

STREAM INVENTORY REPORT

Pudding Creek

INTRODUCTION

A stream inventory was conducted from October 16 to November 1, 2006 on Pudding Creek. The survey began at the confluence with Pacific Ocean and extended upstream 14 miles.

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

The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for 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

Pudding Creek is a tributary to the Pacific Ocean, located in Mendocino County, California (Map 1). Pudding Creek's legal description at the confluence with Pacific Ocean is T18N R18W S01. Its location is 39.4591 north latitude and 123.8091 west longitude, LLID number 1238079394591. Pudding Creek is a second order stream and has approximately 14.3 miles of blue line stream according to the USGS Fort Bragg 7.5 minute quadrangle. Pudding Creek drains a watershed of approximately 17.4 square miles. Elevations range from about sea level at the mouth of the creek to 1,600 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for residential use, timber production, and recreation. Vehicle access exists via Highway 1 in Fort Bragg.

METHODS

The habitat inventory conducted in Pudding Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The Pacific States Marine Fisheries Commission (PSMFC) Fisheries Technicians 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

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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 Pudding 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". Pudding Creek habitat typing used standard basin level measurement criteria. These parameters require that the minimum length of a described habitat unit must be equal to or greater than the stream's mean wetted width. All measurements are in feet to the nearest tenth. Habitat characteristics are measured using a clinometer, hip chain, and stadia rod.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Pudding Creek, embeddedness was

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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 Pudding 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 Pudding 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 Pudding Creek, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully-described unit were selected from the habitat inventory form. Additionally, the percent of each bank covered by vegetation (including downed trees, logs, and rootwads) was estimated and recorded.

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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 Pudding Creek include:

- Riffle, Flatwater, Pool Habitat Types by Percent Occurrence
- Riffle, Flatwater, Pool Habitat Types by Total Length
- Total Habitat Types by Percent Occurrence
- Pool Types by Percent Occurrence
- Maximum Residual Depth in Pools

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- 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 October 16 to November 1, 2006, was conducted by J. Caldwell and J. Beck (PSMFC). The total length of the stream surveyed was 73,884 feet with an additional 101 feet of side channel. A section from the Pacific Ocean upstream to approximately 17,388 feet was not surveyed due to unsurveyable conditions. The data included in this report is for the 56,496 feet actually surveyed.

Stream flow was not measured on Pudding Creek.

Pudding Creek is an unknown channel type for the first 17,388 feet of the stream not surveyed (Reach 1), and an F4 channel type for the remaining 56,597 feet of the stream surveyed (Reach 2). F4 channel types 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 44 to 60 degrees Fahrenheit. Air temperatures ranged from 41 to 69 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 42% flatwater units, 35% pool units and 22% riffle units (Graph 1). Based on total length of Level II habitat types there were 71% flatwater units, 19% pool units and 10% riffle units (Graph 2).

Ten Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 30%; step run units, 25%; and low gradient riffle units, 22% (Graph 3). Based on percent total length, step run units made up 54%, mid-channel pool units 17%, and run units 16%.

A total of 220 pools were identified (Table 3). Main channel pools were the most frequently encountered at 85% (Graph 4), and comprised 89% 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 hundred forty-nine of the 204 pools measured (73%) 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 203 pool tail-outs measured, 116 had a value of 1 (57.1%); 65 had a value of 2 (32%); 18 had a value of 3 (8.9%); 4 had a value of 5 (2%) (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 11, and pool habitats had a mean shelter rating of 41 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 49. Main channel pools had a mean shelter rating of 40 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in Pudding Creek. Graph 7 describes the pool cover in Pudding Creek. 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 98% of the pool tail-outs. Sand was the next most frequently observed dominant substrate type and occurred in 2% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Pudding Creek was 86%. Fourteen percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 52% and 48%, respectively. Graph 9 describes the mean percent canopy in Pudding Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 95%. The mean percent left bank vegetated was 99%. The dominant elements composing the structure of the stream banks consisted of 100% sand/silt/clay (Graph 10). Coniferous trees were the dominant vegetation type observed in 61% of the units surveyed. Additionally, 35% of the units surveyed had deciduous trees as the dominant vegetation type, and 4% had brush as the dominant vegetation type (Graph 11).

DISCUSSION

Pudding Creek is an unknown channel type for the first 17,388 feet of stream and an F4 channel type for the remaining 56,597 feet of stream surveyed. The suitability of F4 channel types for fish habitat improvement structures is as follows: F4 channel types are good for bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover.

The water temperatures recorded on the survey days October 16 to November 1, 2006, ranged from 44 to 60 degrees Fahrenheit. Air temperatures ranged from 41 to 69 degrees Fahrenheit. To make any conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling would need to be conducted.

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Flatwater habitat types comprised 71% of the total length of this survey, riffles 10% and pools 19%. One hundred forty-nine of the 204 (73%) pools had 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 large wood structures that will increase or deepen pool habitat is recommended.

One hundred eighty-one of the 203 pool tail-outs measured had embeddedness ratings of 1 or 2. Eighteen of the pool tail-outs had embeddedness ratings of 3 or 4. Four 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.

One hundred ninety-nine of the 203 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 41. The shelter rating in the flatwater habitats was 11. 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 Pudding Creek. 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 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 86%. Reach 1 was not surveyed. Reach 2 had a canopy density of 86%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 95% and 99%, 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) Pudding 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) 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.

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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	Survey started at the Pacific Ocean. Pudding Creek was not surveyed for the first 17,388 feet due to a marsh.
17388	0002.00	Sampling begins 80' upstream of the upper most train bridge. The train tracks enter a tunnel after the bridge.
19351	0021.00	Log debris accumulation (LDA) at 30 feet into the unit is 35' long x 45' wide x 4' high.
20542	0026.00	LDA at 25' into the unit is 40' long x 15' wide x 6' high.
22785	0048.00	LDA at 50' into the unit is 40' long x 10' wide x 10' high and is retaining sediment.
31135	0132.00	There is a bridge at the top of the unit.
31204	0133.00	There is a road along the right bank.
34380	0174.00	LDA at the top of unit is 30' long x 10' wide x 8' high and is retaining sediment.
35109	0183.00	A bridge crosses the stream at 223'.
37459	0208.00	A right bank erosion at 10' into unit is contributing fines. It measures 40' high x 12' wide.
38132	0218.00	There is a Humboldt crossing at 92' into the unit.
40232	0240.00	A right bank tributary enters at 524' into the unit.
41103	0246.00	A left bank tributary, (Little Valley Creek), enters at the top of the unit.
41225	0250.00	There is right bank erosion
42193	0262.00	A road encroaches on the right bank.
42278	0264.00	There is right bank erosion from a road.

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42873	0267.00	A road encroaches on the right bank.
46628	0311.00	LDA at 10' into the unit measures 30' long x 10' wide x 7' high.
47358	0322.00	There is left bank erosion at 10' into the unit.
50968	0377.00	LDA at 181' into unit measures 35' long x 5' wide x 4' high.
51426	0383.00	LDA at 102' into unit measures 40' long x 5' wide x 6' high.
51774	0387.00	Right bank erosion at 77' into unit is associated with a road.
52062	0390.00	LDA at 10' into the unit measures 28' long x 6' wide x 4' high.
53151	0404.00	There is a bridge crossing at 89' into the unit.
54093	0419.00	LDA at top of unit measures 15' long x 4' wide x 4' high.
54926	0431.00	Right bank erosion at 238' into the unit contributes fines and measures 45' long x 14' high.
57734	0466.00	LDA at top of the unit measures 25' long x 8' wide x 8' high.
59980	0501.00	Right bank erosion at 292' into the unit is caused by a road encroachment.
60311	0503.00	A right bank tributary enters through a culvert at 48' into the unit.
61214	0515.00	A right bank culvert enters at 58' into the unit.
62676	0535.00	A left bank seep enters at 20' into the unit.
63270	0545.00	There is right bank and left bank erosion.
63750	0548.00	LDA at 326' into the unit measures 24' long x 5' wide x 10' high.
68174	0579.00	Right bank erosion at 79' into the unit measures 45' long x 30' x 5' high and contributes fines.
69083	0585.00	LDA at 249' into the unit measures 30' long x 5' wide x 6' high.
70384	0598.00	LDA at top of the unit measures 25' long x 10' wide x 8' high. The LDA is caused by a right-bank landslide measuring 40' long x 15' high and contributing fines.

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70643	0601.00	Left bank landslide at 323' into the unit measures 50' long x 25' wide.
70643	0601.00	LDA at 547' into the unit measures 12' long x 20' wide x 6' high.
71321	0603.00	Right bank landslide at 270' into the unit measures 40' long x 30' high and is contributing fines.
71321	0603.00	LDA at 204' into the unit measures 30' long x 8' wide x 8' high.
71905	0604.00	Dry right bank tributary enters at 2' into the unit.
71905	0604.00	Left bank landslide at 5' into the unit measures 20' long x 30' high.
72247	0607.00	Left bank landslide at 90' into the unit measures 12' long x 30' high.
72247	0607.00	LDA at 68' into the unit measures 35' long x 10' wide x 10' high and retaining sediment 8' to 10' high. This is a possible barrier to anadromous fish.
73664	0618.00	LDA at 106' into the unit measures 80' long x 15' wide x 10' high and is a possible barrier.
73884	0619.00	End of survey. No fish were observed above the last two LDAs.

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: Pudding Creek

LLID: 1238079394591 Drainage: Noyo River

Survey Dates: 10/16/2006 to 11/1/2006

Confluence Location: Quad: FORT BRAGG Legal Description: T19NR16WS32 Latitude: 39:27:33.0N Longitude: 123:48:28.0

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
1	0	DRY	0.2	100	100	0.2									
263	22	FLATWATER	42.4	152	39937	70.6	11.7	0.6	1.4	1342	352850	882	231968		11
1	0	NOSURVEY		17388	17388										
220	213	POOL	35.5	50	10924	19.3	15.5	1.1	2.5	829	182458	1306	268403	1063	41
136	9	RIFFLE	21.9	41	5636	9.9	7.0	0.2	0.4	193	26302	36	4907		0
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
621	244				73985					561610			505278		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Pudding Creek

LLID: 1238079394591

Drainage: Noyo River

Survey Dates: 10/16/2006 to 11/1/2006

Confluence Location: Quad: FORT BRAGG

Legal Description: T19NR16WS32

Latitude: 39:27:33.0N

Longitude: 123:48:28.0W

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 (%)
136	9	LGR	21.9	41	5636	10.0	7	0.2	0.7	193	26302	36	4907		0	90
3	1	POW	0.5	101	304	0.5	20	0.5	0.8	1133	3399	567	1700		40	92
102	11	RUN	16.4	89	9070	16.0	14	0.8	2.2	1339	136567	1072	109329		13	83
158	10	SRN	25.4	193	30563	54.0	8	0.5	1.8	1366	215751	705	111347		7	90
188	181	MCP	30.3	51	9675	17.1	16	1.2	5.7	863	162282	1392	242863	1137	40	84
8	8	LSL	1.3	38	300	0.5	15	1.0	3	597	4775	709	4964	550	56	94
16	16	LSR	2.6	42	670	1.2	17	1.1	3.7	733	11721	963	15410	748	53	89
3	3	LSBk	0.5	59	176	0.3	15	1.1	3.2	913	2740	1290	3870	988	12	90
5	5	PLP	0.8	21	103	0.2	12	1.4	3.5	236	1178	360	1798	316	48	91
1	0	DRY	0.2	100	100	0.2										
1	0	NS		17388	17388											

Total Units
621

Total Units Fully Measured
244

Total Length (ft.)
73985

Total Area (sq.ft.)
564714

Total Volume (cu.ft.)
496188

Table 3 - Summary of Pool Types

Stream Name: Pudding Creek

LLID: 1238079394591

Drainage: Noyo River

Survey Dates: 10/16/2006 to 11/1/2006

Confluence Location: Quad: FORT BRAGG

Legal Description: T19NR16WS32

Latitude: 39:27:33.0N

Longitude: 123:48:28.0W

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
188	181	MAIN	85	51	9675	89	15.5	1.2	863	162282	1137	198473	40
32	32	SCOUR	15	39	1249	11	15.5	1.1	638	20414	657	20368	49

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
220	213	10924	182695	218840

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

Stream Name: Pudding Creek

LLID: 1238079394591

Drainage: Noyo River

Survey Dates: 10/16/2006 to 11/1/2006

Confluence Location: Quad: FORT BRAGG

Legal Description: T19NR16WS32

Latitude: 39:27:33.0N

Longitude: 123:48:28.0W

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
173	MCP	85	0	0	51	29	87	50	23	13	12	7
7	LSL	3	0	0	2	29	4	57	1	14	0	0
16	LSR	8	0	0	0	0	14	88	2	13	0	0
3	LSBk	1	0	0	1	33	1	33	1	33	0	0
5	PLP	2	0	0	1	20	3	60	1	20	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
204	0	0	55	27	109	53	28	14	12	6

Mean Maximum Residual Pool Depth (ft.): 2.5

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Pudding Creek

LLID: 1238079394591

Drainage: Noyo River

Survey Dates: 10/16/2006 to 11/1/2006

Dry Units: 1

Confluence Location: Quad: FORT BRAGG

Legal Description: T19NR16WS32

Latitude: 39:27:33.0N

Longitude: 123:48:28.0W

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
137	9	LGR	0	0	0	0	0	0	0	0	0
137	9	TOTAL RIFFLE	0	0	0	0	0	0	0	0	0
3	1	POW	0	0	0	0	0	0	0	100	0
102	12	RUN	31	20	27	10	10	0	0	2	0
157	11	SRN	26	24	21	14	0	0	0	14	0
262	24	TOTAL FLAT	27	20	24	11	6	0	0	12	0
188	186	MCP	16	12	47	9	5	0	0	6	5
8	8	LSL	10	11	77	0	3	0	0	0	0
16	16	LSR	8	4	9	75	3	0	0	0	0
3	3	LSBk	0	0	0	0	0	0	0	0	100
5	5	PLP	26	8	62	4	0	0	0	0	0
220	218	TOTAL POOL	15	11	45	14	4	0	0	5	6
1	0	NS									
621	251	TOTAL	16	12	43	14	4	0	0	6	5

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Pudding Creek

LLID: 1238079394591

Drainage: Noyo River

Survey Dates: 10/16/2006 to 11/1/2006

Dry Units: 1

Confluence Location: Quad: FORT BRAGG

Legal Description: T19NR16WS32

Latitude: 39:27:33.0N

Longitude: 123:48:28.0W

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
137	9	LGR	0	0	100	0	0	0	0
3	1	POW	0	0	0	0	0	100	0
102	12	RUN	0	0	100	0	0	0	0
157	11	SRN	0	0	100	0	0	0	0
188	185	MCP	1	26	72	0	0	1	0
8	8	LSL	0	63	38	0	0	0	0
16	16	LSR	0	25	75	0	0	0	0
3	3	LSBk	0	0	100	0	0	0	0
5	5	PLP	0	40	60	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Pudding Creek

LLID: 1238079394591

Drainage: Noyo River

Survey Dates: 10/16/2006 to 11/1/2006

Confluence Location: Quad: FORT BRAGG

Legal Description: T19NR16WS32

Latitude: 39:27:33.0N

Longitude: 123:48:28.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
86	48	52	0	95	99

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 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Pudding Creek

LLID: 1238079394591

Drainage: Noyo River

Survey Dates: 10/16/2006 to 11/1/2006

Confluence Location: Quad: FORT BRAGG

Legal Description: T19NR16WS32

Latitude: 39:27:33.0N

Longitude: 123:48:28.0W

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	0	0	0.0
Boulder	1	0	0.2
Cobble / Gravel	0	0	0.0
Sand / Silt / Clay	249	250	99.8

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	1	0.2
Brush	12	7	3.8
Hardwood Trees	93	80	34.6
Coniferous Trees	144	162	61.2
No Vegetation	1	0	0.2

Total Stream Cobble Embeddedness Values: 2

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

StreamName: Pudding Creek

LLID: 1238079394591

Drainage: Noyo River

Survey Dates: 10/16/2006 to 11/1/2006

Confluence Location: Quad: FORT BRAGG

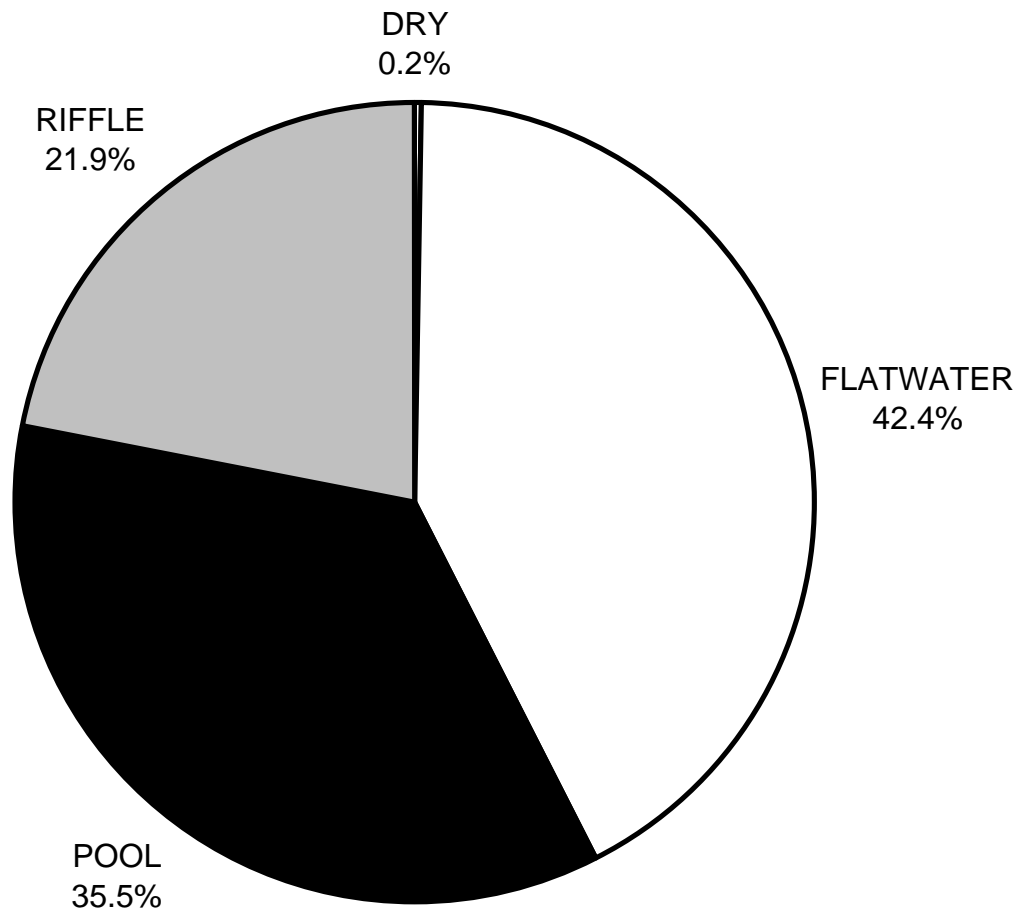
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Latitude: 39:27:33.0N

Longitude: 123:48:28.0W

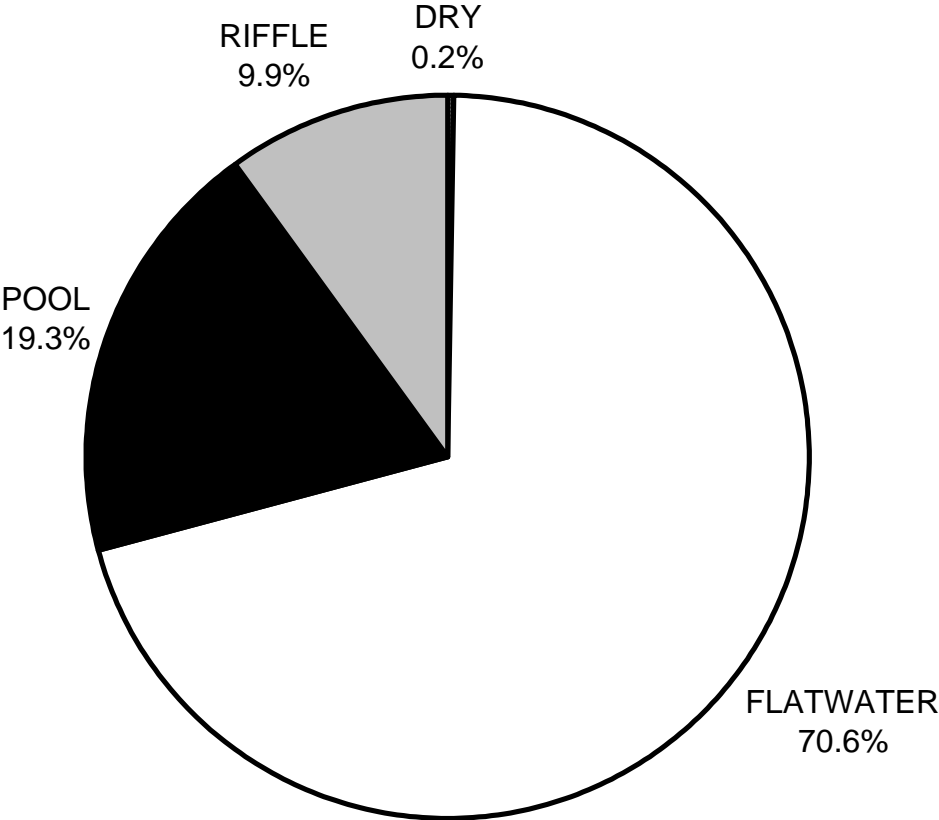
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	27	15
SMALL WOODY DEBRIS (%)	0	20	11
LARGE WOODY DEBRIS (%)	0	24	45
ROOT MASS (%)	0	11	14
TERRESTRIAL VEGETATION (%)	0	6	4
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	0	12	5
BEDROCK LEDGES (%)	0	0	6

PUDDING CREEK 2006 HABITAT TYPES BY PERCENT OCCURRENCE



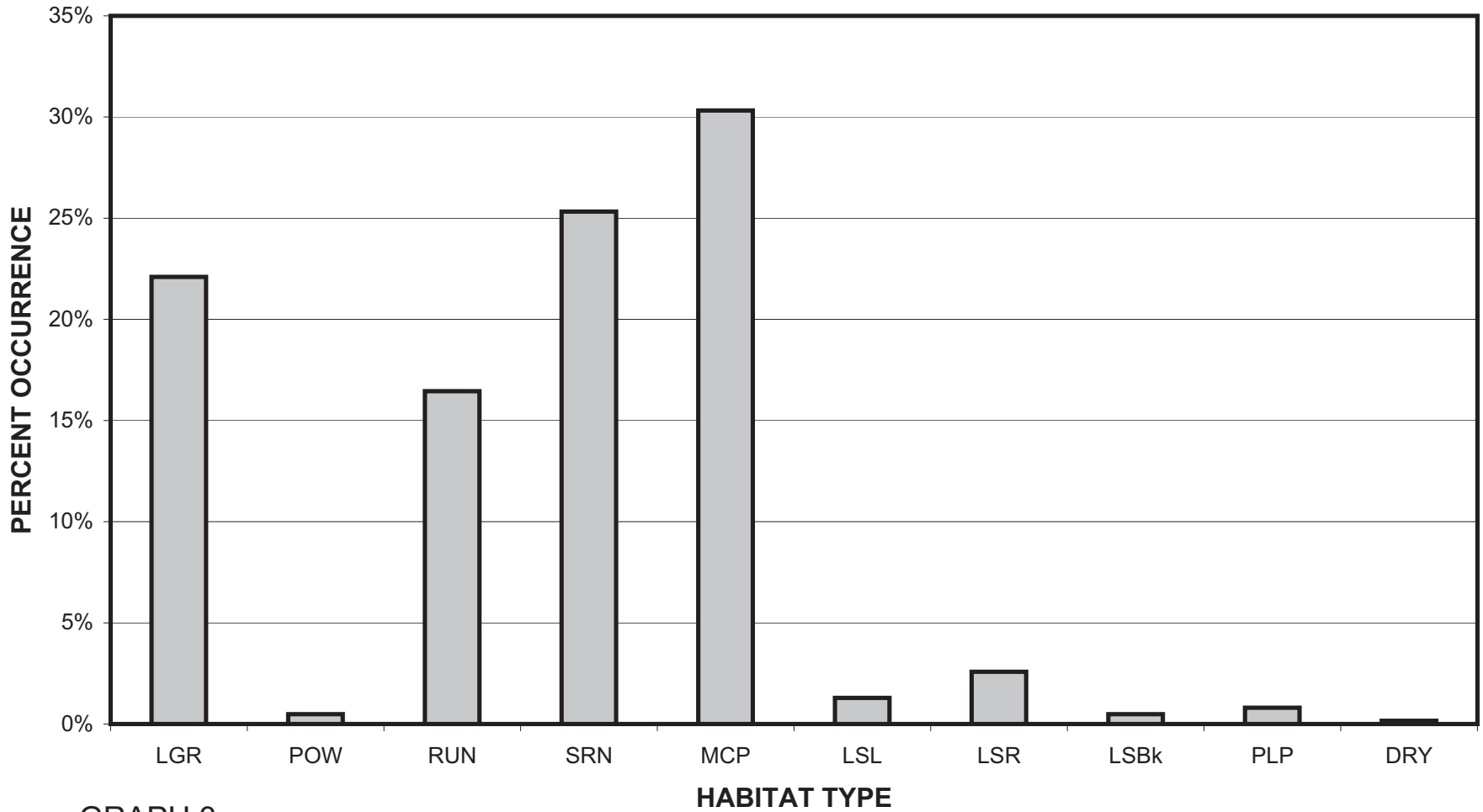
GRAPH 1

**PUDDING CREEK 2006
HABITAT TYPES BY PERCENT TOTAL LENGTH**



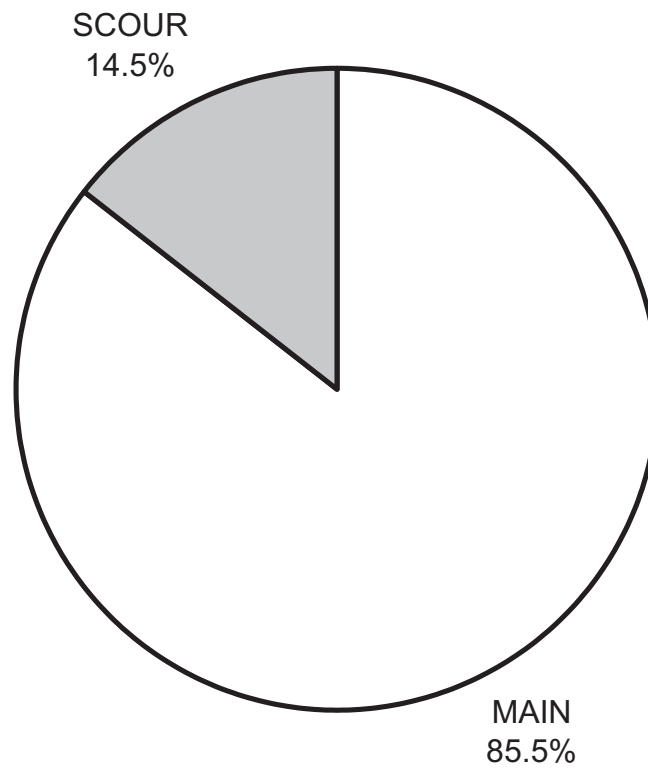
GRAPH 2

PUDDING CREEK 2006 HABITAT TYPES BY PERCENT OCCURRENCE



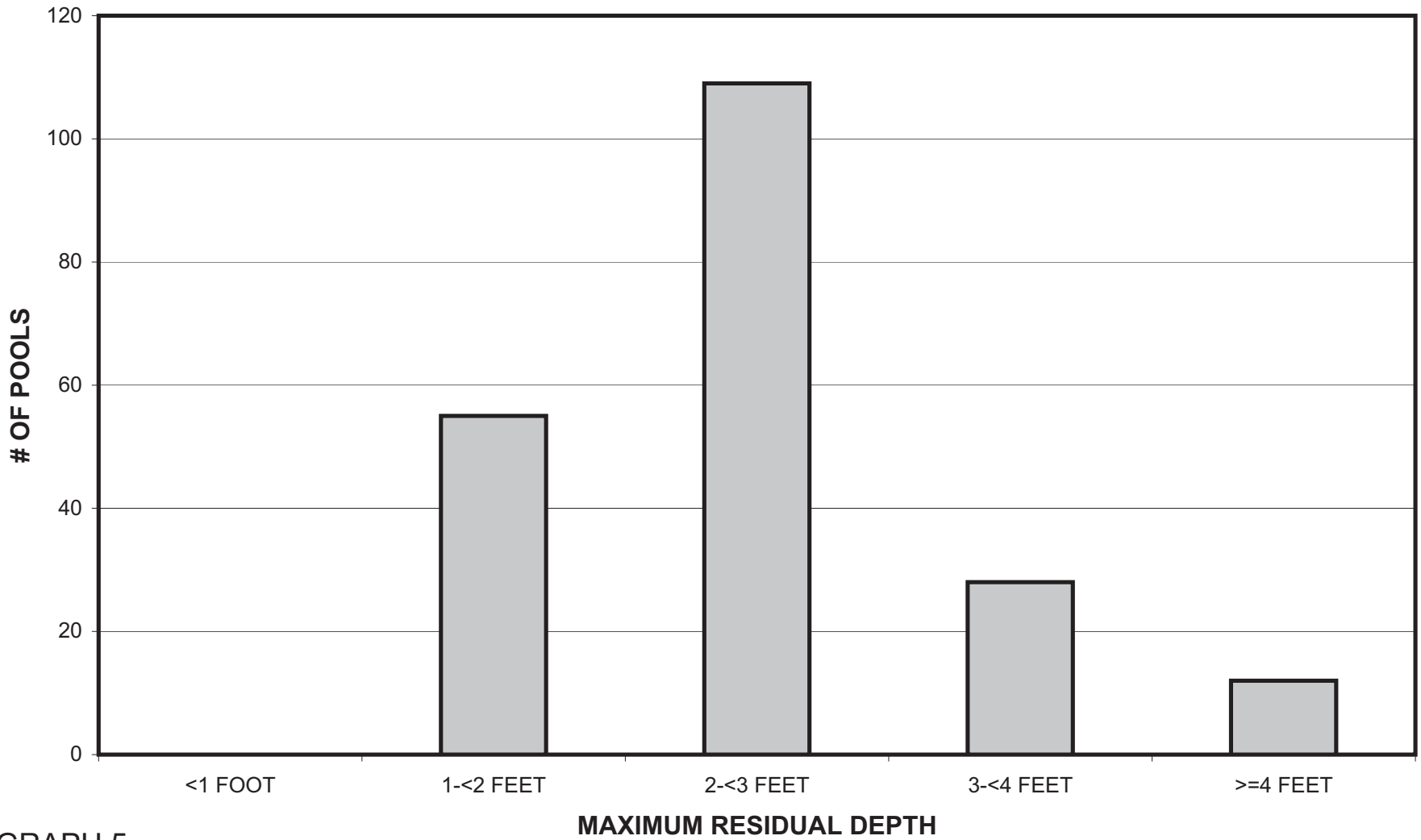
GRAPH 3

**PUDDING CREEK 2006
POOL TYPES BY PERCENT OCCURRENCE**



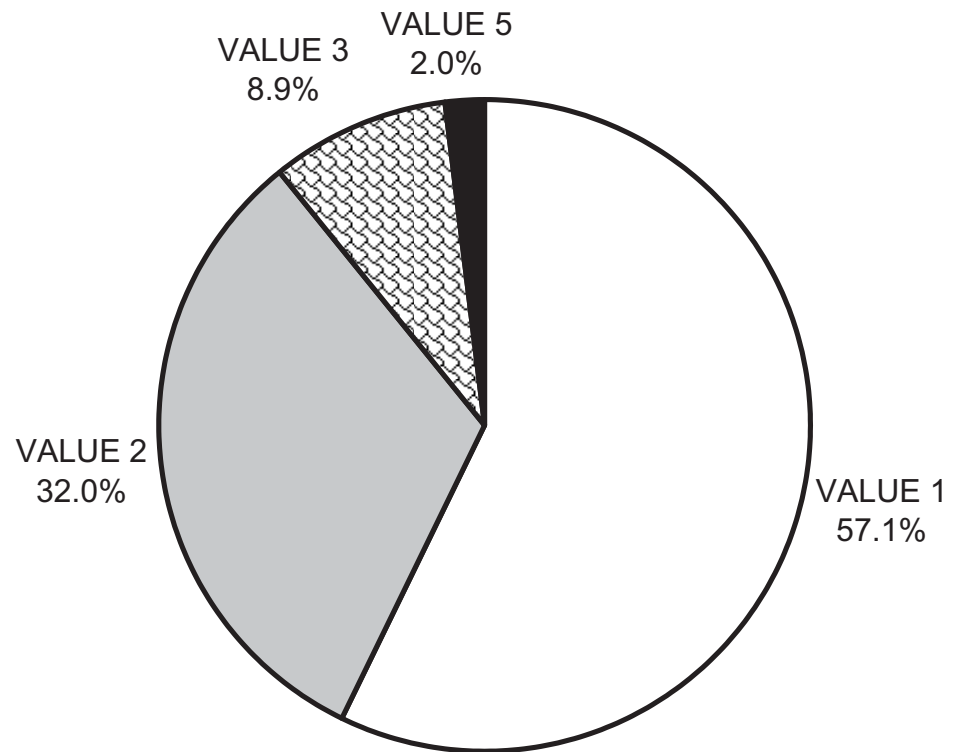
GRAPH 4

PUDDING CREEK 2006 MAXIMUM DEPTH IN POOLS



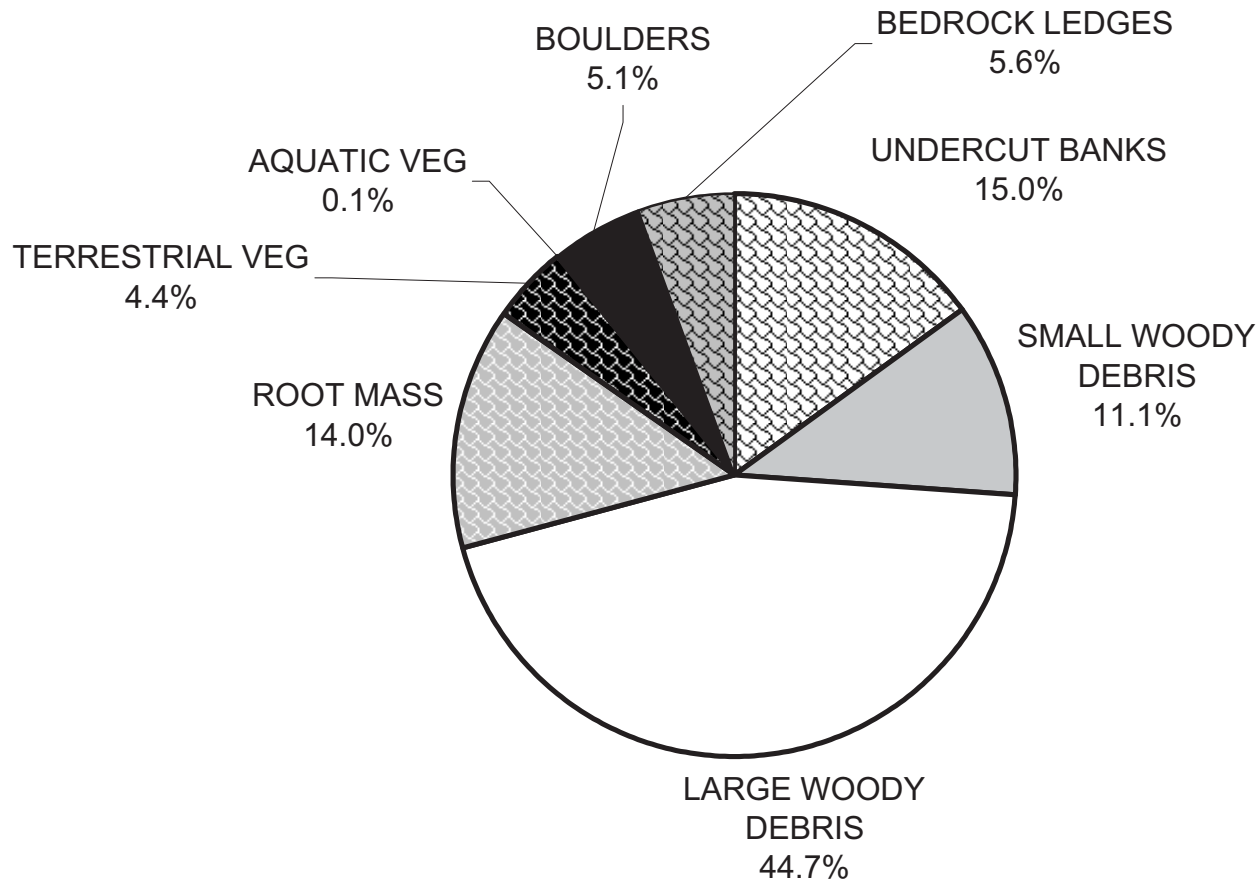
GRAPH 5

PUDDING CREEK 2006 PERCENT EMBEDDEDNESS



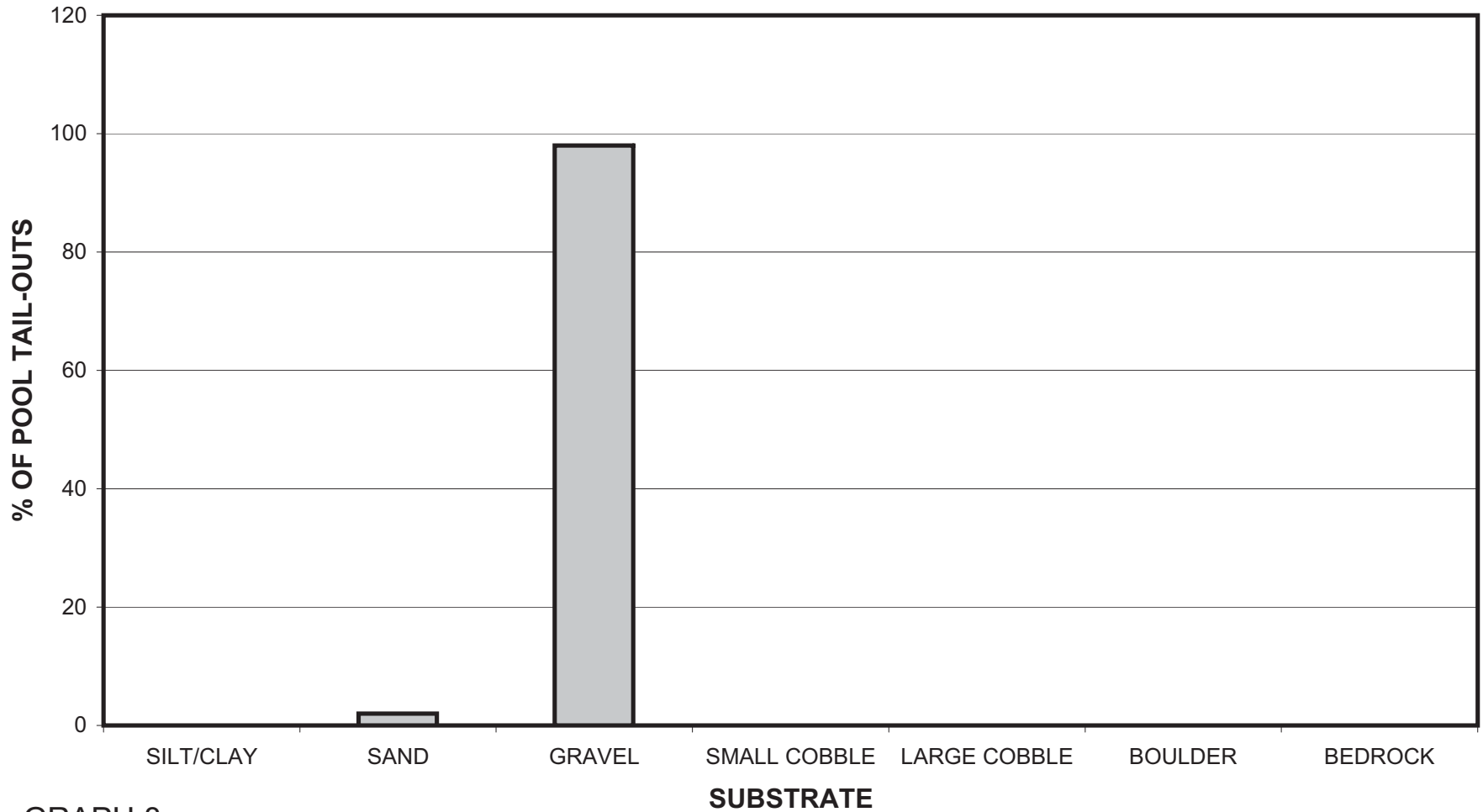
GRAPH 6

PUDDING CREEK 2006 MEAN PERCENT COVER TYPES IN POOLS



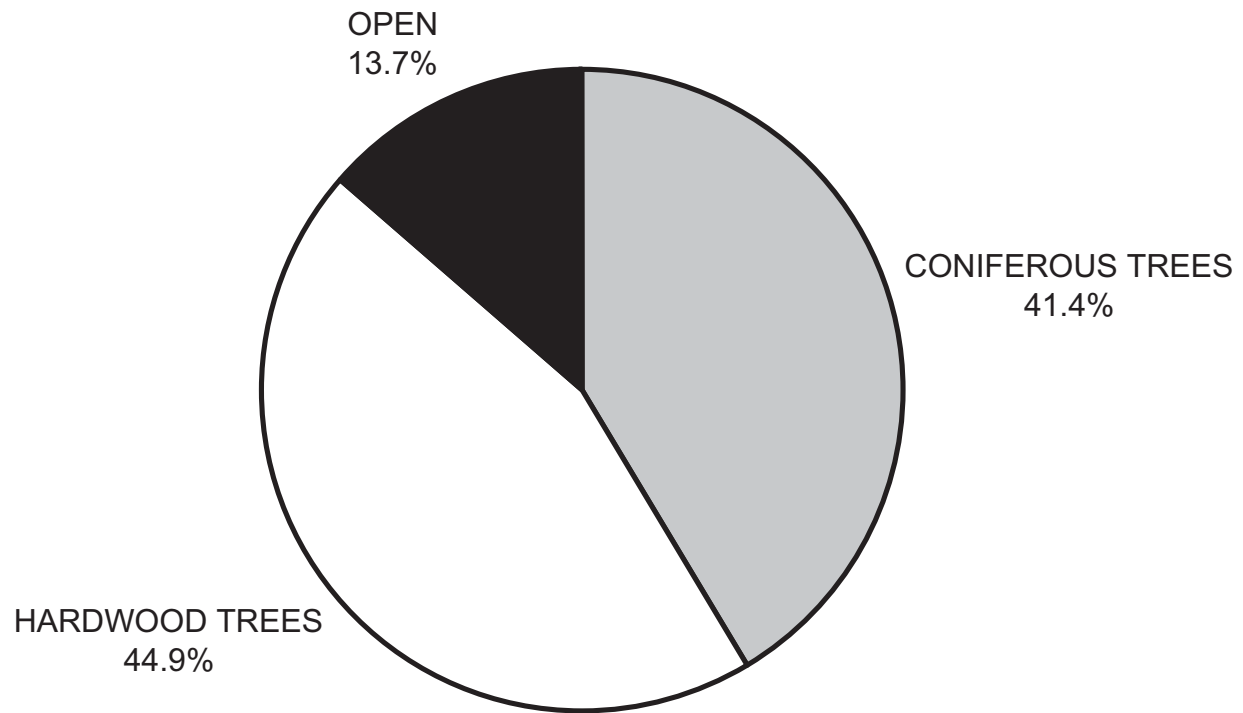
GRAPH 7

PUDDING CREEK 2006 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



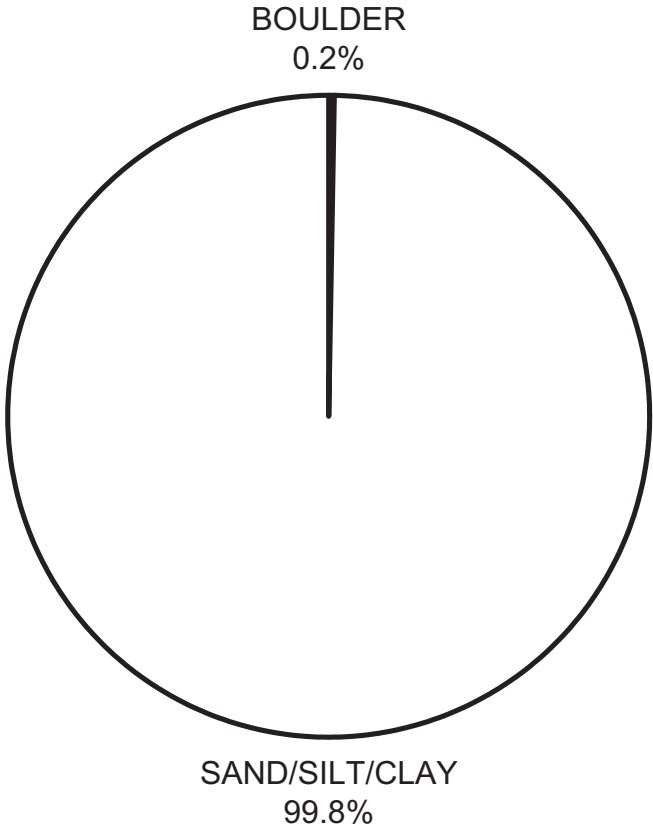
GRAPH 8

PUDDING CREEK 2006 MEAN PERCENT CANOPY



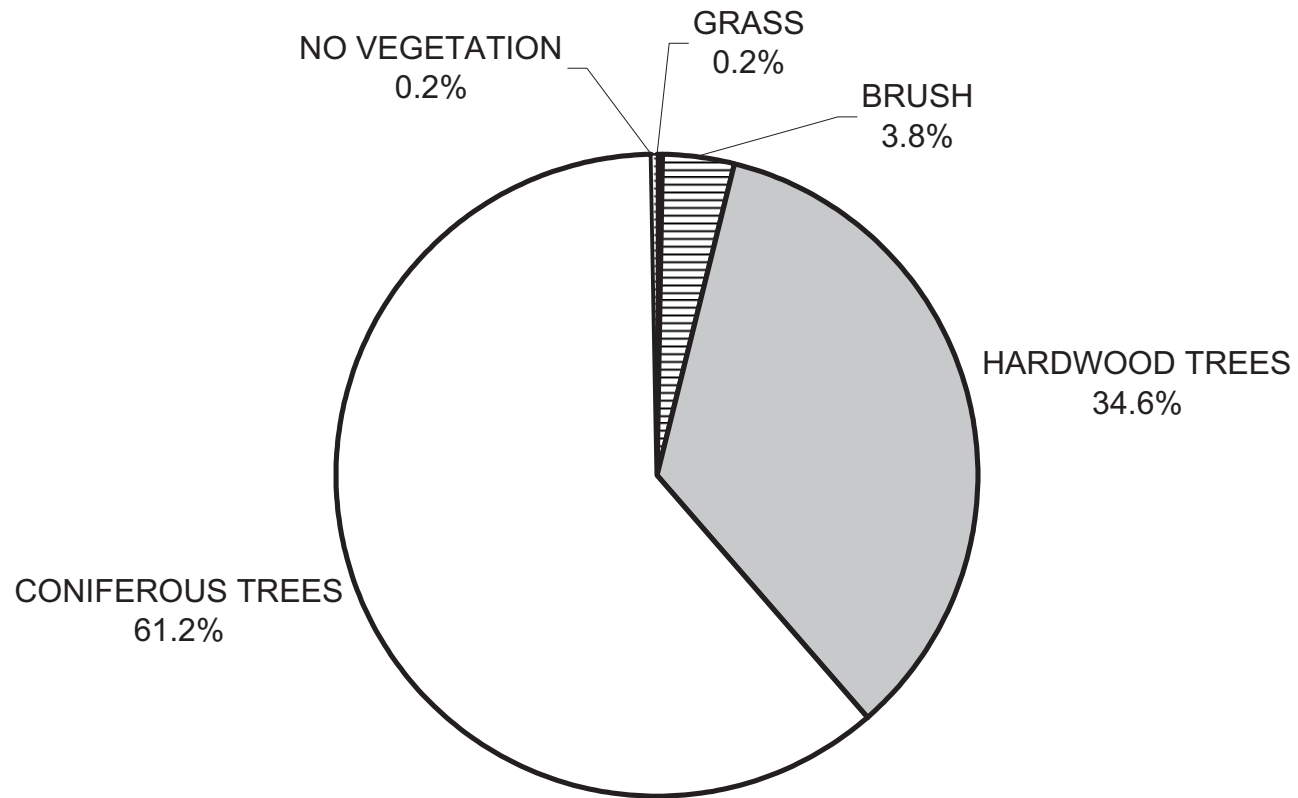
GRAPH 9

**PUDDING CREEK 2006
DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10

**PUDDING CREEK 2006
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11

