

STREAM INVENTORY REPORT

Puma Creek

INTRODUCTION

A stream inventory was conducted during 7/24/2006 and 7/25/2006 on Puma Creek. The survey began at the confluence with Telegraph Creek and extended upstream 0.8 miles.

The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Puma Creek.

The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for Chinook salmon, coho salmon, and steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

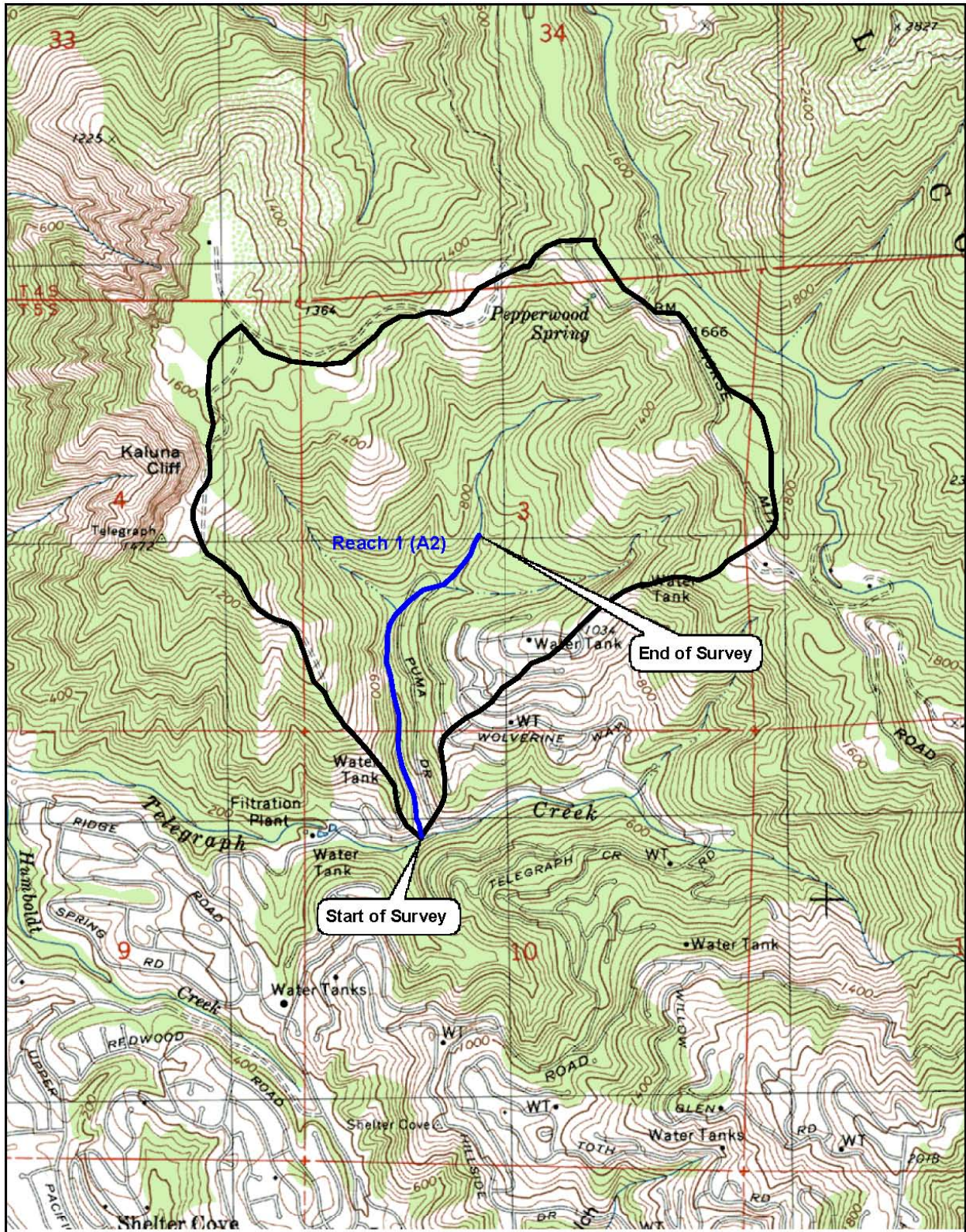
WATERSHED OVERVIEW

Puma Creek is a tributary to Telegraph Creek, is a tributary to Pacific Ocean, located in Humboldt County, California (Map 1). Puma Creek's legal description at the confluence with Telegraph Creek is T05S R01E S10. Its location is 40°02'37" north latitude and 124°03'31" west longitude, LLID number 1240587400437. Puma Creek is a first order stream and has approximately 1.27 miles of blue line stream according to the USGS Shelter Cove 7.5 minute quadrangle. Puma Creek drains a watershed of approximately 0.93 square miles. Elevations range from about 280 feet at the mouth of the creek to 1,700 feet in the headwater areas. Douglas fir and tan oak forest dominates the watershed. The watershed is primarily owned by the Bureau of Land Management and private landowners and is managed for residential use and for city water supply. Vehicle access exists via Telegraph Creek Road and Puma Creek Road in Shelter Cove.

METHODS

The habitat inventory conducted in Puma Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The California Conservation Corps (CCC) Technical Advisors and Watershed Stewards Project/AmeriCorps (WSP) Members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). This inventory was conducted by a two-person team.

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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 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 Puma Creek to record measurements and observations. There are eleven components to the inventory form.

1. Flow:

Flow is measured in cubic feet per second (cfs) near the bottom of the stream survey reach using a Marsh-McBirney Model 2000 flow meter.

2. Channel Type:

Channel typing is conducted according to the classification system developed and revised by David Rosgen (1994). This methodology is described in the *California Salmonid Stream Habitat Restoration Manual*. Channel typing is conducted simultaneously with habitat typing and follows a standard form to record measurements and observations. There are five measured parameters used to determine channel type: 1) water slope gradient, 2) entrenchment, 3) width/depth ratio, 4) substrate composition, and 5) sinuosity. Channel characteristics are measured using a clinometer, hand level, hip chain, tape measure, and a stadia rod.

3. Temperatures:

Both water and air temperatures are measured and recorded at every tenth habitat unit. The time of the measurement is also recorded. Both temperatures are taken in degrees Fahrenheit at the middle of the habitat unit and within one foot of the water surface.

4. Habitat Type:

Habitat typing uses the 24 habitat classification types defined by McCain and others (1990). Habitat units are numbered sequentially and assigned a type identification number selected from a standard list of 24 habitat types. Dewatered units are labeled "dry". Puma 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

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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 Puma Creek, embeddedness was ocularly estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3) and 76 - 100% (value 4). Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate like bedrock, log sills, boulders or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide juvenile salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow separation of territorial units to reduce density related competition for prey. The shelter rating is calculated for each fully-described habitat unit by multiplying shelter value and percent cover. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All cover is then classified according to a list of nine cover types. In Puma 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 Puma 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 Puma Creek, the dominant composition type and the dominant

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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.

DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 2.0.19, 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 Puma Creek include:

- Riffle, Flatwater, Pool Habitat Types by Percent Occurrence

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

HABITAT INVENTORY RESULTS

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

The habitat inventory of 7/24/2006 and 7/25/2006 was conducted by C. Pollastrini and S. McSmith (WSP). The total length of the stream surveyed was 4,152 feet.

Stream flow was estimated to be 0.5 cfs during the survey period.

Puma Creek is an A2 channel type for the 4,152 feet of the stream surveyed.

A2 channels are steep, narrow, cascading, step-pool, high energy debris transporting channels associated with depositional soils, and boulder dominant substrates.

Water temperatures taken during the survey period ranged from 60 to 64 degrees Fahrenheit. Air temperatures ranged from 65 to 73 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 40% riffle units, 27.5% pool units, 28.8% flatwater units, and 3.8% culvert units (Graph 1). Based on total length of Level II habitat types there were 48.2% riffle units, 39.2% flatwater units, 6% pool units, and 6.6% culvert units (Graph 2).

Seven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were 21% step run units, 20% low gradient riffle units and 20% high gradient riffle units (Graph 3). Based on percent total length, they were 35% step run units, 29% high gradient riffle units and 20% low gradient riffle units.

A total of 22 pools were identified (Table 3). Scour pools were the most frequently encountered, at 59% (Graph 4), and comprised 57% 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. One of the 22 pools (5%) had a residual depth of two feet or greater (Graph 5).

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The depth of cobble embeddedness was estimated at pool tail-outs. Of the 22 pool tail-outs measured, 3 had a value of 1 (13.6%); 4 had a value of 2 (18.2%); 6 had a value of 3 (27.3%); 4 had a value of 4 (18.2%); 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 1, flatwater habitat types had a mean shelter rating of 8, and pool habitats had a mean shelter rating of 37 (Table 1). Of the pool types, the scour pools had a mean shelter rating of 44, main channel pools had a mean shelter rating of 26 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover types in Puma Creek. Graph 7 describes the pool cover in Puma Creek. Large woody debris is the dominant pool cover type followed by boulders.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Boulders are the dominant substrate type, observed in 45% of pool tail-outs, followed by gravel, observed in 23% of pool tail-outs.

The mean percent canopy density for the surveyed length of Puma Creek was 93%. Seven percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 85% and 15%, respectively. Graph 9 describes the mean percent canopy in Puma Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 93%. The mean percent left bank vegetated was 94%. The dominant elements composing the structure of the stream banks consisted of 78% sand/silt/clay, 8% cobble/gravel, 12% bedrock and 2% boulder (Graph 10). Hardwood trees were the dominant vegetation type observed in 70% of the units surveyed. The remaining 30% of the units surveyed had brush as the dominant vegetation type (Graph 11).

DISCUSSION

Puma Creek is an A2 channel type for the entire 4,152 feet of stream surveyed. An A2 channel type is generally not suitable for fish habitat improvement structures because it is a high energy stream with stable banks and poor gravel retention capabilities

The water temperatures recorded on the survey days 7/24/2006 and 7/25/1006, ranged from 60 to 64 degrees Fahrenheit. Air temperatures ranged from 65 to 73 degrees Fahrenheit. To make any further conclusions, temperatures would need to be monitored throughout the warm summer months, and biological sampling would need to be conducted.

Flatwater habitat types comprised 39% of the total length of this survey, riffles 48%, and pools 6%. The pools are relatively shallow, with only 1 of the 22 (4.5%) pools having a maximum

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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 not recommended for Puma Creek due to the channel type not being suitable for fish habitat improvements structures.

Seven of the 22 pool tail-outs measured had embeddedness ratings of 1 or 2. Ten 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 Puma Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Fourteen of the 22 pool tail-outs had either silt, sand, large cobble, boulders or bedrock as the dominant substrate. These substrates are generally considered unsuitable for spawning salmonids.

The mean shelter rating for pools was 37. 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 Puma Creek. Large woody debris is the dominant cover type in pools followed by boulders. 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 93%. In general, revegetation projects are considered when canopy density is less than 80%. The percentage of right and left bank covered with vegetation was 93% and 94%, respectively. In areas of stream bank erosion planting endemic species of coniferous and hardwood trees is recommended.

RECOMMENDATIONS

- 1) Puma 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 August temperature extreme period should be performed for 3 to 5 years.
- 3) The culverts at the start of the survey and at 2,989 and 3,339 feet create potential access problems for migrating salmonids. Good water temperature and flow regimes exist in the stream and it offers good conditions for rearing fish. Fish passage should be assessed, monitored and improved where possible.

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- 4) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from large woody debris. Adding high quality complexity with woody cover in the pools is desirable.
- 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.

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 Comments:

(ft.): Unit #:

- | | | |
|------|---------|--|
| 0 | 0001.00 | Start of survey
Culvert #1, 6.5' high x 7' wide x 84' long; no plunge at outlet, corrugated steel, rusted/corroded bottom in very bad shape, outlet: concrete apron rock cascade for 15 feet, likely barrier for juvenile and temporal barrier for adult salmonids |
| 104 | 0003.00 | Plunge of 2.2 feet over boulder tail-out of pool |
| 408 | 0010.00 | Left bank erosion, 30' long x 50' high |
| 640 | 0014.00 | Drainage pipe on the right bank, 40 feet up on hillslope |
| 640 | 0014.00 | Plunge of 1.5 feet |
| 762 | 0016.00 | Three metal pipes, approximately eight inches in diameter across creek overhead
Right bank erosion 30' long x 70' high |
| 991 | 0020.00 | Plunge of 1.8 feet |
| 1154 | 0025.00 | Log debris accumulation (LDA) #1: 3.5' high x 30' wide x 3' long; plunge over log is 3.3' high, composed of 2 logs >20' long; water flows through; visible gaps in LDA; sediment retention: 2' wide x 100' long x 3.5' diameter; size range gravel to cobble; fish seen above LDA; not a barrier to juvenile/adult salmonids |
| 1196 | 0027.00 | Left bank, channel is dry
Left bank erosion, 30' long x 30' high |
| 1301 | 0028.00 | Plunge of 2.9' over boulders at pool tail-out |

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Position Habitat Comments:

(ft.): Unit #:

1375 0030.00 Plunge of 1.9' over boulders at pool tail-out

1981 0042.00 Plunge of 1.9' over boulders at pool tail-out

2054 0044.00 Right bank erosion 108' long x 20' high.

2146 0045.00 Plunge of 3.9' over boulders

2160 0046.00 LDA #2: 4' high x 25' wide x 1.4' long; 1 piece of large wood, water flows through; visible gaps in LDA present, retaining sediment 25' wide x 20' long x 4' deep, sediment ranges from sand to cobble; fish seen above LDA, 5.4' plunge no jump pool present, not a barrier to juvenile/adult salmonids

2288 0049.00 Right bank erosion and seep, 30' long x 50' high

2551 0052.00 Dry channel
Erosion on left bank; drainage pipe with contributions of gravel

2667 0056.00 Right bank erosion; 30' long x 50' high

2743 0057.00 Right bank drainage pipe: 3.5' diameter

2823 0058.00 Tributary #1: Right bank with the flow estimated 0.2 cfs; contributes approximately 35% to downstream flow; Water temperature of 62° F; accessible to fish; checked up tributary 100'; 5% slope estimated with hand level, no fish observed
Right bank erosion 100 feet from confluence, contributing sediment

2989 0060.00 Plunge of 6 feet off of concrete

2997 0061.00 Entire unit is concrete/boulder at culvert outlet; culvert out flow spills directly onto concrete.

3030 0062.00 Culvert #2, in channel; 5.5' high x 6' wide x 96' long; jump height at outlet is 4.5'; likely barrier to all upstream migrating salmonids; corrugated steel, good condition with concrete bottom 4' wide, no baffles; 33' long concrete/boulder apron

3332 0069.00 Plunge of 4 feet plunge off of concrete

3339 0070.00 Entire unit is concreted boulder to prevent erosion at culvert outlet, culvert out flow spills directly onto concrete.

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Position Habitat Comments:

(ft.): Unit #:

- 3358 0071.00 Culvert #3, 6' high x 5.5' wide x 92' long; jump height at outlet is 5.2', likely barrier to all upstream migrating salmonids; corrugated steel, good condition with flat concrete bottom 4' with no baffles; concrete/boulder apron 19 feet long
- 3536 0075.00 Step pool unit has accumulative rise of 4.6' over 26'; approximate slope: 17.6%
- 3591 0077.00 Tributary #3: Left bank with the flow estimated at 0.4 cfs; contributes approximately 50% to the downstream flow; Water temperature of tributary 64° F, accessible to fish; checked up tributary 80'; 10% slope estimated with hand level, no fish observed
- 4152 0080.00 End of survey: channel gets very steep and flow quickly diminishes

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.

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LEVEL III and LEVEL IV HABITAT TYPES

RIFFLE

Low Gradient Riffle	(LGR)	[1.1]	{ 1 }
High Gradient Riffle	(HGR)	[1.2]	{ 2 }

CASCADE

Cascade	(CAS)	[2.1]	{ 3 }
Bedrock Sheet	(BRS)	[2.2]	{24}

FLATWATER

Pocket Water	(POW)	[3.1]	{21}
Glide	(GLD)	[3.2]	{14}
Run	(RUN)	[3.3]	{15}
Step Run	(SRN)	[3.4]	{16}
Edgewater	(EDW)	[3.5]	{18}

MAIN CHANNEL POOLS

Trench Pool	(TRP)	[4.1]	{ 8 }
Mid-Channel Pool	(MCP)	[4.2]	{17}
Channel Confluence Pool	(CCP)	[4.3]	{19}
Step Pool	(STP)	[4.4]	{23}

SCOUR POOLS

Corner Pool	(CRP)	[5.1]	{22}
Lateral Scour Pool - Log Enhanced	(LSL)	[5.2]	{10}
Lateral Scour Pool - Root Wad Enhanced	(LSR)	[5.3]	{11}
Lateral Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{12}
Lateral Scour Pool - Boulder Formed	(LSBo)	[5.5]	{20}
Plunge Pool	(PLP)	[5.6]	{ 9 }

BACKWATER POOLS

Secondary Channel Pool	(SCP)	[6.1]	{ 4 }
Backwater Pool - Boulder Formed	(BPB)	[6.2]	{ 5 }
Backwater Pool - Root Wad Formed	(BPR)	[6.3]	{ 6 }
Backwater Pool - Log Formed	(BPL)	[6.4]	{ 7 }
Dammed Pool	(DPL)	[6.5]	{13}

ADDITIONAL UNIT DESIGNATIONS

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

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

Stream Name: 1240587400437

LLID: 1240587400437 Drainage: Mattole River

Survey Dates: 7/24/2006 to 7/24/2006

Confluence Location: Quad: SHELTER COVE Legal Description: T05SR01ES10 Latitude: 40:02:37.0N Longitude: 124:03:31.0

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
3	0	CULVERT	3.8	91	272	6.6									
23	5	FLATWATER	28.8	71	1627	39.2	8.8	0.5	1.1	368	8469	171	3931		8
22	22	POOL	27.5	11	251	6.0	10.5	0.8	1.3	100	2207	108	2383	82	37
32	4	RIFFLE	40.0	63	2002	48.2	7.8	0.3	0.6	158	5050	46	1484		1
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
80	31				4152					15726			7798		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: 1240587400437

LLID: 1240587400437

Drainage: Mattole River

Survey Dates: 7/24/2006 to 7/24/2006

Confluence Location: Quad: SHELTER COVE

Legal Description: T05SR01ES10

Latitude: 40:02:37.0N

Longitude: 124:03:31.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	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 (%)
16	3	LGR	20.0	51	812	19.6	8	0.2	0.8	171	2739	42	676		0	94
16	1	HGR	20.0	74	1190	28.7	7	0.5	0.8	118	1882	59	941		5	93
6	3	RUN	7.5	31	187	4.5	10	0.5	1.4	223	1338	89	537		3	90
17	2	SRN	21.3	85	1440	34.7	8	0.5	1.2	586	9964	293	4982		15	96
8	8	MCP	10.0	10	82	2.0	8	0.6	1.8	74	594	69	553	49	27	94
1	1	STP	1.3	26	26	0.6	6	1.0	1.6	117	117	140	140	117	20	98
13	13	PLP	16.3	11	143	3.4	12	0.8	2	115	1496	130	1689	100	44	92
3	0	CUL	3.8	91	272	6.6										

Total Units
80

Total Units Fully Measured
31

Total Length (ft.)
4152

Total Area (sq.ft.)
18129

Total Volume (cu.ft.)
9518

Table 3 - Summary of Pool Types

Stream Name: 1240587400437

LLID: 1240587400437

Drainage: Mattole River

Survey Dates: 7/24/2006 to 7/24/2006

Confluence Location: Quad: SHELTER COVE

Legal Description: T05SR01ES10

Latitude: 40:02:37.0N

Longitude: 124:03:31.0W

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
9	9	MAIN	41	12	108	43	7.9	0.7	79	711	56	506	26
13	13	SCOUR	59	11	143	57	12.2	0.8	115	1496	100	1301	44

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
22	22	251	2207	1807

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

Stream Name: 1240587400437

LLID: 1240587400437

Drainage: Mattole River

Survey Dates: 7/24/2006 to 7/24/2006

Confluence Location: Quad: SHELTER COVE

Legal Description: T05SR01ES10

Latitude: 40:02:37.0N

Longitude: 124:03:31.0W

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
8	MCP	36	2	25	6	75	0	0	0	0	0	0
1	STP	5	0	0	1	100	0	0	0	0	0	0
13	PLP	59	4	31	8	62	1	8	0	0	0	0

Total Units	Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1< 2 Foot Max Resid. Depth	Total 1< 2 Foot % Occurrence	Total 2< 3 Foot Max Resid. Depth	Total 2< 3 Foot % Occurrence	Total 3< 4 Foot Max Resid. Depth	Total 3< 4 Foot % Occurrence	Total >= 4 Foot Max Resid. Depth	Total >= 4 Foot % Occurrence
22	6	27	15	68	1	5	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.3

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: 1240587400437

LLID: 1240587400437

Drainage: Mattole River

Survey Dates: 7/24/2006 to 7/24/2006

Dry Units: 0

Confluence Location: Quad: SHELTER COVE

Legal Description: T05SR01ES10

Latitude: 40:02:37.0N

Longitude: 124:03:31.0W

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
16	3	LGR	0	0	0	0	0	0	0	0	0
16	1	HGR	0	0	0	0	0	0	100	0	0
32	4	TOTAL RIFFLE	0	0	0	0	0	0	25	0	0
6	3	RUN	0	0	0	0	0	0	0	33	0
17	2	SRN	0	0	0	5	0	0	15	30	0
23	5	TOTAL FLAT	0	0	0	2	0	0	6	32	0
8	8	MCP	0	8	36	26	0	0	0	18	0
1	1	STP	0	0	0	0	0	0	0	100	0
13	13	PLP	7	7	32	10	0	0	21	8	0
22	22	TOTAL POOL	4	7	32	15	0	0	12	16	0
3	0	CUL									
80	31	TOTAL	3	5	23	11	0	0	13	16	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: 1240587400437

LLID: 1240587400437

Drainage: Mattole River

Survey Dates: 7/24/2006 to 7/24/2006

Dry Units: 0

Confluence Location: Quad: SHELTER COVE

Legal Description: T05SR01ES10

Latitude: 40:02:37.0N

Longitude: 124:03:31.0W

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
16	3	LGR	0	0	0	33	33	33	0
16	1	HGR	0	0	0	0	100	0	0
6	3	RUN	0	0	0	0	0	100	0
17	2	SRN	0	0	50	0	0	50	0
8	8	MCP	0	0	50	38	0	13	0
1	1	STP	0	0	0	0	0	100	0
13	13	PLP	0	0	23	23	15	31	8

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: 1240587400437

LLID: 1240587400437

Drainage: Mattole River

Survey Dates: 7/24/2006 to 7/24/2006

Confluence Location: Quad: SHELTER COVE

Legal Description: T05SR01ES10

Latitude: 40:02:37.0N

Longitude: 124:03:31.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
93	15	85	0	93	94

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: 1240587400437 LLID: 1240587400437 Drainage: Mattole River
 Survey Dates: 7/24/2006 to 7/24/2006 Survey Length (ft.): 4152 Main Channel (ft.): 4152 Side Channel (ft.): 0
 Confluence Location: Quad: SHELTER COVE Legal Description: T05SR01ES10 Latitude: 40:02:37.0N Longitude: 124:03:31.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: A2	Canopy Density (%): 93.2	Pools by Stream Length (%): 6.0
Reach Length (ft.): 4152	Coniferous Component (%): 14.6	Pool Frequency (%): 27.5
Riffle/Flatwater Mean Width (ft.): 8.3	Hardwood Component (%): 85.4	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 95
Range (ft.): 12 to 26	Vegetative Cover (%): 93.3	2 to 2.9 Feet Deep: 5
Mean (ft.): 18	Dominant Shelter: Large Woody Debris	3 to 3.9 Feet Deep: 0
Std. Dev.: 4	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.5	Occurrence of LWD (%): 23	Mean Max Residual Pool Depth (ft.): 1.3
Water (F): 60 - 64 Air (F): 65 - 71	LWD per 100 ft.:	Mean Pool Shelter Rating: 37
Dry Channel (ft): 0	Riffles: 3	
	Pools: 11	
	Flat: 5	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 23 Sm Cobble: 14 Lg Cobble: 14 Boulder: 45 Bedrock: 5		
Embeddedness Values (%): 1. 13.6 2. 18.2 3. 27.3 4. 18.2 5. 22.7		

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: 1240587400437

LLID: 1240587400437

Drainage: Mattole River

Survey Dates: 7/24/2006 to 7/24/2006

Confluence Location: Quad: SHELTER COVE

Legal Description: T05SR01ES10

Latitude: 40:02:37.0N

Longitude: 124:03:31.0W

Mean Percentage of Dominant Stream Bank Substrate

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Bedrock	5	2	11.7
Boulder	1	0	1.7
Cobble / Gravel	3	2	8.3
Sand / Silt / Clay	21	26	78.3

Mean Percentage of Dominant Stream Bank Vegetation

Dominant Class of Vegetation	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Grass	0	0	0.0
Brush	9	9	30.0
Hardwood Trees	21	21	70.0
Coniferous Trees	0	0	0.0
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 3

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

StreamName: 1240587400437

LLID: 1240587400437

Drainage: Mattole River

Survey Dates: 7/24/2006 to 7/24/2006

Confluence Location: Quad: SHELTER COVE

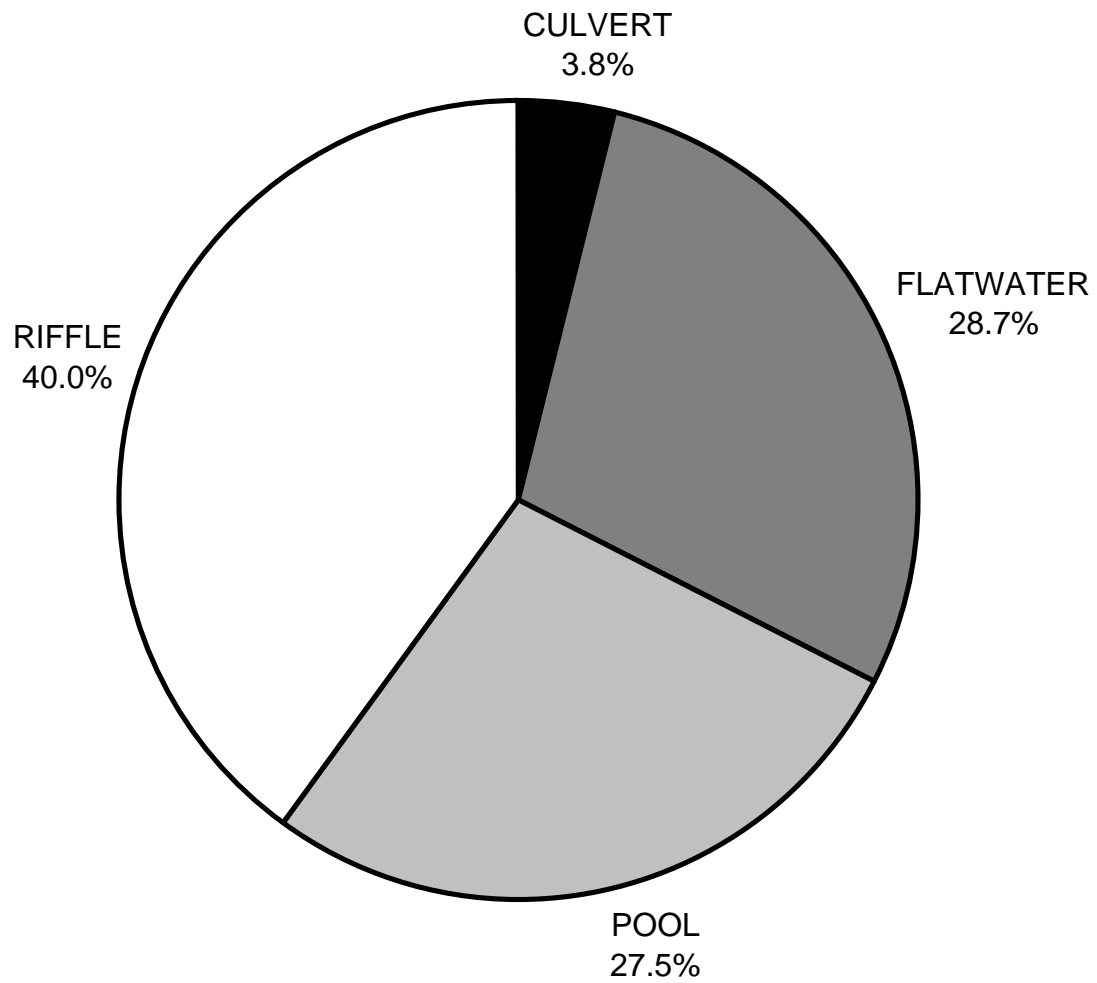
Legal Description: T05SR01ES10

Latitude: 40:02:37.0N

Longitude: 124:03:31.0W

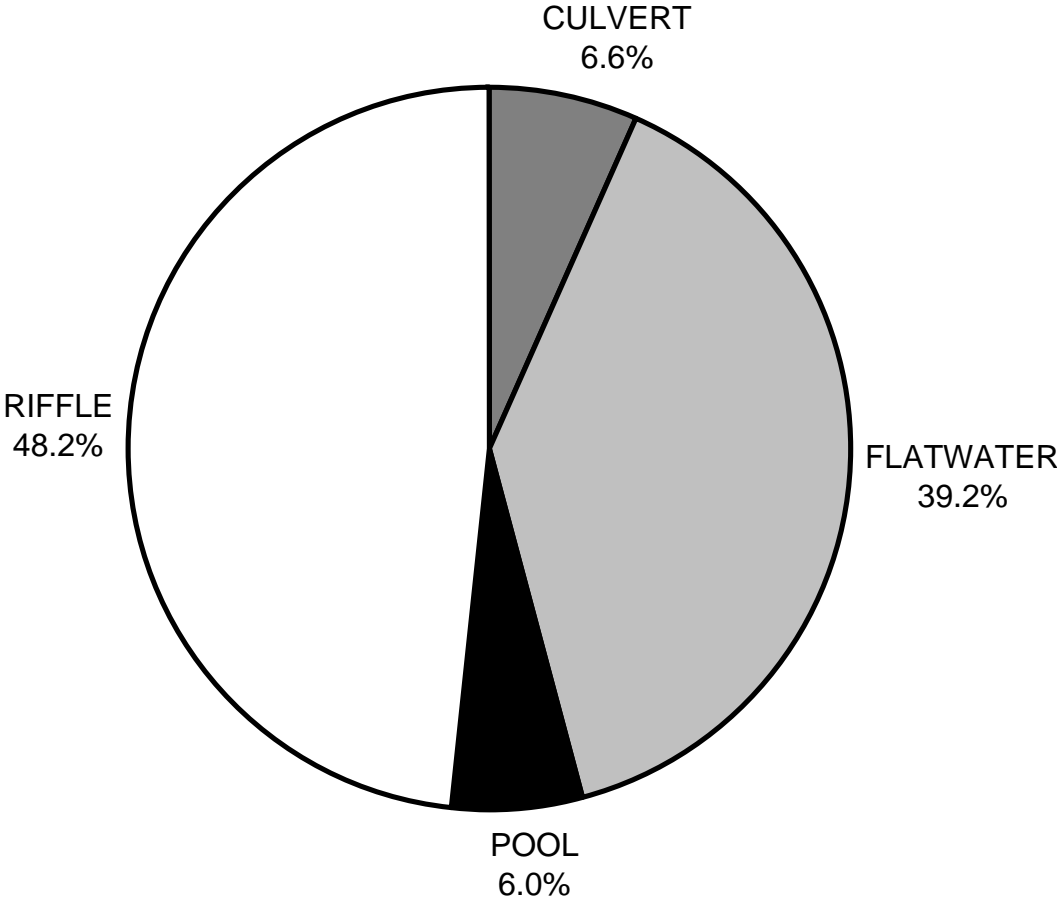
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	0	4
SMALL WOODY DEBRIS (%)	0	0	7
LARGE WOODY DEBRIS (%)	0	0	32
ROOT MASS (%)	0	2	15
TERRESTRIAL VEGETATION (%)	0	0	0
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	25	6	12
BOULDERS (%)	0	32	16
BEDROCK LEDGES (%)	0	0	0

1240587400437 2006
HABITAT TYPES BY PERCENT OCCURRENCE



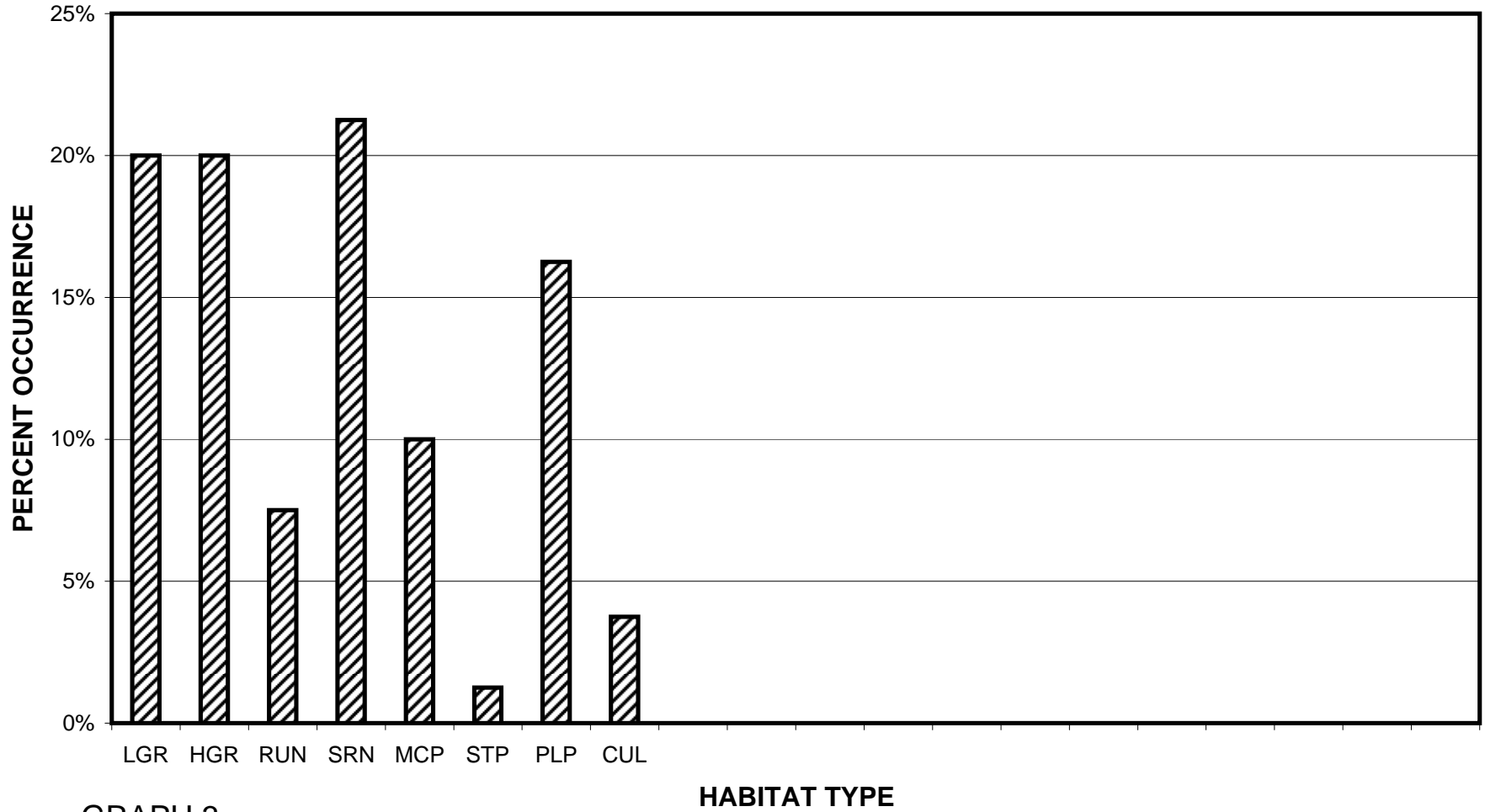
GRAPH 1

1240587400437 2006
HABITAT TYPES BY PERCENT TOTAL LENGTH



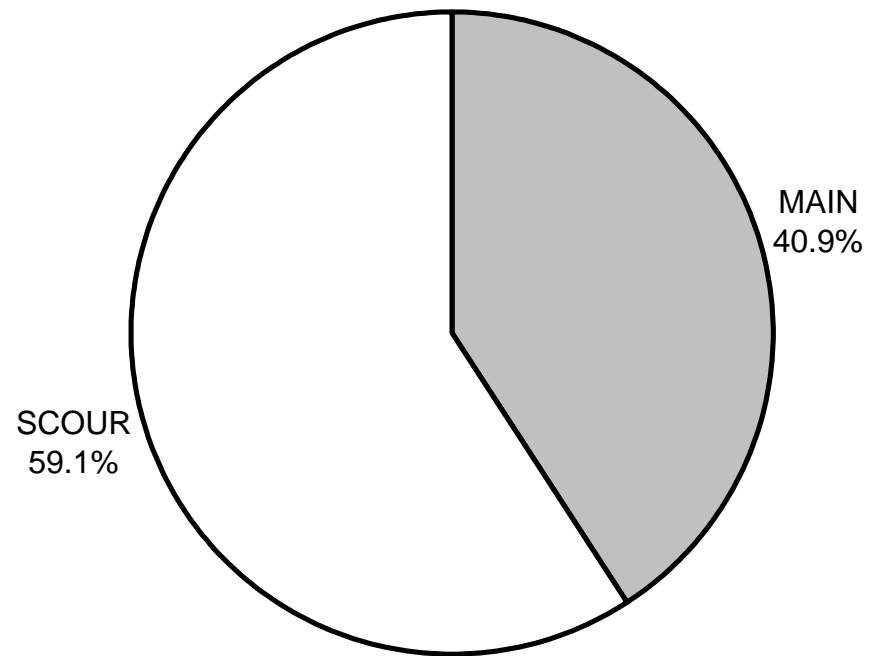
GRAPH 2

1240587400437 2006
HABITAT TYPES BY PERCENT OCCURRENCE



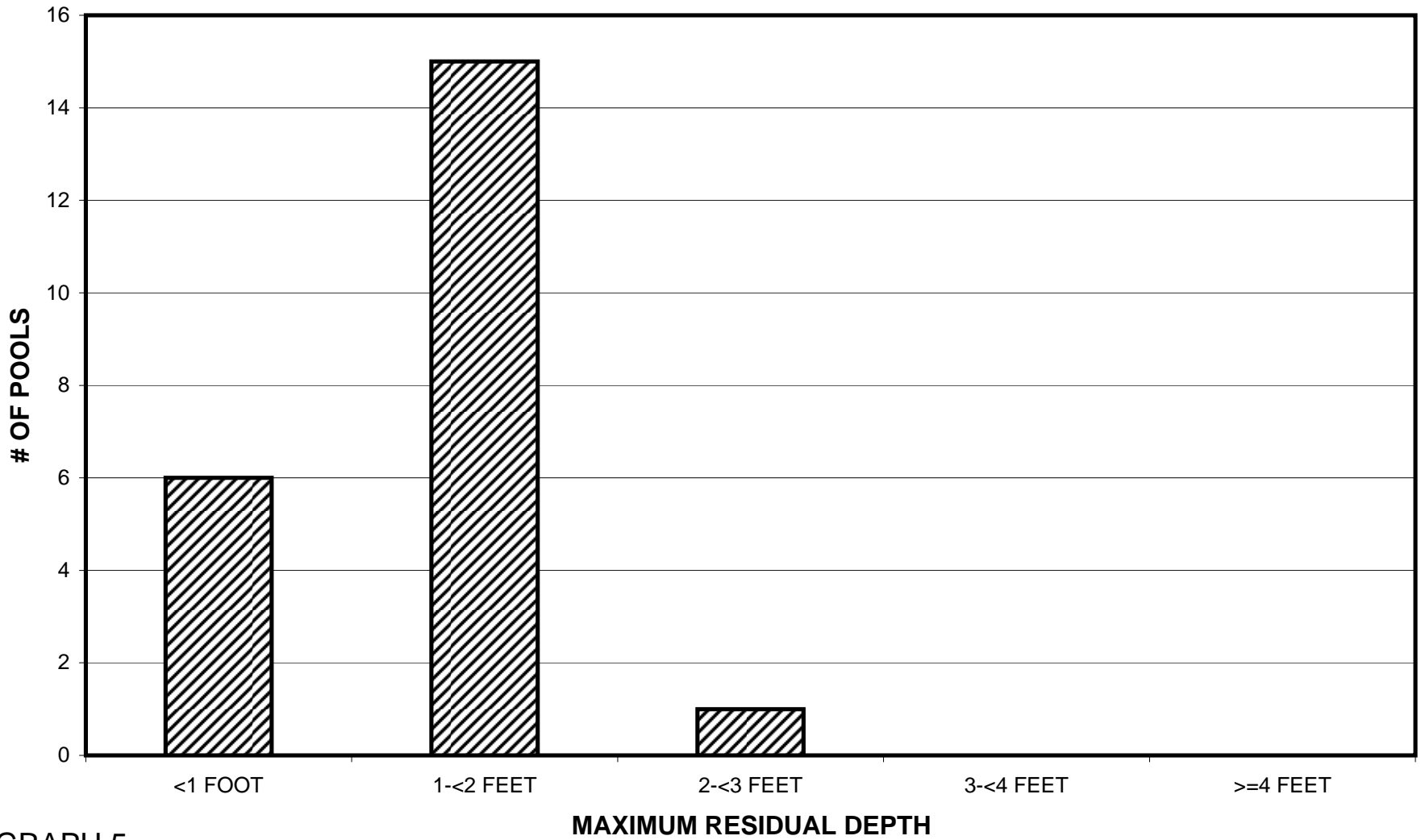
GRAPH 3

1240587400437 2006
POOL TYPES BY PERCENT OCCURRENCE



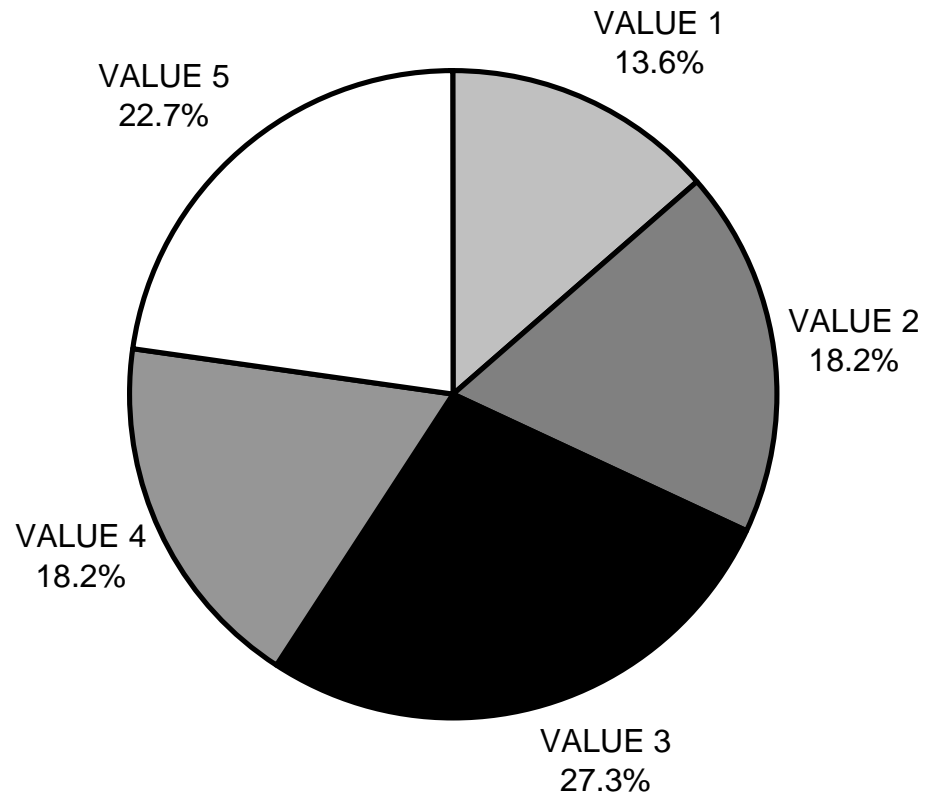
GRAPH 4

1240587400437 2006
MAXIMUM DEPTH IN POOLS



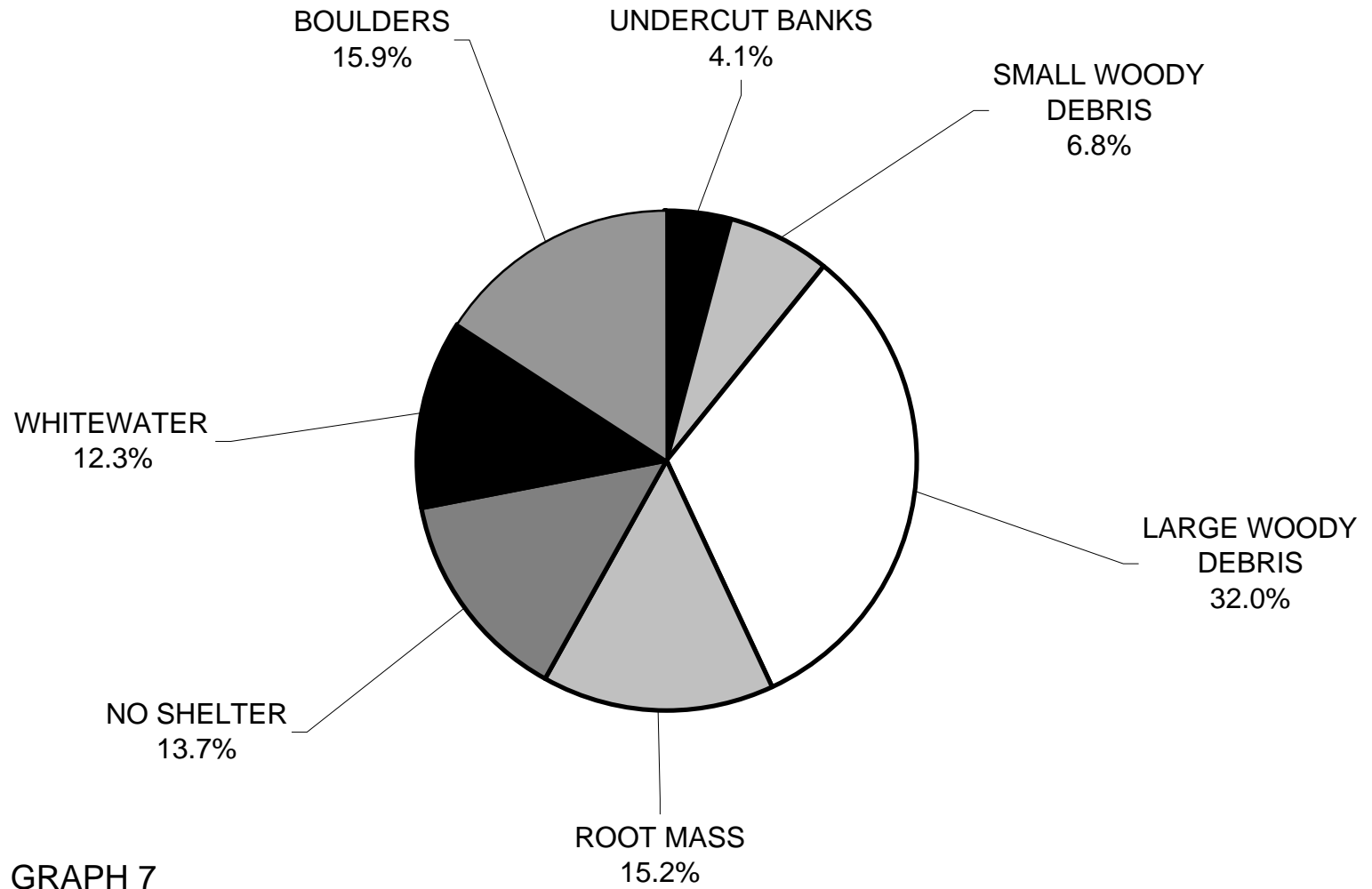
GRAPH 5

**1240587400437 2006
PERCENT EMBEDDEDNESS**



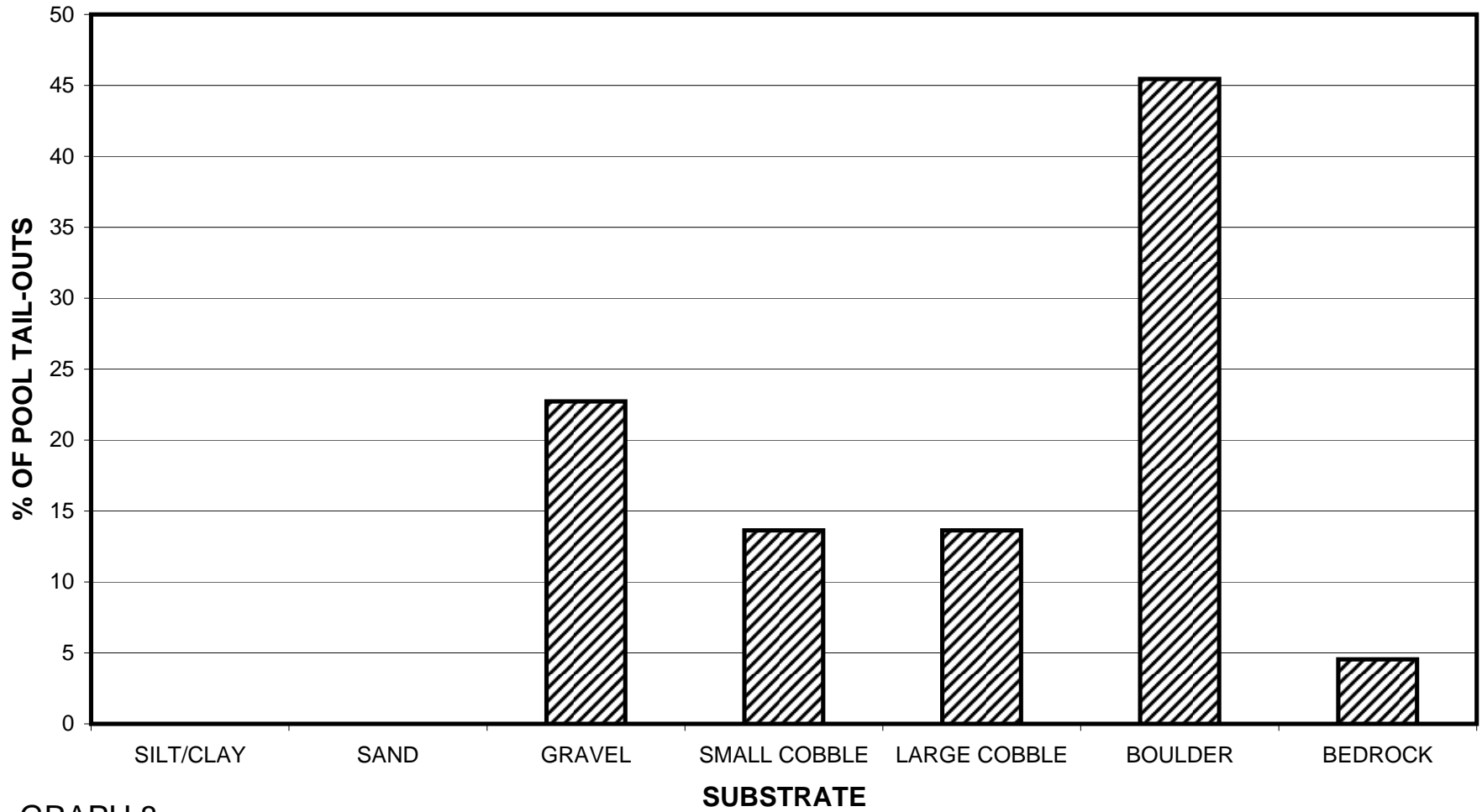
GRAPH 6

1240587400437 2006
MEAN PERCENT COVER TYPES IN POOLS



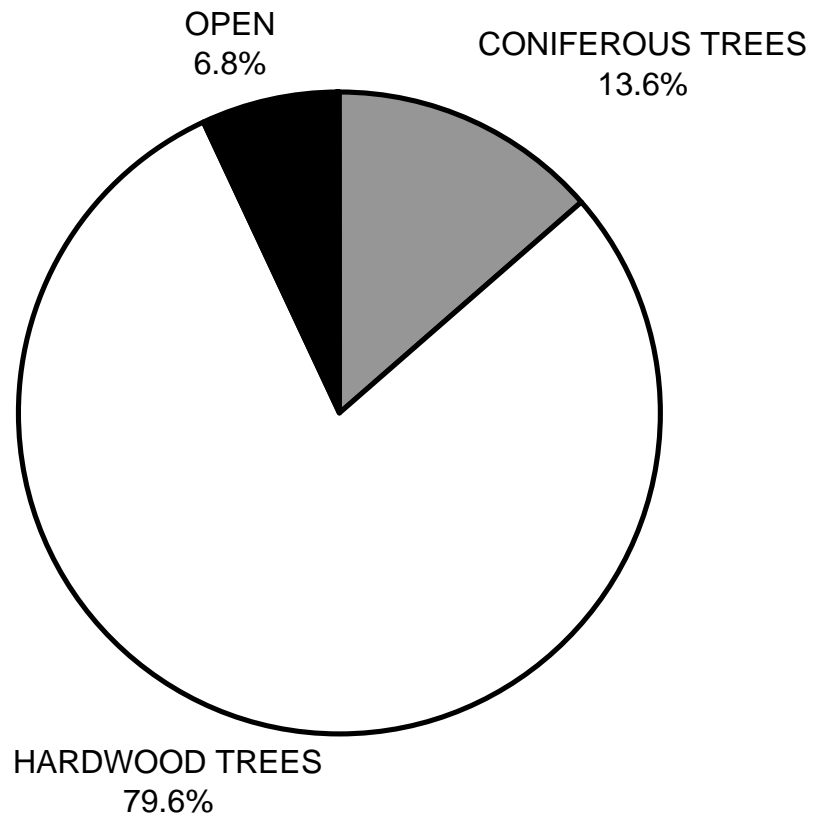
GRAPH 7

1240587400437 2006
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



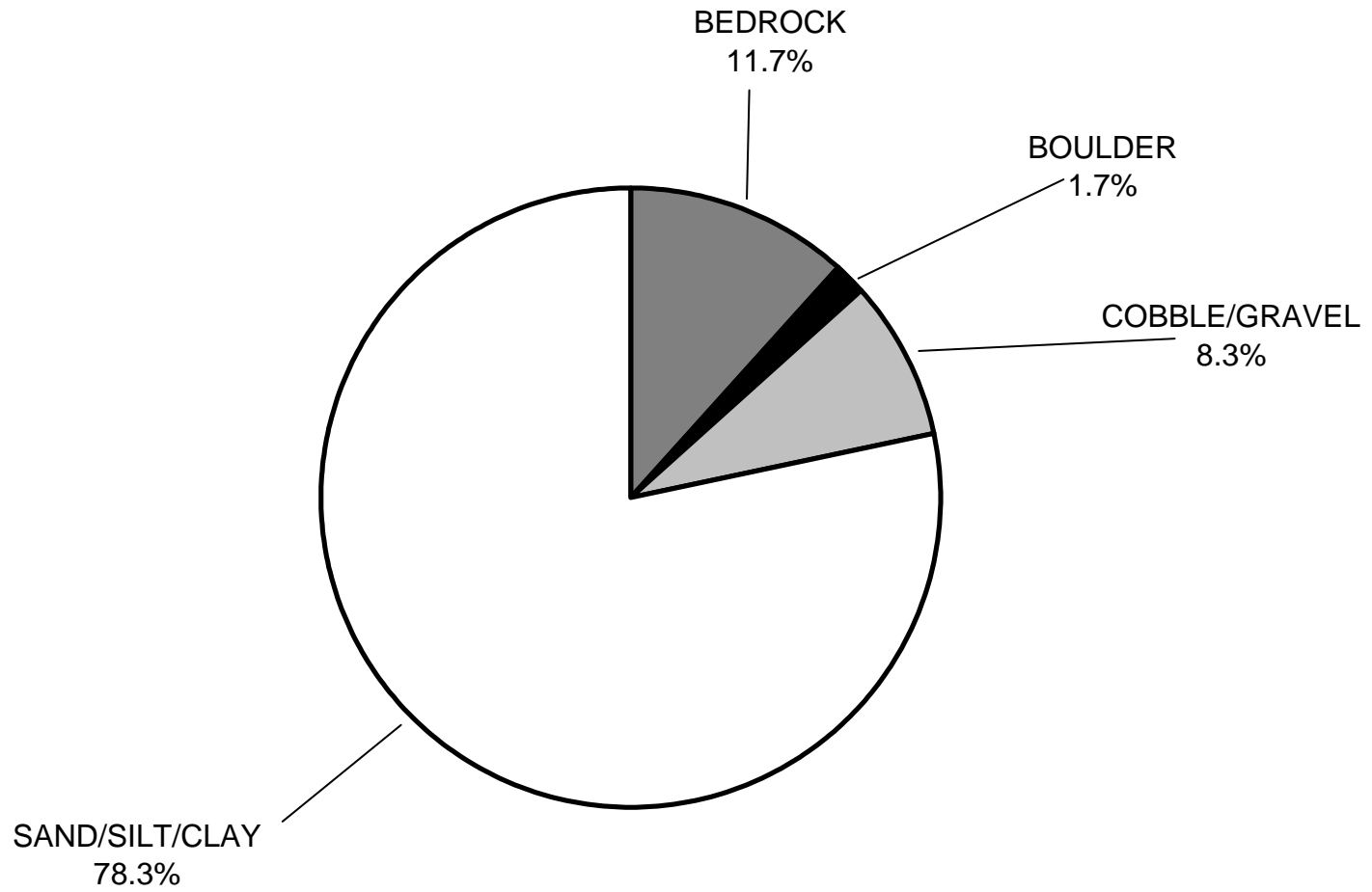
GRAPH 8

**1240587400437 2006
MEAN PERCENT CANOPY**



GRAPH 9

1240587400437 2006
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

1240587400437 2006
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11