STREAM INVENTORY REPORT

Bee Tree Creek

INTRODUCTION

A stream inventory was conducted on July 23, 2003 on Bee Tree Creek. The survey began at the confluence with Alder Creek and extended upstream 2,750 feet.

The Bee Tree 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 Bee Tree Creek. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species.

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

WATERSHED OVERVIEW

Bee Tree Creek is a tributary to Alder Creek, a tributary to the Pacific Ocean, located in Mendocino County, California (Map 1). Bee Tree Creek's legal description at the confluence with Alder Creek is T13N R16W S11. Its location is 39°00′30″ north latitude and 123°35′45″ west longitude. Bee Tree Creek is a first order stream and has approximately 4,239 feet of solid blue line and 4,755 feet of dashed blue line stream according to the USGS Cold Spring 7.5 minute quadrangle. Bee Tree Creek drains a watershed of approximately 1.33 square miles. Elevations range from about 497 feet at the mouth of the creek to 1,836 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production. Vehicle access exists via Piper Ranch logging roads.

METHODS

The habitat inventory conducted in Bee Tree Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al., 1998). The California Department of Fish and Game field crew and the Watershed Stewards Project/AmeriCorps (WSP/AmeriCorps) 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 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 Bee Tree Creek to record measurements and observations. There are nine components to the inventory form.

1. Flow:

Flow is measured in cubic feet per second (cfs) at 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 (1985 rev. 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 (1988). 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". Bee Tree 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 Bee Tree 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 particle size, bedrock, or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide 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. 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 Bee Tree 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 Bee Tree 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 evergreen or deciduous 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 Bee Tree 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.

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 Bee Tree Creek. In addition, four sites were electrofished using a Smith-Root Model 12 electrofisher by Mendocino Redwood Company, aquatic biologists. These sampling techniques are discussed in the *California Salmonid Stream Habitat Restoration Manual*.

DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat 8.4, a dBASE 4.2 data entry program developed by Tim Curtis, Inland Fisheries Division, California Department of Fish and Game. This program processes and summarizes the data, and produces the following seven tables:

- Summary of riffle, flatwater, and pool habitat types
- Summary of habitat types and measured parameters
- Summary of pool types
- Summary of maximum pool depths by pool habitat types
- Summary of shelter by habitat types
- Summary of dominant substrates by habitat types
- Summary of fish habitat elements by stream reach

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

- Level II habitat types by % occurrence
- Level II habitat types by % total length
- Level IV habitat types by % occurrence
- Level I pool habitat types by % occurrence
- Maximum depth in pools
- Percent embeddedness estimated in pool tail-outs
- Mean percent cover types in pools
- Substrate composition in pool tail-outs
- Mean percent canopy
- Dominant bank composition in survey reach
- Dominant bank vegetation in survey reach

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HABITAT INVENTORY RESULTS

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

The habitat inventory of July 23, 2003, was conducted by G. Trousdale (WSP/AmeriCorps) and J. Crews (DFG). The total length of the stream surveyed was 2,750 feet.

Stream flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.15 cfs on October 21, 2003.

Bee Tree Creek is a B3 channel type for the entire 2,750 feet of the stream surveyed. B3 channels are moderately entrenched, moderate gradient, riffle dominated channels with infrequently spaced pools; very stable plan and profile with stable banks and cobble-dominant substrates.

Water temperatures taken during the survey period ranged from 58° to 60° Fahrenheit. Air temperatures ranged from 66° to 73° Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 50% riffle units, 41% pool units, and 7% flatwater units (Graph 1). Based on total length of Level II habitat types there were 79% riffle units, 11% pool units, and 7% flatwater units (Graph 2).

Eleven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low-gradient riffles, 46%; mid-channel pools, 26%; and runs, corner pools, and plunge pools, each at 6% (Graph 3). Based on percent total length, low-gradient riffles made up 77%, mid-channel pools 7%, and runs 6%.

A total of 22 pools were identified (Table 3). Main-channel pools were the most frequently encountered, at 68%, and comprised 70% of the total length of all pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Nine of the 22 measured pools (41%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 22 pool tail-outs measured, 0 had a value of 1 (0%); 8 had a value of 2 (36%); 13 had a value of 3 (59%); 0 had a value of 4 (0%); and 1 had a value of 5 (5%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate.

Flatwater habitat types had a mean shelter rating of 88, pool habitats had a mean shelter rating of 50, and riffle habitat types had a mean shelter rating of 20 (Table 1). Of the pool types, the main-channel pools had the highest mean shelter rating at 56. Scour pools had a mean shelter rating of 35 (Table 3).

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Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover types in Bee Tree Creek. Graph 7 describes the pool cover in Bee Tree Creek. Large woody debris is the dominant pool cover type followed by boulders.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Small cobble was the dominant substrate observed in 64% of pool tail-outs while gravel was the next most frequently observed substrate type, at 23%.

The mean percent canopy density for the surveyed length of Bee Tree Creek was 93%. The mean percentages of evergreen and deciduous trees were 74% and 19%, respectively with 7% of the canopy open. Graph 9 describes the mean percent canopy in Bee Tree Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 42%. The mean percent left bank vegetated was 40%. The dominant elements composing the structure of the stream banks consisted of 77% sand/silt/clay, 20% bedrock, 3% cobble/gravel, and 0% boulder (Graph 10). Coniferous trees were the dominant vegetation type observed in 82% of the units surveyed. Additionally, 8% of the units surveyed had brush as the dominant vegetation type, and 3% had deciduous trees as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Backpack electrofisher surveys were conducted at three locations within mainstem Bee Tree Creek by Mendocino Redwood Company, aquatic biologists, in the summer of 2002. All aquatic species were identified and lengths were taken of salmonids. Steelhead rainbow trout (SH) were the only salmonid species observed. Other aquatic species identified were, yellow legged frogs (YLF), Pacific giant salamanders (PGS), and crayfish (CY) (Table A).

Site 89-12 produced nine steelhead trout, including seven below 70 mm in length and two between 70-130 mm.

Site 89-13 produced one steelhead trout between 70-130 mm in length.

Site 89-25 produced no salmonid species.

Site 89-27 produced one steelhead trout between 70-130 mm in length.

Table A. Bee Tree Creek biological sampling data.

Date	Site	Species	<70 mm	70-130 mm	>130 mm	Other species
9/27/2002	89-12	SH	7	2	0	YLF, PGS, CY
9/27/2002	89-13	SH	0	1	0	YLF, PGS
9/27/2002	89-25		0	0	0	YLF, PGS
9/27/2002	89-27	SH	0	1	0	YLF, PGS

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DISCUSSION

Bee Tree Creek is a B3 channel type for the entire 2,750 feet of stream surveyed. The suitability of B3 channel types for fish habitat improvement structures is as follows: B3 channel types are excellent for plunge weirs, boulder clusters, bank-placed boulders; single and opposing wing-deflectors and log cover.

The water temperatures recorded on the survey day ranged from 58° to 60° Fahrenheit. Air temperatures ranged from 66° to 73° Fahrenheit. Recorded water temperatures of 60° Fahrenheit and below are suitable for 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.

Riffle habitat types comprised 79% of the total length of this survey, pools 11%, and flatwater 7%. The pools are relatively shallow, with only 9 of the 22 (41%) measured pools having a maximum 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 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.

Eight of the 22 pool tail-outs measured had embeddedness ratings of 1 or 2. Thirteen of the pool tail-outs had embeddedness ratings of 3 or 4. One of the pool tail-outs had a rating of 5, which is considered 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.

Nineteen of the 22 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter for flatwater was 88. The mean shelter rating for pools was 50. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by large woody debris in all habitat types. Additionally, boulders contribute a small amount.

The mean percent canopy density for the stream was 93%.

The percentage of right and left bank covered with vegetation was low at 42% and 41%, respectively. In areas of stream bank erosion or where bank vegetation is not at acceptable levels, planting endemic trees species, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

1) Bee Tree Creek should be managed as an anadromous, natural production stream.

2) Active and potential sediment sources need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.

3) Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediments entering the stream.

4) Where feasible, design and engineer pool enhancement structures to increase the number of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

5) There are several log debris accumulations present on Bee Tree Creek that are retaining large quantities of fine sediment. The modification of these debris accumulations is desirable, but must be done carefully, over time, to avoid excessive sediment loading in downstream reaches.

6) 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.

7) The limited water temperature data available suggest that maximum temperatures are within the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for 3 to 5 years.

COMMENTS AND LANDMARKS

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

Position (ft.)	Habitat Unit#	Comments:
0	0001	Start of survey at confluence with Alder Creek. Unit 001 is within influence of Alder Creek; not surveyed.
164	0003	Large debris accumulation (LDA) retaining sediment.
285	0005	Left bank landslide measures 50' wide x 30' high x 20' deep.
399	0007	Left bank tributary.
445	0008	Old road crossing.
645	0015	LDA, potential barrier.
705	0018	Channel type is B3. Left bank tributary. Salmonids observed.

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933	0019	11' high vertical bedrock cascade.
1228	0028	Right bank slide brought large woody debris into stream creating a step pool.
1318	0031	Steelhead young-of-the-year (YOY) observed.
1760	0042	LDA retaining 3’ deep sediment.
2026	0043	Steelhead YOY.
2750	0054	End of Survey. Twenty foot high waterfall. Left bank tributary; survey continued up mainstem (west fork). The east fork tributary had a LDA, potentially impassable for salmonids.

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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]	

TABLES AND GRAPHS

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Bee Tree Creek Drainage: Point Arena

Survey Dates: 7/23/2003 to 7/23/2003

Confluence Location: Quad: COLD SPRING Legal Description: T13NR16WS11 Latitude: 39:00:30.0N Longitude: 123:35:45.0W

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 (%)
25	4	LGR	46.3	85	2130	77.5	7	0.5	1.4	726	18142	385	9632		10	92
1	1	CAS	1.9	20	20	0.7	2	0.3	1	40	40	12	12		0	88
1	1	BRS	1.9	10	10	0.4	4	0.2	0.4	40	40	8	8		0	97
1	1	GLD	1.9	24	24	0.9	7	0.3	0.7	168	168	50	50		160	89
3	1	RUN	5.6	55	164	6.0	6	0.4	1	407	1222	163	489		15	95
14	14	MCP	25.9	14	194	7.1	9	1.0	3.2	126	1758	151	2120	123	56	93
1	1	STP	1.9	24	24	0.9	9	0.4	1.1	194	194	156	156	78	60	85
3	3	CRP	5.6	13	40	1.5	6	0.6	1.5	69	207	58	175	41	18	94
1	1	LSR	1.9	19	19	0.7	7	0.7	1.4	133	133	120	120	93	60	98
3	3	PLP	5.6	11	34	1.2	9	1.3	2.5	98	293	149	446	129	43	95
1	0	NS	1.9	91	91	3.3										95

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
54	30	2750	22197.01	13207.7

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Table 3 - Summary of Pool Types

Stream Name: Bee Tree Creek Drainage: Point Arena

Survey Dates: 7/23/2003 to 7/23/2003

Confluence Location: Quad: COLD SPRING Legal Description: T13NR16WS11 Latitude: 39:00:30.0N Longitude: 123:35:45.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Residual Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Residual Pool Vol (cu.ft.)	Estimated Total Resid.Vol. (cu.ft.)	Mean Shelter Rating
15	15	MAIN	68	15	218	70	8.6	0.9	130	1952	120	1804	56
7	7	SCOUR	32	13	93	30	7.1	0.9	90	633	86	605	35

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
22	22	311	2585.25	2408.92

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

Stream Name: Bee Tree Creek Drainage: Point Arena

Survey Dates: 7/23/2003 to 7/23/2003

Confluence Location: Quad: COLD SPRING Legal Description: T13NR16WS11 Latitude: 39:00:30.0N Longitude: 123:35:45.0W

Habitat Units	Habitat Type	Habitat Occurrence (%)	< 1 Foot Maximum Residual Depth	< 1 Foot Percent Occurrence	1 < 2 Feet Maximum Residual Depth	1 < 2 Feet Percent Occurrence	2 < 3 Feet Maximum Residual Depth	2 < 3 Feet Percent Occurrence	3 < 4 Feet Maximum Residual Depth	3 < 4 Feet Percent Occurrence	>= 4 Feet Maximum Residual Depth	>= 4 Feet Percent Occurrence
14	MCP	64	0	0	7	50	5	36	2	14	0	0
1	STP	5	0	0	1	100	0	0	0	0	0	0
3	CRP	14	0	0	3	100	0	0	0	0	0	0
1	LSR	5	0	0	1	100	0	0	0	0	0	0
3	PLP	14	0	0	1	33	2	67	0	0	0	0

Total Units	Total 1 Foot Max Resid. Depth	<Total 1 Foot % Occurrence	< Total 1< 2 Foot Max Resid. Depth	Total 1< 2 Foot % Occurrence	Total 2< 3 Foot Max Resid. Depth	Total 2< 3 Foot % Occurrence	Total 3< 4 Foot Max Resid. Depth	Total 3< 4 Foot % Occurrence	Total >= 4 Foot Max Resid. Depth	Total >= 4 Foot % Occurrence
22	0	0	13	59	7	32	2	9	0	0

Mean Maximum Residual Pool Depth (ft.): 1.8

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Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Bee Tree Creek Drainage: Point Arena
Survey Dates: 7/23/2003 to 7/23/2003 Dry Units: 0
Confluence Location: Quad: COLD SPRING Legal Description: T13NR16WS11 Latitude: 39:00:30.0N Longitude: 123:35:45.0W

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
25	4	LGR	0	15	30	0	0	0	0	5	0
1	1	CAS	0	0	0	0	0	0	0	0	0
1	1	BRS	0	0	0	0	0	0	0	0	0
27	6	TOTAL RIFFLE	0	10	20	0	0	0	0	3	0
1	1	GLD	0	40	50	0	10	0	0	0	0
3	1	RUN	80	10	10	0	0	0	0	0	0
4	2	TOTAL FLAT	40	25	30	0	5	0	0	0	0
14	14	MCP	16	15	30	1	0	0	8	21	10
1	1	STP	0	20	80	0	0	0	0	0	0
3	3	CRP	0	27	13	32	0	0	2	27	0
1	1	LSR	20	10	0	70	0	0	0	0	0
3	3	PLP	0	7	53	0	0	0	27	13	0
22	22	TOTAL POOL	11	15	32	8	0	0	9	19	6
1	0	NS									
54	30	TOTAL	11	15	29	6	0	0	7	14	5

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Bee Tree Creek Drainage: Point Arena
Survey Dates: 7/23/2003 to 7/23/2003 Dry Units: 0
Confluence Location: Quad: COLD SPRING Legal Description: T13NR16WS11 Latitude: 39:00:30.0N Longitude: 123:35:45.0W

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
25	4	LGR	0	0	25	75	0	0	0
1	1	CAS	0	0	0	0	0	0	100
1	1	BRS	0	0	0	0	0	0	100
1	1	GLD	0	0	100	0	0	0	0
3	1	RUN	0	0	0	100	0	0	0
14	14	MCP	7	0	57	7	0	21	7
1	1	STP	0	0	100	0	0	0	0
3	3	CRP	0	0	67	33	0	0	0
1	1	LSR	0	0	0	0	100	0	0
3	3	PLP	0	0	33	0	33	33	0

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Table 8 - Fish Habitat Inventory Data Summary

Stream Name: Bee Tree Creek | Drainage: Point Arena

Survey Dates: 7/23/2003 to 7/23/2003 | Survey Length (ft.): 2750 | Main Channel (ft.): 2750 | Side Channel (ft.): 0

Confluence Location: Quad: COLD SPRING | Legal Description: T13NR16WS11 | Latitude: 39:00:30.0N | Longitude: 123:35:45.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

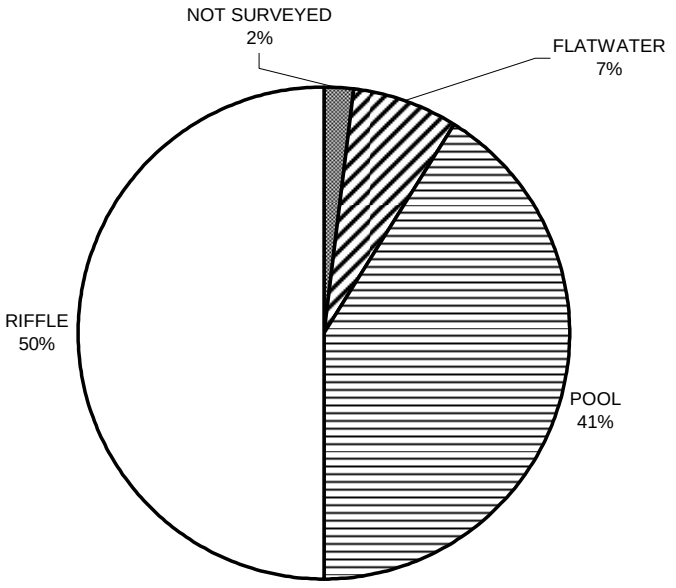
Channel Type: B3	Canopy Density (%): 93	Pools by Stream Length (%): 11
Reach Length (ft.): 2750	Coniferous Component (%): 80	Pool Frequency (%): 41
Riffle/Flatwater Mean Width (ft.): 6.0	Deciduous Component (%): 20	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Evergreen Trees	< 2 Feet Deep: 59
Range (ft.): 8 to 10	Vegetative Cover (%): 55	2 to 2.9 Feet Deep: 32
Mean (ft.): 9	Dominant Shelter: Large Woody Debris	3 to 3.9 Feet Deep: 9
Std. Dev.: 1	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 29	Mean Max Residual Pool Depth (ft.): 1.8
Water (F): 58 - 60 Air (F): 66 - 73	LWD per 100 ft.:	Mean Pool Shelter Rating: 50
Dry Channel (ft): 0	Riffles: 3	
	Pools: 10	
	Flat: 7	

Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 23 Sm Cobble: 64 Lg Cobble: 9 Boulder: 0 Bedrock: 5

Embeddedness Values (%): 1. 0 2. 36 3. 59 4. 0 5. 5

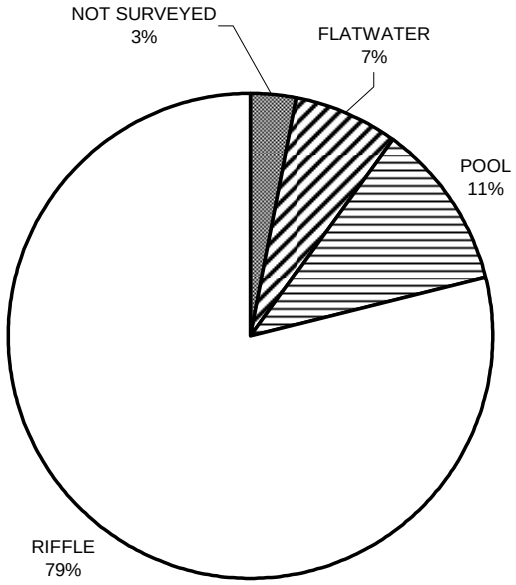
BEE TREE CREEK

HABITAT TYPES BY PERCENT OCCURRENCE



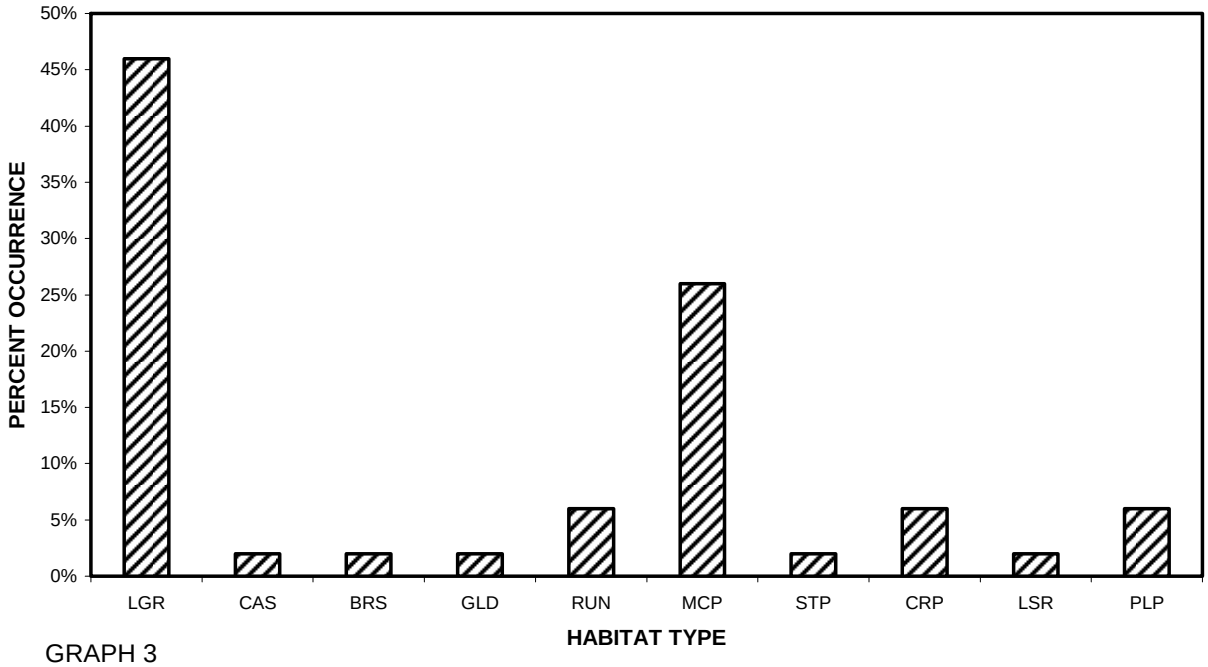
GRAPH 1

BEE TREE CREEK
HABITAT TYPES BY PERCENT TOTAL LENGTH



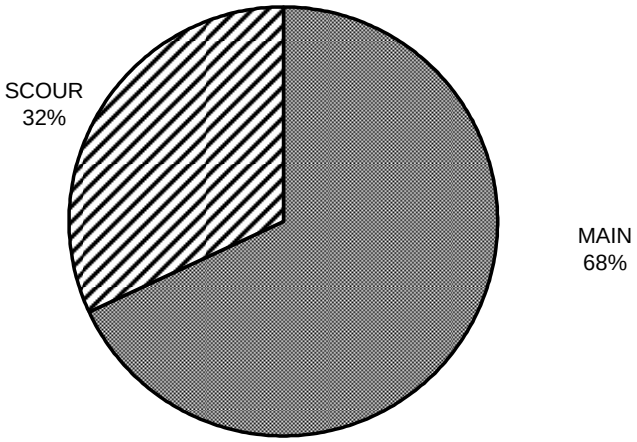
GRAPH 2

BEE TREE CREEK
HABITAT UNIT TYPES BY PERCENT OCCURRENCE



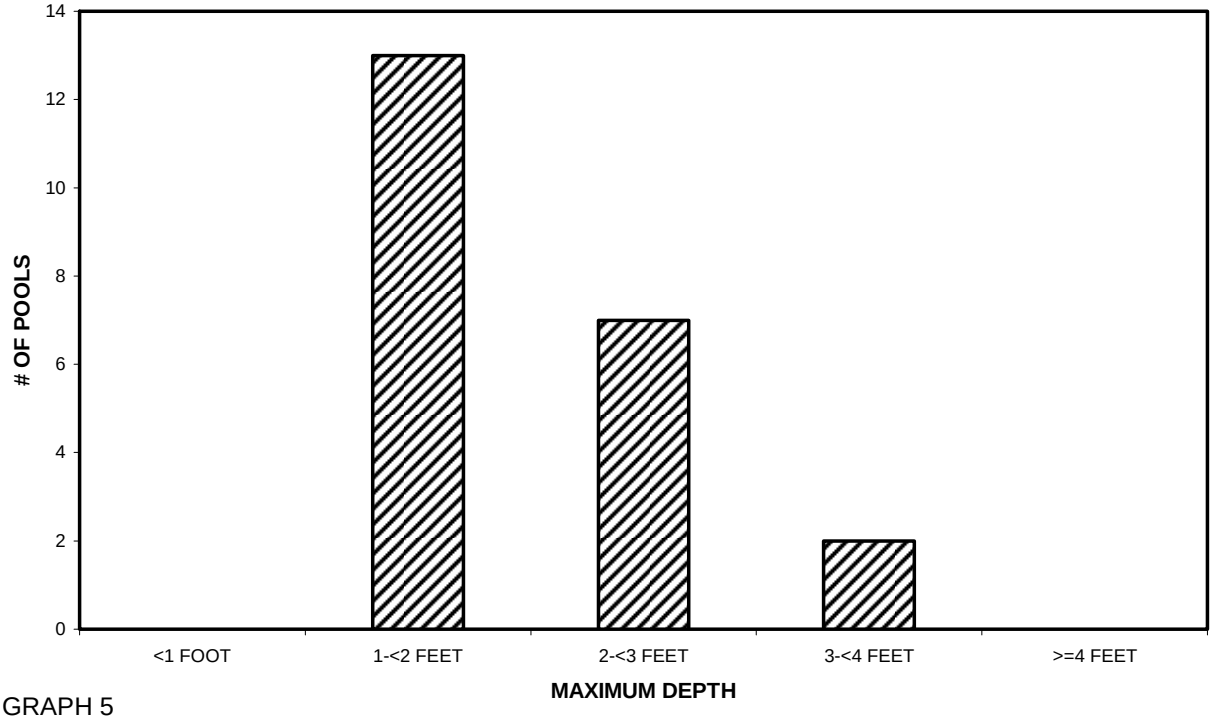
GRAPH 3

BEE TREE CREEK
POOL HABITAT TYPES BY PERCENT OCCURRENCE



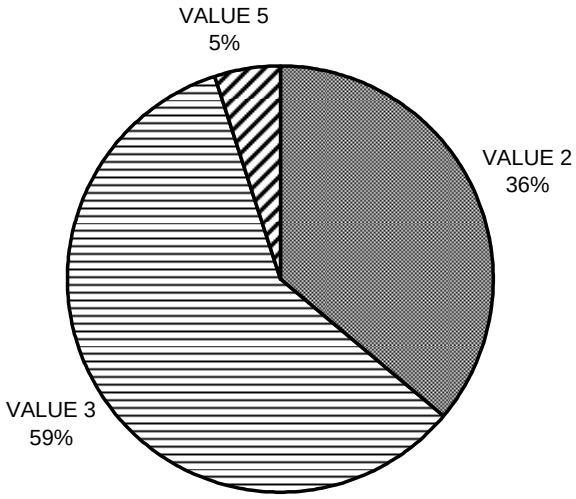
GRAPH 4

BEE TREE CREEK
MAXIMUM DEPTH IN POOLS



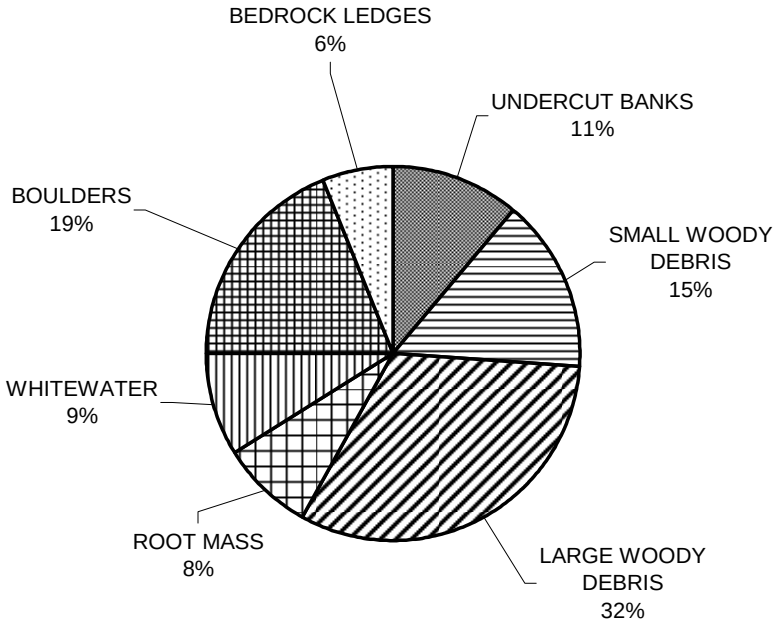
GRAPH 5

BEE TREE CREEK
PERCENT EMBEDDEDNESS



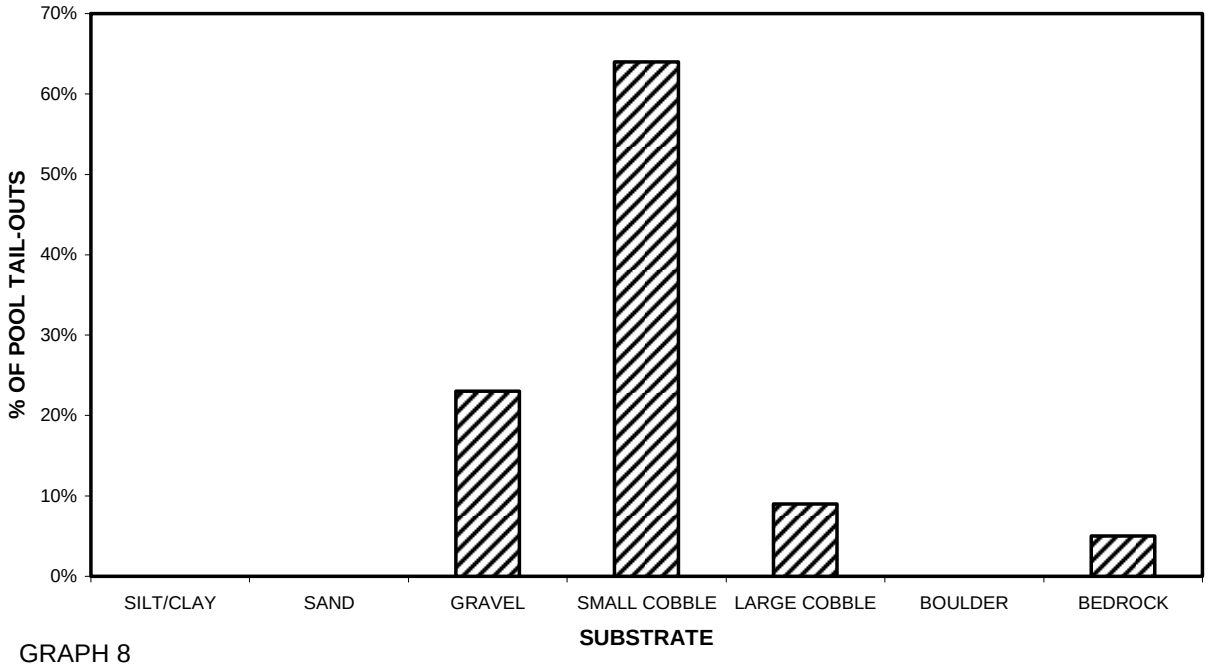
GRAPH 6

BEE TREE CREEK
MEAN PERCENT COVER TYPES IN POOLS



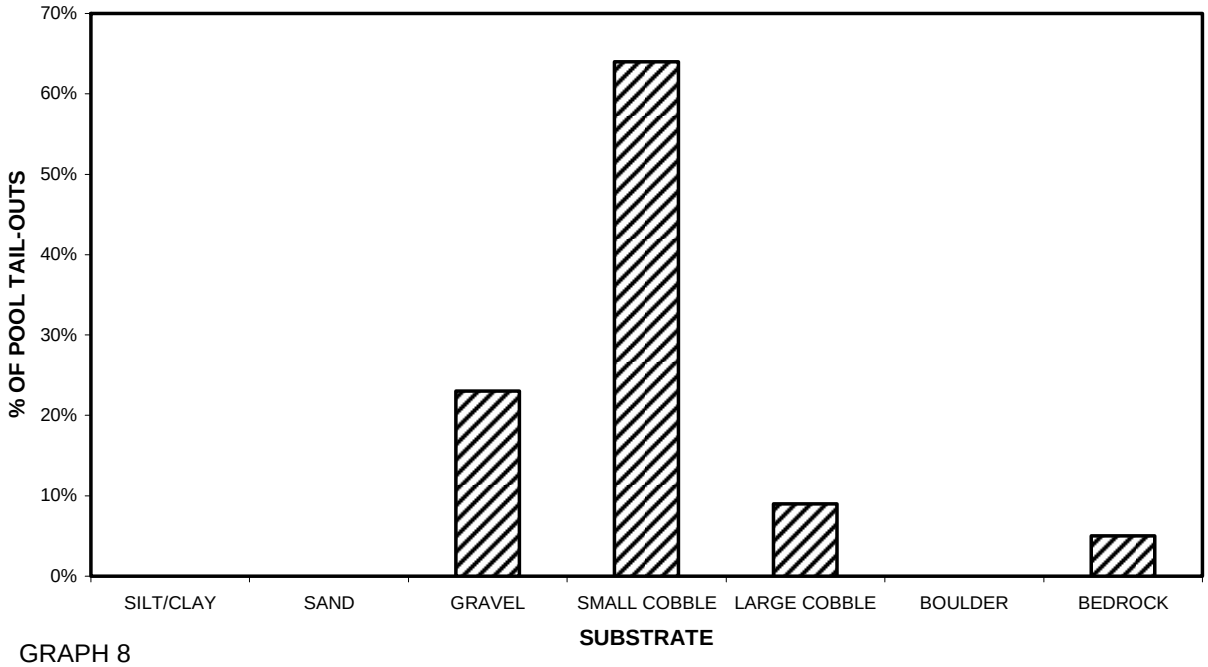
GRAPH 7

BEE TREE CREEK
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



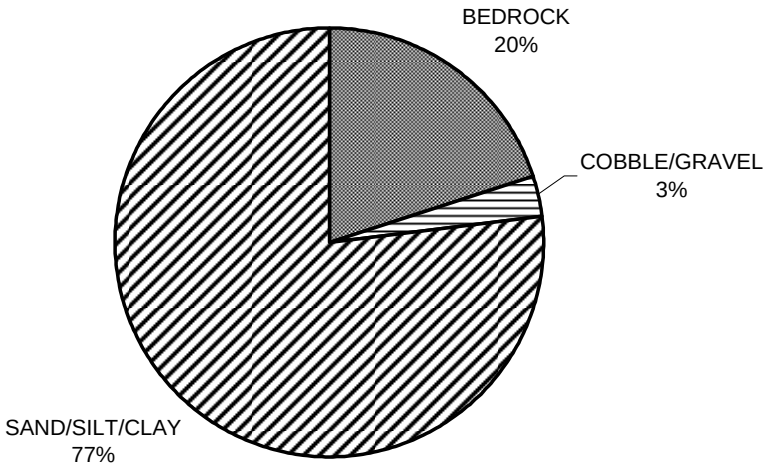
GRAPH 8

BEE TREE CREEK
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



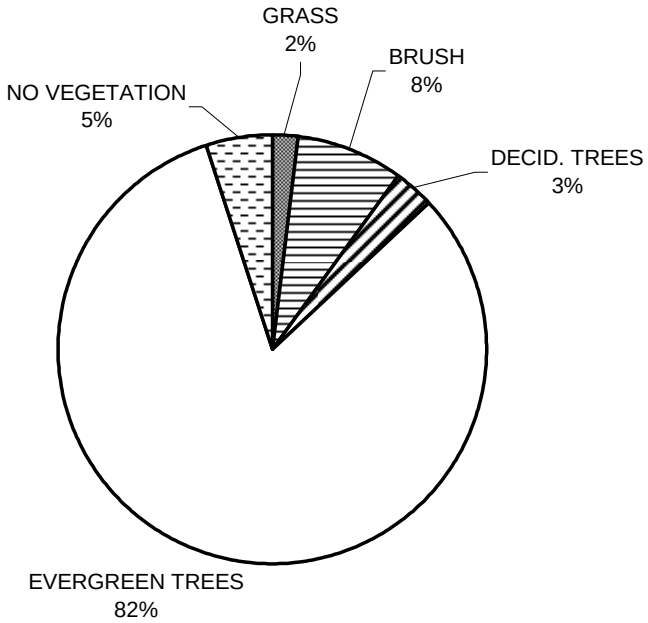
GRAPH 8

BEE TREE CREEK
DOMINANT BANK COMPOSITION IN SURVEY REACH



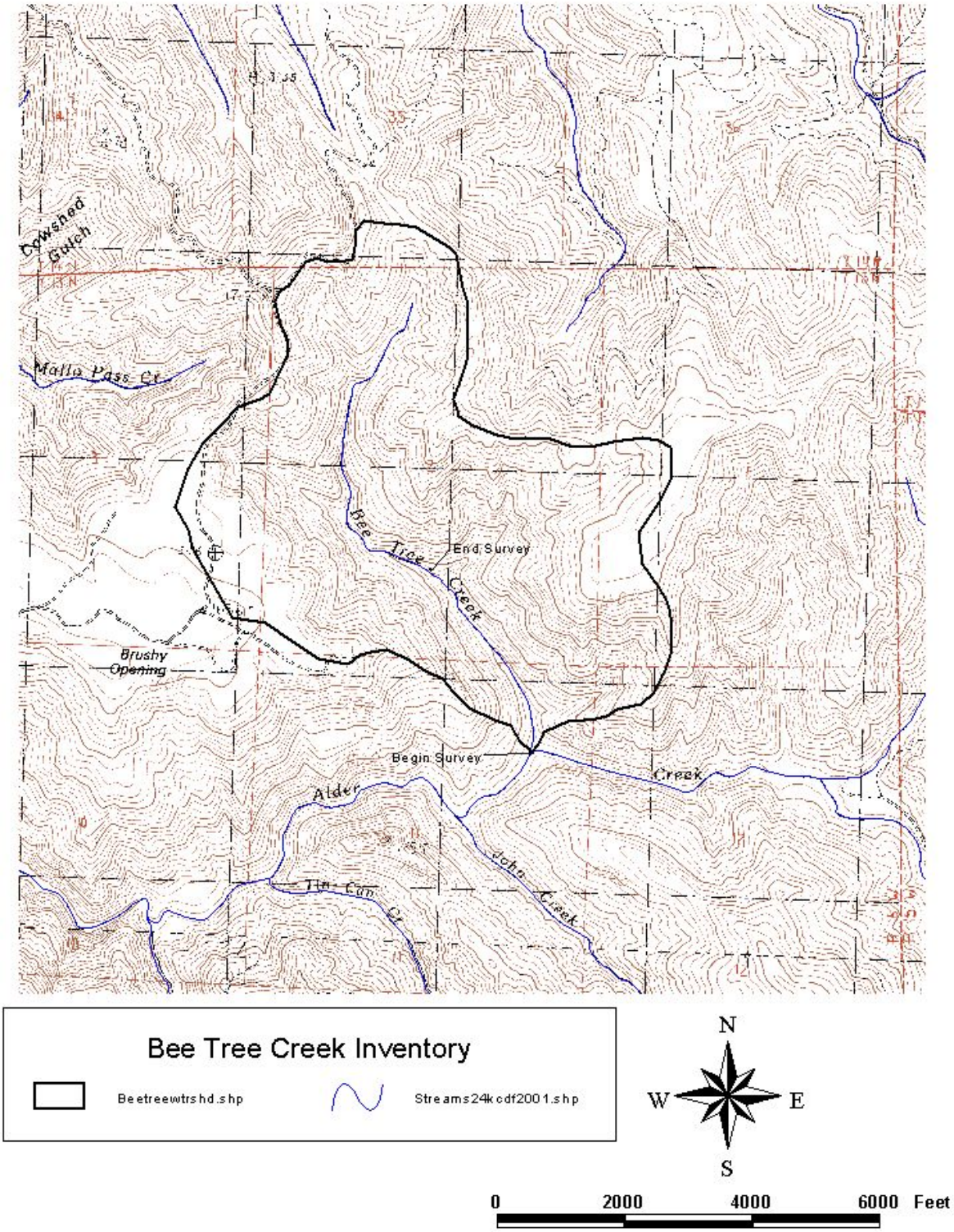
GRAPH 10

BEE TREE CREEK
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

Bee Tree Creek



MAP 1. Map of Bee Tree Creek showing the stream habitat inventory reach and watershed boundary.

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.