STREAM INVENTORY REPORT

Unnamed Tributary to Johnson Creek

INTRODUCTION

A stream inventory was conducted on June 5, 2012 on an unnamed tributary to Johnson Creek. The survey began at the confluence with Johnson Creek and extended upstream 0.3 miles.

The unnamed tributary 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 the unnamed tributary. 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

The unnamed tributary is a tributary to Johnson Creek, tributary to John Smith Creek, tributary to North Branch North Fork Navarro River, tributary to North Fork Navarro River, tributary to the Navarro River, which drains to the Pacific Ocean. It is located in Mendocino County, California (Map 1). The unnamed tributary's legal description at the confluence with Johnson Creek is T16N R15W S21. Its location is 39.2348 degrees north latitude and 123.5363 degrees west longitude, LLID number 1235351392347. The unnamed tributary is a first order stream and has approximately 0.6 miles of blue line stream according to the USGS Navarro 7.5 minute quadrangle. The unnamed tributary drains a watershed of approximately 1.1 square miles. Elevations range from about 425 feet at the mouth of the creek to 700 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production, rangeland, and rural development. Vehicle access exists via a logging road off of Masonite Industrial Road.

METHODS

The habitat inventory conducted in the unnamed tributary follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The California Department of Fish and Wildlife (DFW) personnel that conducted the inventory were trained in standardized habitat inventory methods by the DFW. This inventory was conducted by a two-person team.

SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach. All habitat units included in the survey are classified according to habitat type and

their lengths are measured. All pool units are measured for maximum depth, depth of pool tail crest (measured in the thalweg), dominant substrate composing the pool tail crest, and embeddedness. Habitat unit types encountered for the first time are measured for all the parameters and characteristics on the field form. Additionally, from the ten habitat units on each field form page, one is randomly selected for complete measurement.

HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the *California Salmonid Stream Habitat Restoration Manual*. This form was used in the unnamed tributary to record measurements and observations. There are eleven components to the inventory form.

1. Flow:

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

2. Channel Type:

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

3. Temperatures:

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

4. Habitat Type:

Habitat typing uses the 24 habitat classification types defined by McCain and others (1990). Habitat units are numbered sequentially and assigned a type identification number selected from a standard list of 24 habitat types. Dewatered units are labeled "dry". The unnamed tributary habitat typing used standard basin level measurement criteria. These parameters require that the minimum length of a described habitat unit must be equal to or greater than the stream's mean wetted width. All measurements are in feet to the nearest tenth. Habitat characteristics are measured using a clinometer, hip chain, and stadia rod.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In the unnamed tributary, 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 the unnamed tributary, 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 the unnamed tributary, an estimate of the percentage of the habitat unit covered by canopy was made from the center of approximately every third unit in addition to every fully-described unit, giving an approximate 30% sub-sample. In addition, the area of canopy was estimated ocularly into percentages of coniferous or hardwood trees.

9. Bank Composition and Vegetation:

Bank composition elements range from bedrock to bare soil. However, the stream banks are usually covered with grass, brush, or trees. These factors influence the ability of stream banks to withstand winter flows. In the unnamed tributary, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully-described unit were selected from the habitat inventory form. Additionally, the percent of each bank covered by vegetation (including downed trees, logs, and rootwads) was estimated and recorded.

10. Large Woody Debris Count:

Large woody debris (LWD) is an important component of fish habitat and an element in channel forming processes. In each habitat unit all pieces of LWD partially or entirely below the elevation of bankfull discharge are counted and recorded. The minimum size to be considered is twelve inches in diameter and six feet in length. The LWD count is presented by reach and is expressed as an average per 100 feet.

11. Average Bankfull Width:

Bankfull width can vary greatly in the course of a channel type stream reach. This is especially true in very long reaches. Bankfull width can be a factor in habitat components like canopy density, water temperature, and pool depths. Frequent measurements taken at riffle crests (velocity crossovers) are needed to accurately describe reach widths. At the first appropriate velocity crossover that occurs after the beginning of a new stream survey page (ten habitat units), bankfull width is measured and recorded in the appropriate header block of the page. These widths are presented as an average for the channel type reach.

BIOLOGICAL INVENTORY

Biological sampling during the stream inventory is used to determine fish species and their distribution in the stream. Fish presence was observed from the stream banks in the unnamed tributary. In addition, underwater observations were made at five 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 Wildlife. This program processes and summarizes the data, and produces the following ten tables:

- Riffle, Flatwater, and Pool Habitat Types
- Habitat Types and Measured Parameters
- Pool Types
- Maximum Residual Pool Depths by Habitat Types
- Mean Percent Cover by Habitat Type
- Dominant Substrates by Habitat Type
- Mean Percent Vegetative Cover for Entire Stream
- Fish Habitat Inventory Data Summary by Stream Reach (Table 8)
- Mean Percent Dominant Substrate / Dominant Vegetation Type for Entire Stream
- Mean Percent Shelter Cover Types for Entire Stream

Graphics are produced from the tables using Microsoft Excel. Graphics developed for the unnamed tributary 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 5, 2012 was conducted by M. Groff and I. Mikus (DFW). The total length of the stream surveyed was 1,653 feet.

Stream flow was not measured on the unnamed tributary.

The unnamed tributary is a G4 channel type for 1,653 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 52 to 53 degrees Fahrenheit. Air temperatures ranged from 47 to 50 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 52% pool units, 28% flatwater units, 19% riffle units, and 2% culvert units (Graph 1). Based on total length of Level II habitat types there were 49% pool units, 39% flatwater units, 11% riffle units, and 2% culvert 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, 43%; step run units, 17%; run units, 10%; and low gradient riffle units, 10% (Graph 3). Based on percent total length, mid-channel pool units made up 42%, step run units 29%, and run units 9%.

A total of 30 pools were identified (Table 3). Main channel pools were the most frequently encountered at 87% (Graph 4), and comprised 89% of the total length of all pools (Table 3).

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Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Five of the 30 pools (17%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 30 pool tail-outs measured, 12 had a value of 1 (40%); nine had a value of 2 (30%); three had a value of 3 (10%); six had a value of 5 (20%) (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 3, and pool habitats had a mean shelter rating of 9 (Table 1). Of the pool types, the backwater pools had the highest mean shelter rating at 15%. Main channel pools had a mean shelter rating of 9. Scour pools had a mean shelter rating of 7 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Undercut banks are the dominant cover type in the unnamed tributary. Graph 7 describes the pool cover in the unnamed tributary. Undercut banks are 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 63% of the pool tail-outs. Bedrock was the next most frequently observed dominant substrate type and occurred in 23% of the pool tail-outs.

The mean percent canopy density for the surveyed length of the unnamed tributary was 98%. Two 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 the unnamed tributary.

For the stream reach surveyed, the mean percent right bank vegetated was 100%. The mean percent left bank vegetated was 100%. The dominant elements composing the structure of the stream banks consisted of 91% sand/silt/clay, 8% bedrock, and 1% cobble/gravel (Graph 10). Coniferous trees were the dominant vegetation type observed in 42% of the units surveyed. Additionally, 37% of the units surveyed had deciduous trees as the dominant vegetation type, and 22% had brush as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a snorkel survey at five sites for species composition and distribution in the unnamed tributary on June 5, 2012. The sites were sampled by I. Mikus and M. Groff (DFW).

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Five sites were sampled within the first 875 feet of the unnamed tributary to Johnson Creek. No fish were observed.

The following chart displays the information yielded from these sites:

2012 Unnamed Tributary to Johnson Creek 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									
06/05/12	1	007	Pool	148	0	0	0	0	0
	2	012	Pool	260	0	0	0	0	0
	3	019	Pool	504	0	0	0	0	0
	4	030	Pool	825	0	0	0	0	0
	5	031	Pool	875	0	0	0	0	0

DISCUSSION

The unnamed tributary is a G4 channel type for the entire length of the survey, 1,653. 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 5, 2012 ranged from 52 to 53 degrees Fahrenheit. Air temperatures ranged from 47 to 50 degrees Fahrenheit. This is a good water temperature range for salmonids. To make any conclusions, temperatures need to be monitored throughout the warm summer months, and more extensive biological sampling needs to be conducted.

Flatwater habitat types comprised 39% of the total length of this survey, riffles 11%, and pools 49%. Five of the 30 (17%) 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.

Twenty-one of the 30 pool tail-outs measured had embeddedness ratings of 1 or 2. Three 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.

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Nineteen of the 30 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 9. The shelter rating in the flatwater habitats is 3. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by undercut banks in the unnamed tributary. Undercut banks are 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 structures provide rearing fry with protection from predation, rest from water velocity, and also divide territorial units to reduce density related competition.

The mean percent canopy density for the stream was 98%. The percentage of right and left bank covered with vegetation was 100% and 100%, respectively.

RECOMMENDATIONS

1) The unnamed tributary 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) Due to the misaligned and rusting culvert at 148', access for migrating salmonids is an ongoing potential problem. Good water temperature and flow regimes exist in the stream and it offers good conditions for rearing fish. Fish passage should be monitored and improved where possible.

COMMENTS AND LANDMARKS

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

Position (ft):	Habitat unit #:	Comments:
0	0001.00	Start of survey at the confluence with Johnson Creek. The channel is a G4 for the entire length of the survey.
148	0008.00	A private road crosses the channel. The crossing is a 4' high x 4' wide x 30' long corrugated metal culvert. The slope of the culvert is 1.3%; there is no plunge at the outlet. The bottom of the culvert is rusting through; there are some holes in the bottom. The culvert is misaligned. Concrete

		rip-rap was placed on the right bank, at the culvert inlet where bank erosion is occurring due to the misaligned culvert.
787	0029.00	There is a 3' high plunge over root mass and bedrock.
1186	0043.00	There is a 2' high plunge over small woody debris (SWD).
1199	0044.00	Dry right bank tributary.
1239	0045.00	Right bank seep.
1313	0047.00	Log debris accumulation (LDA) #01 contains seven pieces of large woody debris (LWD) and measures 5' high x 12' wide x 11' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from silt to gravel and measures 10' wide x 60' long x 2.5' deep. There is a 3' high plunge over the LDA.
1641	0058.00	End of survey.

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: 1235351392347 LLID: 1235351392347 Drainage: Navarro River

Survey Dates: 6/5/2012 to 6/5/2012

Confluence Location: Quad: NAVARRO Legal Description: T16NR15WS21 Latitude: 39:14:05.0N Longitude: 123:32:06.0

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	CULVERT	1.7	30	30	1.8									
16	4	FLATWATER	27.6	40	638	38.6	5.0	0.5	0.9	272	4357	129	2068		3
30	30	POOL	51.7	27	804	48.6	7.5	0.8	1.6	192	5749	192	5755	163	9
11	3	RIFFLE	19.0	16	181	10.9	5.2	0.1	0.4	61	672	9	97		0

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
58	37	1653	10779	7919

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: 1235351392347 LLID: 1235351392347 Drainage: Navarro River

Survey Dates: 6/5/2012 to 6/5/2012

Confluence Location: Quad: NAVARRO Legal Description: T16NR15WS21 Latitude: 39:14:05.0N Longitude: 123:32:06.0W

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 (%)
6	1	LGR	10.3	19	113	6.8	4	0.1	0.3	33	200	3	20		0	98
4	1	HGR	6.9	13	52	3.1	6	0.1	0.2	68	274	7	27		0	98
1	1	BRS	1.7	16	16	1.0	6	0.2	0.6	82	82	16	16		0	97
6	2	RUN	10.3	26	153	9.3	5	0.4	0.8	139	834	56	334		3	100
10	2	SRN	17.2	48	485	29.3	5	0.5	1.2	406	4057	203	2028		3	98
25	25	MCP	43.1	28	698	42.2	8	0.8	3.2	203	5064	205	5116	176	9	98
1	1	STP	1.7	20	20	1.2	8	0.6	1.3	144	144	115	115	86	0	98
1	1	LSL	1.7	17	17	1.0	7	0.4	0.9	101	101	61	61	40	0	99
1	1	LSBk	1.7	21	21	1.3	6	0.6	0.9	126	126	101	101	76	0	99
1	1	PLP	1.7	30	30	1.8	6	0.8	1.8	195	195	195	195	156	20	99
1	1	DPL	1.7	18	18	1.1	7	1.1	1.7	120	120	168	168	132	15	97
1	0	CUL	1.7	30	30	1.8										

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
58	37	1653	11195	8180

Table 3 - Summary of Pool Types

Stream Name: 1235351392347 LLID: 1235351392347 Drainage: Navarro River

Survey Dates: 6/5/2012 to 6/5/2012

Confluence Location: Quad: NAVARRO Legal Description: T16NR15WS21 Latitude: 39:14:05.0N Longitude: 123:32:06.0W

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
26	26	MAIN	87	28	718	89	7.6	0.8	200	5208	173	4490	9
3	3	SCOUR	10	23	68	8	6.5	0.6	141	422	91	272	7
1	1	BACKWATER	3	18	18	2	7.0	1.1	120	120	132	132	15

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
30	30	804	5749	4893

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

Stream Name: 1235351392347 LLID: 1235351392347 Drainage: Navarro River

Survey Dates: 6/5/2012 to 6/5/2012

Confluence Location: Quad: NAVARRO Legal Description: T16NR15WS21 Latitude: 39:14:05.0N Longitude: 123:32:06.0W

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
25	MCP	83	1	4	19	76	4	16	1	4	0	0
1	STP	3	0	0	1	100	0	0	0	0	0	0
1	LSL	3	1	100	0	0	0	0	0	0	0	0
1	LSBk	3	1	100	0	0	0	0	0	0	0	0
1	PLP	3	0	0	1	100	0	0	0	0	0	0
1	DPL	3	0	0	1	100	0	0	0	0	0	0

Total Units	Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1< 2 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
30	3	10	22	73	4	13	1	3	0	0

Mean Maximum Residual Pool Depth (ft.): 1.6

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: 1235351392347 LLID: 1235351392347 Drainage: Navarro River

Survey Dates: 6/5/2012 to 6/5/2012 Dry Units: 0

Confluence Location: Quad: NAVARRO Legal Description: T16NR15WS21 Latitude: 39:14:05.0N Longitude: 123:32:06.0W

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
6	1	LGR	0	0	0	0	0	0	0	0	0
4	1	HGR	0	0	0	0	0	0	0	0	0
1	1	BRS	0	0	0	0	0	0	0	0	0
11	3	TOTAL RIFFLE	0	0	0	0	0	0	0	0	0
6	2	RUN	0	80	20	0	0	0	0	0	0
10	2	SRN	90	10	0	0	0	0	0	0	0
16	4	TOTAL FLAT	45	45	10	0	0	0	0	0	0
25	25	MCP	73	9	6	7	3	0	0	0	2
1	1	STP	0	0	0	0	0	0	0	0	0
1	1	LSL	0	0	0	0	0	0	0	0	0
1	1	LSBk	0	0	0	0	0	0	0	0	0
1	1	PLP	60	20	20	0	0	0	0	0	0
1	1	DPL	90	10	0	0	0	0	0	0	0
30	30	TOTAL POOL	73	10	6	6	3	0	0	0	2
1	0	CUL									
58	37	TOTAL	70	14	7	5	3	0	0	0	1

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: 1235351392347 LLID: 1235351392347 Drainage: Navarro River

Survey Dates: 6/5/2012 to 6/5/2012 Dry Units: 0

Confluence Location: Quad: NAVARRO Legal Description: T16NR15WS21 Latitude: 39:14:05.0N Longitude: 123:32:06.0W

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
6	1	LGR	0	0	100	0	0	0	0
4	1	HGR	0	0	100	0	0	0	0
1	1	BRS	0	0	0	0	0	0	100
6	2	RUN	0	0	100	0	0	0	0
10	2	SRN	0	0	50	0	0	0	50
25	25	MCP	0	0	72	0	4	0	24
1	1	STP	0	0	100	0	0	0	0
1	1	LSL	0	0	100	0	0	0	0
1	1	LSBk	0	0	100	0	0	0	0
1	1	PLP	0	0	100	0	0	0	0
1	1	DPL	0	0	100	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: 1235351392347 LLID: 1235351392347 Drainage: Navarro River

Survey Dates: 6/5/2012 to 6/5/2012

Confluence Location: Quad: NAVARRO Legal Description: T16NR15WS21 Latitude: 39:14:05.0N Longitude: 123:32:06.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
98	48	52	0	100	100

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: 1235351392347 LLID: 1235351392347 Drainage: Navarro River

Survey Dates: 6/5/2012 to 6/5/2012 Survey Length (ft.): 1653 Main Channel (ft.): 1653 Side Channel (ft.): 0

Confluence Location: Quad: NAVARRO Legal Description: T16NR15WS21 Latitude: 39:14:05.0N Longitude: 123:32:06.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: G4
Reach Length (ft.): 1653
Riffle/Flatwater Mean Width (ft.): 5.1
BFW:
Range (ft.): 7 to 14
Mean (ft.): 10
Std. Dev.: 2
Base Flow (cfs.): 0.0
Water (F): 52 - 53 Air (F): 47 - 50
Dry Channel (ft): 0

Canopy Density (%): 98.3
Coniferous Component (%): 48.1
Hardwood Component (%): 51.9
Dominant Bank Vegetation: Coniferous Trees
Vegetative Cover (%): 99.7
Dominant Shelter: Undercut Banks
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 4
LWD per 100 ft.:
Riffles: 1
Pools: 4
Flat: 2

Pools by Stream Length (%): 48.6
Pool Frequency (%): 51.7
Residual Pool Depth (%):
< 2 Feet Deep: 83
2 to 2.9 Feet Deep: 13
3 to 3.9 Feet Deep: 3
>= 4 Feet Deep: 0
Mean Max Residual Pool Depth (ft.): 1.6
Mean Pool Shelter Rating: 9

Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 63 Sm Cobble: 0 Lg Cobble: 10 Boulder: 3 Bedrock: 23

Embeddedness Values (%): 1. 40.0 2. 30.0 3. 10.0 4. 0.0 5. 20.0

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: 1235351392347 LLID: 1235351392347 Drainage: Navarro River

Survey Dates: 6/5/2012 to 6/5/2012

Confluence Location: Quad: NAVARRO Legal Description: T16NR15WS21 Latitude: 39:14:05.0N Longitude: 123:32:06.0W

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	0	8.1
Boulder	0	0	0.0
Cobble / Gravel	0	1	1.4
Sand / Silt / Clay	31	36	90.5

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	7	9	21.6
Hardwood Trees	12	15	36.5
Coniferous Trees	18	13	41.9
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 2

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

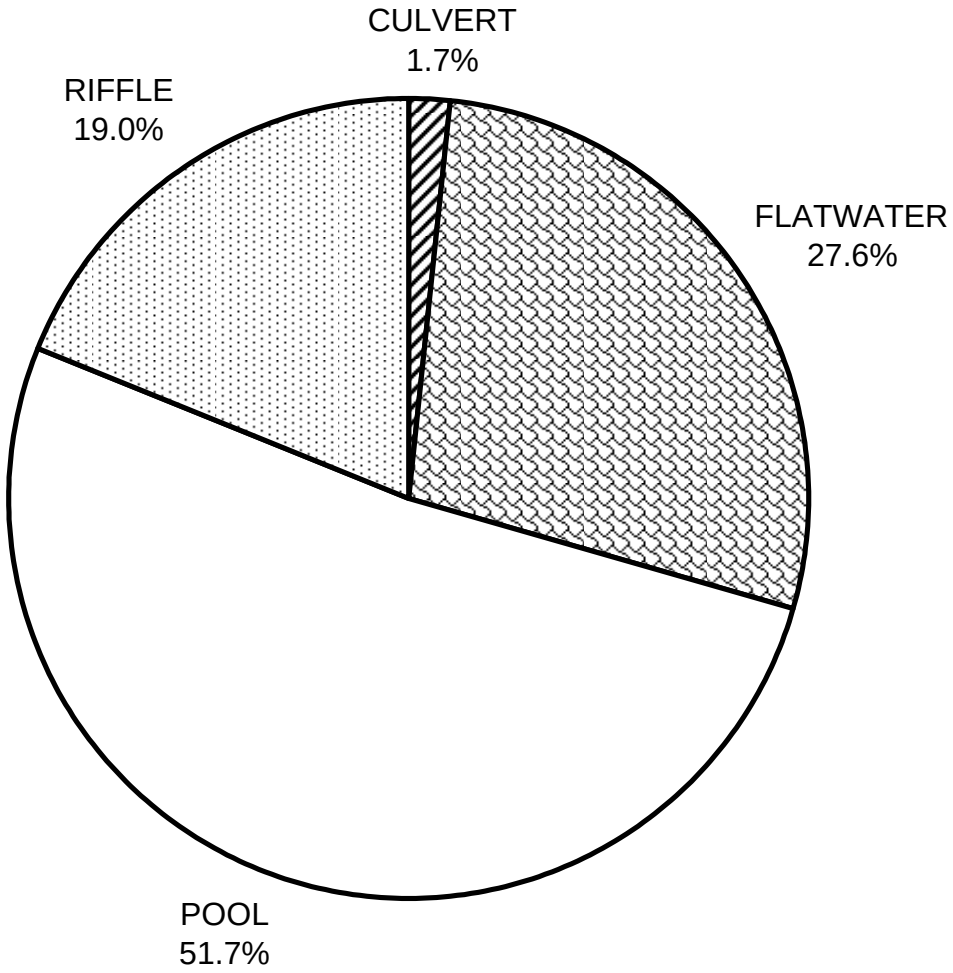
StreamName: 1235351392347 LLID: 1235351392347 Drainage: Navarro River

Survey Dates: 6/5/2012 to 6/5/2012

Confluence Location: Quad: NAVARRO Legal Description: T16NR15WS21 Latitude: 39:14:05.0N Longitude: 123:32:06.0W

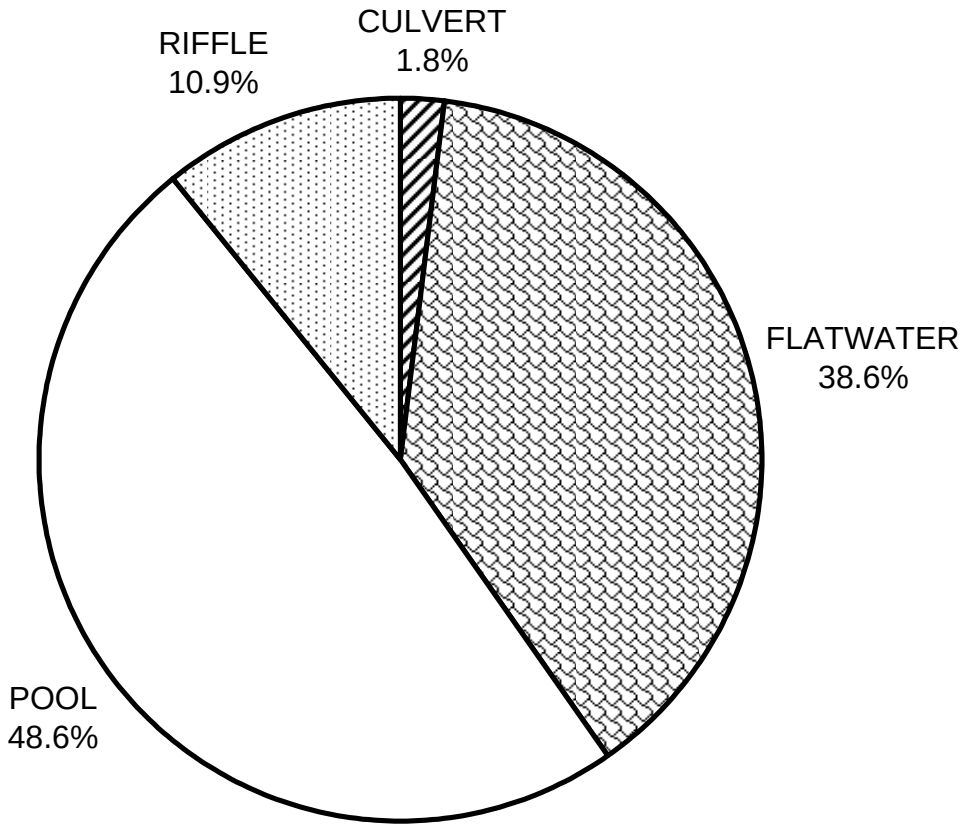
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	45	73
SMALL WOODY DEBRIS (%)	0	45	10
LARGE WOODY DEBRIS (%)	0	10	6
ROOT MASS (%)	0	0	6
TERRESTRIAL VEGETATION (%)	0	0	3
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	0	0	0
BEDROCK LEDGES (%)	0	0	2

UNNAMED TRIBUTARY TO JOHNSON CREEK 2012
HABITAT TYPES BY PERCENT OCCURRENCE



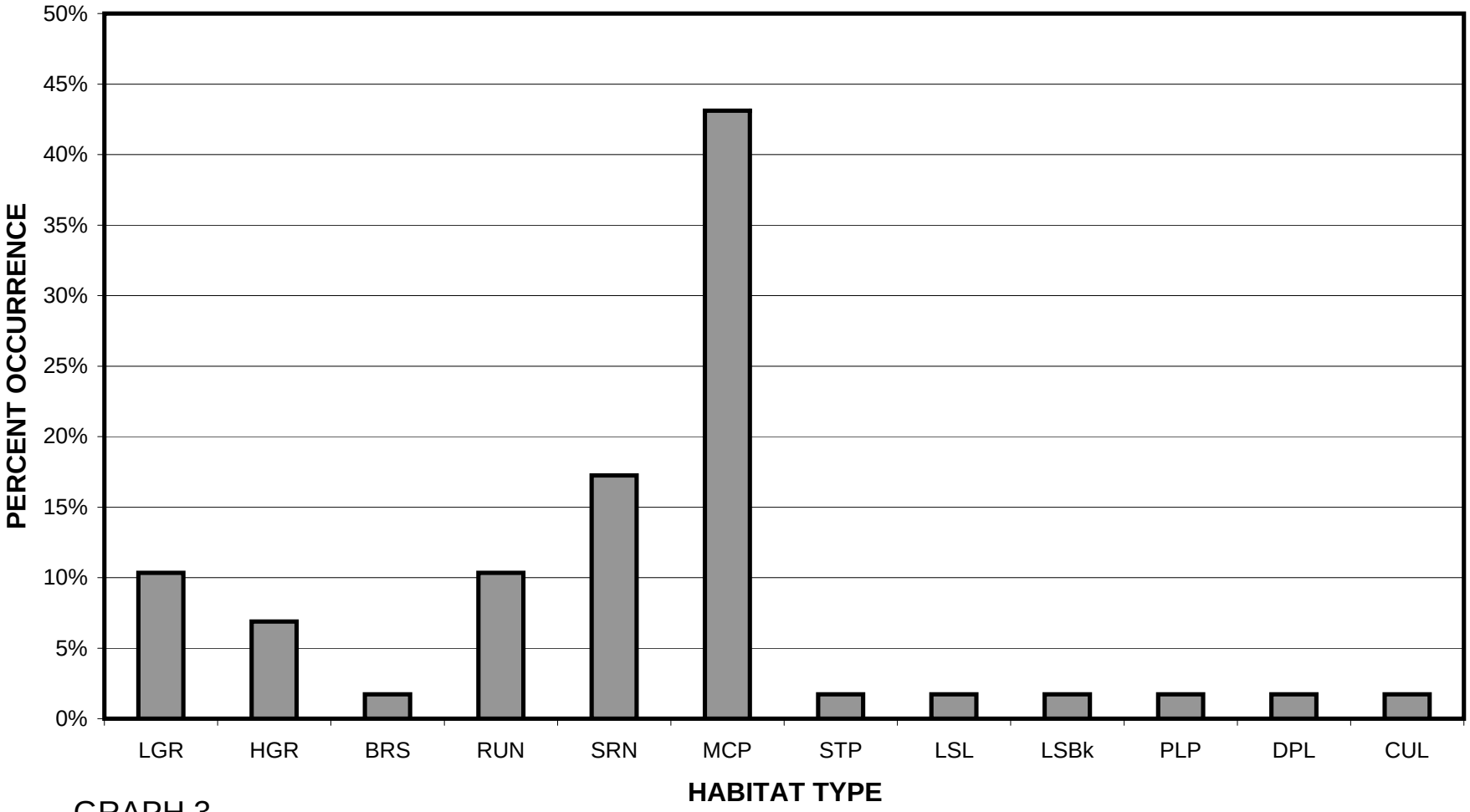
GRAPH 1

UNNAMED TRIBUTARY TO JOHNSON CREEK 2012
HABITAT TYPES BY PERCENT TOTAL LENGTH



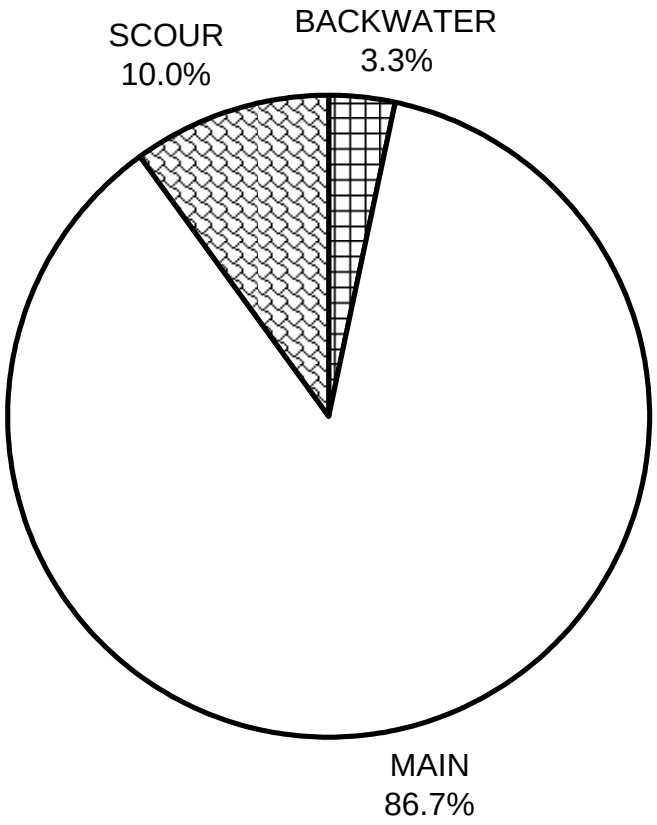
GRAPH 2

UNNAMED TRIBUTARY TO JOHNSON CREEK 2012
HABITAT TYPES BY PERCENT OCCURRENCE



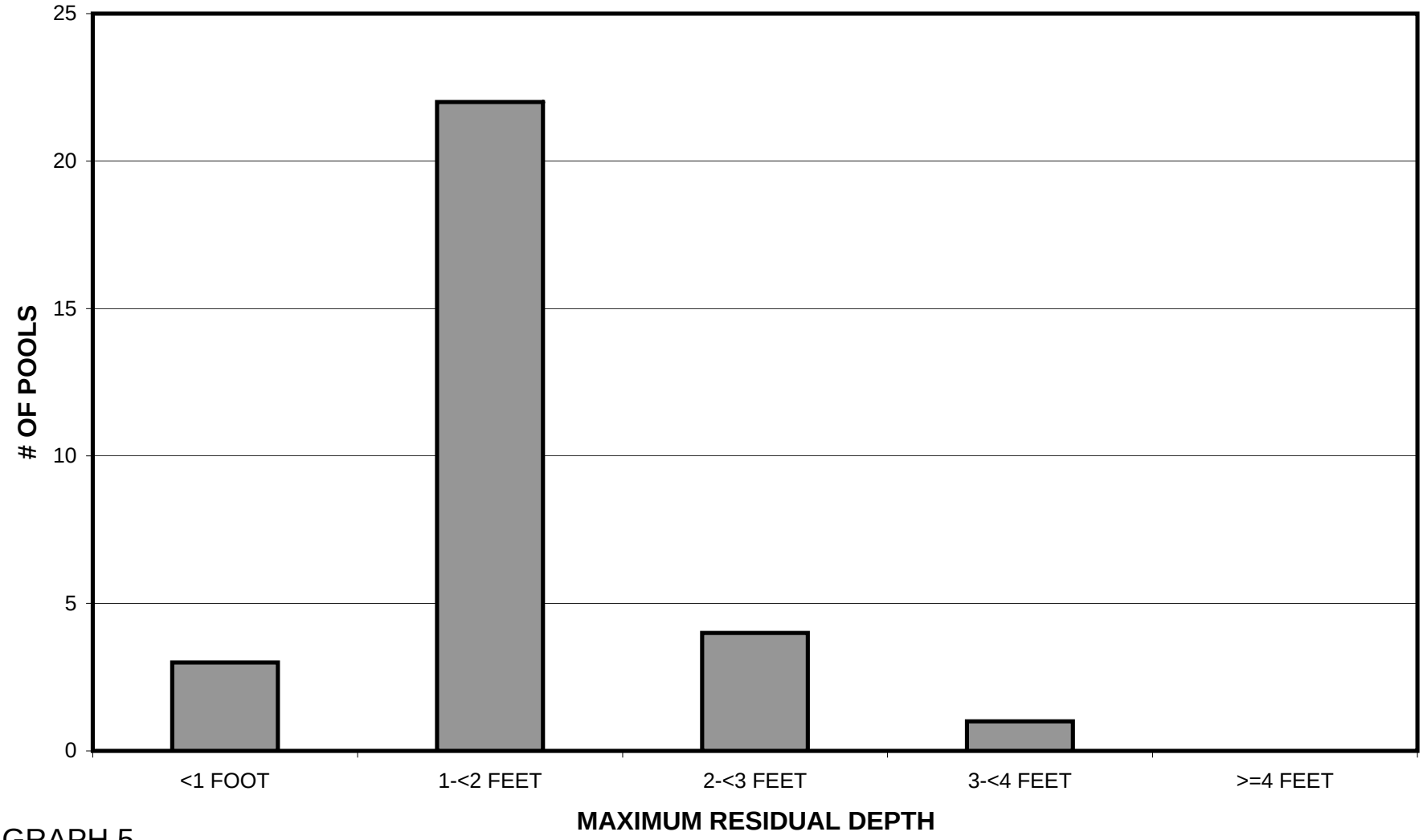
GRAPH 3

UNNAMED TRIBUTARY TO JOHNSON CREEK 2012
POOL TYPES BY PERCENT OCCURRENCE



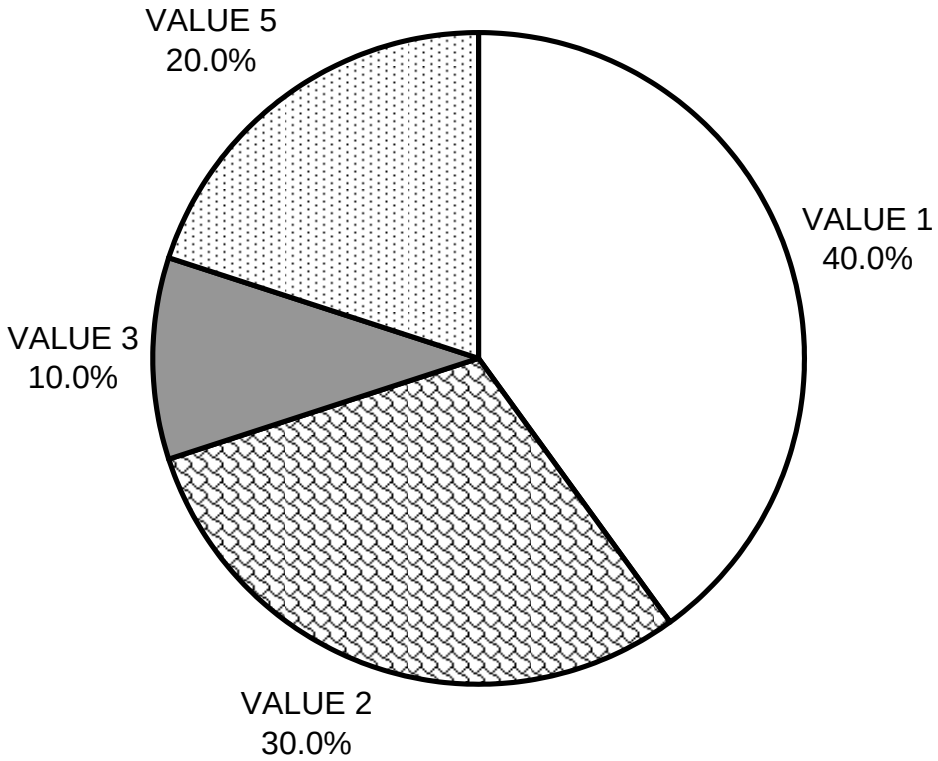
GRAPH 4

UNNAMED TRIBUTARY TO JOHNSON CREEK 2012
MAXIMUM DEPTH IN POOLS



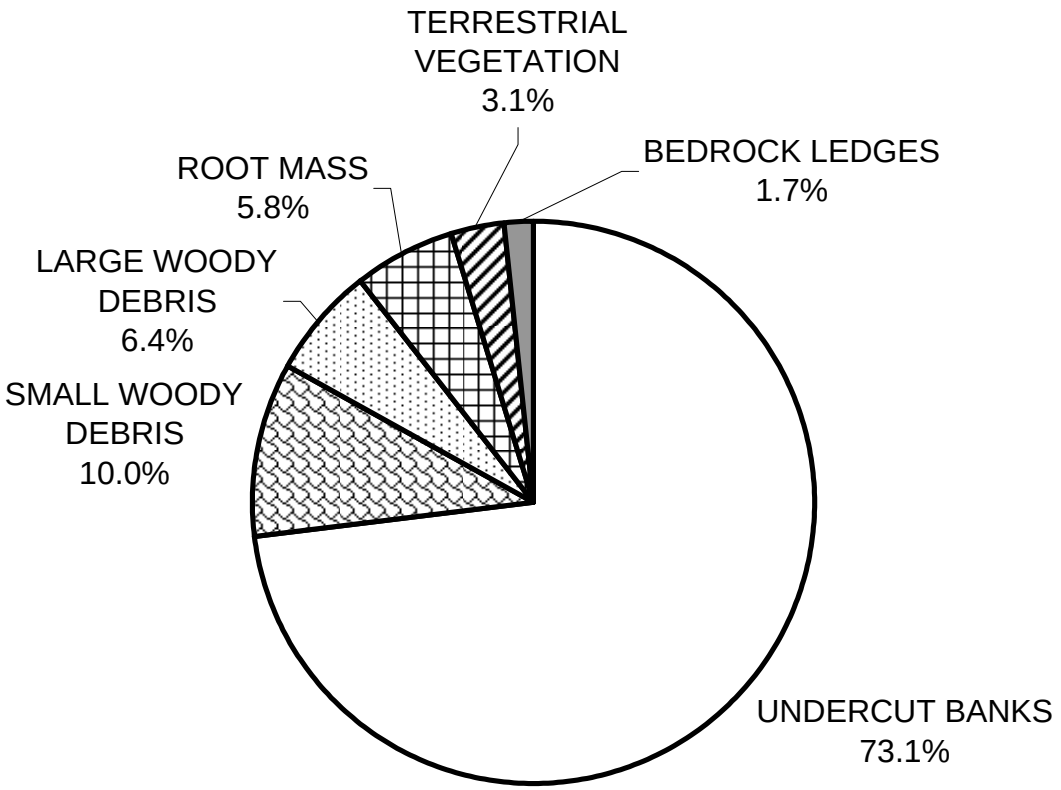
GRAPH 5

UNNAMED TRIBUTARY TO JOHNSON CREEK 2012
PERCENT EMBEDDEDNESS



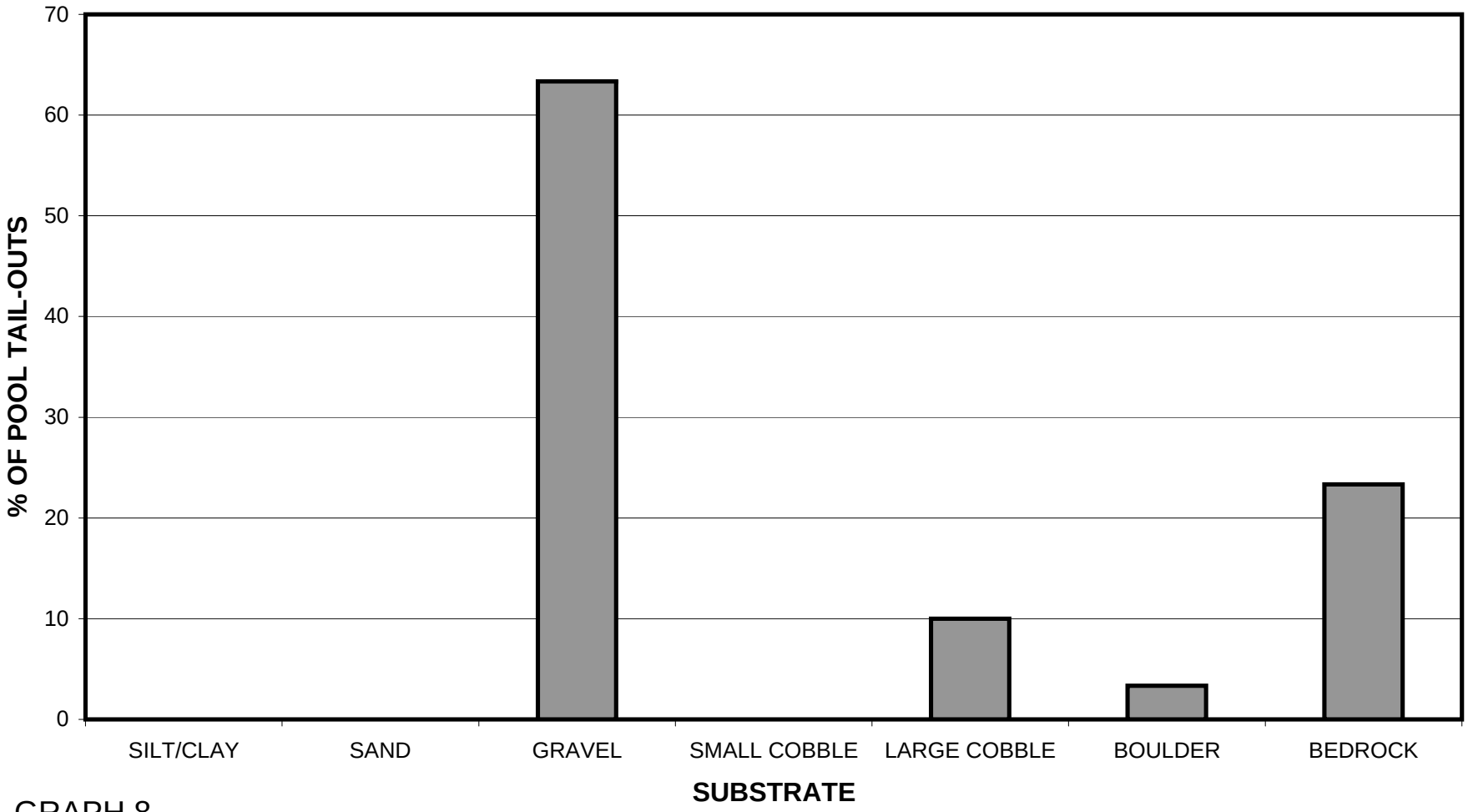
GRAPH 6

UNNAMED TRIBUTARY TO JOHNSON CREEK 2012
MEAN PERCENT COVER TYPES IN POOLS



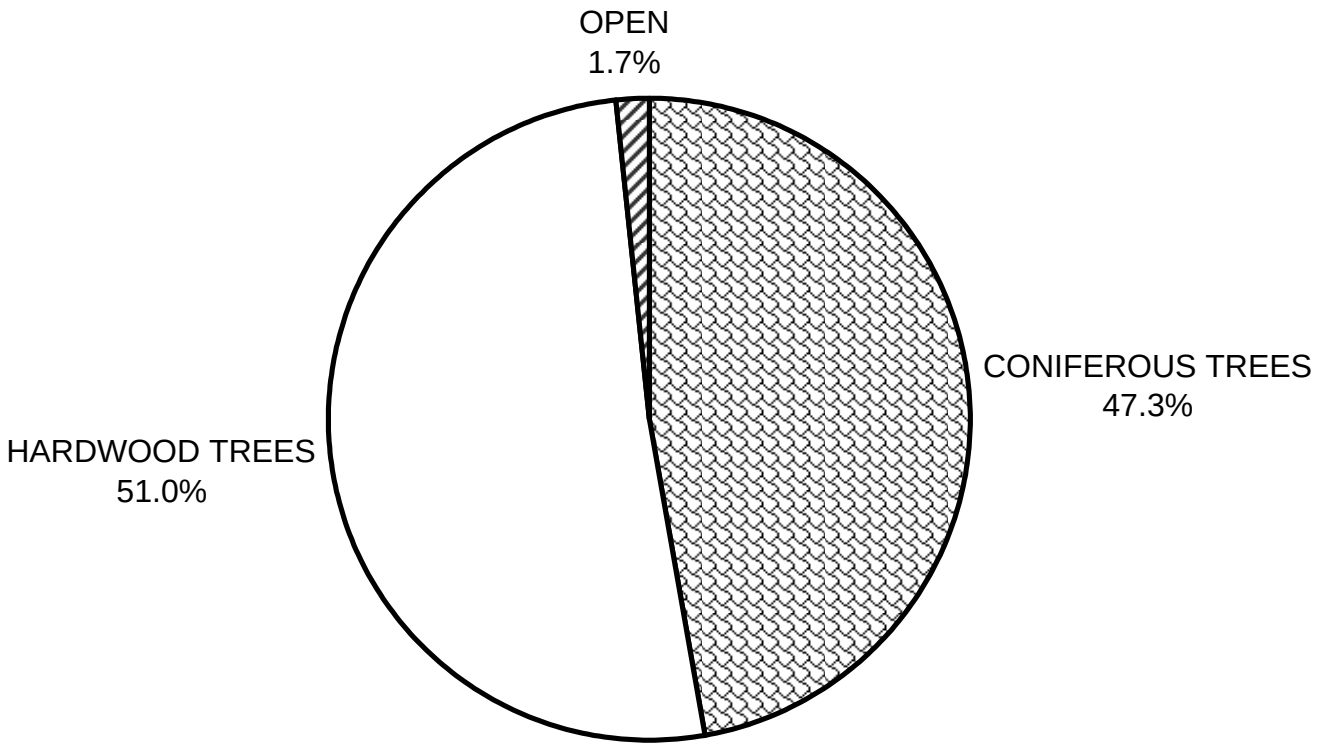
GRAPH 7

UNNAMED TRIBUTARY TO JOHNSON CREEK 2012
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



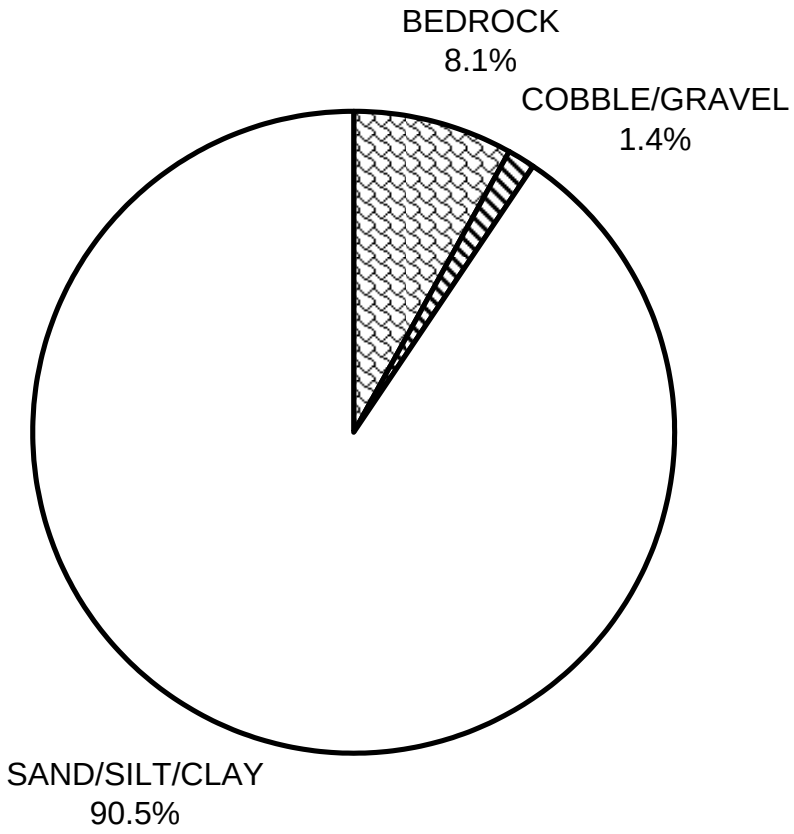
GRAPH 8

UNNAMED TRIBUTARY TO JOHNSON CREEK 2012
MEAN PERCENT CANOPY



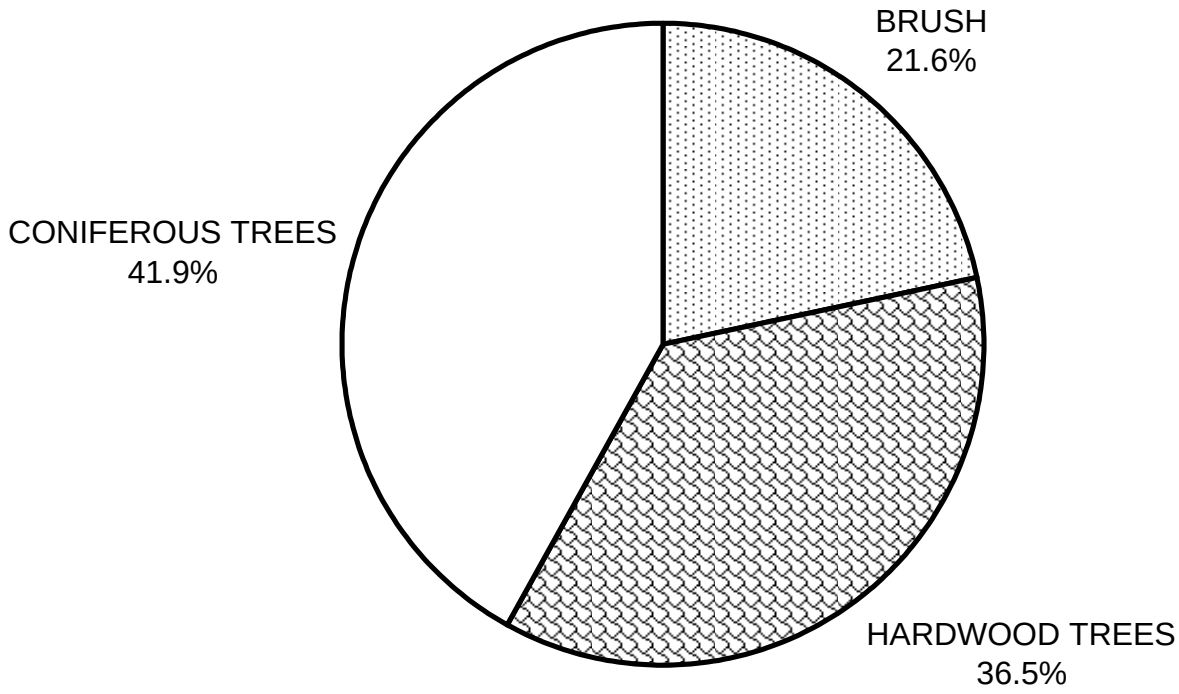
GRAPH 9

UNNAMED TRIBUTARY TO JOHNSON CREEK 2012
DOMINANT BANK COMPOSITION IN SURVEY REACH

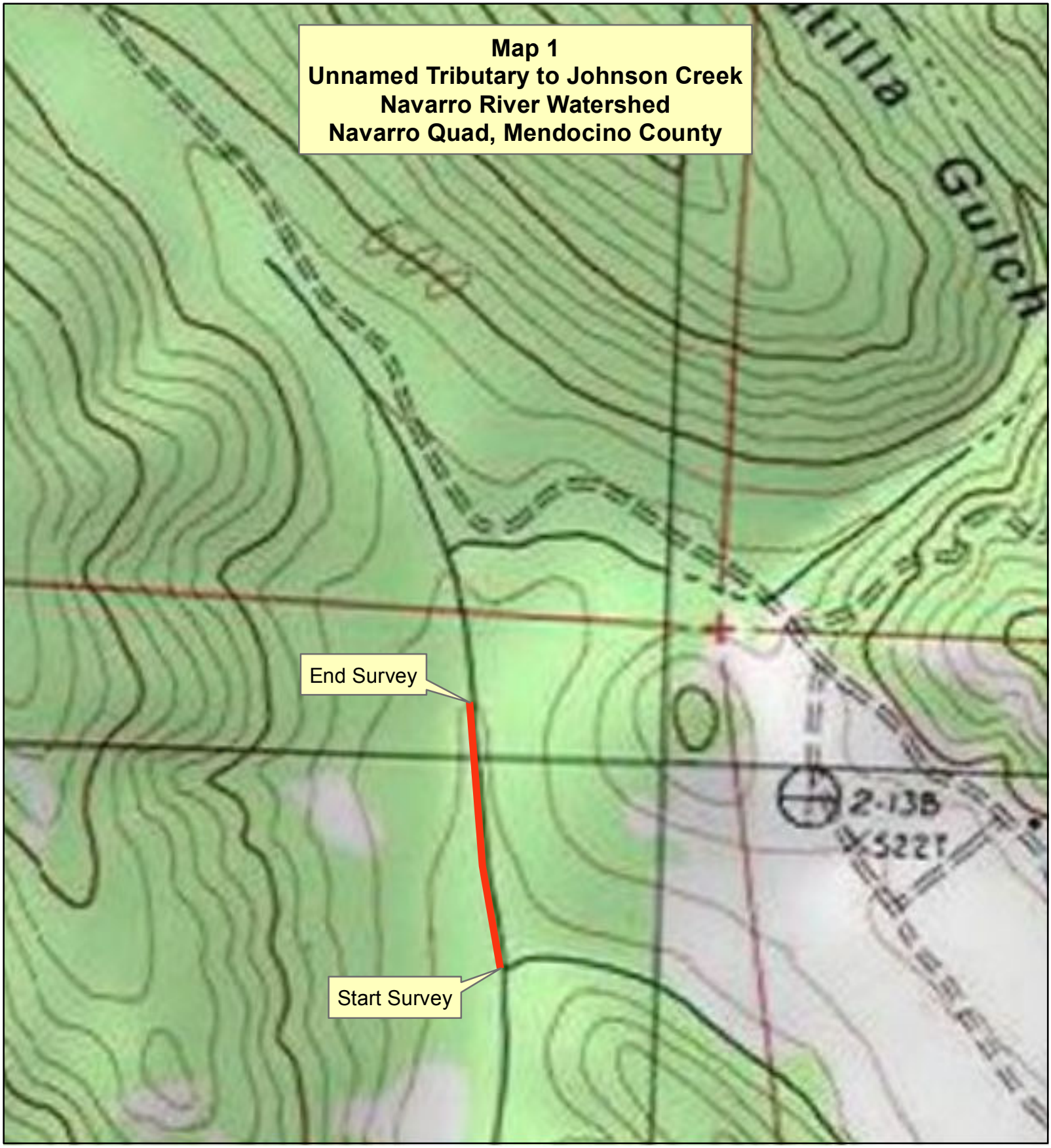


GRAPH 10

UNNAMED TRIBUTARY TO JOHNSON CREEK 2012
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11


Map 1
Unnamed Tributary to Johnson Creek
Navarro River Watershed
Navarro Quad, Mendocino County
End Survey
Start Survey
2-138
4522'
N
W
E
S
Channel Type G4
0
250
500 Feet
CALIFORNIA
DEPARTMENT OF
FISH &
WILDLIFE