

STREAM INVENTORY REPORT

Brandon Gulch

INTRODUCTION

A stream inventory was conducted from June 22 to July 19, 2010 on Brandon Gulch. The survey began at the confluence with the North Fork of the South Fork Noyo River and extended upstream 1.9 miles.

The Brandon Gulch inventory was conducted in two parts: habitat inventory and biological inventory. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Brandon Gulch. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species.

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

Brandon Gulch is a tributary to the North Fork of the South Fork Noyo River, a tributary to the South Fork Noyo River, a tributary to the Noyo River, which drains to the Pacific Ocean. It is located in Mendocino County, California (Map 1). Brandon Gulch's legal description at the confluence with the North Fork of the South Fork Noyo River is T18N R16W S19. Its location is 39.4045 degrees north latitude and 123.6824 degrees west longitude, LLID number 1236813394045. Brandon Gulch is an intermittent stream according to the USGS Noyo Hill 7.5 minute quadrangle. Brandon Gulch drains a watershed of approximately 1.4 square miles. Elevations range from about 140 feet at the mouth of the creek to 800 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is in the Jackson Demonstration State Forest and is managed by the California Department of Forestry and Fire Protection for timber production. Vehicle access exists via California Division of Forestry and Fire Protection Road 300 to Road 360.

METHODS

The habitat inventory conducted in Brandon Gulch follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The Watershed Stewards Project/AmeriCorps (WSP) Members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and 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

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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 Brandon Gulch 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". Brandon Gulch 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.

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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 Brandon Gulch, 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 not suitable 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 Brandon Gulch, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:

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

8. Canopy:

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

BIOLOGICAL INVENTORY

Biological sampling during the stream inventory is used to determine fish species and their distribution in the stream. Fish presence was observed from the stream banks in Brandon Gulch. In addition, underwater observations were made at 11 sites using techniques discussed in the *California Salmonid Stream Habitat Restoration Manual*.

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

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Graphics are produced from the tables using Microsoft Excel. Graphics developed for Brandon Gulch include:

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

HABITAT INVENTORY RESULTS

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

The habitat inventory of June 22 to July 19, 2010, was conducted by A. Glasgow, B. Williams and P. Scott (WSP), and I. Mikus (DFG). The total length of the stream surveyed was 10,285 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.23 cfs on June 28, 2010.

Brandon Gulch is a G4 channel type for 10,285 feet of the stream surveyed. G4 channels are entrenched “gully” step-pool channels on moderate gradients with low width /depth ratios and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 51 to 56 degrees Fahrenheit. Air temperatures ranged from 53 to 69 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 33% riffle units, 31% pool units, 30% flatwater units, 5% dry units, and 2% no survey units (Graph 1). Based on total length of Level II habitat types there were 45% flatwater units, 26% riffle units, 22% pool units, 5% dry units, and 2% no survey units (Graph 2).

Eleven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 28%; low gradient riffle units, 27%; and run units, 16% (Graph 3). Based on percent total length, step run units made up 27%, low gradient riffle units 22%, and mid-channel pool units 20%

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A total of 96 pools were identified (Table 3). Main channel pools were the most frequently encountered at 91% (Graph 4), and comprised 92% 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. Twenty-two of 94 pools (23%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 95 pool tail-outs measured, 43 had a value of 1 (45.3%); 27 had a value of 2 (28.4%); 11 had a value of 3 (11.6%); 8 had a value of 4 (8.4%); 6 had a value of 5 (6.3%) (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 not suitable 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 6, and pool habitats had a mean shelter rating of 24 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 25. Scour pools had a mean shelter rating of 18 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in Brandon Gulch. Graph 7 describes the pool cover in Brandon Gulch. Large woody debris is the dominant pool cover type followed by small woody debris.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 70% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 17% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Brandon Gulch was 93%. Seven percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 30% and 70%, respectively. Graph 9 describes the mean percent canopy in Brandon Gulch.

For the stream reach surveyed, the mean percent right bank vegetated was 97%. The mean percent left bank vegetated was 98%. The dominant elements composing the structure of the stream banks consisted of 83% sand/silt/clay, 9% cobble/gravel, 4% bedrock, and 4% boulder (Graph 10). Coniferous trees were the dominant vegetation type observed in 60% of the units surveyed. Additionally, 30% of the units surveyed had deciduous trees as the dominant vegetation type, and 9% had brush as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a snorkel survey at 11 sites for species composition and distribution in Brandon Gulch on July 26, 2010. The water temperature taken during the survey period of 1205

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hours to 1340 hours was 55 degrees Fahrenheit. Air temperatures ranged from 62 to 69 degrees Fahrenheit. The sites were sampled by I. Mikus (DFG), and M. Groff (WSP).

The sample sites yielded four young-of-the-year steelhead/rainbow trout (SH/RT) and two age 1+ SH/RT.

The following chart displays the information yielded from these sites:

2010 Brandon Gulch underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
G4 Channel Type									
07/26/10	1	002	Pool	30	0	1	0	0	0
	2	004	Pool	48	0	0	0	0	0
	3	006	Pool	73	0	0	0	0	0
	4	008	Pool	101	0	1	0	0	0
	5	019	Pool	513	0	0	0	0	0
	6	028	Pool	814	0	0	0	0	0
	7	044	Pool	1302	2	0	0	0	0
	8	060	Pool	1958	1	0	0	0	0
	9	065	Pool	2125	1	0	0	0	0
	10	070	Pool	2291	0	0	0	0	0
	11	112	Pool	3866	0	0	0	0	0

DISCUSSION

Brandon Gulch is a G4 channel type for the entire 10,285 feet of the stream surveyed. The suitability of G4 channel types for fish habitat improvement structures is as follows: G4 channel types are good for bank-placed boulders and fair for plunge weirs, opposing wing-deflectors, and log cover.

The water temperatures recorded on the survey days June 22 to July 19, 2010, ranged from 51 to 56 degrees Fahrenheit. Air temperatures ranged from 53 to 69 degrees Fahrenheit. This is a suitable water temperature range for salmonids. To make any further conclusions, temperatures need to be monitored throughout the warm summer months, and more extensive biological sampling needs to be conducted.

Flatwater habitat types comprised 45% of the total length of this survey, riffles 26%, and pools 22%. Twenty-two of 94 (23%) pools had a maximum residual depth greater than 2 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40%

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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.

Seventy of the 95 pool tail-outs measured had embeddedness ratings of 1 or 2. Nineteen of the pool tail-outs had embeddedness ratings of 3 or 4. Six 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 Brandon Gulch should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Eighty-two of the 94 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 is 24. The shelter rating in the flatwater habitats is 6. 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 Brandon Gulch. Large woody debris is the dominant cover type in pools followed by small woody debris. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

The mean percent canopy density for the stream was 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 97% and 98%, 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) Brandon Gulch 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) 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.

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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.

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 the North Fork of the South Fork Noyo River. The channel is a G4 for the entire length of the survey, 10,285.
80	0008.00	There is a 2' high plunge with a bedrock sheet above it.
162	0012.00	A gravel trail crosses the channel.
2722	0084.00	Tributary #01 enters on the left bank. It contributes approximately 1% of Brandon Gulch's flow. The water temperature downstream and upstream of the tributary is 53 degrees Fahrenheit; the water temperature of the tributary is 52 degrees Fahrenheit. The slope of the tributary is approximately 1%. The tributary is mostly dry; only a few stagnant pools remain. No fish were observed in the tributary.
4337	0121.00	Log debris accumulation (LDA) #01 contains three pieces of large woody debris (LWD) and measures 5' high x 12' wide x 5' long. Water flows through the LDA and there are no visible gaps in it. Retained sediment ranges from sand to gravel and measures 6' wide x 10' long x 2.5' deep. It is a possible barrier to juvenile and adult salmonids.
5165	0143.00	There is a 4' high jump over a small woody debris accumulation.
5453	0152.00	Dry tributary on the right bank.
5835	0166.00	LDA #02 contains one piece of LWD and measures 5' high x 10' wide x 7' long. Water flows through the LDA and there are no visible gaps in it. Retained sediment ranges from silt to gravel and measures 8' wide x 9' long x 1' deep. It is a possible barrier to juvenile and adult salmonids.
7618	0221.00	Dry tributary on the right bank.

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7801	0225.00	LDA #03 contains 13 pieces of LWD and measures 7' high x 9' wide x 15' long. Water flows through the LDA and there are no visible gaps in it. Retained sediment ranges from silt to cobble and measures 4' wide x 5' long x 2' deep. It is a possible barrier to juvenile and adult salmonids.
7816	0226.00	There is a 3.5' high plunge into a 1.9' deep pool.
8465	0247.00	There is a 4' high plunge.
8847	0260.00	There is a 6' high plunge.
9371	0282.00	There is a 5' high plunge over LWD.
9824	0299.00	There is a 5' high plunge.
9920	0302.00	There is a 4' high plunge.
10144	0310.00	End of survey due to probable end of anadromy. The barrier is an 8' high plunge into 3" of water.

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: Brandon Gulch

LLID: 1236813394045 Drainage: Noyo River

Survey Dates: 6/22/2010 to 7/19/2010

Confluence Location: Quad: NOYO HILL

Legal Description: T18NR16WS19

Latitude: 39:24:16.0N

Longitude: 123:40:53.0W

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
14	0	DRY	4.5	36	503	4.9									
93	10	FLATWATER	30.0	50	4676	45.5	4.9	0.4	0.8	357	33176	142	13162		7
6	0	NOSURVEY	1.9	28	167	1.6									
96	95	POOL	31.0	24	2287	22.2	7.5	0.8	1.6	176	16855	173	16403	144	24
101	16	RIFFLE	32.6	26	2652	25.8	4.0	0.2	0.5	82	8310	16	1590		0
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
310	121				10285					58341			31155		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Brandon Gulch

LLID: 1236813394045

Drainage: Noyo River

Survey Dates: 6/22/2010 to 7/19/2010

Confluence Location: Quad: NOYO HILL

Legal Description: T18NR16WS19

Latitude: 39:24:16.0N

Longitude: 123:40:53.0W

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 (%)
85	12	LGR	27.4	27	2287	22.2	4	0.2	2	94	8002	17	1461		0	94
11	2	HGR	3.5	28	310	3.0	7	0.3	0.5	75	829	18	197		0	92
5	2	BRS	1.6	11	55	0.5	2	0.3	0.4	18	90	5	24		0	100
51	5	RUN	16.5	37	1871	18.2	4	0.4	1.4	200	10189	84	4263		12	90
42	5	SRN	13.5	67	2805	27.3	5	0.4	1	514	21575	199	8378		1	94
86	85	MCP	27.7	24	2084	20.3	8	0.7	3.7	177	15196	167	14403	139	25	93
1	1	STP	0.3	31	31	0.3	7	1.0	1.9	217	217	239	239	217	20	89
1	1	CRP	0.3	10	10	0.1	4	0.4	1	40	40	20	20	16	0	88
2	2	LSL	0.6	28	55	0.5	7	0.6	1.8	242	484	192	384	145	48	99
6	6	PLP	1.9	18	107	1.0	8	1.4	3.2	153	919	271	1354	246	12	92
14	0	DRY	4.5	36	503	4.9										92
6	0	NS	1.9	28	167	1.6										

Total Units
310

Total Units Fully Measured
121

Total Length (ft.)
10285

Total Area (sq.ft.)
57541

Total Volume (cu.ft.)
30723

Table 3 - Summary of Pool Types

Stream Name: Brandon Gulch

LLID: 1236813394045

Drainage: Noyo River

Survey Dates: 6/22/2010 to 7/19/2010

Confluence Location: Quad: NOYO HILL

Legal Description: T18NR16WS19

Latitude: 39:24:16.0N

Longitude: 123:40:53.0W

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
87	86	MAIN	91	24	2115	92	7.5	0.7	177	15414	140	12175	25
9	9	SCOUR	9	19	172	8	7.7	1.1	160	1443	192	1535	18

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
96	95	2287	16857	13711

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

Stream Name: Brandon Gulch

LLID: 1236813394045

Drainage: Noyo River

Survey Dates: 6/22/2010 to 7/19/2010

Confluence Location: Quad: NOYO HILL

Legal Description: T18NR16WS19

Latitude: 39:24:16.0N

Longitude: 123:40:53.0W

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
85	MCP	90	3	4	64	75	15	18	3	4	0	0
1	STP	1	0	0	1	100	0	0	0	0	0	0
1	CRP	1	0	0	1	100	0	0	0	0	0	0
2	LSL	2	0	0	2	100	0	0	0	0	0	0
5	PLP	5	0	0	1	20	2	40	2	40	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
94	3	3	69	73	17	18	5	5	0	0

Mean Maximum Residual Pool Depth (ft.): 1.6

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Brandon Gulch

LLID: 1236813394045

Drainage: Noyo River

Survey Dates: 6/22/2010 to 7/19/2010

Dry Units: 14

Confluence Location: Quad: NOYO HILL

Legal Description: T18NR16WS19

Latitude: 39:24:16.0N

Longitude: 123:40:53.0W

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
85	12	LGR	0	0	0	0	0	0	0	0	0
11	2	HGR	0	0	0	0	0	0	0	0	0
5	2	BRS	0	0	0	0	0	0	0	0	0
101	16	TOTAL RIFFLE	0	0	0	0	0	0	0	0	0
51	5	RUN	0	50	50	0	0	0	0	0	0
42	5	SRN	0	20	0	0	5	0	0	75	0
93	10	TOTAL FLAT	0	35	25	0	3	0	0	38	0
86	86	MCP	13	26	33	7	3	0	7	10	1
1	1	STP	0	0	50	50	0	0	0	0	0
1	1	CRP	0	0	0	0	0	0	0	0	0
2	2	LSL	0	30	70	0	0	0	0	0	0
6	6	PLP	7	7	0	0	1	0	85	0	0
96	96	TOTAL POOL	12	24	32	7	3	0	13	8	1
6	0	NS									
310	122	TOTAL	11	25	31	7	2	0	13	9	1

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Brandon Gulch

LLID: 1236813394045

Drainage: Noyo River

Survey Dates: 6/22/2010 to 7/19/2010

Dry Units: 14

Confluence Location: Quad: NOYO HILL

Legal Description: T18NR16WS19

Latitude: 39:24:16.0N

Longitude: 123:40:53.0W

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
85	12	LGR	0	0	92	8	0	0	0
11	2	HGR	0	0	50	50	0	0	0
5	2	BRS	0	0	0	0	0	0	100
51	5	RUN	0	0	100	0	0	0	0
42	5	SRN	0	0	80	0	20	0	0
86	86	MCP	5	8	76	7	0	1	3
1	1	STP	0	0	100	0	0	0	0
1	1	CRP	0	100	0	0	0	0	0
2	2	LSL	0	0	100	0	0	0	0
6	6	PLP	17	0	67	17	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Brandon Gulch

LLID: 1236813394045

Drainage: Noyo River

Survey Dates: 6/22/2010 to 7/19/2010

Confluence Location: Quad: NOYO HILL

Legal Description: T18NR16WS19

Latitude: 39:24:16.0N

Longitude: 123:40:53.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
93	70	30	0	97	98

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: Brandon Gulch

LLID: 1236813394045

Drainage: Noyo River

Survey Dates: 6/22/2010 to 7/19/2010

Confluence Location: Quad: NOYO HILL

Legal Description: T18NR16WS19

Latitude: 39:24:16.0N

Longitude: 123:40:53.0W

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	6	4	4.1
Boulder	5	5	4.1
Cobble / Gravel	14	8	9.0
Sand / Silt / Clay	97	105	82.8

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	0.4
Brush	9	14	9.4
Hardwood Trees	33	40	29.9
Coniferous Trees	80	67	60.2
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 2

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

StreamName: Brandon Gulch

LLID: 1236813394045

Drainage: Noyo River

Survey Dates: 6/22/2010 to 7/19/2010

Confluence Location: Quad: NOYO HILL

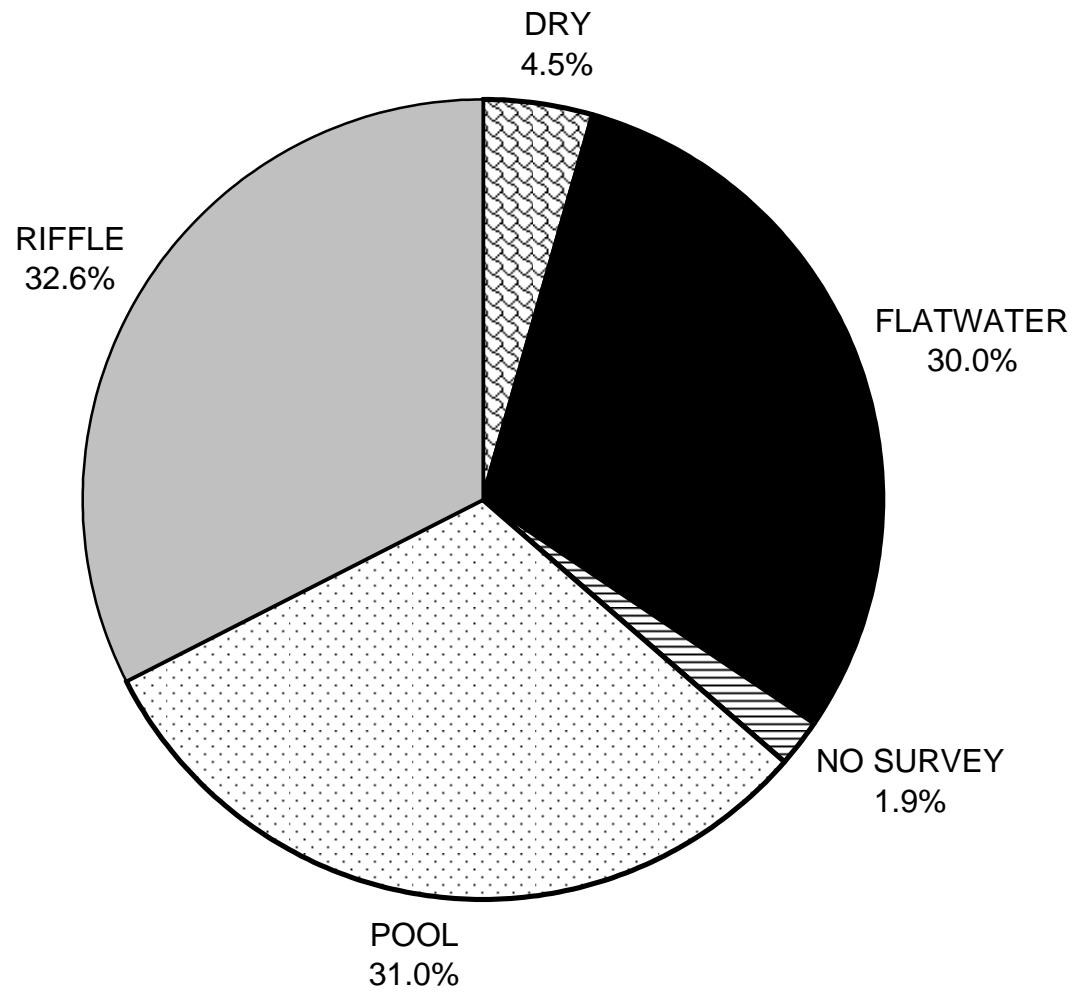
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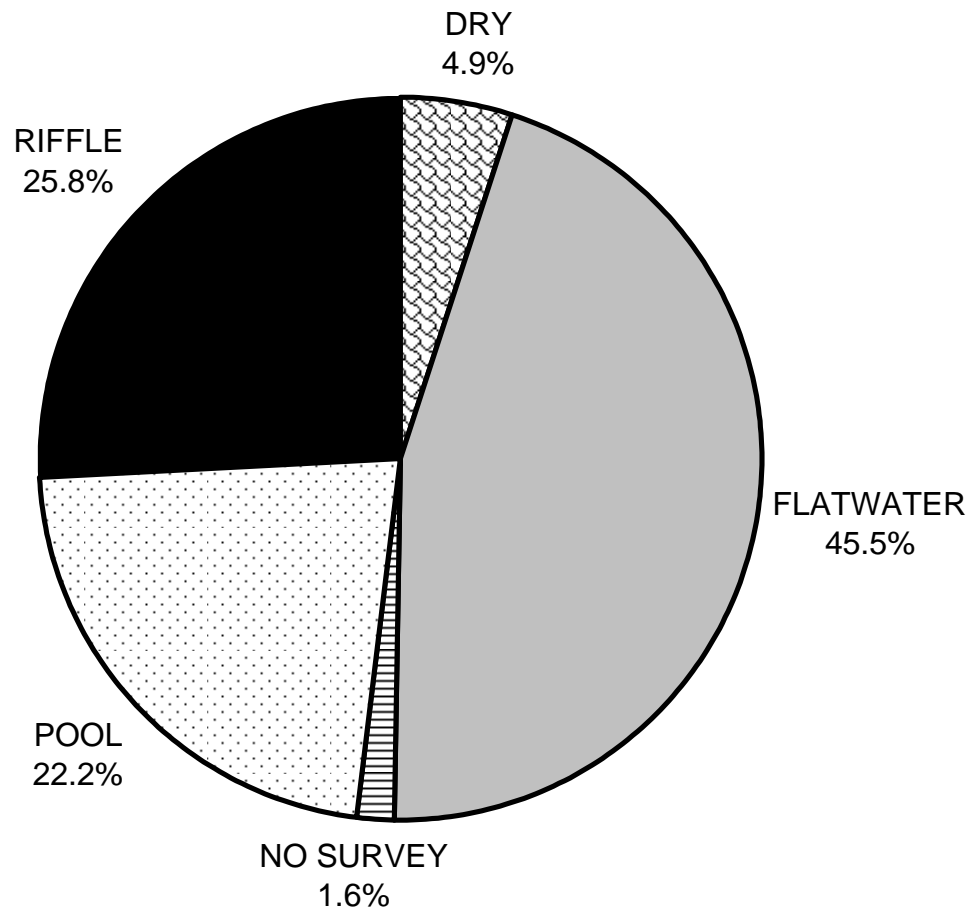
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	0	12
SMALL WOODY DEBRIS (%)	0	35	24
LARGE WOODY DEBRIS (%)	0	25	32
ROOT MASS (%)	0	0	7
TERRESTRIAL VEGETATION (%)	0	3	3
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	13
BOULDERS (%)	0	38	8
BEDROCK LEDGES (%)	0	0	1

BRANDON GULCH 2010 HABITAT TYPES BY PERCENT OCCURRENCE



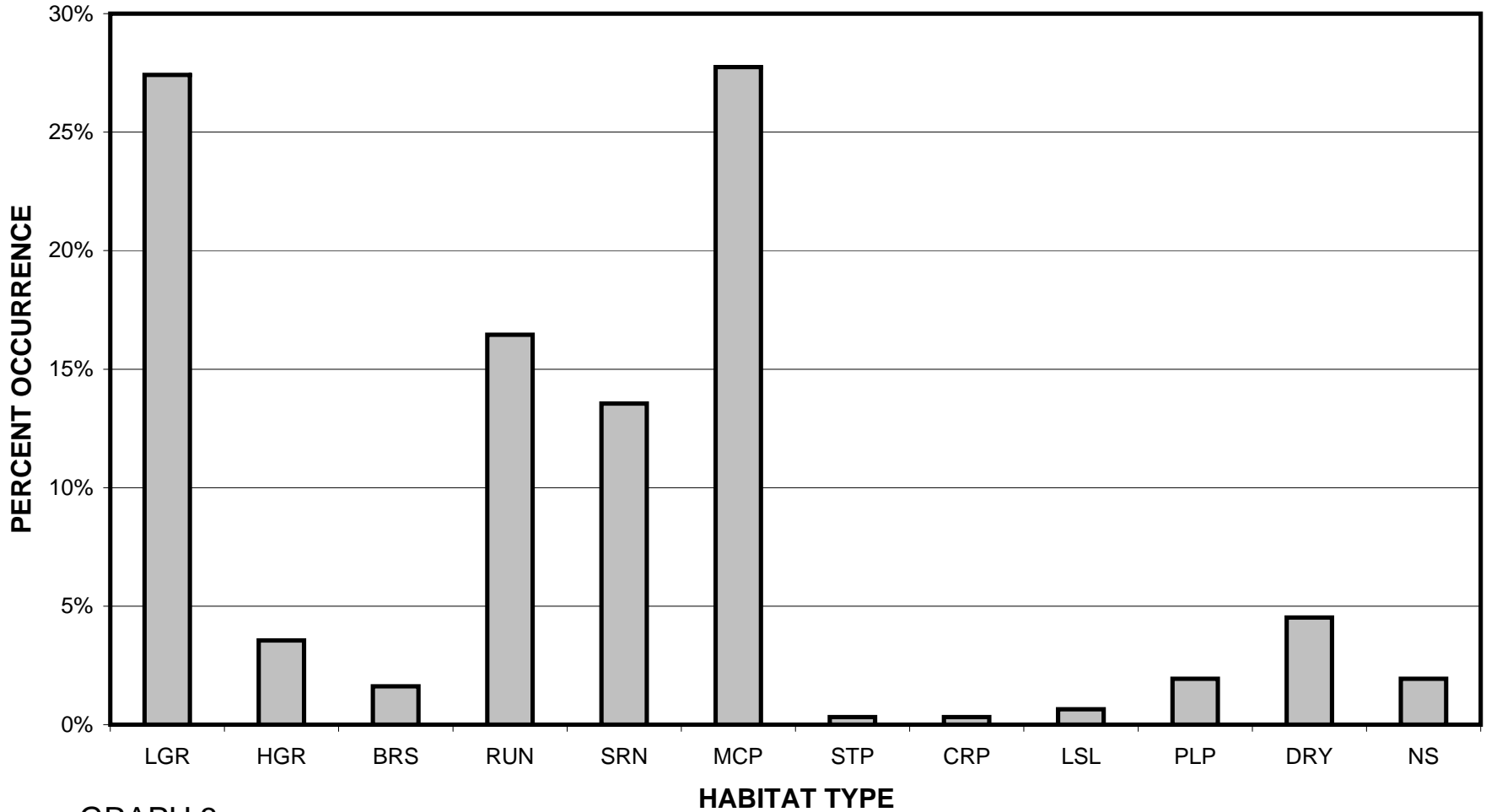
GRAPH 1

BRANDON GULCH 2010 HABITAT TYPES BY PERCENT TOTAL LENGTH



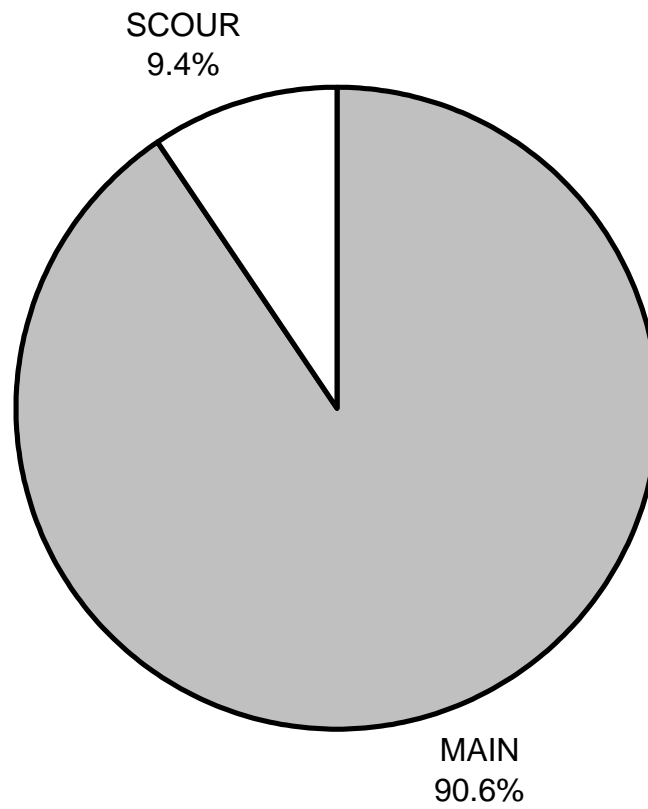
GRAPH 2

BRANDON GULCH 2010 HABITAT TYPES BY PERCENT OCCURRENCE



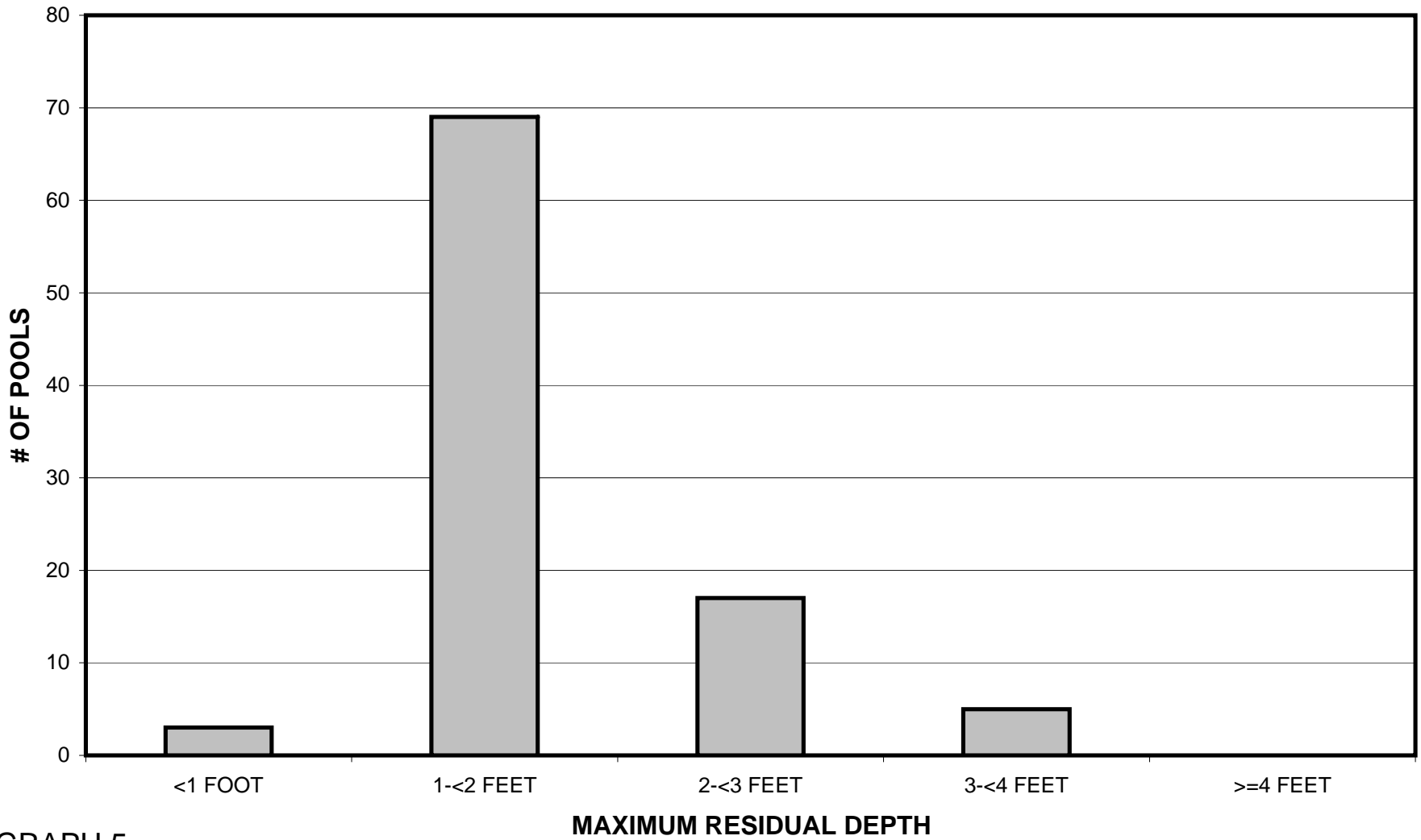
GRAPH 3

**BRANDON GULCH 2010
POOL TYPES BY PERCENT OCCURRENCE**



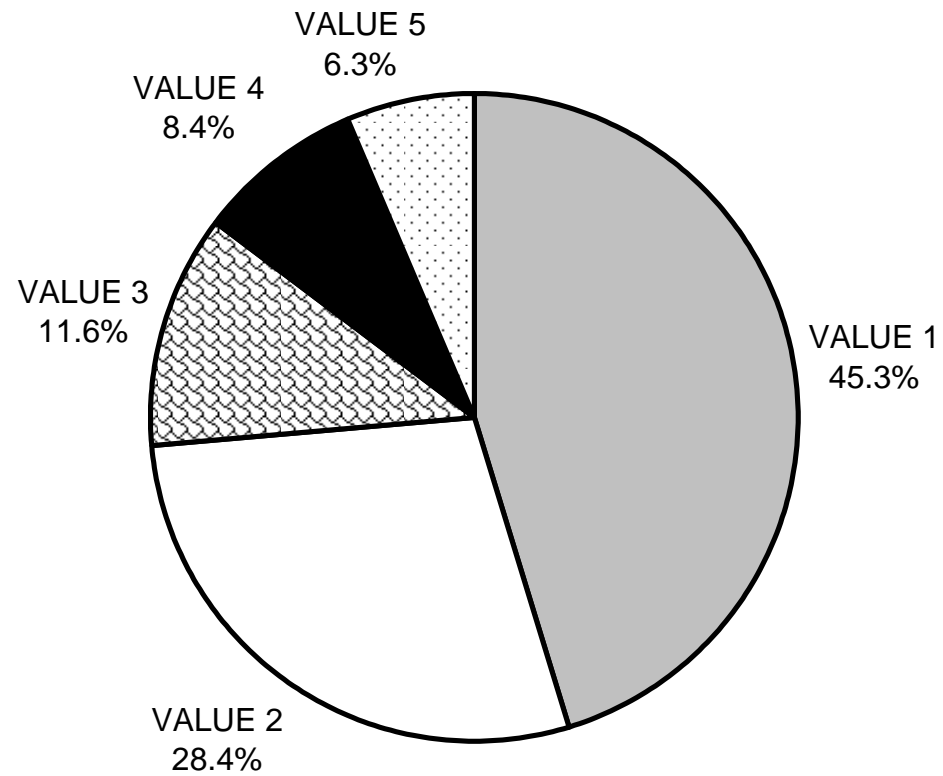
GRAPH 4

BRANDON GULCH 2010 MAXIMUM DEPTH IN POOLS



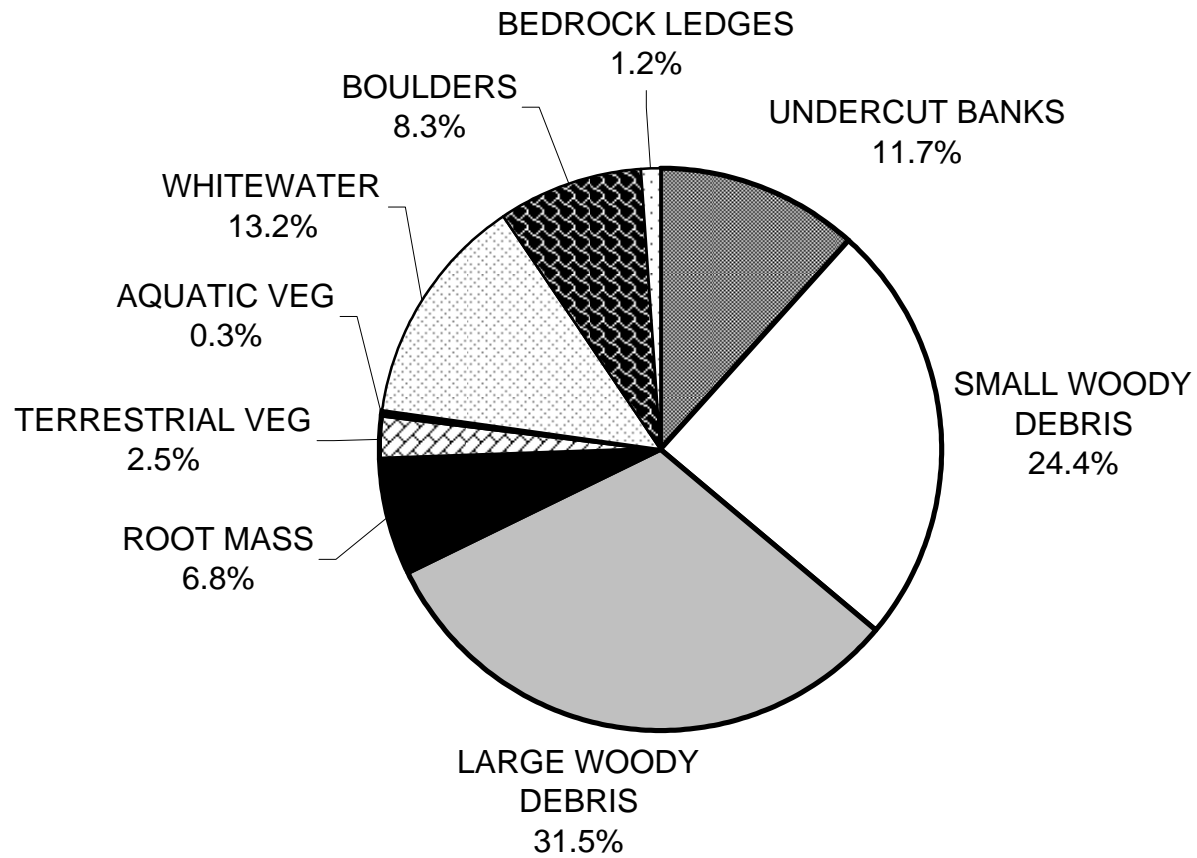
GRAPH 5

BRANDON GULCH 2010 PERCENT EMBEDDEDNESS



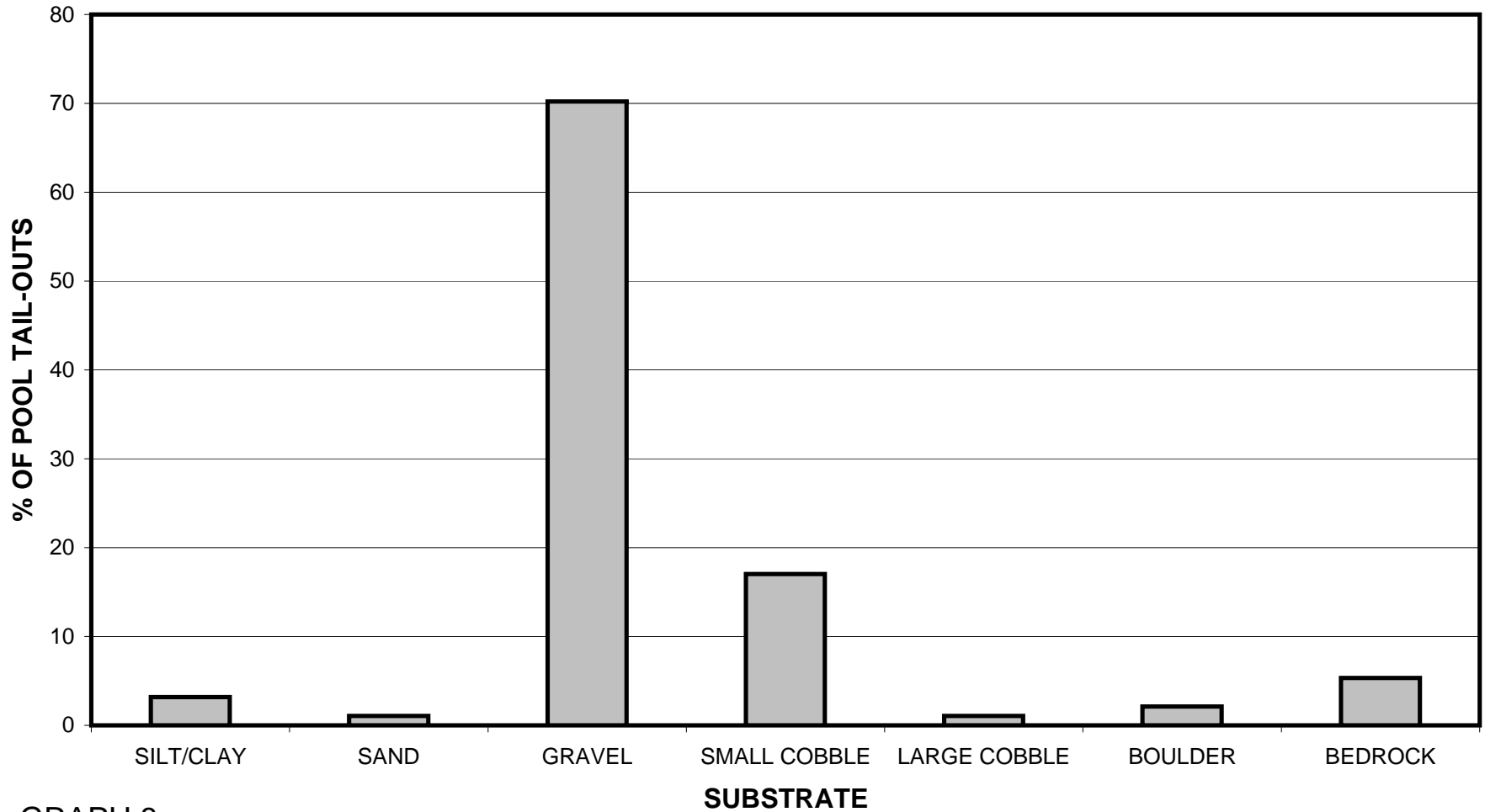
GRAPH 6

BRANDON GULCH 2010 MEAN PERCENT COVER TYPES IN POOLS



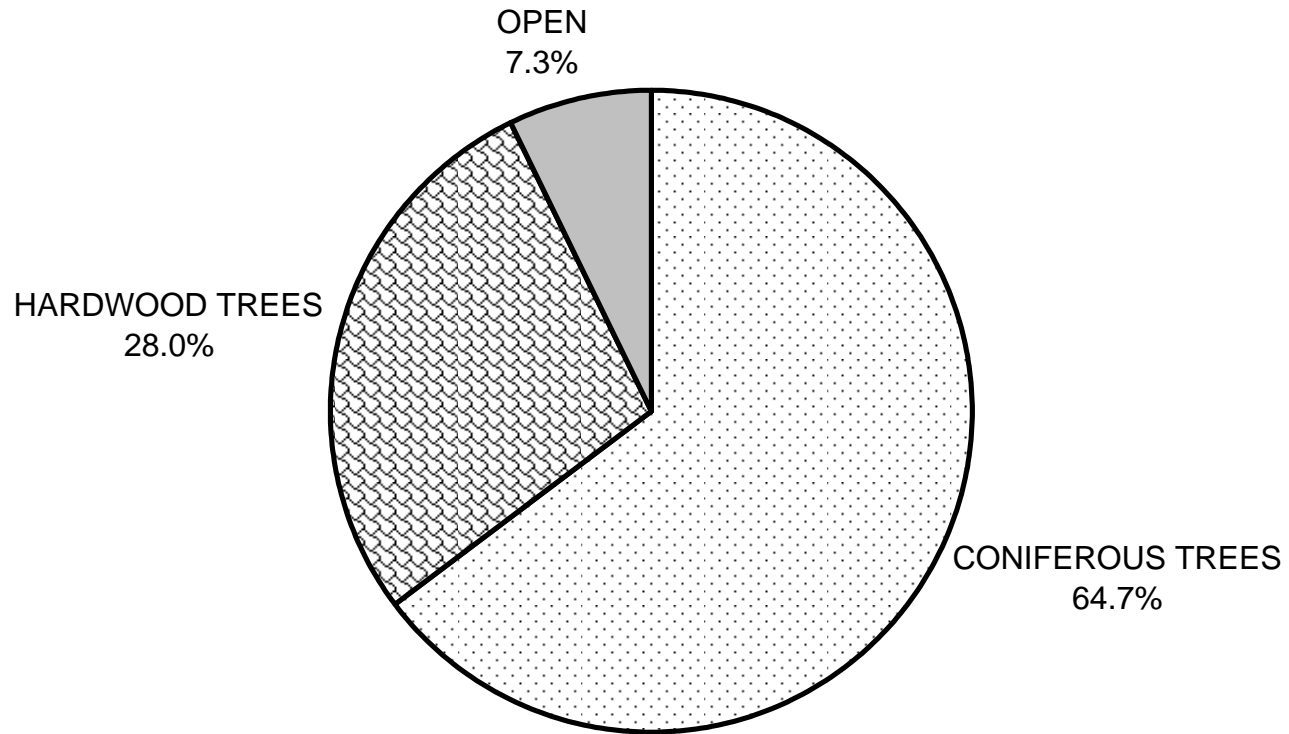
GRAPH 7

BRANDON GULCH 2010 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



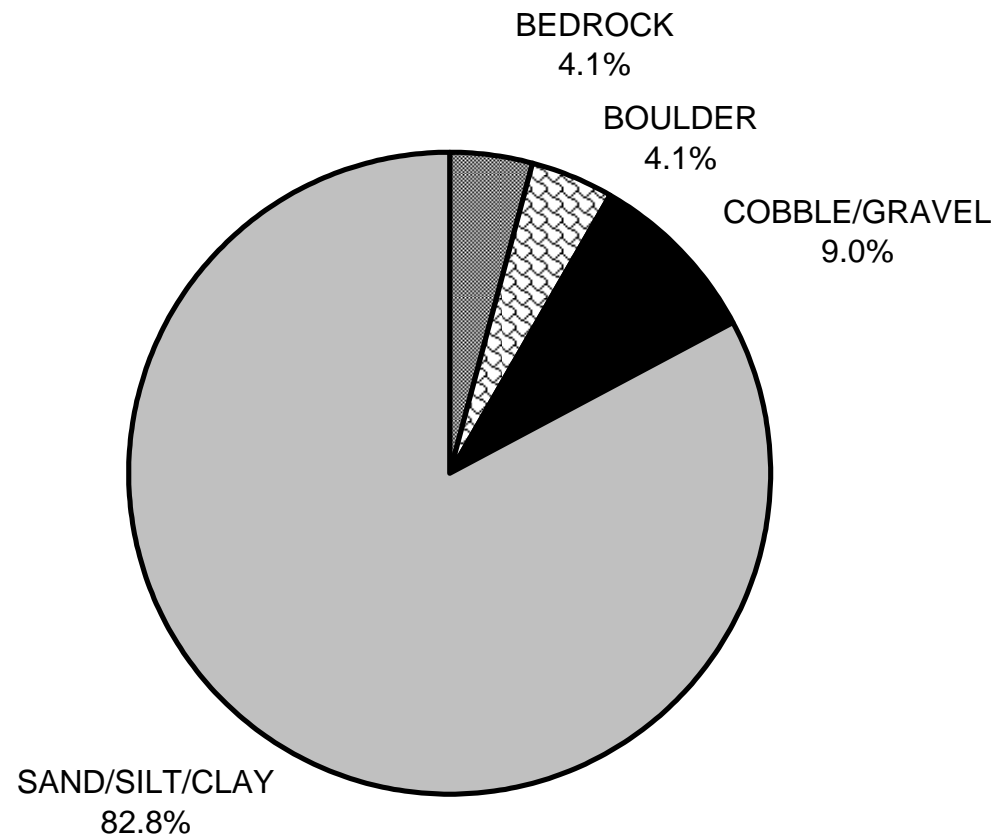
GRAPH 8

BRANDON GULCH 2010 MEAN PERCENT CANOPY



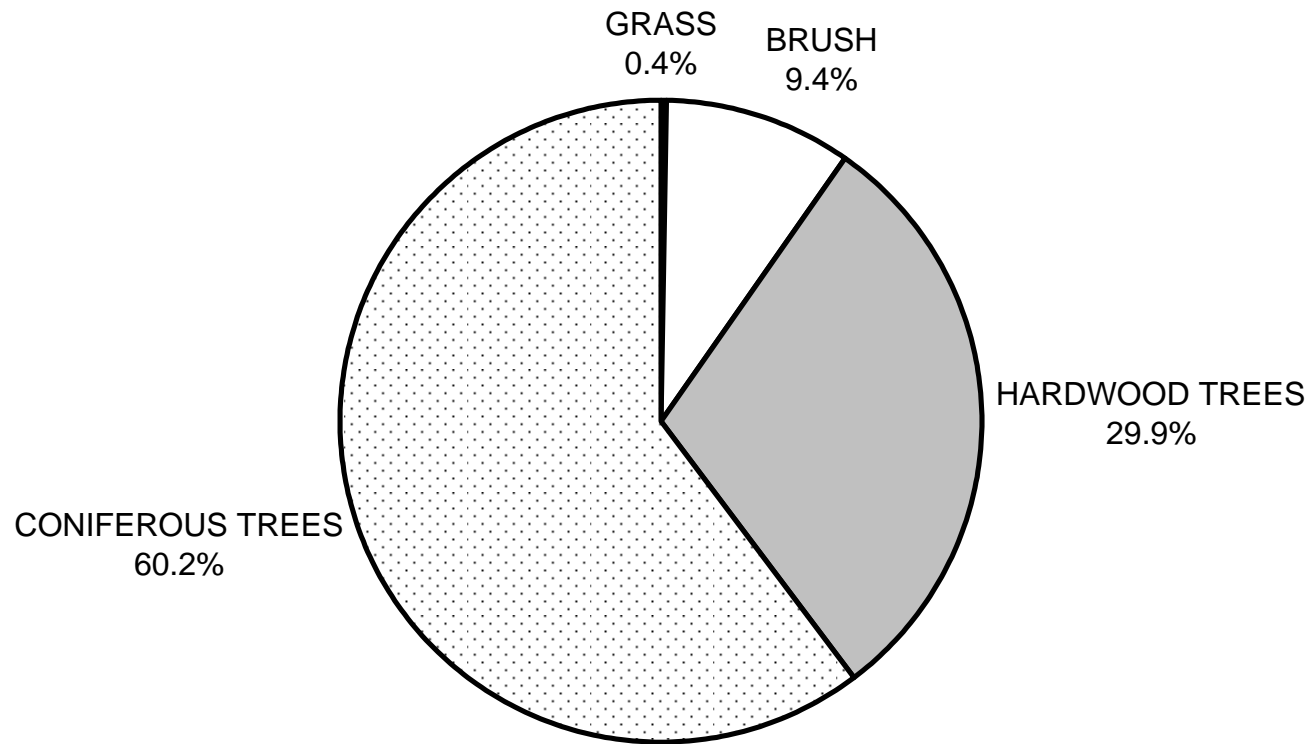
GRAPH 9

**BRANDON GULCH 2010
DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10

**BRANDON GULCH 2010
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11

