

STREAM INVENTORY REPORT

Indian Creek

INTRODUCTION

A stream inventory was conducted from September 23, 2008 to October 17, 2008 on Indian Creek. The survey began at the confluence with South Fork Eel River and extended upstream 9.7 miles. Stream inventories and reports were also completed for two tributaries to Indian Creek.

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

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

Indian Creek is a tributary to South Fork Eel River, tributary to Eel River which drains to the Pacific Ocean, located in Mendocino County, California (Map 1). Indian Creek's legal description at the confluence with South Fork Eel River is T05S R03E S35. Its location is 39.9767 north latitude and 123.8050 west longitude, LLID number 1238039399768. Indian Creek is a second order stream and has approximately 17.8 miles of blue line stream according to the USGS Piercy 7.5 minute quadrangle. Indian Creek drains a watershed of approximately 27 square miles. Elevations range from about 490 feet at the mouth of the creek to 1,300 feet in the headwater area. Mixed conifer and mixed hardwood forest dominates the watershed. The watershed is primarily privately owned and is managed for timber production. Vehicle access exists via Highway 101, exit Piercy, travel north on Highway 271, left turn on Dimmick Road; further directions may be obtained by the landowner.

METHODS

The habitat inventory conducted in Indian Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The California Department of Fish and Game (DFG) scientific aides 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 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.

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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 Indian 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". Indian 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 Indian Creek, embeddedness was ocularly estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3) and 76 - 100% (value 4). Additionally, a value of 5 was assigned to tail-outs deemed 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

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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 Indian Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:

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

8. Canopy:

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

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.

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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 Indian Creek. In addition, underwater observations were made at 19 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

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Indian Creek include:

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

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HABITAT INVENTORY RESULTS

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

The habitat inventory of September 23, 2008 to October 17, 2008, was conducted by I. Mikus and S. McSmith (DFG). The total length of the stream surveyed was 51,476 feet.

Stream flow was not measured on Indian Creek.

Indian Creek is an F4 channel type for 12,965 feet of the stream surveyed (Reach 1), an F2 channel type for 5,616 feet of the stream surveyed (Reach 2), an F4 channel type for 30,342 feet of the stream surveyed (Reach 3), and an F1 channel type for 2,553 feet of the stream surveyed (Reach 4). F4 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios, very stable with gravel-dominant substrates. F2 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios and boulder-dominant substrates. F1 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios, very stable with boulder-dominant substrates.

Water temperatures taken during the survey period ranged from 45 to 62 degrees Fahrenheit. Air temperatures ranged from 39 to 72 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 37% pool units, 36% flatwater units, 24% riffle units and 2% dry units (Graph 1). Based on total length of Level II habitat types there were 45% flatwater units, 41% pool units, 12% riffle units and 2% dry units (Graph 2).

Eighteen level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 31%; low gradient riffle units, 21%; and run units 20% (Graph 3). Based on percent total length, mid-channel pool units made up 37%, step run units 27%, and run units 16%.

A total of 183 pools were identified (Table 3). Main channel pools were the most frequently encountered at 86% (Graph 4), and comprised 90% of the total length of all pools (Table 3).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. One-hundred-seventy-four of the 183 pools (95%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 183 pool tail-outs measured, 141 had a value of 1 (77%); 19 had a value of 2 (10.4%); 4 had a value of 3 (2.2%); 3 had a value of 4 (1.6%); 16 had a value of 5 (8.7%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst. Additionally, a value of 5 was assigned to tail-outs deemed 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 13, flatwater habitat types had a mean shelter rating of 5, and pool habitats had a mean shelter rating of 11 (Table 1).

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Of the pool types, the main channel pools had the highest mean shelter rating of 12, scour pools had a mean shelter rating of 10, and backwater pools had a mean shelter rating of 10 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Indian Creek. Graph 7 describes the pool cover in Indian Creek. Boulders are the dominant pool cover type followed by large woody debris.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 35% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 28% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Indian Creek was 83%. Seventeen percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 80% and 20%, respectively. Graph 9 describes the mean percent canopy in Indian Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 97%. The mean percent left bank vegetated was 97%. The dominant elements composing the structure of the stream banks consisted of 37% bedrock, 36% sand/silt/clay, 24% cobble/gravel and 3% boulder (Graph 10). Deciduous trees were the dominant vegetation type observed in 84% of the units surveyed. Additionally, 9% of the units surveyed had coniferous as the dominant vegetation type, and 5% had brush as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Nineteen sites were snorkeled for species composition and distribution in Indian Creek on October 21, 23, and 30, 2008. Water temperatures taken during the snorkeling period of 1100 to 1405 ranged from 45 to 52 degrees Fahrenheit. Air temperatures ranged from 43 to 58 degrees Fahrenheit. The sites were sampled by Isaac Mikus (DFG).

In reach 1, which comprised the first 12,965 feet of stream, 9 sites were sampled. The reach sites yielded 46 young-of-the-year steelhead/rainbow trout (SH/RT), 11 age 1+ SH/RT and 2 age 2+ SH/RT, 6 coho and 250 Sacramento pikeminnow.

In reach 2, 2 sites were sampled starting approximately 12,966 from the confluence with South Fork Eel River and continuing upstream 5,616 feet. The reach sites yielded 86 young-of-the-year SH/RT, 5 age 1+ SH/RT, 2 age 2+ SH/RT, 28 coho and 30 Sacramento pikeminnow.

In reach 3, 2 sites were sampled starting approximately 18,582 from the confluence with South Fork Eel River and continuing upstream 30,342 feet. The reach sites yielded 52 young-of-the-year SH/RT and 18 coho.

In reach 4, 6 sites were sampled starting approximately 48, 923 from the confluence with South Fork Eel River and continuing upstream 2,553 feet. The reach sites yielded 102 young-of-the-year SH/RT and 90 coho.

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The following chart displays the information yielded from these sites:
2008 Indian Creek underwater observations.

Date	Site #	Hab. Unit #	Hab. Type	Approx. Dist. from mouth (ft.)	Coho		SH/RT		
					YOY	1+	YOY	1+	2+
Reach 1: F4 Channel Type									
10/21/08	1	011	4.2	1,003	0	0	5	1	1
10/21/08	2	018	4.2	1,683	0	0	7	1	0
10/21/08	3	023	4.2	2,154	0	0	10	1	0
10/21/08	4	056	4.2	5,484	0	0	0	0	1
10/21/08	5	058	4.2	5,663	0	0	0	1	0
10/21/08	6	067	4.2	6,717	0	0	5	2	0
10/21/08	7	088	4.2	8,859	2	0	4	2	0
10/21/08	8	118	3.3	12,647	4	0	15	2	0
10/21/08	9	120	4.2	12,965	0	0	0	1	0
Reach 2: F2 Channel Type									
10/21/08	1	125	4.2	13,345	22	0	60	5	2
10/21/08	2	170	4.2	18,428	6	0	26	0	0
Reach 3: F4 Channel Type									
10/23/08	1	184	5.4	20,273	10	0	26	0	0
10/23/08	2	450	4.2	48,923	8	0	26	0	0
Reach 4: F1 Channel Type									
10/30/80	1	463	4.2	49,821	35	0	25	0	0
10/30/80	2	470	4.3	50,547	55	0	15	0	0
10/30/80	3	477	5.4	50,934	0	0	60	0	0
10/30/80	4	483	5.4	51,280	0	0	2	0	0
10/30/80	5	486	5.6	51,355	0	0	0	0	0
10/30/80	6	488	5.6	51,402	0	0	0	0	1

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DISCUSSION

Indian Creek is an F4 channel type for the first 12,965 feet of stream surveyed and an F2 channel type for the next 5,616 feet and an F4 channel type for the next 30,342 and an F1 the remaining 2,553 feet. The suitability of F4, F2, and F1 channel types for fish habitat improvement structures is as follows: F4 channel types are good for bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover. F2 channel types are fair for plunge weirs, single and opposing wing-deflectors, and log cover. F1 channel types are good for bank-placed boulders and fair for single wing-deflectors and log cover.

The water temperatures recorded on the survey days September 23 to October 17, 2008 ranged from 45 to 62 degrees Fahrenheit. Air temperatures ranged from 39 to 72 degrees Fahrenheit. To make any 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 45% of the total length of this survey, riffles 12%, and pools 41%. The pools are relatively deep, with 174 of the 183 (95%) 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.

One-hundred-sixty of the 183 pool tail-outs measured had embeddedness ratings of 1 or 2. Seven of the pool tail-outs had embeddedness ratings of 3 or 4. Sixteen of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. Sediment sources in Indian Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

One hundred sixteen of the 183 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 11. The shelter rating in the flatwater habitats was 5. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by boulders in Indian Creek. Boulders are the dominant cover type in pools followed by large woody debris. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover 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 83%. Reach 1 had a canopy density of 69.3%, Reach 2 had a canopy density of 81.3%, Reach 3 had a canopy density of 86.9% and Reach 4 had a canopy density of 90.7%. 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 97%, respectively.

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RECOMMENDATIONS

- 1) Indian Creek should be managed as an anadromous, natural production stream.
- 2) The limited water temperature data available suggest that maximum temperatures are within the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for 3 to 5 years.
- 3) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from boulders. Adding high quality complexity with woody cover in the pools is desirable.
- 4) Active and potential sediment sources related to the road system need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.

COMMENTS AND LANDMARKS

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

Position (ft):	Habitat Unit #:	Comments:
0	0001.00	Start of survey at the confluence with the South Fork Eel River.
105	0002.00	This isolated pool appears to have no salmonids in it.
834	0010.00	Dead salmonid observed below the tail of the pool in dry gravel.
1082	0013.00	This unit is about 1' deep and barely flowing.
3654	0039.00	More than 50 Sacramento pikeminnow observed in this pool.
3965	0041.00	There is a slide on the left bank that is approximately 20' wide x 10' high.
5878	0061.00	Road 1000 crosses through the stream at the top of this unit.
6829	0069.00	An unnamed tributary (trib #01) enters from the right bank. The flow is estimated to be 0.01 cfs; contributing less than 1% to the flow of Indian Creek. The temperature of the tributary is 53 degrees Fahrenheit, while Indian Creek is 56 degrees Fahrenheit both upstream as well as downstream of the confluence. For the 75' explored, the slope is 90% and ends at a 50' waterfall. No fish were seen in the tributary.
8308	0081.00	More than 5 young-of-the-year salmonids (YOY) observed. YOY are becoming more common despite the continuing high numbers of pikeminnow.

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8859	0088.00	This is the first occurrence of coho; more than 10 YOY observed.
8947	0089.00	Road 1000 fords the creek in the middle of this unit.
10058	0096.00	There is an old railroad crossing over a dry tributary on the left bank. It is source of silt and gravel being added to Indian Creek. The erosion site is 80' long x 25' high.
10406	0100.00	A road crosses through the stream at middle of this unit.
11212	0109.00	Jones Creek enters the bottom of this unit. It is dry for first 250'.
11212	0109.00	A road crosses through the stream in middle of unit.
13345	0125.00	This is the first habitat unit that has had more salmonids then pikeminnow.
13651	0128.00	Parker Creek enters this unit. It is dry.
14243	0134.00	Tunnel Gulch (trib #02) enters from the right bank. The flow is estimated to be 0.01 cfs; contributing 1% to the flow of Indian Creek. The temperature of the tributary is 52 degrees Fahrenheit, while Indian Creek is 54 degrees Fahrenheit both upstream as well as downstream of the confluence. There is a 25' waterfall at the mouth. For the 50' observed upstream the slope is 50% and there is no sign of fish.
14559	0137.00	There is erosion on the left bank that is 60' high x 150' long. It is contributing sediment ranging from silt to gravel.
17628	0163.00	A bedrock gorge prevents the crew from being able to measure the length due to the depth of the unit; length based on previous survey. The maximum depth has been estimated based on the most accessible area that was and that depth is 15'.
23974	0215.00	Kalisher Gulch enters on right bank. There are only a few wet spots within the first 250'.
25227	0224.00	Four Mile Gulch (trib #03) enters from the left bank. The flow is estimated to be 0.05 cfs; contributing 2% to the flow of Indian Creek. The temperature of the tributary is 53 degrees Fahrenheit, while Indian Creek is 54 degrees Fahrenheit both upstream as well as downstream of the confluence. For the 300' explored, the slope is 7% and is accessible to fish though none were observed.
28092	0247.00	Five Mile Gulch (trib #04) enters from the right bank. The flow is estimated to be 0.05 cfs; contributing 3% to the flow of Indian Creek. The temperature of the tributary is 54 degrees Fahrenheit, while Indian Creek is also 54 degrees Fahrenheit both upstream as well as downstream of the confluence. For the 125' explored, the slope is 8% and salmonids are present.

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28688	0253.00	An unnamed tributary (trib #05) enters from the left bank. The flow is estimated to be 0.01 cfs; contributing 1% to the flow of Indian Creek. The temperature of the tributary is 55 degrees Fahrenheit, while Indian Creek is also 55 degrees Fahrenheit both upstream as well as downstream of the confluence. For the 10' explored, the slope is 30% and no fish are present. There is a 5' waterfall at the mouth with no jump pool.
31518	0277.00	There is a right bank slide measuring 30' wide x 70' high contributing sediment ranging silt to gravel.
31760	0278.00	There is a right bank slide measuring 50' wide x 130' high contributing sediment ranging silt to gravel.
32386	0284.00	This is left erosion on the left bank along the entire length of the unit, it is 10' high.
32478	0286.00	Little Manus Gulch (trib #06) enters from the right bank. The flow is estimated to be 0.01 cfs; contributing a negligible flow to Indian Creek. The temperature of the tributary is 56 degrees Fahrenheit, while Indian Creek is 55 degrees Fahrenheit both upstream as well as downstream of the confluence. For the 200' explored, the slope is 4%. The tributary is dry for the first 5' and a debris accumulation occurs at 200'. No fish are present.
33288	0296.00	There is a slide on the left bank that is 90' long x 80' high, contributing sediment ranging silt to cobbles.
33428	0297.00	Manus Gulch (trib #07) enters from the right bank. The flow is estimated to be 0.05 cfs; contributing 2% to the flow of Indian Creek. The temperature of the tributary is 55 degrees Fahrenheit, while Indian Creek is also 56 degrees Fahrenheit both upstream as well as downstream of the confluence. For the 600' explored, the slope is 4% and salmonids are present.
35044	0312.00	Moody Creek (trib #08) enters from the right bank. The flow is estimated to be 0.1 cfs; contributing 5% to the flow of Indian Creek. The temperature of the tributary is 52 degrees Fahrenheit, while Indian Creek is also 53 degrees Fahrenheit both upstream as well as downstream of the confluence. See the 2008 Moody Creek habitat survey report for more detail.
36570	0322.00	Road 2000 bridge crosses Indian Creek. It is a railcar bridge that is 12.5' wide, 9' high and 89' long. It poses no barrier to salmonids and is in good condition.
36759	0324.00	Lampkins Creek (trib #09) enters from the left bank. The flow is estimated to be 0.05 cfs; contributing 2% to the flow of Indian Creek. The temperature of the tributary is 53 degrees Fahrenheit, while Indian Creek is also 53 degrees Fahrenheit both upstream as well as downstream of the confluence. For the 250' explored, the slope is 4% and salmonids are present.

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- 37882 0336.00 Sebbass Creek (trib #10) enters from the left bank. The flow is estimated to be contributing 5% to the flow of Indian Creek. The temperature of the tributary is 54 degrees Fahrenheit, while Indian Creek is 53 degrees Fahrenheit both downstream as well as upstream of the confluence. For the 200' explored, the slope is 3% and salmonids are present.
- 38737 0344.00 There is a slide on the right bank that is 60' high x 15' wide, contributing sediment ranging silt to cobbles.
- 40160 0361.00 There is a slide on the right bank that is caused by a road failure at an ephemeral tributary crossing. The slide has caused the creek to migrate towards the right bank. Riparian trees are falling into the creek.
- 42479 0380.00 Coulbourn Creek (trib #11) enters from the left bank. The flow is estimated to be 0.2 cfs; contributing 10% to the flow of Indian Creek. The temperature of the tributary is 47 degrees Fahrenheit, while Indian Creek is also 46 degrees Fahrenheit both upstream as well as downstream of the confluence. For the 300' explored, the slope is 2% and salmonids are present.
- 46594 0425.00 There is a slide on the right bank that is 100' tall x 100' long, it is contributing sediment ranging from silt to boulder substrates. At the top is a road. Sediment from the slide is forcing Indian Creek towards the left bank and causing more erosion.
- 49203 0453.00 There is a 3.2' plunge over bedrock.
- 49571 0460.00 There is a 4' at the top of this deep bedrock pool
- 50441 0468.00 There is a 4.5' plunge in this unit, passable in higher flows.
- 50547 0470.00 Anderson Creek (trib #12) enters from the right bank. The flow is estimated to be 0.5 cfs; contributing 40% to the flow of Indian Creek. The temperature of the tributary is 48 degrees Fahrenheit, while Indian Creek is also 47 degrees Fahrenheit both upstream as well as downstream of the confluence. For more details see the 2008 Anderson Creek habitat survey.
- 50780 0474.00 Log debris accumulation (LDA) #001 is 4.7' high x 46' wide x 5' long; consisting of 7 pieces of large woody debris (LWD). Water does not flow through, though there are visible gaps. Retained sediment measures 10' wide x 130' long x 1' deep ranging from silt to gravel. There are fish upstream of the LDA. Currently the water is flowing subsurface through the strainer. Plunge height is 2' high.
- 51355 0486.00 There is a 2' high bedrock plunge.
- 51402 0488.00 There is an 8' waterfall at the top of the unit with 8' high jump pool. The jump pool will drain efficiently in high flows. Probable end of anadromy due to jump and the barriers presented by habitat unit 489.

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- 51432 0489.00 The gradient is greater than 10% and has 2 plunges with no jump pools. The first plunge is 3.1' high and the second is 3.8' foot high. Combined, habitat units 488 and 489 have 20.7' high gain over 44' which is a 47% slope.
- 51476 0489.00 End of survey due to probable end of anadromy. No young-of-the-year salmonids (YOY) observed for 1,350' upstream.

REFERENCES

Flosi, G., Downie, S., Hopelain, J., Bird, M., Coey, R., and Collins, B. 1998. *California Salmonid Stream Habitat Restoration Manual*, 3rd edition. California Department of Fish and Game, Sacramento, California.

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LEVEL III and LEVEL IV HABITAT TYPES

RIFFLE

Low Gradient Riffle	(LGR)	[1.1]	{ 1 }
High Gradient Riffle	(HGR)	[1.2]	{ 2 }

CASCADE

Cascade	(CAS)	[2.1]	{ 3 }
Bedrock Sheet	(BRS)	[2.2]	{24}

FLATWATER

Pocket Water	(POW)	[3.1]	{21}
Glide	(GLD)	[3.2]	{14}
Run	(RUN)	[3.3]	{15}
Step Run	(SRN)	[3.4]	{16}
Edgewater	(EDW)	[3.5]	{18}

MAIN CHANNEL POOLS

Trench Pool	(TRP)	[4.1]	{ 8 }
Mid-Channel Pool	(MCP)	[4.2]	{17}
Channel Confluence Pool	(CCP)	[4.3]	{19}
Step Pool	(STP)	[4.4]	{23}

SCOUR POOLS

Corner Pool	(CRP)	[5.1]	{22}
Lateral Scour Pool - Log Enhanced	(LSL)	[5.2]	{10}
Lateral Scour Pool - Root Wad Enhanced	(LSR)	[5.3]	{11}
Lateral Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{12}
Lateral Scour Pool - Boulder Formed	(LSBo)	[5.5]	{20}
Plunge Pool	(PLP)	[5.6]	{ 9 }

BACKWATER POOLS

Secondary Channel Pool	(SCP)	[6.1]	{ 4 }
Backwater Pool - Boulder Formed	(BPB)	[6.2]	{ 5 }
Backwater Pool - Root Wad Formed	(BPR)	[6.3]	{ 6 }
Backwater Pool - Log Formed	(BPL)	[6.4]	{ 7 }
Dammed Pool	(DPL)	[6.5]	{13}

ADDITIONAL UNIT DESIGNATIONS

Dry	(DRY)	[7.0]	
Culvert	(CUL)	[8.0]	
Not Surveyed	(NS)	[9.0]	
Not Surveyed due to a marsh	(MAR)	[9.1]	

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

Stream Name: Indian Creek

LLID: 1238039399768

Drainage: Eel River - South Fork

Survey Dates: 9/23/2008 to 10/17/2008

Confluence Location: Quad: PIERCY

Legal Description: T05SR03ES35

Latitude: 39:58:36.0N

Longitude: 123:48:14.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	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
12	0	DRY	2.5	75	902	1.8									
176	23	FLATWATER	36.0	131	23105	44.9	22.3	0.5	1.3	2168	381603	1297	228201		5
183	183	POOL	37.4	116	21254	41.3	25.3	1.6	3.7	3025	553534	5834	1067686	5060	11
118	15	RIFFLE	24.1	53	6215	12.1	15.0	0.4	1.0	454	53519	199	23478		13
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
489	221				51476					988656			1319364		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Indian Creek

LLID: 1238039399768

Drainage: Eel River - South Fork

Survey Dates: 9/23/2008 to 10/17/2008

Confluence Location: Quad: PIERCY

Legal Description: T05SR03ES35

Latitude: 39:58:36.0N

Longitude: 123:48:14.0W

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 (%)
103	9	LGR	21.1	55	5626	10.9	14	0.3	2	580	59746	252	25952		7	90
13	4	HGR	2.7	40	515	1.0	18	0.4	2.1	275	3571	129	1675		30	88
1	1	CAS	0.2	44	44	0.1	5	0.6	2.4	187	187	112	112		20	94
1	1	BRS	0.2	30	30	0.1	18	0.3	0.9	297	297	89	89		0	98
1	1	POW	0.2	164	164	0.3	32	0.6	1.5	4198	4198	2519	2519		20	97
5	2	GLD	1.0	202	1012	2.0	31	1.0	2.3	3538	17690	4234	21170		3	65
96	10	RUN	19.6	86	8267	16.1	25	0.5	2.1	1316	126378	631	60578		5	85
74	10	SRN	15.1	185	13662	26.5	17	0.5	2.1	2543	188181	1252	92679		5	95
154	154	MCP	31.5	123	18955	36.8	26	1.7	17.8	3295	507451	6528	1005282	5695	11	82
2	2	CCP	0.4	79	158	0.3	17	1.2	2.4	1335	2670	2008	4016	1608	20	75
1	1	STP	0.2	93	93	0.2	28	1.2	3.6	2213	2213	3763	3763	2656	20	96
3	3	LSL	0.6	58	175	0.3	17	0.7	2.6	1039	3116	1215	3646	858	20	81
3	3	LSR	0.6	70	211	0.4	28	1.0	3	1945	5834	2940	8819	2510	17	72
13	13	LSBk	2.7	82	1068	2.1	17	0.7	3.4	1431	18606	1566	20360	1116	5	81
4	4	LSBo	0.8	116	465	0.9	23	0.8	2.7	2712	10847	3211	12846	2429	10	93
2	2	PLP	0.4	34	69	0.1	28	3.1	7.95	888	1777	3253	6506	3225	20	96
1	1	SCP	0.2	60	60	0.1	17	2.4	4.7	1020	1020	2448	2448	2448	10	
12	0	DRY	2.5	75	902	1.8										

Total Units
489

Total Units Fully Measured
221

Total Length (ft.)
51476

Total Area (sq.ft.)
953782

Total Volume (cu.ft.)
1272461

Table 3 - Summary of Pool Types

Stream Name: Indian Creek

LLID: 1238039399768

Drainage: Eel River - South Fork

Survey Dates: 9/23/2008 to 10/17/2008

Confluence Location: Quad: PIERCY

Legal Description: T05SR03ES35

Latitude: 39:58:36.0N

Longitude: 123:48:14.0W

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
157	157	MAIN	86	122	19206	90	26.2	1.7	3263	512334	5623	882829	12
25	25	SCOUR	14	80	1988	9	20.3	1.0	1607	40180	1631	40773	10
1	1	BACKWATER	1	60	60	0	17.0	2.4	1020	1020	2448	2448	10

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
183	183	21254	553534	926050

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

Stream Name: Indian Creek

LLID: 1238039399768

Drainage: Eel River - South Fork

Survey Dates: 9/23/2008 to 10/17/2008

Confluence Location: Quad: PIERCY

Legal Description: T05SR03ES35

Latitude: 39:58:36.0N

Longitude: 123:48:14.0W

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
154	MCP	84	0	0	4	3	45	29	39	25	66	43
2	CCP	1	0	0	0	0	2	100	0	0	0	0
1	STP	1	0	0	0	0	0	0	1	100	0	0
3	LSL	2	0	0	1	33	2	67	0	0	0	0
3	LSR	2	0	0	0	0	2	67	1	33	0	0
13	LSBk	7	0	0	4	31	7	54	2	15	0	0
4	LSBo	2	0	0	0	0	4	100	0	0	0	0
2	PLP	1	0	0	0	0	0	0	1	50	1	50
1	SCP	1	0	0	0	0	0	0	0	0	1	100
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
183			0	0	9	5	62	34	44	24	68	37

Mean Maximum Residual Pool Depth (ft.): 3.7

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Indian Creek

LLID: 1238039399768

Drainage: Eel River - South Fork

Survey Dates: 9/23/2008 to 10/17/2008

Dry Units: 12

Confluence Location: Quad: PIERCY

Legal Description: T05SR03ES35

Latitude: 39:58:36.0N

Longitude: 123:48:14.0W

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
103	9	LGR	0	0	0	0	0	0	0	100	0
13	4	HGR	0	1	0	0	0	0	25	74	0
1	1	CAS	0	0	0	0	0	0	20	70	10
1	1	BRS									
118	15	TOTAL RIFFLE	0	1	0	0	0	0	13	85	1
1	1	POW	0	0	0	0	0	0	0	100	0
5	2	GLD	0	5	80	0	0	0	0	15	0
96	10	RUN	0	0	23	8	0	0	8	61	0
74	10	SRN	0	5	15	2	0	0	0	77	2
176	23	TOTAL FLAT	0	2	24	5	0	0	4	65	0
154	154	MCP	7	10	16	13	3	1	0	37	13
2	2	CCP	0	0	0	0	0	50	0	50	0
1	1	STP	0	0	0	0	0	0	0	100	0
3	3	LSL	47	0	45	2	5	0	0	0	0
3	3	LSR	17	13	20	50	0	0	0	0	0
13	12	LSBk	0	5	21	10	0	25	0	30	9
4	4	LSBo	0	3	0	0	0	0	0	97	0
2	2	PLP	0	0	0	0	0	0	5	30	65
1	1	SCP	8	9	16	13	3	2	0	37	13
183	182	TOTAL POOL									
489	220	TOTAL	4	5	9	7	2	1	1	26	7

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Indian Creek

LLID: 1238039399768

Drainage: Eel River - South Fork

Survey Dates: 9/23/2008 to 10/17/2008

Dry Units: 12

Confluence Location: Quad: PIERCY

Legal Description: T05SR03ES35 Latitude: 39:58:36.0N

Longitude: 123:48:14.0W

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
103	8	LGR	0	0	25	13	25	25	13
13	4	HGR	0	0	0	0	0	75	25
1	1	CAS	0	0	0	0	0	0	100
1	1	BRS	0	0	0	0	0	0	100
1	1	POW	0	0	100	0	0	0	0
5	2	GLD	0	0	100	0	0	0	0
96	10	RUN	0	0	50	10	20	10	10
74	10	SRN	0	0	60	10	10	10	10
154	151	MCP	0	3	81	7	2	3	4
2	2	CCP	0	0	50	0	0	50	0
1	1	STP	0	0	100	0	0	0	0
3	3	LSL	0	0	67	0	33	0	0
3	3	LSR	0	0	100	0	0	0	0
13	13	LSBk	0	0	85	0	8	0	8
4	4	LSBo	0	0	75	25	0	0	0
2	2	PLP	0	0	50	0	0	50	0
1	1	SCP	0	0	0	0	100	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Indian Creek

LLID: 1238039399768

Drainage: Eel River - South Fork

Survey Dates: 9/23/2008 to 10/17/2008

Confluence Location: Quad: PIERCY

Legal Description: T05SR03ES35

Latitude: 39:58:36.0N

Longitude: 123:48:14.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
83	20	80	0	97	97

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: Indian Creek LLID: 1238039399768 Drainage: Eel River - South Fork
 Survey Dates: 9/23/2008 to 10/17/2008 Survey Length (ft.): 51476 Main Channel (ft.): 51476 Side Channel (ft.): 0
 Confluence Location: Quad: PIERCY Legal Description: T05SR03ES35 Latitude: 39:58:36.0N Longitude: 123:48:14.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: F4	Canopy Density (%): 69.3	Pools by Stream Length (%): 30.9
Reach Length (ft.): 12965	Coniferous Component (%): 26.0	Pool Frequency (%): 30.3
Riffle/Flatwater Mean Width (ft.): 24.3	Hardwood Component (%): 74.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 3
Range (ft.): 54 to 101	Vegetative Cover (%): 93.7	2 to 2.9 Feet Deep: 22
Mean (ft.): 72	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 25
Std. Dev.: 14	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 50
Base Flow (cfs.):	Occurrence of LWD (%): 17	Mean Max Residual Pool Depth (ft.): 3.9
Water (F): 52 - 62 Air (F): 47 - 72	LWD per 100 ft.:	Mean Pool Shelter Rating: 16
Dry Channel (ft): 902	Riffles: 1	
	Pools: 2	
	Flat: 1	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 39 Sm Cobble: 31 Lg Cobble: 17 Boulder: 8 Bedrock: 6		
Embeddedness Values (%): 1. 58.3 2. 22.2 3. 11.1 4. 8.3 5. 0.0		

STREAM REACH: 2

Channel Type: F2	Canopy Density (%): 81.3	Pools by Stream Length (%): 42.8
Reach Length (ft.): 5616	Coniferous Component (%): 17.0	Pool Frequency (%): 35.3
Riffle/Flatwater Mean Width (ft.): 22.2	Hardwood Component (%): 83.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 6
Range (ft.): 49 to 64	Vegetative Cover (%): 96.0	2 to 2.9 Feet Deep: 44
Mean (ft.): 57	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 22
Std. Dev.: 5	Dominant Bank Substrate Type: Bedrock	>= 4 Feet Deep: 28
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 4	Mean Max Residual Pool Depth (ft.): 4.0
Water (F): 54 - 59 Air (F): 52 - 62	LWD per 100 ft.:	Mean Pool Shelter Rating: 13
Dry Channel (ft): 0	Riffles: 2	
	Pools: 1	
	Flat: 1	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 17 Sm Cobble: 6 Lg Cobble: 17 Boulder: 61 Bedrock: 0		
Embeddedness Values (%): 1. 50.0 2. 38.9 3. 0.0 4. 0.0 5. 11.1		

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

Channel Type: F4	Canopy Density (%): 86.9	Pools by Stream Length (%): 45.1
Reach Length (ft.): 30342	Coniferous Component (%): 17.3	Pool Frequency (%): 40.1
Riffle/Flatwater Mean Width (ft.): 17.6	Hardwood Component (%): 82.7	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 4
Range (ft.): 30 to 76	Vegetative Cover (%): 98.4	2 to 2.9 Feet Deep: 38
Mean (ft.): 48	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 24
Std. Dev.: 12	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 33
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 9	Mean Max Residual Pool Depth (ft.): 3.5
Water (F): 45 - 56	Air (F): 39 - 70	LWD per 100 ft.:
Dry Channel (ft): 0		Riffles: 1
		Pools: 2
		Flat: 1
Pool Tail Substrate (%): Silt/Clay: 0	Sand: 1	Gravel: 39
	Sm Cobble: 35	Lg Cobble: 9
	Boulder: 8	Bedrock: 8
Embeddedness Values (%): 1. 92.0	2. 3.6	3. 0.0
	4. 0.0	5. 4.5

STREAM REACH: 4

Channel Type: F1	Canopy Density (%): 90.7	Pools by Stream Length (%): 44.8
Reach Length (ft.): 2553	Coniferous Component (%): 27.3	Pool Frequency (%): 42.5
Riffle/Flatwater Mean Width (ft.): 14.7	Hardwood Component (%): 72.7	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 12
Range (ft.): 22 to 53	Vegetative Cover (%): 100.0	2 to 2.9 Feet Deep: 18
Mean (ft.): 34	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 24
Std. Dev.: 12	Dominant Bank Substrate Type: Bedrock	>= 4 Feet Deep: 47
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 6	Mean Max Residual Pool Depth (ft.): 4.5
Water (F): 46 - 47	Air (F): 46 - 58	LWD per 100 ft.:
Dry Channel (ft): 0		Riffles: 1
		Pools: 2
		Flat: 2
Pool Tail Substrate (%): Silt/Clay: 0	Sand: 0	Gravel: 18
	Sm Cobble: 6	Lg Cobble: 6
	Boulder: 18	Bedrock: 53
Embeddedness Values (%): 1. 47.1	2. 0.0	3. 0.0
	4. 0.0	5. 52.9

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Indian Creek

LLID: 1238039399768

Drainage: Eel River - South Fork

Survey Dates: 9/23/2008 to 10/17/2008

Confluence Location: Quad: PIERCY

Legal Description: T05SR03ES35

Latitude: 39:58:36.0N

Longitude: 123:48:14.0W

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	77	86	36.9
Boulder	9	6	3.4
Cobble / Gravel	43	63	24.0
Sand / Silt / Clay	92	66	35.7

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	1	3	0.9
Brush	15	7	5.0
Hardwood Trees	179	191	83.7
Coniferous Trees	23	16	8.8
No Vegetation	3	4	1.6

Total Stream Cobble Embeddedness Values: 2

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

StreamName: Indian Creek

LLID: 1238039399768

Drainage: Eel River - South Fork

Survey Dates: 9/23/2008 to 10/17/2008

Confluence Location: Quad: PIERCY

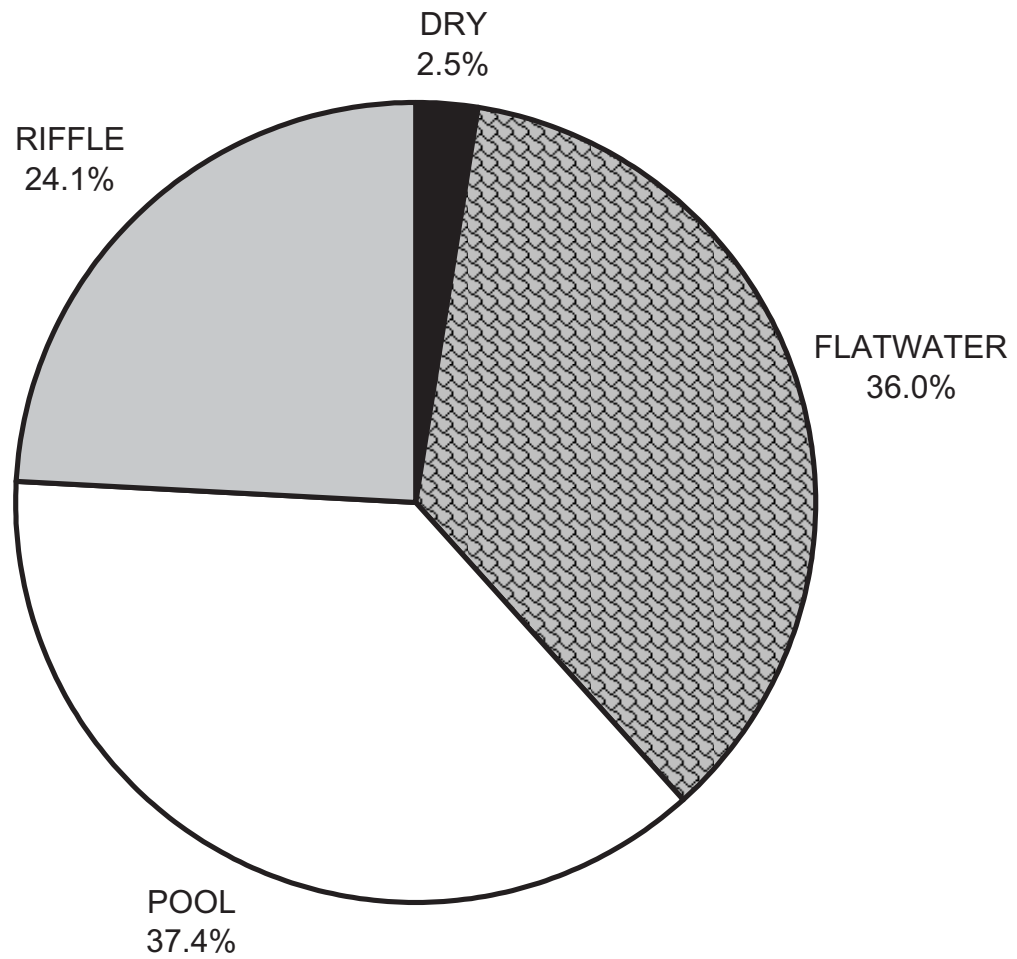
Legal Description: T05SR03ES35

Latitude: 39:58:36.0N

Longitude: 123:48:14.0W

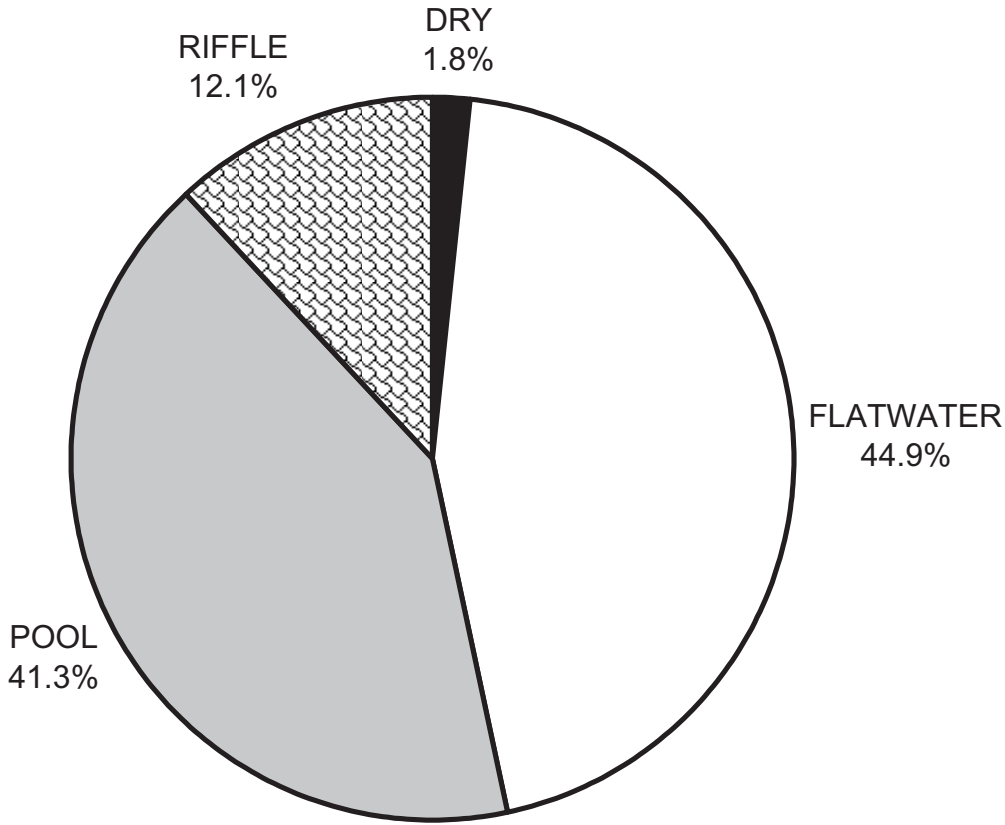
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	0	8
SMALL WOODY DEBRIS (%)	1	2	9
LARGE WOODY DEBRIS (%)	0	24	16
ROOT MASS (%)	0	5	13
TERRESTRIAL VEGETATION (%)	0	0	3
AQUATIC VEGETATION (%)	0	0	2
WHITEWATER (%)	13	4	0
BOULDERS (%)	85	65	37
BEDROCK LEDGES (%)	1	0	13

INDIAN CREEK 2008 HABITAT TYPES BY PERCENT OCCURRENCE



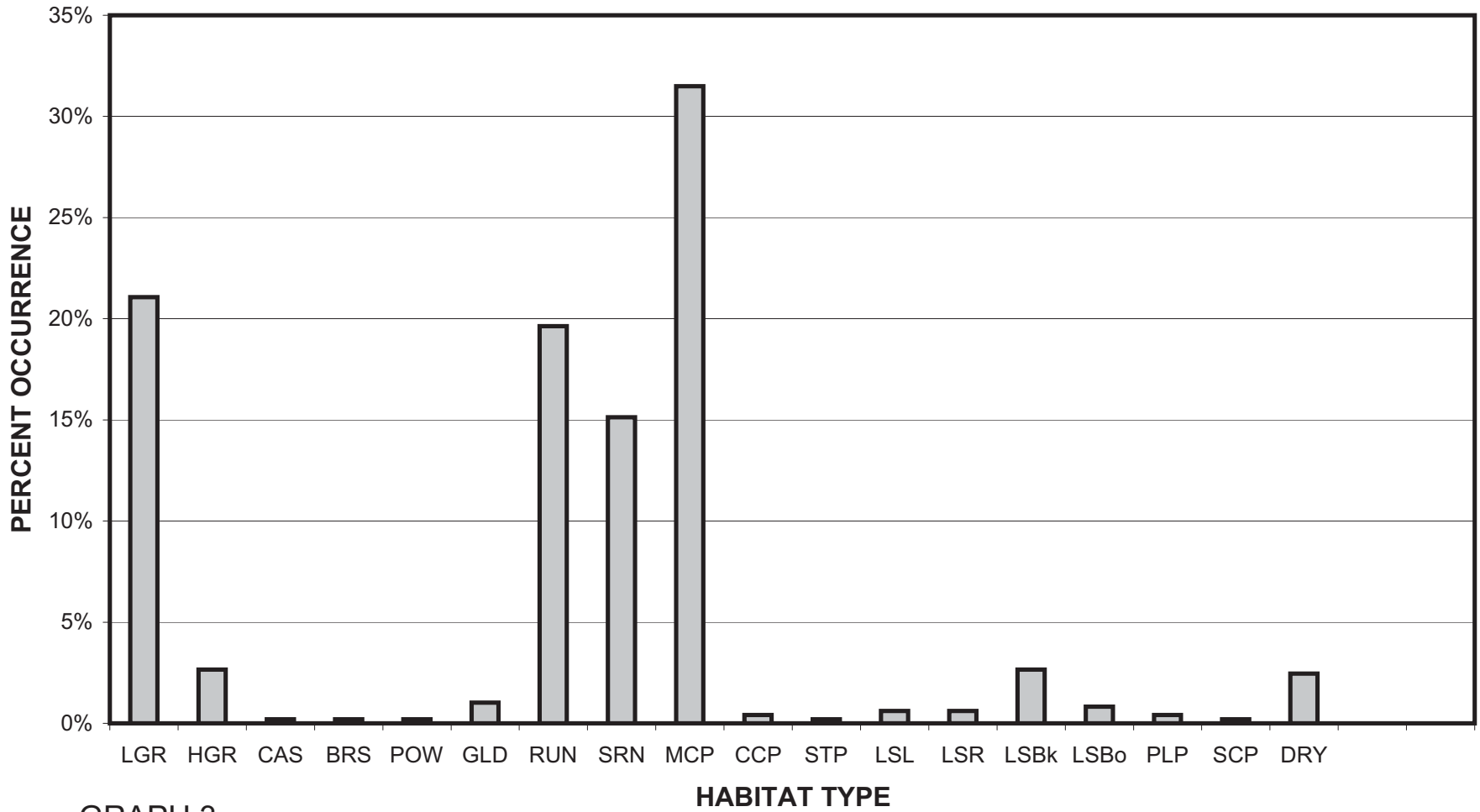
GRAPH 1

**INDIAN CREEK 2008
HABITAT TYPES BY PERCENT TOTAL LENGTH**



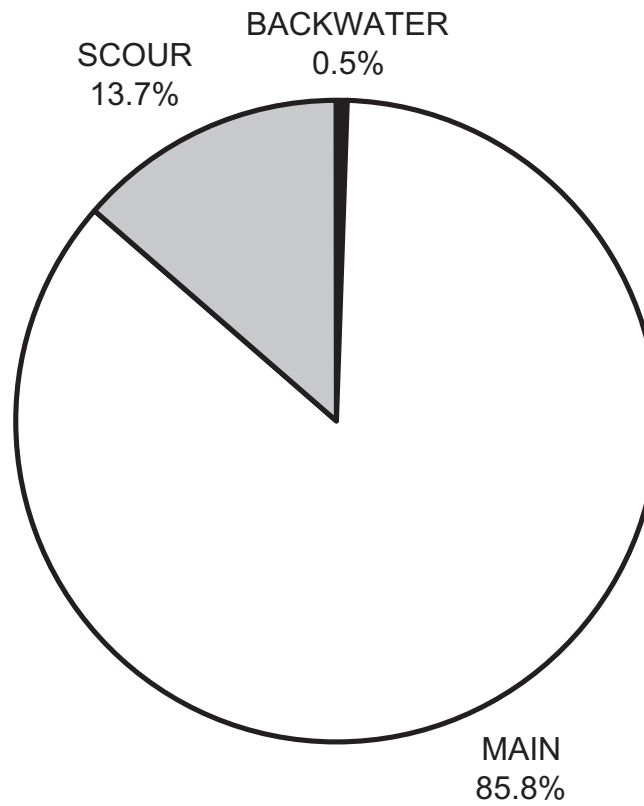
GRAPH 2

INDIAN CREEK 2008 HABITAT TYPES BY PERCENT OCCURRENCE



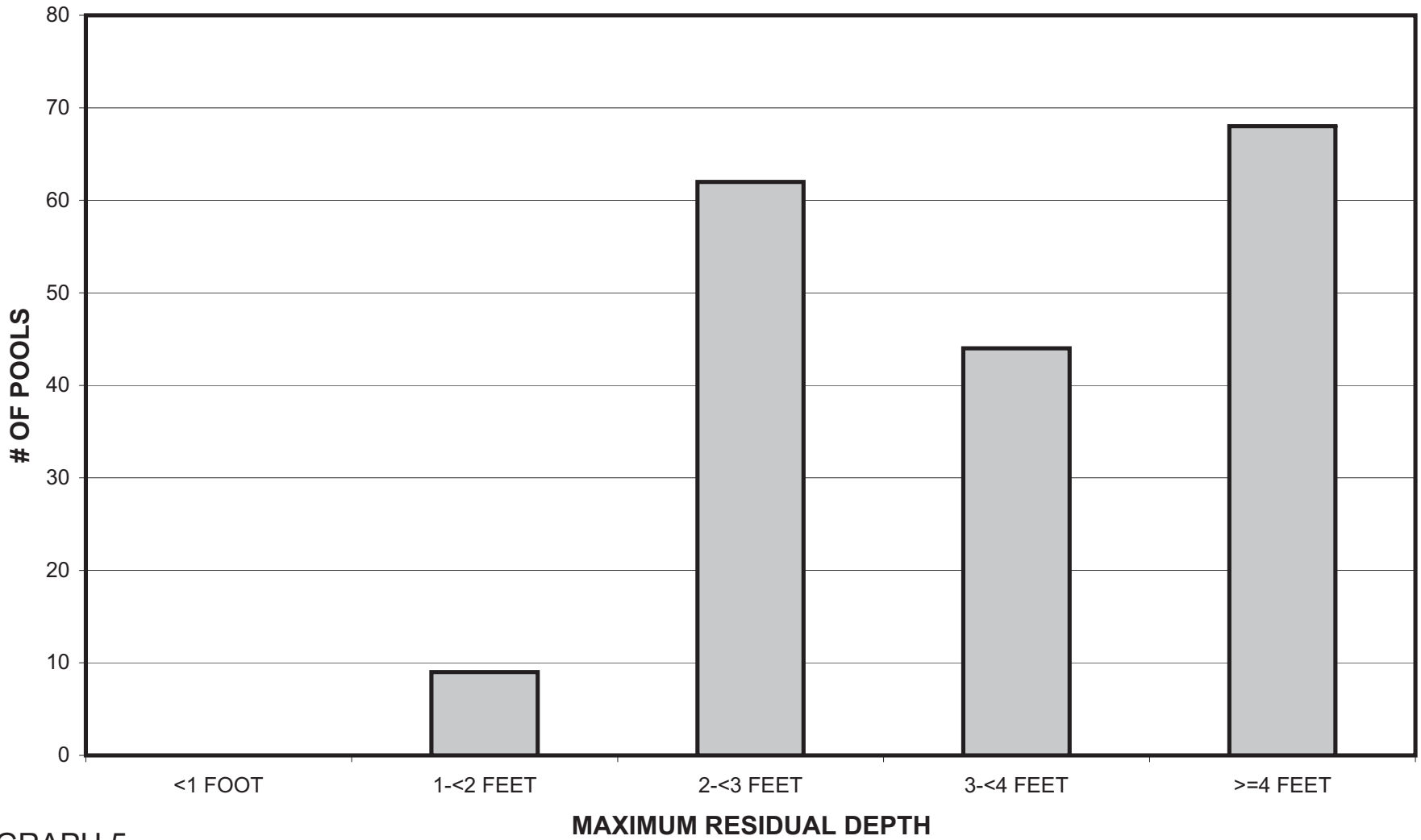
GRAPH 3

INDIAN CREEK 2008 POOL TYPES BY PERCENT OCCURRENCE



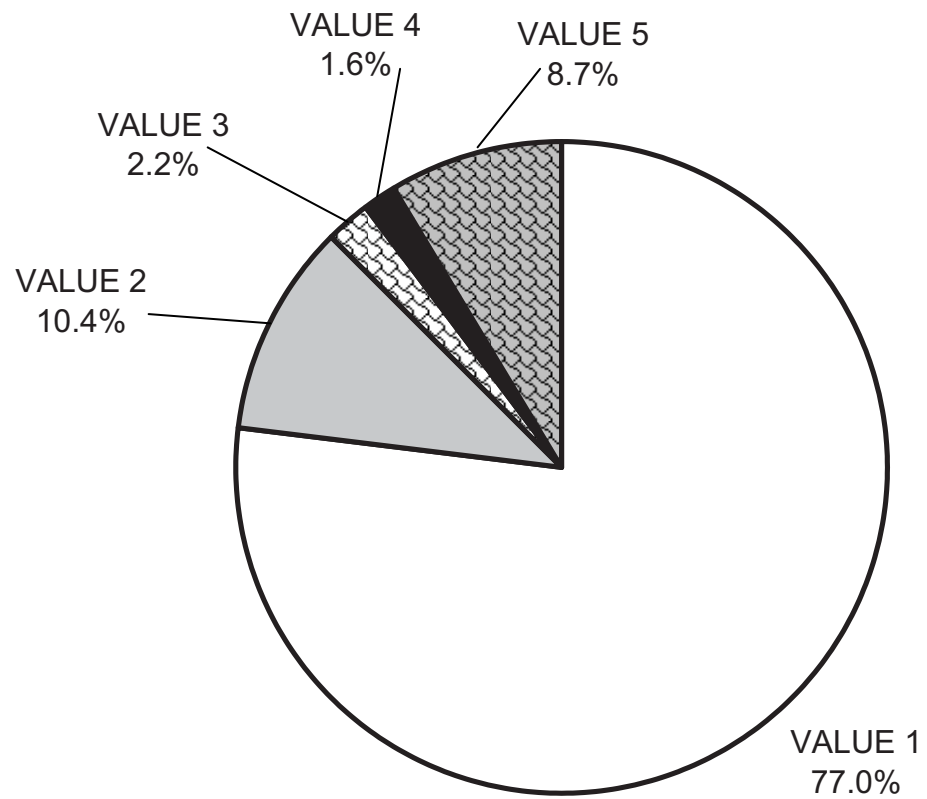
GRAPH 4

INDIAN CREEK 2008 MAXIMUM DEPTH IN POOLS



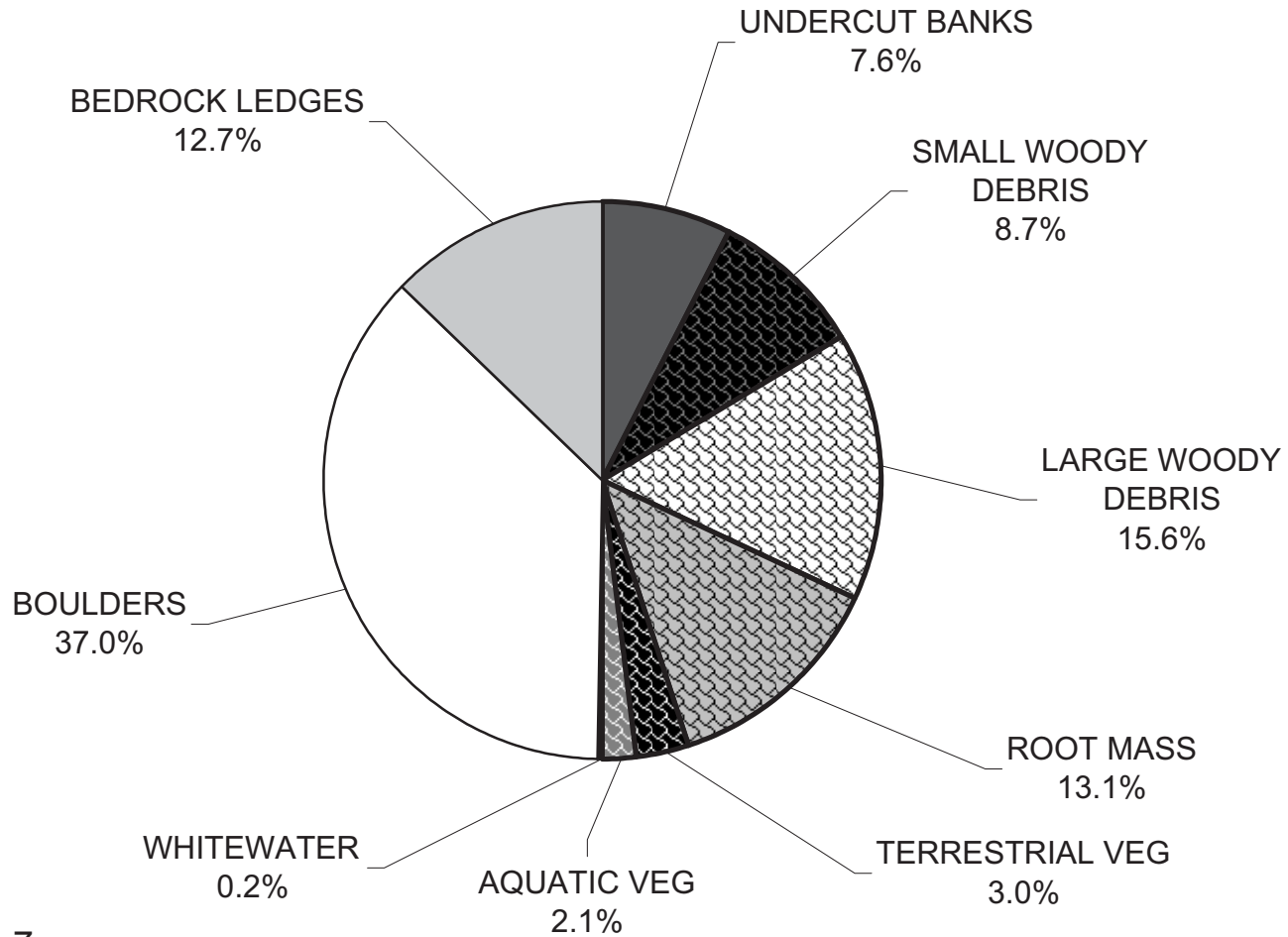
GRAPH 5

INDIAN CREEK 2008 PERCENT EMBEDDEDNESS



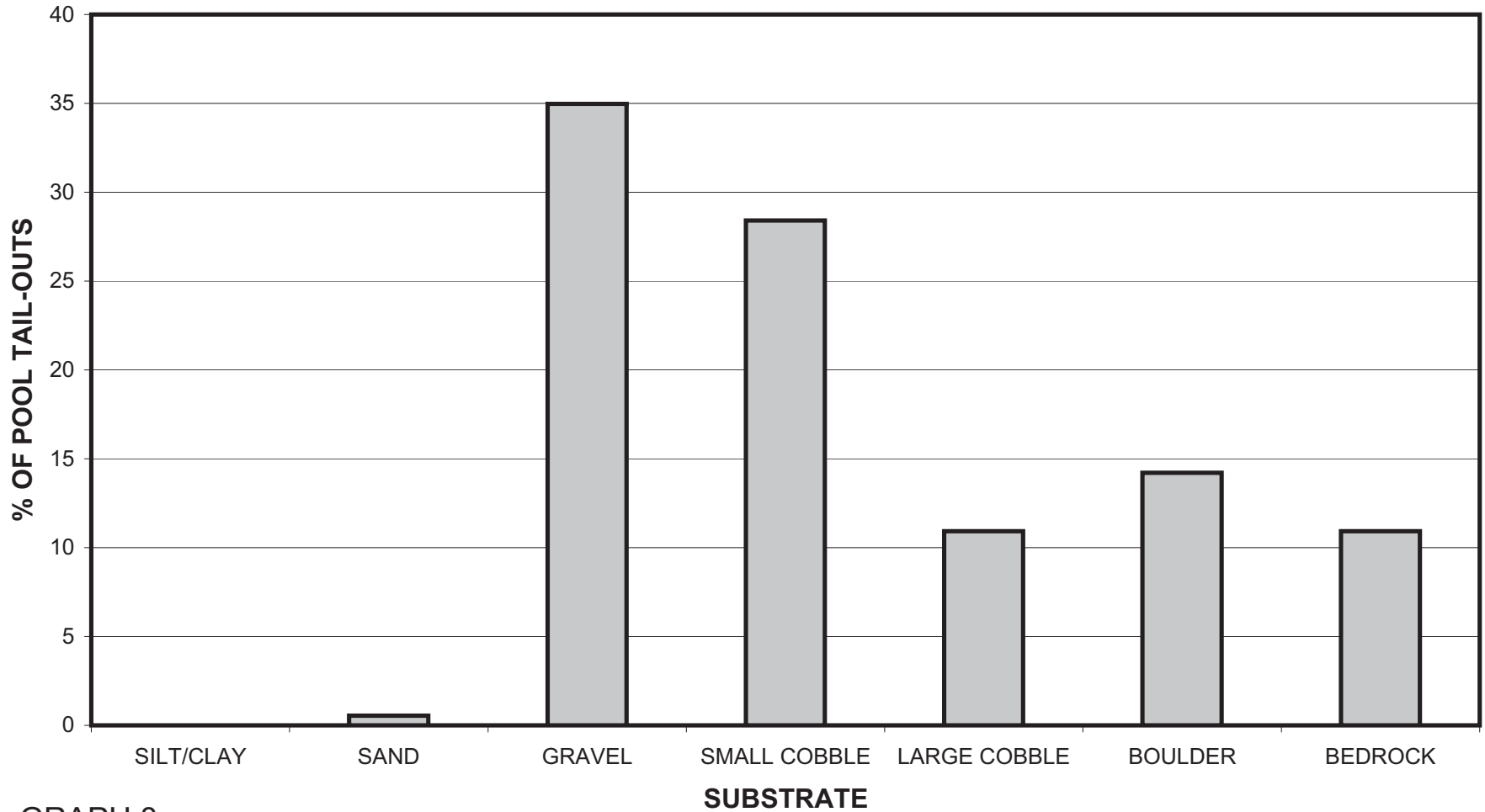
GRAPH 6

INDIAN CREEK 2008 MEAN PERCENT COVER TYPES IN POOLS



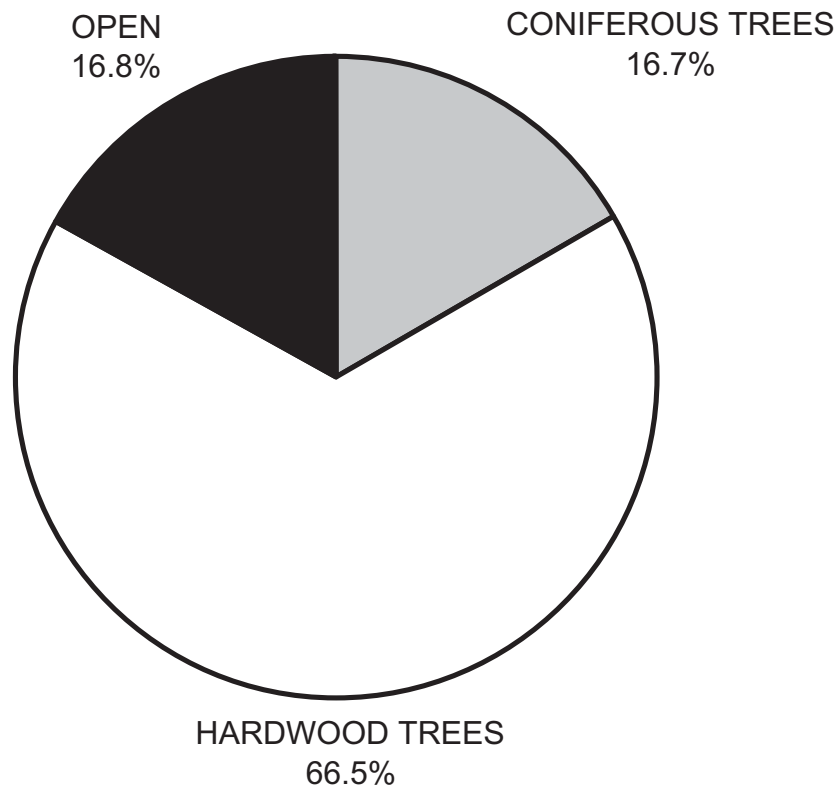
GRAPH 7

INDIAN CREEK 2008 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



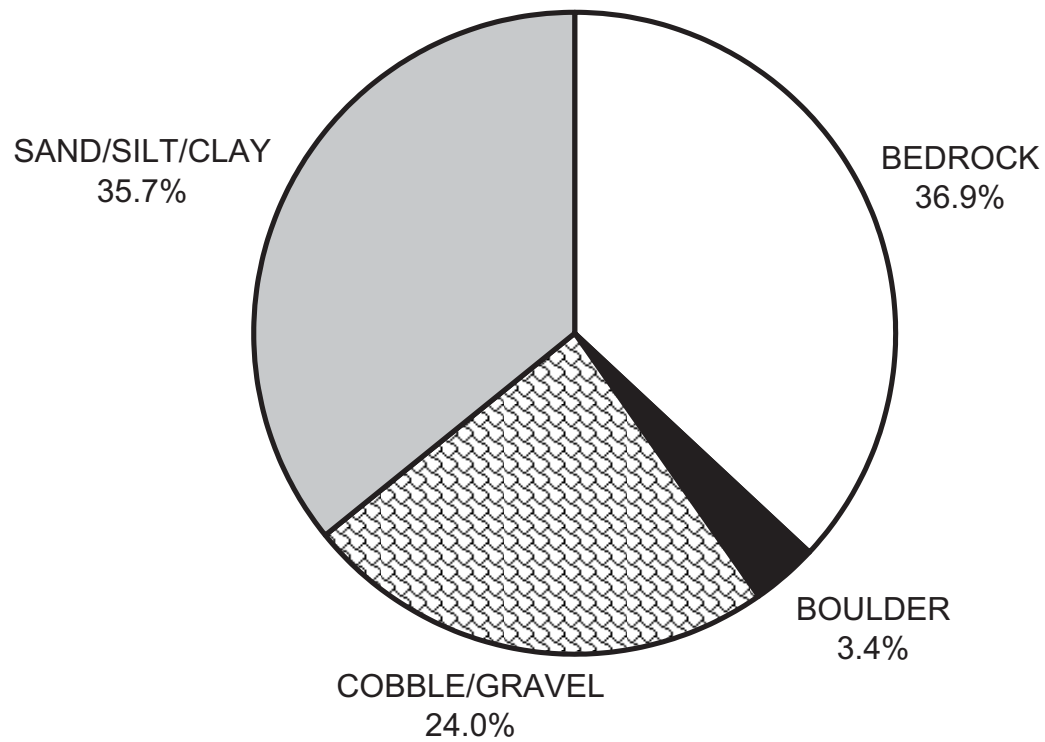
GRAPH 8

INDIAN CREEK 2008 MEAN PERCENT CANOPY



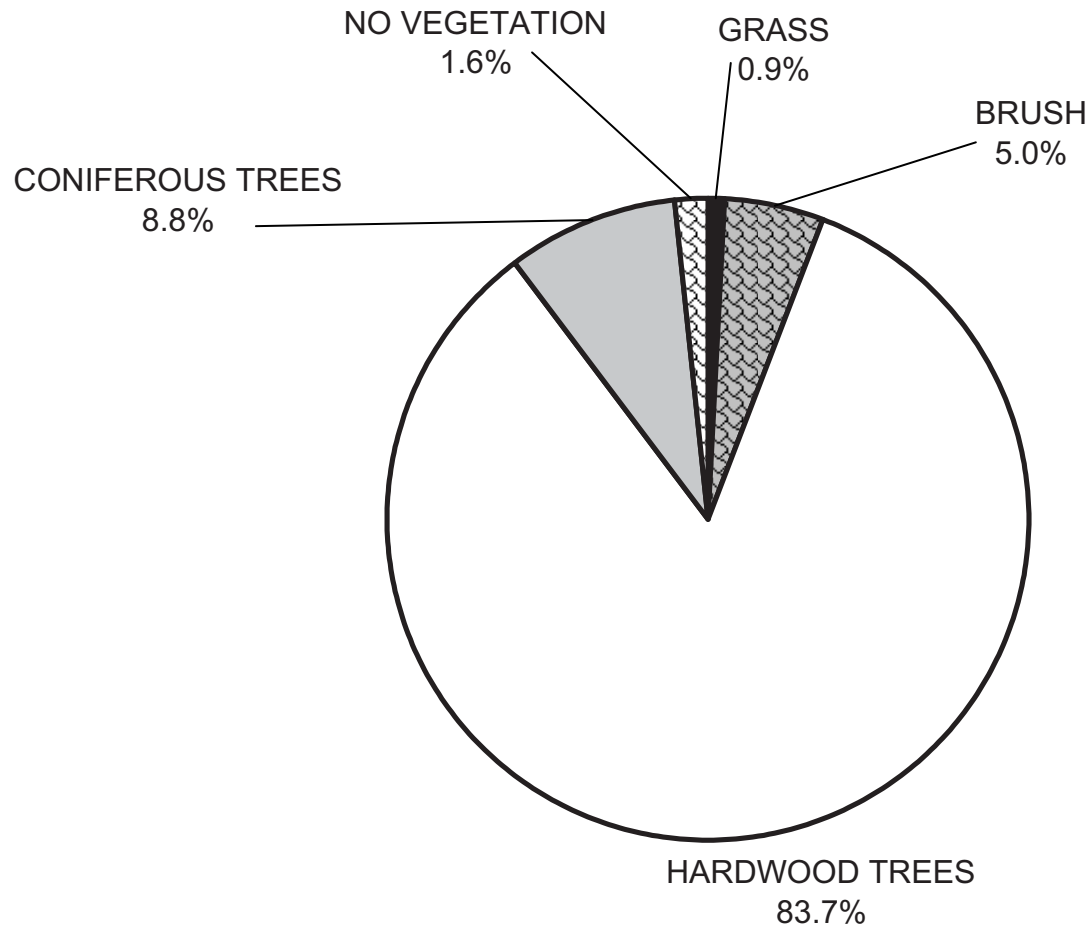
GRAPH 9

**INDIAN CREEK 2008
DOMINANT BANK COMPOSITION IN SURVEY REACH**



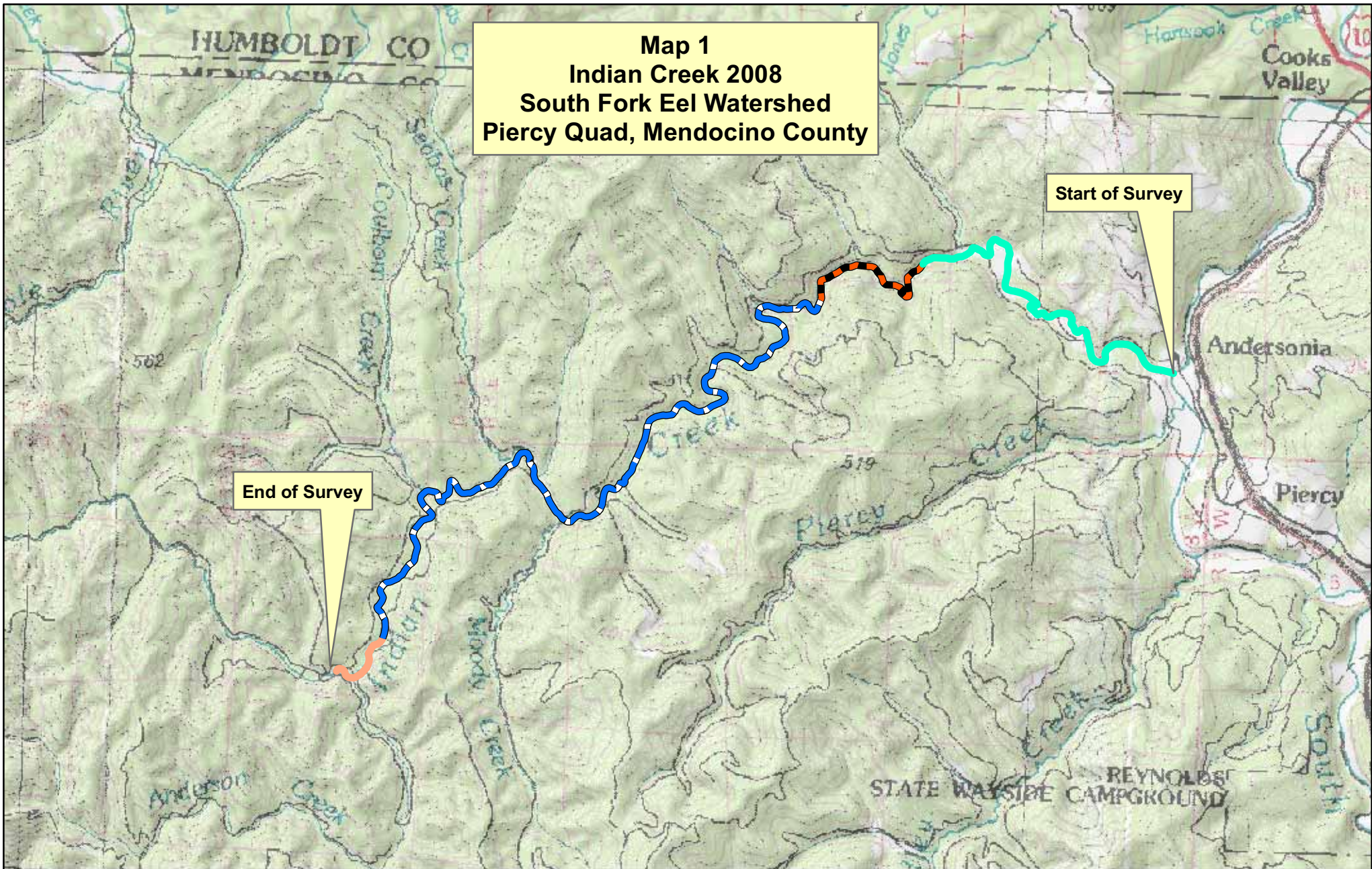
GRAPH 10

INDIAN CREEK 2008 DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

Map 1
Indian Creek 2008
South Fork Eel Watershed
Piercy Quad, Mendocino County



End of Survey

Start of Survey



Legend

- Reach 1, F4 Channel Type
- Reach 2, F2 Channel Type
- Reach 3, F4 Channel Type
- Reach 4, F1 Channel Type

