

STREAM INVENTORY REPORT

Elk Creek

INTRODUCTION

A stream inventory was conducted during July 3, 2007 to August 2, 2007 on Elk Creek. The survey began at the confluence with South Fork Eel River and extended upstream 4.1 miles. Stream inventories and reports to this report were also completed for two tributaries to Elk Creek.

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

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

WATERSHED OVERVIEW

Elk Creek is a tributary to South Fork Eel River, tributary to Eel River, which drains to the Pacific Ocean, located in Humboldt County, California (Map 1). Elk Creek's legal description at the confluence with South Fork Eel River is T2S R3E S21. Its location is 40.2779 degrees north latitude and 123.8541 degrees west longitude, LLID number 1238528402779. Elk Creek is a second order stream and has approximately 6.6 miles of blue line stream according to the USGS Myers Flat 7.5 minute quadrangle. Elk Creek drains a watershed of approximately 6.7 square miles. Elevations range from about 140 feet at the mouth of the creek to 1,100 feet in the headwater areas redwood and Douglas fir forest dominate the watershed, with some oak grassland in the upper reaches of the watershed. The watershed is primarily privately owned and is managed as a rural subdivision. Vehicle access exists via Highway 101 to Myers Flat Exit; take Highway 254 south to Elk Creek Road.

METHODS

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

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

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Elk Creek, embeddedness was ocularly estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26

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- 50% (value 2), 51 - 75% (value 3) and 76 - 100% (value 4). Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate like bedrock, log sills, boulders or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide juvenile salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow separation of territorial units to reduce density related competition for prey. The shelter rating is calculated for each fully-described habitat unit by multiplying shelter value and percent cover. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All cover is then classified according to a list of nine cover types. In Elk Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:

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

8. Canopy:

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

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.

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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 is used to determine fish species and their distribution in the stream. Detailed biological sampling was not conducted on Elk Creek during the 2007 survey. Fish presence was observed from the stream banks during 2007 habitat typing in Elk Creek. Data from a 2007 fish relocation project is listed in the Biological Inventory Results section of this report. These sampling techniques are 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

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Elk 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

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- 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 July 3, 2007 to August, 2, 2007, was conducted by L. Lee, and S. Truett (WSP). The total length of the stream surveyed was 21,862 feet with an additional 145 feet of side channel.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 1.09 cfs on June 6, 2007.

Elk Creek is a B2 channel type for 3,826 feet of the stream surveyed (Reach 1), an F4 channel type for 7,722 feet of the stream surveyed (Reach 2), a B3 channel type for 1,082 feet of the stream surveyed (Reach 3), a G3 channel type for 6,536 feet of the stream surveyed (Reach 4), a B2 channel type for 570 feet of the stream surveyed (Reach 5), and a B4 channel type for 2,126 feet of the stream surveyed (Reach 6). B2 channels are moderately entrenched, moderate gradient, riffle dominated channels with infrequently placed pools, very stable plans and profiles, stable banks, and boulder-dominant substrates. F4 channels are entrenched meandering riffle/pool channels on low gradients with high width/depth ration, and gravel-dominant substrates. B3 channels are moderately entrenched, have moderate gradients, riffle dominated channels with infrequently spaced pools, very stable plans and profiles, stable banks, and cobble-dominant substrates. G3 channel types have entrenched “gully” step-pools and low width/depth ratio on moderate gradients with cobble-dominant substrates. B4 channels are moderately entrenched, have moderate gradients, riffle dominated channels with infrequently spaced pools, very stable plans and profiles, stable banks, and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 54 to 62 degrees Fahrenheit. Air temperatures ranged from 52 to 82 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 39% riffle units, 32% flatwater units, and 28% pool units (Graph 1). Based on total length of Level II habitat types there were 45% riffle units, 34% flatwater units, and 21% pool units (Graph 2).

Twelve Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were 32% low gradient riffle units, 26% run units, and 26% mid-channel pool units (Graph 3). Based on percent total length, low gradient riffle units made up 34%, run units 22%, and mid-channel pool units 19%.

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A total of 158 pools were identified, 157 were fully sampled (Table 3). Main channel pools were the most frequently encountered, at 93% (Graph 4), and comprised 94% 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. Sixty-eight of the 157 pools (43%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 157 pool tail-outs measured, 63 had a value of 1 (40.1%); 65 had a value of 2 (41.4%); 21 had a value of 3 (13.4%); 4 had a value of 4 (2.5%); 4 had a value of 5 (2.5%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst. Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate such as bedrock, log sills, boulders, or other considerations.

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Riffle habitat types had a mean shelter rating of 52, flatwater habitat types had a mean shelter rating of 35, and pool habitats had a mean shelter rating of 71 (Table 1). Of the pool types, the main channel pools had a mean shelter rating of 70, and scour pools had a mean shelter rating of 84 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover types in Elk Creek. Graph 7 describes the pool cover in Elk Creek. 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 observed in 62% of pool tail-outs, and small cobble was observed in 27% of pool tail-outs.

The mean percent canopy density for the surveyed length of Elk Creek was 90%. Ten percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 70% and 30%, respectively. Graph 9 describes the mean percent canopy in Elk Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 78%. The mean percent left bank vegetated was 84%. The dominant elements composing the structure of the stream banks consisted of 85% sand/silt/clay, 10% cobble/gravel, 4% boulder, and 1% bedrock (Graph 10). Deciduous trees were the dominant vegetation type observed in 65% of the units surveyed. Additionally, 22% of the units surveyed had coniferous trees as the dominant vegetation type, and 7% had grass as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Elk Creek was electrofished on June 15, 2007 by the Department of Fish and Game for fish relocation purposes. The electrofishing site began 13,667 feet upstream of the confluence with the South Fork Eel River and ended 13,917 feet upstream of the confluence.. This site yielded 135 steelhead trout juveniles.

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DISCUSSION

Elk Creek is a B2 channel type for the first 3,826 feet of stream surveyed, an F4 channel type for the next 7,722 feet, a B3 channel type for 1,082 feet, a G3 channel type for 6,536 feet, a B2 channel for 570 feet, and a B4 channel type for 2,126 feet of the stream surveyed. The suitability of B2, F4, B3, G3, and B4 channel types for fish habitat improvement structures is as follows: B2 channel types are excellent for plunge weirs, single and opposing wing-deflectors, and log cover. F4 channel types are good for bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover. B3 channel types are excellent for plunge weirs, boulder clusters and bank placed boulders, single and opposing wing deflectors, and log cover. G3 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 July 3, 2007 to August 2, 2007, ranged from 54 to 62 degrees Fahrenheit. Air temperatures ranged from 52 to 82 degrees Fahrenheit. To make any further conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling would need to be conducted.

Flatwater habitat types comprised 34% of the total length of this survey, riffles 45%, and pools 21%. The pools are relatively shallow, with 68 of the 157 (43%) pools having 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 structures that will increase or deepen pool habitat is recommended.

One hundred and twenty-eight of the 157 pool tail-outs measured had embeddedness ratings of 1 or 2. Twenty-five of the pool tail-outs had embeddedness ratings of 3 or 4. Four of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead.

One-hundred and forty of the 157 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter rating for pools was 71. The shelter rating in the flatwater habitats was 35. 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 Elk Creek. 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 90%. Reach 1 had a canopy density of 87.3%, reach 2 had a canopy density of 89.9%, reach 3 had a canopy density of 88%, reach 4 had a canopy density of 91.5%, reach 5 had a canopy density of 93.5%, and reach 6 had a canopy density of 93.1%. In general, revegetation projects are considered when canopy density is less than 80%.

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The percentage of right and left bank covered with was high at 78% and 84%, 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) Elk Creek should be managed as an anadromous, natural production stream.
- 2) 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.
- 3) Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediments entering the stream.
- 4) 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.

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	This survey began at the confluence of Elk Creek and the South Fork Eel River. Reach 1 began here and was a B3 channel type.
340	0006.00	Bridge #1 was 28' wide x 22' high x 116' long. It was made of concrete.
1531	0025.00	There was a 2.5' plunge at the beginning of this unit, and another 2.5' plunge at the end of the unit.
2022	0034.00	Log debris accumulation (LDA) #1 was 14' high x 38' wide x 30' long and contained 12 pieces of large woody debris (LWD). Water flowed through it and it had visible gaps. It was retaining sediment that measured 18' wide x 9' long x 3' deep. The sediment ranged in size from silt to small cobble. Fish were observed above the LDA.
2233	0043.00	There were two 2' plunges at the beginning of this unit.

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2388	0047.00	The plunge at this unit was 2.5' high.
2424	0049.00	The plunge at this unit was 3.5' high.
2822	0062.00	There was a right bank slide, approximately 60' high x 40' long.
2836	0063.00	There was a left bank slide approximately 90' high x 50' long.
3264	0069.00	There was left bank erosion measuring 40' high x 50' long.
3826	0083.00	The channel type changes to an F4 at this unit. This marks the beginning of Reach #2.
5667	0118.00	There was right bank erosion measuring 10' high x 35' long.
5791	0121.00	There was left bank erosion measuring 50' high x 45' long.
5863	0123.00	There was left bank erosion measuring 50' high x 38' long.
6334	0137.00	There was left bank erosion measuring 60' high x 20' long.
6755	0151.00	There was a left bank slide it measured 35' high x 25' long.
6991	0158.00	LDA #2 was 5.5' high x 18' wide x 24' long and contained 10 pieces of LWD. Water was flowing through and there were visible gaps. There was retained sediment that measured 5' wide x 2' long x 2' deep. The sediment was sand and silt. Fish were seen above the LDA.
7123	0160.00	Tributary #1 entered from the right bank. It was flowing at an estimated 0.3 cubic feet per second (cfs) and it was contributing to 5% of Elk Creek's flow. The tributary was accessible to fish and salmonids were observed in it. The tributary had a 3% slope.
7915	0180.00	LDA #3 was 5' high x 17' wide x 12' long and contained 2 pieces of LWD. The retained sediment was 8' wide x 8' long x 6' deep and ranged in size from sand/silt to small cobble.
8869	0208.00	LDA #4 was 6' high x 12' wide x 15' long and contained 2 pieces of LWD. Water was flowing through it and it had visible gaps. The retained sediment measured 12' wide x 6' long x 4' deep and ranged in size from gravel to small cobble. Fish were seen upstream of the LDA.
9204	0219.00	Tributary #2 entered from the right bank, it was not flowing but did have standing water. The temperature of the tributary was 58 degrees Fahrenheit; the temperature of Elk Creek downstream and upstream of the tributary was 59 degrees Fahrenheit. The tributary had an approximate slope of 2% and was fish accessible at higher flows. No fish were observed in the first 250'.

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10047	0240.00	Bridge #2 was 18' wide x 14' high x 24.5' long. It was made of metal.
10170	0241.00	Boulder weir; young-of-the-year salmonids were observed.
11226	0267.00	LWD and boulder structure.
11548	0275.00	The channel type changes to a B3 at this unit. This marks the beginning of Reach #3.
12377	0299.00	There was a 3.5' boulder plunge, with no jump pool, at the beginning of this unit.
12630	0305.00	The channel type changed to a G3. This marks the beginning of Reach #4.
12859	0312.00	There was a 1.5' log plunge at beginning of this unit.
12990	0316.00	Bridge #3 was 18' wide x 16' high x 21' long. It was made of metal and wood.
14865	0369.00	There was a 2' plunge at the beginning of this unit.
14930	0371.00	There was a 1.5' plunge in this unit.
15450	0387.00	Tributary #3 was a dry right bank tributary. .
17725	0439.00	LDA #5 was 5' high x 18' wide x 13' long and 5 pieces of LWD. Water was flowing through, and there were visible gaps. Sediment was being retained in the dimensions of 8' wide x 8' long x 1' deep. The sediment ranged in size from gravel to cobble. Fish were seen above the LDA.
17804	0440.00	There was a left bank slide, it was 60' high x 40' long.
17970	0444.00	Tributary #4 entered from the left bank. It was not accessible to fish due to the high gradient and no fish were observed in its few small pools.
19166	0474.00	Reach #5 began at this unit. Reach 5 was a B2 channel type.
19465	0484.00	Tributary #5 entered from the right bank. It was flowing at 0.01 cfs and was contributing a negligible amount of flow to Elk Creek. The temperature of the tributary was 60 degrees Fahrenheit. The temperature of Elk Creek downstream and upstream of the tributary was also 60 degrees Fahrenheit. It had a very steep gradient and thus was not fish accessible. No fish were seen in the first 350 feet.
19736	0494.00	Reach #6 began at this unit. Reach 6 was a B4 channel type.
20266	0509.00	LDA #6 was 8' high x 16' wide x 70' long and it contained 1 piece of LWD. Water was flowing through it and there were visible gaps in it.

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There was retained sediment in the dimensions of 5' wide, 13' long x 2' deep. The sediment ranged in size from silt/sand to gravel. Salmonids were seen above the LDA.

21252	0538.00	There was a 1.5' plunge.
21360	0541.00	LDA #7 was 4' high x 14' wide x 10' long and contained 4 pieces of LWD. Water was flowing through and there were visible gaps. The retained sediment measured 7' wide x 24' long x 4' deep. The sediment ranged in size from sand/silt to small cobble. Fish were seen above the LDA.
21360	0541.00	There was a left bank slide measuring 40' high x 40' long.
21375	0542.00	Tributary #6 entered from the left bank. It had negligible flow and was contributing a negligible amount to Elk Creek's flow. The temperature of the tributary was 56 degrees Fahrenheit. The temperature of Elk Creek downstream and upstream of the tributary was 56 degrees Fahrenheit as well. The tributary was not accessible to fish due to its high gradient. Fish were not observed in the tributary.
21542	0548.00	LDA #8 was 5' high x 24' wide x 47' long and contained 10 pieces of LWD. Water was flowing through, and there were visible gaps in the LDA. The sediment retained by the LDA measured 27' wide x 14' long x 5' deep and ranged in size from sand/silt to large cobble. Fish were seen above the LDA.
21664	0552.00	Tributary #7 entered from the right bank. Its temperature was 56 degrees Fahrenheit. The temperature of Elk Creek downstream and upstream of the tributary was 56 degrees Fahrenheit. The tributary was accessible to fish and salmonids were seen in the tributary.
21862	0553.00	The survey ended due to Elk Creek turning high gradient with a dominant substrate of 3'+ boulders. This unit marks a possible end of anadromy.

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 }

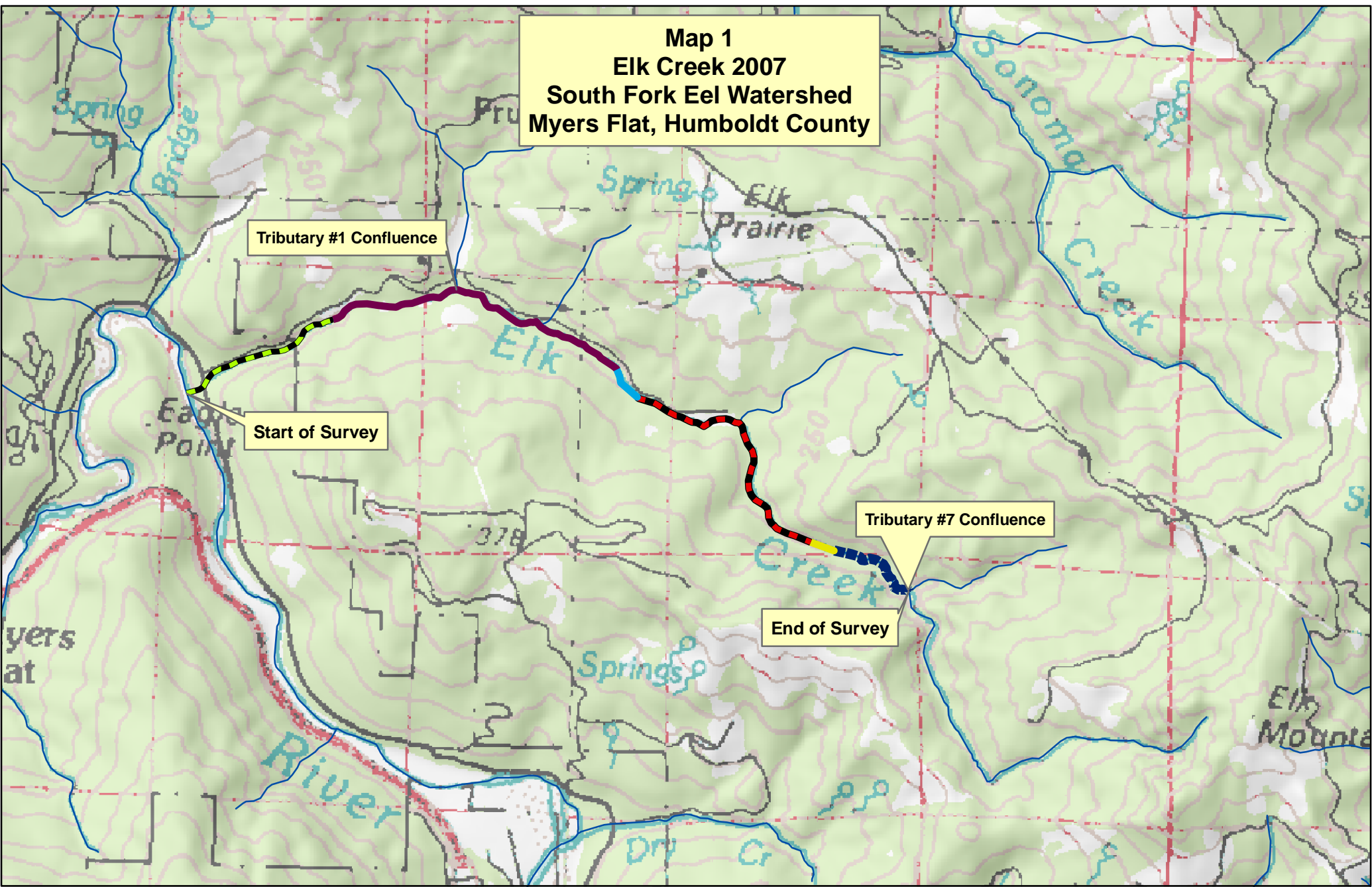
BACKWATER POOLS

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]	

Map 1
Elk Creek 2007
South Fork Eel Watershed
Myers Flat, Humboldt County



Legend

- | | |
|--------------------------|--------------------------|
| Reach 1, B2 Channel Type | Reach 4, G3 Channel Type |
| Reach 2, F4 Channel Type | Reach 5, B2 Channel Type |
| Reach 3, B3 Channel Type | Reach 6, B4 Channel Type |

0 1,300 2,600 5,200 Feet



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

Stream Name: Elk Creek

LLID: 1238528402779

Drainage: Eel River - South Fork

Survey Dates: 7/3/2007 to 8/2/2007

Confluence Location: Quad: MYERS FLAT

Legal Description: T02SR03ES21

Latitude: 40:16:40.0N

Longitude: 123:51:10.0

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Mean Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating
1	0	DRY	0.2	102	102	0.5									
180	31	FLATWATER	32.3	41	7414	33.7	8.5	0.6	1.0	391	70375	245	44134		35
158	157	POOL	28.3	29	4575	20.8	11.8	0.9	1.9	331	52276	469	74163	331	71
219	37	RIFFLE	39.2	45	9916	45.1	10.6	0.4	0.8	303	66459	138	30130		52
Total Units	Total Units Fully Measured				Total Length (ft.)						Total Area (sq.ft.)		Total Volume (cu.ft.)		
558	225				22007						189110		148427		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Elk Creek

LLID: 1238528402779

Drainage: Eel River - South Fork

Survey Dates: 7/3/2007 to 8/2/2007

Confluence Location: Quad: MYERS FLAT

Legal Description: T02SR03ES21

Latitude: 40:16:40.0N

Longitude: 123:51:10.0W

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 (%)
177	26	LGR	31.7	42	7378	33.5	10	0.4	1.4	288	51062	125	22081		43	91
42	11	HGR	7.5	60	2538	11.5	11	0.5	1.5	339	14233	168	7052		72	90
143	22	RUN	25.6	33	4767	21.7	8	0.6	1.6	270	38681	165	23622		28	90
37	9	SRN	6.6	72	2647	12.0	9	0.6	1.6	685	25362	441	16307		52	91
143	142	MCP	25.6	29	4106	18.7	12	0.9	4.1	331	47264	477	68161	338	70	90
2	2	CCP	0.4	37	74	0.3	12	0.8	2	419	837	433	866	349	20	94
2	2	STP	0.4	58	115	0.5	12	0.5	1.2	444	888	460	919	193	120	87
2	2	CRP	0.4	48	97	0.4	13	1.0	3.3	657	1315	991	1981	728	60	94
1	1	LSL	0.2	19	19	0.1	16	0.9	2	289	289	347	347	260	120	89
4	4	LSR	0.7	24	97	0.4	12	0.7	2	269	1076	283	1133	185	96	93
4	4	PLP	0.7	17	67	0.3	10	0.8	2.9	152	607	191	765	126	75	84
1	0	DRY	0.2	102	102	0.5										

Total Units
558

Total Units Fully Measured
225

Total Length (ft.)
22007

Total Area (sq.ft.)
181614

Total Volume (cu.ft.)
143233

Table 3 - Summary of Pool Types

Stream Name: Elk Creek

LLID: 1238528402779

Drainage: Eel River - South Fork

Survey Dates: 7/3/2007 to 8/2/2007

Confluence Location: Quad: MYERS FLAT

Legal Description: T02SR03ES21

Latitude: 40:16:40.0N

Longitude: 123:51:10.0W

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
147	146	MAIN	93	29	4295	94	11.8	0.9	333	48992	336	49407	70
11	11	SCOUR	7	25	280	6	11.7	0.8	299	3286	269	2960	84
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)		Total Volume (cu.ft.)	
158	157				4575					52278		52367	

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

Stream Name: Elk Creek

LLID: 1238528402779

Drainage: Eel River - South Fork

Survey Dates: 7/3/2007 to 8/2/2007

Confluence Location: Quad: MYERS FLAT

Legal Description: T02SR03ES21

Latitude: 40:16:40.0N

Longitude: 123:51:10.0W

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
142	MCP	90	9	6	72	51	45	32	15	11	1	1
2	CCP	1	0	0	1	50	1	50	0	0	0	0
2	STP	1	0	0	2	100	0	0	0	0	0	0
2	CRP	1	0	0	0	0	1	50	1	50	0	0
1	LSL	1	0	0	0	0	1	100	0	0	0	0
4	LSR	3	0	0	3	75	1	25	0	0	0	0
4	PLP	3	0	0	2	50	2	50	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
157			9	6	80	51	51	32	16	10	1	1

Mean Maximum Residual Pool Depth (ft.): 1.9

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Elk Creek

LLID: 1238528402779

Drainage: Eel River - South Fork

Survey Dates: 7/3/2007 to 8/2/2007

Dry Units: 1

Confluence Location: Quad: MYERS FLAT

Legal Description: T02SR03ES21

Latitude: 40:16:40.0N

Longitude: 123:51:10.0W

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
177	26	LGR	0	19	6	1	51	0	4	18	0
42	11	HGR	0	25	0	4	23	0	5	38	4
219	37	TOTAL RIFFLE	0	21	5	1	43	0	5	24	1
143	22	RUN	7	14	17	2	36	0	0	24	1
37	9	SRN	9	10	23	10	26	0	2	21	0
180	31	TOTAL FLAT	7	13	19	4	33	0	1	23	0
143	142	MCP	10	21	29	9	9	2	0	18	1
2	2	CCP	55	18	0	0	28	0	0	0	0
2	2	STP	0	3	0	10	5	0	15	68	0
2	2	CRP	13	15	30	0	20	0	0	23	0
1	1	LSL	5	50	35	0	10	0	0	0	0
4	4	LSR	10	29	55	0	6	0	0	0	0
4	4	PLP	0	13	15	8	5	0	26	34	0
158	157	TOTAL POOL	10	21	29	9	10	2	1	19	1
558	225	TOTAL	8	20	23	7	18	1	2	20	1

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Elk Creek

LLID: 1238528402779

Drainage: Eel River - South Fork

Survey Dates: 7/3/2007 to 8/2/2007

Dry Units: 1

Confluence Location: Quad: MYERS FLAT

Legal Description: T02SR03ES21

Latitude: 40:16:40.0N

Longitude: 123:51:10.0W

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
177	26	LGR	0	0	15	38	27	19	0
42	11	HGR	0	0	9	0	55	36	0
143	22	RUN	0	5	23	36	32	5	0
37	9	SRN	0	0	11	56	11	22	0
143	142	MCP	9	12	20	24	23	11	1
2	2	CCP	0	0	50	0	50	0	0
2	2	STP	0	0	0	0	0	100	0
2	2	CRP	50	0	50	0	0	0	0
1	1	LSL	0	0	0	0	100	0	0
4	4	LSR	0	0	0	100	0	0	0
4	4	PLP	0	0	25	0	25	50	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Elk Creek

LLID: 1238528402779

Drainage: Eel River - South Fork

Survey Dates: 7/3/2007 to 8/2/2007

Confluence Location: Quad: MYERS FLAT

Legal Description: T02SR03ES21

Latitude: 40:16:40.0N

Longitude: 123:51:10.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
90	30	70	0	78	84

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.

Stream Name: Elk Creek	LLID: 1238528402779	Drainage: Eel River - South Fork
Survey Dates: 7/3/2007 to 8/2/2007	Survey Length (ft.): 22007	Main Channel (ft.): 21862
Confluence Location: Quad: MYERS FLAT	Legal Description: T02SR03ES21	Side Channel (ft.): 145
	Latitude: 40:16:40.0N	Longitude: 123:51:10.0W

Summary of Fish Habitat Elements By Stream Reach

Channel Type:	B2			Canopy Density (%): 87.3					Pools by Stream Length (%): 16.8				
Reach Length (ft.):	3826			Coniferous Component (%): 37.9					Pool Frequency (%): 33.3				
Riffle/Flatwater Mean Width (ft.):	10.9			Hardwood Component (%): 62.1					Residual Pool Depth (%):				
BFW:				Dominant Bank Vegetation: Hardwood Trees					< 2 Feet Deep: 85				
Range (ft.):	19	to	47	Vegetative Cover (%): 71.4					2 to 2.9 Feet Deep: 4				
Mean (ft.):	32			Dominant Shelter: Boulders					3 to 3.9 Feet Deep: 11				
Std. Dev.:	8			Dominant Bank Substrate Type: Sand/Silt/Clay					>= 4 Feet Deep: 0				
Base Flow (cfs.):	1.1			Occurrence of LWD (%): 13					Mean Max Residual Pool Depth (ft.): 1.5				
Water (F): 57 - 62	Air (F): 58 - 69	LWD per 100 ft.:			Mean Pool Shelter Rating: 88								
Dry Channel (ft): 102	Riffles: 1												
	Pools: 7												
	Flat: 1												
Pool Tail Substrate (%):	Silt/Clay: 0	Sand: 4	Gravel: 48	Sm Cobble: 30	Lg Cobble: 7	Boulder: 11	Bedrock: 0						
Embeddedness Values (%):	1. 81.5	2. 0.0	3. 3.7	4. 3.7	5. 11.1								

Channel Type:	F4	Canopy Density (%):	89.9	Pools by Stream Length (%):	28.8		
Reach Length (ft.):	7722	Coniferous Component (%):	34.2	Pool Frequency (%):	33.0		
Riffle/Flatwater Mean Width (ft.):	11.4	Hardwood Component (%):	65.8	Residual Pool Depth (%):			
BFW:		Dominant Bank Vegetation:	Hardwood Trees	< 2 Feet Deep:	36		
Range (ft.):	14 to 27	Vegetative Cover (%):	81.2	2 to 2.9 Feet Deep:	50		
Mean (ft.):	20	Dominant Shelter:	Large Woody Debris	3 to 3.9 Feet Deep:	14		
Std. Dev.:	4	Dominant Bank Substrate Type:	Sand/Silt/Clay	>= 4 Feet Deep:	0		
Base Flow (cfs.):	1.1	Occurrence of LWD (%):	32	Mean Max Residual Pool Depth (ft.):	2.2		
Water (F):	56 - 62	Air (F):	59 - 82	Mean Pool Shelter Rating:	78		
Dry Channel (ft):	0	Riffles:	1				
		Pools:	5				
		Flat:	1				
Pool Tail Substrate (%):	Silt/Clay: 0	Sand: 2	Gravel: 58	Sm Cobble: 36	Lg Cobble: 5	Boulder: 0	Bedrock: 0
Embeddedness Values (%):	1. 54.7	2. 39.1	3. 6.3	4. 0.0	5. 0.0		

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

Channel Type: B3	Canopy Density (%): 88.0	Pools by Stream Length (%): 26.1
Reach Length (ft.): 1082	Coniferous Component (%): 41.1	Pool Frequency (%): 33.3
Riffle/Flatwater Mean Width (ft.): 8.9	Hardwood Component (%): 58.9	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 60
Range (ft.): 16 to 17	Vegetative Cover (%): 77.5	2 to 2.9 Feet Deep: 40
Mean (ft.): 16	Dominant Shelter: Large 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.): 1.1	Occurrence of LWD (%): 23	Mean Max Residual Pool Depth (ft.): 1.8
Water (F): 56 - 60	Air (F): 58 - 65	Mean Pool Shelter Rating: 62
Dry Channel (ft): 0	LWD per 100 ft.:	
	Riffles: 1	
	Pools: 6	
	Flat: 1	
Pool Tail Substrate (%): Silt/Clay: 0	Sand: 10	Gravel: 60
	Sm Cobble: 10	Lg Cobble: 10
	Boulder: 10	Bedrock: 0
Embeddedness Values (%): 1. 20.0	2. 40.0	3. 20.0
	4. 10.0	5. 10.0

STREAM REACH: 4

Channel Type: G3	Canopy Density (%): 91.4	Pools by Stream Length (%): 18.0
Reach Length (ft.): 6536	Coniferous Component (%): 31.4	Pool Frequency (%): 25.9
Riffle/Flatwater Mean Width (ft.): 7.4	Hardwood Component (%): 68.6	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 59
Range (ft.): 14 to 25	Vegetative Cover (%): 83.2	2 to 2.9 Feet Deep: 30
Mean (ft.): 17	Dominant Shelter: Large Woody Debris	3 to 3.9 Feet Deep: 9
Std. Dev.: 3	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 2
Base Flow (cfs.): 1.1	Occurrence of LWD (%): 28	Mean Max Residual Pool Depth (ft.): 1.9
Water (F): 54 - 59	Air (F): 52 - 68	Mean Pool Shelter Rating: 59
Dry Channel (ft): 0	LWD per 100 ft.:	
	Riffles: 1	
	Pools: 5	
	Flat: 2	
Pool Tail Substrate (%): Silt/Clay: 0	Sand: 2	Gravel: 80
	Sm Cobble: 14	Lg Cobble: 5
	Boulder: 0	Bedrock: 0
Embeddedness Values (%): 1. 9.1	2. 65.9	3. 22.7
	4. 2.3	5. 0.0

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 5

Channel Type: B2	Canopy Density (%): 93.5	Pools by Stream Length (%): 9.5
Reach Length (ft.): 570	Coniferous Component (%): 1.8	Pool Frequency (%): 15.0
Riffle/Flatwater Mean Width (ft.): 7.7	Hardwood Component (%): 98.2	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 100
Range (ft.): 21 to 23	Vegetative Cover (%): 85.0	2 to 2.9 Feet Deep: 0
Mean (ft.): 22	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 0
Std. Dev.: 1	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 1.1	Occurrence of LWD (%): 5	Mean Max Residual Pool Depth (ft.): 1.0
Water (F): 54 - 61	Air (F): 58 - 66	Mean Pool Shelter Rating: 35
Dry Channel (ft): 0	LWD per 100 ft.:	
	Riffles: 1	
	Pools: 2	
	Flat: 1	
Pool Tail Substrate (%): Silt/Clay: 0	Sand: 0	Gravel: 0
	Sm Cobble: 67	Lg Cobble: 33
	Boulder: 0	Bedrock: 0
Embeddedness Values (%): 1. 0.0	2. 33.3	3. 33.3
	4. 33.3	5. 0.0

STREAM REACH: 6

Channel Type: B4	Canopy Density (%): 93.1	Pools by Stream Length (%): 7.6
Reach Length (ft.): 2126	Coniferous Component (%): 7.0	Pool Frequency (%): 15.0
Riffle/Flatwater Mean Width (ft.): 8.9	Hardwood Component (%): 93.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 89
Range (ft.): 12 to 23	Vegetative Cover (%): 90.0	2 to 2.9 Feet Deep: 11
Mean (ft.): 17	Dominant Shelter: Terrestrial Veg.	3 to 3.9 Feet Deep: 0
Std. Dev.: 4	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 1.1	Occurrence of LWD (%): 3	Mean Max Residual Pool Depth (ft.): 1.4
Water (F): 56 - 57	Air (F): 63 - 67	Mean Pool Shelter Rating: 46
Dry Channel (ft): 0	LWD per 100 ft.:	
	Riffles: 2	
	Pools: 3	
	Flat: 2	
Pool Tail Substrate (%): Silt/Clay: 0	Sand: 0	Gravel: 67
	Sm Cobble: 33	Lg Cobble: 0
	Boulder: 0	Bedrock: 0
Embeddedness Values (%): 1. 0.0	2. 66.7	3. 33.3
	4. 0.0	5. 0.0

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Elk Creek

LLID: 1238528402779

Drainage: Eel River - South Fork

Survey Dates: 7/3/2007 to 8/2/2007

Confluence Location: Quad: MYERS FLAT

Legal Description: T02SR03ES21

Latitude: 40:16:40.0N

Longitude: 123:51:10.0W

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	4	1	1.1
Boulder	13	3	3.6
Cobble / Gravel	23	24	10.4
Sand / Silt / Clay	185	197	84.9

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	25	7	7.1
Brush	12	14	5.8
Hardwood Trees	144	147	64.7
Coniferous Trees	43	57	22.2
No Vegetation	1	0	0.2

Total Stream Cobble Embeddedness Values: 2

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

StreamName: Elk Creek

LLID: 1238528402779

Drainage: Eel River - South Fork

Survey Dates: 7/3/2007 to 8/2/2007

Confluence Location: Quad: MYERS FLAT

Legal Description: T02SR03ES21

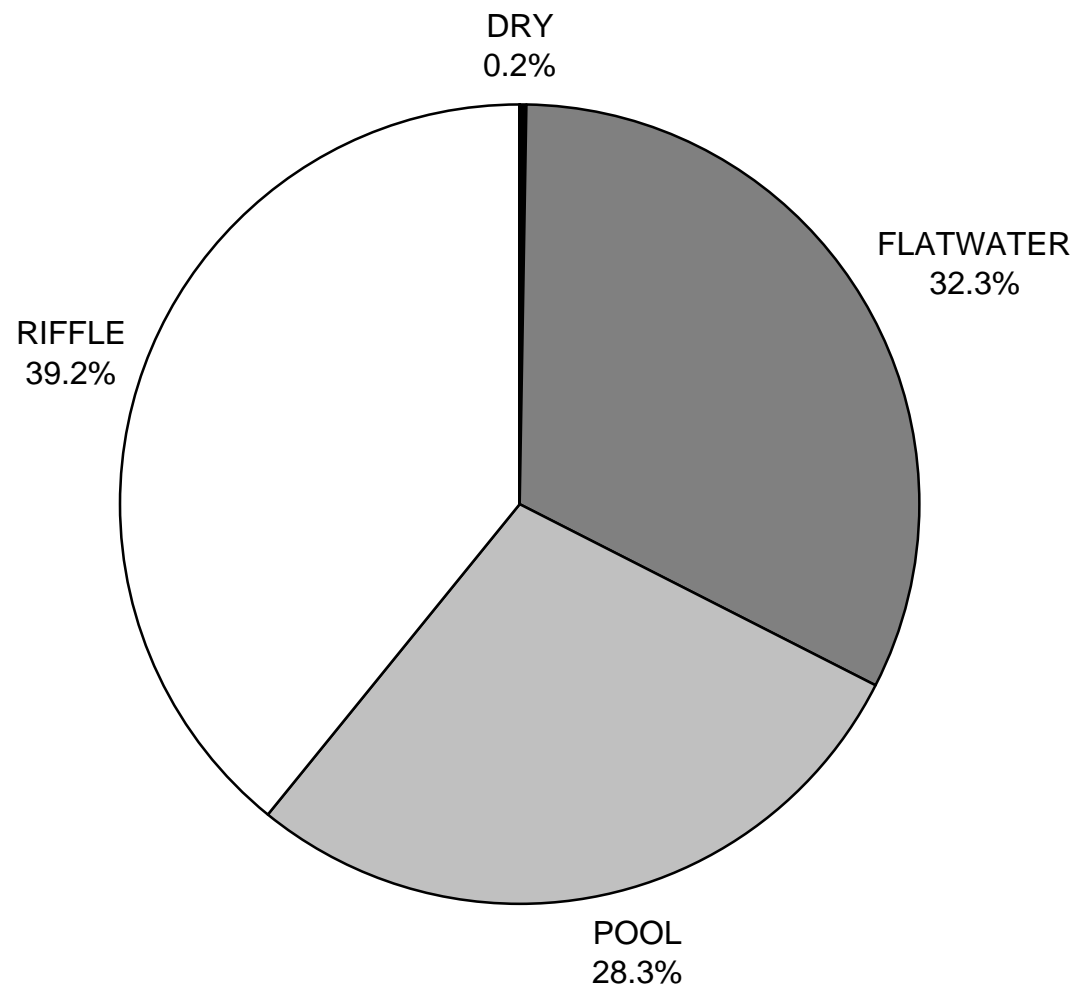
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Longitude: 123:51:10.0W

	Riffles	Flatwater	Pools
<hr/>			
UNDERCUT BANKS (%)	0	7	10
SMALL WOODY DEBRIS (%)	21	13	21
LARGE WOODY DEBRIS (%)	5	19	29
ROOT MASS (%)	1	4	9
TERRESTRIAL VEGETATION (%)	43	33	10
AQUATIC VEGETATION (%)	0	0	2
WHITEWATER (%)	5	1	1
BOULDERS (%)	24	23	19
BEDROCK LEDGES (%)	1	0	1

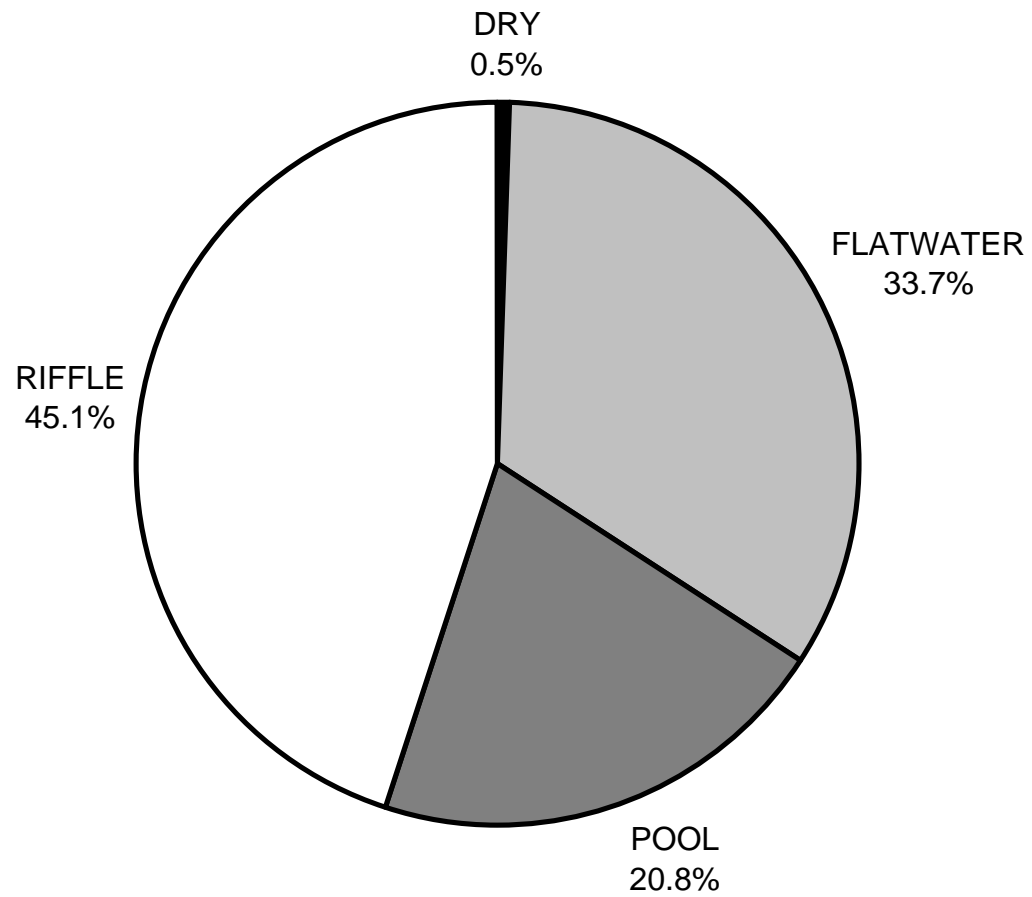
ELK CREEK 2007

HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

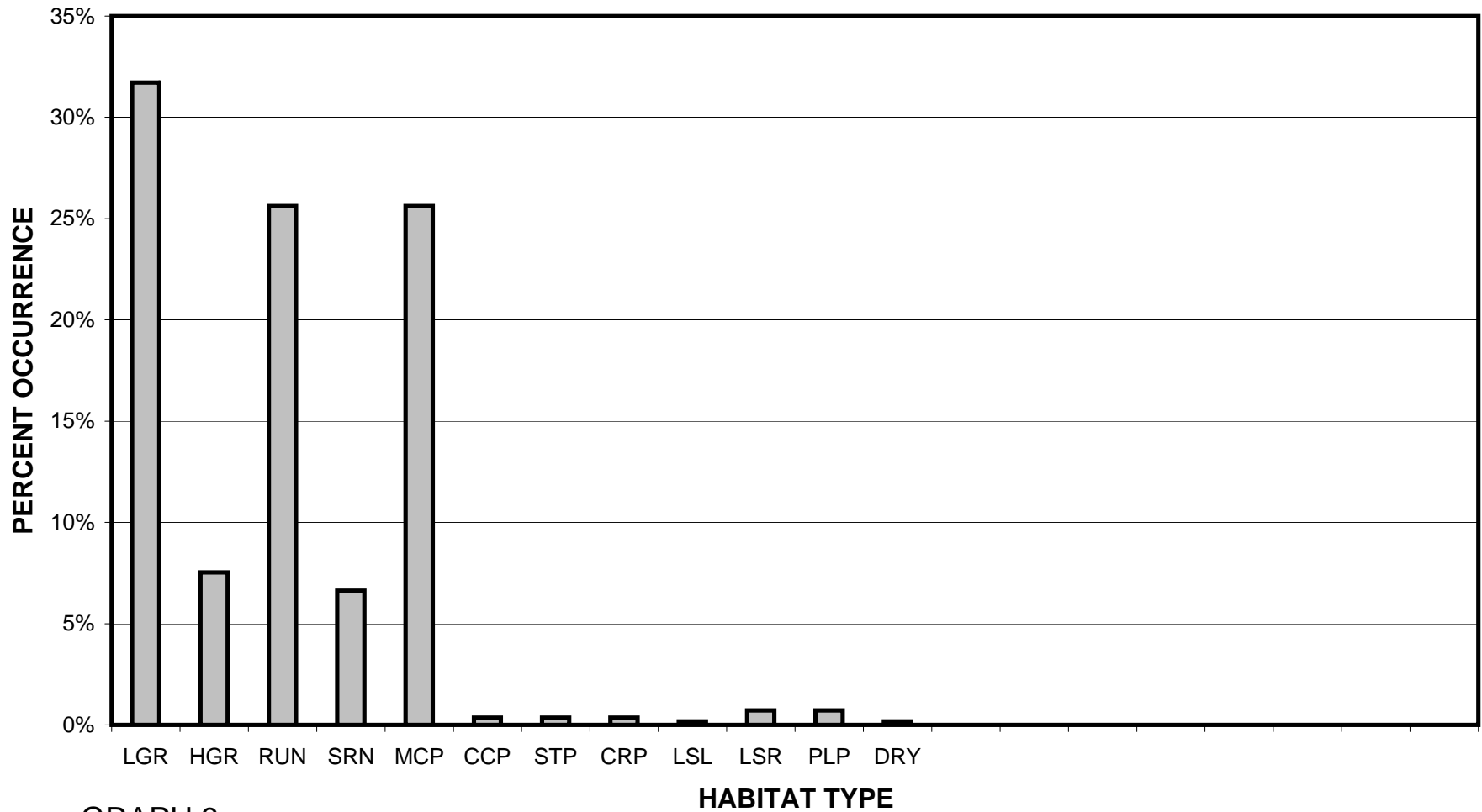
ELK CREEK 2007
HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

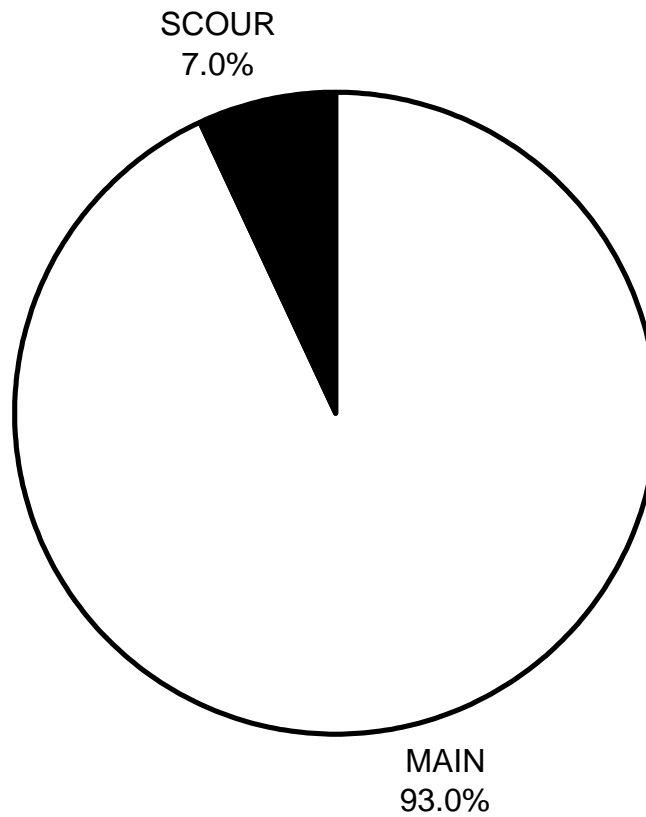
ELK CREEK 2007

HABITAT TYPES BY PERCENT OCCURRENCE



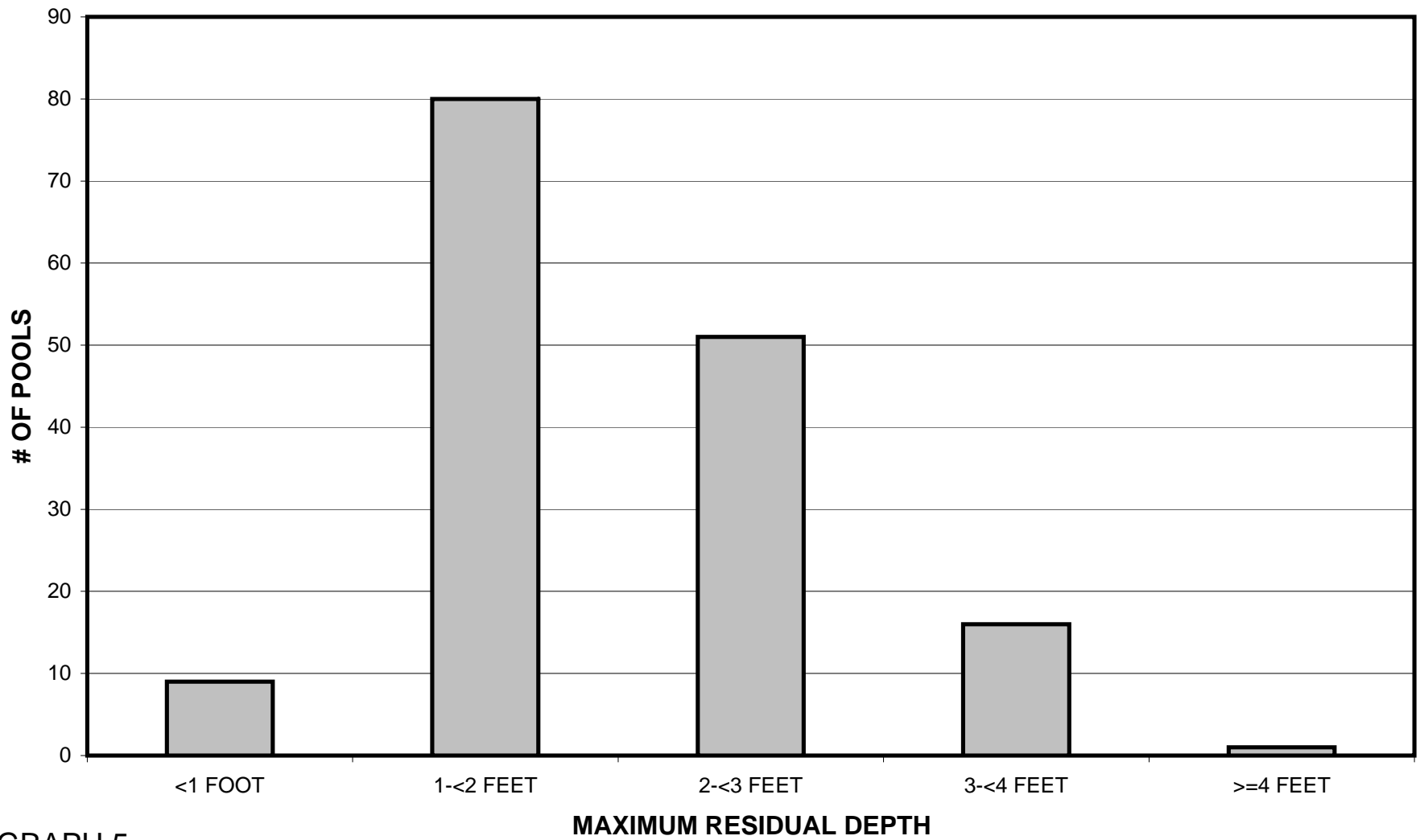
GRAPH 3

ELK CREEK 2007
POOL TYPES BY PERCENT OCCURRENCE



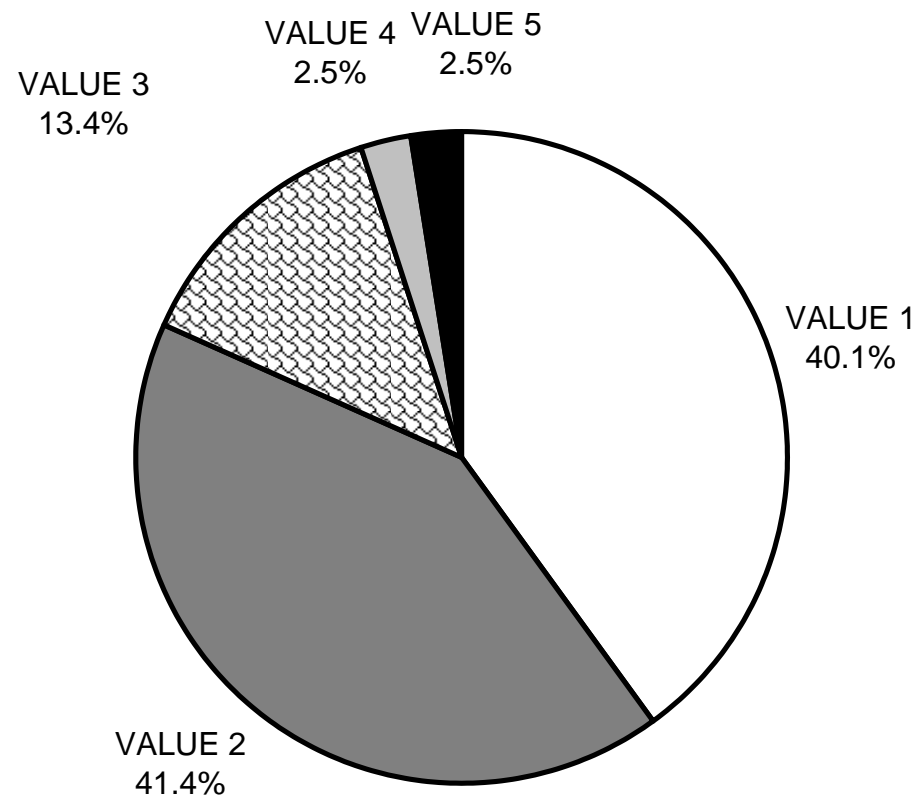
GRAPH 4

ELK CREEK 2007 MAXIMUM DEPTH IN POOLS



GRAPH 5

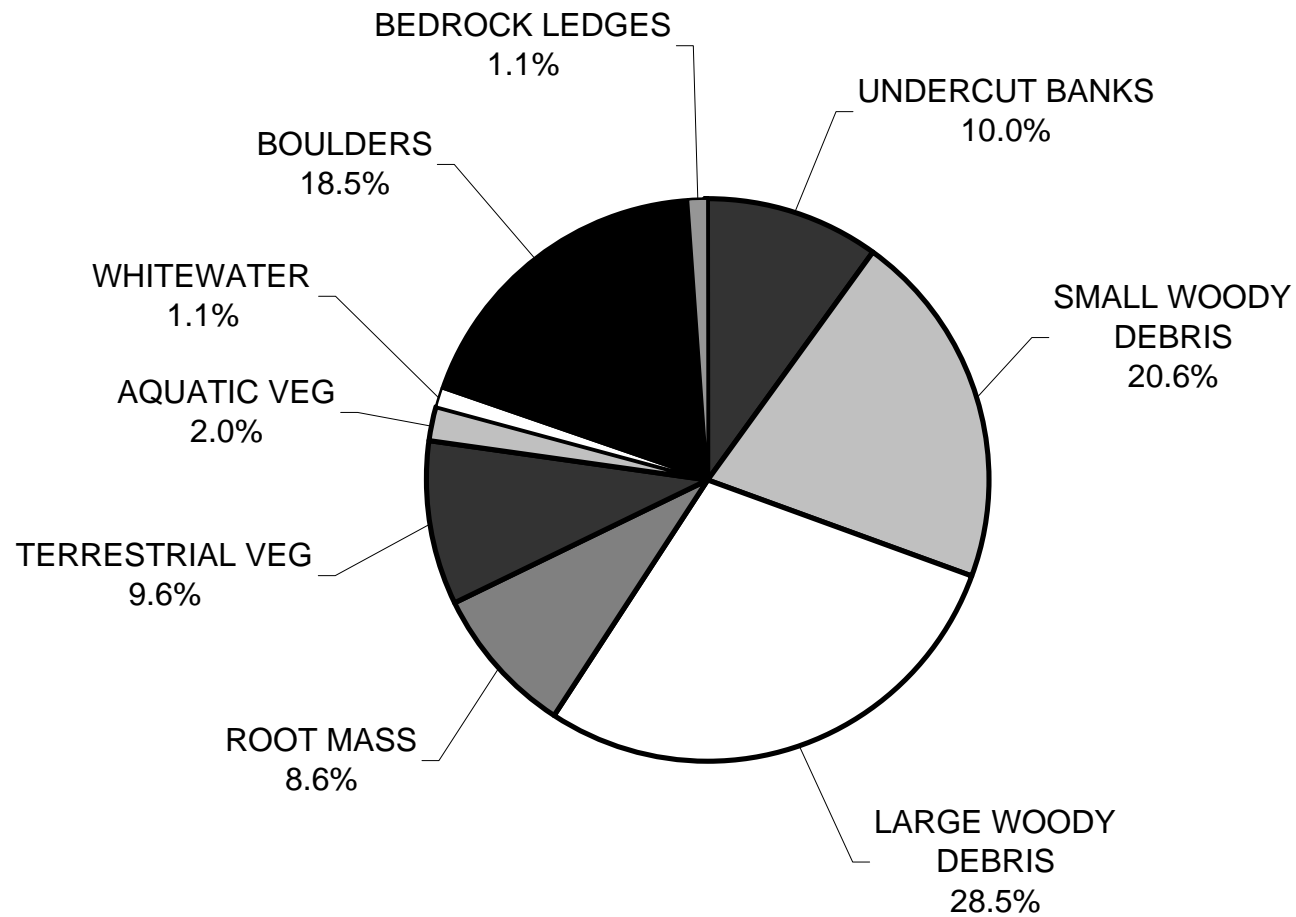
ELK CREEK 2007 PERCENT EMBEDDEDNESS



GRAPH 6

ELK CREEK 2007

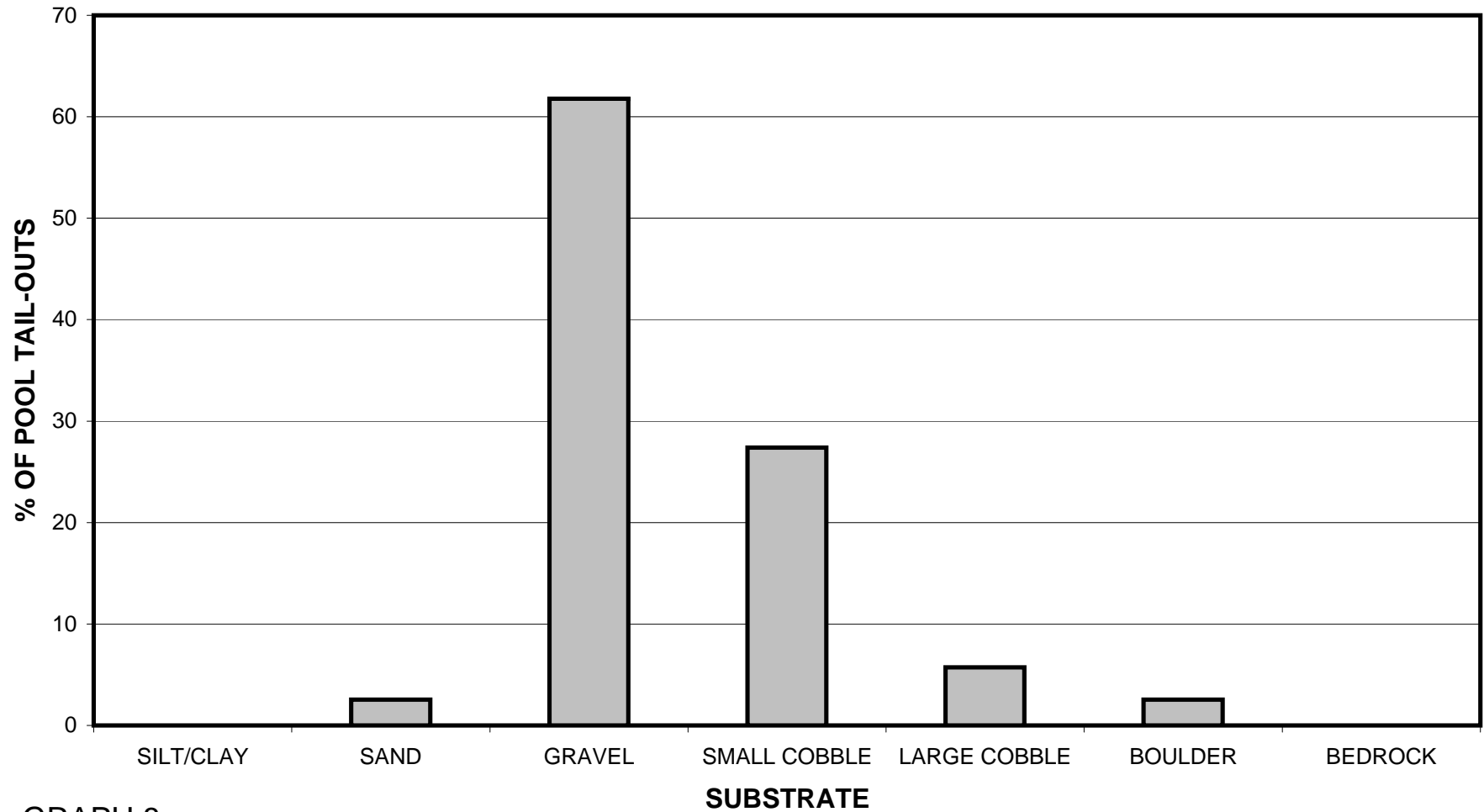
MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

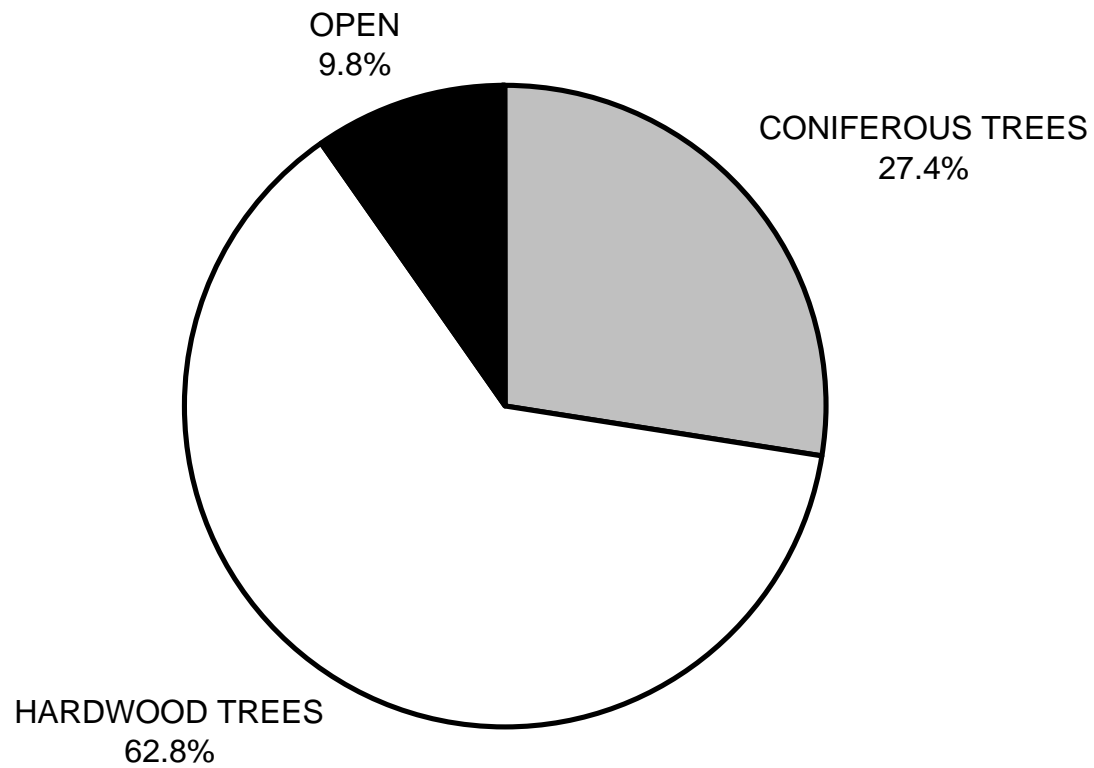
ELK CREEK 2007

SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



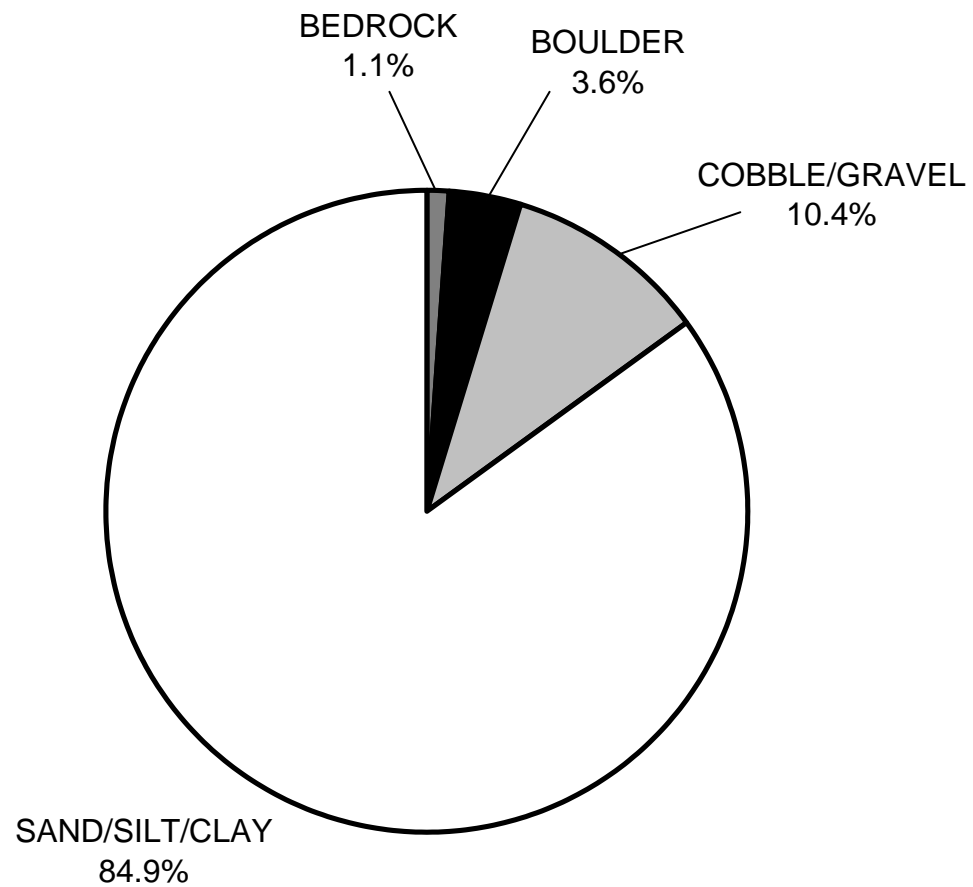
GRAPH 8

**ELK CREEK 2007
MEAN PERCENT CANOPY**



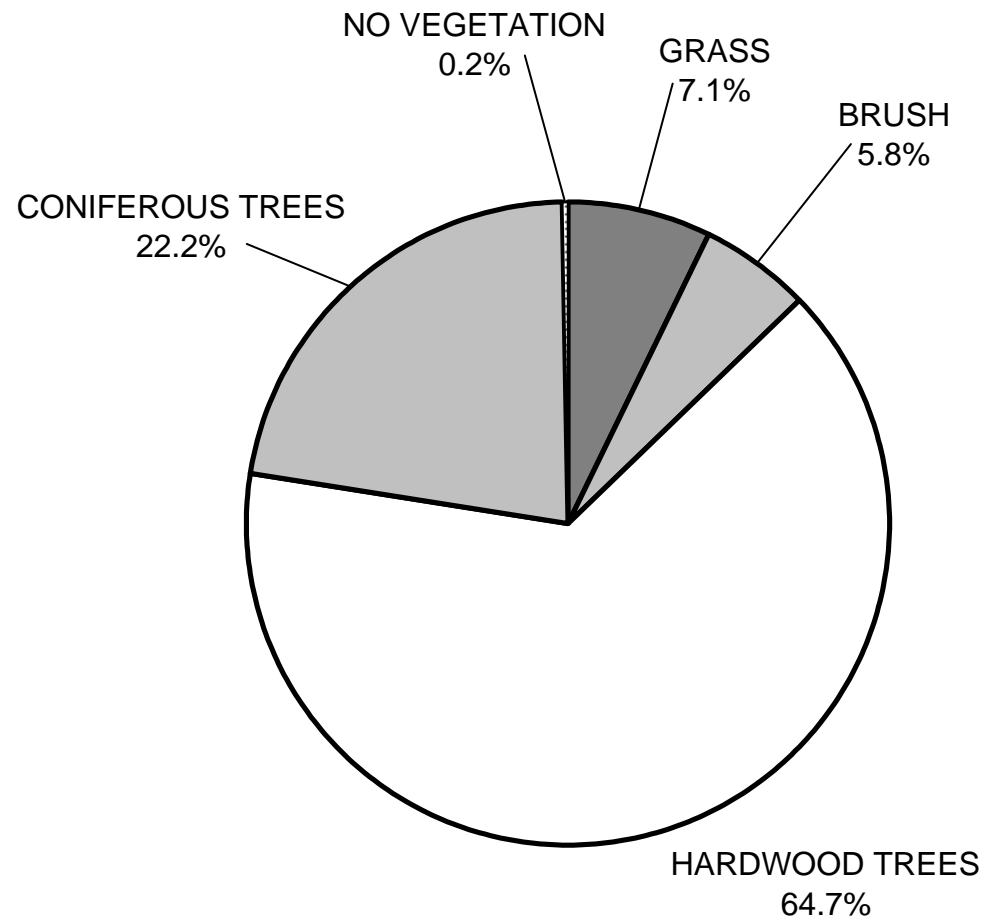
GRAPH 9

ELK CREEK 2007
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

ELK CREEK 2007
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11