STREAM INVENTORY REPORT

John Creek

INTRODUCTION

A stream inventory was conducted beginning July 29 and ending July 30, 2003 on John Creek. The survey began at the confluence with Alder Creek and extended upstream 3,131 feet.

The John 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 John 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

John Creek is a tributary to Alder Creek, a tributary to the Pacific Ocean, located in Mendocino County, California (Map 1). John Creek's legal description at the confluence with Alder Creek is T13N R16W S11. Its location is 39°00′20″ north latitude and 123°35′59″ west longitude. John Creek is a first order stream and has approximately 12,339 feet of solid blue line stream and 2,826 feet of dashed blue line stream according to the USGS Cold Spring and Eureka Hill 7.5 minute quadrangles. John Creek drains a watershed of approximately 1.59 square miles. Elevations range from about 493 feet at the mouth of the creek to 1,853 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 Mountain View Road, south of Manchester. Follow Mountain View Road east to the 11 mile road marker. Follow Piper Ranch logging roads to the north and into the Alder Creek watershed.

METHODS

The habitat inventory conducted in John 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.

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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 John 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". John 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 John 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 John 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 John 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 John 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 John Creek. In addition, two sites were electrofished in 2002 by Mendocino Redwood Company Aquatic Biologists, using a Smith-Root Model 12 electrofisher. 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 John 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 29 to 30, 2003, was conducted by G. Trousdale (WSP/AmeriCorps) and J. Crews (DFG). The total length of the stream surveyed was 3,131 feet.

Stream flow was not measured on John Creek due to subsurface flow at the mouth.

John Creek is an F3 channel type for 2,359 feet and an A2 for 772 feet of the stream surveyed. F3 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and cobble-dominant substrates. A2 channels are steep, narrow, cascading, step-pool streams with high energy/debris transport associated with depositional soils, and boulder-dominant substrates.

Water temperatures taken during the survey period ranged from 59° to 61° Fahrenheit. Air temperatures ranged from 65° to 74° Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 43% pool units, 41% riffle units, and 14% flatwater units (Graph 1). Based on total length of Level II habitat types there were 49% riffle units, 28% flatwater units, and 19% pool units (Graph 2).

Nine Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low-gradient riffles, 35%; mid-channel pools, 19%; and lateral-scour boulder pools, 14% (Graph 3). Based on percent total length, low-gradient riffles made up 43%, glides 25%, and high-gradient riffles, mid-channel pools, step pools, and lateral-scour boulder pools, each at 6%.

A total of 16 pools were identified (Table 3). Main-channel pools were the most frequently encountered, at 63%, and comprised 66% 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. Eight of the 16 measured pools (50%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 16 pool tail-outs measured, 1 had a value of 1 (6%); 13 had a value of 2 (81%); 1 had a value of 3 (6%); 1 had a value of 4 (6%); and 1 had a value of 5 (6%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate.

Pool habitats types had a mean shelter rating of 62, flatwater habitat types had a mean shelter rating of 45, and riffle habitat types had a mean shelter rating of 43 (Table 1). Of the pool types, the main-channel pools had the highest mean shelter rating at 68. Scour- pools had a mean shelter rating of 52 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 88% of pool tail-outs while small cobble and boulders were the next most frequently observed substrate type, each at 6%.

The mean percent canopy density for the surveyed length of John Creek was 92%. The mean percentages of evergreen and deciduous trees were 82% and 10%, respectively with 8% of the canopy open. Graph 9 describes the mean percent canopy in John Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 41%. The mean percent left bank vegetated was 37%. The dominant elements composing the structure of the stream banks consisted of 84% sand/silt/clay, 9% bedrock, and 7% boulder (Graph 10). Coniferous trees were the dominant vegetation type observed in 91% of the units surveyed. Additionally, 5% of the units surveyed had brush as the dominant vegetation type, and 5% had deciduous trees as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

A backpack electrofisher survey was conducted at two locations on John Creek, by Mendocino Redwood Company, aquatic biologists, in the summer of 2002. All aquatic species were identified, lengths were taken of salmonids. Steelhead rainbow trout were the only salmonid species observed. Other species identified were yellow legged frogs (YLF), Pacific giant salamanders (PGS), and crayfish (CY) (Table A).

Site 89-10 produced six steelhead trout including five below 70 mm and one between 70-130 mm in length.

Site 89-11 produced four steelhead trout between 70-130 mm in length.

Table A. John Creek biological sampling data.

Date	Site	Species	<70 mm	70-130 mm	>130 mm	Other species
9/26/2002	89-10	SH	5	1	0	YLF, PGS, CY
9/26/2002	89-11	SH	0	1	0	YLF, PGS

DISCUSSION

John Creek is an F3 channel type for 2,359 feet and an A2 channel type for 772 feet of stream surveyed. The suitability of F3 channel types for fish habitat improvement structures is as follows: F3 channels are good for bank-placed boulders, single and opposing wing-deflectors; fair for plunge weirs, boulder clusters, channel constrictors, and log cover. A2 channels are

generally not suitable for fish habitat improvement structures.

The water temperatures recorded on the survey days ranged from 59° to 61° Fahrenheit. Air temperatures ranged from 65° to 74° Fahrenheit. Recorded water temperatures below 60° Fahrenheit are suitable for salmonids. In order 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.

Pool habitat types comprised 43% of the total length of this survey, riffles 41%, and flatwater 14%. The pools are relatively deep, with 8 of the 16 (50%) measured pools having a maximum depth greater than 2 feet.

One of the 16 pool tail-outs measured had embeddedness ratings of 1 or 2. Fourteen 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. Sediment sources in John Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Fourteen of the 16 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 45. The mean shelter rating for pools was 62. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by boulders in all habitat types. Additionally, large woody debris contributes a small amount. 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 92%. Reach 1 had a canopy density of 93% while Reach 2 had a canopy density of 92%.

The percentage of right and left bank covered with vegetation was low at 41% and 37%, 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) John Creek should be managed as an anadromous, natural production stream.

2) There are several log debris accumulations present on John 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.

3) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover is from boulders. Adding high quality complexity with log and root wad cover is desirable.

4) 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.

COMMENTS AND LANDMARKS

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

Position (ft.)	Habitat Unit#:	Comments:
0	0001	Start of survey, dry at mouth, within influence of Alder Creek.
130	0002	Salmonids observed.
204	0005	Large debris accumulation (LDA).
299	0006	LDA.
515	0010	Salmonids observed.
653	0012	Left bank tributary. Salmonids observed.
851	0014	1+ salmonid observed.
1486	0022	39°00'09.4" N, 123°35'46.1" W
2798	0033	39°00'02.3" N, 123°35'33.1" W. LDA.
2882	0035	5’ high plunge.
3131	0037	End of Survey: end of unit, boulder jam, 8' high jump, dry. Small trickle of water and a large log jam above. Waterfall, 20' high, 1500 feet upstream.

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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]	

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TABLES AND GRAPHS

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

Stream Name: John Creek Drainage: Point Arena

Survey Dates: 7/29/2003 to 7/30/2003

Confluence Location: Quad: COLD SPRING Legal Description: T13NR16WS11 Latitude: 39:00:20.0N Longitude: 123:35:59.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Percent 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
5	2	FLATWATER	13.5	173	864	27.6	9.0	0.7	1.6	617	3085	419	2096		45
1	0	NOSURVEY	2.7	130	130	4.2									
16	16	POOL	43.2	38	603	19.3	11.9	1.0	2.1	372	5951	457	7314	420	62
15	4	RIFFLE	40.5	102	1534	49.0	7.0	0.4	0.8	321	4808	159	2390		33

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
37	22	3131	13844.18	11800.34

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: John Creek Drainage: Point Arena

Survey Dates: 7/29/2003 to 7/30/2003

Confluence Location: Quad: COLD SPRING Legal Description: T13NR16WS11 Latitude: 39:00:20.0N Longitude: 123:35:59.0W

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 (%)
13	3	LGR	35.1	104	1350	43.1	7	0.3	1	309	4017	153	1992		23	93
2	1	HGR	5.4	92	184	5.9	8	0.5	1.5	355	710	178	355		60	90
4	1	GLD	10.8	193	771	24.6	10	0.8	1.6	490	1960	392	1568		30	86
1	1	SRN	2.7	93	93	3.0	8	0.6	1.6	744	744	446	446		60	95
7	7	MCP	18.9	29	200	6.4	13	1.3	3.8	347	2429	569	3984	534	66	93
3	3	STP	8.1	65	195	6.2	12	1.1	3.3	553	1660	609	1828	554	70	92
1	1	LSBk	2.7	31	31	1.0	8	0.8	1.4	236	236	212	212	188	10	89
5	5	LSBo	13.5	35	177	5.7	11	0.7	2.4	325	1627	258	1290	225	60	91
1	0	NS	2.7	130	130	4.2										95

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
37	22	3131	13382.27	11676.15

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Table 3 - Summary of Pool Types

Stream Name: John Creek Drainage: Point Arena

Survey Dates: 7/29/2003 to 7/30/2003

Confluence Location: Quad: COLD SPRING Legal Description: T13NR16WS11 Latitude: 39:00:20.0N Longitude: 123:35:59.0W

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
10	10	MAIN	63	40	395	66	12.6	1.2	409	4088	540	5403	68
6	6	SCOUR	38	35	208	34	10.8	0.7	311	1863	219	1316	52

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
16	16	603	5951.3	6719.04

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

Stream Name: John Creek Drainage: Point Arena

Survey Dates: 7/29/2003 to 7/30/2003

Confluence Location: Quad: COLD SPRING Legal Description: T13NR16WS11 Latitude: 39:00:20.0N Longitude: 123:35:59.0W

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
7	MCP	44	0	0	3	43	2	29	2	29	0	0
3	STP	19	0	0	1	33	1	33	1	33	0	0
1	LSBk	6	0	0	1	100	0	0	0	0	0	0
5	LSBo	31	0	0	3	60	2	40	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
16	0	0	8	50	5	31	3	19	0	0

Mean Maximum Residual Pool Depth (ft.): 2.1

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Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: John Creek Drainage: Point Arena
Survey Dates: 7/29/2003 to 7/30/2003 Dry Units: 0
Confluence Location: Quad: COLD SPRING Legal Description: T13NR16WS11 Latitude: 39:00:20.0N Longitude: 123:35:59.0W

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
13	3	LGR	0	10	23	0	0	0	0	33	0
2	1	HGR	10	0	0	0	0	0	20	70	0
15	4	TOTAL RIFFLE	3	8	18	0	0	0	5	43	0
4	1	GLD	0	20	0	80	0	0	0	0	0
1	1	SRN	0	0	0	0	0	0	30	70	0
5	2	TOTAL FLAT	0	10	0	40	0	0	15	35	0
7	7	MCP	27	12	52	1	2	0	0	6	0
3	3	STP	10	7	0	0	0	0	8	75	0
1	1	LSBk	0	0	0	0	0	0	0	100	0
5	5	LSBo	17	13	10	0	0	0	0	58	2
16	16	TOTAL POOL	19	11	26	0	1	0	2	41	1
1	0	NS									
37	22	TOTAL	14	10	22	4	1	0	3	41	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: John Creek Drainage: Point Arena
Survey Dates: 7/29/2003 to 7/30/2003 Dry Units: 0
Confluence Location: Quad: COLD SPRING Legal Description: T13NR16WS11 Latitude: 39:00:20.0N Longitude: 123:35:59.0W

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
13	3	LGR	0	0	33	33	0	33	0
2	1	HGR	0	0	0	0	0	100	0
4	1	GLD	0	100	0	0	0	0	0
1	1	SRN	0	0	0	0	0	100	0
7	7	MCP	0	86	14	0	0	0	0
3	3	STP	0	0	0	67	0	33	0
1	1	LSBk	0	0	100	0	0	0	0
5	5	LSBo	0	60	20	0	0	20	0

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Table 8 - Fish Habitat Inventory Data Summary

Stream Name: John Creek | Drainage: Point Arena

Survey Dates: 7/29/2003 to 7/30/2003 | Survey Length (ft.): 3131 | Main Channel (ft.): 3131 | Side Channel (ft.): 0

Confluence Location: Quad: COLD SPRING | Legal Description: T13NR16WS11 | Latitude: 39:00:20.0N | Longitude: 123:35:59.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: F3	Canopy Density (%): 93	Pools by Stream Length (%): 19
Reach Length (ft.): 2359	Coniferous Component (%): 85	Pool Frequency (%): 44
Riffle/Flatwater Mean Width (ft.): 9.0	Deciduous Component (%): 15	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Evergreen Trees	< 2 Feet Deep: 50
Range (ft.): 14 to 19	Vegetative Cover (%): 52	2 to 2.9 Feet Deep: 33
Mean (ft.): 17	Dominant Shelter: Large Woody Debris	3 to 3.9 Feet Deep: 17
Std. Dev.: 2	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 32	Mean Max Residual Pool Depth (ft.): 2.0
Water (F): 59 - 61 Air (F): 65 - 70	LWD per 100 ft.:	Mean Pool Shelter Rating: 54
Dry Channel (ft): 0	Riffles: 1	
	Pools: 4	
	Flat: 0	

Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 83 Sm Cobble: 8 Lg Cobble: 0 Boulder: 8 Bedrock: 0

Embeddedness Values (%): 1. 0 2. 0 3. 83 4. 8 5. 8

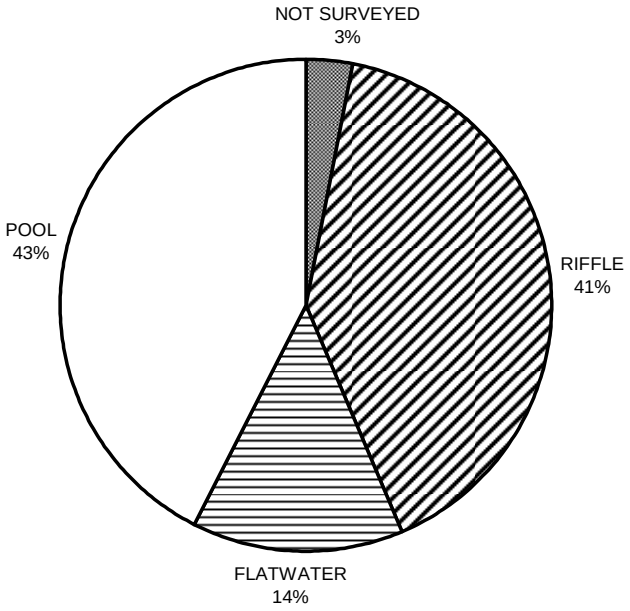
STREAM REACH: 2

Channel Type: A2	Canopy Density (%): 92	Pools by Stream Length (%): 21
Reach Length (ft.): 772	Coniferous Component (%): 99	Pool Frequency (%): 40
Riffle/Flatwater Mean Width (ft.): 6.3	Deciduous Component (%): 1	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Evergreen Trees	< 2 Feet Deep: 50
Range (ft.): 14 to 19	Vegetative Cover (%): 48	2 to 2.9 Feet Deep: 25
Mean (ft.): 17	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 25
Std. Dev.: 3	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 1	Mean Max Residual Pool Depth (ft.): 2.3
Water (F): 60 - 61 Air (F): 65 - 74	LWD per 100 ft.:	Mean Pool Shelter Rating: 85
Dry Channel (ft): 0	Riffles: 1	
	Pools: 7	
	Flat: 0	

Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 100 Sm Cobble: 0 Lg Cobble: 0 Boulder: 0 Bedrock: 0

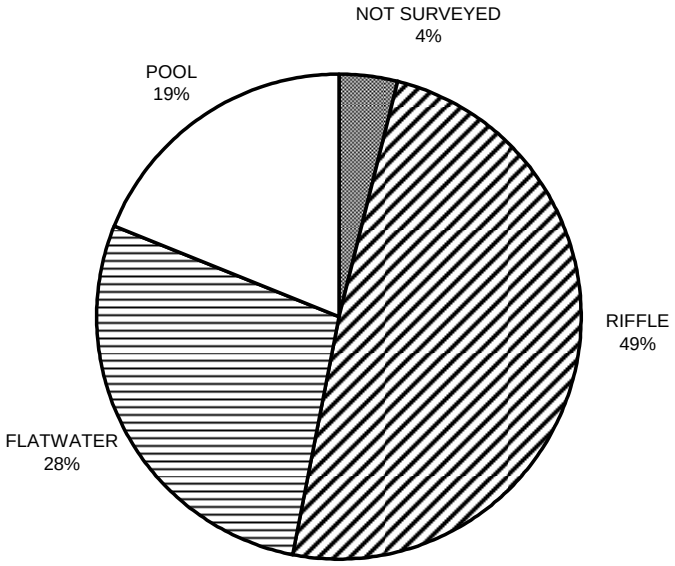
Embeddedness Values (%): 1. 0 2. 25 3. 75 4. 0 5. 0

JOHN CREEK
HABITAT TYPES BY PERCENT OCCURRENCE



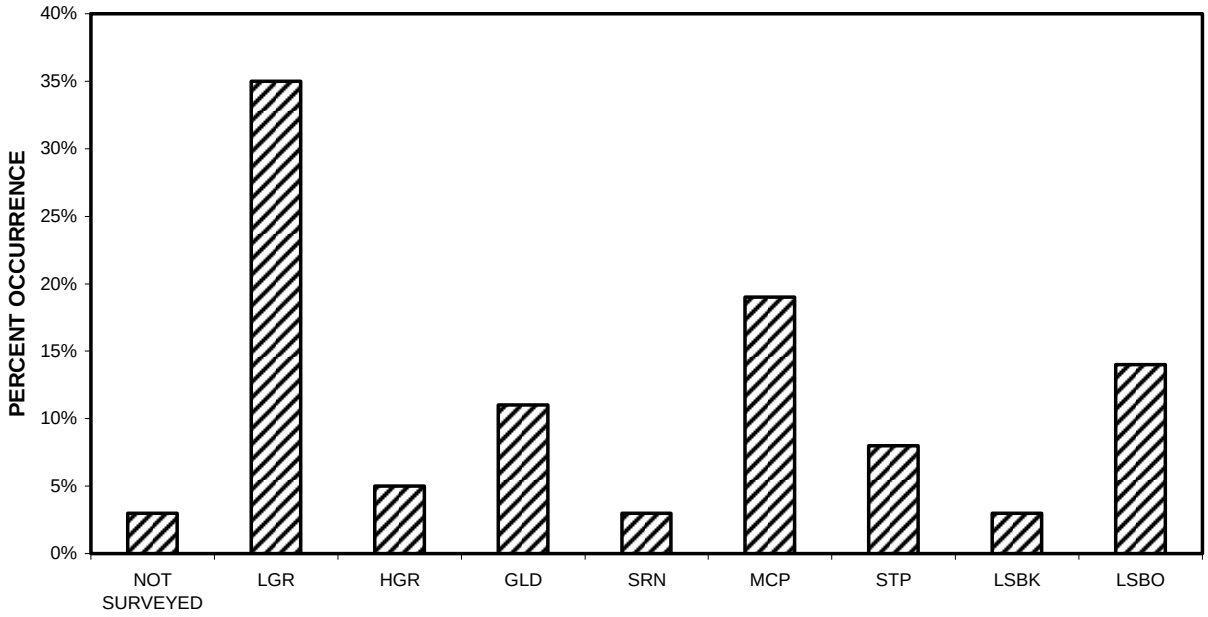
GRAPH 1

JOHN CREEK
HABITAT TYPES BY PERCENT TOTAL LENGTH



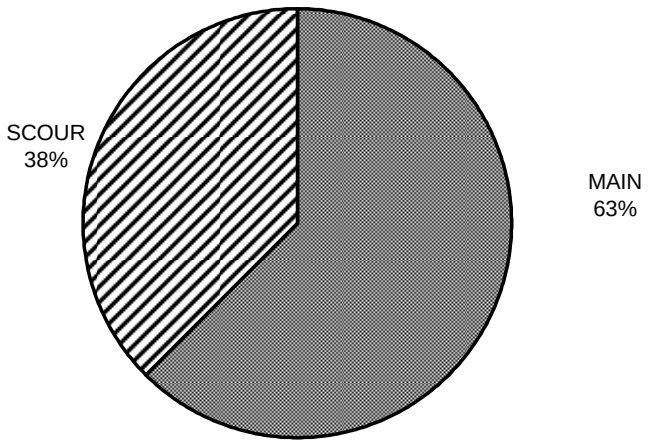
GRAPH 2

JOHN CREEK
HABITAT UNIT TYPES BY PERCENT OCCURRENCE

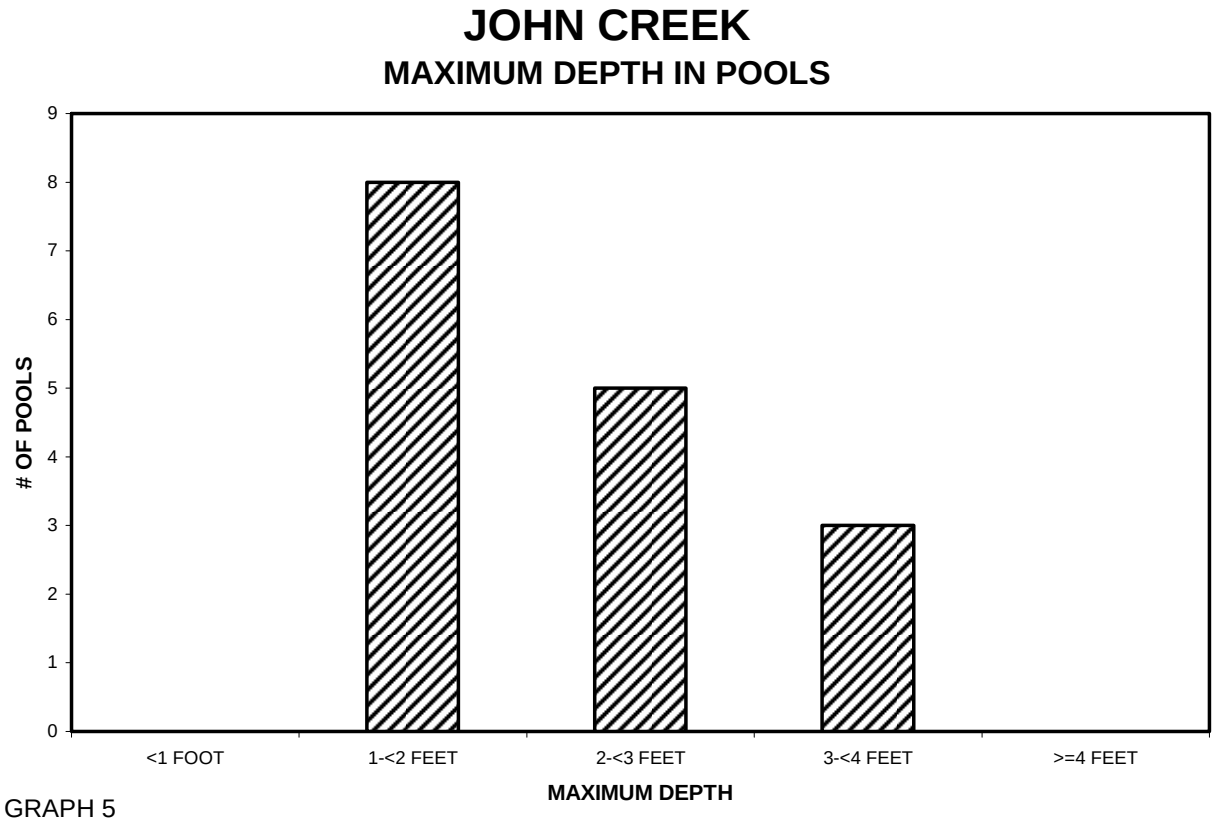


GRAPH 3

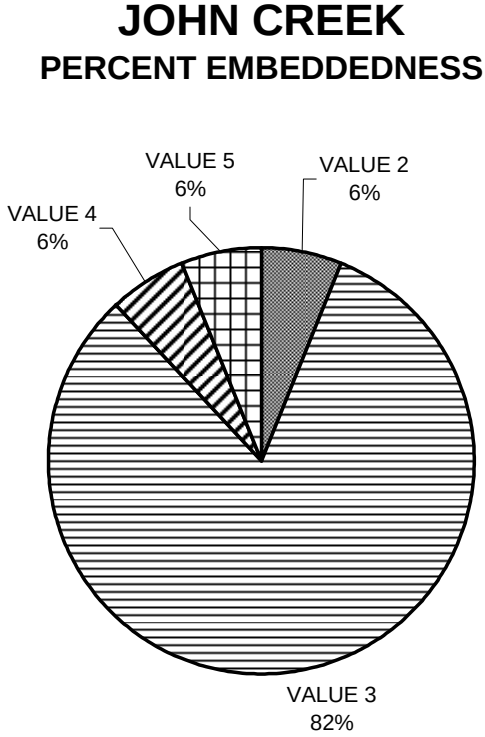
JOHN CREEK
POOL HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 4

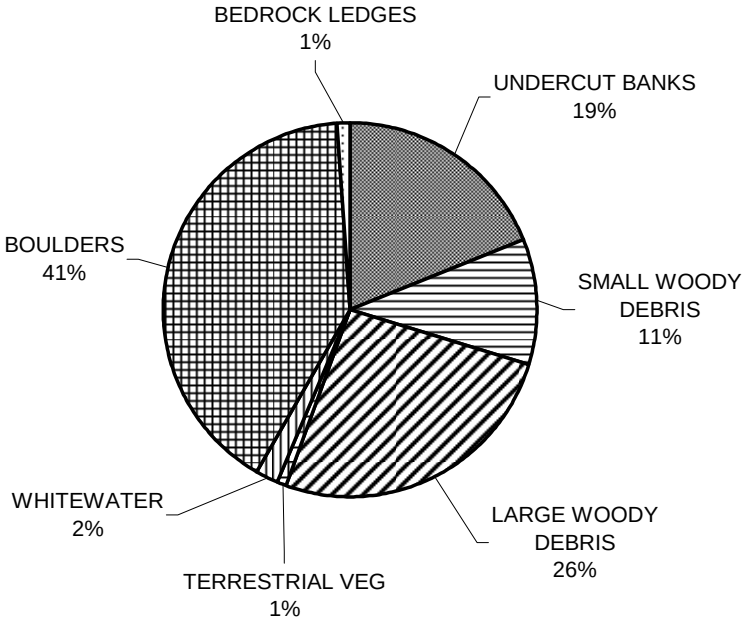


GRAPH 5



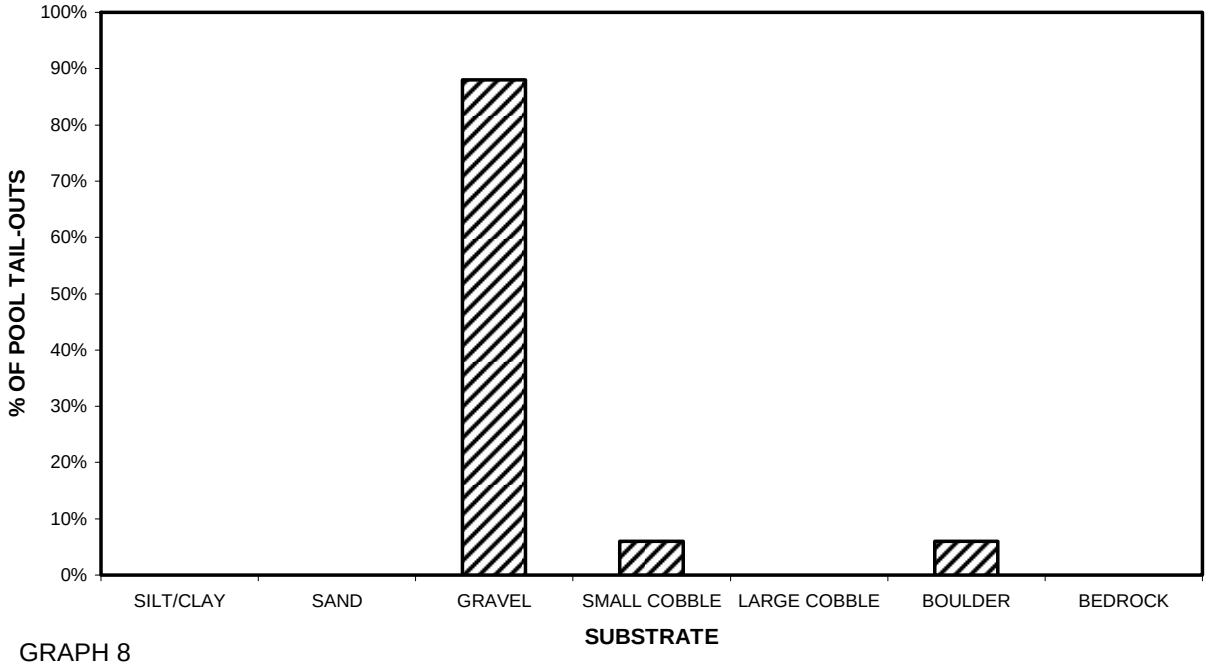
GRAPH 6

JOHN CREEK
MEAN PERCENT COVER TYPES IN POOLS



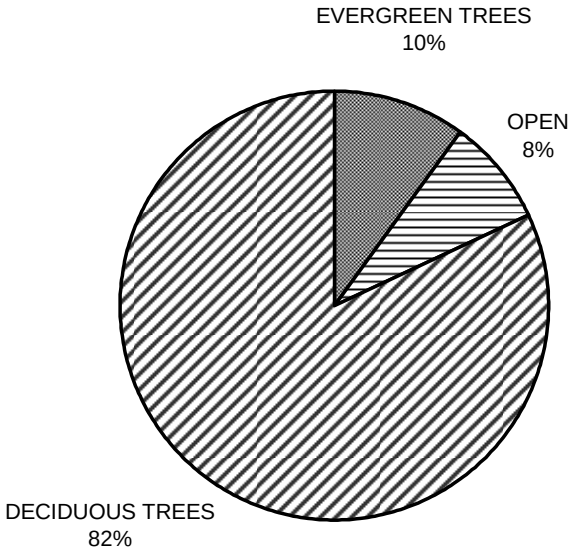
GRAPH 7

JOHN CREEK
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



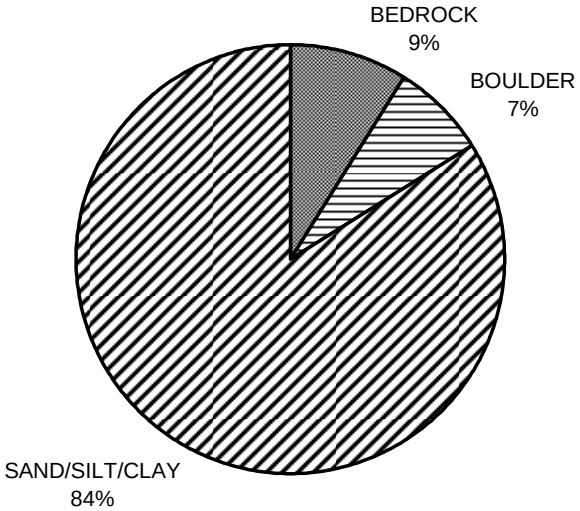
GRAPH 8

JOHN CREEK
MEAN PERCENT CANOPY



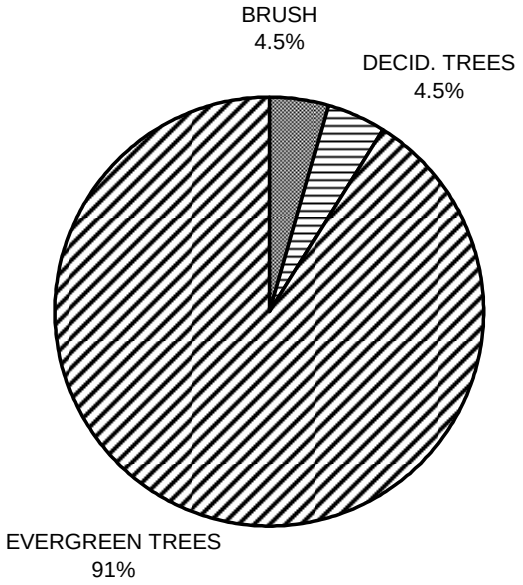
GRAPH 9

JOHN CREEK
DOMINANT BANK COMPOSITION IN SURVEY REACH

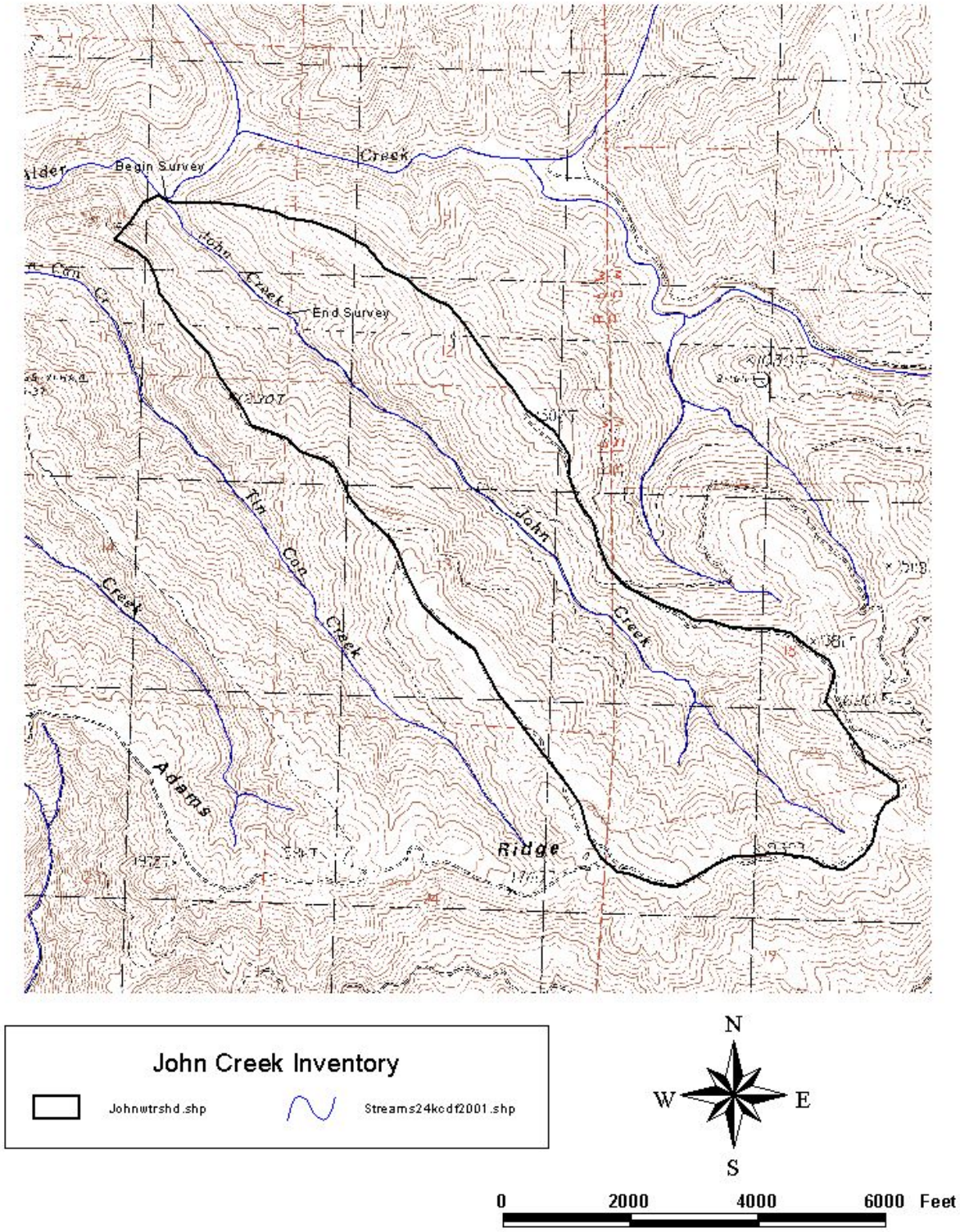


GRAPH 10

JOHN CREEK
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11



MAP 1. Map of John 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.