

STREAM INVENTORY REPORT

Tenmile Creek

INTRODUCTION

A stream inventory was conducted from June 29 to July 28, 2009 on Tenmile Creek. The survey began at the confluence with the South Fork Eel River and extended upstream 18.7 miles.

The Tenmile 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 Tenmile 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

Tenmile Creek is a tributary to the South Fork Eel River, which drains to the Pacific Ocean. Tenmile Creek is located in Mendocino County, California (Map 1). Tenmile Creek's legal description at the confluence with South Fork Eel River is T22N R16W S16. Its location is 39.7546 degrees north latitude and 123.6313 degrees west longitude, LLID number 1236302397547. Tenmile Creek is a third order stream and has approximately 56 miles of blue line stream according to the USGS Leggett 7.5 minute quadrangle. Tenmile Creek drains a watershed of approximately 65.3 square miles. Elevations range from about 1,200 feet at the mouth of the creek to 2,200 feet in the headwater areas. Mixed hardwood forest dominates the watershed. The watershed is entirely privately owned and is managed as a rural subdivision. Vehicle access exists via U.S. Highway 101 to Laytonville.

METHODS

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

SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach. All habitat units included in the survey are classified according to habitat type and their lengths are measured. All pool units are measured for maximum depth, depth of pool tail

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

HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the *California Salmonid Stream Habitat Restoration Manual*. This form was used in Tenmile 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". Tenmile Creek habitat typing used standard basin level measurement criteria. These parameters require that the minimum length of a described habitat unit must be equal to or greater than the stream's mean wetted width. All measurements are in feet to the nearest tenth. Habitat characteristics are measured using a clinometer, hip chain, and stadia rod.

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5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Tenmile 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 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 Tenmile Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:

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

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Tenmile 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 Tenmile Creek, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully-described unit were selected from the habitat inventory form. Additionally, the percent of each bank covered by vegetation (including downed trees, logs, and rootwads) was estimated and recorded.

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10. Large Woody Debris Count:

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

11. Average Bankfull Width:

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

BIOLOGICAL INVENTORY

Biological sampling during the stream inventory is used to determine fish species and their distribution in the stream. Fish presence was observed from the stream banks in Tenmile Creek. In addition, underwater observations were made at 33 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 Tenmile Creek include:

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

HABITAT INVENTORY RESULTS

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

The habitat inventory of June 29 to July 28, 2009 was conducted by M. Groff and N. Talkington (WSP), and S. McSmith and I. Mikus (DFG). The total length of the stream surveyed was 98,768 feet with an additional 1,497 feet of side channel.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 7.0 cfs on June 30, 2009.

Tenmile Creek is an F2 channel type for 8,026 feet of the stream surveyed (Reach 01), an unknown channel type for 2,500 feet of the stream that was not surveyed (Reach 02), an F4 channel type for 43,183 feet of the stream surveyed (Reach 03), a C4 channel type for 6,581 feet of the stream surveyed (Reach 04), an unknown channel type for 915 feet of the stream that was not surveyed (Reach 05), a C4 channel type for 7,439 feet of the stream surveyed (Reach 06), a B1 channel type for 3,985 feet of the stream surveyed (Reach 07), a B4 channel type for 6,312 feet of the stream surveyed (Reach 08), an unknown channel type for 1,000 feet of the stream that was not surveyed (Reach 09), a B4 channel type for 11,539 feet of the stream surveyed (Reach 10), an unknown channel type for 2,770 feet of the stream that was not surveyed (Reach 11), and an F4 channel type for 6,015 feet of the stream surveyed (Reach 12). F2 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios and boulder-dominant substrates. F4 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates. C4 channels are meandering point-bar, riffle/pool, alluvial channels with broad well defined floodplain on low gradients and gravel-dominant substrates. B1 channels are moderately entrenched, moderate gradient, riffle dominated channel with infrequently spaced pools, very stable plan and profile, stable banks and bedrock-dominant substrates. B4 channels are

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moderately entrenched, moderate gradient, riffle dominated channel with infrequently spaced pools, very stable plan and profile, stable banks and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 64 to 82 degrees Fahrenheit. Air temperatures ranged from 53 to 95 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 43% flatwater units, 28% pool units, 17% dry units, and 11% riffle units (Graph 1). Based on total length of Level II habitat types there were 44% flatwater units, 41% pool units, 10% dry units, and 5% riffle units (Graph 2).

Thirteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 24%; glide units, 24%; and dry units, 17% (Graph 3). Based on percent total length, mid-channel pool units made up 37%, glide units 19%, and run units 13%.

A total of 177 pools were identified (Table 3). Main channel pools were the most frequently encountered at 87% (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 fifty-one of the 177 pools (85%) had a residual depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 177 pool tail-outs measured, 62 had a value of 1 (35%); 50 had a value of 2 (28.2%); 23 had a value of 3 (13%); 12 had a value of 4 (6.8%); 30 had a value of 5 (16.9%) (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 45, flatwater habitat types had a mean shelter rating of 14, and pool habitats had a mean shelter rating of 23 (Table 1). Of the pool types, scour pools had the highest mean shelter rating at 34. Main channel pools had a mean shelter rating of 21 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Tenmile Creek. Graph 7 describes the pool cover in Tenmile Creek. Boulders are the dominant pool cover type followed by aquatic vegetation.

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; it was observed in 53% of the pool tail-outs. Small cobbles were the second dominant substrate; they were found in 13% of the pool tail-outs.

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The mean percent canopy density for the surveyed length of Tenmile Creek was 45%. Fifty-five percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 86% and 14%, respectively. Graph 9 describes the mean percent canopy in Tenmile Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 93%. The mean percent left bank vegetated was 94%. The dominant elements composing the structure of the stream banks consisted of 36% sand/silt/clay, 35% cobble/gravel, 18% boulder, and 12% bedrock (Graph 10). Deciduous trees were the dominant vegetation type observed in 78% of the units surveyed. Additionally, 13% of the units surveyed had coniferous trees as the dominant vegetation type, and 8% had grass as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Thirty-three sites were snorkel surveyed for species composition and distribution in Tenmile Creek from July 1 to July 29, 2009. The sites were sampled by S. McSmith, I. Mikus (DFG), N. Talkington and M. Groff (WSP).

In reach 01, which comprised the first 8,026 feet of stream, 10 sites were sampled. The reach sites yielded 301 young-of-the-year steelhead/rainbow trout (SH/RT), 20 age 1+ SH/RT, nine age 2+ SH/RT, 11 three-spine stickleback, over 1,720 California roach, and 14 green sunfish.

In reach 03, seven sites were sampled starting approximately 11,870 from the confluence with South Fork Eel River and continuing upstream 51,594 feet from the confluence. The reach sites yielded 20 young-of-the-year SH/RT, five age 1+ SH/RT, two age 2+ SH/RT, two three-spine stickleback, four black bullhead, over 1,740 California roach, 36 green sunfish, and 15 large mouth bass.

In reach 06, six sites were sampled starting approximately 64,442 from the confluence with South Fork Eel River and continuing upstream 67,147 feet from the confluence. The reach sites yielded 110 young-of-the-year SH/RT, 21 age 1+ SH/RT, 10 age 2+ SH/RT, 23 three-spine stickleback, over 1,500 California roach, 22 green sunfish, one Pacific lamprey, and four large mouth bass.

In reach 07, nine sites were sampled starting approximately 67,448 from the confluence with South Fork Eel River and continuing upstream 70,744 feet from the confluence. The reach sites yielded 285 young-of-the-year SH/RT, 11 age 1+ SH/RT, eight age 2+ SH/RT, 44 three-spine stickleback, 446 California roach, and three green sunfish.

In reach 08, one site was sampled starting approximately 73,587 from the confluence with South Fork Eel River and continuing upstream 73,771 feet from the confluence. The reach sites yielded eight young-of-the-year SH/RT, three age 2+ SH/RT, 48 three-spine stickleback, over 500 California roach, two mosquito fish, one green sunfish and six unidentified suckers.

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The following chart displays the information yielded from these sites:

2009 Tenmile Creek underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
Reach 01: F2 Channel Type									
07/01/09	1	003	4.2	549	20	3	1	0	0
	2	005	4.2	658	16	0	0	0	0
	3	011	4.2	2,861	20	2	2	0	0
	4	013	4.2	2,972	25	0	0	0	0
	5	024	5.6	4,069	40	3	1	0	0
	6	027	4.2	4,488	30	1	0	0	0
	7	036	4.2	4,787	40	4	2	0	0
	8	043	4.2	5,950	60	5	1	0	0
	9	049	4.2	6,507	20	2	1	0	0
	10	053	4.2	7,231	30	0	1	0	0
Reach 2: Unknown Channel Type									
Reach 3: F4 Channel Type									
07/06/09	11	063	4.2	12,005	4	1	1	0	0
	12	088	4.2	17,592	6	1	0	0	0
	13	090	3.3	19,385	0	0	0	0	0
	14	091	4.2	19,523	0	1	0	0	0
	15	143	4.2	33,992	2	0	0	0	0
	16	209	4.2	46,045	0	0	0	0	0
	17	236	4.2	52,463	8	2	1	0	0
Reach 4: C4 Channel Type									
Reach 5: Unknown Channel Type									
Reach 6: C4 Channel Type									
07/29/09	18	306	3.2	64,645	15	0	0	0	0
	19	310	4.2	65,096	20	10	0	0	0
	20	315	3.2	66,216	26	1	1	0	0
	21	317	3.2	66,502	17	2	1	0	0
	22	321	3.2	66,992	2	0	0	0	0
	23	322	5.6	67,147	30	8	8	0	0

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Reach 7: B1 Channel Type									
07/29/09	24	328	4.2	67,510	37	1	0	0	0
	25	333	5.6	68,070	78	1	1	0	0
	26	337	3.2	68,602	52	2	0	0	0
	27	338	4.2	68,752	47	1	3	0	0
	28	345	4.3	69,953	20	2	1	0	0
	29	346	3.2	70,067	18	1	1	0	0
	30	348	3.2	70,398	13	3	0	0	0
	31	350	4.2	70,556	15	0	2	0	0
	32	353	4.2	70,744	5	0	0	0	0
Reach 8: B4 Channel Type									
07/29/09	33	358	4.2	71,413	8	0	3	0	0
Reach 9: Unknown Channel Type									
Reach 10: B4 Channel Type									
Reach 11: Unknown Channel Type									
Reach 12: F4 Channel Type									

DISCUSSION

Tenmile Creek is an F2 channel type for 8,026 feet of the stream surveyed (Reach 01), an unknown channel type for 2,500 feet of the stream that was not surveyed (Reach 02), an F4 channel type for 43,183 feet of the stream surveyed (Reach 03), a C4 channel type for 6,581 feet of the stream surveyed (Reach 04), an unknown channel type for 915 feet of the stream that was not surveyed (Reach 05), a C4 channel type for 7,439 feet of the stream surveyed (Reach 06), a B1 channel type for 3,985 feet of the stream surveyed (Reach 07), a B4 channel type for 6,312 feet of the stream surveyed (Reach 08), an unknown channel type for 1,000 feet of the stream that was not surveyed (Reach 09), a B4 channel type for 11,539 feet of the stream surveyed (Reach 10), an unknown channel type for 2,770 feet of the stream that was not surveyed (Reach 11), and an F4 channel type for 6,015 feet of the stream surveyed (Reach 12). The suitability of F2, F4, C4, B1, and B4 channel types for fish habitat improvement structures is as follows: F2 channel types are fair for plunge weirs, single and opposing wing-deflectors, and log cover. F4 channel types are good for bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover. C4 channel types are good for bank placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover. B1 channel types are excellent for bank-placed boulders and good for log cover. B4 channel types are excellent for low-stage plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors, and log cover.

The water temperatures recorded on the survey days June 29 to July 28, 2009 ranged from 64 to 82 degrees Fahrenheit. Air temperatures ranged from 53 to 95 degrees Fahrenheit. The upper

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range of these water temperatures is unsuitable for rearing juvenile salmonids. To make any further conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling would need to be conducted.

Flatwater habitat types comprised 44% of the total length of this survey, riffles 5%, and pools 41%. One hundred fifty-one of the 177 (85%) pools had a maximum residual depth greater than 2 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In 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 large wood structures that will increase or deepen pool habitat is recommended.

One hundred twelve of the 177 pool tail-outs measured had embeddedness ratings of 1 or 2. Thirty-five of the pool tail-outs had embeddedness ratings of 3 or 4. Thirty of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead.

One hundred seventeen of the 177 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 23. The shelter rating in the flatwater habitats is 14. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by boulders in Tenmile Creek. Boulders are the dominant cover type in pools followed by aquatic vegetation. 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 45%. Reach 1 had a canopy density of 35.1%, Reach 3 had a canopy density of 31.1%, Reach 4 had a canopy density of 55.4%, Reach 6 had a canopy density of 64.7%, Reach 7 had a canopy density of 68.4%, Reach 8 had a canopy density of 64.1%, Reach 10 had a canopy density of 55.7%, Reach 12 had a canopy density of 55.2%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 93% and 94%, 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) Tenmile Creek should be managed as an anadromous, natural production stream.
- 2) The limited water temperature data available suggest that maximum temperatures exceed the acceptable range for juvenile salmonids. To establish more complete and meaningful

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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) Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediments entering the stream.
- 5) Increase the canopy on Tenmile Creek by planting appropriate native vegetation like willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels. The reaches above this survey section should be inventoried and treated as well, since the water flowing here is affected from upstream. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.

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	The survey starts at the confluence with the South Fork Eel River. The channel type is an F2.
624	0005.00	Bank erosion on the left bank measures approximately 500' long x 175' high. It is contributing sediment ranging in size from silt to boulders.
2707	0020.00	Outside the influence of the South Fork Eel.
3014	0025.00	Bank erosion on the right bank measures approximately 500' long x 100' high. It is contributing sediment ranging in size from silt to cobble.
3762	0029.01	Bank erosion on the right bank measures approximately 150' long x 100' high. It is contributing sediment ranging in size from silt to boulders.
3829	0032.00	Bank erosion on the left bank measures approximately 150' long x 20' high. It is contributing sediment ranging in size from silt to boulders.
4289	0034.00	There is a seep on the left bank.

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5554	0042.00	There is a small spring on the left bank.
5795	0045.00	Tributary #01 enters from the right bank. The flow of the tributary is approximately 0.2 cfs; it is contributing less than five percent of the flow of Tenmile Creek. The water temperature of the tributary is 59 degrees Fahrenheit; the water temperature downstream of the confluence is 69 degrees Fahrenheit. The water temperature upstream of the confluence is 71 degrees Fahrenheit. The tributary has a ten percent gradient. It is accessible to fish. A 1+ salmonid was observed in the tributary.
6672	0051.00	There is a seep on the left bank.
6748	0052.00	There is a seep on the left bank.
7050	0053.00	Tributary #02 enters from the left bank. The flow of the tributary is less than 0.1 cfs; it is contributing less than one percent of the flow of Tenmile Creek. The water temperature of the tributary is 56 degrees Fahrenheit; the water temperature downstream and upstream of the confluence is 69 degrees Fahrenheit. The tributary has a 90 percent gradient, making it inaccessible to fish.
7353	0055.00	Reach 02 was not surveyed due to lack of access. The channel type is unknown.
9853	0056.00	The channel is an F4.
10269	0058.00	Bank erosion on the left bank measures approximately 30' long x 100' high. It is contributing fine sediment.
12306	0066.00	Bank erosion on the left bank measures approximately 20' long x 15' high. It is contributing fine sediment and woody debris.
12612	0068.00	Tributary #03 enters from the left bank. The flow of the tributary is less than 0.5 cfs; it is contributing less than one percent of the flow of Tenmile Creek. The water temperature of the tributary is 54 degrees Fahrenheit; the water temperature downstream and upstream of the confluence is 69 degrees Fahrenheit. The tributary has a ten percent gradient. It is accessible to adult salmonids, but no fish were observed in the tributary. A cascade with a 2.5' high jump at the mouth is a possible barrier to juvenile salmonids.
15594	0083.00	Tributary #04 (Peterson Creek) enters from the left bank. The flow of the tributary is less than 1.0 cfs; it is contributing less than ten percent of the flow of Tenmile Creek. The water temperature of the tributary is 57 degrees Fahrenheit; the water temperature downstream and upstream of the confluence is 68 degrees Fahrenheit. The tributary has a three

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percent gradient. It is accessible to fish. Salmonid young-of-the-year (YOY) were observed in the tributary.

19970	0105.00	There is a seep on the right bank.
22143	0113.00	Tributary #05 (Grub Creek) enters from the right bank. The first 20' of the tributary are dry. The flow of the tributary is less than 0.5 cfs; it is contributing less than five percent of the flow of Tenmile Creek. The water temperature of the tributary is 69 degrees Fahrenheit; the water temperature downstream of the tributary is 69 degrees Fahrenheit. The water temperature upstream of the tributary is 63 degrees Fahrenheit. The tributary has a one percent gradient. It is accessible to fish. Salmonid YOY were observed in the tributary.
24238	0117.00	Bank erosion on the left bank measures approximately 150' long x 40' high. It is contributing fine sediment.
28412	0130.00	Tributary #06 enters from the left bank. The first 40' of the tributary are dry. The flow of the tributary is less than 0.1cfs; it is contributing less than one percent of the flow of Tenmile Creek. The water temperature of the tributary is 56 degrees Fahrenheit; the water temperature downstream and upstream of the confluence is 69 degrees Fahrenheit. The tributary has a seven percent gradient. It is accessible to fish, but no fish were observed in the tributary.
31238	0141.00	Tributary #07 enters from the right bank. The first 200' of the tributary are dry. The water is stagnant. The water temperature of the tributary is 54 degrees Fahrenheit; the water temperature downstream and upstream of the confluence is 69 degrees Fahrenheit. The tributary has a three percent gradient. It is accessible to fish. Salmonid YOY were observed in the tributary.
31773	0143.00	Active erosion below the road on the right bank is contributing sediment ranging in size from silt to cobble.
33953	0159.00	There is a dry tributary on the right bank. The tributary has a fish ladder and a box culvert at its mouth.
36023	0165.00	Tributary #08 enters from the right bank. The first 100' of the tributary are dry. The flow of the tributary is less than 0.1cfs; it is contributing less than one percent of the flow of Tenmile Creek. The water temperature of the tributary is 64 degrees Fahrenheit; the water temperature downstream and upstream of the confluence is 74 degrees Fahrenheit. The tributary has a two percent gradient. It is accessible to fish. Salmonid YOY were observed in the tributary.

Tenmile Creek

36420	0167.00	A 12' wide x 22' high x 101' long railcar bridge crosses the stream..
38804	0180.00	Tributary #09 enters from the left bank. The first 100' of the tributary are dry. The flow of the tributary is less than 0.1cfs; it is contributing less than one percent of the flow of Tenmile Creek. The water temperature of the tributary is 59 degrees Fahrenheit; the water temperature downstream and upstream of the confluence is 74 degrees Fahrenheit. The tributary has a three percent gradient. It is accessible to fish. Unidentified fish were observed in the tributary.
40895	0192.00	The channel becomes braided.
41573	0194.00	The braided section of the channel ends. A 10' wide x 15' high x 150' long railcar bridge with concrete footings crosses the stream.
44196	0204.00	Tributary #10 (Streeter Creek) enters from the left bank. See the Streeter Creek 2009 Stream Habitat Inventory Report for more details.
44433	0205.00	The right bank is armored with boulders.
45049	0207.00	Bank erosion on the left bank measures approximately 200' long x 6' high. It is contributing sediment ranging in size from silt to small cobbles.
45414	0209.00	Bank erosion on the right bank measures approximately 200' long x 20' high. It is contributing fine sediment.
47207	0216.00	Bank erosion on the left bank measures approximately 200' long x 30' high. It is contributing sediment ranging in size from silt to gravel.
48353	0220.00	Tributary #11 (Lewis Creek) enters from the right bank. The flow of the tributary is approximately 1.0 cfs; it is contributing less than ten percent of the flow of Tenmile Creek. The water temperature of the tributary is 67 degrees Fahrenheit; the water temperature downstream and upstream of the confluence is 69 degrees Fahrenheit. The tributary has a less than one percent gradient. It is accessible to fish. Green sunfish and California roach were observed in the tributary.
50111	0225.00	Tributary #12 (Big Rock Creek) enters from the left bank. See the Big Rock Creek 2009 Stream Habitat Inventory Report for more details.
52493	0241.00	The channel changes from an F4 to a C4.
53084	0248.00	Bank erosion on the left bank measures approximately 200' long x 6' high. It is contributing sediment ranging in size from silt to gravel.

Tenmile Creek

53280	0249.00	A 17' wide x 18' high x 100' long concrete bridge crosses the stream.
55474	0258.00	There is a beaver dam at the pool tail-out.
55830	0262.00	There is a beaver dam at the pool tail-out.
56443	0267.00	The left bank is armored with concrete slabs.
57006	0271.00	There is a beaver dam at the pool tail-out.
58275	0281.00	There is a beaver dam at the pool tail-out.
63744	0305.00	A 3.5' wide x 18' high x 120' long wooden footbridge with metal supports crosses the stream. Tenmile Creek Road fords the stream. A cut on the right bank measures approximately 50' long by 30' high. It is contributing fine sediment.
65096	0311.00	Bank erosion on the left bank measures approximately 300' long x 15' high. It is contributing sediment ranging in size from silt to gravel.
66992	0322.00	There is a 5' high bedrock waterfall.
67147	0323.00	The channel changes from a C4 to a B1.
68374	0337.00	Tributary #13 (Mud Springs Creek) enters from the left bank. The flow of the tributary is less than 1.0 cfs; it is contributing less than ten percent of the flow of Tenmile Creek. The water temperature of the tributary is 65 degrees Fahrenheit; the water temperature downstream and upstream of the confluence is 68 degrees Fahrenheit. The tributary has a four percent gradient. It is accessible to fish. Unidentified fish were observed in the tributary.
69744	0345.00	Tributary #14 (Mill Creek) enters from the left bank. The flow of the tributary is less than 1.0 cfs; it is contributing less than ten percent of the flow of Tenmile Creek. The water temperature of the tributary is 67 degrees Fahrenheit; the water temperature downstream and upstream of the confluence is 68 degrees Fahrenheit. The tributary has a 0.5 percent gradient. It is accessible to fish. Salmonid YOY were observed in the tributary.
71132	0357.00	The channel changes from a B1 to a B4.
71413	0359.00	A private road fords the stream.
73034	0364.00	The left bank is armored with concrete slabs and old cars. Approximately 50% of the shelter in the pool is provided by old cars.

Tenmile Creek

73243	0366.00	Bank erosion on the right bank measures approximately 100' long x 20' high. It is contributing fine sediment.
73801	0372.00	Branscomb Road crosses the stream. The concrete bridge measures 27' wide x 11.5' high x 124' long.
75299	0388.00	Bank erosion on the right bank measures approximately 40' long x 15' high. It is contributing fine sediment.
75858	0394.00	Bank erosion on the right bank measures approximately 160' long x 8' high. It is contributing fine sediment.
79063	0419.00	Bank erosion on the right bank measures approximately 40' long x 15' high. It is contributing fine sediment.
79374	0422.00	Bank erosion on the left bank measures approximately 60' long x 20' high. It is contributing fine sediment.
80620	0436.00	A 8' wide x 12' high x 78' long railcar bridge crosses the stream.
81356	0445.00	A 9' wide x 14' high x 80' long railcar bridge crosses the stream.
81952	0451.00	Bank erosion on the right bank measures approximately 100' long x 12' high. It is contributing fine sediment.
83443	0460.00	Bank erosion on the right bank measures approximately 50' long x 20' high. It is contributing fine sediment.
83655	0462.00	Bank erosion on the left bank measures approximately 60' long x 20' high. It is contributing fine sediment.
84038	0467.00	Bank erosion on the right bank measures approximately 100' long x 15' high. It is contributing fine sediment.
86002	0494.00	Bank erosion on the left bank measures approximately 100' long x 15' high. It is contributing sediment ranging in size from silt to gravel.
86946	0507.00	Bank erosion on the left bank measures approximately 80' long x 20' high. It is contributing fine sediment.
89374	0533.00	Steele Lane crosses the stream. The concrete bridge measures 28' wide x 13' high x 88' long.
89416	0535.00	There is a dry tributary on the left bank.

Tenmile Creek

89558	0538.00	Bank erosion on the right bank measures approximately 80' long x 10' high. It is contributing fine sediment.
89983	0546.00	Reach 07 was not surveyed due to lack of access. The channel type is unknown.
92753	0547.00	The channel is an F4.
92753	0547.00	Highway 101 crosses the stream. The crossing is a concrete shotgun culvert. Each half of the culvert is approximately 7' high x 10' wide x 70' long. The culvert is a possible barrier to juvenile salmonids.
94181	0565.00	Large woody debris is starting to accumulate in the channel.
94258	0566.00	Bank erosion on the right bank measures approximately 100' long x 8' high. It is contributing fine sediment.
95079	0577.00	Bank erosion on the right bank measures approximately 200' long x 8' high. It is contributing fine sediment.
96231	0594.00	Bank erosion on the left bank measures approximately 40' long x 10' high. It is contributing fine sediment.
97283	0596.00	A 10' wide x 9.1' high x 30' long wooden bridge with metal supports crosses the stream.
97967	0603.00	The right bank is armored with concrete slabs.
98720	0621.00	Davidson Road crosses the stream. The crossing is a 10' wide x 12' high x 60' long railcar bridge.
98768	0621.00	The survey ends due to lack of access.

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.

Tenmile Creek

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: Tenmile Creek

LLID: 1236302397547

Drainage: Eel River - South Fork

Survey Dates: 6/29/2009 to 7/28/2009

Confluence Location: Quad: LEGGETT

Legal Description: T22NR16WS16

Latitude: 39:45:17.0N

Longitude: 123:37:49.0

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Mean Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating
1	0	CULVERT	0.2	70	70	0.1									
109	11	DRY	17.4	81	8795	9.6									0
270	40	FLATWATER	43.0	148	40054	43.7	22.9	1.2	2.2	4560	1231294	5785	1561827		14
7	0	NOSURVEY		1230	8610										
1	0	NOSURVEY_		47	47										
177	177	POOL	28.2	214	37796	41.3	36.0	2.4	4.9	9529	1686630	32090	5679949	27519	23
71	21	RIFFLE	11.3	69	4893	5.3	18.0	0.7	1.5	1026	72881	866	61515		45
Total Units	Total Units Fully Measured			Total Length (ft.)						Total Area (sq.ft.)		Total Volume (cu.ft.)			
636	249			100265						2990804		7303291			

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Tenmile Creek

LLID: 1236302397547

Drainage: Eel River - South Fork

Survey Dates: 6/29/2009 to 7/28/2009

Confluence Location: Quad: LEGGETT

Legal Description: T22NR16WS16

Latitude: 39:45:17.0N

Longitude: 123:37:49.0W

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 (%)
41	12	LGR	6.5	59	2404	2.6	18	0.6	3.6	1154	47319	892	36574		44	49
30	9	HGR	4.8	83	2489	2.7	18	0.8	3.2	856	25689	832	24966		46	35
149	19	GLD	23.7	116	17337	18.9	22	1.4	3.6	5475	815786	7898	1176749		7	58
75	14	RUN	11.9	163	12201	13.3	21	1.0	3.5	2370	177762	2715	203636		21	51
46	7	SRN	7.3	229	10516	11.5	30	0.8	3.1	6458	297063	6188	284639		20	37
152	152	MCP	24.2	221	33622	36.7	36	2.4	23.6	9920	1507818	33329	5066053	28510	20	41
2	2	CCP	0.3	126	252	0.3	42	6.5	13.6	5864	11727	64169	128337	60981	63	53
1	1	LSL	0.2	85	85	0.1	21	2.4	3.2	1785	1785	4284	4284	4284	40	31
4	4	LSR	0.6	84	334	0.4	22	0.8	3.9	1896	7583	2255	9019	1404	48	83
6	6	LSBk	1.0	263	1576	1.7	34	1.8	9.1	13071	78425	40414	242483	35016	16	50
7	7	LSBo	1.1	191	1335	1.5	43	1.4	7.7	8123	56862	21049	147345	17801	8	10
5	5	PLP	0.8	118	592	0.6	30	2.4	8.9	4486	22430	16485	82427	14143	82	53
109	11	DRY	17.4	81	8795	9.6	0			0	0				0	56
1	0	CUL	0.2	70	70	0.1										
7	0	NS		1230	8610											
1	0	MAR		47	47											

Total Units
636

Total Units Fully Measured
249

Total Length (ft.)
100265

Total Area (sq.ft.)
3050249

Total Volume (cu.ft.)
7406512

Table 3 - Summary of Pool Types

Stream Name: Tenmile Creek

LLID: 1236302397547

Drainage: Eel River - South Fork

Survey Dates: 6/29/2009 to 7/28/2009

Confluence Location: Quad: LEGGETT

Legal Description: T22NR16WS16

Latitude: 39:45:17.0N

Longitude: 123:37:49.0W

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
154	154	MAIN	87	220	33874	90	36.4	2.5	9867	1519545	28932	4455495	21
23	23	SCOUR	13	171	3922	10	33.1	1.7	7265	167085	18058	415323	34
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)		Total Volume (cu.ft.)	
177	177				37796					1686630		4870818	

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

Stream Name: Tenmile Creek

LLID: 1236302397547

Drainage: Eel River - South Fork

Survey Dates: 6/29/2009 to 7/28/2009

Confluence Location: Quad: LEGGETT

Legal Description: T22NR16WS16

Latitude: 39:45:17.0N

Longitude: 123:37:49.0W

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
152	MCP	86	0	0	2	1	15	10	52	34	83	55
2	CCP	1	0	0	0	0	1	50	0	0	1	50
1	LSL	1	0	0	0	0	0	0	1	100	0	0
4	LSR	2	0	0	0	0	3	75	1	25	0	0
6	LSBk	3	0	0	0	0	1	17	3	50	2	33
7	LSBo	4	0	0	0	0	2	29	3	43	2	29
5	PLP	3	0	0	0	0	2	40	2	40	1	20
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
177			0	0	2	1	24	14	62	35	89	50

Mean Maximum Residual Pool Depth (ft.): 4.9

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Tenmile Creek

LLID: 1236302397547

Drainage: Eel River - South Fork

Survey Dates: 6/29/2009 to 7/28/2009

Dry Units: 109

Confluence Location: Quad: LEGGETT

Legal Description: T22NR16WS16

Latitude: 39:45:17.0N

Longitude: 123:37:49.0W

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
41	12	LGR	0	10	0	2	38	11	20	19	0
30	9	HGR	0	0	0	4	11	12	34	39	0
71	21	TOTAL RIFFLE	0	6	0	2	27	11	26	27	0
149	21	GLD	2	40	5	3	24	9	0	11	7
75	15	RUN	0	17	4	14	18	14	3	27	2
46	7	SRN	0	1	0	6	20	20	6	44	3
270	43	TOTAL FLAT	1	24	3	8	21	13	2	23	5
152	152	MCP	2	18	4	6	18	24	1	23	4
2	2	CCP	0	0	0	0	0	40	0	10	50
1	1	LSL	0	0	10	0	90	0	0	0	0
4	4	LSR	34	41	6	16	3	0	0	0	0
6	6	LSBk	10	13	2	22	3	36	0	8	8
7	7	LSBo	0	21	1	1	4	9	2	61	0
5	5	PLP	0	10	0	0	0	24	17	43	6
177	177	TOTAL POOL	3	18	4	7	16	23	1	24	4
1	0	CUL									
7	0	NS									
1	0	MAR									
636	252	TOTAL	3	17	3	6	18	21	3	24	4

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Tenmile Creek

LLID: 1236302397547

Drainage: Eel River - South Fork

Survey Dates: 6/29/2009 to 7/28/2009

Dry Units: 109

Confluence Location: Quad: LEGGETT

Legal Description: T22NR16WS16

Latitude: 39:45:17.0N

Longitude: 123:37:49.0W

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
41	12	LGR	0	0	50	8	17	17	8
30	9	HGR	0	0	0	22	11	44	22
149	19	GLD	0	0	89	0	0	5	5
75	14	RUN	0	0	86	0	0	7	7
46	7	SRN	0	0	71	0	0	14	14
152	152	MCP	1	2	85	1	3	7	2
2	2	CCP	0	0	50	0	0	50	0
1	1	LSL	0	0	100	0	0	0	0
4	4	LSR	0	0	75	25	0	0	0
6	6	LSBk	0	0	100	0	0	0	0
7	7	LSBo	0	0	86	0	0	14	0
5	5	PLP	0	0	40	0	0	60	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Tenmile Creek

LLID: 1236302397547

Drainage: Eel River - South Fork

Survey Dates: 6/29/2009 to 7/28/2009

Confluence Location: Quad: LEGGETT

Legal Description: T22NR16WS16

Latitude: 39:45:17.0N

Longitude: 123:37:49.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
45	14	86	3	93	94

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: Tenmile Creek

LLID: 1236302397547

Drainage: Eel River - South Fork

Survey Dates: 6/29/2009 to 7/28/2009

Survey Length (ft.): 100265

Main Channel (ft.): 98768

Side Channel (ft.): 1497

Confluence Location: Quad: LEGGETT

Legal Description: T22NR16WS16

Latitude: 39:45:17.0N

Longitude: 123:37:49.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 01

Channel Type: F2

Reach Length (ft.): 7353

Riffle/Flatwater Mean Width (ft.): 39.1

BFW:

Range (ft.): 57 to 137

Mean (ft.): 97

Std. Dev.: 28

Base Flow (cfs.): 7.0

Water (F): 67 - 77

Air (F): 63 - 89

Dry Channel (ft): 191

Canopy Density (%): 35.1

Coniferous Component (%): 25.0

Hardwood Component (%): 75.0

Dominant Bank Vegetation: Hardwood Trees

Vegetative Cover (%): 95.6

Dominant Shelter: Boulders

Dominant Bank Substrate Type: Boulder

Occurrence of LWD (%): 0

LWD per 100 ft.:

Riffles: 0

Pools: 0

Flat: 0

Pool Tail Substrate (%): Silt/Clay: 0

Sand: 0

Gravel: 9

Sm Cobble: 0

Lg Cobble: 0

Boulder: 83

Bedrock: 9

Embeddedness Values (%): 1. 26.1

2. 34.8

3. 0.0

4. 13.0

5. 26.1

Pools by Stream Length (%): 32.3

Pool Frequency (%): 38.3

Residual Pool Depth (%):

< 2 Feet Deep: 4

2 to 2.9 Feet Deep: 26

3 to 3.9 Feet Deep: 22

>= 4 Feet Deep: 48

Mean Max Residual Pool Depth (ft.): 4.4

Mean Pool Shelter Rating: 60

STREAM REACH: 02

Channel Type: NA

Reach Length (ft.): 2500

Riffle/Flatwater Mean Width (ft.):

BFW:

Range (ft.): 61 to 61

Mean (ft.): 61

Std. Dev.: 0

Base Flow (cfs.): 7.0

Water (F): 74 - 74

Air (F): 69 - 69

Dry Channel (ft): 0

Canopy Density (%):

Coniferous Component (%):

Hardwood Component (%):

Dominant Bank Vegetation:

Vegetative Cover (%): 0.0

Dominant Shelter:

Dominant Bank Substrate Type:

Occurrence of LWD (%):

LWD per 100 ft.:

Riffles:

Pools:

Flat:

Pool Tail Substrate (%): Silt/Clay:

Sand:

Gravel:

Sm Cobble:

Lg Cobble:

Boulder:

Bedrock:

Embeddedness Values (%): 1.

2.

3.

4.

5. 0.0

Pools by Stream Length (%): 0.0

Pool Frequency (%): 0.0

Residual Pool Depth (%):

< 2 Feet Deep:

2 to 2.9 Feet Deep:

3 to 3.9 Feet Deep:

>= 4 Feet Deep:

Mean Max Residual Pool Depth (ft.):

Mean Pool Shelter Rating:

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 03

Channel Type: F4	Canopy Density (%): 31.1	Pools by Stream Length (%): 56.7
Reach Length (ft.): 42640	Coniferous Component (%): 15.8	Pool Frequency (%): 45.8
Riffle/Flatwater Mean Width (ft.): 22.7	Hardwood Component (%): 84.2	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 1
Range (ft.): 61 to 230	Vegetative Cover (%): 95.0	2 to 2.9 Feet Deep: 11
Mean (ft.): 149	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 26
Std. Dev.: 42	Dominant Bank Substrate Type: Cobble/Gravel	>= 4 Feet Deep: 61
Base Flow (cfs.): 7.0	Occurrence of LWD (%): 3	Mean Max Residual Pool Depth (ft.): 5.5
Water (F): 65 - 75 Air (F): 56 - 89	LWD per 100 ft.:	Mean Pool Shelter Rating: 16
Dry Channel (ft): 70	Riffles: 0	
	Pools: 0	
	Flat: 0	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 2 Gravel: 57 Sm Cobble: 14 Lg Cobble: 8 Boulder: 3 Bedrock: 15		
Embeddedness Values (%): 1. 60.9 2. 19.5 3. 4.6 4. 2.3 5. 12.6		

STREAM REACH: 04

Channel Type: C4	Canopy Density (%): 55.4	Pools by Stream Length (%): 57.3
Reach Length (ft.): 6581	Coniferous Component (%): 20.0	Pool Frequency (%): 38.6
Riffle/Flatwater Mean Width (ft.): 14.0	Hardwood Component (%): 80.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 0
Range (ft.): 18 to 72	Vegetative Cover (%): 93.8	2 to 2.9 Feet Deep: 18
Mean (ft.): 46	Dominant Shelter: Aquatic Vegetation	3 to 3.9 Feet Deep: 47
Std. Dev.: 19	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 35
Base Flow (cfs.): 7.0	Occurrence of LWD (%): 1	Mean Max Residual Pool Depth (ft.): 3.9
Water (F): 64 - 74 Air (F): 67 - 87	LWD per 100 ft.:	Mean Pool Shelter Rating: 24
Dry Channel (ft): 0	Riffles: 0	
	Pools: 0	
	Flat: 0	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 65 Sm Cobble: 29 Lg Cobble: 6 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 11.8 2. 41.2 3. 11.8 4. 35.3 5. 0.0		

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 05

Channel Type:	NA	Canopy Density (%):		Pools by Stream Length (%):	0.0
Reach Length (ft.):	915	Coniferous Component (%):		Pool Frequency (%):	0.0
Riffle/Flatwater Mean Width (ft.):		Hardwood Component (%):		Residual Pool Depth (%):	
BFW:		Dominant Bank Vegetation:		< 2 Feet Deep:	
Range (ft.):	40 to 40	Vegetative Cover (%):	0.0	2 to 2.9 Feet Deep:	
Mean (ft.):	40	Dominant Shelter:		3 to 3.9 Feet Deep:	
Std. Dev.:	0	Dominant Bank Substrate Type:		>= 4 Feet Deep:	
Base Flow (cfs.):	7.0	Occurrence of LWD (%):		Mean Max Residual Pool Depth (ft.):	
Water (F):	68 - 68	Air (F):	76 - 76	LWD per 100 ft.:	
Dry Channel (ft):	0	Riffles:		Mean Pool Shelter Rating:	
		Pools:			
		Flat:			
Pool Tail Substrate (%):	Silt/Clay:	Sand:	Gravel:	Sm Cobble:	Lg Cobble:
Embeddedness Values (%):	1.	2.	3.	4.	5. 0.0
				Boulder:	Bedrock:

STREAM REACH: 06

Channel Type:	C4	Canopy Density (%):	64.7	Pools by Stream Length (%):	22.1
Reach Length (ft.):	7158	Coniferous Component (%):	8.3	Pool Frequency (%):	19.5
Riffle/Flatwater Mean Width (ft.):	28.3	Hardwood Component (%):	91.7	Residual Pool Depth (%):	
BFW:		Dominant Bank Vegetation:	Hardwood Trees	< 2 Feet Deep:	0
Range (ft.):	40 to 102	Vegetative Cover (%):	94.6	2 to 2.9 Feet Deep:	0
Mean (ft.):	57	Dominant Shelter:	Terrestrial Veg.	3 to 3.9 Feet Deep:	63
Std. Dev.:	21	Dominant Bank Substrate Type:	Sand/Silt/Clay	>= 4 Feet Deep:	38
Base Flow (cfs.):	7.0	Occurrence of LWD (%):	2	Mean Max Residual Pool Depth (ft.):	4.4
Water (F):	66 - 72	Air (F):	60 - 76	LWD per 100 ft.:	
Dry Channel (ft):	0	Riffles:	0	Mean Pool Shelter Rating:	22
		Pools:	0		
		Flat:	0		
Pool Tail Substrate (%):	Silt/Clay: 0	Sand: 38	Gravel: 63	Sm Cobble: 0	Lg Cobble: 0
Embeddedness Values (%):	1. 0.0	2. 25.0	3. 37.5	4. 0.0	5. 37.5
				Boulder: 0	Bedrock: 0

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 07

Channel Type: B1	Canopy Density (%): 68.4	Pools by Stream Length (%): 29.7
Reach Length (ft.): 3985	Coniferous Component (%): 6.6	Pool Frequency (%): 20.6
Riffle/Flatwater Mean Width (ft.): 15.1	Hardwood Component (%): 93.4	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 0
Range (ft.): 42 to 102	Vegetative Cover (%): 98.9	2 to 2.9 Feet Deep: 14
Mean (ft.): 58	Dominant Shelter: Whitewater	3 to 3.9 Feet Deep: 29
Std. Dev.: 17	Dominant Bank Substrate Type: Bedrock	>= 4 Feet Deep: 57
Base Flow (cfs.): 7.0	Occurrence of LWD (%): 7	Mean Max Residual Pool Depth (ft.): 6.7
Water (F): 66 - 74 Air (F): 69 - 78	LWD per 100 ft.:	Mean Pool Shelter Rating: 8
Dry Channel (ft): 0	Riffles: 0	
	Pools: 0	
	Flat: 0	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 0 Sm Cobble: 86 Lg Cobble: 0 Boulder: 0 Bedrock: 14		
Embeddedness Values (%): 1. 14.3 2. 57.1 3. 14.3 4. 0.0 5. 14.3		

STREAM REACH: 08

Channel Type: B4	Canopy Density (%): 64.1	Pools by Stream Length (%): 19.9
Reach Length (ft.): 6312	Coniferous Component (%): 7.8	Pool Frequency (%): 14.8
Riffle/Flatwater Mean Width (ft.): 14.0	Hardwood Component (%): 92.2	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 0
Range (ft.): 34 to 78	Vegetative Cover (%): 91.1	2 to 2.9 Feet Deep: 25
Mean (ft.): 54	Dominant Shelter: Small Woody Debris	3 to 3.9 Feet Deep: 25
Std. Dev.: 14	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 50
Base Flow (cfs.): 7.0	Occurrence of LWD (%): 8	Mean Max Residual Pool Depth (ft.): 4.3
Water (F): 64 - 74 Air (F): 53 - 77	LWD per 100 ft.:	Mean Pool Shelter Rating: 13
Dry Channel (ft): 943	Riffles:	
	Pools: 1	
	Flat: 1	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 13 Gravel: 75 Sm Cobble: 0 Lg Cobble: 0 Boulder: 0 Bedrock: 13		
Embeddedness Values (%): 1. 0.0 2. 12.5 3. 62.5 4. 0.0 5. 25.0		

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 09

Channel Type:	NA	Canopy Density (%):		Pools by Stream Length (%):	0.0
Reach Length (ft.):	1000	Coniferous Component (%):		Pool Frequency (%):	0.0
Riffle/Flatwater Mean Width (ft.):		Hardwood Component (%):		Residual Pool Depth (%):	
BFW:		Dominant Bank Vegetation:		< 2 Feet Deep:	
Range (ft.):	34 to 34	Vegetative Cover (%):	0.0	2 to 2.9 Feet Deep:	
Mean (ft.):	34	Dominant Shelter:		3 to 3.9 Feet Deep:	
Std. Dev.:	0	Dominant Bank Substrate Type:		>= 4 Feet Deep:	
Base Flow (cfs.):	7.0	Occurrence of LWD (%):		Mean Max Residual Pool Depth (ft.):	
Water (F):	66 - 66	LWD per 100 ft.:		Mean Pool Shelter Rating:	
Air (F):	62 - 62	Riffles:			
Dry Channel (ft):	0	Pools:			
		Flat:			
Pool Tail Substrate (%):	Silt/Clay:	Sand:	Gravel:	Sm Cobble:	Lg Cobble:
Embeddedness Values (%):	1.	2.	3.	4.	5. 0.0
				Boulder:	Bedrock:

STREAM REACH: 10

Channel Type:	B4	Canopy Density (%):	55.7	Pools by Stream Length (%):	22.1
Reach Length (ft.):	11539	Coniferous Component (%):	8.7	Pool Frequency (%):	15.7
Riffle/Flatwater Mean Width (ft.):	9.5	Hardwood Component (%):	91.3	Residual Pool Depth (%):	
BFW:		Dominant Bank Vegetation:	Hardwood Trees	< 2 Feet Deep:	0
Range (ft.):	20 to 61	Vegetative Cover (%):	90.7	2 to 2.9 Feet Deep:	10
Mean (ft.):	41	Dominant Shelter:	Terrestrial Veg.	3 to 3.9 Feet Deep:	57
Std. Dev.:	14	Dominant Bank Substrate Type:	Sand/Silt/Clay	>= 4 Feet Deep:	33
Base Flow (cfs.):	7.0	Occurrence of LWD (%):	4	Mean Max Residual Pool Depth (ft.):	3.7
Water (F):	66 - 82	LWD per 100 ft.:		Mean Pool Shelter Rating:	20
Air (F):	62 - 95	Riffles:			
Dry Channel (ft):	3905	Pools:	0		
		Flat:	0		
Pool Tail Substrate (%):	Silt/Clay: 0	Sand: 19	Gravel: 81	Sm Cobble: 0	Lg Cobble: 0
Embeddedness Values (%):	1. 0.0	2. 42.9	3. 33.3	4. 4.8	5. 19.0
				Boulder: 0	Bedrock: 0

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 11

Channel Type: NA	Canopy Density (%):	Pools by Stream Length (%): 0.0
Reach Length (ft.): 2770	Coniferous Component (%):	Pool Frequency (%): 0.0
Riffle/Flatwater Mean Width (ft.):	Hardwood Component (%):	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation:	< 2 Feet Deep:
Range (ft.): 42 to 42	Vegetative Cover (%): 0.0	2 to 2.9 Feet Deep:
Mean (ft.): 42	Dominant Shelter:	3 to 3.9 Feet Deep:
Std. Dev.: 0	Dominant Bank Substrate Type:	>= 4 Feet Deep:
Base Flow (cfs.): 7.0	Occurrence of LWD (%):	Mean Max Residual Pool Depth (ft.):
Water (F): 70 - 70 Air (F): 67 - 67	LWD per 100 ft.:	Mean Pool Shelter Rating:
Dry Channel (ft): 0	Riffles:	
	Pools:	
	Flat:	
Pool Tail Substrate (%): Silt/Clay: Sand: Gravel: Sm Cobble: Lg Cobble: Boulder: Bedrock:		
Embeddedness Values (%): 1. 2. 3. 4. 5. 0.0		

STREAM REACH: 12

Channel Type: F4	Canopy Density (%): 55.2	Pools by Stream Length (%): 5.4
Reach Length (ft.): 6015	Coniferous Component (%): 11.2	Pool Frequency (%): 8.0
Riffle/Flatwater Mean Width (ft.): 11.6	Hardwood Component (%): 88.8	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 0
Range (ft.): 18 to 45	Vegetative Cover (%): 82.3	2 to 2.9 Feet Deep: 0
Mean (ft.): 31	Dominant Shelter: Small Woody Debris	3 to 3.9 Feet Deep: 83
Std. Dev.: 10	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 17
Base Flow (cfs.): 7.0	Occurrence of LWD (%): 2	Mean Max Residual Pool Depth (ft.): 3.7
Water (F): 68 - 78 Air (F): 67 - 82	LWD per 100 ft.:	Mean Pool Shelter Rating: 14
Dry Channel (ft): 3686	Riffles:	
	Pools: 1	
	Flat: 0	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 17 Gravel: 50 Sm Cobble: 0 Lg Cobble: 0 Boulder: 0 Bedrock: 33		
Embeddedness Values (%): 1. 0.0 2. 33.3 3. 16.7 4. 0.0 5. 50.0		

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Tenmile Creek

LLID: 1236302397547

Drainage: Eel River - South Fork

Survey Dates: 6/29/2009 to 7/28/2009

Confluence Location: Quad: LEGGETT

Legal Description: T22NR16WS16

Latitude: 39:45:17.0N

Longitude: 123:37:49.0W

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	30	29	11.8
Boulder	40	48	17.7
Cobble / Gravel	84	88	34.5
Sand / Silt / Clay	95	84	35.9

Mean Percentage of Dominant Stream Bank Vegetation

Dominant Class of Vegetation	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Grass	21	17	7.6
Brush	4	5	1.8
Hardwood Trees	201	185	77.5
Coniferous Trees	23	42	13.1
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values:

2

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

StreamName: Tenmile Creek

LLID: 1236302397547

Drainage: Eel River - South Fork

Survey Dates: 6/29/2009 to 7/28/2009

Confluence Location: Quad: LEGGETT

Legal Description: T22NR16WS16

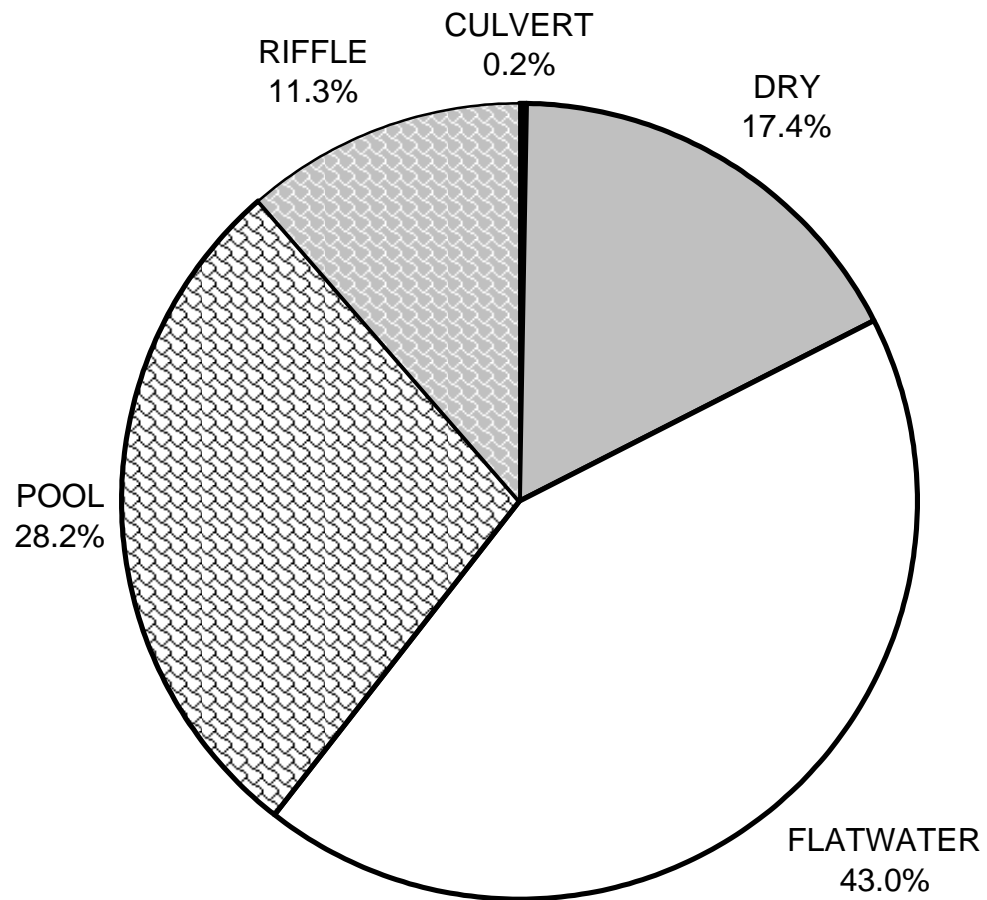
Latitude: 39:45:17.0N

Longitude: 123:37:49.0W

	Riffles	Flatwater	Pools
<hr/>			
UNDERCUT BANKS (%)	0	1	3
SMALL WOODY DEBRIS (%)	6	24	18
LARGE WOODY DEBRIS (%)	0	3	4
ROOT MASS (%)	2	8	7
TERRESTRIAL VEGETATION (%)	27	21	16
AQUATIC VEGETATION (%)	11	13	23
WHITEWATER (%)	26	2	1
BOULDERS (%)	27	23	24
BEDROCK LEDGES (%)	0	5	4

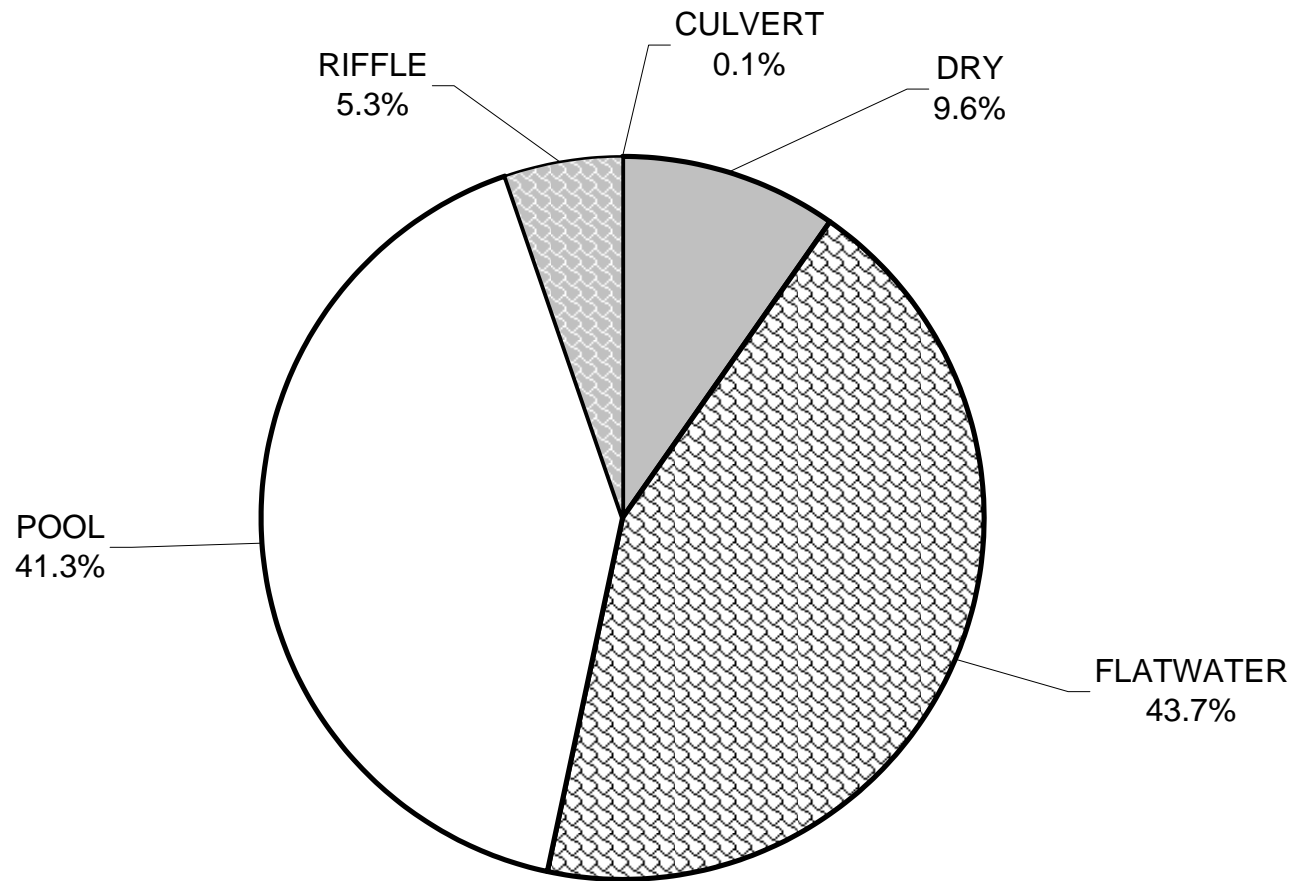
TENMILE CREEK 2009

HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

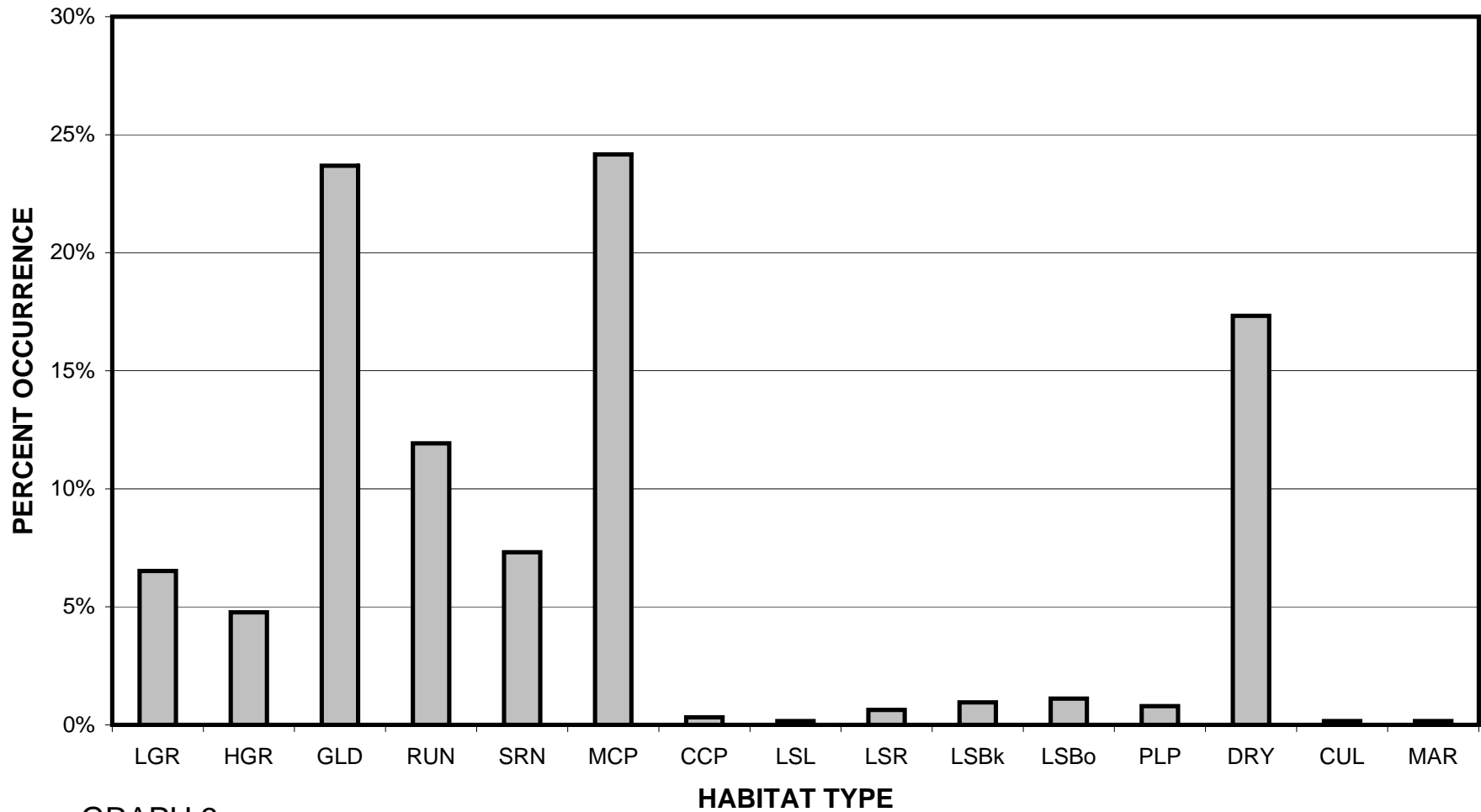
TENMILE CREEK 2009 HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

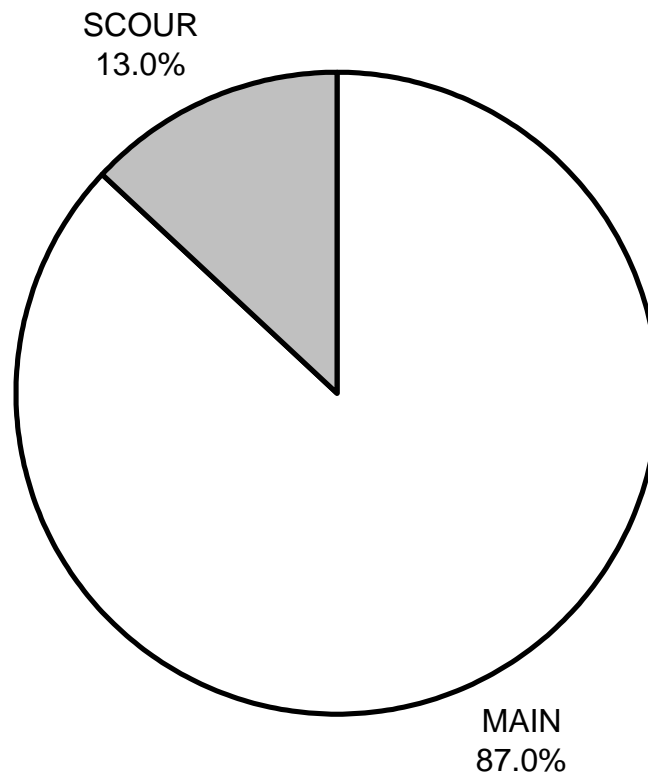
TENMILE CREEK 2009

HABITAT TYPES BY PERCENT OCCURRENCE



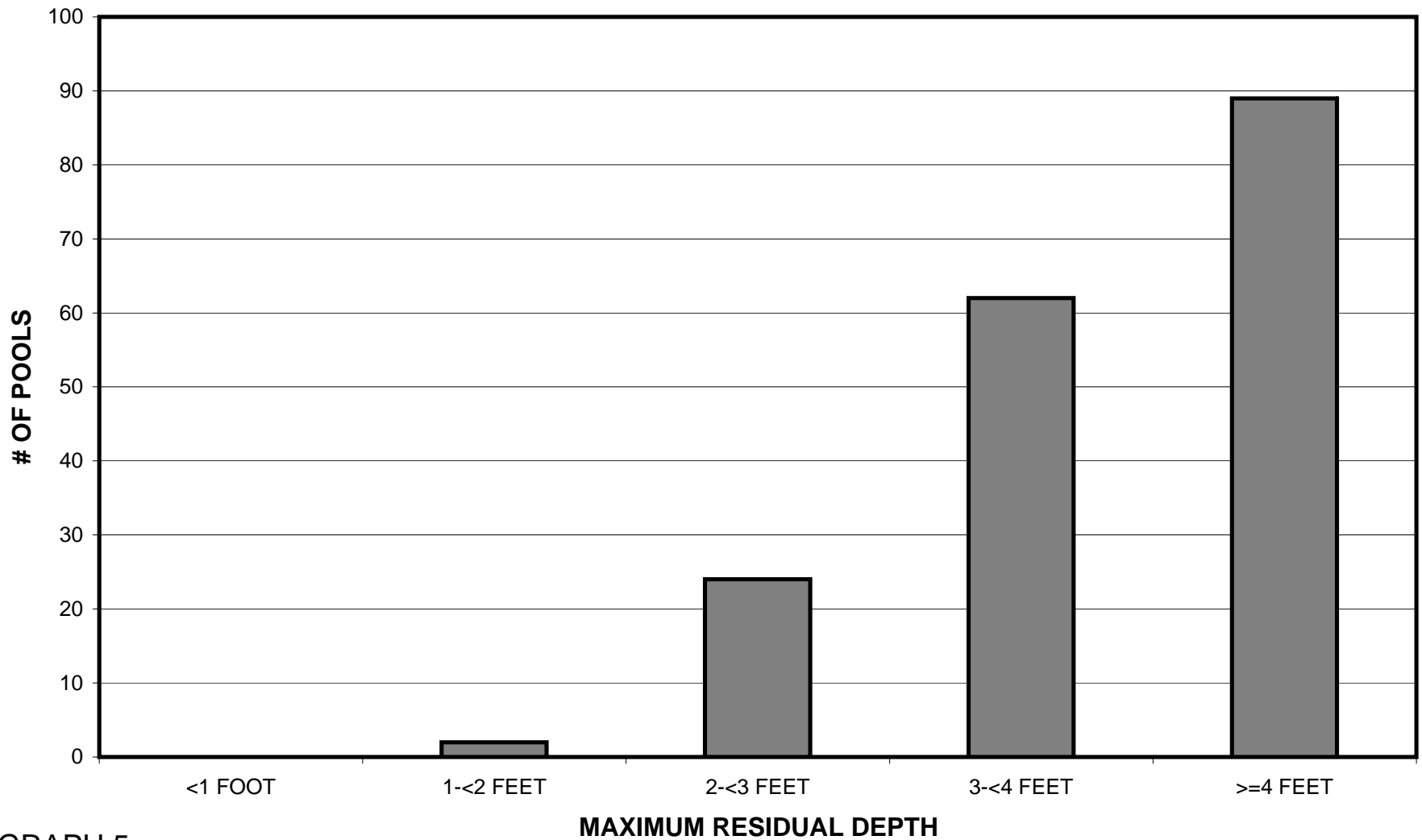
GRAPH 3

**TENMILE CREEK 2009
POOL TYPES BY PERCENT OCCURRENCE**



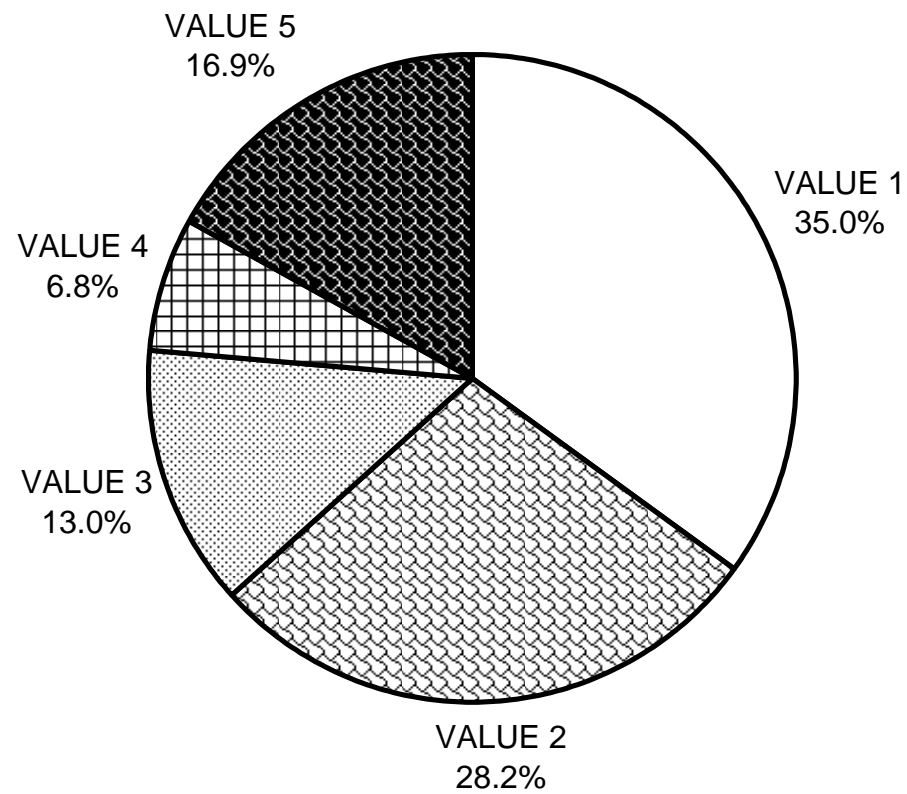
GRAPH 4

TENMILE CREEK 2009 MAXIMUM DEPTH IN POOLS



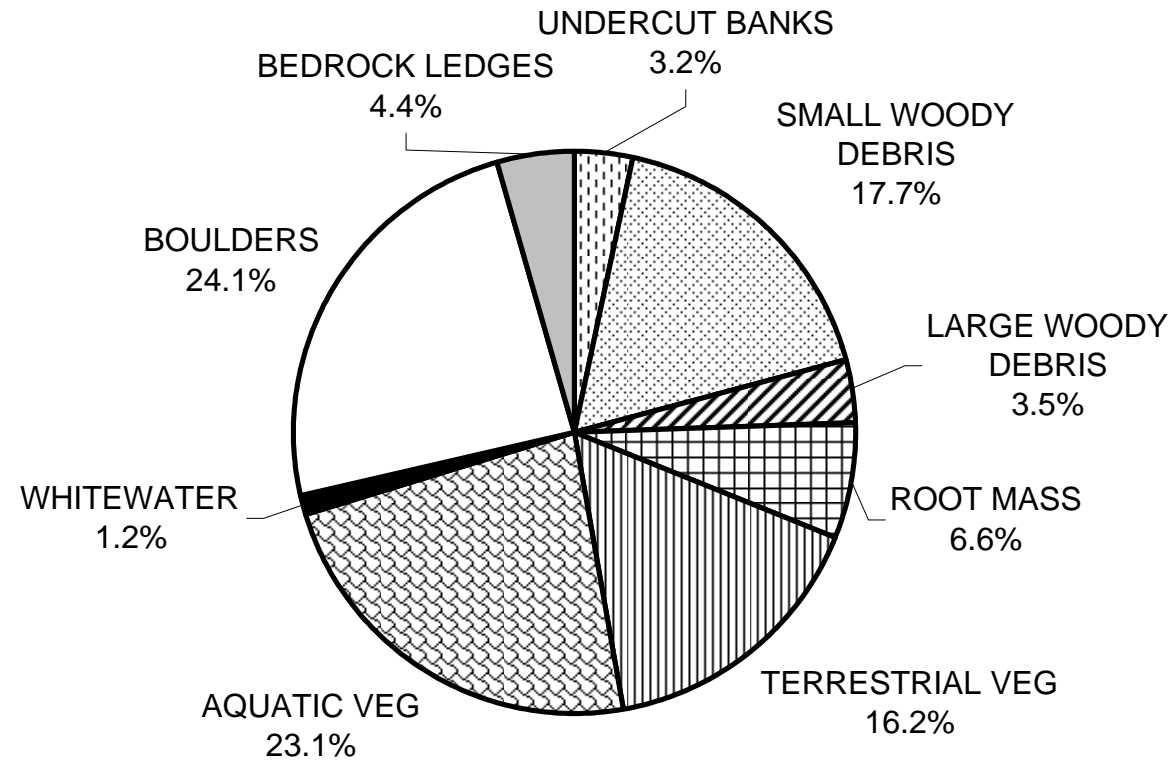
GRAPH 5

TENMILE CREEK 2009 PERCENT EMBEDDEDNESS



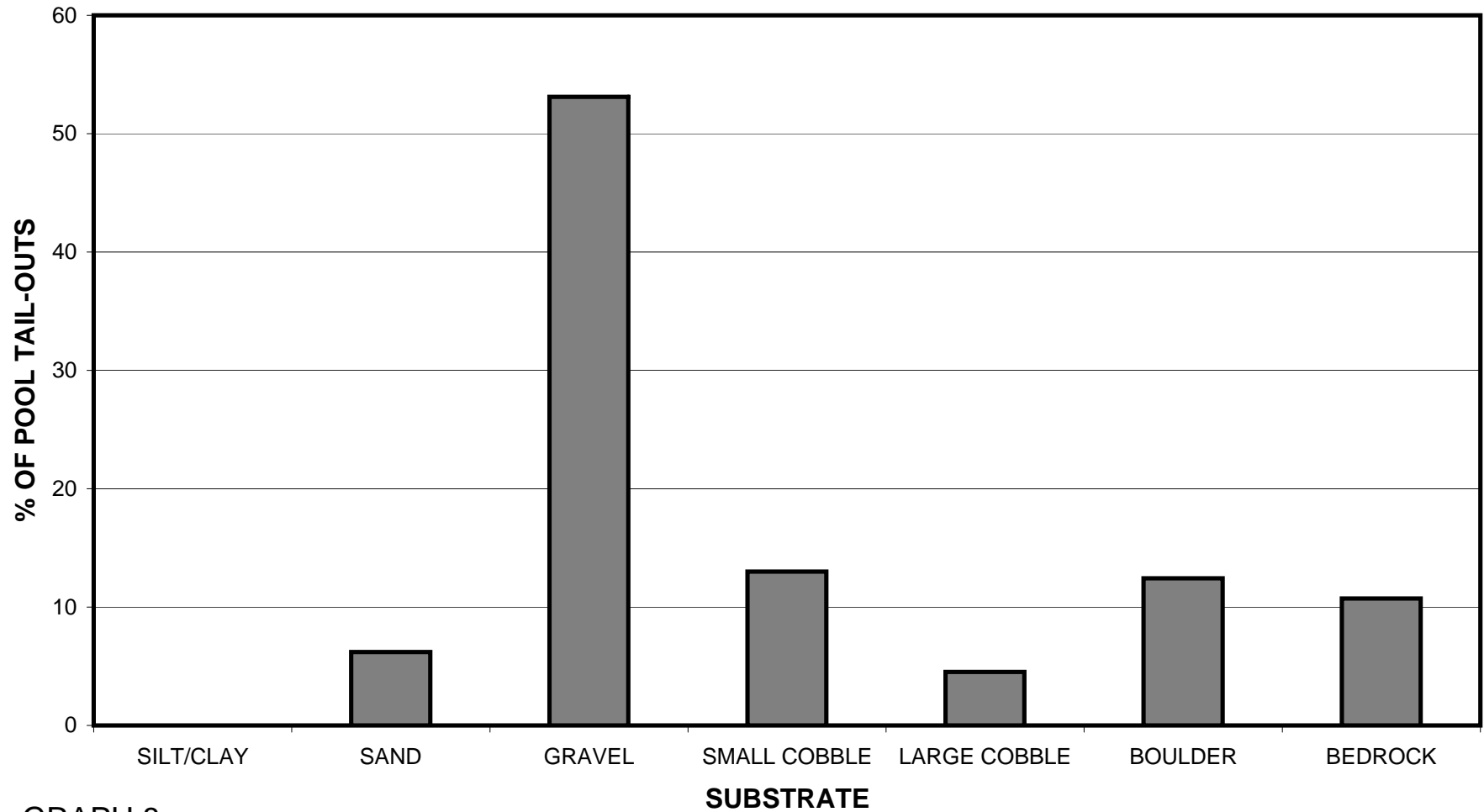
GRAPH 6

TENMILE CREEK 2009 MEAN PERCENT COVER TYPES IN POOLS



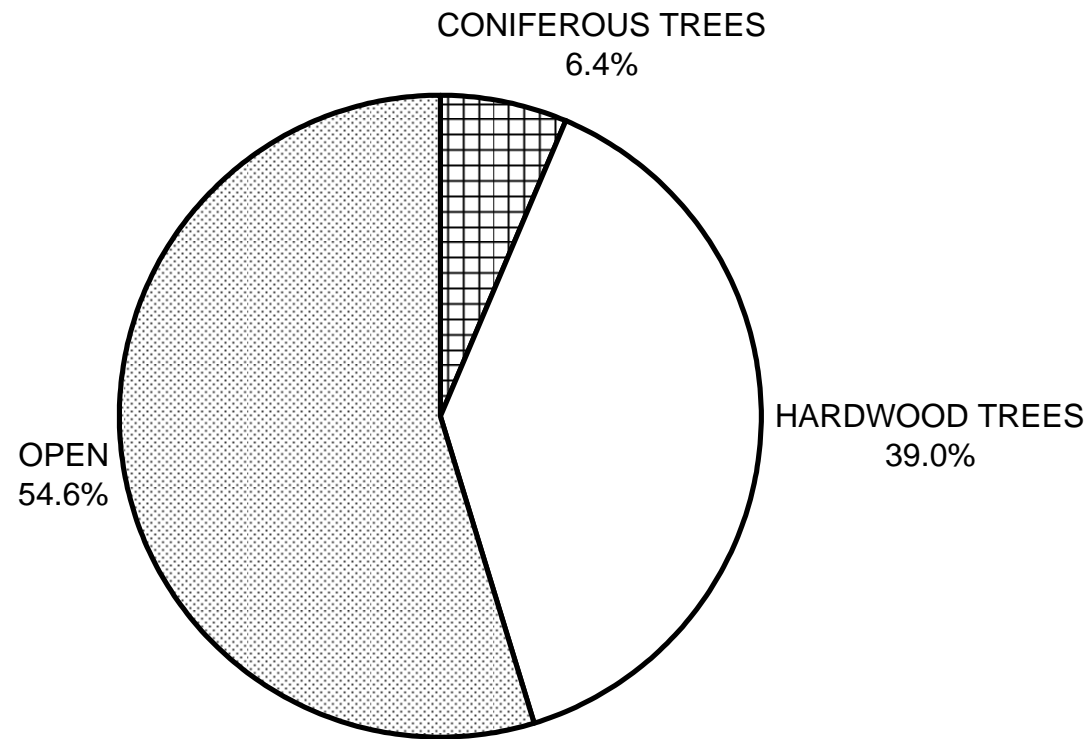
GRAPH 7

TENMILE CREEK 2009 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



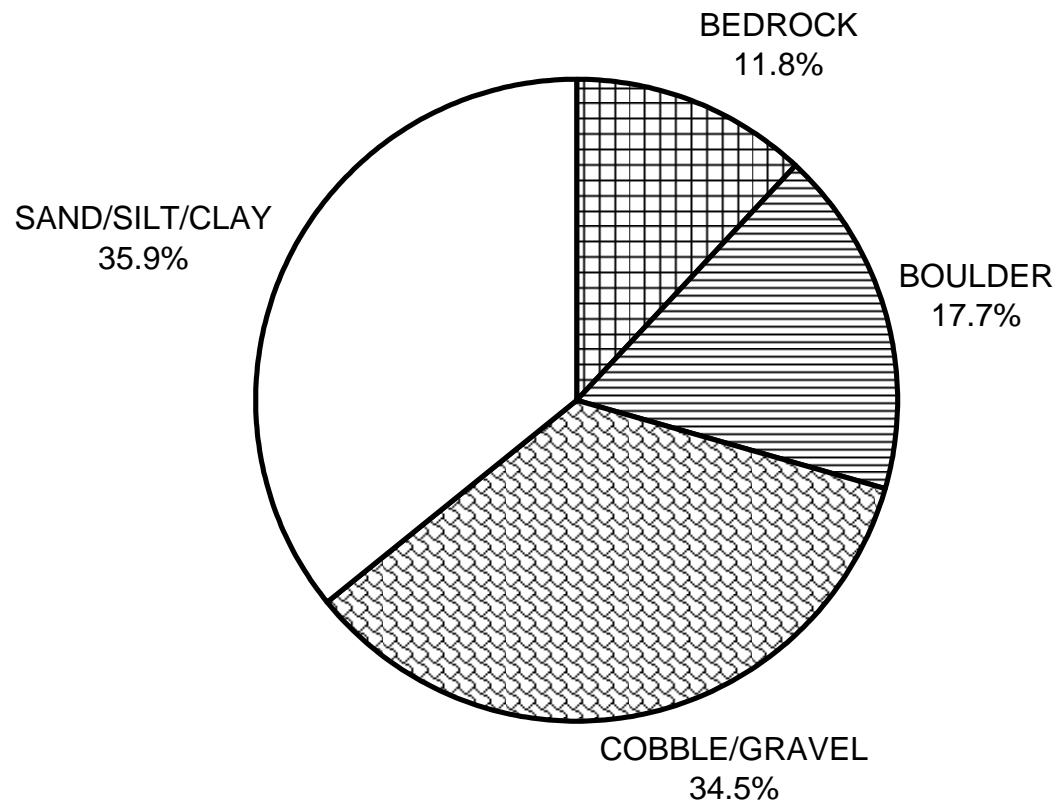
GRAPH 8

**TENMILE CREEK 2009
MEAN PERCENT CANOPY**



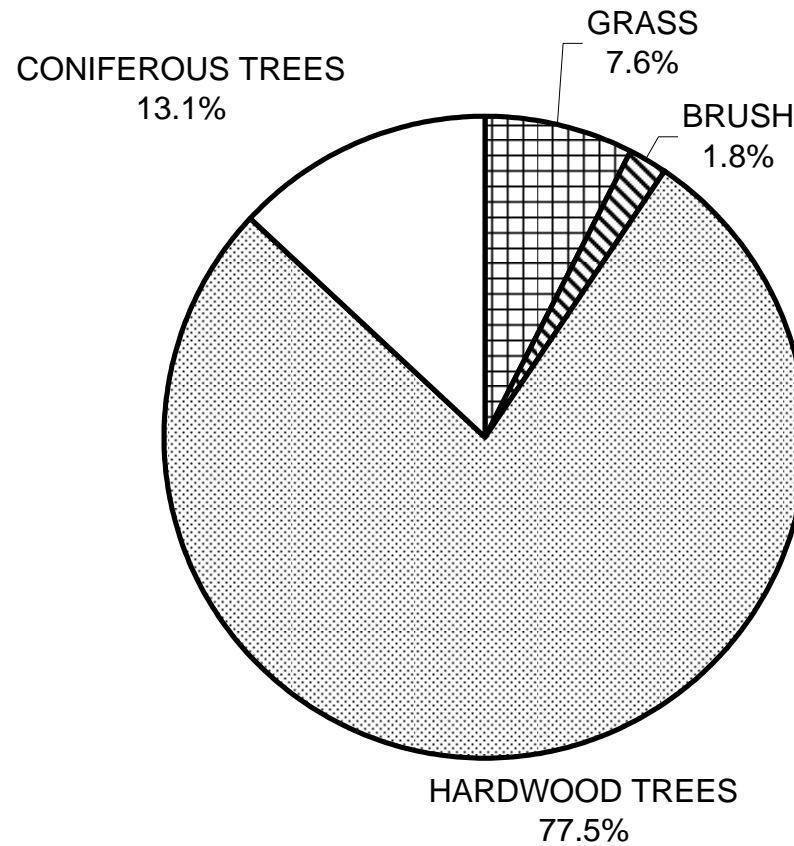
GRAPH 9

**TENMILE CREEK 2009
DOMINANT BANK COMPOSITION IN SURVEY REACH**



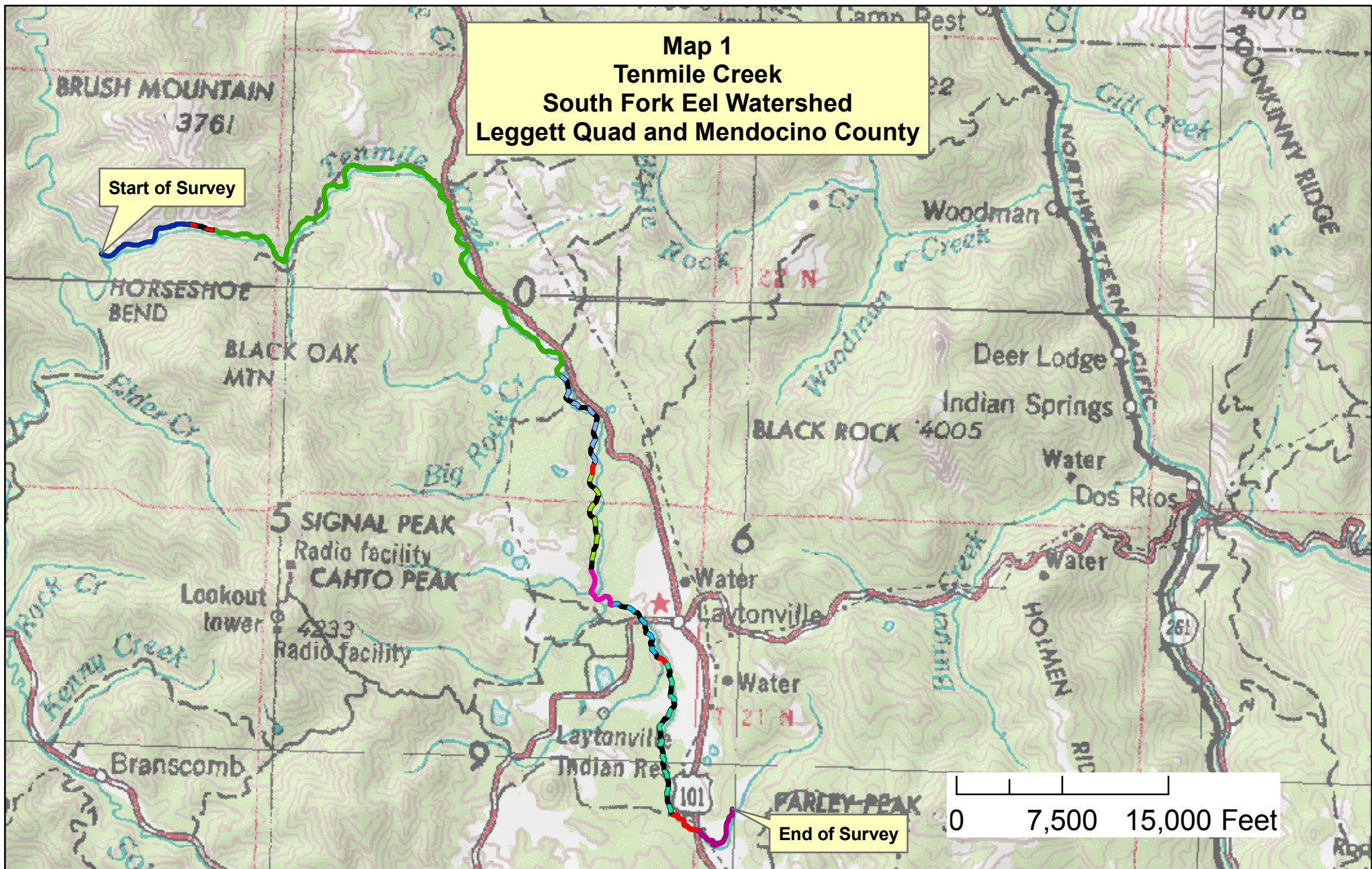
GRAPH 10

**TENMILE CREEK 2009
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11

Map 1
Tenmile Creek
South Fork Eel Watershed
Leggett Quad and Mendocino County



Legend

- | | | | |
|--------------------------|--------------------------|--------------------------|---------------------------|
| Reach 1, Channel Type F2 | Reach 4, Channel Type C4 | Reach 7, Channel Type B1 | Reach 10, Channel Type B4 |
| Reach 2, Not Surveyed | Reach 5, Not Surveyed | Reach 8, Channel Type B4 | Reach 11, Not Surveyed |
| Reach 3, Channel Type F4 | Reach 6, Channel Type C4 | Reach 9, Not Surveyed | Reach 12, Channel Type F4 |

