

# STREAM INVENTORY REPORT

## East Branch North Fork Big River

### INTRODUCTION

A stream inventory was conducted from June 7 to June 22, 2011 on East Branch North Fork Big River. The survey began at the confluence with North Fork Big River and extended upstream 7.8 miles. A stream inventory and report was also completed for one tributary to East Branch North Fork Big River.

The East Branch North Fork Big River 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 East Branch North Fork Big River. 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

East Branch North Fork Big River is a tributary to North Fork Big River, tributary to Big River, which drains to the Pacific Ocean. It is located in Mendocino County, California (Map 1). East Branch North Fork Big River's legal description at the confluence with North Fork Big River is T17N R15W S20. Its location is 39.3193 degrees north latitude and 123.5551 degrees west longitude, LLID number 1235539393193. East Branch North Fork Big River is a third order stream and has approximately 6.3 miles of blue line stream according to the USGS Comptche 7.5 minute quadrangle. East Branch North Fork Big River drains a watershed of approximately 8.3 square miles. Elevations range from about 220 feet at the mouth of the creek to 1,800 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 U.S. Highway 20.

### METHODS

The habitat inventory conducted in East Branch North Fork Big River follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The California Department of Fish and Game (DFG) personnel or the Watershed Stewards Project/AmeriCorps (WSP) Members that conducted the inventory were trained in standardized habitat inventory methods by the DFG. This inventory was conducted by a two-person team.

### SAMPLING STRATEGY

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

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

### HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the *California Salmonid Stream Habitat Restoration Manual*. This form was used in East Branch North Fork Big River 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". East Branch North Fork Big River 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 East Branch North Fork Big River, 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. In East Branch North Fork Big River, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. Next, 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. The shelter rating is calculated for each fully-described habitat unit by multiplying shelter value and percent 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 East Branch North Fork Big River, 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 East Branch North Fork Big River, 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 East Branch North Fork Big River. In addition, underwater observations were made at 27 sites using techniques discussed in the *California Salmonid Stream Habitat Restoration Manual*.

## DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 2.0.19, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and Game. This program processes and summarizes the data, and produces the following ten tables:

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

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Graphics are produced from the tables using Microsoft Excel. Graphics developed for East Branch North Fork Big River 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 7 to June 22, 2011 was conducted by M. Groff and I. Mikus (DFG), and T. Anderson and B. Schleifer (WSP). The total length of the stream surveyed was 41,085 feet with an additional 23 feet of side channel.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 4.6 cfs on June 8, 2011.

East Branch North Fork Big River is an F4 channel type for 2,082 feet of the stream surveyed (Reach 1), a B4 channel type for 2,665 feet of the stream surveyed (Reach 2), an F4 channel type for 30,016 feet of the stream surveyed (Reach 3), and a G4 channel type for 6,345 feet of the stream surveyed (Reach 4). F4 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios 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. 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 58 degrees Fahrenheit. Air temperatures ranged from 53 to 82 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 38% riffle units, 32% flatwater units, and 30% pool units (Graph 1). Based on total length of Level II habitat types there were 42% flatwater units, 34% riffle units, 23% pool units, and 1% dry units (Graph 2).

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Fifteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffle units, 31%; mid-channel pool units, 22%; and run units 21% (Graph 3). Based on percent total length, low gradient riffle units made up 28%, step run units 24%, run units 18%, and mid-channel pool units 18%.

A total of 266 pools were identified (Table 3). Main channel pools were the most frequently encountered at 77% (Graph 4), and comprised 79% 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. Forty-seven of the 266 pools (18%) had a residual depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 266 pool tail-outs measured, 131 had a value of 1 (49.2%); 105 had a value of 2 (39.5%); 25 had a value of 3 (9.4%); 2 had a value of 4 (0.8%); 3 had a value of 5 (1.1%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate. 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 3, flatwater habitat types had a mean shelter rating of 4, and pool habitats had a mean shelter rating of 14 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 15. Scour pools had a mean shelter rating of 14 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in East Branch North Fork Big River. Graph 7 describes the pool cover in East Branch North Fork Big River. Large woody debris is the dominant pool cover type followed by small woody debris.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 84% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 11% of the pool tail-outs.

The mean percent canopy density for the surveyed length of East Branch North Fork Big River was 92%. Eight percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 33% and 67%, respectively. Graph 9 describes the mean percent canopy in East Branch North Fork Big River.

For the stream reach surveyed, the mean percent right bank vegetated was 97%. The mean percent left bank vegetated was 95%. The dominant elements composing the structure of the stream banks consisted of 44% cobble/gravel, 42% sand/silt/clay, 11% bedrock, and 3% boulder (Graph 10). Coniferous trees were the dominant vegetation type observed in 53% of the units surveyed. Additionally, 34% of the units surveyed had deciduous trees as the dominant vegetation type, and 12% had brush as the dominant vegetation type (Graph 11).

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### BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a snorkel survey at 27 sites for species composition and distribution in East Branch North Fork Big River on June 22, June 23, and July 06, 2011. Water temperatures taken during the survey period ranged from 56 to 59 degrees Fahrenheit. Air temperatures ranged from 60 to 75 degrees Fahrenheit. The sites were sampled by I. Mikus and M. Groff (DFG).

In reach 1, which comprised the first 2,082 feet of stream, one site was sampled. The reach site yielded one young-of-the-year steelhead/rainbow trout (SH/RT) and two coho salmon.

In reach 2, two sites were sampled starting approximately 3,457 feet from the confluence with North Fork Big River and continuing upstream 193 feet. The reach sites yielded eight young-of-the-year SH/RT and four coho salmon.

In reach 3, 18 sites were sampled starting approximately 17,562 feet from the confluence with North Fork Big River and continuing upstream 8,061 feet. The reach sites yielded 68 young-of-the-year SH/RT, eight age 1+ SH/RT, five age 2+ SH/RT, two age 3+ SH/RT and four coho salmon.

In reach 4, four sites were sampled starting approximately 41,061 feet from the confluence with North Fork Big River and continuing upstream 124 feet. The reach sites yielded eight young-of-the-year SH/RT.

Additionally, two sites were sampled above the end of survey point. No fish were observed.

2011 East Branch North Fork Big River underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+/3+	YOY	1+
Reach 1: F4 Channel Type									
07/06/11	1	029	Pool	2,082	1	0	0	2	0
Reach 2: B4 Channel Type									
	2	046	Pool	3,484	6	0	0	0	0
	3	051	Pool	3,650	2	0	0	4	0
Reach 3: F4 Channel Type									
	4	283	Pool	17,596	3	0	0	0	0
	5	285	Pool	17,663	6	0	0	1	0
	6	362	Pool	21,243	1	0	1	0	0
	7	372	Pool	21,780	14	1	0	1	0
	8	391	Pool	22,737	10	2	1	2	0

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	9	393	Pool	22,848	3	0	0	0	0
	10	401	Pool	23,171	3	0	0	0	0
	11	403	Pool	23,265	6	0	0	0	0
06/23/11	12	431	Pool	24,379	1	1	2	0	0
	13	435	Pool	24,708	1	1	1	0	0
	14	437	Pool	24,794	2	1	0	0	0
	15	439	Pool	24,908	5	0	0	0	0
	16	441	Pool	24,975	3	1	1	0	0
	17	446	Pool	25,166	4	1	0	0	0
	18	448	Run	25,230	1	0	0	0	0
	19	449	Pool	25,258	1	0	0	0	0
	20	454	Pool	25,461	2	0	1	0	0
	21	457	Pool	25,623	2	0	0	0	0
Reach 4: G4 Channel Type									
06/22/11	22	889	Run	41,082	5	0	0	0	0
	23	891	Pool	41,121	3	0	0	0	0
	24	893	Pool	41,164	0	0	0	0	0
	25	895	Run	41,185	0	0	0	0	0
Above End of Survey									
	26	--	Pool	--	0	0	0	0	0
	27	--	Pool	--	0	0	0	0	0

## DISCUSSION

East Branch North Fork Big River is an F4 channel type for the first 2,082 feet of stream surveyed, a B4 channel type for the next 2,665 feet, an F4 channel type for the next 30,016 feet, and a G4 channel type for the remaining 6,345 feet. The suitability of F4, B4 and G4 channel types for fish habitat improvement structures is as follows: F4 channels are good for bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover. B4 channels are excellent for low-stage plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors, and log cover. G4 channels 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 7 to June 22, 2011 ranged from 52 to 58 degrees Fahrenheit. Air temperatures ranged from 53 to 82 degrees Fahrenheit. This is a suitable 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.



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Flatwater habitat types comprised 42% of the total length of this survey, riffles 34%, and pools 23%. Forty-seven of the 266 (18%) pools had a maximum residual depth greater than 3 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In third and fourth order streams, a primary pool is defined to have a maximum residual depth of at least three 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.

Two hundred thirty-six of the 266 pool tail-outs measured had embeddedness ratings of 1 or 2. Twenty-seven of the pool tail-outs had embeddedness ratings of 3 or 4. Three 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.

Two hundred fifty-three of the 266 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 14. The shelter rating in the flatwater habitats is 4. 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 East Branch North Fork Big River. 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 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 92%. Reach 1 had a canopy density of 92%, Reach 2 had a canopy density of 88%, Reach 3 had a canopy density of 92%, and Reach 4 had a canopy density of 95%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 97% and 95%, 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) East Branch North Fork Big River 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.

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- 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) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from large woody debris. Adding high quality complexity with woody cover in the pools is desirable.

### COMMENTS AND LANDMARKS

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

Position (ft):	Habitat Unit #:	Comment:
0	0001.00	Start of survey at the confluence with North Fork Big River. The channel is an F4.
314	0008.00	Out of the influence of North Fork Big River.
1609	0025.00	Tributary #01 enters on the left bank. It contributes approximately 1% to East Branch North Fork Big River's flow. The water temperature of the tributary is 52 degrees Fahrenheit; the water temperature downstream and upstream of the tributary is 53 degrees Fahrenheit. The slope of the tributary is greater than 12% and there is a 12' high waterfall approximately 70' upstream from the mouth.
2082	0030.00	The channel changes from an F4 to a B4.
3103	0041.00	2.2' high plunge over boulders and small woody debris.
3650	0052.00	The right bank is eroding under a redwood rootwad. The erosion site measures approximately 30' long x 15' high; it is contributing fine sediment to the channel.
4747	0071.00	The channel changes from a B4 to an F4.
4817	0072.00	Tributary #02 enters on the right bank. It contributes approximately 2% to East Branch North Fork Big River's flow. The water temperature of the tributary is 54 degrees Fahrenheit; the water temperature downstream and upstream of the tributary is 55 degrees Fahrenheit. The slope of the tributary is approximately 10%.

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6408	0094.00	Woody debris is accumulating in the channel. Most of the volume is on the left bank. The accumulation has the potential to become an LDA. It is not retaining sediment.
6517	0096.00	An erosion site on the left bank measures approximately 20' long x 30' high; it is contributing fine sediment to the channel.
6558	0098.00	Tributary #03 enters on the left bank. It contributes approximately 2% to East Branch North Fork Big River's flow. The water temperature of the tributary is 53 degrees Fahrenheit; the water temperature downstream and upstream of the tributary is 56 degrees Fahrenheit. The slope of the tributary is approximately 15%.
6815	0102.00	A logging road crosses the channel. The crossing is a 14.5' wide x 11.3' high x 58' long railcar bridge with redwood log abutments.
8736	0130.00	Tributary #04 enters on the right bank. It contributes approximately 2% to East Branch North Fork Big River's flow. The water temperature of the tributary is 53 degrees Fahrenheit; the water temperature upstream and downstream of the confluence is 54 degrees Fahrenheit. The slope of the tributary is approximately 8%.
9072	0136.00	A landslide on the right bank measures approximately 50' long x 70' high; it is contributing fine sediment to the channel.
9679	0146.00	Woody debris is accumulating in the channel.
10320	0156.00	The right bank is eroding around a redwood rootwad.
11073	0167.00	A landslide on the left bank measures approximately 20' long x 50' high; it is contributing sediment ranging in size from silt to gravel and woody debris to the channel.
11335	0171.00	Tributary #05 enters on the right bank. It contributes less than 5% to East Branch North Fork Big River's flow. The water temperature of the tributary is 55 degrees Fahrenheit; and the water temperature upstream and downstream of the confluence is 56 degrees Fahrenheit. This tributary used to be two tributaries; the downstream tributary was diverted into the upstream tributary. One has a slope of 2%; the other has a slope of 5%.
11605	0176.00	Right bank seep. The water is trickling through a 2' diameter perched culvert approximately 10' up the bank.

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12840	0195.00	Large woody debris (LWD) is accumulating in the channel and has the potential to become a log debris accumulation (LDA). The debris is not retaining sediment.
13218	0204.00	Right bank seep.
14152	0215.00	An erosion site on the right bank measures approximately 20' long x 10' high; it is contributing fine sediment to the channel.
14302	0218.00	A log stringer bridge has collapsed into the creek; it has the potential to become an LDA. The banks are bare dirt where the bridge ends used to be.
14693	0226.00	Woody debris is accumulating in the channel.
15279	0234.00	Tributary #06 enters on the right bank. It contributes approximately 1% to East Branch North Fork Big River's flow. The water temperature of the tributary is 54 degrees Fahrenheit, the water temperature downstream of the tributary is 57 degrees Fahrenheit, and the water temperature upstream of the confluence is 58 degrees Fahrenheit. The tributary has a 15' high waterfall at its mouth.
15627	0241.00	The right bank is eroding under alder roots. The erosion site measures approximately 20' long x 4' high; it is contributing fine sediment to the channel.
15755	0243.00	Left bank seep.
16189	0252.00	Tributary #07 enters on the left bank. It contributes less than 1% to East Branch North Fork Big River's flow. The water temperature of the tributary is 53 degrees Fahrenheit; and the water temperature upstream and downstream of the confluence is 58 degrees Fahrenheit. The slope of the tributary is over 15%.
16571	0262.00	The right bank is eroding under a redwood rootwad. The erosion site measures approximately 15' long x 4' high; it is contributing fine sediment to the channel.
16632	0264.00	Woody debris is accumulating in the channel; it has the potential to become an LDA.
16665	0266.00	An erosion site on the left bank measures approximately 30' long x 5' high; it is contributing fine sediment to the channel.
16710	0267.00	Left bank seep.

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17313	0278.00	"Frykman Gulch" (tributary #08) enters on the right bank. It contributes approximately 10% to East Branch North Fork Big River's flow. The water temperature of the tributary is 56 degrees Fahrenheit; and the water temperature upstream and downstream of the confluence is 58 degrees Fahrenheit. See the 2011 "Frykman Gulch" Stream Habitat Inventory Report.
17742	0288.00	Left bank seep. An erosion site on the left measures approximately 20' long x 4' high; it is contributing fine sediment to the channel.
17997	0295.00	Woody debris is accumulating in the channel; it has the potential to become an LDA.
18500	0307.00	Left bank seep.
20328	0344.00	Tributary #09 enters on the right bank. It contributes approximately 2% to East Branch North Fork Big River's flow. The water temperature of the tributary is 53 degrees Fahrenheit; the water temperature upstream and downstream of the confluence is 55 degrees Fahrenheit. The slope of the tributary is approximately 7%.
21204	0362.00	A logging road crosses the channel. The crossing is a 14' wide x 7.5' high x 58' long railcar bridge. There is lots of rust/corrosion on the bottom of the bridge. The bank underneath the bridge is bare dirt.
22618	0391.00	LDA #01 contains five pieces of LWD and measures 6' high x 25' wide x 5' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from fines to gravel and measures 6' wide x 20' long x 1.5' deep. There is a 2' high plunge over the LDA. Fish are present above the LDA.
23522	0412.00	Tributary #10 enters on the right bank. It contributes approximately 5% to East Branch North Fork Big River's flow. The water temperature of the tributary is 56 degrees Fahrenheit; the water temperature upstream and upstream of the confluence is 54 degrees Fahrenheit. The slope of the tributary is approximately 3%.
23624	0414.00	LDA #02 contains six pieces of LWD and measures 5' high x 27' wide x 9' long. Water flows through the LDA and there are visible gaps in it. The LDA is retaining a volume of fine sediment measuring 5' wide x 10' long x 1' deep. Fish are present above the LDA.
24586	0435.00	Left bank seep.
24835	0441.00	Left bank seep.

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25130	0449.00	Woody debris is accumulating on the left bank.
26712	0484.00	LWD is accumulating in the channel.
27152	0495.00	There is a 2.5' high plunge over redwood roots and bedrock.
27267	0499.00	Tributary #11 enters on the right bank. It contributes approximately 10% to East Branch North Fork Big River's flow. The water temperature of the tributary is 54 degrees Fahrenheit; the water temperature upstream of the confluence is 55 degrees Fahrenheit. The slope of the tributary is approximately 5%. There is a 6' high plunge from a culvert approximately 35' upstream from the mouth. There is no jump pool below the culvert.
27535	0510.00	LDA #03 contains over 15 pieces of LWD and measures 4' high x 40' wide x 4' long. Water flows through the LDA and there no visible gaps in it. Retained sediment ranges from fines to gravel and measures 15' wide x 20' long x 1.5' deep. There is a 2.5' high plunge over the LDA. Fish are present above the LDA.
29044	0549.00	LDA #04 contains 26 pieces of LWD and measures 6' high x 17' wide x 60' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from fines to gravel and measures 10' wide x 20' long x 1' deep. Fish are present above the LDA.
29206	0553.00	There is a 2' high plunge.
29367	0557.00	LDA #05 contains 10 pieces of LWD and measures 5' high x 17' wide x 36' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from fines to gravel and measures 10' wide x 10' long x 2' deep. Fish are present above the LDA.
29679	0567.00	Flow is subterranean for 7'.
29686	0568.00	The channel is choked with LWD, boulders and brush for approximately 50'. The flow is split in three different channels; some of the flow is subterranean.
29721	0571.00	A landslide on the right bank measures approximately 60' long x 15' high; it is contributing fine sediment to the channel.
29736	0572.00	LDA #06 contains over 20 pieces of LWD and measures 8' high x 50' wide x 25' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from fines to gravel and measures 10' wide x 10' long x 4' deep. Fish are present above the LDA.

## East Branch North Fork Big River

30462	0591.00	The left bank is eroding under a redwood rootwad. The erosion site measures approximately 20' long x 6' high and is contributing sediment ranging in size from silt to cobble.
30822	0605.00	Tributary #12 enters on the left bank. The tributary is dry at the mouth. The water temperature of the tributary is 52 degrees Fahrenheit; and the water temperature upstream and upstream of the confluence is 54 degrees Fahrenheit. The slope of the tributary is approximately 10%.
31347	0620.00	A landslide on the left bank measures approximately 20' long x 20' high; it is contributing sediment ranging in size from silt to gravel. LWD is accumulating in the channel; it has the potential to become and LDA. The accumulation is not retaining sediment.
31595	0629.00	LDA #07 contains 20 pieces of LWD and measures 5' high x 40' wide x 30' long. Water does not flow through the LDA (the flow is subterranean for 437' above the LDA) and there are visible gaps in it. Retained sediment ranges from fines to cobble and measures 20' wide x 40' long x 3' deep. Fish are present above the LDA.
32578	0641.00	There is a 2' high plunge.
32926	0655.00	Dry tributary on the right bank.
33363	0664.00	LWD is accumulating in the channel; it has the potential to become an LDA.
34691	0700.00	"Lori Creek" (tributary #13) enters on the left bank. It contributes approximately 10% to East Branch North Fork Big River's flow. The water temperature of the tributary is 55 degrees Fahrenheit; and the water temperature upstream and downstream of the confluence is 55 degrees Fahrenheit. The slope of the tributary is approximately 6%. The tributary is accessible to salmonids, but no fish were observed.
34763	0701.00	The channel changes from an F4 to a G4.
35025	0710.00	LDA #08 contains 15 pieces of LWD and measures 8' high x 27' wide x 25' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from fines to gravel and measures 10' wide x 10' long x 2' deep. Fish are present above the LDA.
35301	0720.00	Right bank seep.
35398	0722.00	LWD is accumulating in the channel; it has the potential to become an LDA.

## East Branch North Fork Big River

35738	0730.00	LDA #09 contains 12 pieces of LWD and measures 5' high x 21' wide x 30' long. Water does not flow through the LDA (the flow is subterranean for 134' above the LDA) and there are visible gaps in it. Retained sediment ranges from fines to cobble and measures 10' wide x 30' long x 4' deep. Fish are present above the LDA.  Tributary #14 enters on the right bank. The tributary is dry at the mouth. The water temperature downstream of the tributary is 56 degrees Fahrenheit, the water temperature of the tributary is 55 degrees Fahrenheit, and the water temperature upstream of the confluence is 55 degrees Fahrenheit. The slope of the tributary is approximately 20%.
37019	0761.00	Tributary #15 enters on the right bank. It contributes approximately 1% to East Branch North Fork Big River's flow. The water temperature downstream of the tributary is 57 degrees Fahrenheit, the water temperature of the tributary is 56 degrees Fahrenheit, and the water temperature upstream of the confluence is 56 degrees Fahrenheit. The slope of the tributary is approximately 20%.
37957	0784.00	Dry tributary on the left bank.
38125	0791.00	Right bank seep; and old logging road causes the water to seep out of the hillside.
38524	0803.00	LDA #10 contains 16 pieces of LWD and measures 6' high x 24' wide x 54' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from fines to gravel and measures 4' wide x 10' long x 1.5' deep. Fish are present above the LDA.
38650	0805.00	There is a 1.5' high plunge.
38758	0810.00	There is a 1' high plunge.
38915	0813.00	A landslide on the left bank measures approximately 20' long x 60' high; it is contributing sediment ranging in size from silt to boulders.
39045	0819.00	Woody debris is accumulating in the channel; it has the potential to become an LDA.
39459	0827.00	There is a 3.5' high plunge, half over bedrock, half over rootmass and small woody debris.
39539	0831.00	There is a 1' high plunge.
39552	0832.00	LDA #11 contains three pieces of LWD and measures 5' high x 19' wide x 16' long. Water flows through the LDA and there are visible gaps in it.



## East Branch North Fork Big River

The LDA is retaining a volume of fine sediment measuring 4' wide x 3' long x 1' deep. Fish are present above the LDA.

- |       |         |  |
|-------|---------|--|
| 39661 | 0838.00 | Dry tributary on the right bank.   |
| 39796 | 0844.00 | Woody debris is accumulating in the channel; it has the potential to become an LDA.  |
| 40687 | 0876.00 | There is a 1.5' high plunge.   |
| 40715 | 0878.00 | Tributary #16 enters on the right bank. It contributes approximately 5% to East Branch North Fork Big River's flow. The water temperature downstream of the tributary is 56 degrees Fahrenheit, the water temperature of the tributary is 55 degrees Fahrenheit, and the water temperature upstream of the confluence is 55 degrees Fahrenheit. The slope of the tributary is approximately 20%. |
| 40864 | 0885.00 | There is a 2' high plunge.   |
| 41007 | 0891.00 | There is a 1' high plunge.   |
| 41072 | 0895.00 | Tributary #17 enters on the left bank. The first 300' of the tributary are dry. The water temperature downstream of the tributary is 55 degrees Fahrenheit, the water temperature of the tributary is 54 degrees Fahrenheit, and the water temperature upstream of the confluence is 56 degrees Fahrenheit. The slope of the tributary is approximately 10%.                                     |

End of survey. The channel is dry for 150' past the confluence with the tributary. Visual observation 1,000 feet upstream of the end of survey point revealed multiple LDAs and no fish.

## 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.

## East Branch North Fork Big River

### 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: East Branch North Fork Big River

LLID: 1235539393193 Drainage: Big River

Survey Dates: 6/7/2011 to 6/22/2011

Confluence Location: Quad: COMPTCHE Legal Description: T17NR15WS20 Latitude: 39:19:09.0N Longitude: 123:33:14.0

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
3	0	DRY	0.3	193	578	1.4									
289	37	FLATWATER	32.3	60	17348	42.2	10.4	0.5	1.2	729	210609	444	128331		4
266	266	POOL	29.7	35	9348	22.7	12.4	1.0	2.2	448	119152	601	159871	443	14
338	40	RIFFLE	37.7	41	13834	33.7	10.3	0.3	0.8	533	180148	233	78827		3
<b>Total Units</b>	<b>Total Units Fully Measured</b>				<b>Total Length (ft.)</b>					<b>Total Area (sq.ft.)</b>			<b>Total Volume (cu.ft.)</b>		
896	343				41108					509909			367029		

**Table 2 - Summary of Habitat Types and Measured Parameters**

Stream Name: East Branch North Fork Big River

LLID: 1235539393193

Drainage: Big River

Survey Dates: 6/7/2011 to 6/22/2011

Confluence Location: Quad: COMPTCHE

Legal Description: T17NR15WS20

Latitude: 39:19:09.0N

Longitude: 123:33:14.0W

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 (%)
275	32	LGR	30.7	42	11540	28.1	11	0.3	1.5	491	135103	181	49787		2	93
63	8	HGR	7.0	36	2294	5.6	9	0.4	1.9	700	44086	442	27841		9	93
2	2	GLD	0.2	81	162	0.4	17	0.6	2.3	1361	2722	747	1495		3	76
187	21	RUN	20.9	39	7362	17.9	10	0.5	1.8	445	83196	279	52159		5	93
100	14	SRN	11.2	98	9824	23.9	10	0.6	1.8	1064	106421	648	64842		4	94
201	201	MCP	22.4	36	7230	17.6	12	1.0	4.1	465	93441	635	127549	469	15	92
2	2	CCP	0.2	21	42	0.1	14	1.6	3.1	312	623	597	1194	510	5	98
2	2	STP	0.2	41	82	0.2	14	1.2	3.1	550	1100	856	1711	655	10	87
6	6	CRP	0.7	37	223	0.5	12	1.4	3.4	452	2712	742	4453	625	3	93
9	9	LSL	1.0	24	220	0.5	12	0.7	2.6	293	2640	278	2504	205	12	91
9	9	LSR	1.0	41	366	0.9	12	0.7	2.8	498	4486	529	4757	360	21	93
17	17	LSBk	1.9	45	757	1.8	11	0.6	3.1	487	8274	458	7791	297	5	93
1	1	LSBo	0.1	51	51	0.1	14	0.4	1.7	678	678	543	543	271	0	92
19	19	PLP	2.1	20	377	0.9	13	1.4	4	274	5198	493	9369	379	23	94
3	0	DRY	0.3	193	578	1.4										

Total Units  
896

Total Units Fully Measured  
343

Total Length (ft.)  
41108

Total Area (sq.ft.)  
490680

Total Volume (cu.ft.)  
355994

**Table 3 - Summary of Pool Types**

Stream Name: East Branch North Fork Big River

LLID: 1235539393193

Drainage: Big River

Survey Dates: 6/7/2011 to 6/22/2011

Confluence Location: Quad: COMPTCHE

Legal Description: T17NR15WS20

Latitude: 39:19:09.0N

Longitude: 123:33:14.0W

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
205	205	MAIN	77	36	7354	79	12.5	1.0	464	95163	471	96592	15
61	61	SCOUR	23	33	1994	21	12.2	1.0	393	23989	350	21369	14

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
266	266	9348	119152	117961

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

Stream Name: East Branch North Fork Big River

LLID: 1235539393193

Drainage: Big River

Survey Dates: 6/7/2011 to 6/22/2011

Confluence Location: Quad: COMPTCHE

Legal Description: T17NR15WS20

Latitude: 39:19:09.0N

Longitude: 123:33:14.0W

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
201	MCP	76	0	0	88	44	81	40	31	15	1	0
2	CCP	1	0	0	1	50	0	0	1	50	0	0
2	STP	1	0	0	0	0	1	50	1	50	0	0
6	CRP	2	0	0	0	0	0	0	6	100	0	0
9	LSL	3	0	0	6	67	3	33	0	0	0	0
9	LSR	3	0	0	7	78	2	22	0	0	0	0
17	LSBk	6	0	0	9	53	7	41	1	6	0	0
1	LSBo	0	0	0	1	100	0	0	0	0	0	0
19	PLP	7	0	0	4	21	9	47	5	26	1	5
<b>Total Units</b>			<b>Total &lt; 1 Foot Max Resid. Depth</b>	<b>Total &lt; 1 Foot % Occurrence</b>	<b>Total 1&lt; 2 Foot Max Resid. Depth</b>	<b>Total 1&lt; 2 Foot % Occurrence</b>	<b>Total 2&lt; 3 Foot Max Resid. Depth</b>	<b>Total 2&lt; 3 Foot % Occurrence</b>	<b>Total 3&lt; 4 Foot Max Resid. Depth</b>	<b>Total 3&lt; 4 Foot % Occurrence</b>	<b>Total &gt;= 4 Foot Max Resid. Depth</b>	<b>Total &gt;= 4 Foot % Occurrence</b>
266			0	0	116	44	103	39	45	17	2	1

Mean Maximum Residual Pool Depth (ft.): 2.2

**Table 5 - Summary of Mean Percent Cover By Habitat Type**

Stream Name: East Branch North Fork Big River

LLID: 1235539393193

Drainage: Big River

Survey Dates: 6/7/2011 to 6/22/2011

Dry Units: 3

Confluence Location: Quad: COMPTCHE

Legal Description: T17NR15WS20 Latitude: 39:19:09.0N

Longitude: 123:33:14.0W

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
275	32	LGR	2	0	0	0	46	0	26	26	0
63	8	HGR	0	0	0	0	0	0	70	30	0
338	40	TOTAL RIFFLE	1	0	0	0	29	0	43	28	0
2	2	GLD	0	90	0	0	0	0	0	10	0
187	21	RUN	3	52	5	0	17	0	13	11	0
100	14	SRN	0	31	5	0	6	0	32	26	0
289	37	TOTAL FLAT	2	47	5	0	12	0	18	16	0
201	201	MCP	18	31	30	2	6	0	3	8	1
2	2	CCP	50	5	0	0	0	0	40	0	5
2	2	STP	0	8	50	0	0	0	13	30	0
6	6	CRP	0	40	60	0	0	0	0	0	0
9	9	LSL	10	15	71	0	4	0	0	0	0
9	9	LSR	37	28	29	4	1	0	0	0	0
17	17	LSBk	71	9	5	3	9	0	0	0	3
1	1	LSBo	0	0	0	0	0	0	0	0	0
19	19	PLP	0	29	36	0	0	0	24	8	2
266	266	TOTAL POOL	19	29	31	2	5	0	5	7	1
896	343	TOTAL	17	29	28	2	7	0	8	9	1

**Table 6 - Summary of Dominant Substrates By Habitat Type**

Stream Name: East Branch North Fork Big River

LLID: 1235539393193

Drainage: Big River

Survey Dates: 6/7/2011 to 6/22/2011

Dry Units: 3

Confluence Location: Quad: COMPTCHE

Legal Description: T17NR15WS20

Latitude: 39:19:09.0N

Longitude: 123:33:14.0W

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
275	32	LGR	0	0	88	6	3	3	0
63	8	HGR	0	0	75	0	0	25	0
2	2	GLD	0	0	100	0	0	0	0
187	21	RUN	0	0	95	0	5	0	0
100	14	SRN	0	0	93	7	0	0	0
201	201	MCP	0	2	95	0	0	1	1
2	2	CCP	0	0	100	0	0	0	0
2	2	STP	0	0	100	0	0	0	0
6	6	CRP	0	0	100	0	0	0	0
9	9	LSL	0	0	100	0	0	0	0
9	9	LSR	0	0	100	0	0	0	0
17	17	LSBk	0	0	100	0	0	0	0
1	1	LSBo	0	0	100	0	0	0	0
19	19	PLP	5	21	68	0	5	0	0



**Table 7 - Summary of Mean Percent Canopy for Entire Stream**

Stream Name: East Branch North Fork Big River

LLID: 1235539393193

Drainage: Big River

Survey Dates: 6/7/2011 to 6/22/2011

Confluence Location: Quad: COMPTCHE

Legal Description: T17NR15WS20

Latitude: 39:19:09.0N

Longitude: 123:33:14.0W

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Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
92	67	33	0	97	95

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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: East Branch North Fork Big River      LLID: 1235539393193      Drainage: Big River  
 Survey Dates: 6/7/2011 to 6/22/2011      Survey Length (ft.): 41108      Main Channel (ft.): 41085      Side Channel (ft.): 23  
 Confluence Location: Quad: COMPTCHE      Legal Description: T17NR15WS20      Latitude: 39:19:09.0N      Longitude: 123:33:14.0W

**Summary of Fish Habitat Elements By Stream Reach**

**STREAM REACH: 1**

Channel Type: F4	Canopy Density (%): 91.5	Pools by Stream Length (%): 22.8
Reach Length (ft.): 2082	Coniferous Component (%): 67.1	Pool Frequency (%): 24.1
Riffle/Flatwater Mean Width (ft.): 21.8	Hardwood Component (%): 32.9	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 14
Range (ft.): 19 to 23	Vegetative Cover (%): 99.7	2 to 2.9 Feet Deep: 71
Mean (ft.): 21	Dominant Shelter: Whitewater	3 to 3.9 Feet Deep: 14
Std. Dev.: 2	Dominant Bank Substrate Type: Cobble/Gravel	>= 4 Feet Deep: 0
Base Flow (cfs.): 4.6	Occurrence of LWD (%): 6	Mean Max Residual Pool Depth (ft.): 2.3
Water (F): 53 - 53    Air (F): 55 - 58	LWD per 100 ft.:	Mean Pool Shelter Rating: 21
Dry Channel (ft): 0	Riffles: 1	
	Pools: 1	
	Flat: 1	
Pool Tail Substrate (%): Silt/Clay: 0    Sand: 0    Gravel: 71    Sm Cobble: 14    Lg Cobble: 14    Boulder: 0    Bedrock: 0		
Embeddedness Values (%): 1. 71.4    2. 28.6    3. 0.0    4. 0.0    5. 0.0		

**STREAM REACH: 2**

Channel Type: B4	Canopy Density (%): 87.9	Pools by Stream Length (%): 19.0
Reach Length (ft.): 2665	Coniferous Component (%): 82.1	Pool Frequency (%): 31.7
Riffle/Flatwater Mean Width (ft.): 16.8	Hardwood Component (%): 17.9	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 46
Range (ft.): 19 to 34	Vegetative Cover (%): 99.8	2 to 2.9 Feet Deep: 38
Mean (ft.): 31	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 15
Std. Dev.: 3	Dominant Bank Substrate Type: Cobble/Gravel	>= 4 Feet Deep: 0
Base Flow (cfs.): 4.6	Occurrence of LWD (%): 5	Mean Max Residual Pool Depth (ft.): 2.0
Water (F): 53 - 55    Air (F): 57 - 65	LWD per 100 ft.:	Mean Pool Shelter Rating: 18
Dry Channel (ft): 0	Riffles: 1	
	Pools: 2	
	Flat: 1	
Pool Tail Substrate (%): Silt/Clay: 0    Sand: 0    Gravel: 62    Sm Cobble: 0    Lg Cobble: 0    Boulder: 38    Bedrock: 0		
Embeddedness Values (%): 1. 30.8    2. 38.5    3. 15.4    4. 0.0    5. 15.4		

### Summary of Fish Habitat Elements By Stream Reach

#### STREAM REACH: 3

Channel Type: F4	Canopy Density (%): 91.7	Pools by Stream Length (%): 25.1
Reach Length (ft.): 30016	Coniferous Component (%): 62.9	Pool Frequency (%): 31.6
Riffle/Flatwater Mean Width (ft.): 10.2	Hardwood Component (%): 37.1	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 41
Range (ft.): 12 to 35	Vegetative Cover (%): 95.2	2 to 2.9 Feet Deep: 39
Mean (ft.): 20	Dominant Shelter: Small Woody Debris	3 to 3.9 Feet Deep: 20
Std. Dev.: 4	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 1
Base Flow (cfs.): 4.6	Occurrence of LWD (%): 17	Mean Max Residual Pool Depth (ft.): 2.3
Water (F): 52 - 58 Air (F): 53 - 82	LWD per 100 ft.:	Mean Pool Shelter Rating: 15
Dry Channel (ft): 444	Riffles: 1	
	Pools: 4	
	Flat: 2	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 87 Sm Cobble: 11 Lg Cobble: 2 Boulder: 1 Bedrock: 0		
Embeddedness Values (%): 1. 57.8 2. 34.2 3. 7.5 4. 0.5 5. 0.0		

#### STREAM REACH: 4

Channel Type: G4	Canopy Density (%): 95.1	Pools by Stream Length (%): 13.2
Reach Length (ft.): 6322	Coniferous Component (%): 77.6	Pool Frequency (%): 24.0
Riffle/Flatwater Mean Width (ft.): 5.8	Hardwood Component (%): 22.4	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 57
Range (ft.): 8 to 20	Vegetative Cover (%): 97.1	2 to 2.9 Feet Deep: 34
Mean (ft.): 13	Dominant Shelter: Large Woody Debris	3 to 3.9 Feet Deep: 6
Std. Dev.: 2	Dominant Bank Substrate Type: Cobble/Gravel	>= 4 Feet Deep: 2
Base Flow (cfs.): 4.6	Occurrence of LWD (%): 21	Mean Max Residual Pool Depth (ft.): 2.0
Water (F): 54 - 57 Air (F): 61 - 76	LWD per 100 ft.:	Mean Pool Shelter Rating: 10
Dry Channel (ft): 134	Riffles: 3	
	Pools: 15	
	Flat: 5	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 79 Sm Cobble: 17 Lg Cobble: 0 Boulder: 4 Bedrock: 0		
Embeddedness Values (%): 1. 14.9 2. 63.8 3. 17.0 4. 2.1 5. 2.1		

**Table 9 - Mean Percentage of Dominant Substrate and Vegetation**

Stream Name: East Branch North Fork Big River

LLID: 1235539393193

Drainage: Big River

Survey Dates: 6/7/2011 to 6/22/2011

Confluence Location: Quad: COMPTCHE

Legal Description: T17NR15WS20

Latitude: 39:19:09.0N

Longitude: 123:33:14.0W

**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	50	28	11.4
Boulder	8	10	2.6
Cobble / Gravel	154	147	43.9
Sand / Silt / Clay	131	158	42.1

**Mean Percentage of Dominant Stream Bank Vegetation**

Dominant Class of Vegetation	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Grass	0	1	0.1
Brush	36	49	12.4
Hardwood Trees	124	108	33.8
Coniferous Trees	177	184	52.6
No Vegetation	6	1	1.0

**Total Stream Cobble Embeddedness Values:** 2

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

StreamName: East Branch North Fork Big River

LLID: 1235539393193

Drainage: Big River

Survey Dates: 6/7/2011 to 6/22/2011

Confluence Location: Quad: COMPTCHE

Legal Description: T17NR15WS20

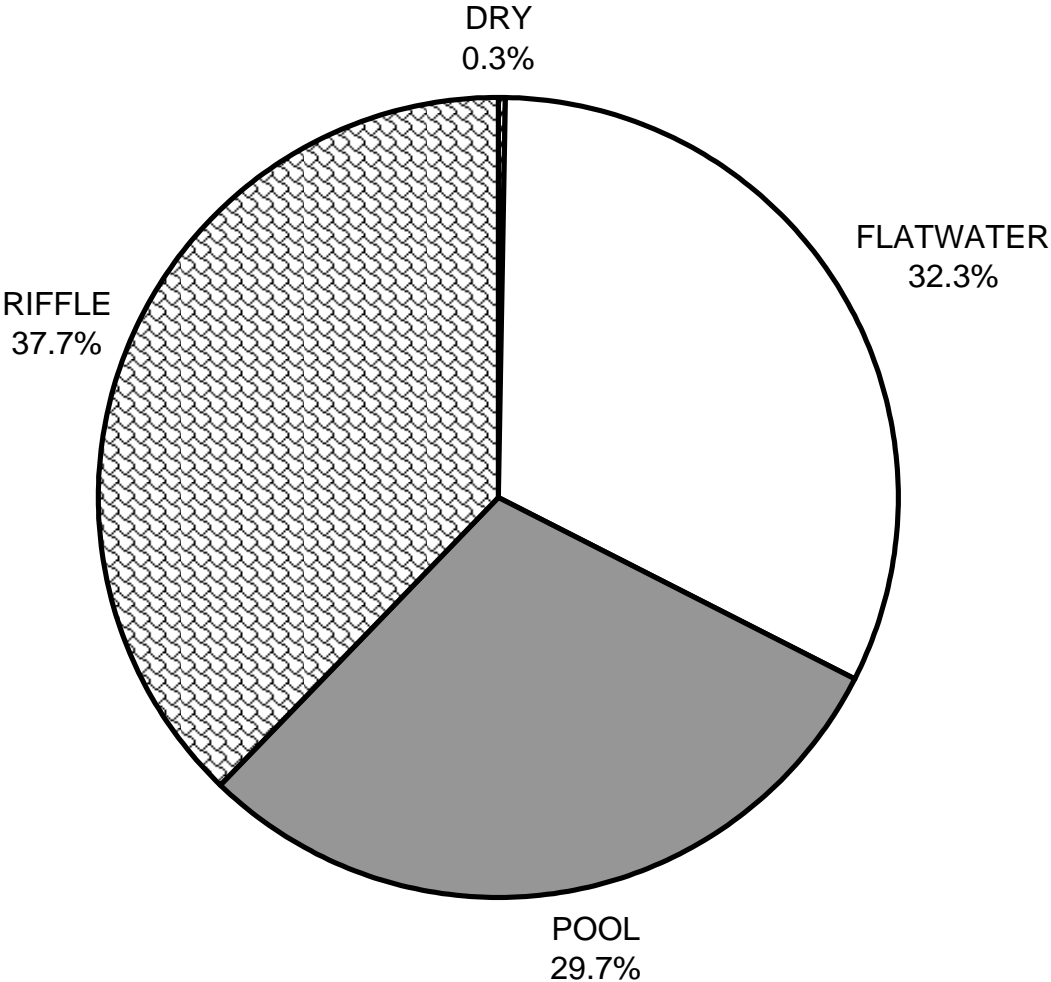
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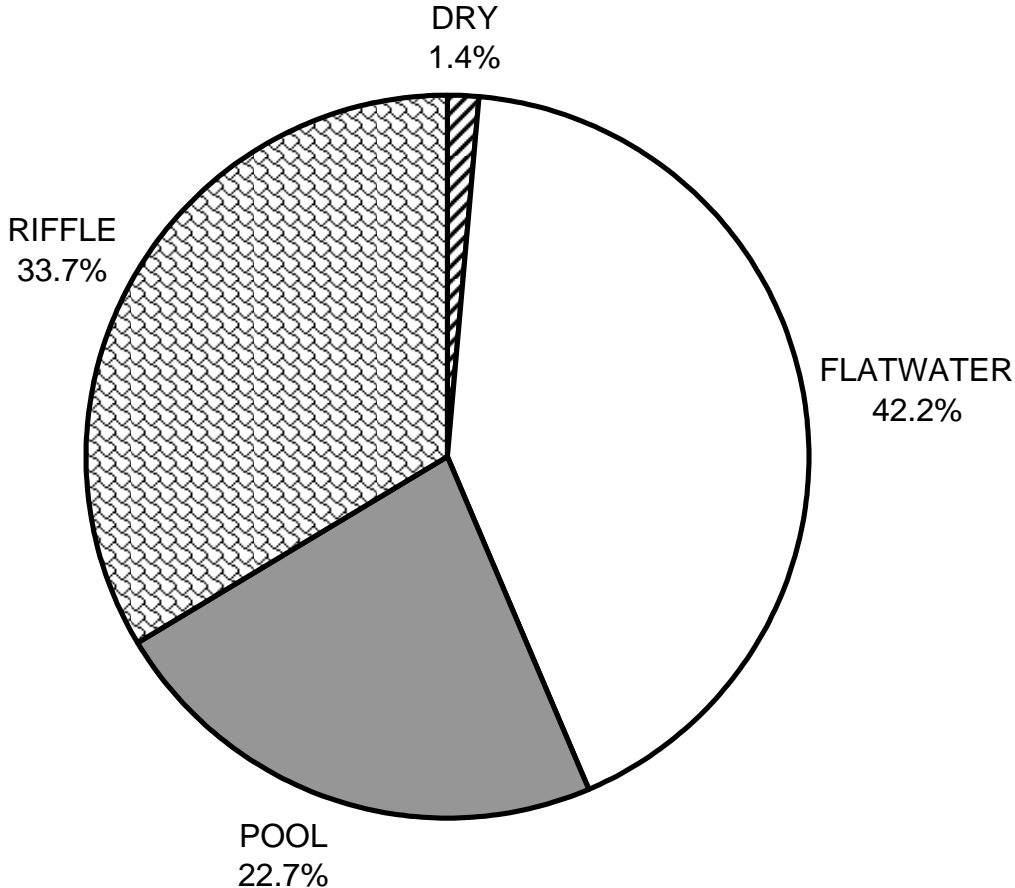
	<b>Riffles</b>	<b>Flatwater</b>	<b>Pools</b>
UNDERCUT BANKS (%)	1	2	19
SMALL WOODY DEBRIS (%)	0	47	29
LARGE WOODY DEBRIS (%)	0	5	31
ROOT MASS (%)	0	0	2
TERRESTRIAL VEGETATION (%)	29	12	5
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	43	18	5
BOULDERS (%)	28	16	7
BEDROCK LEDGES (%)	0	0	1

**EAST BRANCH NORTH FORK BIG RIVER 2011  
HABITAT TYPES BY PERCENT OCCURRENCE**



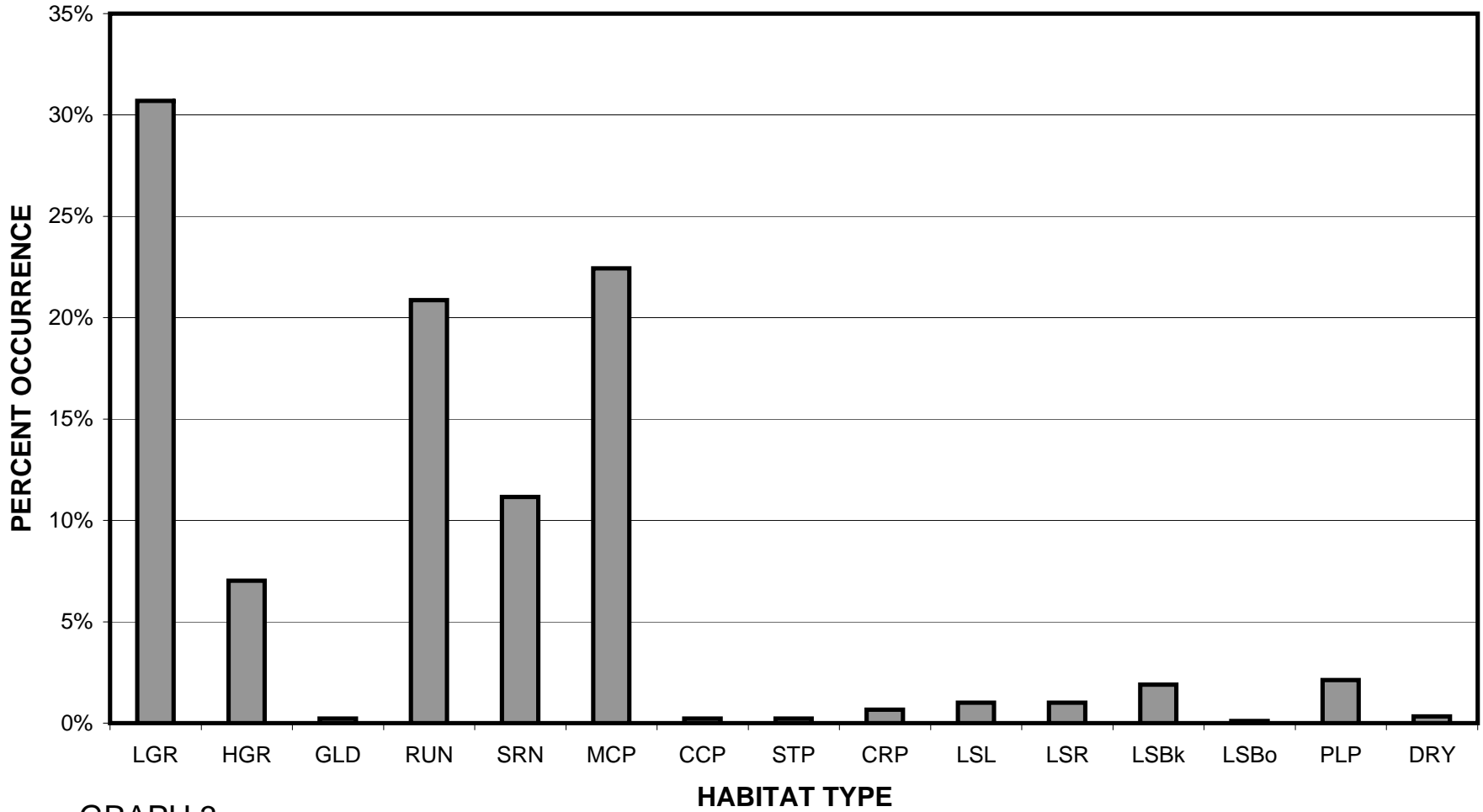
GRAPH 1

**EAST BRANCH NORTH FORK BIG RIVER 2011  
HABITAT TYPES BY PERCENT TOTAL LENGTH**



GRAPH 2

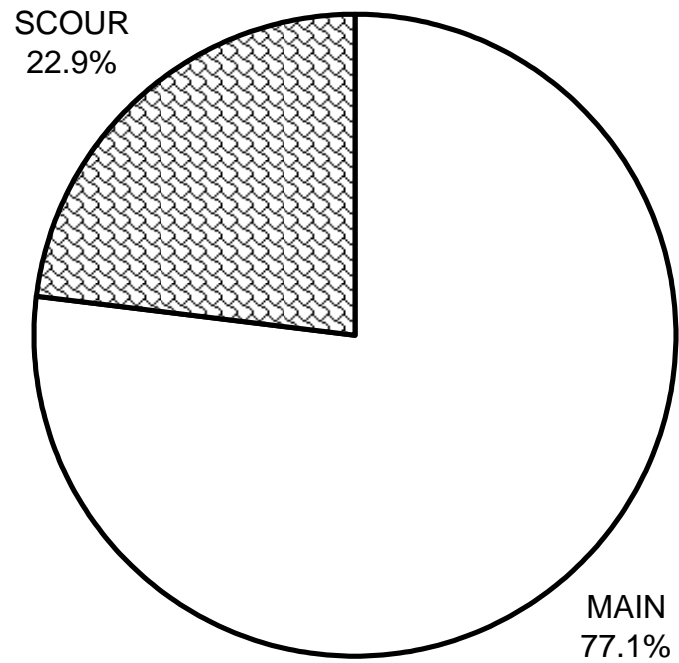
# EAST BRANCH NORTH FORK BIG RIVER 2011 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 3

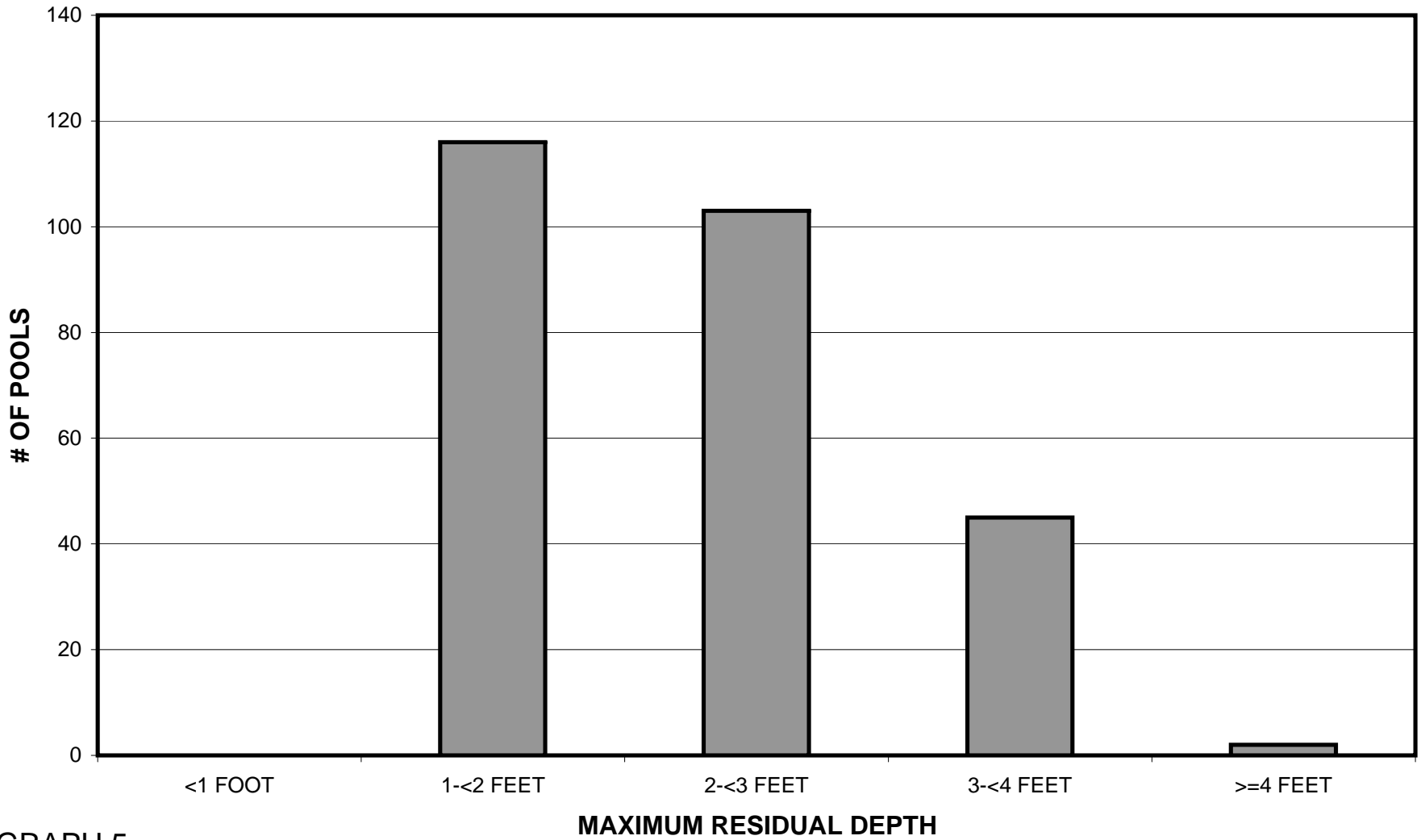


**EAST BRANCH NORTH FORK BIG RIVER 2011  
POOL TYPES BY PERCENT OCCURRENCE**



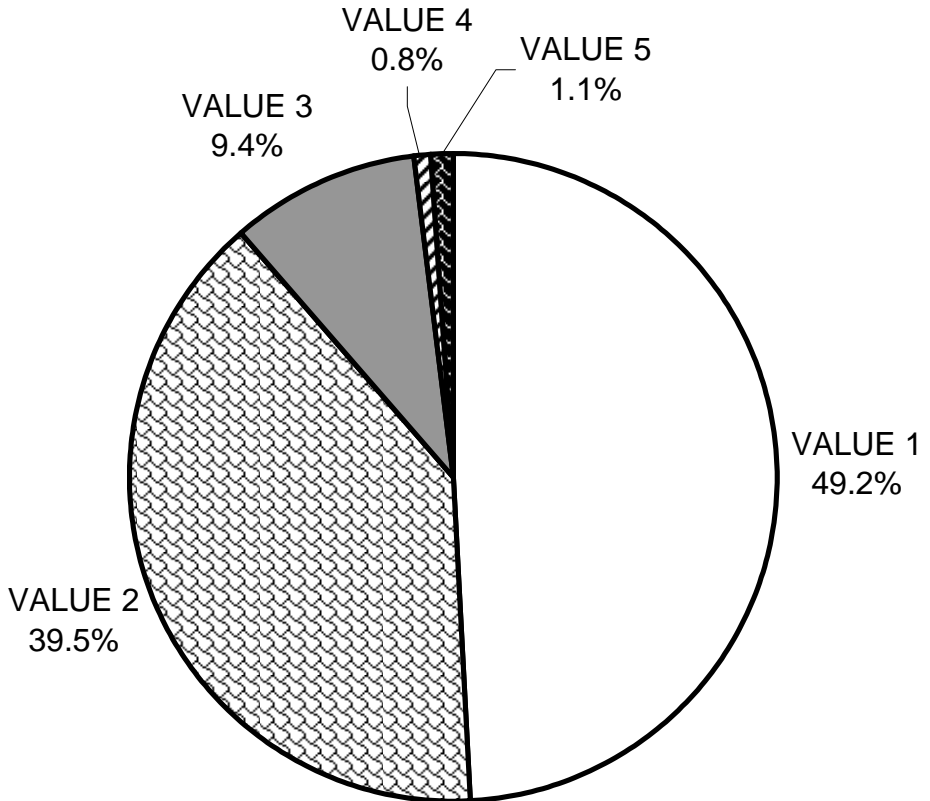
GRAPH 4

# EAST BRANCH NORTH FORK BIG RIVER 2011 MAXIMUM DEPTH IN POOLS



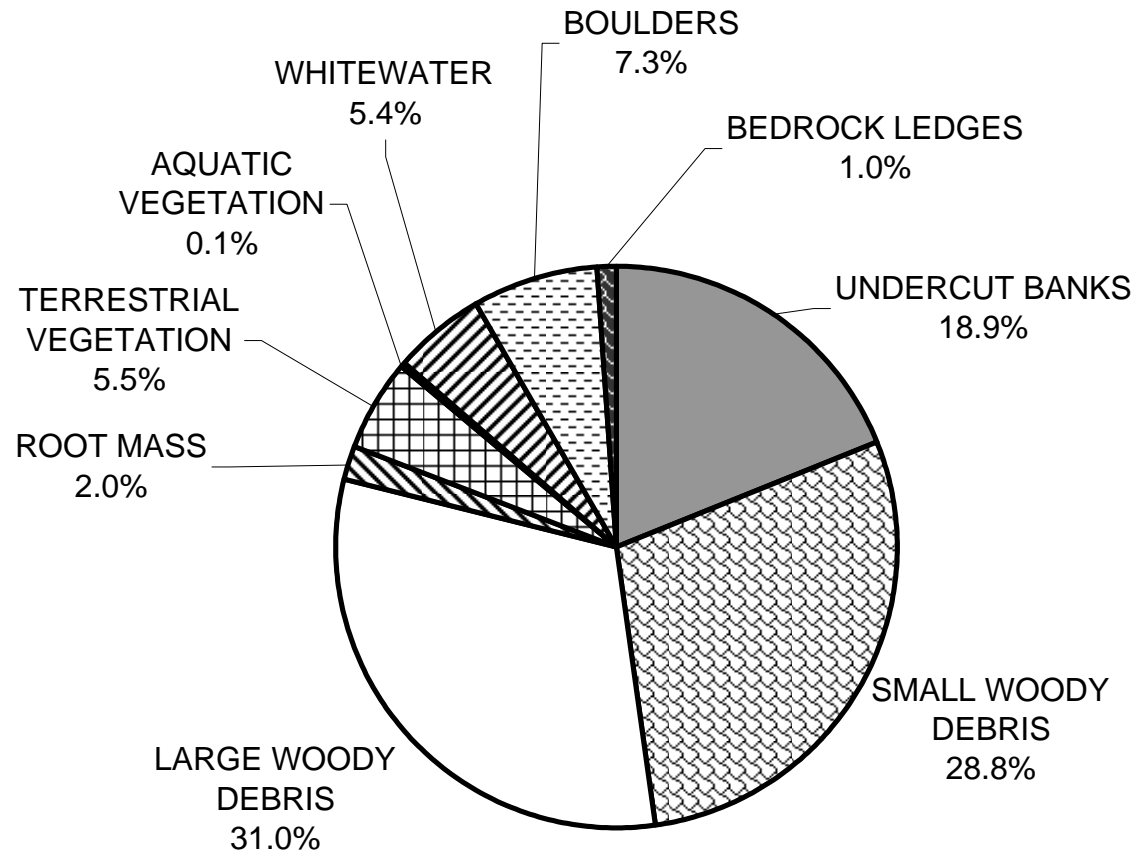
GRAPH 5

# EAST BRANCH NORTH FORK BIG RIVER 2011 PERCENT EMBEDDEDNESS



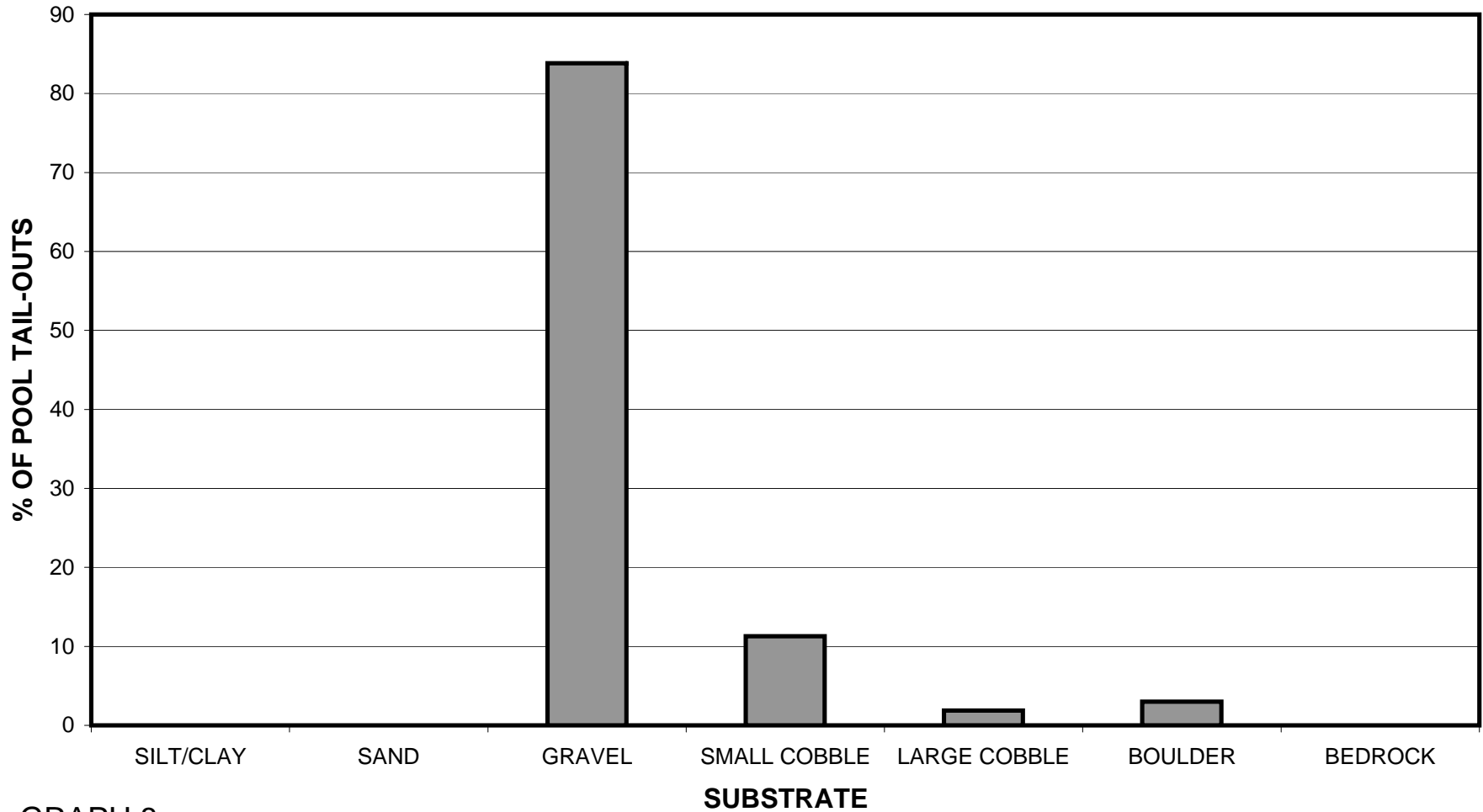
GRAPH 6

# EAST BRANCH NORTH FORK BIG RIVER 2011 MEAN PERCENT COVER TYPES IN POOLS



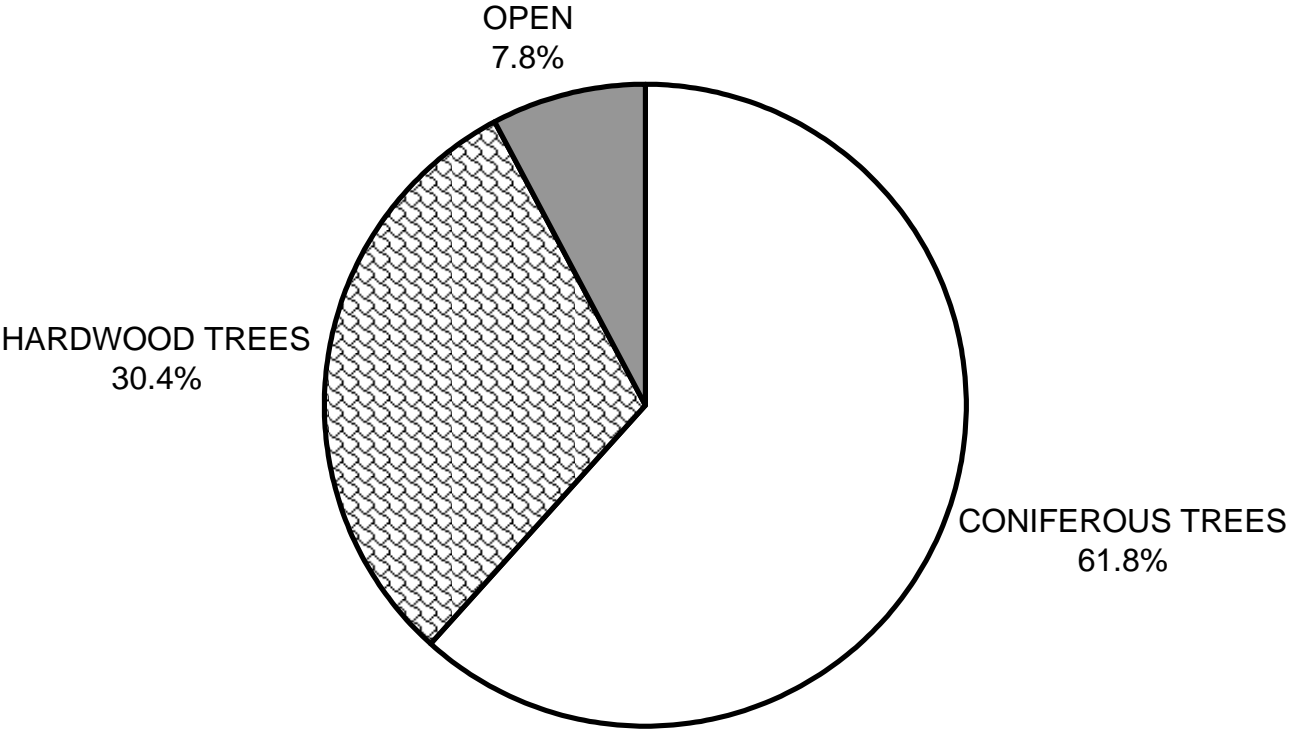
GRAPH 7

# EAST BRANCH NORTH FORK BIG RIVER 2011 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



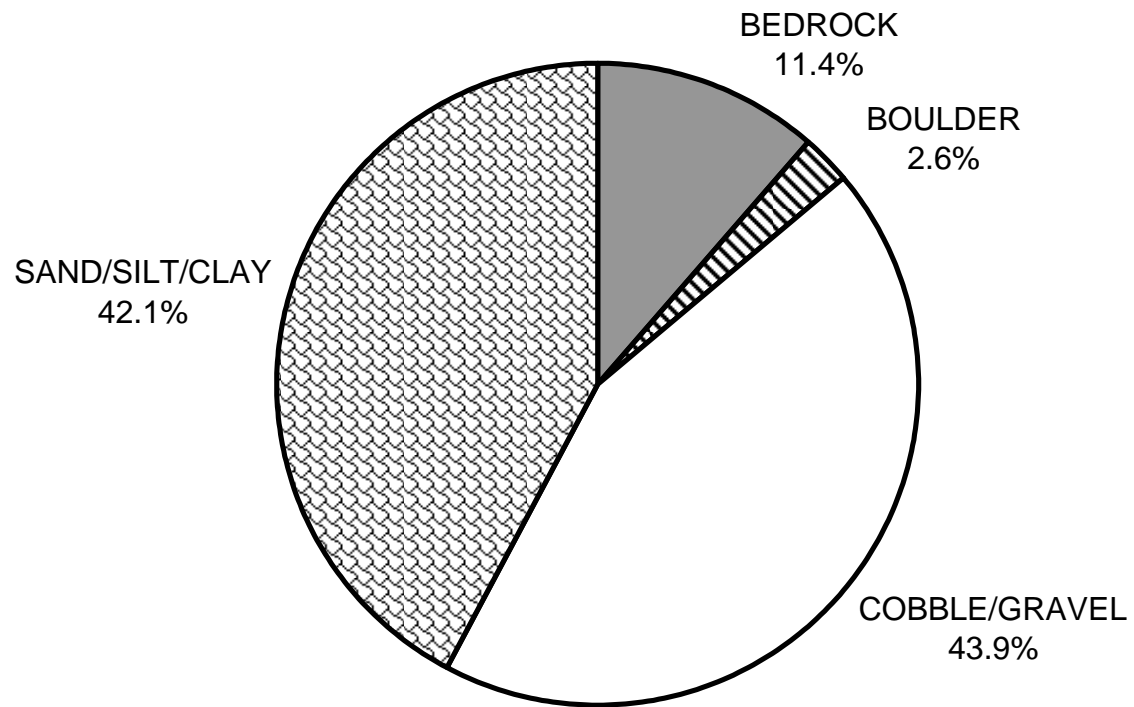
GRAPH 8

**EAST BRANCH NORTH FORK BIG RIVER 2011  
MEAN PERCENT CANOPY**



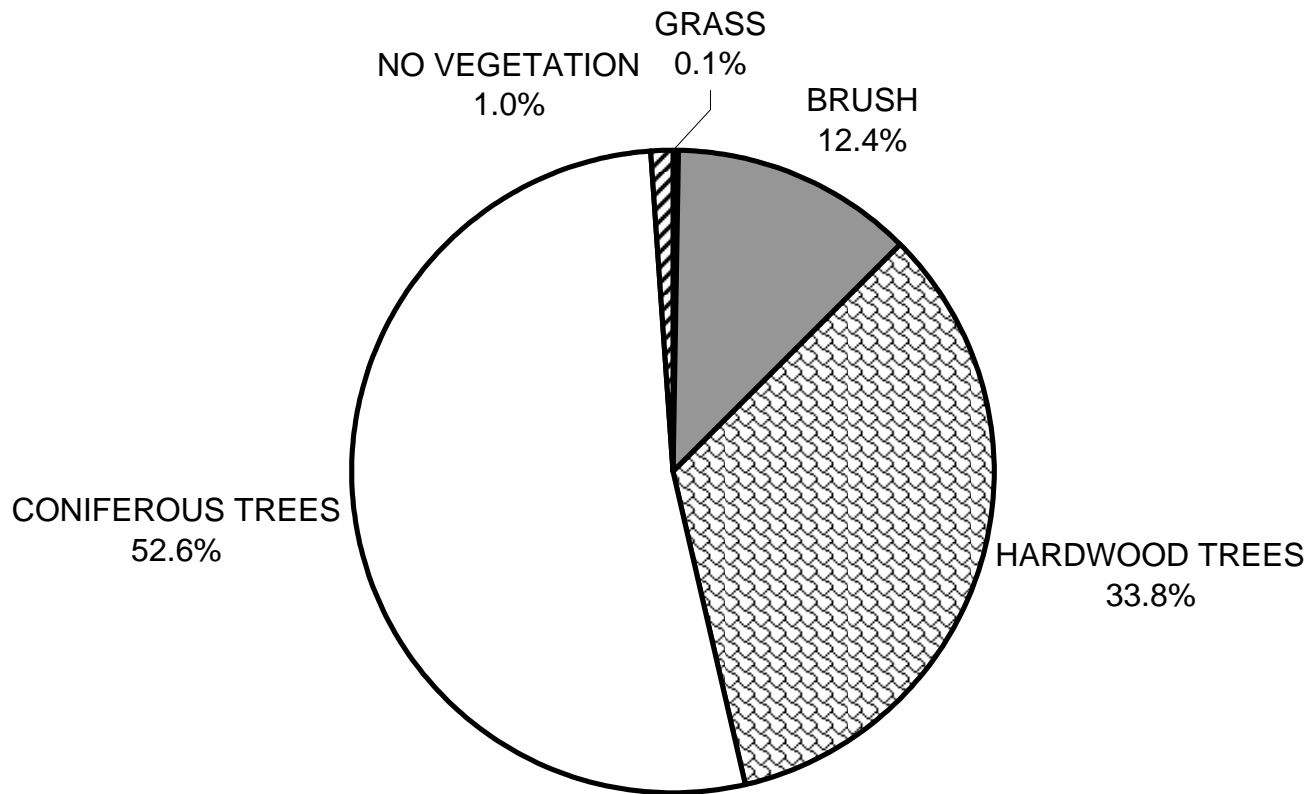
GRAPH 9

# EAST BRANCH NORTH FORK BIG RIVER 2011 DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

# EAST BRANCH NORTH FORK BIG RIVER 2011 DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11



