

STREAM INVENTORY REPORT

Coon Creek

INTRODUCTION

A stream inventory was conducted from May 31 to June 5, 2012 on Coon Creek. The survey began at the confluence with the North Fork Navarro River and extended upstream 0.5 miles.

The Coon Creek 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 Coon Creek. 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

Coon Creek is a tributary to the North Fork Navarro River, a tributary to Navarro River, which drains to the Pacific Ocean. It is located in Mendocino County, California (Map 1). Coon Creek's legal description at the confluence with the North Fork Navarro River is T15N R16W S14. Its location is 39.1588 degrees north latitude and 123.6021 degrees west longitude, LLID number 1236009391588. Coon Creek is an intermittent stream according to the USGS Navarro 7.5 minute quadrangle. Coon Creek drains a watershed of approximately 0.8 square miles. Elevations range from about 50 feet at the mouth of the creek to 600 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production. Vehicle access exists via Highway 128, approximately 18 miles northwest of Boonville, CA.

METHODS

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

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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 Coon 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". Coon 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.

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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 Coon Creek, embeddedness was ocularly estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3) and 76 - 100% (value 4). Additionally, a value of 5 was assigned to tail-outs deemed 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 Coon 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 densimeters as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Coon 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 Coon 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.

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 Coon Creek. In addition, underwater observations were made at three 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

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Graphics are produced from the tables using Microsoft Excel. Graphics developed for Coon 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
- 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 May 31 to June 5, 2012 was conducted by A. Blessing, R. Spencer, S. Atherton (WSP) and B. Leonard (CDFW). The total length of the stream surveyed was 2,537 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.06 cfs on June 4, 2012.

Coon Creek is an E4 channel type for 875 feet of the stream surveyed (Reach 1), and a B4 channel type for 1,662 feet of the stream surveyed (Reach 2). E4 channels are low gradient, meandering riffle/pool streams with low width/depth ratios and little deposition. They are very efficient and stable with a high meander width ratio and gravel-dominant substrates. B4 channels are moderately entrenched, moderate gradient, riffle dominated channel with infrequently spaced pools, very stable plan and profile, stable banks and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 50 to 52 degrees Fahrenheit. Air temperatures ranged from 49 to 56 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 35% flatwater units, 34% pool units, 24% riffle units, 4% dry units, 3% unsurveyed units, and 1% culvert units (Graph 1). Based on total length of Level II habitat types there were 45% flatwater units, 18% riffle units, 18% dry units, 16% pool units, 2% culvert units, and 2% unsurveyed units (Graph 2).

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Nine Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were step run units, 24%; low gradient riffle units, 19%; and mid-channel pool units, 18% (Graph 3). Based on percent total length, step run units made up 40%, dry units 18%, and low gradient riffle units, 13%.

A total of 27 pools were identified (Table 3). Main channel pools were the most frequently encountered at 56% (Graph 4), and comprised 61% of the total length of all pools (Table 3).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. One of the 27 pools (4%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 27 pool tail-outs measured, eight had a value of 1 (29.6%); 10 had a value of 2 (37%); seven had a value of 3 (25.9%); one had a value of 4 (3.7%); one had a value of 5 (3.7%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst. Additionally, a value of 5 was assigned to tail-outs deemed 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 8, flatwater habitat types had a mean shelter rating of 8, and pool habitats had a mean shelter rating of 20 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 22. Main channel pools had a mean shelter rating of 18 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in Coon Creek. Graph 7 describes the pool cover in Coon Creek. Small woody debris is the dominant pool cover type followed by large 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 78% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 11% of pool tail-outs.

The mean percent canopy density for the surveyed length of Coon Creek was 94%. Six percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 25% and 75%, respectively. Graph 9 describes the mean percent canopy in Coon Creek.

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 73% sand/silt/clay, 23% cobble/gravel, 4% boulders, and 1% bedrock (Graph 10). Coniferous trees were the dominant vegetation type observed in 71% of the units surveyed. Additionally, 11% of the units surveyed had deciduous trees as the dominant vegetation type, and 11% had brush as the dominant vegetation type (Graph 11).

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BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a snorkel survey at three sites for species composition and distribution in Coon Creek on August 1, 2012. The sites were sampled by I. Mikus and M. Groff (CDFW).

In Reach 1, which comprised the first 875 feet of stream, three sites were sampled. The reach sites yielded no fish.

The following chart displays the information yielded from these sites:

2012 Coon Creek underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
Reach 1: E4 Channel Type									
08/01/12	1	011	Pool	772	0	0	0	0	0
	2	017	Pool	988	0	0	0	0	0
	3	028	Pool	1269	0	0	0	0	0

DISCUSSION

Coon Creek is an E4 channel type for the first 875 feet of stream surveyed and a B4 channel type for the remaining 1,662 feet. The suitability of E4 and B4 channel types for fish habitat improvement structures is as follows: E4 channel types are good for bank-placed boulders and fair for opposing wing-deflectors. B4 channel types are excellent for low-stage plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors, and log cover.

The water temperatures recorded on the survey days May 31 to June 5, 2012 ranged from 50 to 52 degrees Fahrenheit. Air temperatures ranged from 49 to 56 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 18%, and pools 16%. One of the 27 (4%) 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.

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Eighteen of the 27 pool tail-outs measured had embeddedness ratings of 1 or 2. Eight of the pool tail-outs had embeddedness ratings of 3 or 4. One of the pool tail-outs had a rating of 5, which is considered not suitable 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.

Twenty-four of the 27 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 20. The shelter rating in the flatwater habitats is 8. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by small woody debris in Coon Creek. Small woody debris is the dominant cover type in pools followed by large 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 94%. Reach 1 had a canopy density of 95%; Reach 2 had a canopy density of 94%. In general, revegetation projects are considered when canopy density is less than 80%. The percentage of right and left bank covered with vegetation was 100% and 100%, respectively.

RECOMMENDATIONS

- 1) Coon 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) 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.
- 4) Conduct a fish passage assessment on the Highway 128 stream crossing located at 305 feet from the confluence.

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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	Start of survey at the confluence with the North Fork Navarro River. The first 85' of stream are dry. The channel is an E4.
305	0005.00	Highway 128 crosses the channel. The crossing is a 3' high x 3' wide x 46' long concrete culvert. The culvert may be undersized. It has a slope of approximately 1.9%. Small woody debris is accumulating at the culvert inlet.
875	0013.00	The channel changes from an E4 to a B4.
921	0015.00	There is a 0.5' high plunge.
931	0016.00	Log debris accumulation (LDA) #01 contains three pieces of large woody debris (LWD) and measures 5' high x 12' wide x 3' long. Water does not flow through the LDA and there are visible gaps in it. Retained sediment ranges from silt to cobble and measures 2' wide x 10' long x 1' deep. There is a 4' high plunge over the LDA with no jump pool below. No fish were observed above the LDA.
1025	0020.00	LDA #02 contains four pieces of LWD and measures 6' high x 16' wide x 7' long. Water flows through the LDA and there are visible gaps in it. The LDA is not retaining sediment. There is a 4' high plunge over the LDA with no jump pool below.
1443	0035.00	Tributary #01 enters on the left bank. It contributes 15-20% to Coon Creek's flow. The water temperature of the tributary was 52 degrees Fahrenheit, the water temperature downstream and upstream of the tributary was 50 degrees Fahrenheit. The slope of the tributary is approximately 2%. The first 100 feet of the tributary are accessible to salmonids, but no fish were observed.
1943	0053.00	LDA #03 contains eight pieces of LWD and measures 9' high x 23' wide x 30' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from silt to cobble and measures 6' wide x 45' long x 1' deep. There are two plunges over the LDA: the first is 3.5' high, the second is 2.5' high.
2186	0064.00	There is a 1' high plunge.

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- 2254 0068.00 LDA #04 contains three pieces of LWD and measures 4' high x 13' wide x 4' long. Water flows through the LDA and there are no visible gaps in it. Retained sediment ranges from silt to gravel and measures 3' wide x 10' long x 1' deep. There is a 3' high plunge over the LDA.
- 2305 0072.00 LDA #05 contains three pieces of LWD and measures 4.5' high x 15' wide x 1.5' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from silt to cobble. There is a 3' high plunge over the LDA.
- 2394 0075.00 LDA #06 contains six pieces of LWD and measures 4.5' high x 17' wide x 8' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from silt to boulders and measures 15' wide x 25' long x 1.5' deep. There is a 4' high plunge over the LDA.
- 2445 0077.00 LDA #07 contains six pieces of LWD and measures 4' high x 12' wide x 7' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from silt to boulders and measures 6' wide x 15' long x 1' deep.
- 2473 0079.00 LDA #08 contains two pieces of LWD and measures 5' high x 11' wide x 16' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from silt to gravel and measures 5' wide x 10' long x 1' deep.
- 2489 0080.00 End of survey. A boulder cascade has a slope of approximately 25% over 50'. There are no pools above the cascade.

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: Coon Creek

LLID: 1236009391588

Drainage: Navarro River

Survey Dates: 5/31/2012 to 6/5/2012

Confluence Location: Quad: NAVARRO

Legal Description: T15NR16WS14

Latitude: 39:09:32.0N

Longitude: 123:36:03.0

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	1.3	46	46	1.8									
3	0	DRY	3.8	148	444	17.5									
28	7	FLATWATER	35.0	41	1147	45.2	3.8	0.3	0.6	128	3591	36	1006		8
2	0	NOSURVEY	2.5	23	46	1.8									
27	27	POOL	33.8	15	397	15.6	6.6	0.7	1.3	97	2608	78	2097	68	20
19	6	RIFFLE	23.8	24	457	18.0	4.0	0.2	0.5	66	1263	19	368		8
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
80	40				2537					7462			3471		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Coon Creek

LLID: 1236009391588

Drainage: Navarro River

Survey Dates: 5/31/2012 to 6/5/2012

Confluence Location: Quad: NAVARRO

Legal Description: T15NR16WS14

Latitude: 39:09:32.0N

Longitude: 123:36:03.0W

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 (%)
15	3	LGR	18.8	22	332	13.1	4	0.1	0.3	61	910	6	91		3	95
1	1	HGR	1.3	30	30	1.2	4	0.2	0.4	79	79	16	16		5	98
3	2	CAS	3.8	32	95	3.7	5	0.5	1.2	69	207	41	123		15	78
9	3	RUN	11.3	16	142	5.6	4	0.3	0.8	57	513	20	178		10	96
19	4	SRN	23.8	53	1005	39.6	3	0.3	0.7	182	3452	48	913		6	94
14	14	MCP	17.5	16	227	8.9	6	0.6	1.8	95	1333	70	982	61	18	96
1	1	CCP	1.3	16	16	0.6	8	0.8	1.3	128	128	115	115	102	20	91
12	12	PLP	15.0	13	154	6.1	7	0.8	2.6	96	1147	83	1000	73	22	95
3	0	DRY	3.8	148	444	17.5										
1	0	CUL	1.3	46	46	1.8										
2	0	NS	2.5	23	46	1.8										

Total Units
80

Total Units Fully Measured
40

Total Length (ft.)
2537

Total Area (sq.ft.)
7769

Total Volume (cu.ft.)
3418

Table 3 - Summary of Pool Types

Stream Name: Coon Creek

LLID: 1236009391588

Drainage: Navarro River

Survey Dates: 5/31/2012 to 6/5/2012

Confluence Location: Quad: NAVARRO

Legal Description: T15NR16WS14

Latitude: 39:09:32.0N

Longitude: 123:36:03.0W

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
15	15	MAIN	56	16	243	61	6.0	0.6	97	1461	64	962	18
12	12	SCOUR	44	13	154	39	7.5	0.8	96	1147	73	877	22

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
27	27	397	2608	1839

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

Stream Name: Coon Creek

LLID: 1236009391588

Drainage: Navarro River

Survey Dates: 5/31/2012 to 6/5/2012

Confluence Location: Quad: NAVARRO

Legal Description: T15NR16WS14

Latitude: 39:09:32.0N

Longitude: 123:36:03.0W

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
14	MCP	52	2	14	12	86	0	0	0	0	0	0
1	CCP	4	0	0	1	100	0	0	0	0	0	0
12	PLP	44	2	17	9	75	1	8	0	0	0	0

Total Units	Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1< 2 Foot Max Resid. Depth	Total 1< 2 Foot % Occurrence	Total 2< 3 Foot Max Resid. Depth	Total 2< 3 Foot % Occurrence	Total 3< 4 Foot Max Resid. Depth	Total 3< 4 Foot % Occurrence	Total >= 4 Foot Max Resid. Depth	Total >= 4 Foot % Occurrence
27	4	15	22	81	1	4	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.3

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Coon Creek

LLID: 1236009391588

Drainage: Navarro River

Survey Dates: 5/31/2012 to 6/5/2012

Dry Units: 3

Confluence Location: Quad: NAVARRO

Legal Description: T15NR16WS14

Latitude: 39:09:32.0N

Longitude: 123:36:03.0W

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
15	3	LGR	0	0	0	0	0	0	0	100	0
1	1	HGR	0	25	0	0	0	0	0	75	0
3	2	CAS	0	15	0	0	0	0	0	85	0
19	6	TOTAL RIFFLE	0	11	0	0	0	0	0	89	0
9	3	RUN	3	75	13	2	0	0	0	7	0
19	4	SRN	5	48	10	0	0	0	0	38	0
28	7	TOTAL FLAT	4	59	11	1	0	0	0	24	0
14	14	MCP	17	43	15	1	3	0	0	21	0
1	1	CCP	25	75	0	0	0	0	0	0	0
12	12	PLP	11	24	38	0	0	0	2	25	0
27	27	TOTAL POOL	15	35	25	0	1	0	1	22	0
1	0	CUL									
2	0	NS									
80	40	TOTAL	11	37	19	0	1	0	1	31	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Coon Creek

LLID: 1236009391588

Drainage: Navarro River

Survey Dates: 5/31/2012 to 6/5/2012

Dry Units: 3

Confluence Location: Quad: NAVARRO

Legal Description: T15NR16WS14

Latitude: 39:09:32.0N

Longitude: 123:36:03.0W

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
15	3	LGR	0	0	100	0	0	0	0
1	1	HGR	0	0	100	0	0	0	0
3	2	CAS	0	0	0	0	0	100	0
9	3	RUN	0	33	67	0	0	0	0
19	4	SRN	0	0	100	0	0	0	0
14	14	MCP	0	7	86	0	7	0	0
1	1	CCP	0	0	100	0	0	0	0
12	12	PLP	0	0	83	0	8	0	8

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Coon Creek

LLID: 1236009391588

Drainage: Navarro River

Survey Dates: 5/31/2012 to 6/5/2012

Confluence Location: Quad: NAVARRO

Legal Description: T15NR16WS14

Latitude: 39:09:32.0N

Longitude: 123:36:03.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
94	75	25	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: Coon Creek LLID: 1236009391588 Drainage: Navarro River
 Survey Dates: 5/31/2012 to 6/5/2012 Survey Length (ft.): 2537 Main Channel (ft.): 2537 Side Channel (ft.): 0
 Confluence Location: Quad: NAVARRO Legal Description: T15NR16WS14 Latitude: 39:09:32.0N Longitude: 123:36:03.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: E4	Canopy Density (%): 94.8	Pools by Stream Length (%): 5.6
Reach Length (ft.): 875	Coniferous Component (%): 71.0	Pool Frequency (%): 25.0
Riffle/Flatwater Mean Width (ft.): 3.3	Hardwood Component (%): 29.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 100
Range (ft.): 9 to 10	Vegetative Cover (%): 99.0	2 to 2.9 Feet Deep: 0
Mean (ft.): 9	Dominant Shelter: Small Woody Debris	3 to 3.9 Feet Deep: 0
Std. Dev.: 0	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.1	Occurrence of LWD (%): 0	Mean Max Residual Pool Depth (ft.): 1.2
Water (F): 50 - 50 Air (F): 49 - 52	LWD per 100 ft.:	Mean Pool Shelter Rating: 8
Dry Channel (ft): 444	Riffles: 1	
	Pools: 2	
	Flat: 1	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 33 Gravel: 67 Sm Cobble: 0 Lg Cobble: 0 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 33.3 2. 0.0 3. 66.7 4. 0.0 5. 0.0		

STREAM REACH: 2

Channel Type: B4	Canopy Density (%): 94.1	Pools by Stream Length (%): 20.9
Reach Length (ft.): 1662	Coniferous Component (%): 76.0	Pool Frequency (%): 35.3
Riffle/Flatwater Mean Width (ft.): 4.0	Hardwood Component (%): 24.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 96
Range (ft.): 5 to 10	Vegetative Cover (%): 99.9	2 to 2.9 Feet Deep: 4
Mean (ft.): 8	Dominant Shelter: Small Woody Debris	3 to 3.9 Feet Deep: 0
Std. Dev.: 2	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.1	Occurrence of LWD (%): 21	Mean Max Residual Pool Depth (ft.): 1.3
Water (F): 50 - 52 Air (F): 51 - 56	LWD per 100 ft.:	Mean Pool Shelter Rating: 21
Dry Channel (ft): 0	Riffles: 2	
	Pools: 8	
	Flat: 2	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 79 Sm Cobble: 13 Lg Cobble: 4 Boulder: 4 Bedrock: 0		
Embeddedness Values (%): 1. 29.2 2. 41.7 3. 20.8 4. 4.2 5. 4.2		

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Coon Creek

LLID: 1236009391588

Drainage: Navarro River

Survey Dates: 5/31/2012 to 6/5/2012

Confluence Location: Quad: NAVARRO

Legal Description: T15NR16WS14

Latitude: 39:09:32.0N

Longitude: 123:36:03.0W

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	1	0	1.3
Boulder	2	1	3.8
Cobble / Gravel	14	4	22.5
Sand / Silt / Clay	23	35	72.5

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	3	2	6.3
Brush	6	3	11.3
Hardwood Trees	7	2	11.3
Coniferous Trees	24	33	71.3
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 2

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

StreamName: Coon Creek

LLID: 1236009391588

Drainage: Navarro River

Survey Dates: 5/31/2012 to 6/5/2012

Confluence Location: Quad: NAVARRO

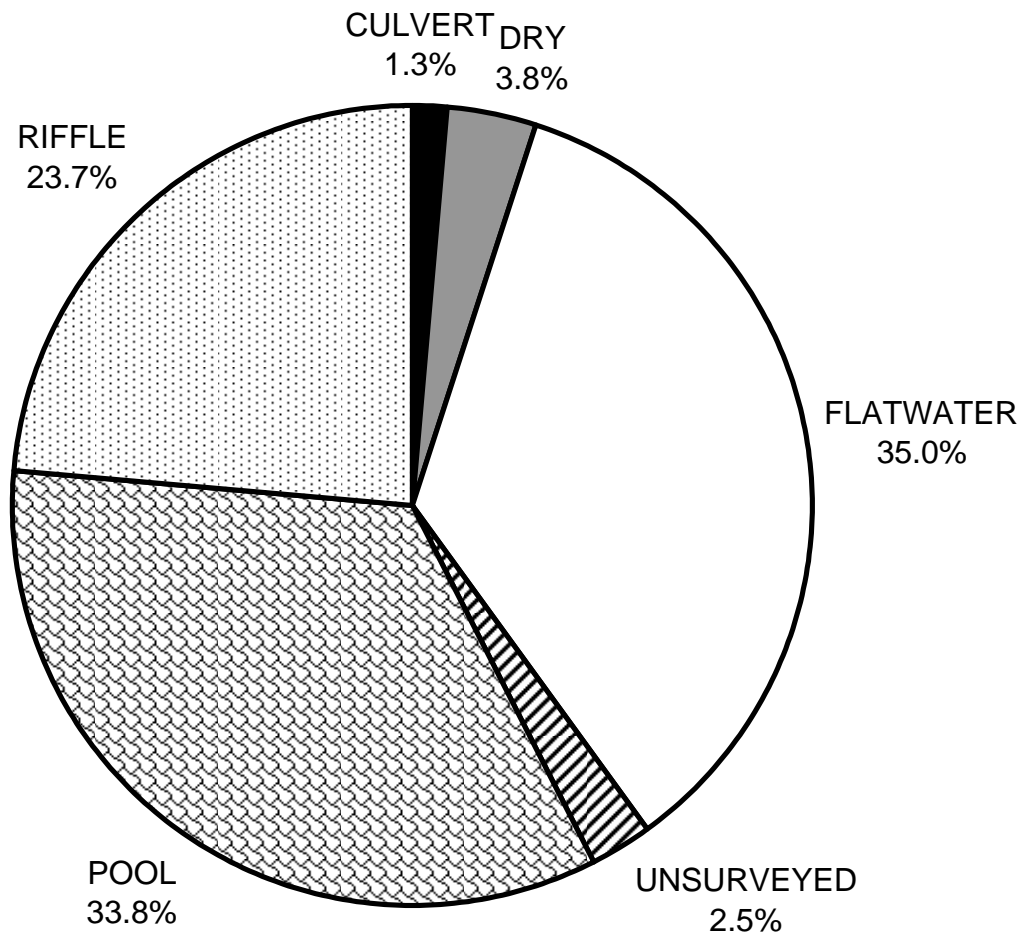
Legal Description: T15NR16WS14

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Longitude: 123:36:03.0W

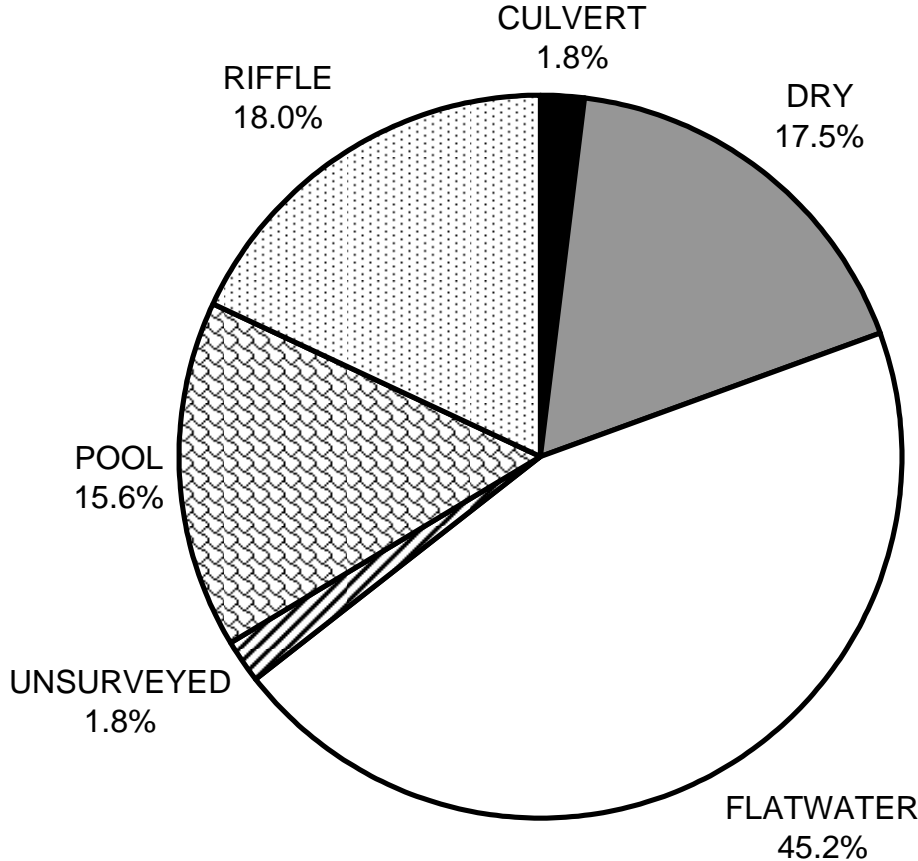
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	4	15
SMALL WOODY DEBRIS (%)	11	59	35
LARGE WOODY DEBRIS (%)	0	11	25
ROOT MASS (%)	0	1	0
TERRESTRIAL VEGETATION (%)	0	0	1
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	1
BOULDERS (%)	89	24	22
BEDROCK LEDGES (%)	0	0	0

COON CREEK 2012 HABITAT TYPES BY PERCENT OCCURRENCE



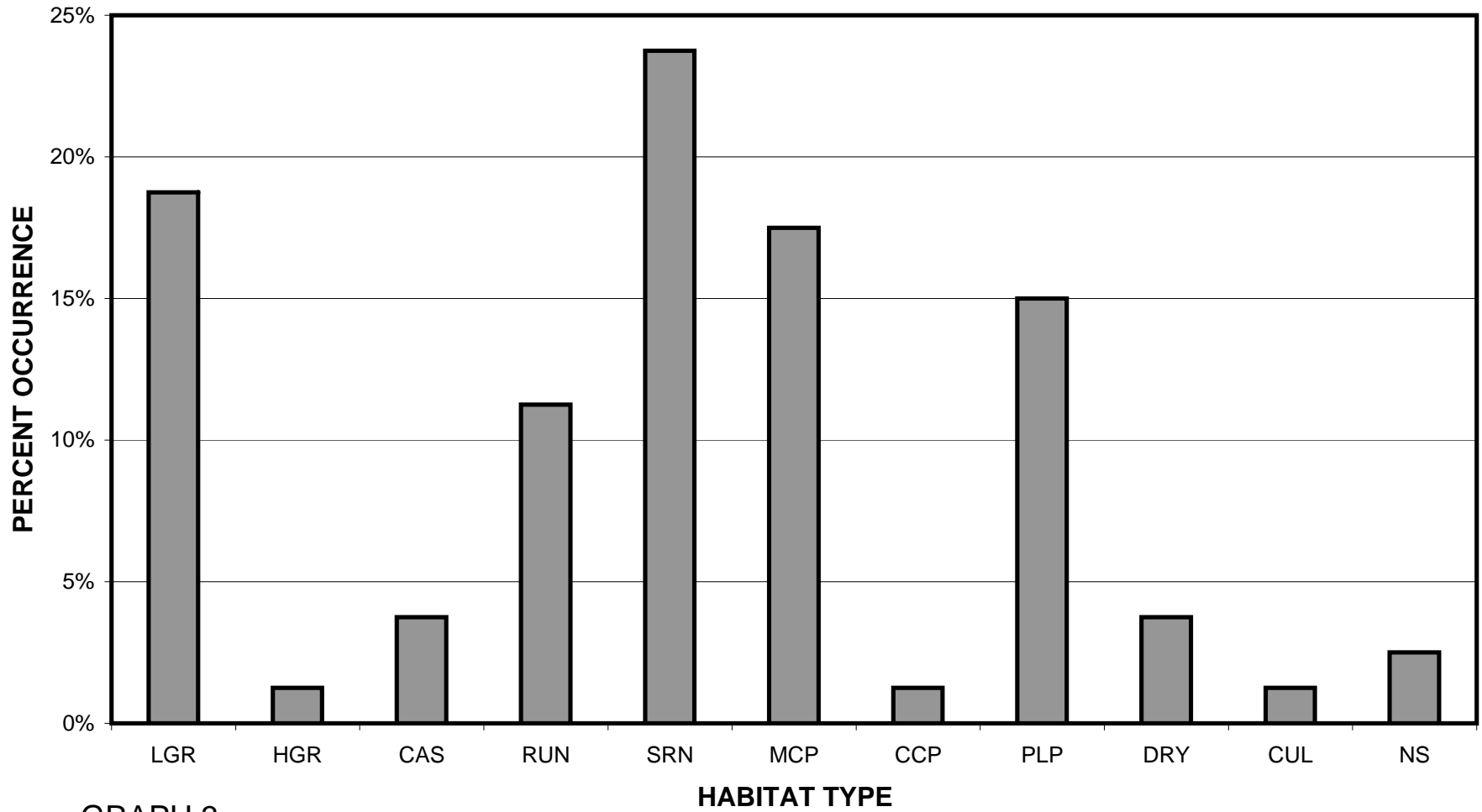
GRAPH 1

COON CREEK 2012 HABITAT TYPES BY PERCENT TOTAL LENGTH



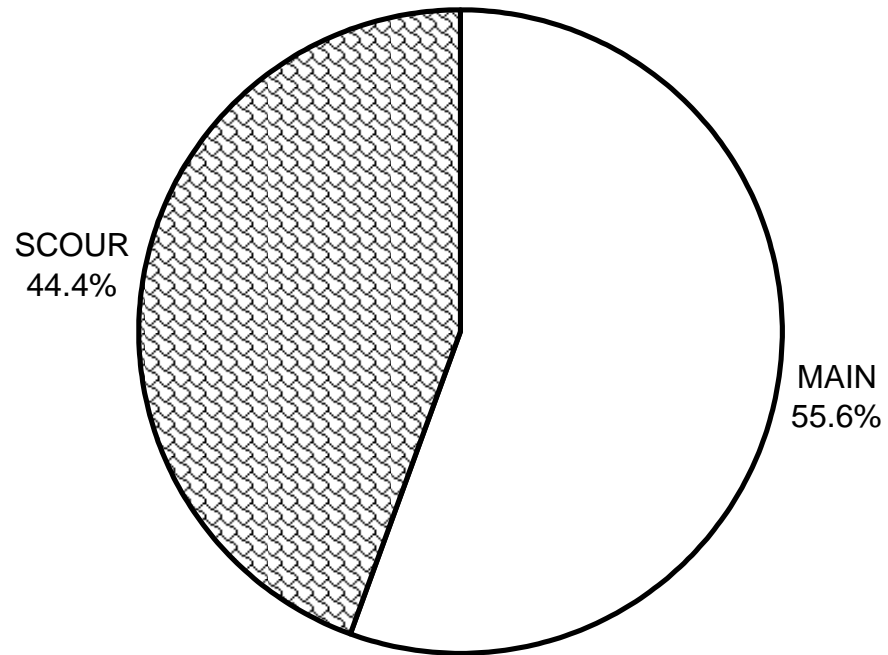
GRAPH 2

COON CREEK 2012 HABITAT TYPES BY PERCENT OCCURRENCE



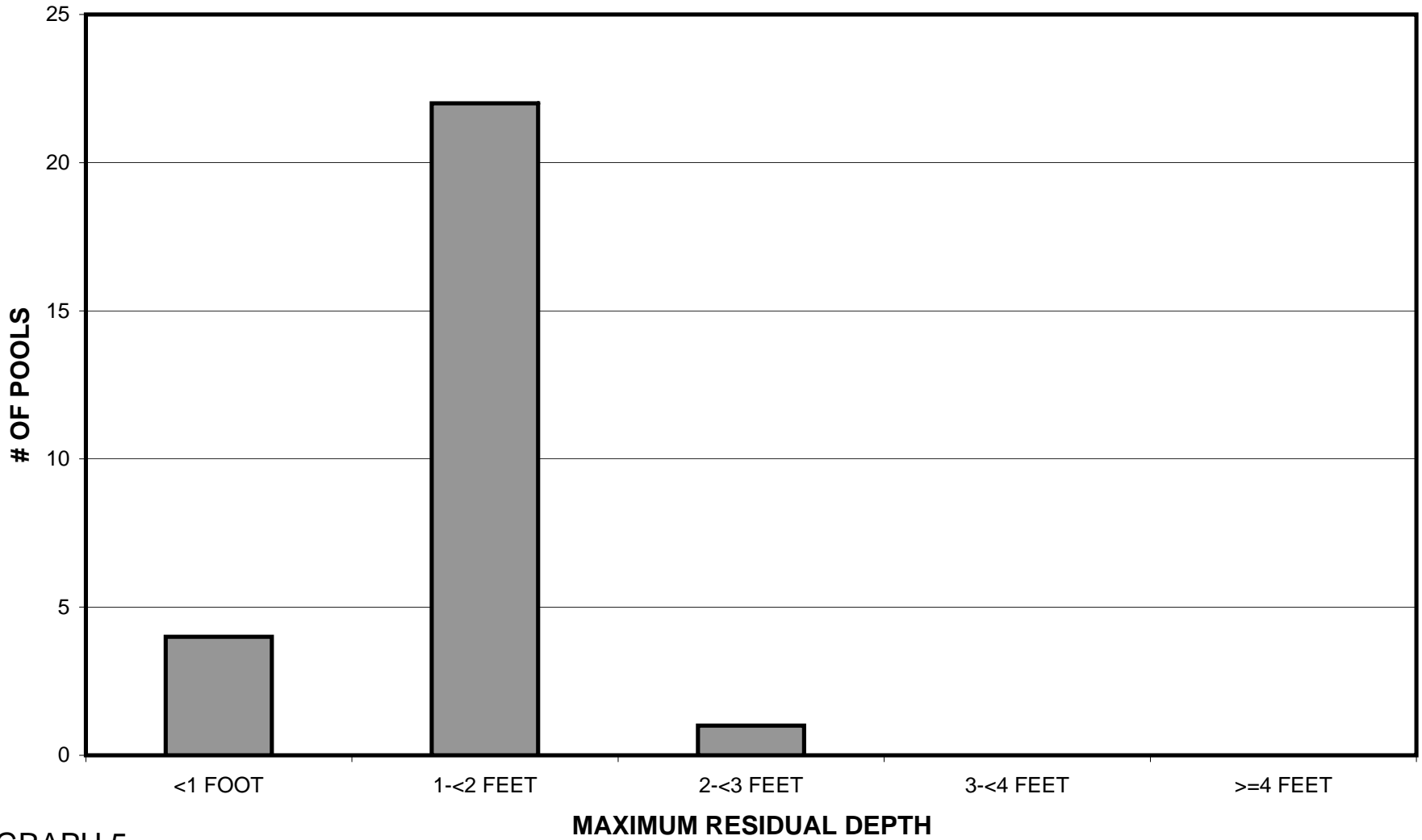
GRAPH 3

**COON CREEK 2012
POOL TYPES BY PERCENT OCCURRENCE**



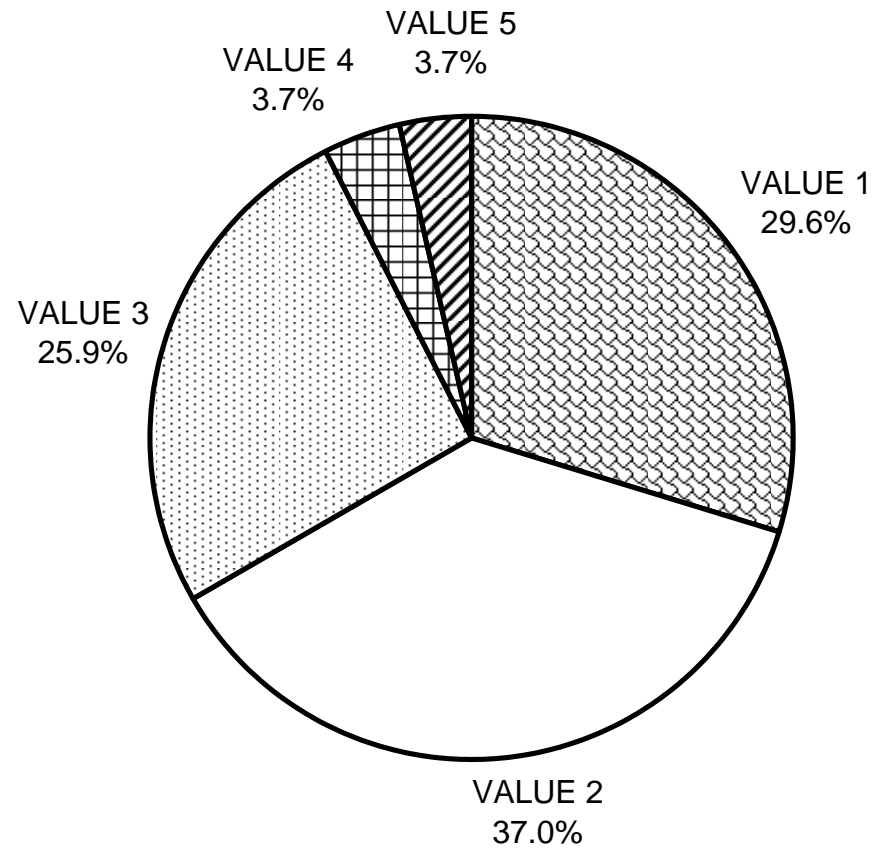
GRAPH 4

COON CREEK 2012 MAXIMUM DEPTH IN POOLS



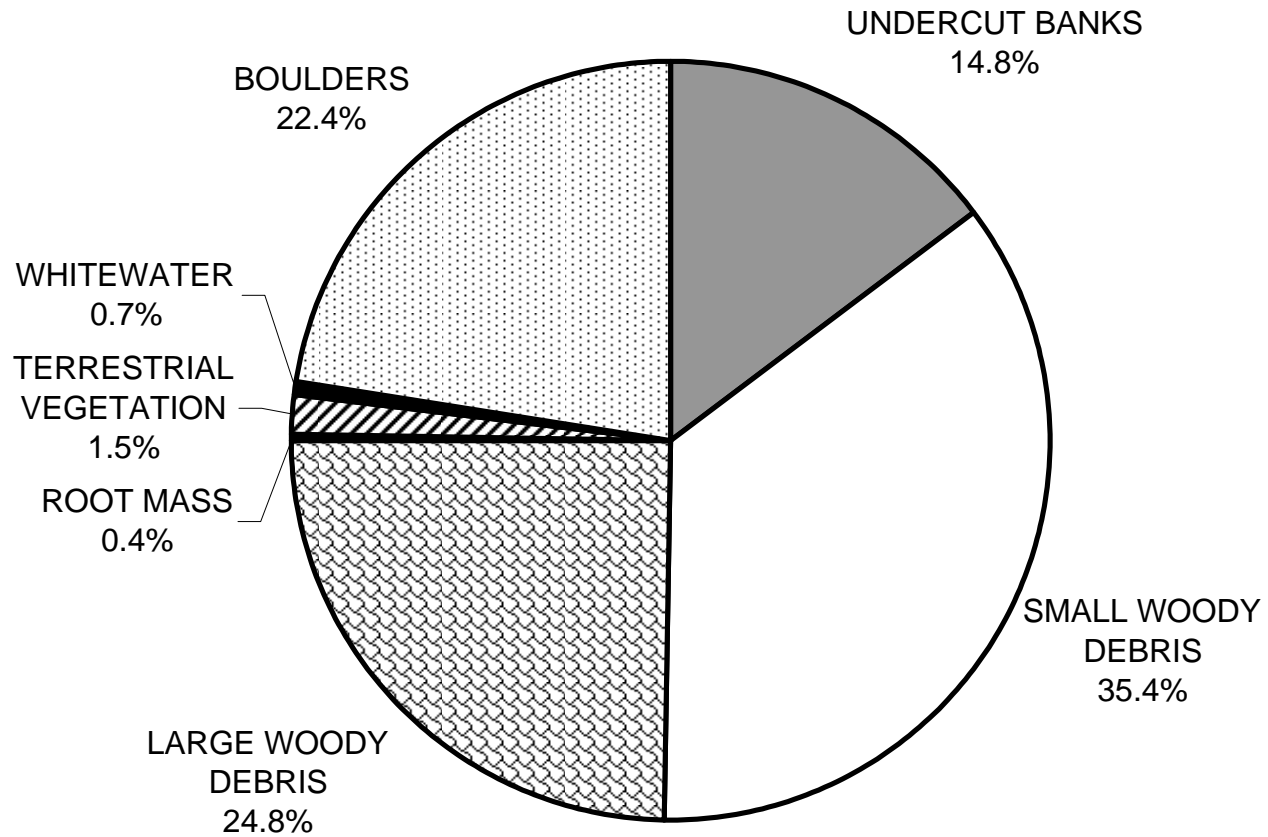
GRAPH 5

COON CREEK 2012 PERCENT EMBEDDEDNESS



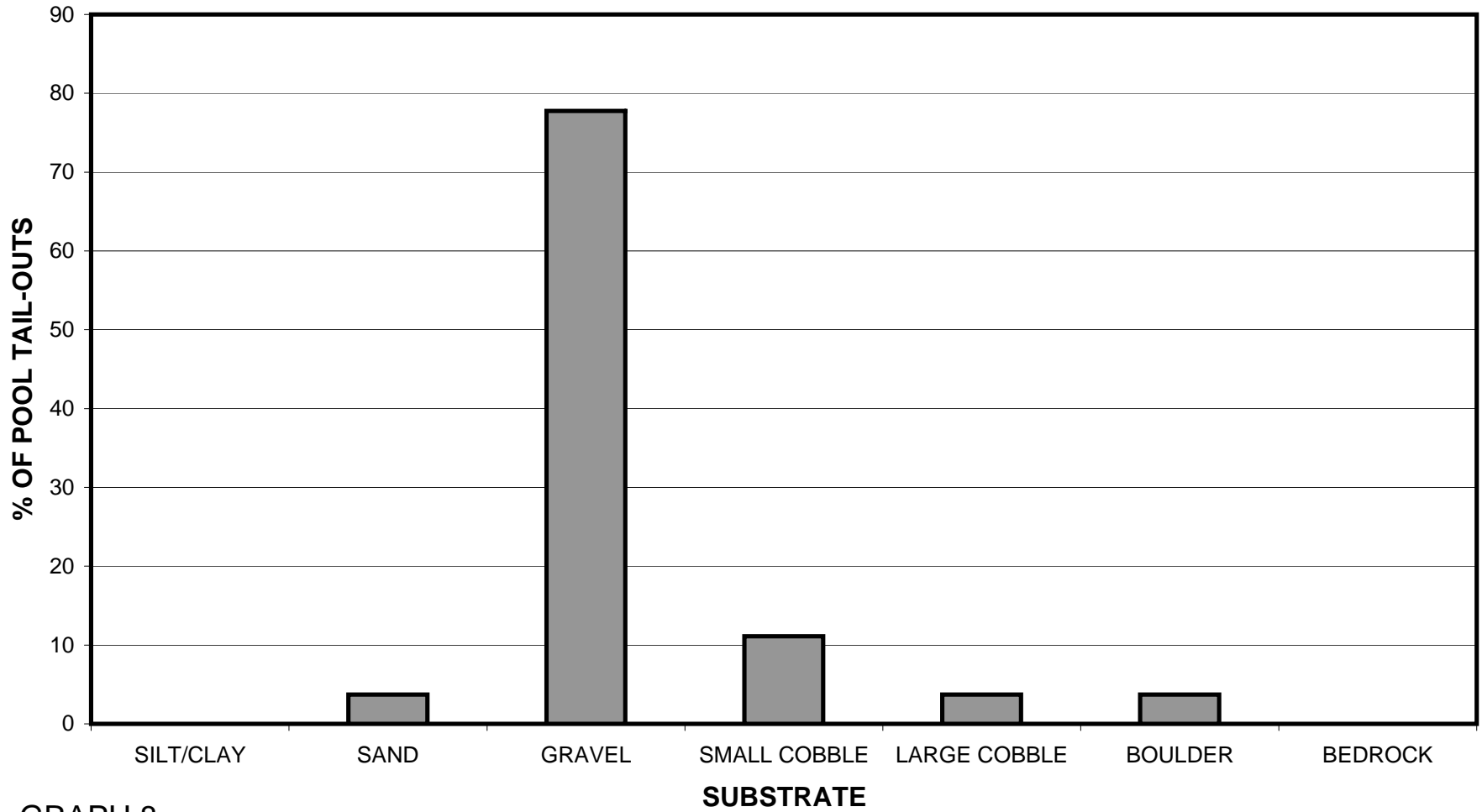
GRAPH 6

COON CREEK 2012 MEAN PERCENT COVER TYPES IN POOLS



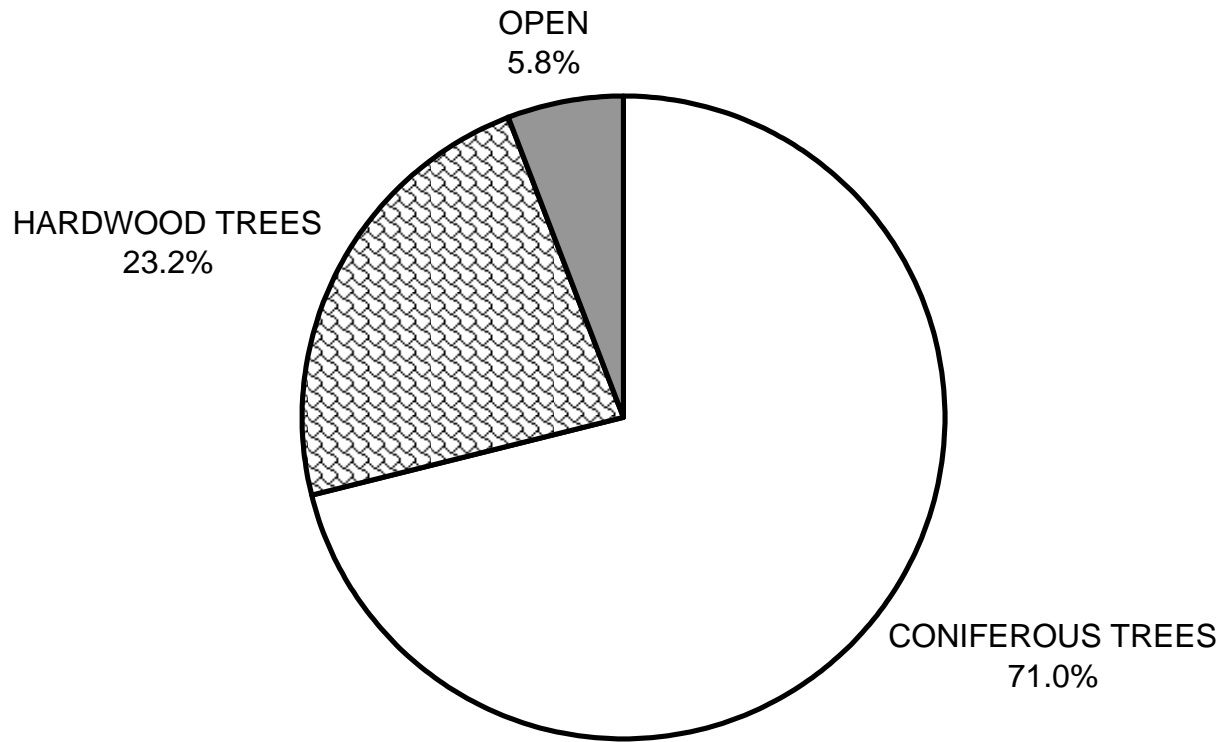
GRAPH 7

COON CREEK 2012 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



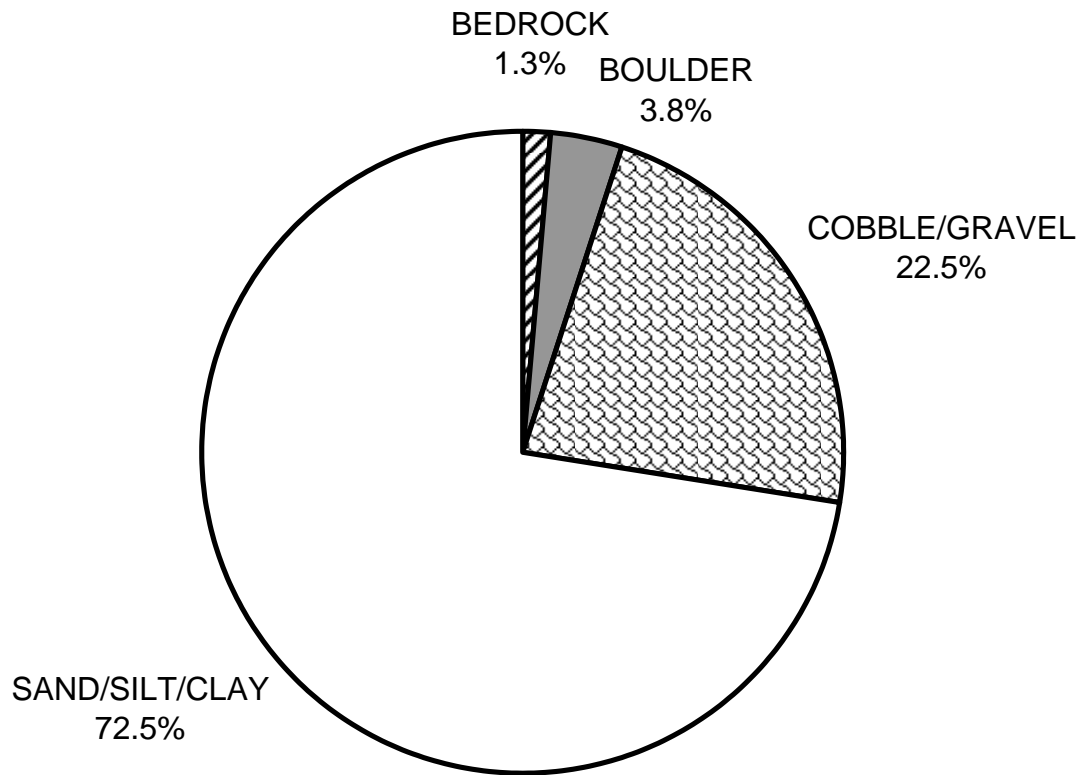
GRAPH 8

COON CREEK 2012 MEAN PERCENT CANOPY



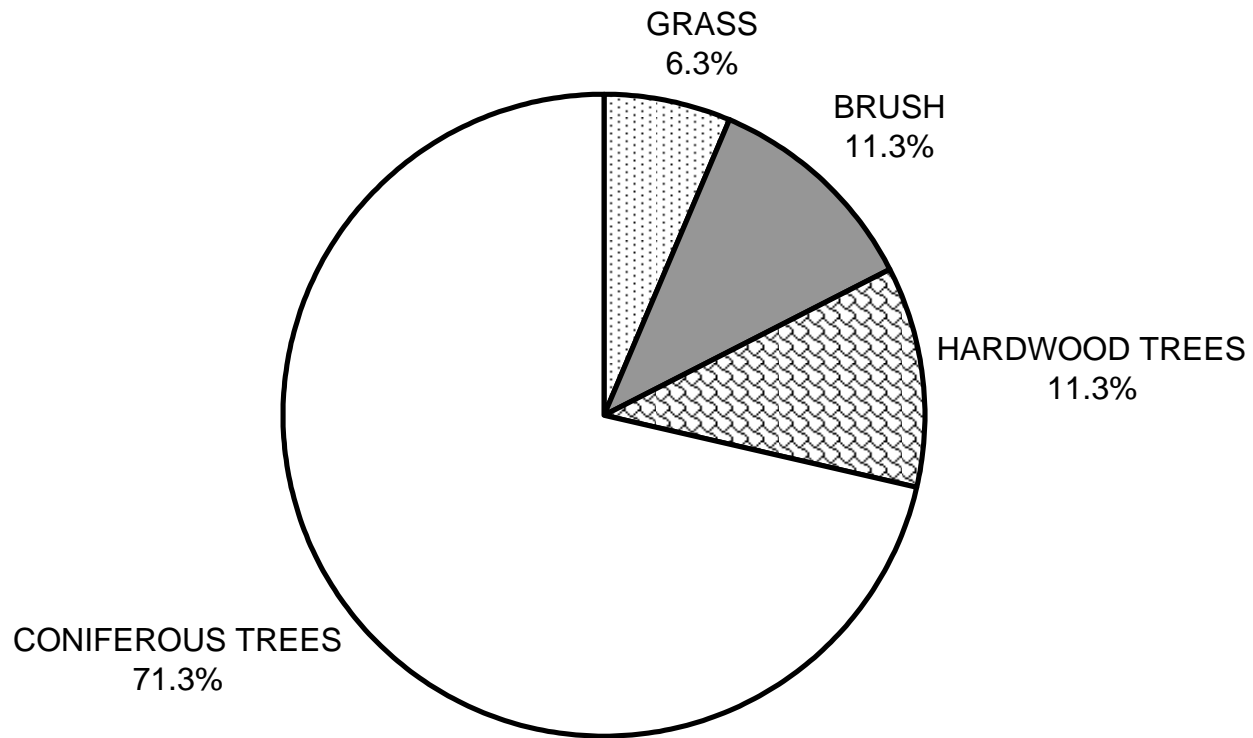
GRAPH 9

COON CREEK 2012 DOMINANT BANK COMPOSITION IN SURVEY REACH



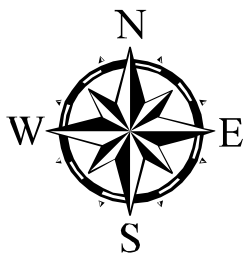
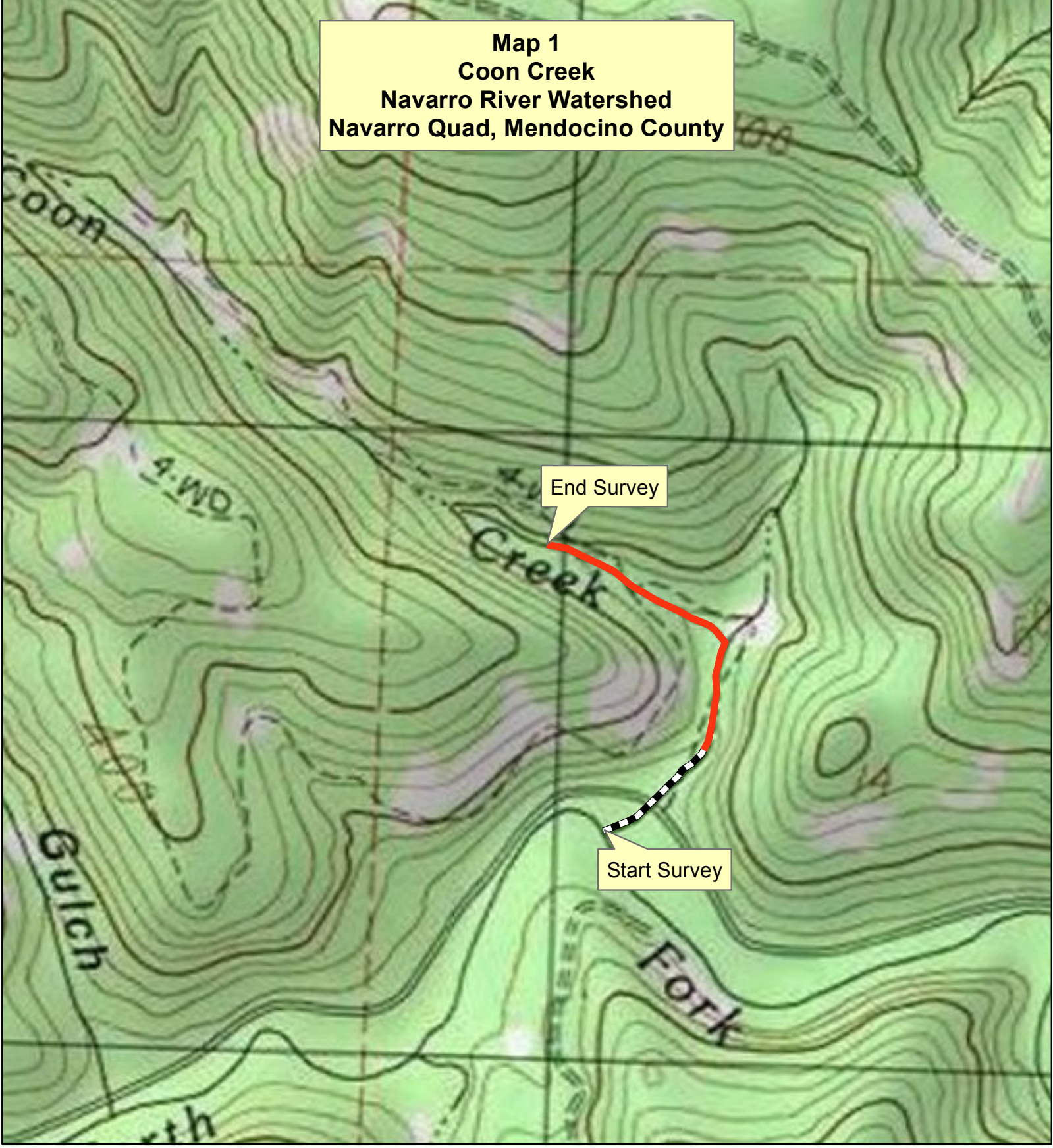
GRAPH 10



COON CREEK 2012 DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

Map 1
Coon Creek
Navarro River Watershed
Navarro Quad, Mendocino County



-  Reach 1, Channel Type E4
-  Reach 2, Channel Type B4

