STREAM INVENTORY REPORT

Fleming Creek, South Fork Garcia River, 2002

CALIFORNIA DEPARTMENT OF FISH AND GAME

2003

Central Coast Region

STREAM INVENTORY REPORT

Fleming Creek

INTRODUCTION

A stream inventory was conducted beginning August 12 and ending August 13, 2002 on Fleming Creek. The survey began at the confluence with South Fork Garcia River and extended upstream 0.84 miles.

The Fleming 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 Fleming 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

Fleming Creek is a tributary to the South Fork Garcia River, tributary to the Garcia River, located in Mendocino County, California (Map 1). Fleming Creek's legal description at the confluence with South Fork Garcia River is T11N R15W S4. Its location is 38°50′8″ north latitude and 123°32′36″ west longitude. Fleming Creek is a first order stream and has approximately 0.056 miles of solid blue line stream and approximately 1.48 miles of dashed blue line stream according to the USGS Gualala 7.5 minute quadrangle. Fleming Creek drains a watershed of approximately 1.05 square miles. Elevations range from about 400 feet at the mouth of the creek to 1275 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 logging roads from Highway 1 to Iverson Road to Fish Rock Road. Fish Rock road leads to the headwaters of the South Fork Garcia River and a logging road follows the river to the confluence with Fleming Creek.

METHODS

The habitat inventory conducted in Fleming Creek follows the methodology presented in the *California*

Salmonid Stream Habitat Restoration Manual (Flosi et al, 1998). The California Department of Fish and Game Scientific Aids (DFG) and 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 Fleming 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". Fleming 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 Fleming 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 Fleming 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 Fleming Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of approximately every third unit in addition to every fully-described unit, giving an approximate 30% sub-sample. In addition, the area of canopy was estimated ocularly into percentages of coniferous or 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 Fleming 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 Fleming Creek. This sampling technique is 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 six tables:

- Riffle, flatwater, and pool habitat types
- Habitat types and measured parameters
- Pool types
- Maximum pool depths by habitat types
- Dominant substrates by habitat types
- Mean percent shelter by habitat types

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

- Riffle, flatwater, pool habitats by percent occurrence
- Riffle, flatwater, pool habitats by total length
- Total habitat types by percent occurrence
- Pool types by percent occurrence
- Total pools by maximum depths
- Embeddedness
- Pool cover by cover type
- Dominant substrate in low gradient riffles
- Mean percent canopy
- Bank composition by composition type
- Bank vegetation by vegetation type

HABITAT INVENTORY RESULTS

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

The habitat inventory of August 12 through August 13, 2002, was conducted by Libby Earthman and Jen Presnell (WSP). The total length of the stream surveyed was 4,409 feet.

Stream flow was not measured on Fleming Creek.

Fleming Creek is an F4 channel type for the entire 4,409 feet of stream surveyed. F4 channel types are classified as entrenched, meandering, riffle/pool channels, on low gradients with high width/depth ratios and gravel-dominated substrates.

Water temperatures taken during the survey period ranged from 56 to 58 degrees Fahrenheit. Air temperatures ranged from 57 to 63 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 47% pool units, 31% flatwater units, 20% riffle units, and 2% dry units (Graph 1). Based on total **length** of Level II habitat types there were 63% flatwater units, 20% pool units, 13% riffle units, and 4% dry units (Graph 2).

Twelve Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were runs, 30%; mid-channel pools, 19%; and low gradient riffles, 19% (Graph 3). Based on percent total **length**, runs made up, 61%, and low gradient riffles, 13%.

Fleming Creek

A total of 47 pools were identified (Table 3). Main channel pools were the most frequently encountered, at 51%, and comprised 62% 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. Four of the 43 pools measured (9%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 43 pool tail-outs measured, 13 had a value of 1 (30%); 8 had a value of 2 (19%); 14 had a value of 3 (33%); 7 had a value of 4 (7%); and 5 had a value of 5 (12%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate.

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. Pool habitats had a mean shelter rating of 45, flatwater habitat types had a mean shelter rating of 1, and riffle habitat types had a mean shelter rating of 0 (Table 1). Of the pool types, scour pools had the highest mean shelter rating at 64. Main channel pools had mean shelter rating of 23 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in Fleming Creek. Graph 7 describes the pool cover in Fleming Creek. Large woody debris is the dominant pool cover type followed by small 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 84% of pool tail-outs while small cobble was the next most frequently observed substrate type, at 16%.

The mean percent canopy density for the surveyed length of Fleming Creek was 99%. The mean percentages of deciduous and coniferous trees were 34% and 66%, respectively. Graph 9 describes the mean percent canopy in Fleming Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 39%. The mean percent left bank vegetated was 50%. The dominant elements composing the structure of the stream banks consisted of 14% bedrock, 16% cobble/gravel, and 71% sand/silt/clay (Graph 10). Coniferous trees were the dominant vegetation type observed in 53% of the units surveyed. Additionally, 26% of the units surveyed had brush as the dominant vegetation type, and 12% had deciduous trees as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Fleming Creek

Young of year salmonid presence was observed from the stream banks in Fleming Creek up to 2,548 feet. Yearling salmonids were observed up to 2,747 feet. . Snorkel surveys by Mendocino Redwood Company on 8/21/2002 found that salmonids in Fleming Creek consisted of both steelhead trout and coho salmon (Mendocino Redwood Co. 2002).

DISCUSSION

Fleming Creek is a F4 channel type for 4,409 feet of stream surveyed. The suitability of F4 channel types for fish habitat improvement structures is as follows: F4 channel types are good for bank-placed boulders, fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover.

The water temperatures recorded on the survey days August 1 through August 13, 2002 ranged from 56 to 58 degrees Fahrenheit. Air temperatures ranged from 57 to 63 degrees Fahrenheit. This is a suitable water temperature range for salmonids. Maximum Average Weekly Temperature (MWAT) at a station on Fleming Creek ranged from 13.1 - 14.1 C (55.6 – 57.4 F) in 1997-2002 (Mendocino Redwood Co. data)

Flatwater habitat types comprised 63% of the total length of this survey, pools 20%, riffles 13%, and dry 4%. The pools are relatively shallow, with 4 of the 43 (9%) 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. Installing structures that will increase or deepen pool habitat is recommended for locations where their installation will not be threatened by high stream energy, or where their installation will not conflict with the modification of the numerous log debris accumulations (LDA's) in the stream.

Twenty-one of the 43 pool tail-outs measured had embeddedness ratings of 1 or 2. Seventeen of the pool tail-outs had embeddedness ratings of 3 or 4. Five 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 source control efforts in the watershed may be having a beneficial effect in controlling fine sediments.

Forty-three of the 43 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter rating for pools was 45. The shelter rating in the flatwater habitats was 1. 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, small 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 99%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was low at 39% and 50%, respectively. In areas of stream bank erosion or where bank vegetation is not at acceptable levels, planting endemic species of coniferous and deciduous trees, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

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

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

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

4) Continue to identify and treat remaining sources of potential sediment yield.

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.

0'	Begin at confluence with South Fork Garcia River.
72.4'	Bridge at 18.6 feet. One steelhead yoy.
178.1'	Remains of a culvert.
326.8'	Railroad car frame at 12 feet.
432'	Fallen oaks at 102 and 122 feet.
561'	First channel type taken at 38.5 feet into section. Channel type is an F4.
858.1'	One 2+, One 1+ Steelhead, and 4 yoy.
1075.3'	Partially submerged egg sac, 1 cm in dia.
1232'	Dry left bank gully at 10 feet.
1454.6'	2001 Trout Unlimited barrier survey site #2.
1465.5'	Bank slide 30X35X8 Terraced above. Left bank slide possibly old road.

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1694.3'	3.2 foot plunge.
1711.2'	Left bank slide.
1886.2'	Three foot plunge.
1896'	Side channel at 163 feet. At 194 feet, potential barrier, 20 Ft LWD retaining sediment.
2336.5'	Steelhead yoy and 2+.
2354'	Barrier site #4 Trout Unlimited 2001.
2420.8'	Log jam 23'X30'X8.5' retaining sediment. No visibility from 1' TO 23' into unit.
2528.6'	One salamander.
2548'	3 yoy steelhead.
2747'	One steelhead 1+.
2929'	No visibility under log jam 23'X25'X9'. Log jam retaining sediment.
3119.2'	Four foot plunge retaining sediment. Old skid trail on right bank.
3206.8'	Gully on left bank with bedrock at 13.2 feet.
3219.4'	Spring on left bank at 6 feet. Right bank eroding.
3318.7'	Log jam 5'x20'x8'.
3396.3'	One salamander.
3423.8'	Log jam at 15 feet, 12'x22'x11', retaining sediment.
3587'	Log jam 25'x20'x12' retaining sediment.
3631.2'	Right bank gully at 13 feet.
3749.4'	Log jam 8'x12'x6'.
3951.5'	Plunge 1.8 feet.
4102.6'	Spring on right bank at 8'. One salamander.
4117.7'	Spring on right bank at 16 feet.
4134'	3.2 foot plunge.
4148'	Right bank gully at 2 feet.
4367'	End of Survey. Spring on left bank at 118 feet.

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.

Mendocino Redwood Co. 2002. Aquatic Species Distribution on Mendocino Redwood Company Forestlands1994-1996 and 2000-2002. Mendocino Redwood Company, LLC. Fort Bragg CA.

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 8. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: FLEMMING CREEK
SAMPLE DATES: 08/12/02 to 08/13/02
STREAM LENGTH: 4409 ft.
LOCATION OF STREAM MOUTH:
USGS Quad Map: GUALALA — Latitude: 38°50'8"
Legal Description: T11NR15WS04 — Longitude: 123°32'36"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 1

Channel Type: F4	Canopy Density: 99%
Channel Length: 4409 ft.	Coniferous Component: 66%
Riffle/flatwater Mean Width: 4 ft.	Deciduous Component: 34%
Total Pool Mean Depth: 0.8 ft.	Pools by Stream Length: 19%
Base Flow: 0.0 cfs	Pools >=3 ft.deep: 2%
Water: 056- 58 °F Air: 057-63 °F	Mean Pool Shelter Rtn: 48
Dom. Bank Veg.: Coniferous Trees	Dom. Shelter: Large Woody Debris
Vegetative Cover: 44%	Occurrence of LOD: 58%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 170 ft.

Embeddness Value: 1. 30% 2.19% 3. 28% 4. 12% 5. 12%

FLEMMING CREEK

Drainage: SF GARCIA RIVER

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

Survey Dates: 08/12/02 to 08/13/02

Confluence Location: QUAD: GUALALA LEGAL DESCRIPTION: T11NR15WS04 LATITUDE:38°50'8" LONGITUDE:123°32'36"

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 VOLUME (cu.ft.)	ESTIMATED TOTAL VOLUME (cu.ft.)	MEAN RESIDUAL POOL VOL (cu.ft.)	MEAN SHELTER RATING
20	6	RIFFLE	20	30	591	13	3.7	0.2	51	1029	13	253	0	0
31	9	FLATWATER	31	92	2845	63	4.8	0.3	294	9099	87	2706	0	1
47	43	POOL	47	19	878	20	6.5	1.0	100	4719	106	4981	83	45
2	0	DRY	2	85	170	4	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.)
100	58	4484	14847	7939

FLEMMING CREEK

Drainage: SF GARCIA RIVER

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS

Survey Dates: 08/12/02 to 08/13/02

Confluence Location: QUAD: GUALALA LEGAL DESCRIPTION: T11NR15WS04 LATITUDE:38°50'8" LONGITUDE:123°32'36"

HABITAT UNITS #	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT OCCURRENCE %	MEAN LENGTH ft.	TOTAL LENGTH ft.	TOTAL LENGTH %	MEAN WIDTH ft.	MEAN DEPTH ft.	MAXIMUM DEPTH ft.	MEAN AREA sq.ft.	TOTAL AREA EST. sq.ft.	MEAN VOLUME cu.ft.	TOTAL VOLUME EST. cu.ft.	MEAN RESIDUAL POOL VOL cu.ft.	MEAN SHELTER RATING	MEAN CANOPY %
19	5	LGR	19	30	575	13	4	0.2	0.7	53	999	12	219	0	0	100
1	1	CAS	1	16	16	0	4	0.4	0.7	46	46	18	18	0	0	100
30	8	RUN	30	92	2752	61	5	0.3	1.0	275	8239	82	2446	0	1	98
1	1	SRN	1	94	94	2	5	0.3	0.7	445	445	133	133	0	0	100
19	18	MCP	19	15	287	6	7	0.8	1.9	103	1959	94	1780	71	24	98
5	2	STP	5	51	256	6	6	0.7	1.7	237	1187	141	706	99	15	100
4	4	CRP	4	15	59	1	4	0.8	1.9	61	242	45	180	30	75	99
5	5	LSL	5	16	79	2	6	2.5	2.0	92	461	241	1207	218	48	95
5	5	LSR	5	17	84	2	6	0.6	1.7	96	478	57	283	36	52	100
2	2	LSBk	2	14	28	1	5	1.1	2.0	63	126	69	139	47	5	100
7	7	PLP	7	12	85	2	8	1.0	3.3	97	681	111	780	88	96	100
2	0	DRY	2	85	170	4	0	0.0	0.0	0	0	0	0	0	0	94

TOTAL UNITS	TOTAL UNITS	LENGTH (ft.)	AREA (sq.ft)	TOTAL VOL. (cu.ft)
100	58	4484	14862	7890

FLEMMING CREEK

Drainage: SF GARCIA RIVER

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 08/12/02 to 08/13/02

Confluence Location: QUAD: GUALALA LEGAL DESCRIPTION: T11NR15WS04 LATITUDE:38°50'8" LONGITUDE:123°32'36"

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.)	TOTAL AREA EST. (sq.ft.)	MEAN VOLUME (cu.ft.)	TOTAL VOLUME EST. (cu.ft.)	MEAN RESIDUAL POOL VOL. (cu.ft.)	MEAN SHELTER RATING
24	20	MAIN	51	23	543	62	6.9	0.8	117	2796	98	2363	74	23
23	23	SCOUR	49	15	335	38	6.2	1.2	86	1987	113	2588	91	64

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq.ft.)	TOTAL VOL. (cu.ft.)
47	43	878	4784	4951

FLEMMING CREEK Drainage: SF GARCIA RIVER

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES Survey Dates: 08/12/02 to 08/13/02

Confluence Location: QUAD: GUALALA LEGAL DESCRIPTION: T11NR15WS04 LATITUDE:38°50'8" LONGITUDE:123°32'36"

UNITS MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	<1 FOOT MAXIMUM DEPTH	<1 FOOT PERCENT OCCURRENCE	1-<2 FT. MAXIMUM DEPTH	1-<2 FOOT PERCENT OCCURRENCE	2-<3 FT. MAXIMUM DEPTH	2-<3 FOOT PERCENT OCCURRENCE	3-<4 FT. MAXIMUM DEPTH	3-<4 FOOT PERCENT OCCURRENCE	>=4 FEET MAXIMUM DEPTH	>=4 FEET PERCENT OCCURRENCE
19	MCP	40	1	5	18	95	0	0	0	0	0	0
5	STP	11	3	60	2	40	0	0	0	0	0	0
4	CRP	9	0	0	4	100	0	0	0	0	0	0
5	LSL	11	0	0	4	80	1	20	0	0	0	0
5	LSR	11	0	0	5	100	0	0	0	0	0	0
2	LSBk	4	0	0	1	50	1	50	0	0	0	0
7	PLP	15	0	0	5	71	1	14	1	14	0	0

TOTAL UNITS
47

FLEMMING CREEK Drainage: SF GARCIA RIVER

Table 5 - SUMMARY OF MEAN PERCENT COVER BY HABITAT TYPE Survey Dates: 08/12/02 to 08/13/02

Confluence Location: QUAD: GUALALA LEGAL DESCRIPTION: T11NR15WS04 LATITUDE:38°50'8" LONGITUDE:123°32'36"

UNITS MEASURED	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
19	0	LGR	0	0	0	0	0	0	0	0	0
1	0	CAS	0	0	0	0	0	0	0	0	0
30	1	RUN	0	20	70	10	0	0	0	0	0
1	0	SRN	0	0	0	0	0	0	0	0	0
19	16	MCP	1	20	68	6	0	0	0	1	0
5	2	STP	5	40	40	15	0	0	0	0	0
4	4	CRP	14	15	48	24	0	0	0	0	0
5	4	LSL	3	8	83	8	0	0	0	0	0
5	5	LSR	19	44	6	31	0	0	0	0	0
2	1	LSBk	0	0	30	0	0	0	0	0	70
7	6	PLP	3	8	75	8	0	0	3	2	0
2	0	DRY	0	0	0	0	0	0	0	0	0

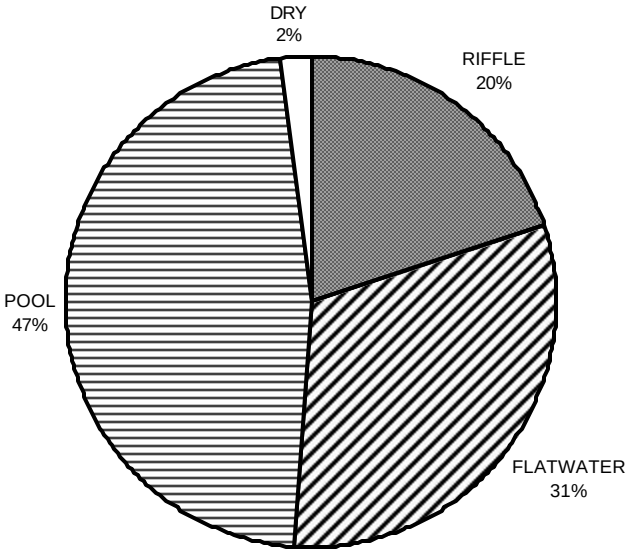
FLEMMING CREEK Drainage: SF GARCIA RIVER

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE Survey Dates: 08/12/02 to 08/13/02

Confluence Location: QUAD: GUALALA LEGAL DESCRIPTION: T11NR15WS04 LATITUDE:38°50'8" LONGITUDE:123°32'36"

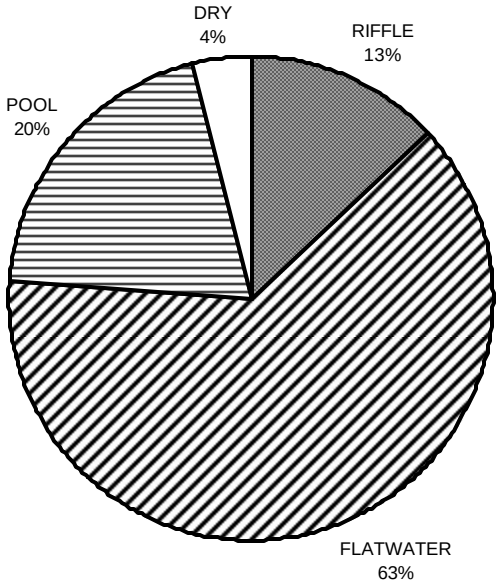
TOTAL HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	% TOTAL SILT/CLAY DOMINANT	% TOTAL SAND DOMINANT	% TOTAL GRAVEL DOMINANT	% TOTAL SM COBBLE DOMINANT	% TOTAL LG COBBLE DOMINANT	% TOTAL BOULDER DOMINANT	% TOTAL BEDROCK DOMINANT
19	5	LGR	0	20	80	0	0	0	0
1	1	CAS	0	0	0	0	0	0	100
30	7	RUN	0	14	86	0	0	0	0
1	1	SRN	0	0	100	0	0	0	0
19	6	MCP	17	67	0	17	0	0	0
5	1	STP	0	100	0	0	0	0	0
4	3	CRP	33	67	0	0	0	0	0
5	1	LSL	0	100	0	0	0	0	0
5	1	LSR	0	100	0	0	0	0	0
2	2	LSBk	0	100	0	0	0	0	0
7	2	PLP	0	100	0	0	0	0	0
2	0	DRY	0	0	0	0	0	0	0

FLEMING CREEK
HABITAT TYPES BY PERCENT OCCURENCE



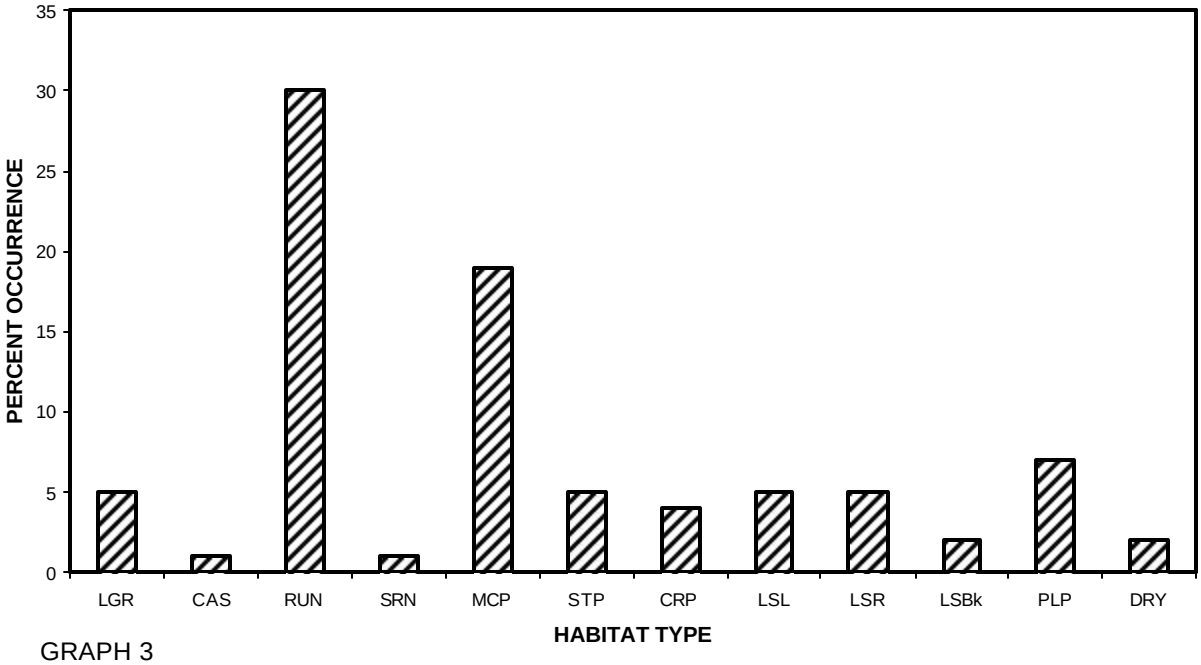
GRAPH 1

FLEMING CREEK
HABITAT TYPES BY PERCENT TOTAL LENGTH



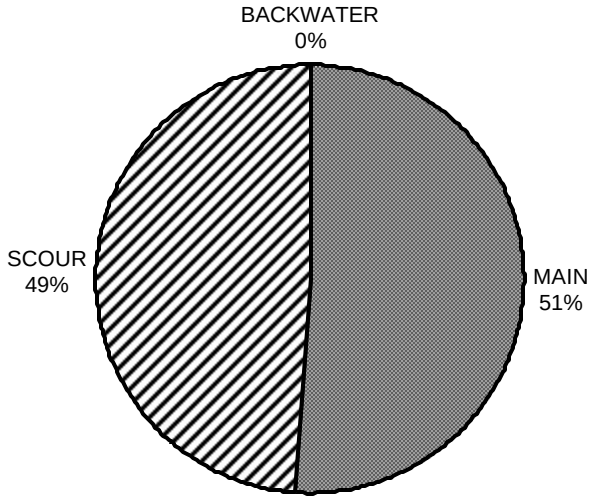
GRAPH 2

FLEMING CREEK
HABITAT TYPES BY PERCENT OCCURRENCE



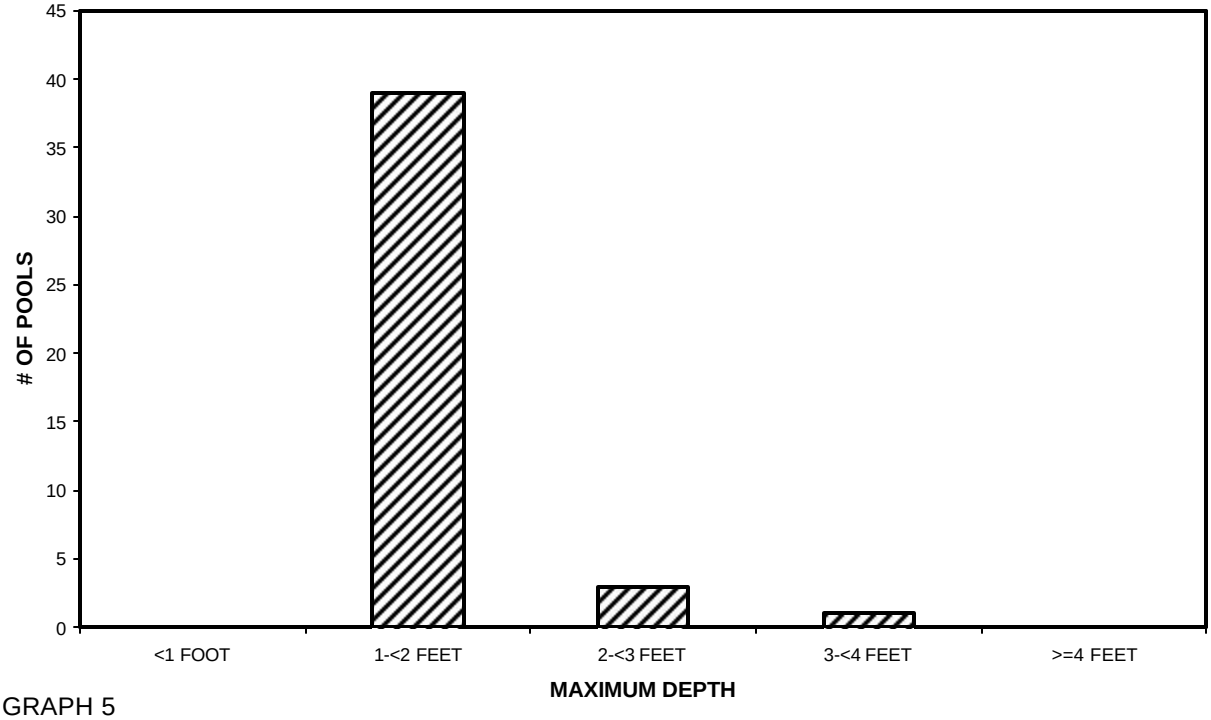
GRAPH 3

FLEMING CREEK
POOL HABITAT TYPES BY PERCENT OCCURRENCE



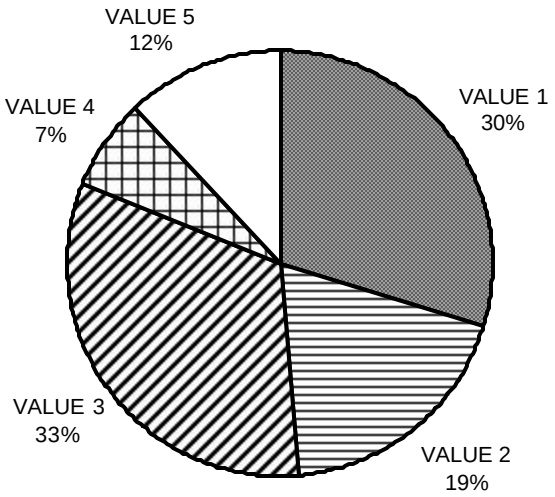
GRAPH 4

FLEMING CREEK
MAXIMUM DEPTH IN POOLS



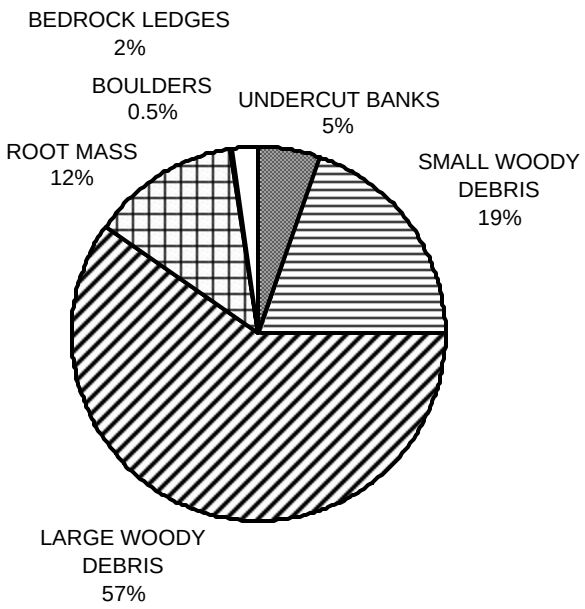
GRAPH 5

FLEMING CREEK
PERCENT EMBEDDEDNESS



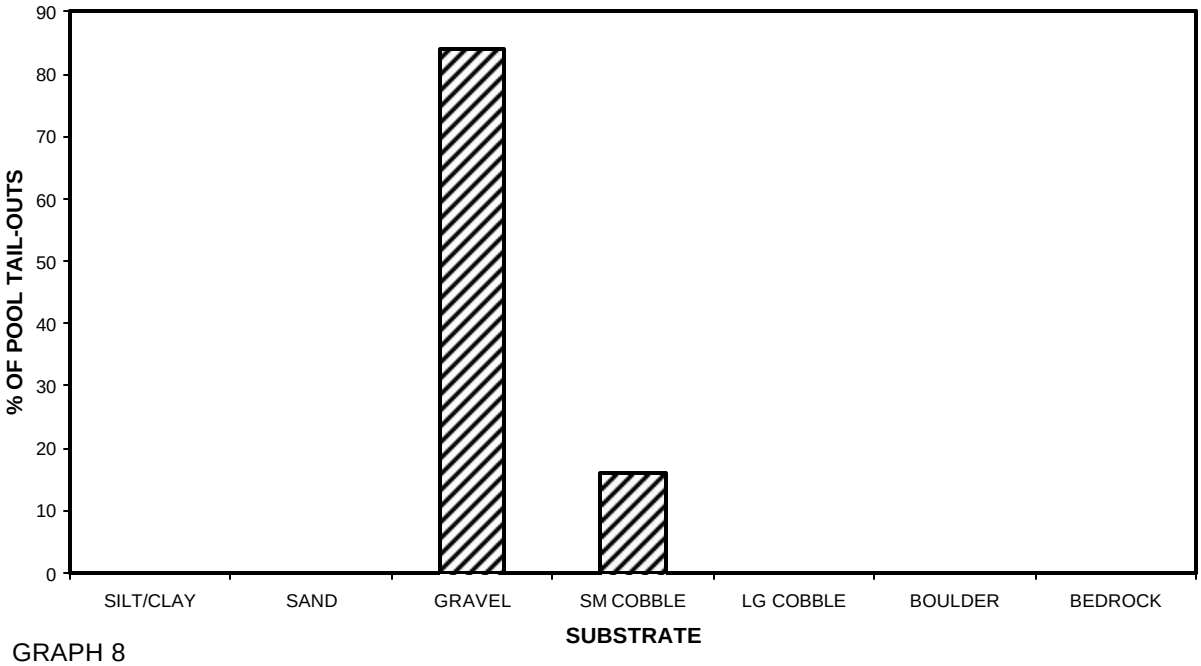
GRAPH 6

FLEMING CREEK
MEAN PERCENT COVER TYPES IN POOLS



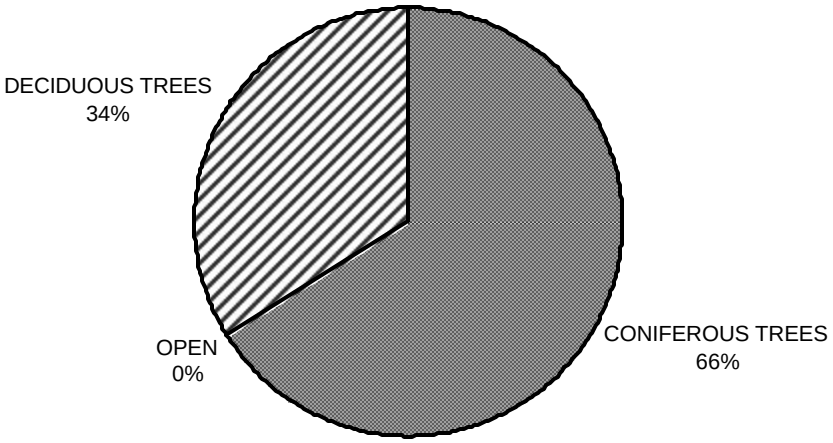
GRAPH 7

FLEMING CREEK
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



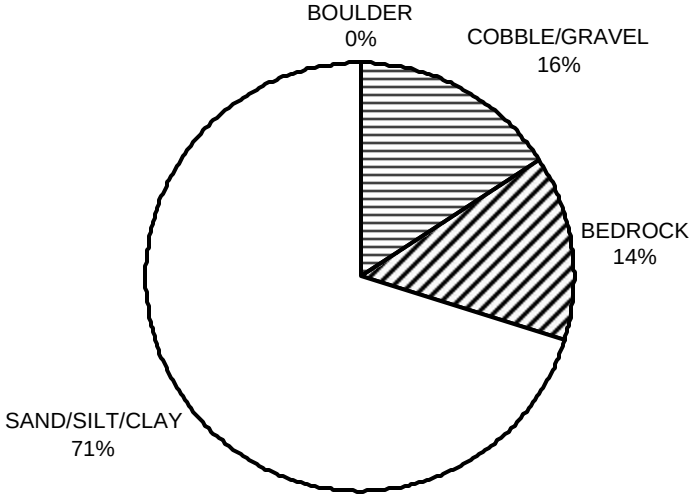
GRAPH 8

FLEMING CREEK
MEAN PERCENT CANOPY



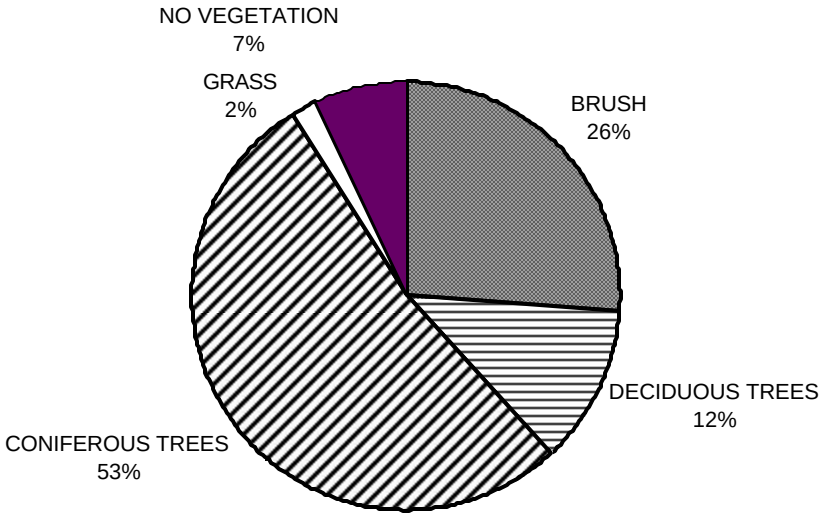
GRAPH 9

FLEMING CREEK
DOMINANT BANK COMPOSITION IN SURVEY REACH

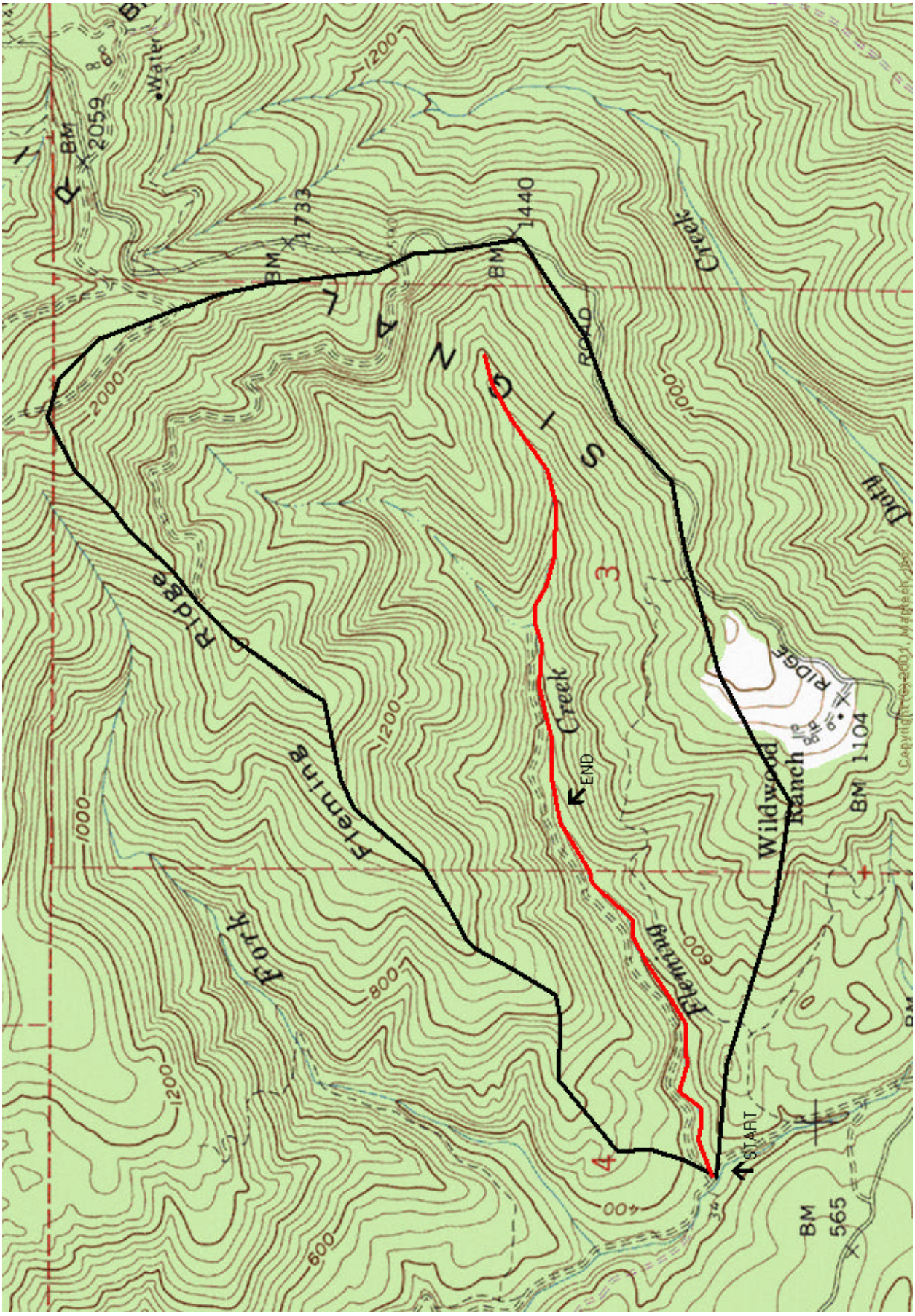


GRAPH 10

FLEMING CREEK
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11



MAP 1. FLEMMING CREEK.