wide x 15' high x 45' long.
198	0003.00	1+ salmonid observed.
481	0008.00	Dry right bank tributary. Wet crossing.
791	0012.00	LDA measures 20' wide x 5' high x 20' long, retaining sediment causing subterranean flow above LDA.
936	0013.00	Fence crossing stream.

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1,042	0015.00	Salmonid young-of-the-year (YOY) observed.
1,787	0021.00	5' high waterfall.
1,994	0022.00	Fence along right bank. Wood bridge has partially fallen into stream.
2,209	0024.00	Left bank tributary.
2,278	0025.00	4' high waterfall.
2,480	0028.00	3' high waterfall.
2,622	0029.00	High gradient left bank tributary. Dry right bank tributary. 5' high waterfall at the end of the unit.
2,678	0029.00	End of survey. Stream is dry 200' upstream of this unit. Beyond this point the stream begins cascading. No fish observed over previous 1500' of sampled stream.

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

Stream Name: 1235395389691

LLID: 1235395389691

Drainage: Point Arena

Survey Dates: 10/25/2005 to 10/25/2005

Confluence Location: Quad: EUREKA HILL

Legal Description: T13NR15WS29

Latitude: 38:58:09.0N

Longitude: 123:32:22.0W

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
12	2	FLATWATER	41.4	88	1060	39.6	6.0	0.6	1.0	215	2579	121	1450		8
1	0	NOSURVEY	3.4	152	152	5.7									
4	4	POOL	13.8	14	57	2.1	9.0	1.5	2.7	124	497	208	831	181	66
12	3	RIFFLE	41.4	117	1409	52.6	8.0	0.3	0.5	296	3552	76	909		7
Total Units	Total Units Fully Measured				Total Length (ft.)						Total Area (sq.ft.)		Total Volume (cu.ft.)		
29	9				2678						6629		3190		

Table 2 - Summary of Habitat Types and Measured

Stream Name: 1235395389691

LLID: 1235395389691

Drainage: Point Arena

Survey Dates: 10/25/2005 to 10/25/2005

Confluence Location: Quad: EUREKA HILL

Legal Description: T13NR15WS29

Latitude: 38:58:09.0N

Longitude: 123:32:22.0W

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	3	LGR	41.4	117	1409	52.6	8.0	0.3	0.5	296	3552	76	909		7	80
2	1	RUN	6.9	42	84	3.1	6.0	0.5	0.8	162	324	81	162		5	70
10	1	SRN	34.5	98	976	36.4	6.0	0.6	1.2	268	2679	161	1607		10	95
1	1	CRP	3.4	18	18	0.7	7.0	1.0	2.4	126	126	151	151	126	5	97
1	1	LSL	3.4	13	13	0.5	7.0	2.0	2.9	91	91	209	209	182	140	100
1	1	LSBo	3.4	12	12	0.4	14.0	1.8	3.1	168	168	336	336	302	60	100
1	1	PLP	3.4	14	14	0.5	8.0	1.0	2.3	112	112	134	134	112	60	90
1	0	NS	3.4	152	152	5.7										
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)			
29	9				2678					7052			3509			

Table 3 - Summary of Pools

Stream Name: 1235395389691

LLID: 1235395389691

Drainage: Point Arena

Survey Dates: 10/25/2005 to 10/25/2005

Confluence Location: Quad: EUREKA HILL

Legal Description: T13NR15WS29

Latitude: 38:58:09.0N

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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	SCOUR	100	14	57	100	9.0	1.5	124	497	181	722	66
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)		Total Volume (cu.ft.)	
4	4				57					497		722	

Table 4 - Summary of Maximum Residual Pool Depths By

Stream Name: 1235395389691

LLID: 1235395389691

Drainage: Point Arena

Survey Dates: 10/25/2005 to 10/25/2005

Confluence Location: Quad: EUREKA HILL

Legal Description: T13NR15WS29

Latitude: 38:58:09.0N

Longitude: 123:32:22.0W

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
1	LSL	25	0	0	0	0	1	100	0	0	0	0
1	CRP	25	0	0	0	0	1	100	0	0	0	0
1	LSBo	25	0	0	0	0	0	0	1	100	0	0
1	PLP	25	0	0	0	0	1	100	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
4			0	0	0	0	3	75	1	25	0	0

Mean Maximum Residual Pool Depth (ft.): 3

Table 6 - Summary of Dominant Substrates By Habitat

Stream Name: 1235395389691

LLID: 1235395389691

Drainage: Point Arena

Survey Dates: 10/25/2005 to 10/25/2005

Confluence Location: Quad: EUREKA HILL

Legal Description: T13NR15WS29

Latitude: 38:58:09.0N

Longitude: 123:32:22.0W

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	3	LGR	0	0	100	0	0	0	0
2	1	RUN	0	0	100	0	0	0	0
10	1	SRN	0	0	100	0	0	0	0
1	1	CRP	0	100	0	0	0	0	0
1	1	LSL	0	0	100	0	0	0	0
1	1	LSBo	100	0	0	0	0	0	0
1	1	PLP	100	0	0	0	0	0	0
1	0	NS	0	0	0	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: 1235395389691

LLID: 1235395389691

Drainage: Point Arena

Survey Dates: 10/25/2005 to 10/25/2005

Confluence Location: Quad: EUREKA HILL

Legal Description: T13NR15WS29

Latitude: 38:58:09.0N

Longitude: 123:32:22.0W

Habitat Units	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
87	55	45	0	49	54

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

Open units represent habitat units with zero canopy cover.

Table 8 - Fish Habitat Inventory Data Summary

Stream Name: 1235395389691 LLID: 1235395389691 Drainage: Point Arena
 Survey Dates: 10/25/2005 to 10/25/2005 Survey Length (ft.): 2678 Main Channel (ft.): 2678 Side Channel (ft.): 0
 Confluence Location: Quad: EUREKA HILL Legal Description: T13NR15WS29 Latitude: 38:58:09.0N Longitude: 123:32:22.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: B4	Canopy Density (%): 87.1	Pools by Stream Length (%): 2.1
Reach Length (ft.): 2678	Coniferous Component (%): 55.0	Pool Frequency (%): 13.8
Riffle/Flatwater Mean Width (ft.): 7.2	Hardwood Component (%): 45.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 0.0
Range (ft.): 17 to 30	Vegetative Cover (%): 51.7	2 to 2.9 Feet Deep: 75.0
Mean (ft.): 23.8965517241379	Dominant Shelter: Large Woody Debris	3 to 3.9 Feet Deep: 25.0
Std. Dev.: 5.25452073070357	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0.0
Base Flow (cfs): 0	Occurrence of LWD (%): 52.2	Mean Max Residual Pool Depth (ft.): 2.675
Water (F): 52 - 53 Air (F): 52 - 55	LWD per 100 ft.:	Mean Pool Shelter Rating: 66
Dry Channel (ft.): 0	Riffles: 6	
	Pools: 11	
	Flat: 4	
Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 0.0 Gravel: 50.0 Sm Cobble: 25.0 Lg Cobble: 0.0 Boulder: 25.0 Bedrock: 0.0		
Embeddedness Values (%): 1. 0.0 2. 50.0 3. 25.0 4. 0.0 5. 25.0		

Table 9 -Mean Percentage of Dominant Substrate and Vegetation

Stream Name: 1235395389691

LLID: 1235395389691

Drainage: Point Arena

Survey Dates: 10/25/2005 to 10/25/2005

Confluence Location: Quad: EUREKA HILL

Legal Description: T13NR15WS29

Latitude: 38:58:09.0N

Longitude: 123:32:22.0W

Mean Percentage of Dominant Stream Bank

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percentage (%)
Bedrock	0	0	0.0
Boulder	0	0	0.0
Cobble/Gravel	3	2	27.8
Sand/Silt/Clay	6	7	72.2

Mean Percentage of Dominant Stream Bank

Dominant Class of Vegetation	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percentage (%)
Grass	4	2	33.3
Brush	0	0	0.0
Hardwood Trees	1	1	11.1
Coniferous Trees	4	6	55.6
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness 3

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

Stream Name: 1235395389691

LLID: 1235395389691

Drainage: Point Arena

Survey Dates: 10/25/2005 to 10/25/2005

Confluence Location: Quad: EUREKA HILL

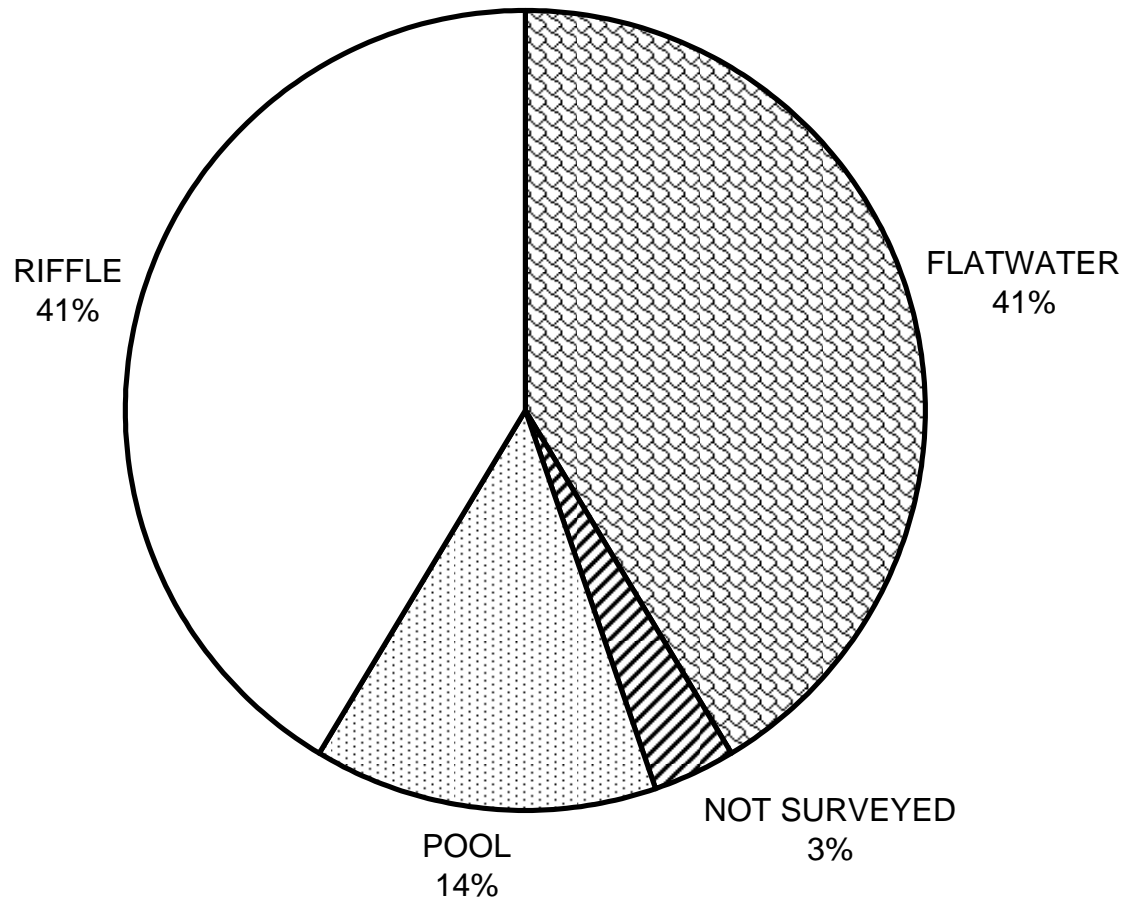
Legal Description: T13NR15WS29

Latitude: 38:58:09.0N

Longitude: 123:32:22.0W

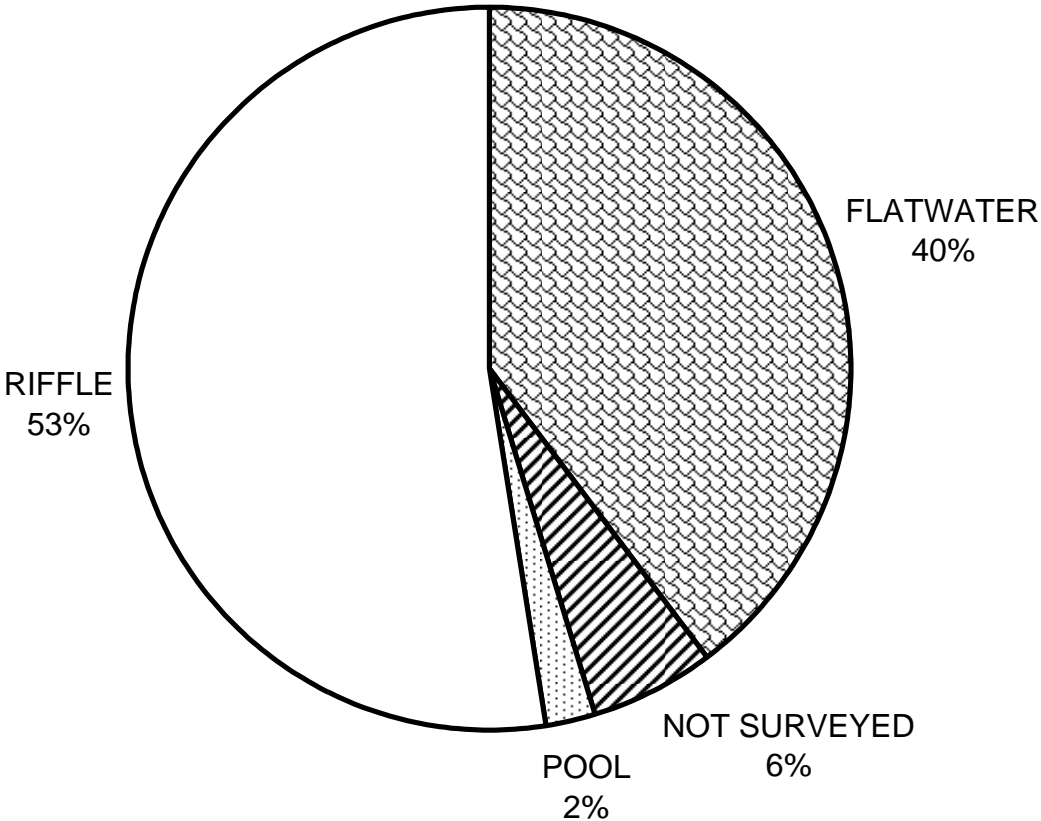
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	70	25
SMALL WOODY DEBRIS (%)	7	0	20
LARGE WOODY DEBRIS (%)	93	30	33
ROOT MASS (%)	0	0	0
TERRESTRIAL VEGETATION (%)	0	0	0
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	0	0	23
BEDROCK LEDGES (%)	0	0	0

BRUSH CREEK, UNNAMED LEFT BANK TRIBUTARY HABITAT TYPES BY PERCENT OCCURRENCE



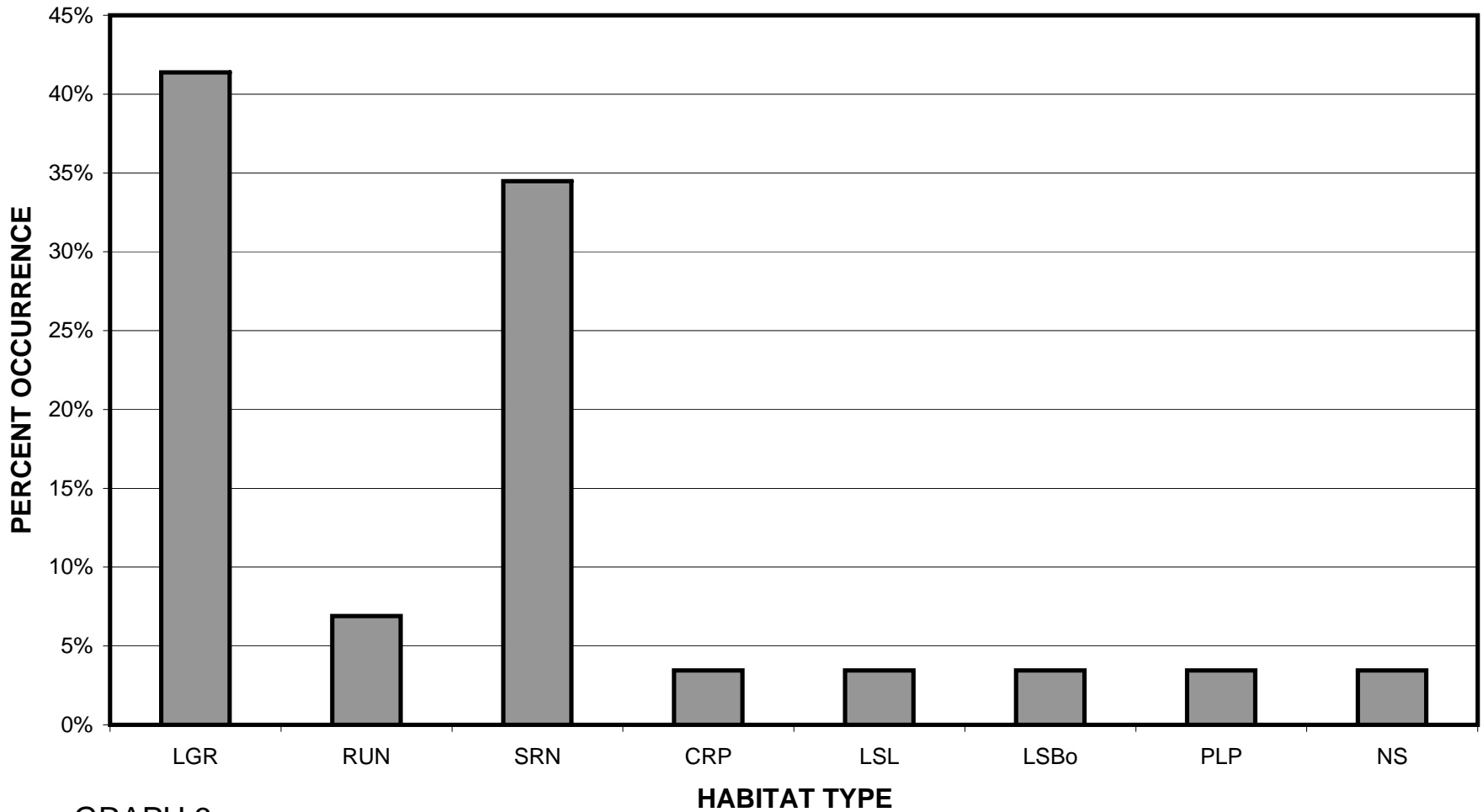
GRAPH 1

**BRUSH CREEK, UNNAMED LEFT BANK TRIBUTARY
HABITAT TYPES BY PERCENT TOTAL LENGTH**



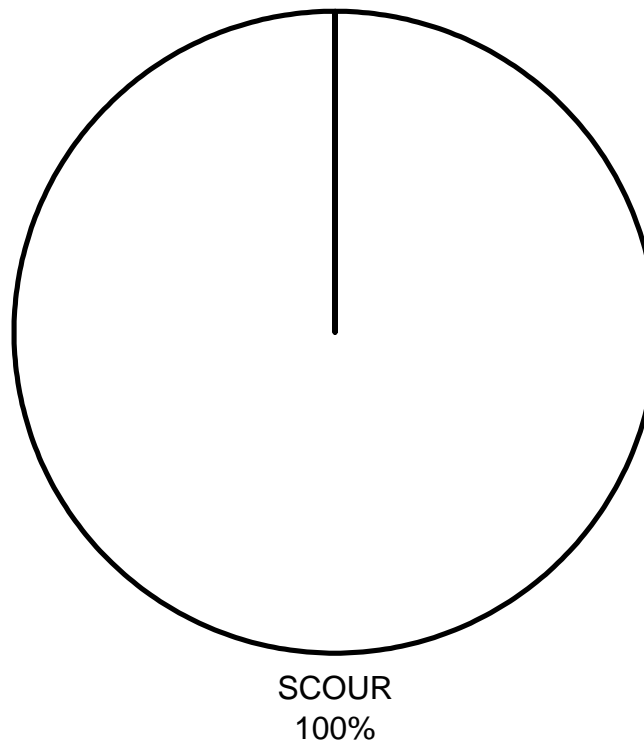
GRAPH 2

BRUSH CREEK, UNNAMED LEFT BANK TRIBUTARY HABITAT TYPES BY PERCENT OCCURRENCE



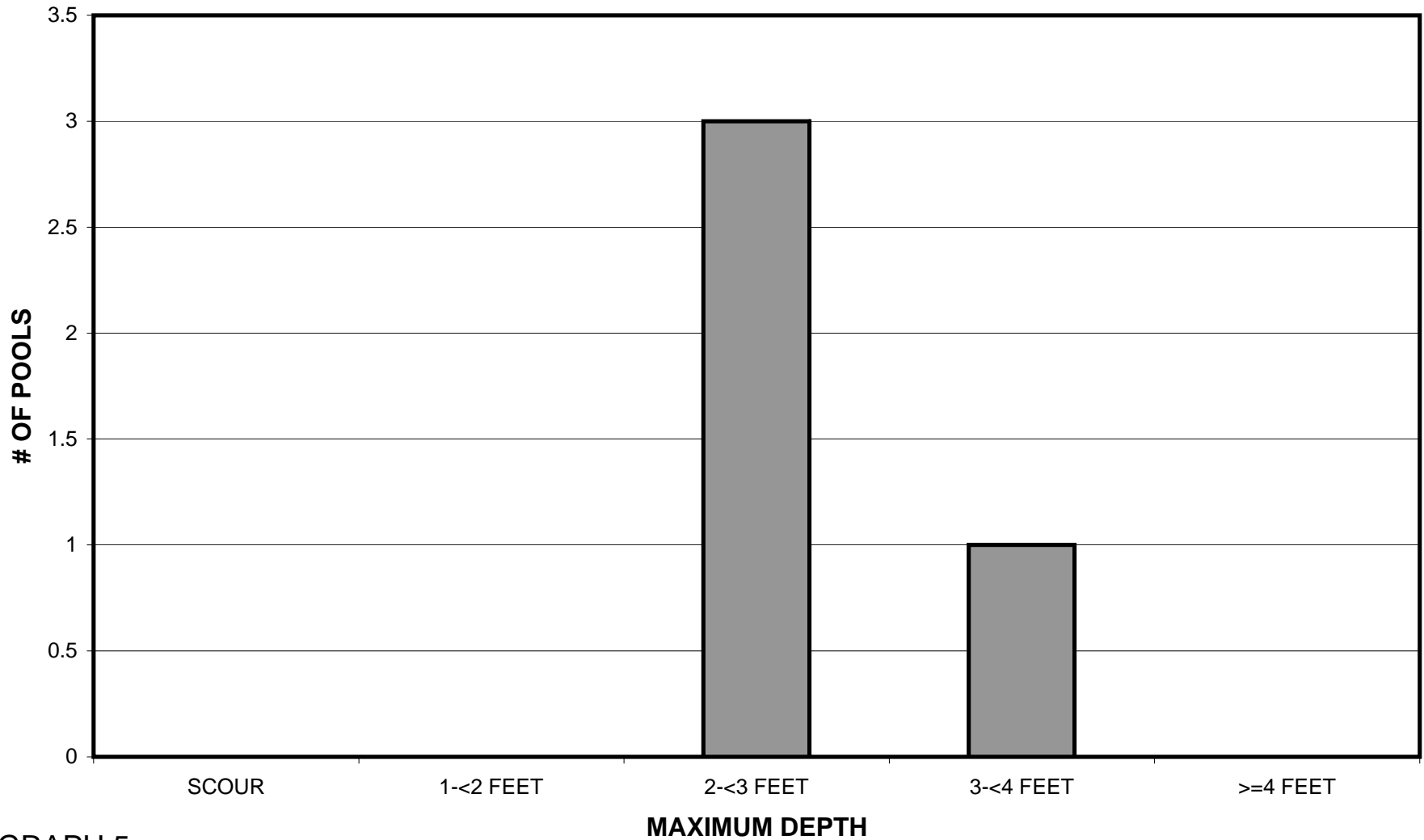
GRAPH 3

**BRUSH CREEK, UNNAMED LEFT BANK TRIBUTARY
POOL TYPES BY PERCENT OCCURRENCE**



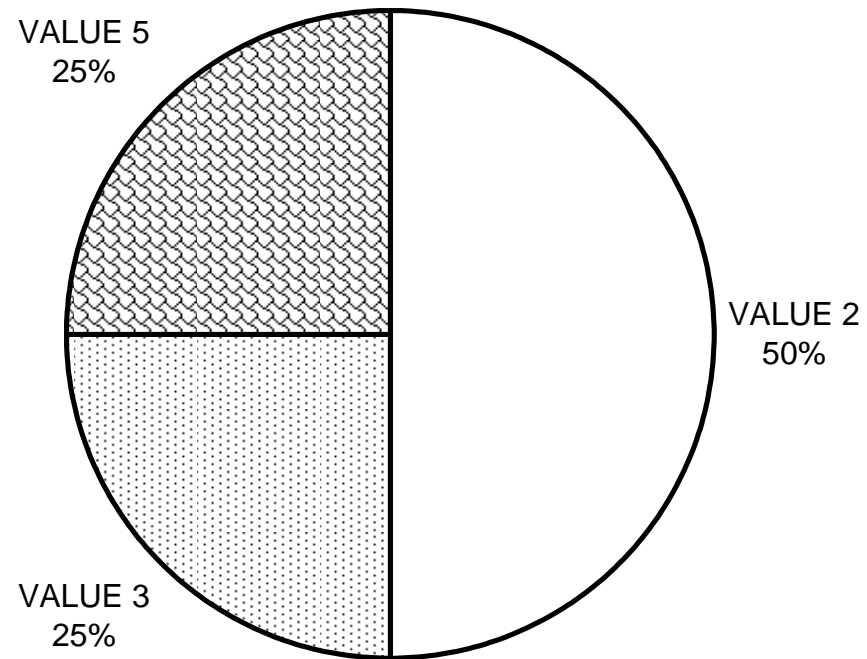
GRAPH 4

BRUSH CREEK, UNNAMED LEFT BANK TRIBUTARY MAXIMUM DEPTH IN POOLS



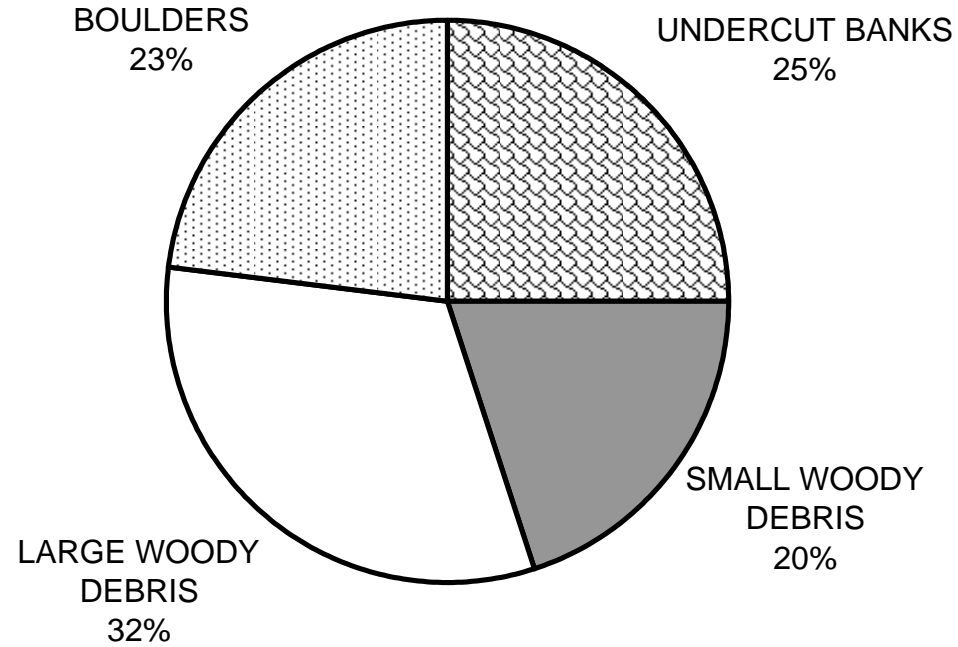
GRAPH 5

BRUSH CREEK, UNNAMED LEFT BANK TRIBUTARY PERCENT EMBEDDEDNESS



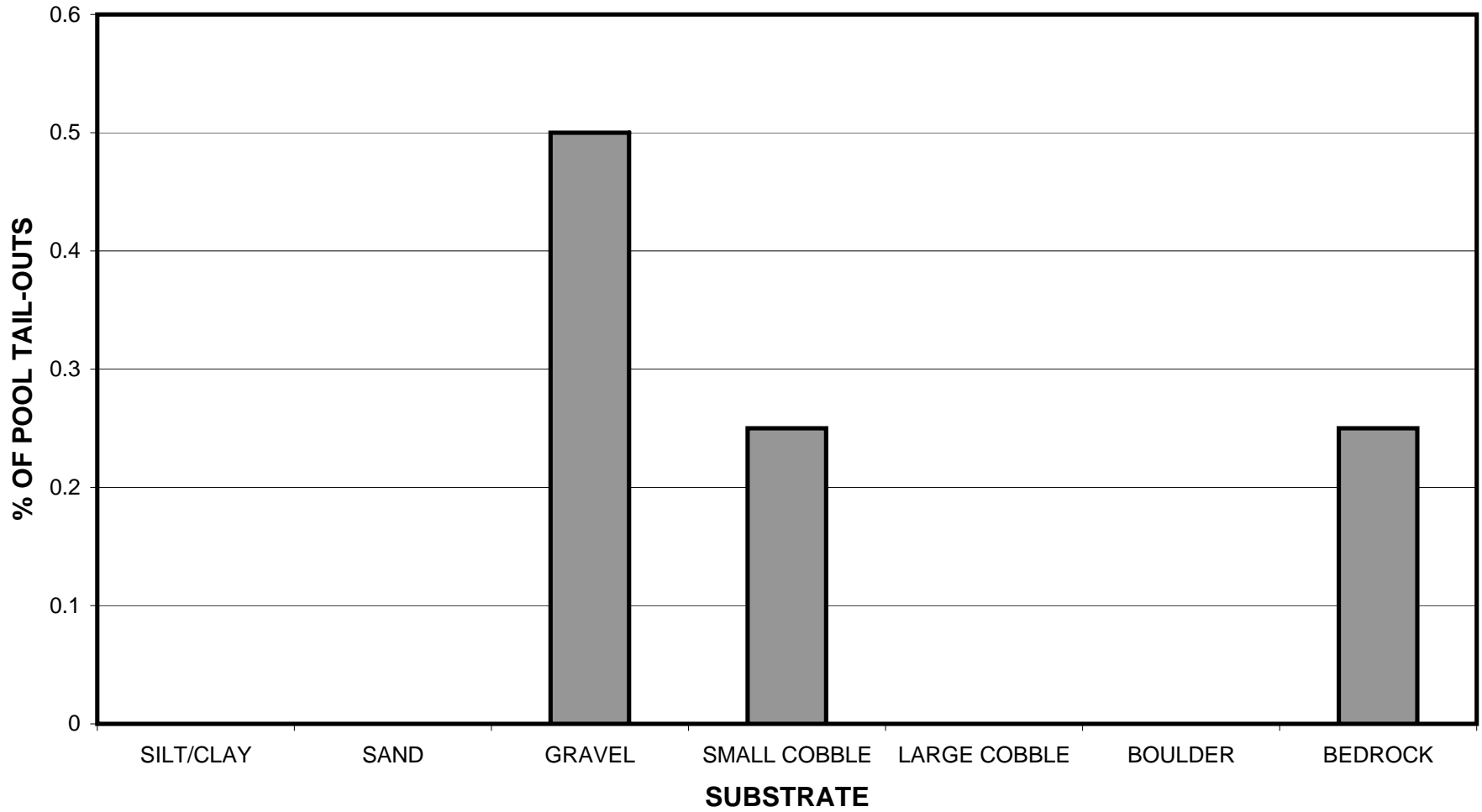
GRAPH 6

BRUSH CREEK, UNNAMED LEFT BANK TRIBUTARY MEAN PERCENT COVER TYPES IN POOLS



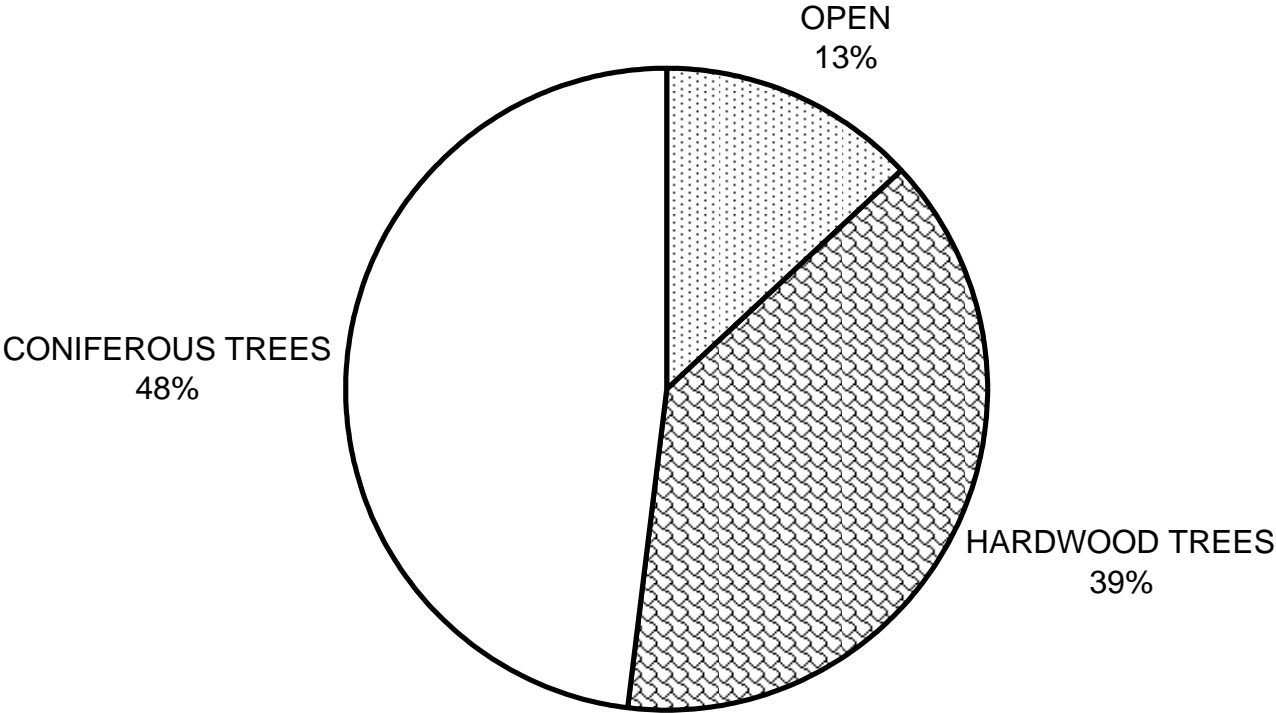
GRAPH 7

BRUSH CREEK, UNNAMED LEFT BANK TRIBUTARY SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



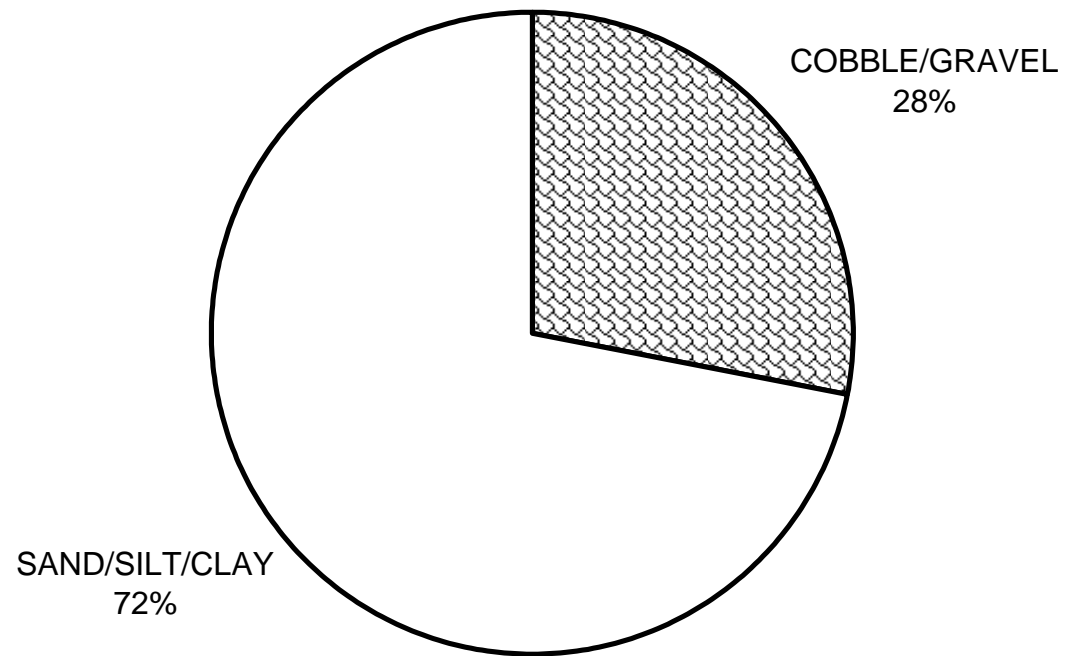
GRAPH 8

**BRUSH CREEK, UNNAMED LEFT BANK TRIBUTARY
MEAN PERCENT CANOPY**



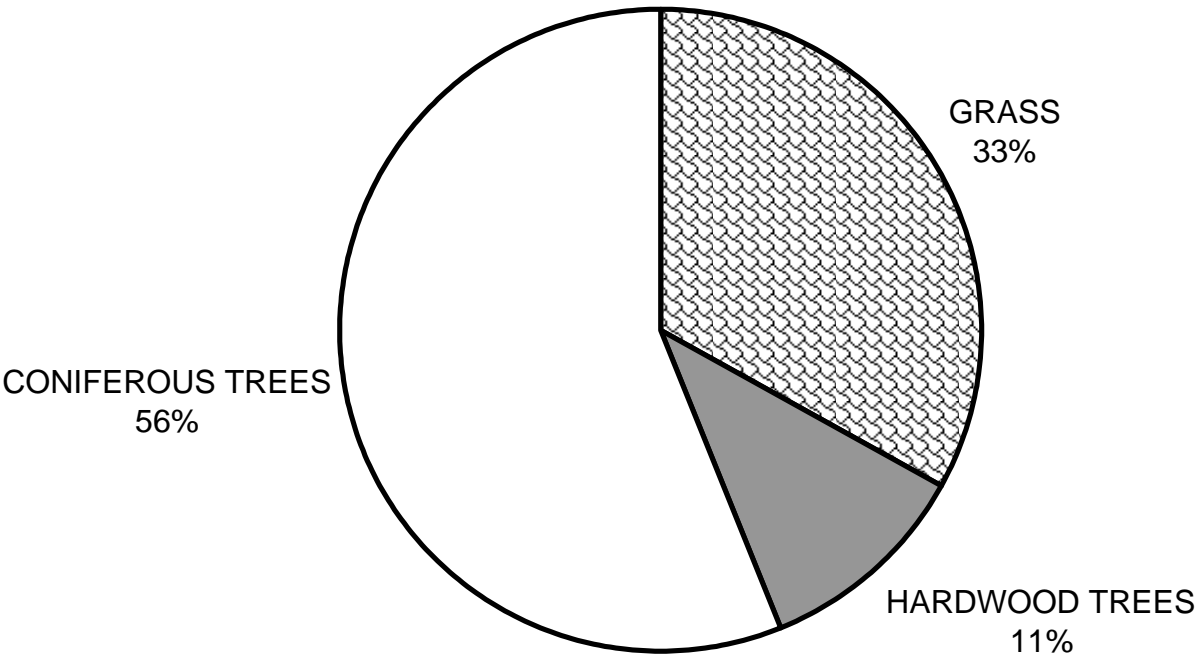
GRAPH 9

**BRUSH CREEK, UNNAMED LEFT BANK TRIBUTARY
DOMINANT BANK COMPOSITION IN SURVEY REACH**

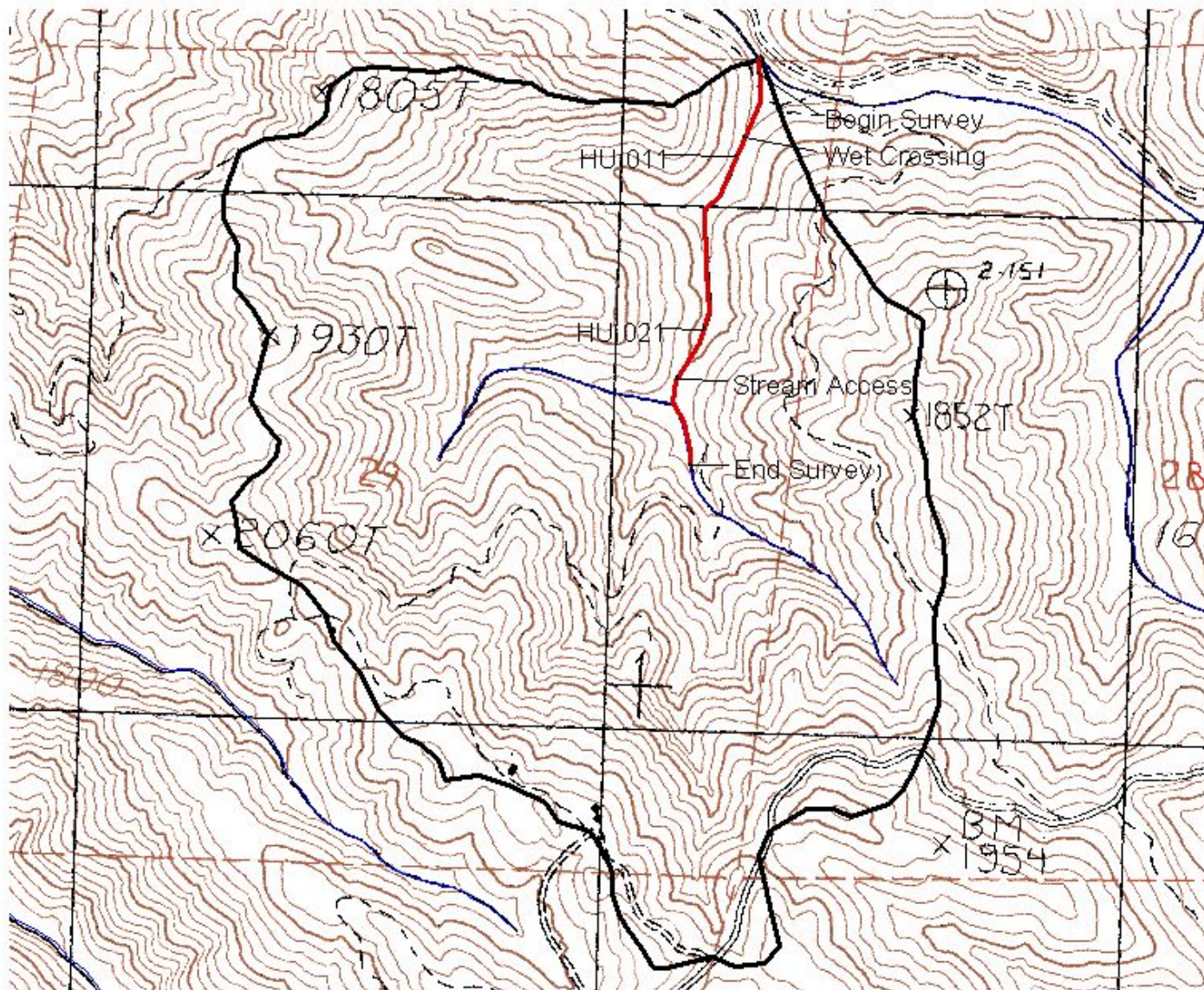


GRAPH 10

**BRUSH CREEK, UNNAMED LEFT BANK TRIBUTARY
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11



Left Bank Unnamed Tributary Stream Habitat Survey

-  Unnamed Left Bank Tributary Survey Reach
-  Streams
-  Unnamed Left Bank Tributary Watershed

