NORTH COAST WATERSHED AND FISHERY IMPROVEMENT PROGRAM

STREAM INVENTORY REPORT

Ramon Creek, South Fork Big River, 2002

CALIFORNIA DEPARTMENT OF FISH AND GAME

2003

Northern California-North Coast Region

STREAM INVENTORY REPORT

Ramon Creek

INTRODUCTION

A stream inventory was conducted beginning June 13, and ending June 20, 2002 on Ramon Creek. The survey began at the confluence with South Fork Big River and extended upstream 3.95 miles. A stream inventory and report was also completed for one tributary to Ramon Creek

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

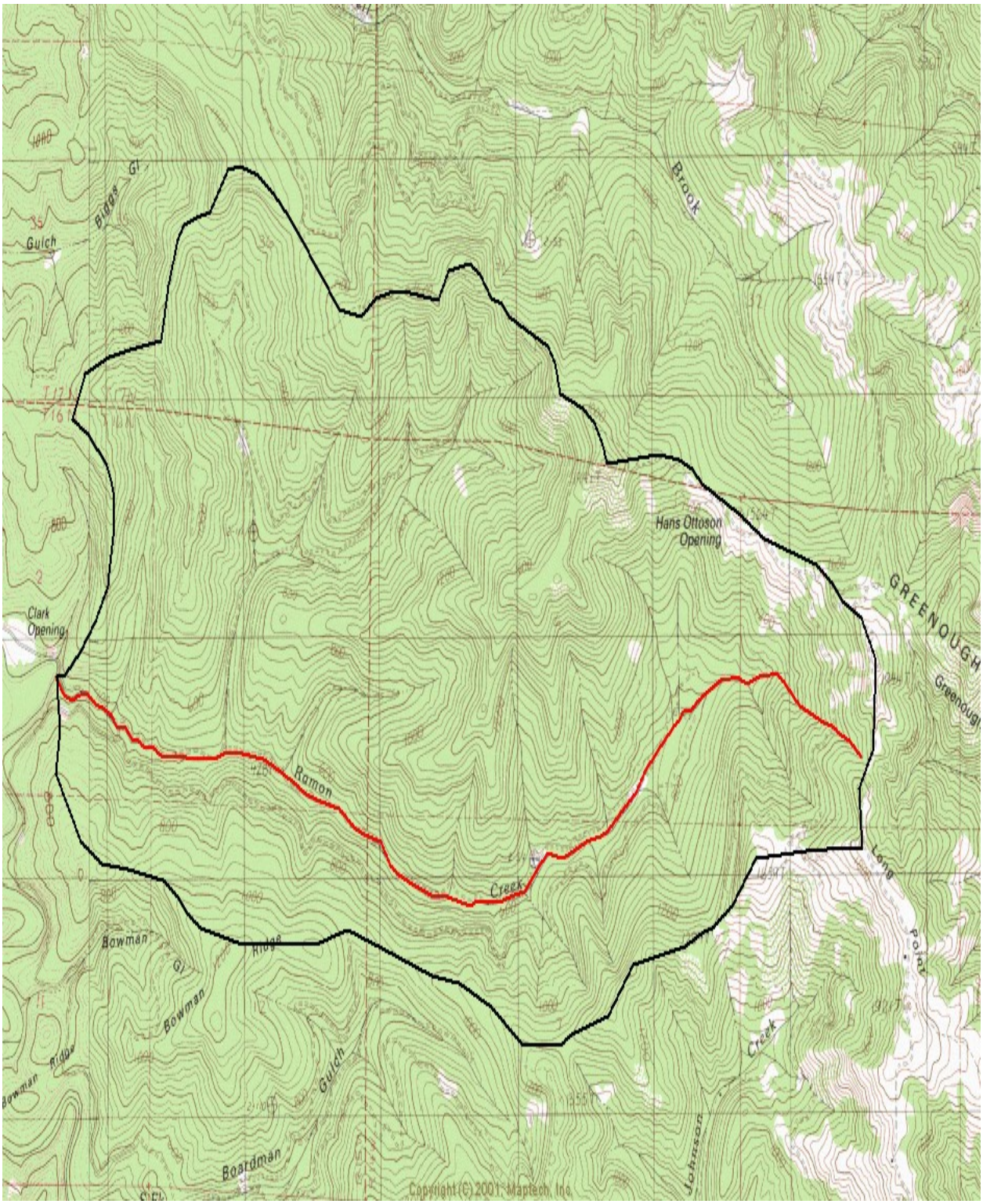
The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for coho salmon, and steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's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

WATERSHED OVERVIEW

Ramon Creek is a tributary to the South Fork Big River, a tributary to the Big River, located in Mendocino County, California (Map 1). Ramon Creek's legal description at the confluence with South Fork Big River is T16N R15W S2. Its location is 39□29□56□ North latitude and 123□53□26□ West longitude. Ramon Creek is a second order stream and has approximately 4.0 miles of solid blue line stream according to the USGS Comptche 7.5 minute quadrangle. Ramon Creek drains a watershed of approximately 5.3 square miles. Elevations range from about 350 feet at the mouth of the creek to 1700 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 Highway 20 at mile marker 17.

METHODS

The habitat inventory conducted in Ramon 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.



MAP 1. RAMON CREEK.

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 Ramon 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". Ramon 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 Ramon 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 Ramon 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 Ramon 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 Ramon 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 Ramon Creek. 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 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 Ramon 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 June 13 through June 20, 2002, was conducted by Scott Monday and Kristi Knechtle (DFG). The total length of the stream surveyed was 20,832 feet.

Stream flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.051 cfs on September 25, 2002.

Ramon Creek is a B4 channel type for the 8,356 feet of stream, an F3 for the next 7,638 feet, and a B3 for the final 4,838 feet of stream surveyed. B4 channel types are classified as moderately entrenched, moderate gradient, riffle dominated channels with infrequently spaced pools, very stable plan and profile, stable banks, and gravel-dominated channels. F3 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratio and cobble-dominated channels. B3 channel types are moderately entrenched, moderate gradient, riffle-dominated channels with infrequently spaced pools, very stable plan and profile, stable banks with a cobble-dominated channel.

Water temperatures taken during the survey period ranged from 54 to 64 degrees Fahrenheit. Air temperatures ranged from 58 to 81 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 7% riffle units, 52% flatwater units, and 41% pool units (Graph 1). Based on total length of Level II habitat types there were 2% riffle units, 86% flatwater units, and 12% pool units (Graph 2).

Fifteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were step runs, 41%; mid-channel pools, 36%; glides, 7%; and low gradient riffles, 6% (Graph 3). Based on percent total length, step runs made up 79%, and mid channel pools 10%.

A total of 94 pools were identified (Table 3). Main channel pools were the most frequently encountered, at 87%, and comprised 84% 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. Thirty-seven of the 94 pools (39%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 94 pool tail-outs measured, 15 had a value of 1 (16%); 52 had a value of 2 (55%); 24 had a value of 3 (24%); 3 had a value of 4 (3%); and 0 had a value of 5 (0%) (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. Riffle habitat types had a mean shelter rating of 13, flatwater habitat types had a mean shelter rating of 19, and pool habitats had a mean shelter rating of 34 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 35. Scour pools had a mean shelter rating of 28 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in Ramon Creek. Graph 7 describes the pool cover in Ramon 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 61% of pool tail-outs while small cobble was the next most frequently observed substrate type, at 32%.

The mean percent canopy density for the surveyed length of Ramon Creek was 75%. The mean percentages of deciduous and coniferous trees were 87% and 13%, respectively. Graph 9 describes the mean percent canopy in Ramon Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 69%. The mean percent left bank vegetated was 69%. The dominant elements composing the structure of the stream banks consisted of 10% bedrock, 3% boulder, 12% cobble/gravel, and 76% sand/silt/clay (Graph 10). Coniferous trees were the dominant vegetation type observed in 72% of the units surveyed. Additionally, 17% of the units surveyed had brush as the dominant vegetation type, and 8% had deciduous trees as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Young of year salmonids were detected using streambank observation techniques during the Ramon Creek stream survey.

DISCUSSION

Ramon Creek is a B4 channel type for the first 8,356 feet of stream surveyed, an F3 channel type for 7,638 feet, and a B3 for the remaining 4,838 feet of stream. The suitability of B4, F3, and B3 channel types for fish habitat improvement structures are as follows: B4 channel types are excellent for low-stage plunge weirs, boulder clusters, bank placed boulders, single opposing wing deflectors, and log cover. F3 channel types are good for bank-placed boulders, single and

opposing wing deflectors, and fair for plunge weirs, boulder clusters, channel constrictors, and log cover. B4 channel types excellent for plunge weirs, boulder clusters and bank placed boulders, single and opposing wing-deflectors, and log cover.

The water temperatures recorded on the survey days June 13 through June 20, 2002 ranged from 54 to 64 degrees Fahrenheit. Air temperatures ranged from 58 to 81 degrees Fahrenheit. This is a suitable water temperature range for salmonids. However, 60□ F, if sustained, is near the threshold stress level for salmonids. To make any further conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling would need to be conducted.

Flatwater habitat types comprised 86% of the total length of this survey, riffles 2%, and pools 12%. The pools are relatively deep, with 37 of the 94 (39%) 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.

Sixty-seven of the 94 pool tail-outs measured had embeddedness ratings of 1 or 2. Twenty-seven of the pool tail-outs had embeddedness ratings of 3 or 4. 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 Ramon Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Eighty-seven of the 94 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good spawning salmonids.

The mean shelter rating for pools was 34. The shelter rating in the flatwater habitats was 19. 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 75%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was moderate at 69% and 69%, 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) Ramon Creek should be managed as an anadromous, natural production stream.

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

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

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

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

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

7) Increase the canopy on Ramon Creek by planting willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels. The reaches above this survey section should be inventoried and treated as well, since the water flowing here is affected from upstream. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.

8) Suitable size spawning substrate on Ramon Creek is limited to relatively few reaches. Projects should be designed at suitable sites to trap and sort spawning gravel.

9) There are several log debris accumulations present on Ramon 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.

10) There are sections where the stream is being impacted from cattle trampling the riparian zone. Alternatives should be explored with the grazier and developed if possible.

11) Good water temperature and flow regimes exist in the stream and it offers good conditions for rearing fish. Fish passage should be monitored and improved where possible.

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 SURVEY ABOUT 30 FEET FROM THE CONFLUENCE WITH SOUTH FORK OF BIG RIVER. THE CHANNEL TYPE IS A B4.
47'	POOL CREATED FROM BOULDER SCOUR. COHO YOUNG OF YEAR (YOY) IN POOL.
126'	BEDROCK POOL GREATER THAN 60% OF WETTED WIDTH.
163'	LEFT BANK EROSION ABOUT 17 FEET LONG AND 20 FEET HIGH.
241'	BIG ROOT WAD STUMP ON THE RIGHT BANK.
517'	HUGE ROOTWAD AND BOULDER CREATING POOL.
769'	DRY RIGHT BANK TRIBUTARY AT TOP OF POOL, GREATER THAN 10% GRADIENT.
1308'	RESOTORATION WORK ON LEFT BANK. LWD CABLED TOGETHER TO FORM A POOL.
1413'	STUMP/ROOTWAD HELPING WITH THE SCOUR OF THIS POOL. COHO AND STEELHEAD YOY.
1439'	RIGHT BANK TRIBUTARY - DONKEY GULCH. THERE IS A CULVERT ABOUT 100 FEET UP THE BANK. DONKEY GULCH HAS A HIGH GRADIENT AND NO FISH PRESENT.
1506'	RESTORATION WORK ON RIGHT BANK, 2 LOGS CABLED TOGETHER.
1781'	2 OR 3 OLD COHO OR STEELHEAD REDDS.
1912'	BRIDGE CROSSING. BRIDGE APPRX. 50 FEET ABOVE WATER.
2314'	RESIDENT STEELHEAD. RESTORATION WORK ON THE LEFT BANK - LOGS REBARRED TOGETHER TO SAVE LEFT BANK FROM EROSION.
2451'	DRY LEFT BANK TRIBUTARY. HIGH GRADIENT. NO FISH OBSERVED.
2811'	LEFT BANK EROSION 35 FEET LONG AND 45 FEET HIGH.
2868'	SPRING ON LEFT BANK.

3146'	DRY RIGHT BANK TRIBUTARY.
3500'	LARGE WOODY DEBRIS (LWD) PILE ASSOCIATED WITH SOME SMALL WOODY DEBRIS (SWD).
3834'	DRY LEFT BANK TRIBUTARY.
4401'	LEFT BANK TRIBUTARY WITH WATER FLOWING. OLD RESTORATION PROJECT
4770'	RESTORATION WORK DONE WITH LWD.
5004'	1.5 FOOT CULVERT PIPE IN STREAM ABOUT 20 FEET LONG.
5196'	NORTH FORK RAMON CREEK ENTERS ON THE RIGHT BANK AND FLOWING.
5240'	HISTORIC RESTORATION SITE.
5765'	HISTORIC RESTORATION SITE.
6538'	FLOWING RIGHT BANK TRIBUTARY – “BIG BUTT CREEK”.
6705'	RIGHT BANK TRIBUTARY WITH A 1 FOOT CULVERT.
7539'	FLOWING LEFT BANK TRIBUTARY.
7823'	CHANNEL CHANGE TO F3.
7858'	DRY LEFT BANK TRIBUTARY.
7906'	LEFT BANK SPRING
8356'	CHANNEL TYPE IN THIS UNIT. F3.
8867'	DRY LEFT BANK TRIBUTARY
9163'	RESTORATION WORK FOR BANK STABILIZATION ON RIGHT BANK. LWD CABLED TOGETHER.
9658'	MORE THAN 10 PIECES OF LWD - ONE LOG IS ACROSS CHANNEL WITH WEIR NOTCHED IN MIDDLE. ROOT STUMPS IN CHANNEL.
9689'	DRY SMALL LEFT BANK TRIBUTARY. LANDSLIDE ON THE LEFT BANK ABOUT 200 FEET HIGH AND 200 FEET WIDE.
10518'	CORNER POOL GREATER THAN 60%. LWD PILE WITH SWD IN THE CORNER.
10541'	DRY TRIBUTARY ON RIGHT BANK.
10763'	DRY RIGHT BANK TRIBUTARY.
10971'	DRY LEFT BANK TRIBUTARY.

11153' BEDROCK ON RIGHT BANK AND LWD ON LEFT BANK. RIGHT BANK SLIDE CONTRIBUTING FINE SEDIMENTS.

11192' SCULPIN.

11458' SCOUR FROM ROOTWAD AND LWD.

11534' LWD PILE ON LEFT BANK CONTRIBUTING TO THE SCOUR.

11787' DRY RIGHT BANK TRIBUTARY WITH HIGH GRADIENT.

11851' LOG ENHANCED SCOUR POOL GREATER THAN 60%.

12085' LWD AND BEDROCK FORMING THE POOL.

12096' RIGHT BANK EROSION 40 FEET HIGH AND 20 FEET LONG.

12230' UNIDENTIFIED FROG.

12378' SALMONID REDD ABOUT 200 FEET INTO UNIT.

13152' LWD PILE 6 FEET HIGH, 30 FEET WIDE, AND 50 FEET LONG.

13260' LEFT BANK TRIBUTARY WITH LITTLE FLOW.

14119' SCULPIN, STEELHEAD, AND COHO IN GLIDE.

14172' CHANNEL GETTING OVERGROWN WITH GRASS AND BRUSH.

14450' RIGHT BANK TRIBUTARY.

14670' LWD 6 FEET TALL, 20 FEET WIDE, AND 10 FEET LONG. SEDIMENT PILE AT THE TOP COULD BE A POTENTIAL BARRIER.

15143' UNIDENTIFIED SKINK WITH BLUE TAIL.

15163' LEFT BANK SPRING.

15306' LWD PILE.

15986' CHANNEL TYPE CHANGE. CHANGED TO B3. DRY RIGHT BANK TRIBUTARY.

15994' HAVEN'T SEENT COHO YOY SINCE 1413’ OF THE SURVEY. STILL SEEING SCATTERED STEELHEAD YOY. CHANNEL TYPE TAKEN.

16162' DRY LEFT BANK TRIBUTARY.

16389' LWD IS SPLITTING THE STREAM. STEELHEAD YOY.

16404' LEFT BANK EROSION CONTRIBUTING FINE SEDIMENTS INTO THE STREAM.

16633' SCULPIN, NO STEELHEAD OR COHO.

16662' DRY RIGHT BANK TRIBUTARY. LARGE WOODED STRUCTURE -OLD BRIDGE OR DAM? MANY LOGS CRISS-CROSSED THROUGH-OUT CHANNEL. SOME UP TO 30 FEET HIGH AND BROKEN IN HALF. LOGS ALSO APPEAR TO HAVE BEEN BURNT.

17267' LOG WEIR RESTORATION SITE.

17420' LWD PILE.

17515' A CUT LOG LYING ACROSS STREAM.

17684' LOG JAM IN STREAM.

17719' LARGE SEDIMENT BUILD UP IN STREAM.

17790' DRY LEFT BANK TRIBUTARY.

17906' SCULPIN.

18044' LARGE WOODEN STRUCTURES IN STREAM.

18358' LEFT BANK TRIBUTARY.

18474' SCOUR CREATED BY LWD BUT POOL IS GREATER THAN 60% WETTED WIDTH. LAYER OF SEDIMENT COVERING THE SUBSTRATE. SUBSTRATE/SEDIMENT PILED AT TOP OF LWD.

18488' SOME BEDROCK AT THE BOTTOM OF UNIT. SLIDE ON LEFT BANK CONTRIBUTING FINE SEDIMENTS.

18661' LEFT BANK TRIBUTARY

19085' 290 FEET INTO UNIT THERE IS A RIGHT BANK TRIBUTARY WITH LITTLE WATER FLOWING. RESTORATION WORK ON THE LEFT BANK.

19150’ DRY LEFT BANK TRIBUTARY

19325' 2.5 FOOT PLUNGE OVER LOG WEIR.

19450' 3 FOOT PLUNGE WITH SUBSTRATE/SEDIMENT PILED AT TOP. POTENTIAL DOWNSTREAM MIGRATING ISSUE.

19968' POSSIBLE CHANNEL TYPE CHANGE. CHANGE TO B3.

20332' LARGE COBBLE AND LARGE WOOD IN CHANNEL. ENTRENCHMENT INCREASING.

20465' POTENTIAL BARRIER. LWD PILE BACKING UP SUBSTRATE/SEDIMENT FLOW SEEPING UNDERGROUND. LWD PILE IS 10 X 25 X 13 FEET.

20550' RIGHT BANK TRIBUTARY.

20672' END OF SURVEY. BELIEVED TO HAVE REACHED END OF ANADROMY. STEELHEAD HAVE NOT BEEN OBSERVED SINCE UNIT 187. CROSSED MULTIPLE LOG JAMS THAT MAY HAVE BEEN POTENTIAL BARRIERS. GRADIENT BEGINNING TO INCREASE.

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.

LEVEL III and LEVEL IV HABITAT TYPES

RIFFLE			
Low Gradient Riffle	(LGR)	[1.1]	{ 1}
High Gradient Riffle	(HGR)	[1.2]	{ 2}
CASCADE			
Cascade	(CAS)	[2.1]	{ 3}
Bedrock Sheet	(BRS)	[2.2]	{24}
FLATWATER			
Pocket Water	(POW)	[3.1]	{21}
Glide	(GLD)	[3.2]	{14}
Run	(RUN)	[3.3]	{15}
Step Run	(SRN)	[3.4]	{16}
Edgewater	(EDW)	[3.5]	{18}
MAIN CHANNEL POOLS			
Trench Pool	(TRP)	[4.1]	{ 8}
Mid-Channel Pool	(MCP)	[4.2]	{17}
Channel Confluence Pool	(CCP)	[4.3]	{19}
Step Pool	(STP)	[4.4]	{23}
SCOUR POOLS			
Corner Pool	(CRP)	[5.1]	{22}
Lateral Scour Pool - Log Enhanced	(LSL)	[5.2]	{10}
Lateral Scour Pool - Root Wad Enhanced	(LSR)	[5.3]	{11}
Lateral Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{12}
Lateral Scour Pool - Boulder Formed	(LSBo)	[5.5]	{20}
Plunge Pool	(PLP)	[5.6]	{ 9}
BACKWATER POOLS			
Secondary Channel Pool	(SCP)	[6.1]	{ 4}
Backwater Pool - Boulder Formed	(BPB)	[6.2]	{ 5}
Backwater Pool - Root Wad Formed	(BPR)	[6.3]	{ 6}
Backwater Pool - Log Formed	(BPL)	[6.4]	{ 7}
Dammed Pool	(DPL)	[6.5]	{13}
ADDITIONAL UNIT DESIGNATIONS			
Dry	(DRY)	[7.0]	
Culvert	(CUL)	[8.0]	
Not Surveyed	(NS)	[9.0]	
Not Surveyed due to a marsh	(MAR)	[9.1]	

TABLE 8. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: RAMON CREEK
SAMPLE DATES: 06/13/02 to 06/20/02
STREAM LENGTH: 20832 ft.
LOCATION OF STREAM MOUTH:
USGS Quad Map: COMPTCHE — Latitude: 39°29'56"
Legal Description: T16NR15WS02 — Longitude: 123°53'26"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 01

Channel Type: B4	Canopy Density: 68%
Channel Length: 8356 ft.	Coniferous Component: 88%
Riffle/flatwater Mean Width: 7 ft.	Deciduous Component: 12%
Total Pool Mean Depth: 1.0 ft.	Pools by Stream Length: 15%
Base Flow: 0.3 cfs	Pools >=3 ft.deep: 8%
Water: 056- 064°F Air: 058-076°F	Mean Pool Shelter Rtn: 26
Dom. Bank Veg.: Coniferous Trees	Dom. Shelter: Large Woody Debris
Vegetative Cover: 68%	Occurrence of LOD: 25%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 0 ft.

Embeddness Value: 1. 22% 2.59% 3. 19% 4. 0% 5. 0%

STREAM REACH 02

Channel Type: F3	Canopy Density: 75%
Channel Length: 7638 ft.	Coniferous Component: 83%
Riffle/flatwater Mean Width: 7 ft.	Deciduous Component: 17%
Total Pool Mean Depth: 1.0 ft.	Pools by Stream Length: 10%
Base Flow: 0.3 cfs	Pools >=3 ft.deep: 6%
Water: 055- 062°F Air: 065-081°F	Mean Pool Shelter Rtn: 31
Dom. Bank Veg.: Coniferous Trees	Dom. Shelter: Large Woody Debris
Vegetative Cover: 79%	Occurrence of LOD: 27%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 0 ft.

Embeddness Value: 1. 14% 2.57% 3. 23% 4. 6% 5. 0%

STREAM REACH 03

Channel Type: B3	Canopy Density: 89%
Channel Length: 4838 ft.	Coniferous Component: 93%
Riffle/flatwater Mean Width: 5 ft.	Deciduous Component: 7%
Total Pool Mean Depth: 0.9 ft.	Pools by Stream Length: 8%
Base Flow: 0.3 cfs	Pools >=3 ft.deep: 0%
Water: 054- 058°F Air: 058-079°F	Mean Pool Shelter Rtn: 58
Dom. Bank Veg.: Coniferous Trees	Dom. Shelter: Large Woody Debris
Vegetative Cover: 50%	Occurrence of LOD: 35%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 13 ft.

Embeddness Value: 1. 9% 2.45% 3. 41% 4. 5% 5. 0%

RAMON CREEK Drainage: SF BIG RIVER

Table 1 - SUMMARY OF RIFFLE, FLATWATER, AND POOL HABITAT TYPES Survey Dates: 06/13/02 to 06/20/02

Confluence Location: QUAD: COMPTCHE LEGAL DESCRIPTION: T16NR15WS02 LATITUDE:39°29'56" LONGITUDE:123°53'26"

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
15	7	RIFFLE	7	32	479	2	6.7	0.2	191	2863	47	704	0	13
120	17	FLATWATER	52	149	17895	86	6.4	0.4	491	58902	210	25228	0	19
94	94	POOL	41	26	2445	12	8.0	1.0	211	19866	219	20569	163	34
1	0	DRY	0	13	13	0	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.)
230	118	20832	81631	46500

RAMON CREEK — Drainage: SF BIG RIVER

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS — Survey Dates: 06/13/02 to 06/20/02

Confluence Location: QUAD: COMPTCHE LEGAL DESCRIPTION: T16NR15WS02 LATITUDE:39°29'56" LONGITUDE:123°53'26"

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 %
14	6	LGR	6	31	436	2	7	0.2	0.9	207	2897	50	700	0	8	74
1	1	HGR	0	43	43	0	4	0.3	1.1	95	95	28	28	0	40	90
16	7	GLD	7	43	689	3	8	0.6	1.5	320	5124	194	3104	0	8	71
10	4	RUN	4	66	664	3	5	0.2	0.5	342	3416	92	924	0	4	61
94	6	SRN	41	176	16542	79	6	0.3	1.8	789	74205	308	28924	0	42	77
82	82	MCP	36	25	2060	10	8	1.0	4.7	209	17114	215	17645	160	35	75
1	1	LSL	0	21	21	0	11	1.5	3.1	231	231	347	347	300	60	80
3	3	LSR	1	25	74	0	5	0.9	1.5	110	330	97	290	78	17	87
6	6	LSBk	3	43	256	1	7	1.0	3.4	304	1825	312	1872	233	12	83
2	2	PLP	1	17	34	0	11	1.1	2.7	183	366	207	414	153	75	90
1	0	DRY	0	13	13	0	0	0.0	0.0	0	0	0	0	0	0	95

TOTAL UNITS	TOTAL UNITS	LENGTH (ft.)	AREA (sq.ft)	TOTAL VOL. (cu.ft)
230	118	20832	105602	54249

RAMON CREEK

Drainage: SF BIG RIVER

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 06/13/02 to 06/20/02

Confluence Location: QUAD: COMPTCHE LEGAL DESCRIPTION: T16NR15WS02 LATITUDE:39°29'56" LONGITUDE:123°53'26"

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
82	82	MAIN	87	25	2060	84	8.1	1.0	209	17114	215	17645	160	35
12	12	SCOUR	13	32	385	16	7.3	1.0	229	2752	244	2923	187	28

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq.ft.)	TOTAL VOL. (cu.ft.)
94	94	2445	19866	20569

RAMON CREEK Drainage: SF BIG RIVER

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES Survey Dates: 06/13/02 to 06/20/02

Confluence Location: QUAD: COMPTCHE LEGAL DESCRIPTION: T16NR15WS02 LATITUDE:39°29'56" LONGITUDE:123°53'26"

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
82	MCP	87	0	0	53	65	26	32	2	2	1	1
1	LSL	1	0	0	0	0	0	0	1	100	0	0
3	LSR	3	0	0	3	100	0	0	0	0	0	0
6	LSBk	6	0	0	0	0	5	83	1	17	0	0
2	PLP	2	0	0	1	50	1	50	0	0	0	0

TOTAL UNITS
94

RAMON CREEK Drainage: SF BIG RIVER

Table 5 - SUMMARY OF MEAN PERCENT COVER BY HABITAT TYPE Survey Dates: 06/13/02 to 06/20/02

Confluence Location: QUAD: COMPTCHE LEGAL DESCRIPTION: T16NR15WS02 LATITUDE:39°29'56" LONGITUDE:123°53'26"

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
14	5	LGR	0	18	14	0	31	0	0	37	0
1	1	HGR	0	50	50	0	0	0	0	0	0
16	7	GLD	11	1	13	0	21	0	0	21	33
10	3	RUN	0	17	17	0	23	0	0	43	0
94	6	SRN	0	10	30	5	29	0	0	23	3
82	77	MCP	10	22	32	7	5	0	0	9	15
1	1	LSL	25	25	25	0	0	0	0	25	0
3	2	LSR	75	0	0	25	0	0	0	0	0
6	6	LSBk	8	17	9	3	9	0	0	6	48
2	2	PLP	25	20	40	8	0	0	8	0	0
1	0	DRY	0	0	0	0	0	0	0	0	0

RAMON CREEK

Drainage: SF BIG RIVER

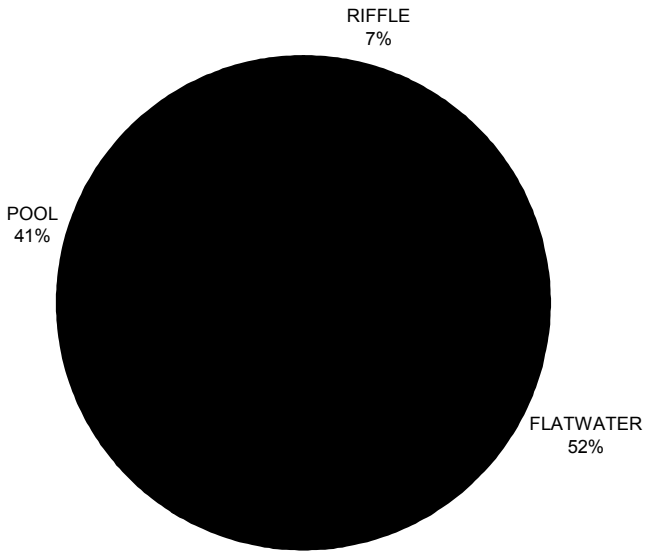
Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE

Survey Dates: 06/13/02 to 06/20/02

Confluence Location: QUAD: COMPTCHE LEGAL DESCRIPTION: T16NR15WS02 LATITUDE:39°29'56" LONGITUDE:123°53'26"

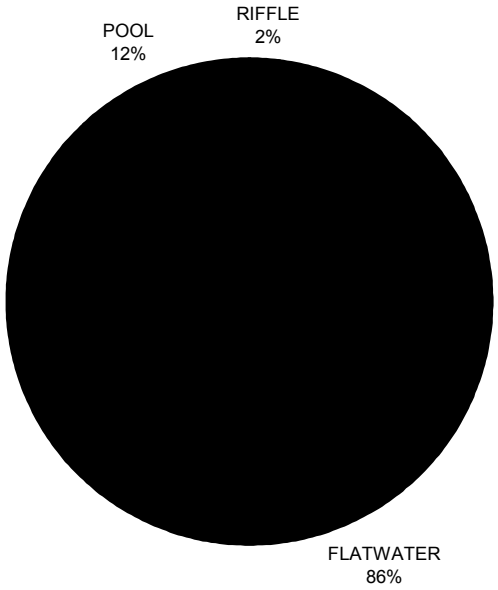
TOTAL HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	% TOTAL SILT/CLAY DOMINANT	% TOTAL SAND DOMINANT	% TOTAL GRAVEL DOMINANT	% TOTAL SM COBBLE DOMINANT	% TOTAL LG COBBLE DOMINANT	% TOTAL BOULDER DOMINANT	% TOTAL BEDROCK DOMINANT
14	6	LGR	0	0	33	67	0	0	0
1	1	HGR	0	0	0	100	0	0	0
16	7	GLD	0	0	71	29	0	0	0
10	4	RUN	0	0	75	25	0	0	0
94	6	SRN	0	0	67	17	17	0	0
82	10	MCP	0	20	60	20	0	0	0
1	1	LSL	0	100	0	0	0	0	0
3	1	LSR	0	100	0	0	0	0	0
6	2	LSBk	50	0	50	0	0	0	0
2	1	PLP	0	0	100	0	0	0	0
1	0	DRY	0	0	0	0	0	0	0

RAMON CREEK
HABITAT TYPES BY PERCENT OCCURENCE



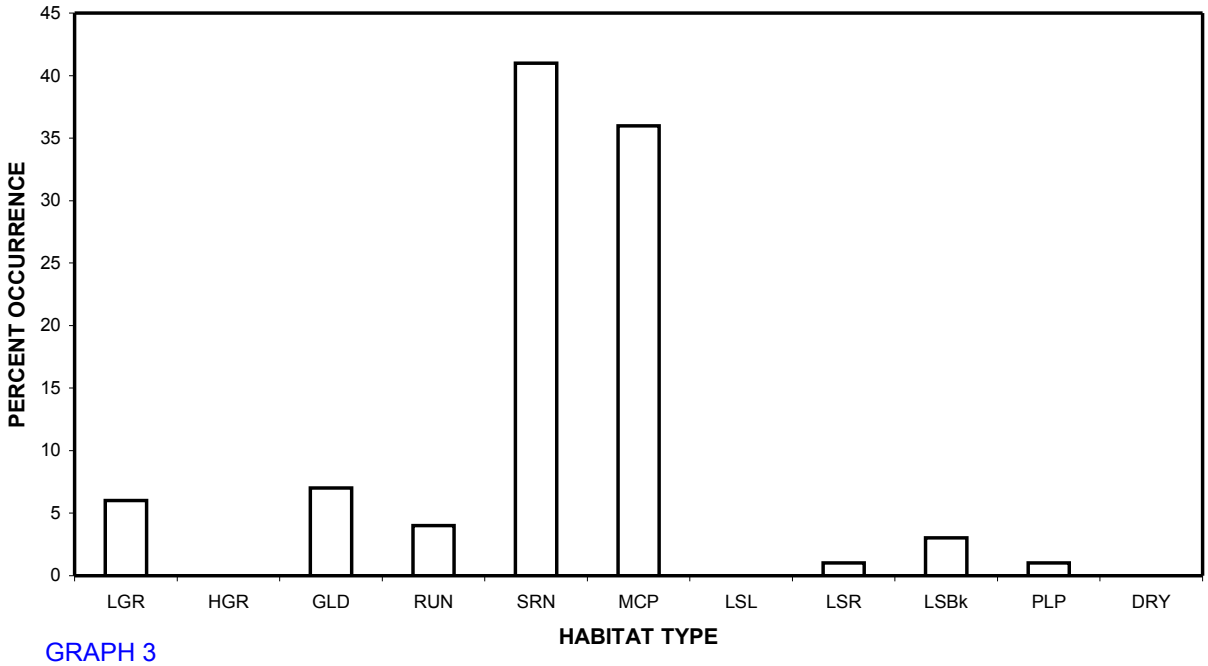
GRAPH 1

RAMON CREEK
HABITAT TYPES BY PERCENT TOTAL LENGTH



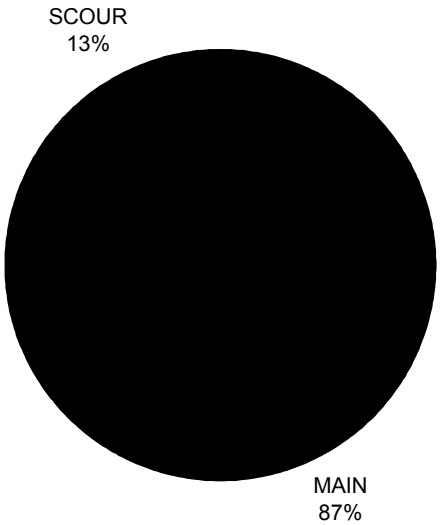
GRAPH 2

RAMON CREEK
HABITAT TYPES BY PERCENT OCCURRENCE



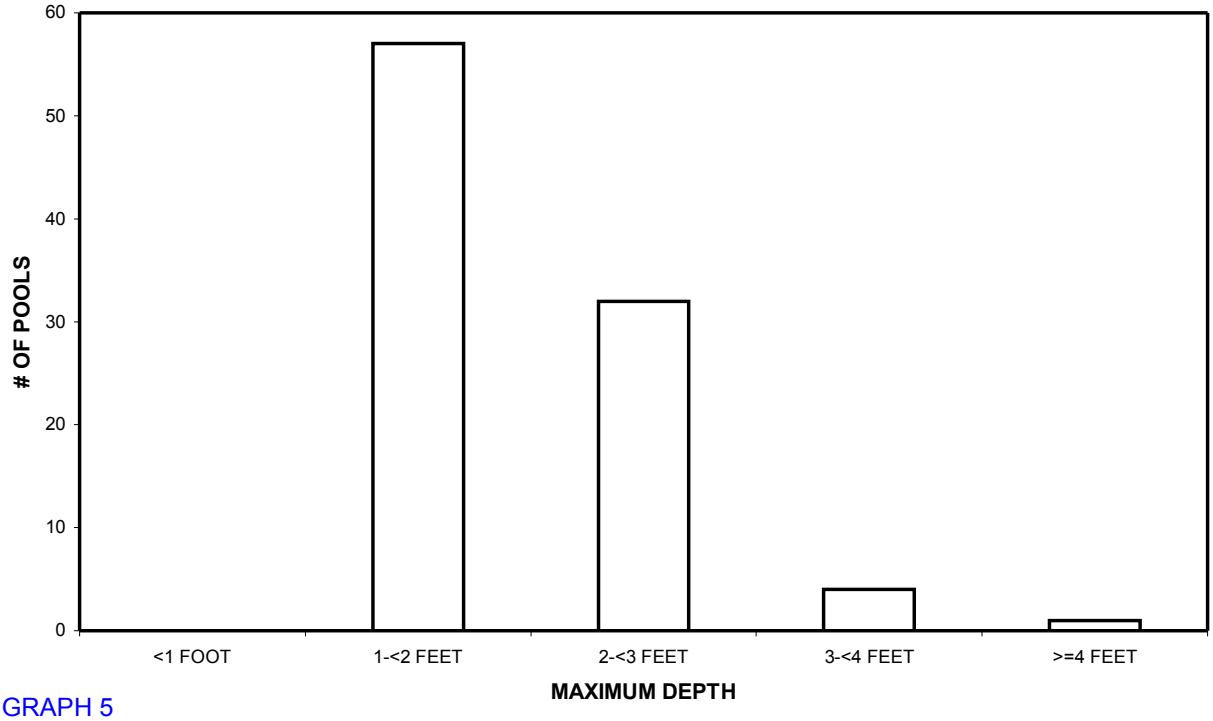
GRAPH 3

RAMON CREEK
POOL HABITAT TYPES BY PERCENT OCCURRENCE



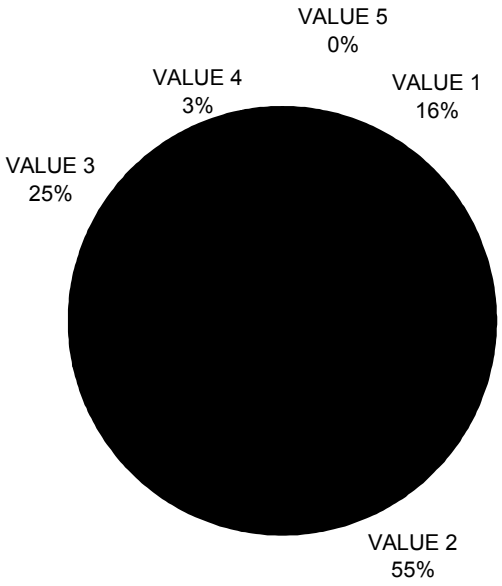
GRAPH 4

RAMON CREEK
MAXIMUM DEPTH IN POOLS



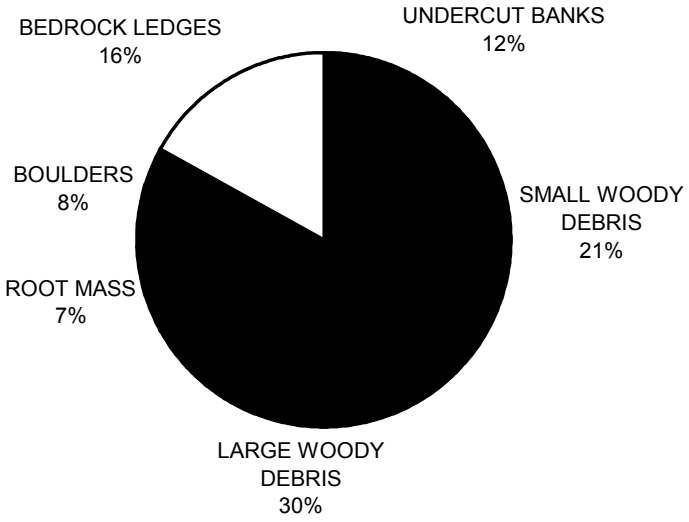
GRAPH 5

RAMON CREEK
PERCENT EMBEDDEDNESS



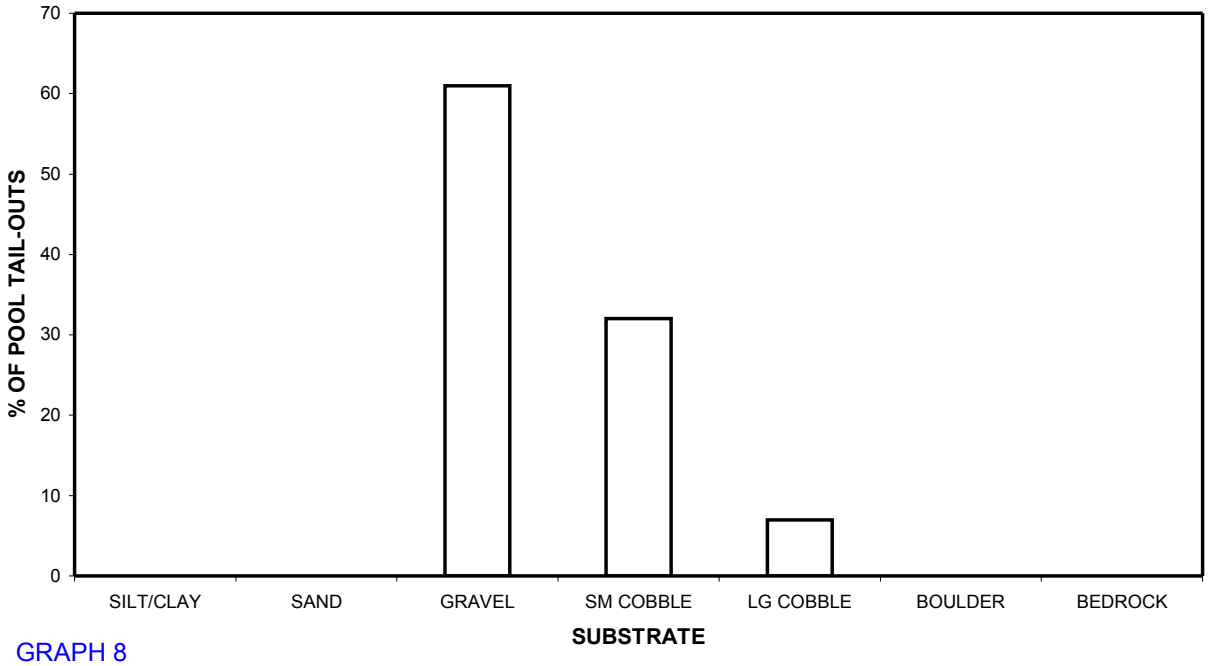
GRAPH 6

RAMON CREEK
MEAN PERCENT COVER TYPES IN POOLS



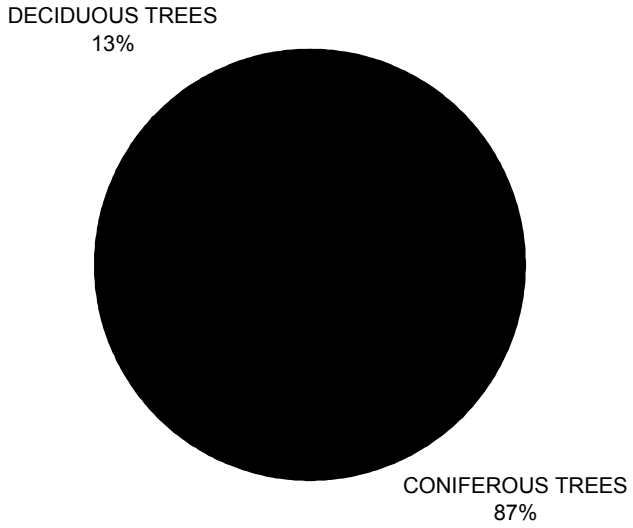
GRAPH 7

RAMON CREEK
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



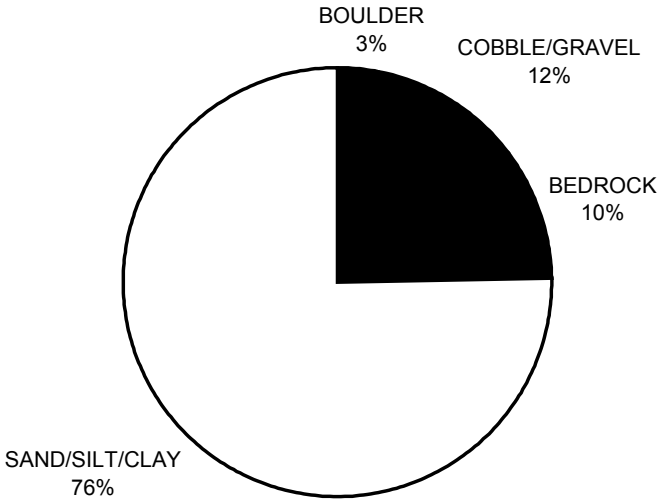
GRAPH 8

RAMON CREEK
MEAN PERCENT CANOPY



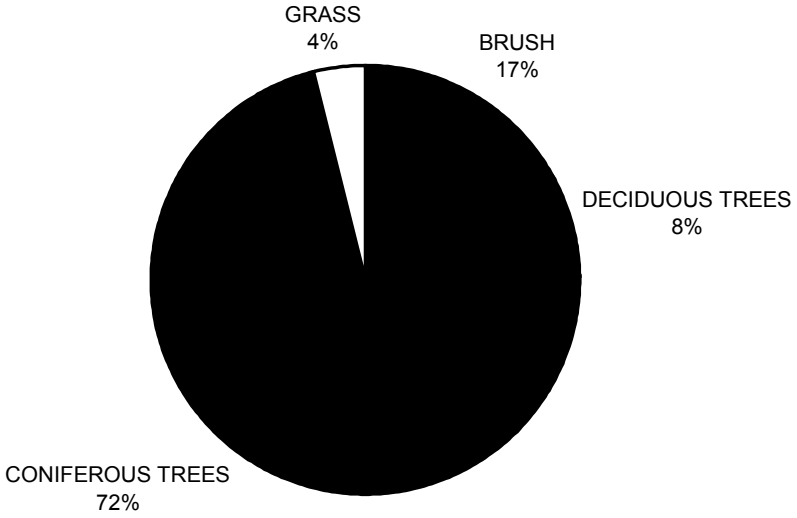
GRAPH 9

RAMON CREEK
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

RAMON CREEK
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11