

Stream Inventory Report

Fay Creek

Salmon Creek Watershed
Sonoma County, California

Survey: Summer 2002
Final Report: September, 2004
Revised May 2007

California Department of Fish and Game
Central Coast Region
Watershed Restoration Program



2003
CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT
Fay Creek

INTRODUCTION

A stream inventory was conducted during the summer of 2002 on Fay Creek a tributary to Salmon Creek in the Salmon Creek watershed. The inventory was conducted in two parts: habitat inventory and biological inventory. The objective of the habitat inventory was to document the amount and condition of available habitat to fish, and other aquatic species with an emphasis on anadromous salmonids in Fay Creek. The objective of the biological inventory was to document the salmonid and other aquatic species present and their distribution.

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

WATERSHED OVERVIEW

Fay Creek is located in Sonoma County, California and is a tributary to Salmon Creek. The legal description at the confluence with Salmon Creek is T6N R10W Section Bodega. Its location is 38°21'28.9"N latitude and 122°59'59.95"W longitude. Fay Creek and its tributaries drain a basin of approximately 3.13 square miles. Fay Creek is a maximum first order stream and has approximately 4 miles of blue line or dashed blue line stream, according to the USGS Valley Ford/Bodega Head 7.5 minute quadrangles. Fay Creek has 4 minor unnamed tributaries, which were not surveyed. Elevations range from about 50' at the mouth of the creek to 750' in the headwaters. Mixed hardwood forest dominates the watershed. The watershed is primarily privately owned and is managed for rangeland/recreation. Vehicle access exists via Salmon Creek Road via Bodega Highway near the town of Bodega.

Salmonid fish species historically present include coho salmon(*Oncorhynchus kisutch*) and steelhead trout(*Oncorhynchus mykiss*). Salmonid fish currently present include steelhead trout(*Oncorhynchus mykiss*,) listed as threatened on the federal endangered species lists.

METHODS

The habitat inventory conducted in Fay Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi, et al., 1998). The California Department of Fish and Game (DFG) field crew that conducted the inventory was trained in standardized habitat inventory methods by DFG. This inventory was conducted by 2 person teams and was supervised by DFG's North Bay Watershed Restoration Planner, Gail Seymour.

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 within each reach are measured for all the parameters and characteristics on the data field form. Additionally, out of each of the ten habitat units, 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 Fay Creek to record measurements and observations. There are nine components to the inventory form: flow, channel type, temperatures, habitat type, embeddedness, shelter rating, substrate composition, canopy, and bank composition.

1. Flow:

Flow is measured in cubic feet per second (cfs) at the bottom of the stream survey reach using standard flow measuring equipment, if available. In some cases flows are estimated. Flows were also measured or estimated at major tributary confluences.

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:

Water and air temperatures, and time, are measured by crew members with hand held thermometers and recorded at each tenth unit typed. Temperatures are measured in 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. Fay 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 were in feet to the nearest tenth. All measurements are in feet to the nearest tenth. Habitat characteristics are measured using a hip chain, and stadia rod.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out reaches is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Fay 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), 76 - 100% (value 4). Additionally, a rating of "not suitable" (value 5) was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate particle size, having a bedrock tail-out, 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. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All shelter is then classified according to a list of nine shelter types. In Fay Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the shelter. The shelter rating is calculated for each habitat unit by multiplying shelter value and percent covered. 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 measured habitat units, dominant and sub-dominant substrate elements were ocularly estimated using a list of seven size classes which are defined in the California Salmonid Stream Habitat Restoration Manual.

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densimeters as described in the California Salmonid Stream Habitat Restoration Manual. Canopy density relates to the amount of stream shaded from the sun. In Fay Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the top 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 Fay Creek, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully measured 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 stream inventory is used to determine fish species and their distribution in the stream. Biological inventory is conducted using one or more of four basic methods: 1) stream bank observation, 2) underwater observation, 3) electro fishing, or 4) seine netting. Methods 1-3 are discussed in the California Salmonid Stream Habitat Restoration Manual. Seine netting is a fish capture technique that involves the use of a one meter square net attached to dowels on two parallel sides. The surveyor pushes the seine through the habitat unit to catch aquatic organisms. At the end of the unit the surveyor scoops up the seine and places all captured organisms in a bucket partially filled with stream water for holding. The water is aerated with a bubbler to maintain dissolved oxygen levels and minimize stress on the organisms. All fish, amphibians, and reptiles

in the holding bucket are identified to species, counted and returned to the stream. Data is recorded on an electrofishing field form. Seine netting is used to confirm the presence of a species, particularly salmon and steelhead, and is not intended to quantify a population estimate.

IMPACT INVENTORY & ANALYSIS

Problems such as migration barriers, streambed erosion, poor water quality or temperatures are noted in the comments and landmarks section. In some cases measurements are taken, an analysis of what caused the problem is made and restoration potential and alternatives are recommended.

DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat for data storage and analysis. Habitat is a Visual Basic extension to Microsoft Access, developed by Zebulon Young, University of California, Berkeley. This program processes and summarizes the data, and produces the following tables and appendices:

- 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 Fay 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

HISTORICAL STREAM SURVEYS:

The Department of Fish and Game has not conducted previous surveys of

Fay Creek.

HABITAT INVENTORY RESULTS FOR FAY CREEK

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

The habitat inventory of Fay Creek, 9/19/2002 - 9/21/2002, was conducted by Amy Livingston and Douglas Mitchel with supervision and analysis by California Department of Fish and Game (DFG). The survey began at the confluence with Salmon Creek and extended up Fay Creek to the end of anadromous fish passage at a rock falls. The total length of stream surveyed was 10,227 feet, with 0 feet of side channel.

Flows were not measured on Fay Creek.

The surveyed section of Fay Creek has two reaches with two distinct channel types: from the mouth to 9,334 feet an **F4** and 9,334 to 10,227 feet an **A2**.

F4 channel types are entrenched meandering riffle/pool channels on low gradients (<2%) with a high width/depth ratio and a predominantly gravel substrate.

A2 channel types are steep (4-10%), narrow, cascading, step-pool streams with a high energy/debris transport associated with depositional soils and a predominantly boulder substrate. Water temperatures ranged from 52°F to 59°F. Air temperatures ranged from 49°F to 78°F.

Water temperatures on the survey days ranged from 48°F to 52°F. Air temperatures ranged from 49°F to 78°F.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 40.3% Flatwater units, 33.0% Dry units, 22.3% Pool units and 4.4% Riffle units (Graph 1). Based on total **length** there were 50.8% Dry units, 31.1% Flatwater units, 16.1% Pool units and 2.0% Riffle units (Graph 1).

Two-hundred and seven habitat units were measured and 21% were completely sampled. 15 Level IV habitat types were identified. The data is summarized in Table 2. The most frequent habitat types by percent **occurrence** were Dry at 33%, Glide at 29%, Run at 10%, Lateral Scour Pool - Root Wad Enhanced at 9%, Mid-Channel Pool at 8%, Low Gradient Riffle at 3%, Step Run at 2%, Corner Pool at 1%, Lateral Scour Pool - Log Enhanced at 1%, Lateral Scour Pool - Boulder Formed at 1%, Lateral Scour Pool - Bedrock Formed at 1%, and Cascade at 1% (Graph 3). By percent total **length**, Dry at 51%,

Glide at 20%, Run at 8%, Lateral Scour Pool - Root Wad Enhanced at 7%, Mid-Channel Pool at 6%, Step Run at 3%, Corner Pool at 1%, Low Gradient Riffle at 1%, Lateral Scour Pool - Log Enhanced at 1%, Lateral Scour Pool - Bedrock Formed at 1%, and Culvert at 1%.

Forty-six pools were identified (Table 3). Lateral Scour Pool - Root Wad Enhanced pools were most often encountered at 9% of all habitat types (Table 2), and comprised 44% of the total length of pools.

Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Thirty four of the 46 pools (74%) had a depth of two feet or greater (Graph 5). These deeper pools comprised 13% of the total length of stream habitat.

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. Riffles rated 4, Flatwater units rated 1 and Pools rated 13 (Table 1). Of the pool types, Lateral Scour Pool - Log Enhanced rated 73, Lateral Scour Pool - Root Wad Enhanced rated 17, Corner Pool rated 7, Mid-Channel Pool rated 6 and Lateral Scour Pool - Boulder Formed rated 8 (Table 2).

Table 5 summarizes fish shelter by habitat type. By percent area, the dominant pool shelter types were Root Mass at 33%, Undercut Banks at 23%, Large Wood at 14%, Boulders at 14%, Small Wood at 12%, Terrestrial Vegetation at 2%, and Aquatic Vegetation at 2%. Graph 7 describes the pool shelter in Fay Creek.

Table 6 summarizes the dominant substrate by habitat type. In the one Low-Gradient Riffles surveyed, the dominant substrate was gravel.

The depth of cobble embeddedness was estimated at pool tail-outs. Of the forty six pool tail-outs measured, two had a value of 1 (4%), twenty two had a value of 2 (48%), five had a value of 3 (11%) and one had a value of 4 (2%). Sixteen (35%) riffles rated a 5 (unsuitable substrate type for spawning). On this scale, a value of one is best for fisheries. Gravel was the dominant substrate observed at pool tail-outs (Graph 8). Graph 6 describes percent embeddedness by reach. No mechanical gravel sampling was conducted in 2002 surveys due to inadequate staffing levels.

The mean percent canopy density for the stream reach surveyed was 93%. The mean percentages of deciduous and evergreen trees were 79% and 21%, respectively. Graph 9 describes the canopy for the entire survey and Table 7 describes the mean percent of vegetative cover for the entire surveyed stream.

For the entire stream reach surveyed, the mean percent right bank vegetated was 33% and the mean percent left bank vegetated was 36% (Table 7). For the habitat units measured, the dominant vegetation types for the stream banks were: 56% Deciduous Trees, 19% Brush, 17% Bare Soil, 7% Evergreen Trees and 1% Grass (Graph 11). The dominant substrate for the stream banks were: 55% Silt, Clay & Sand, 20% Cobble & Gravel, 15% Boulder and 10% Bedrock (Graph 10).

BIOLOGICAL INVENTORY

JUVENILE SURVEYS:

Department of Fish and Game has conducted previous biological inventories of Fay Creek and there are not records of hatchery releases or fish rescues in the Salmon Creek watershed. A biological inventory was not conducted in 2002, although during the stream habitat inventory surveyors observed many juvenile steelhead as well as other fish including stickleback and sculpin.

Historic Biological Surveys Summaries

In September, 2001, Bill Cox (DFG) conducted a biological survey in three reaches of Fay Creek. The focus was to determine coho salmon presence/absence. The creek was split into three reaches and ten pools per reach were electrofished using DFG's "10 Pool" Protocol.

Species Observed in Recent Surveys			
YEARS	SPECIES	SOURCE	NATIVE/ INTRODUCED
2001	STEELHEAD TROUT (<i>Oncorhynchus mykiss</i>)	DFG	N
2001	SCULPIN OR COTTOIDS (<i>Cottus sp.</i>)	DFG	N

Species Observed in Recent Surveys			
YEARS	SPECIES	SOURCE	NATIVE/ INTRODUCED
2001	THREESPINE STICKLEBACK (Gasterosteus aculeatus williamsoni)	DFG	N

DISCUSSION FOR FAY CREEK

Fay Creek has two reaches: The mouth to 9,334 feet, an **F4** and 9,334 feet to 10,227 feet an **A2**.

There are 9,334 feet of **F4** channel type in Reach 1. According to the DFG Salmonid Stream Habitat Restoration Manual, F4 channel types are good for bank-placed boulders and fair for low-stage weirs, single and opposing wing-deflectors, channel constrictors and log cover. Many site specific projects can be designed within this channel type, especially to increase pool frequency, volume and shelter. Any work considered will require careful design, placement, and construction that must include protection for any unstable banks.

There are 893 feet of **A2** channel type in Reach 2. According to the DFG Salmonid Stream Habitat Restoration Manual, the high energy, steep gradient A1/2 channel types have stable stream banks and poor gravel retention capabilities and are generally not suitable for instream enhancement structures.

The water temperatures recorded on the survey days 9/19/2002 - 9/21/2002 ranged from 52°F to 59°F. Air temperatures ranged from 49°F to 78°F. The warmest water temperatures were recorded in Reach 2. This temperature regime is favorable to salmonids. To make any further conclusions, temperatures need to be monitored for a longer period of time through the critical summer months.

Pools comprised 16% of the total length of this survey. 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. In Fay Creek, the pools are relatively deep with 74% having a maximum depth of at least two feet. These pools comprised 13% of the total length of stream habitat. In coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total habitat length.

The mean shelter rating for pools was 17. A pool shelter rating of approximately 80 is desirable. The relatively small amount of

pool shelter that now exists is being provided primarily by Root Mass at 33%, Undercut Banks at 23%, Large Wood at 14%, Boulders at 14%, Small Wood at 12%, Terrestrial Vegetation at 2%, and Aquatic Vegetation at 2%. Log and root wad cover in the pool and flatwater habitats would improve both summer and winter salmonid habitat. Log cover provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density-related competition.

One of the 1 low gradient riffles measured (100%) had either gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

Thirteen percent of the pool tail-outs measured had embeddedness ratings of either 3 or 4. Only 4% had a rating of 1. Cobble embeddedness measured to be 25% or less (a rating of 1) is considered best for the needs of salmon and steelhead. In a reach comparison, Reach 1 had the best rating and Reach 2 had the poorest rating.

The higher the percent of fine sediment, the lower the probability that eggs will survive to hatch. This is due to the reduced quantity of oxygenated water able to percolate through the gravel, or because of fine sediment capping the redd and preventing fry emergence. In Fay Creek both reaches should be mapped and rated according to their potential sediment yields, and control measures taken.

The mean percent canopy for the survey was 92%. This is very good, since 80 percent is generally considered desirable, however, Reach 1 had occurrences of bank erosion problems. This reach as well as other sites with bank erosion could benefit from bio-technical revegetation techniques using native species.

GENERAL MANAGEMENT RECOMMENDATIONS

Fay Creek should be managed as an anadromous, natural production stream.

Winter storms often bring down large trees and other woody debris into the stream, which increases the number and quality of pools. This woody debris, if left undisturbed, will provide fish shelter and rearing habitat, and offset channel incision. Efforts to increase flood protection or improve fish access in the short run, have led to long term problems in the system. Landowners should be sensitive about the natural and positive role woody debris plays in the system, and encouraged not to remove woody debris from the stream, except under extreme buildup and only under guidance by a fishery professional.

PRIORITY FISHERY ENHANCEMENT OPPORTUNITIES

- 1) Where feasible, design and engineer pool enhancement structures to increase the number of pools in the upper reaches. This must be done in conjunction with stream bank armor to prevent erosion (Reach 1).
- 2) Where feasible, increase woody cover in the pool and flatwater habitat units along the entire stream. Most of the existing shelter is from rootmass and boulders banks. Adding high quality complexity with larger woody cover is desirable. Combination cover/scour structures constructed with boulders and woody debris would be effective in many flatwater and pool locations in Reach 1. This must be done in conjunction with stream bank armor to prevent erosion. In some areas the material is at hand.
- 3) Fay creek would benefit from the utilization of bio-technical vegetative techniques (to re-establish floodplain benches and a defined low-flow channel). This would discourage lateral migration of the base flow channel and decrease bank erosion.
- 4) Map sources of upslope and in-channel 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. Near-stream riparian planting along any portion of the stream should be encouraged to provide bank stability and a buffering against agricultural, grazing and urban runoff.
- 5) Increase bank stability and canopy on Fay Creek by planting willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels. The non-anadromous reach above the survey section should be assessed for planting and treated as well, since water temperatures throughout are effected from upstream. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.
- 6) In Fay Creek, active and potential sediment sources related to the road system need to be mapped and treated according to their potential for sediment yield to the stream and its tributaries.
- 7) Conduct gravel sampling in Reach 1. Results of future sampling may indicate the need for structures to decrease channel incision and recruit, trap, sort, and expand redd distribution in the stream.

COMMENTS AND LANDMARKS

The following landmarks and possible problem sites were noted. All locations (footage) are approximate and taken from the beginning of

the survey.

0'	Begin survey at confluence with Salmon Creek. Channel type is F4.
438'	Creek passes through 55 foot long culvert.
875'	Juvenile salmonids observed.
983'	Erosion on right bank.
1,249'	Juvenile salmonids observed.
1431'	Concrete drainage pipe on left bank.
1,595'	Restoration project: willow wall.
1,745'	Salmonids observed, one and two plus.
1,868'	Unnamed tributary enters from bank, dry at time of survey.
2,175'	Restoration project.
2,238'	Salmonids observed, one plus.
2,493'	Bridge crossing.
3,017'	Juvenile salmonids observed.
4,388'	Erosion, contributing sediment.
5,698'	Fitzpatrick Lane bridge
5,900'	Two springs in unit.
5,928'	Juvenile salmonids observed.
6,029'	Erosion, steep bank.
6,615'	Unnamed tributary enters from left bank, extremely steep. Spring present.
6,656'	Juvenile salmonids observed.
6,727'	Erosion on right bank.
7'190'	Erosion on right bank.
7,569'	Dry unnamed tributary enters from right bank,

highly entrenched. Dry at time of survey.

8,102' Erosion on left bank, contributing sediment.

8,692' Unnamed tributary enters from left bank. Dry at time of survey.

8,866' Erosion on right bank.

9,269' Erosion right bank.

9,334' Channel changes from F4 channel type to A2 channel type.

9,660' Unnamed tributary enters from left bank. Dry at time of survey.

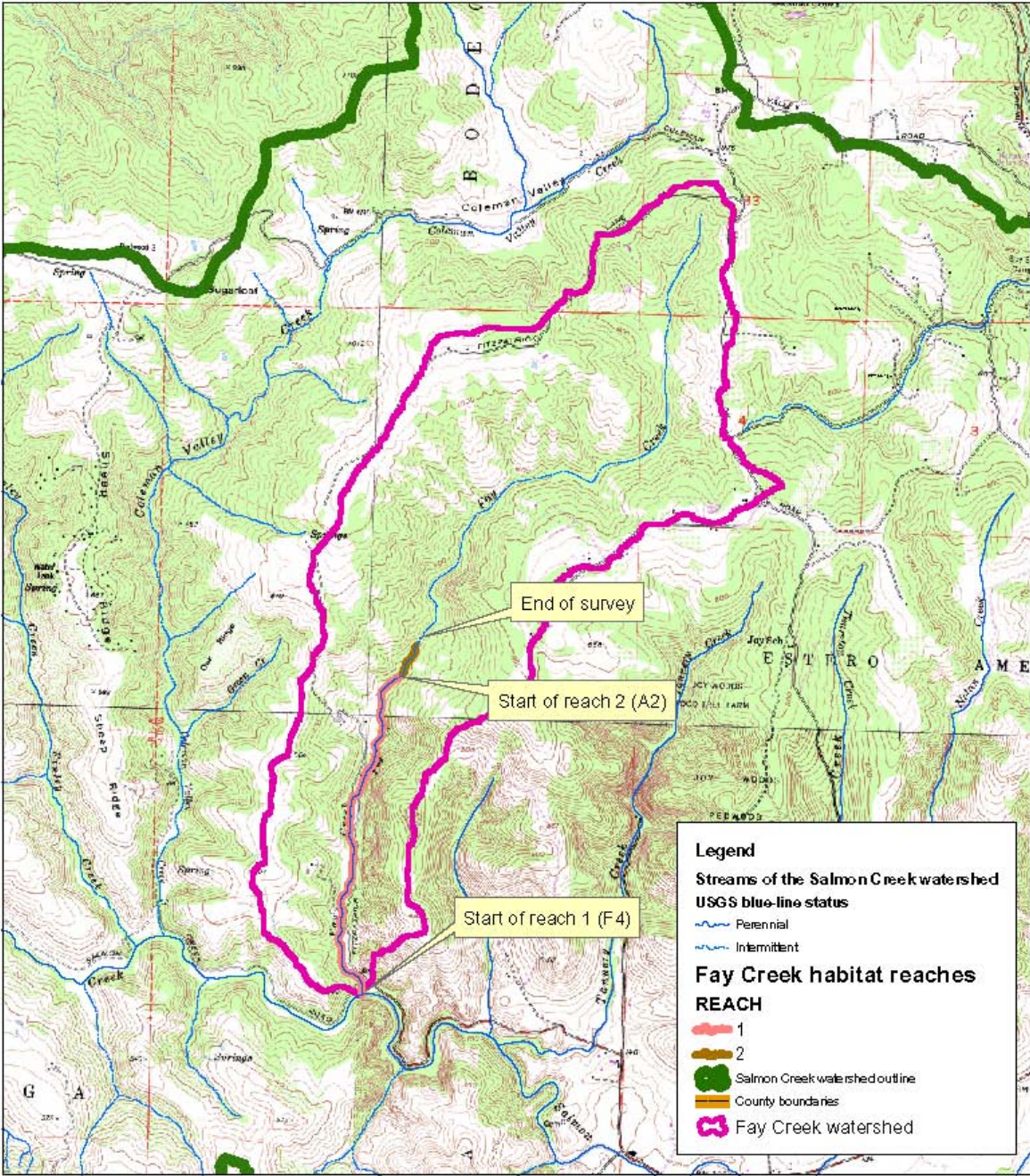
10,227' End of Survey due to potential barrier. Surveyed 300' above barrier; A2 Channel type; no fish present.

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.



Fay Creek habitat survey Survey conducted 2002



Legend

**Streams of the Salmon Creek watershed
USGS blue-line status**

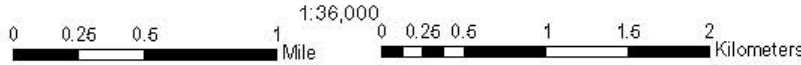
- Perennial
- Intermittent

Fay Creek habitat reaches

REACH

- 1
- 2

- Salmon Creek watershed outline
- County boundaries
- Fay Creek watershed



Map by C.Boots, 9-14-2004
 L:/monda3/data/carey2/aic/regions/projects/
 fay_2002_habitata.mxd
 IHRMP North Coast GIS Lab
 http://hoiland.uchicago.org

LEVEL III and LEVEL IV HABITAT TYPE KEY:

HABITAT TYPE	LETTER	NUMBER
RIFFLE		
Low Gradient Riffle	[LGR]	1.1
High Gradient Riffle	[HGR]	1.2
CASCADE		
Cascade	[CAS]	2.1
Bedrock Sheet	[BRS]	2.2
FLATWATER		
Pocket Water	[POW]	3.1
Glide	[GLD]	3.2
Run	[RUN]	3.3
Step Run	[SRN]	3.4
Edgewater	[EDW]	3.5
MAIN CHANNEL POOLS		
Trench Pool	[TRP]	4.1
Mid-Channel Pool	[MCP]	4.2
Channel Confluence Pool	[CCP]	4.3
Step Pool	[STP]	4.4
SCOUR POOLS		
Corner Pool	[CRP]	5.1
Lateral Scour Pool - Log Enhanced	[LSL]	5.2
Lateral Scour Pool - Root Wad Enhanced	[LSR]	5.3
Lateral Scour Pool - Bedrock Formed	[LSBk]	5.4
Lateral Scour Pool - Boulder Formed	[LSBo]	5.5
Plunge Pool	[PLP]	5.6
BACKWATER POOLS		
Secondary Channel Pool	[SCP]	6.1
Backwater Pool - Boulder Formed	[BPB]	6.2
Backwater Pool - Root Wad Formed	[BPR]	6.3
Backwater Pool - Log Formed	[BPL]	6.4
Dammed Pool	[DPL]	6.5

Fay Creek

Drainage: Salmon Creek

Table 1 - SUMMARY OF RIFFLE, FLATWATER, AND POOL HABITAT TYPES

Survey Dates: 09/19/02 to 09/21/02

Confluence Location: QUAD:

LEGAL DESCRIPTION:

LATITUDE: 0°0'0"

LONGITUDE: 0°0'0"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	PERCENT TOTAL LENGTH	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	ESTIMATED TOTAL AREA (sq.ft.)	MEAN ESTIMATED VOLUME (cu.ft.)	ESTIMATED TOTAL VOLUME (cu.ft.)	MEAN RESIDUAL POOL VOL (cu.ft.)	MEAN SHELTER RATING
9	4	RIFFLE	4	23	207	2	3.6	0.3	34	307	12	104	0	4
83	14	FLATWATER	40	38	3159	31	4.3	0.4	152	12577	83	6909	0	1
46	25	POOL	22	36	1640	16	7.1	1.2	247	11370	313	14415	285	13
68	0	DRY	33	76	5166	51	259.0	0.0	67081	4561508	0	0	0	0
1	0	CULVERT	0	55	55	1	0.0	0.0	0	0	0	0	0	0
TOTAL UNITS	TOTAL UNITS				TOTAL LENGTH (ft.)				TOTAL AREA (sq. ft.)			TOTAL VOL. (cu. ft.)		
207	43				10227				4585762			21427		

Fay Creek

Drainage: Salmon Creek

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS

Survey Dates: 09/19/02 to 09/21/02

Confluence Location: QUAD:

LEGAL DESCRIPTION:

LATITUDE: 0ø0'0"

LONGITUDE: 0ø0'0"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT OCCURRENCE	MEAN LENGTH	TOTAL LENGTH	TOTAL LENGTH	MEAN WIDTH	MEAN DEPTH	MAXIMUM DEPTH	MEAN AREA	TOTAL AREA EST.	MEAN VOLUME	TOTAL VOLUME EST.	MEAN RESIDUAL	MEAN SHELTER	MEAN CANOPY
#			%	ft.	ft.	%	ft.	ft.	ft.	sq.ft.	sq.ft.	cu.ft.	cu.ft.	cu.ft.	RATING	%
6	1	LGR	3	23	138	1	2	0.1	0.1	7	43	1	4	0	0	98
1	1	HGR	0	20	20	0	4	0.2	0.8	32	32	6	6	0	5	85
2	2	CAS	1	25	49	0	5	0.4	0.9	49	97	19	39	0	5	86
59	6	GLD	29	35	2064	20	4	0.6	1.4	118	6947	86	5050	0	2	92
20	6	RUN	10	39	774	8	3	0.1	0.4	51	1012	7	131	0	0	97
4	2	SRN	2	80	321	3	7	0.6	1.3	556	2222	306	1225	0	3	91
17	11	MCP	8	34	576	6	7	1.2	4.2	240	4086	308	5238	284	6	94
3	3	CRP	1	50	150	1	8	1.2	3.1	371	1113	469	1408	420	7	97
2	2	LSL	1	32	63	1	6	1.1	1.9	168	337	179	358	162	73	87
19	5	LSR	9	38	719	7	7	1.1	4.3	275	5231	316	6000	282	17	93
2	1	LSBk	1	31	62	1	8	1.1	3.0	250	499	285	571	261	0	100
2	2	LSBo	1	25	49	0	7	1.7	4.2	176	352	316	632	280	8	99
1	1	SCP	0	21	21	0	5	2.0	3.8	105	105	210	210	200	0	90
68	0	DRY	33	76	5166	51	259	0.0	0.0	67081	*****	0	0	0	0	92
1	0	CUL	0	55	55	1	0	0.0	0.0	0	0	0	0	0	0	0
TOTAL UNITS	TOTAL UNITS				LENGTH (ft.)					AREA (sq.ft)		TOTAL VOL. (cu.ft)				
207	43				10227					4583586		20873				

Fay Creek

Drainage: Salmon Creek

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 09/19/02 to 09/21/02

Confluence Location: QUAD:

LEGAL DESCRIPTION:

LATITUDE: 0ø0'0"

LONGITUDE: 0ø0'0"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	PERCENT TOTAL	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	TOTAL AREA (sq.ft.)	MEAN VOLUME (cu.ft.)	TOTAL VOLUME (cu.ft.)	MEAN RESIDUAL (cu.ft.)	MEAN SHELTER RATING
17	11	MAIN	37	34	576	35	7.3	1.2	240	4086	308	5238	284	6
28	13	SCOUR	61	37	1043	64	7.1	1.2	263	7356	325	9096	291	20
1	1	BACKWATER	2	21	21	1	5.0	2.0	105	105	210	210	200	0
TOTAL UNITS	TOTAL UNITS				TOTAL LENGTH (ft.)				TOTAL AREA (sq.ft.)			TOTAL VOL. (cu.ft.)		
46	25				1640				11547			14544		

Fay Creek

Drainage: Salmon Creek

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES

Survey Dates: 09/19/02 to 09/21/02

Confluence Location: QUAD:

LEGAL DESCRIPTION:

LATITUDE: 0ø0'0"

LONGITUDE: 0ø0'0"

UNITS MAX DPTH MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	<1 FOOT		1-<2 FT.		2-<3 FT.		3-<4 FT.		>=4 FEET	
			MAXIMUM DEPTH	PERCENT OCCURRENCE	MAXIMUM DEPTH	PERCENT OCCURRENCE	MAXIMUM DEPTH	PERCENT OCCURRENCE	MAXIMUM DEPTH	PERCENT OCCURRENCE	MAXIMUM DEPTH	PERCENT OCCURRENCE
17	MCP	37	0	0	6	35	8	47	2	12	1	6
3	CRP	7	0	0	0	0	2	67	1	33	0	0
2	LSL	4	0	0	2	100	0	0	0	0	0	0
19	LSR	41	0	0	2	11	10	53	6	32	1	5
2	LSBk	4	0	0	1	50	0	0	1	50	0	0
2	LSBo	4	0	0	1	50	0	0	0	0	1	50
1	SCP	2	0	0	0	0	0	0	1	100	0	0
TOTAL UNITS 46												

Fay Creek (So. Sonoma)

Drainage:

Table 5 - Summary of Shelter by Habitat Type

Survey Dates: 09/19/02 to 09/21/02

Confluence Location: QUAD:

LEGAL DESCRIPTION:

LATITUDE: 00°0'0"

LONGITUDE: 00°0'0"

UNITS MEASURED	UNITS SHELTER MEASURED	HABITAT TYPE	% TOTAL UNDERCUT BANKS	% TOTAL SWD	% TOTAL LWD	% TOTAL ROOT MASS	% TOTAL TERR. VEGETATION	% TOTAL AQUATIC VEGETATION	% TOTAL WHITE WATER	% TOTAL BOULDERS	% TOTAL BEDROCK LEDGES
6	1	LGR	0	0	0	0	0	0	0	0	0
1	1	HGR	0	0	0	0	0	0	0	100	0
2	2	CAS	0	0	0	0	0	0	0	100	0
59	6	GLD	50	0	0	50	0	0	0	0	0
20	6	RUN	0	0	0	0	0	0	0	0	0
4	2	SRN	0	5	0	0	0	0	0	95	0
17	11	MCP	30	1	0	36	2	0	0	30	0
3	3	CRP	44	18	0	18	9	0	0	12	0
2	2	LSL	8	29	61	2	0	0	0	0	0
19	5	LSR	21	8	3	63	0	4	0	0	0
2	1	LSBk	0	0	0	0	0	0	0	0	0
2	2	LSBo	7	0	0	0	0	0	0	93	0
1	1	SCP	0	0	0	0	0	0	0	0	0
68	0	DRY	0	0	0	0	0	0	0	0	0
1	0	CUL	0	0	0	0	0	0	0	0	0
ALL HABITAT TYPES	207	43	22	11	13	31	2	1	0	19	0
POOLS ONLY	46	25	23	12	14	33	2	2	0	14	0

Fay Creek

Drainage: Salmon Creek

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE

Survey Dates: 09/19/02 to 09/21/02

Confluence Location: QUAD:

LEGAL DESCRIPTION:

LATITUDE: 0ø0'0"

LONGITUDE: 0ø0'0"

TOTAL HABITAT UNITS	UNITS SUBSTRATE MEASURED	HABITAT TYPE	% TOTAL SILT/CLAY DOMINANT	% TOTAL SAND DOMINANT	% TOTAL GRAVEL DOMINANT	% TOTAL SM COBBLE DOMINANT	% TOTAL LG COBBLE DOMINANT	% TOTAL BOULDER DOMINANT	% TOTAL BEDROCK DOMINANT
6	1	LGR	0	0	100	0	0	0	0
1	1	HGR	0	0	0	0	100	0	0
2	2	CAS	0	50	0	0	0	0	50
59	6	GLD	17	67	17	0	0	0	0
20	6	RUN	0	0	83	17	0	0	0
4	2	SRN	0	100	0	0	0	0	0
17	11	MCP	27	64	0	0	0	0	9
3	3	CRP	33	67	0	0	0	0	0
2	2	LSL	0	50	50	0	0	0	0
19	5	LSR	20	60	20	0	0	0	0
2	2	LSBk	0	100	0	0	0	0	0
2	2	LSBo	50	50	0	0	0	0	0
1	1	SCP	100	0	0	0	0	0	0
68	0	DRY	0	0	0	0	0	0	0
1	0	CUL	0	0	0	0	0	0	0

Fay Creek

Table 7. Summary of Mean Percent Vegetative Cover for Entire Stream

Mean Percent Canopy	Mean Percent Evergreen	Mean Percent Deciduous	Mean Right bank % Cover	Mean Left Bank % Cover
93.01	21.43	78.57	35.71	36.10

Table 8. Fay Creek

Mean Percentage of Dominant Substrate

Dominant Class of Substrate	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Bedrock	5	4	10.23
Boulder	7	6	14.77
Cobble/Gravel	6	12	20.45
Silt/clay	26	22	54.55

Mean Percentage of Dominant Vegetation

Dominant Class of Vegetation	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Grass	1	0	1.14
Brush	8	9	19.32
Deciduous Trees	27	22	55.68
Evergreen Trees	2	4	6.82
No Vegetation	6	9	17.05

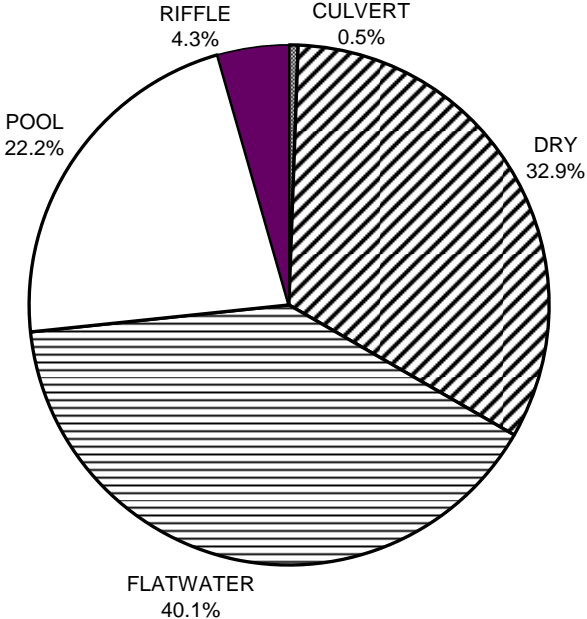
Table 9 - FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: Fay Creek
 SAMPLE 09/19/2002 to 09/21/2002
 SURVEY LENGTH:
 MAIN 10227 ft. SIDE CHANNEL: 0 ft.
 LOCATION OF STREAM MOUTH:
 USGS Quad Map: Valley Ford Latitude: 38°21'28.9"N
 Legal Description: T6N R10W Sec Bodega Longitude:122°59'59.95"W

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

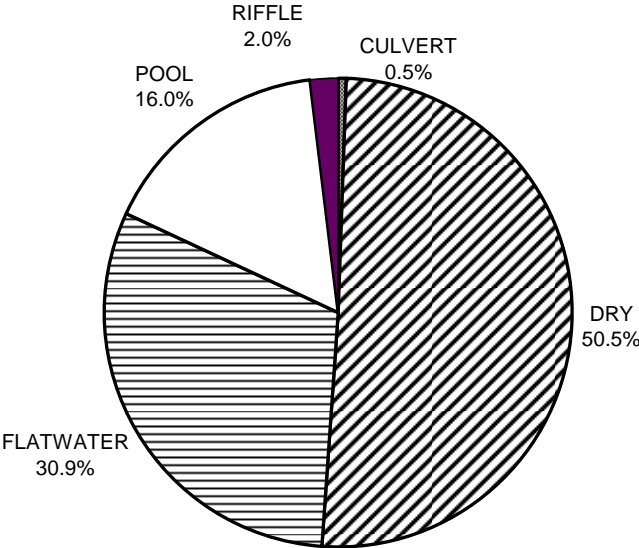
STREAM REACH 01 (Units 1-187)			
Channel Type:	F4	Mean Canopy Density:	94 %
Main Channel:	9334 ft.	Evergreen:	16 %
Side Channel Length:	0 ft.	Deciduous:	84 %
Riffle/Flatwater Mean Width:	4.0 ft.	Pools by Stream:	34 %
Pool Mean Depth:	1.3 ft.	Pools >=2 ft. Deep:	77 %
Base Flow:	not measured	Pools >=3 ft. Deep:	32 %
Water: 52-58°F	Air: 49-78°F	Mean Pool Shelter:	19
Dom. Bank Veg.:	Deciduous Trees	Dom.Shelter:root masses	
Bank Vegetative Cover:	42 %	LOD Pool Shelter:	9%
Dom. Bank Substrate:	Silt/Clay/Sand	Dry Channel:	4656 ft.
Embeddedness Value:	1. 5 % 2. 50 % 3.	11 % 4. 2 % 5. 32 %	
STREAM REACH 02 (Units 188-207)			
Channel Type:	A2	Mean Canopy Density:	86 %
Main Channel:	893 ft.	Evergreen:	60 %
Side Channel Length:	0 ft.	Deciduous:	40 %
Riffle/Flatwater Mean Width:	5 ft.	Pools by Stream:	13 %
Pool Mean Depth:	1.0 ft.	Pools >=2 ft. Deep:	0 %
Base Flow:	not measured	Pools >=3 ft. Deep:	0 %
Water: 55-59°F	Air: 63-66°F	Mean Pool Shelter:	5
Dom. Bank Veg.:	Deciduous Trees	Dom. Shelter: Boulders	
Bank Vegetative Cover:	12 %	LOD Pool Shelter:	0%
Dom. Bank Substrate:	Silt/Sand/Clay	Dry Channel:	510 ft.
Embeddedness Value:	1. 0 % 2. 0 % 3.	0 % 4. 0 % 5.100%	

FAY CREEK 2002 HABITAT TYPES BY PERCENT OCCURRENCE



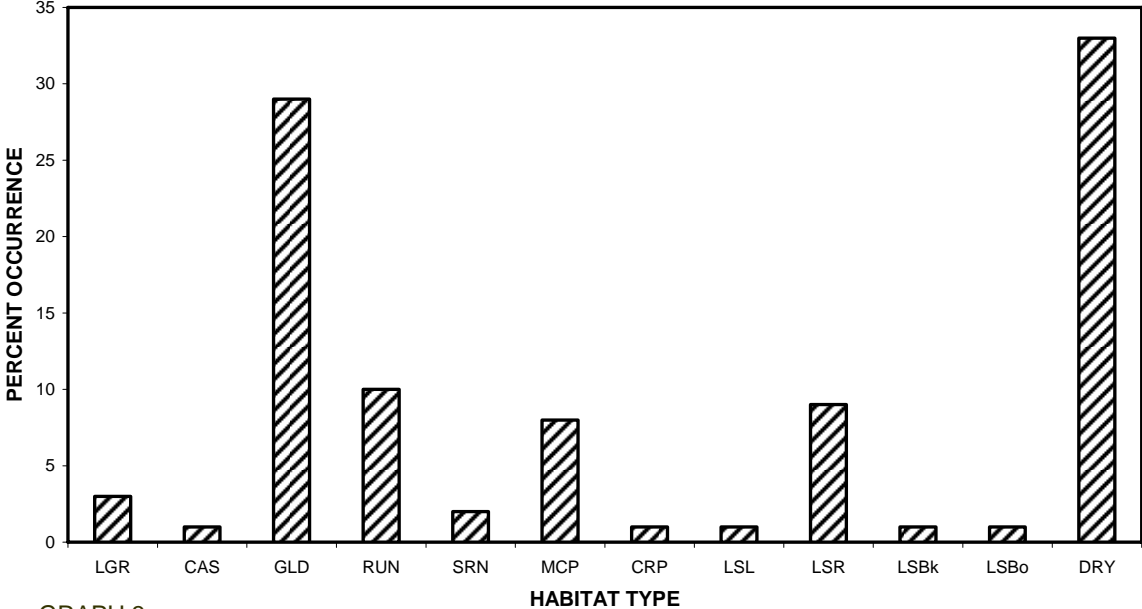
GRAPH 1

FAY CREEK 2002 HABITAT TYPES BY PERCENT TOTAL LENGTH



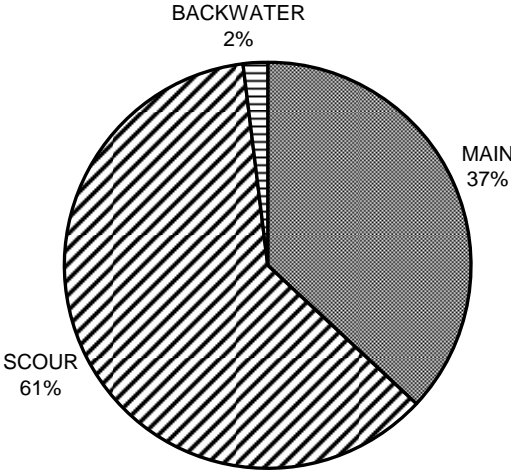
GRAPH 2

FAY CREEK 2002 HABITAT TYPES BY PERCENT OCCURRENCE



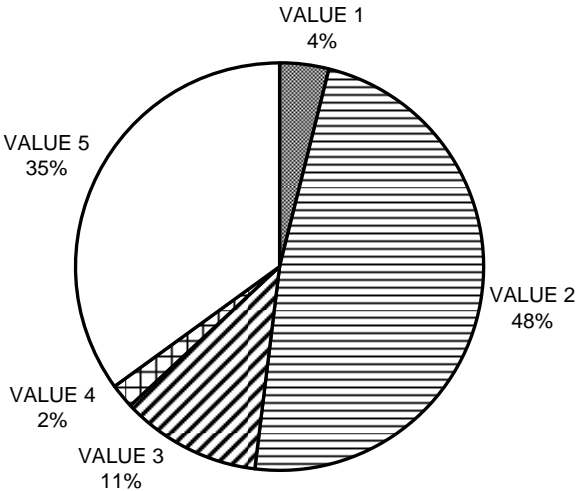
GRAPH 3

FAY CREEK 2002 POOL HABITAT TYPES BY PERCENT OCCURRENCE



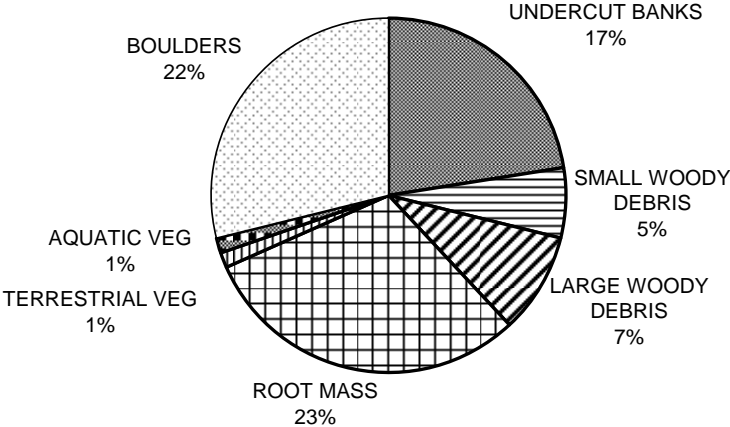
GRAPH 4

FAY CREEK 2002 PERCENT EMBEDDEDNESS



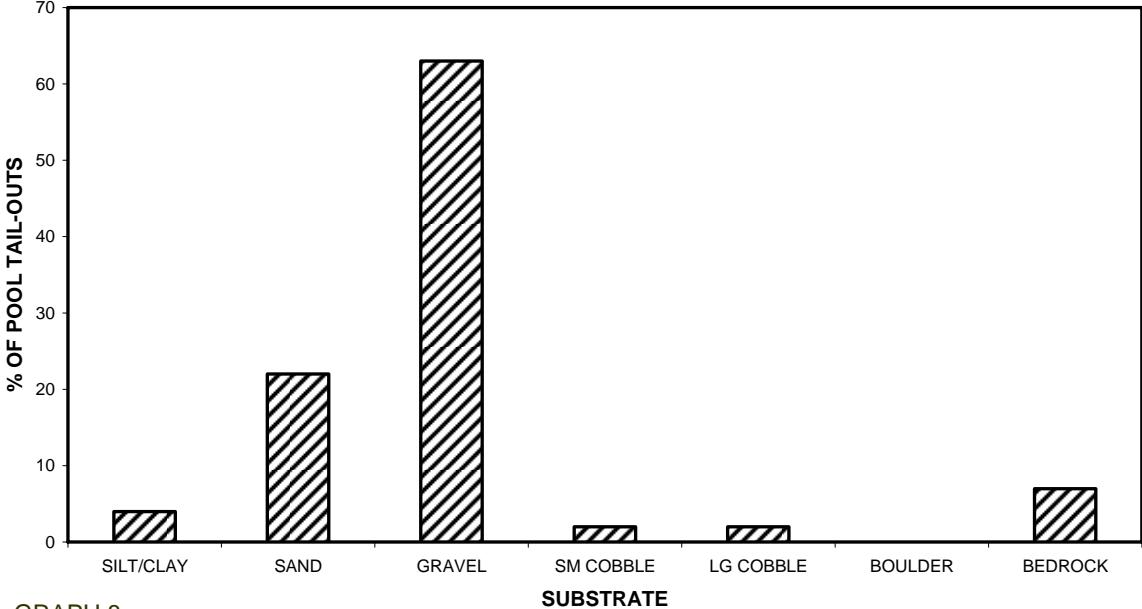
GRAPH 6

FAY CREEK 2002 MEAN PERCENT COVER TYPES IN POOLS



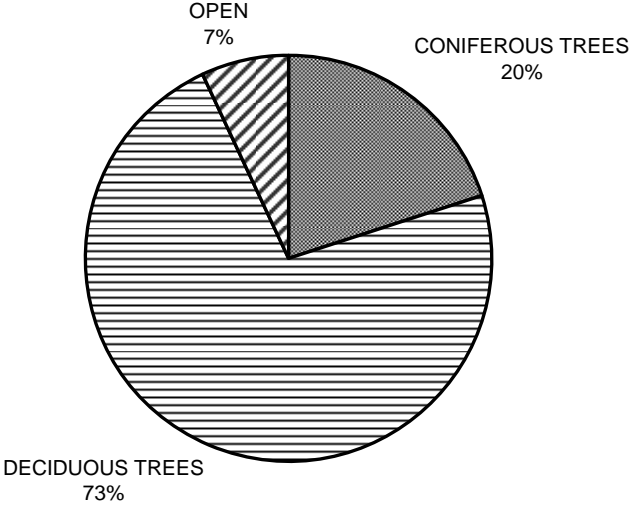
GRAPH 7

FAYCREEK 2002 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



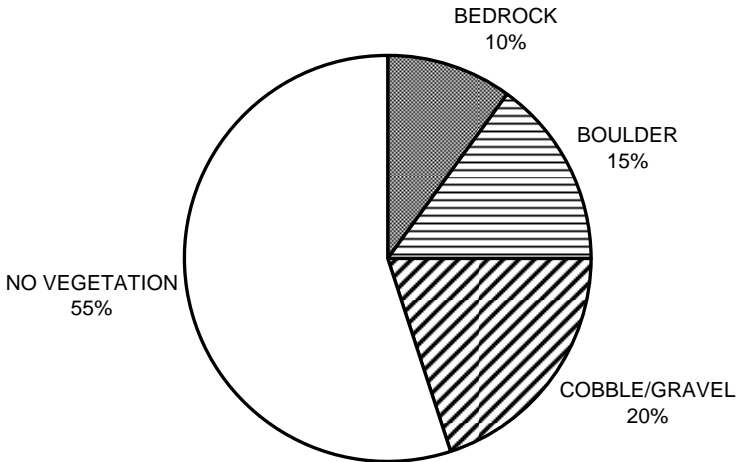
GRAPH 8

FAY CREEK 2002 MEAN PERCENT CANOPY



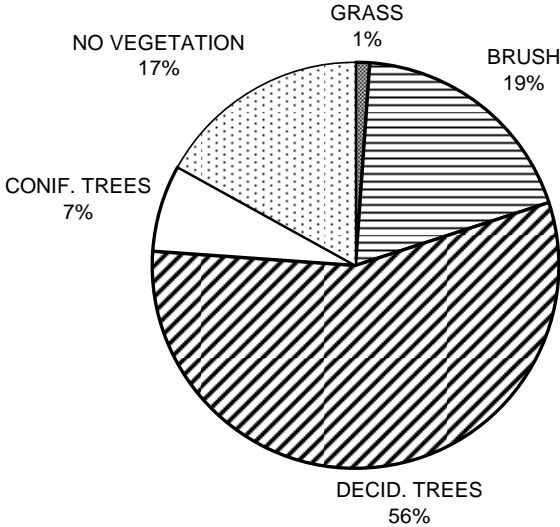
GRAPH 9

FAY CREEK 2002 DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

FAY CREEK 2002 DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11