NORTH COAST WATERSHED AND FISHERY IMPROVEMENT PROGRAM

STREAM INVENTORY REPORT

North Fork Ramon Creek, Ramon Creek, 2002

CALIFORNIA DEPARTMENT OF FISH AND GAME

2003

Northern California-North Coast Region

STREAM INVENTORY REPORT

North Fork Ramon Creek

INTRODUCTION

A stream inventory was conducted beginning June 13, and ending June 20, 2002 on North Fork Ramon Creek. The survey began at the confluence with Ramon Creek and extended upstream 1.45 miles. A stream inventory was also completed for Big Butt Gulch, a tributary to North Fork Ramon Creek. No report was created for Big Butt Gulch.

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

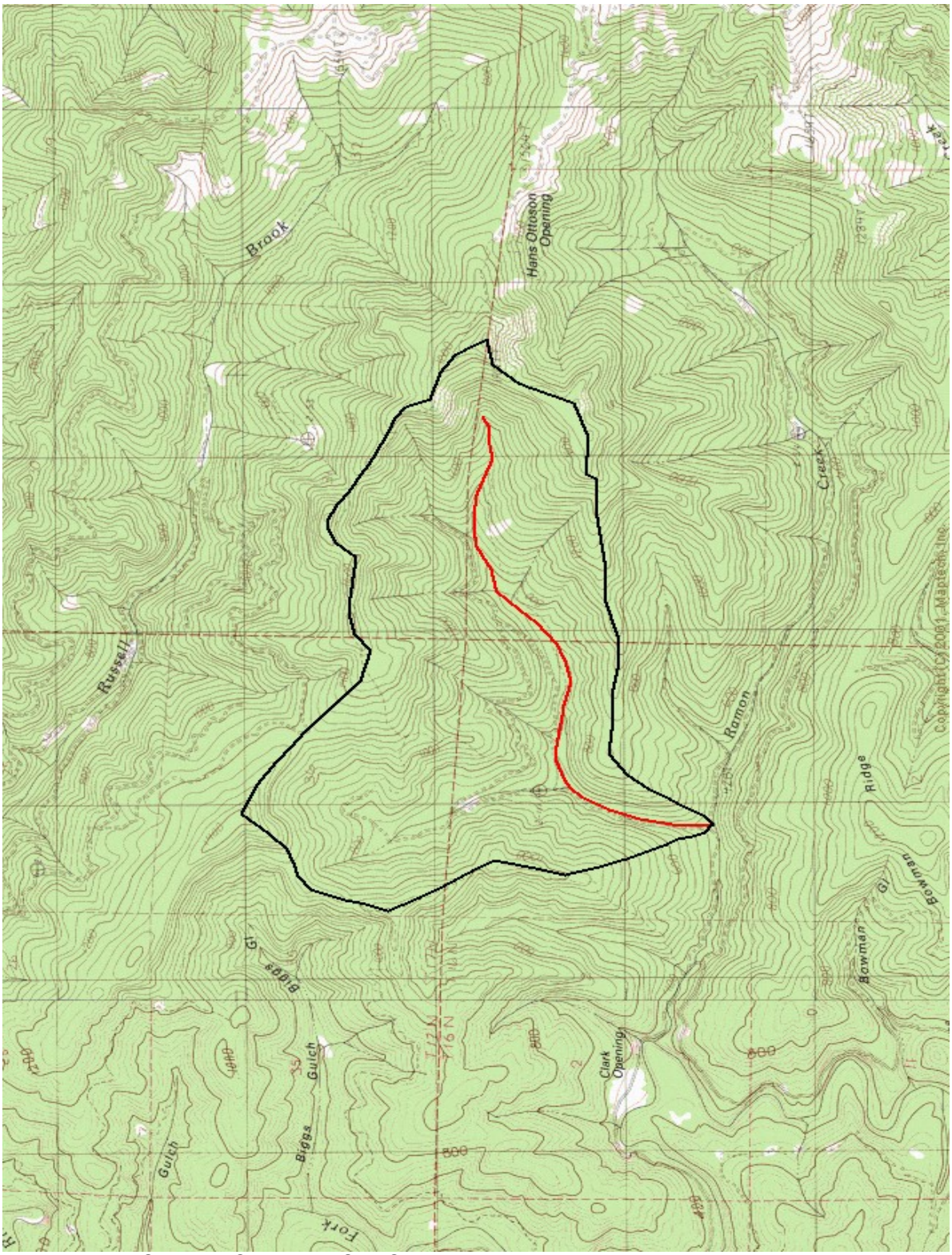
The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for coho salmon, and steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's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

WATERSHED OVERVIEW

North Fork Ramon Creek is a tributary to the Ramon Creek, a tributary to the South Fork Big River, located in Mendocino County, California (Map 1). North Fork Ramon Creek's legal description at the confluence with Ramon Creek is T16N R15W S1. Its location is 39°26′9″ North latitude and 123°48′8″ West longitude. North Fork Ramon Creek is a second order stream and has approximately 1.8 miles of solid blue line stream according to the USGS Greenough Ridge 7.5 minute quadrangle. North Fork Ramon Creek drains a watershed of approximately 1.64 square miles. Elevations range from about 440 feet at the mouth of the creek to 1450 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 North Fork 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).



MAP 1. NORTH FORK RAMON CREEK.

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 North Fork 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". North Fork 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 North Fork 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 North Fork 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 North Fork 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 North Fork 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 North Fork 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 North Fork 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 20, 2002, was conducted by Kate Grossman and Beth Wood (WSP). The total length of the stream surveyed was 7,657 feet.

Stream flow was not measured on North Fork Ramon Creek.

North Fork Ramon Creek is an F4 channel type for the entire 7,657 feet of stream surveyed. F4 channel types are classified as entrenched meandering riffle/pool channels on low gradients with a high width/depth ratio and a gravel-dominated substrate.

Water temperatures taken during the survey period ranged from 53 to 59 degrees Fahrenheit. Air temperatures ranged from 56 to 71 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 13% riffle units, 40% flatwater units, and 47% pool units (Graph 1). Based on total length of Level II habitat types there were 11% riffle units, 69% flatwater units, and 19% pool units (Graph 2).

Seventeen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pools, 31%; step runs, 32%; and low gradient riffles, 10% (Graph 3). Based on percent total length, step runs made up 65%, mid-channel pools, 12%, and low gradient riffles, 10%.

A total of 73 pools were identified (Table 3). Main channel pools were the most frequently encountered, at 78%, and comprised 83% 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. Eleven of the 73 pools (15%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 73 pool tail-outs

measured, 34 had a value of 1 (47%); 15 had a value of 2 (21%); 7 had a value of 3 (10%); 3 had a value of 4 (4%); and 14 had a value of 5 (19%) (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 9, flatwater habitat types had a mean shelter rating of 15, and pool habitats had a mean shelter rating of 37 (Table 1). Of the pool types, the backwater pools had the highest mean shelter rating of 45. Scour pools had a mean shelter rating of 39 and main channel pools had mean shelter rating at 36 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in North Fork Ramon Creek. Graph 7 describes the pool cover in North Fork 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 77% of pool tail-outs while small cobble was the next most frequently observed substrate type, at 11%.

The mean percent canopy density for the surveyed length of North Fork Ramon Creek was 76%. The mean percentages of deciduous and coniferous trees were 9% and 91%, respectively. Graph 9 describes the mean percent canopy in North Fork Ramon Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 43%. The mean percent left bank vegetated was 39%. The dominant elements composing the structure of the stream banks consisted of 17% bedrock, 2% boulder, 202% cobble/gravel, and 61% sand/silt/clay (Graph 10). Coniferous trees were the dominant vegetation type observed in 33% of the units surveyed. Additionally, 22% of the units surveyed had deciduous trees as the dominant vegetation type, and 20% had brush as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Salmonids were detected using streambank observation techniques during theNorth Fork Ramon Creek stream survey.

DISCUSSION

North Fork Ramon Creek is a F4 channel type for the entire 7,657 feet of stream surveyed. The suitability of F4 channel type for fish habitat improvement structures is as follows: F4 channel

types are good for bank placed boulders, fair for plunge weirs, single opposing wing deflectors, channel constrictors, and log cover

The water temperatures recorded on the survey days June 13 through June 20, 2002 ranged from 53 to 59 degrees Fahrenheit. Air temperatures ranged from 56 to 71 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 69% of the total length of this survey, riffles 11%, and pools 19%. The pools are relatively shallow, with 11 of the 73 (15%) 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.

Forty-nine of the 73 pool tail-outs measured had embeddedness ratings of 1 or 2. Ten 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 North Fork Ramon Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Sixty-four of the 73 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 37. The shelter rating in the flatwater habitats was 15. 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 76%. 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 43% and 39%, 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) North Fork 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 North Fork 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 North Fork Ramon Creek is limited to relatively few reaches. Projects should be designed at suitable sites to trap and sort spawning gravel.

9) 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.

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.

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 20 FEET FROM CONFLUENCE WITH RAMON CREEK. BOTH CREEKS HAVE SIMILAR FLOW ABOVE CONFLUENCE. SALMONIDS PRESENT.
90'	BRIDGE. EROSION FROM BRIDGE ON RIGHT BANK, LOTS OF SEDIMENT.
106'	RIGHT BANK CULVERT, POSSIBLE FAILURE RIGHT AFTER BRIDGE. YOUNG OF YEAR (YOY) AND 1+ SALMONID PRESENT.
191'	BEDROCK ON LEFT BANK, STEEP EMBANKMENT. SALMONIDS (4).
211'	SALMONIDS PRESENT; YOY AND 1+.
247'	HUGE RIGHT BANK BEDROCK CAUSING SCOUR, COMPLETELY VERTICAL. FROG PRESENT AND SALMONIDS.
309'	LEFT BANK BEDROCK 20 FEET VERTICAL CLIFF, EVERGREEN TREES ON TOP, NO VEGETATION ON CLIFF. SOME BEDROCK GIVES CANOPY TO POOL.
328'	HIGHLY ENTRENCHED FROM BEDROCK ON BOTH SIDES. LEFT BANK BEDROCK OVERHANG POOL. RED BELLIED NEWT.
335'	GRADIENT GREATER THAN 5%. BUBBLE CURTAIN COVERING TRENCH POOL, HIGHLY ENTRENCHED.
342'	COMING OUT OF BEDROCK ENTRENCHED CHANNEL.
355'	SALMONIDS PRESENT, STEELHEAD YOY, SALAMANDER. LARGE POOL CONSIDERING PREVIOUS ENTRENCHMENT, NO CANOPY. COMPRISED OF 3 POOLS. APPROXIMATELY 40 FEET SQUARED UNDERCUT RIGHT BANK IN 3RD POOL. 3 FOOT CASCADE IN MIDDLE OF POOLS (BETWEEN 2 AND 3 POOLS).
391'	COHO YOY AND SH YOY. SMALL WOOD CREATING COVER.
439'	SALMONIDS PRESENT.
489'	HIGHLY SILTED.

506' HUGE REDWOOD DOWN ACROSS CREEK, BUT 10 FEET ABOVE WATER. STEELHEAD YOY.

583' SALMONIDS PRESENT.

681' 4 PIECES OF LWD AND SMALL WOODY DEBRIS CREATING SMALL WOOD JAM. 3 X 10 X 10 (HxWxD).

695' SALMONID(S) YOY PRESENT

759' LOG ENHANCED 3 PIECES OF LWD MAKING V ACROSS CHANNEL, RETAINING GRAVEL.

793' 4 PIECES OF LARGE WOODY DEBRIS (LWD) WITH SMALL WOODY DEBRIS (SWD) COMPLETELY CROSSING WIDTH OF CHANNEL TO SURFACE OF WATER. 15 X 6 X 7 FEET OF LOG JAM (W x H x D). RETAINING GRAVEL BEHIND, NO SEDIMENT BUILD UP.

804' AT LEAST 1 SALMONID PRESENT.

926' 2 STEELHEAD YOY PRESENT, LOG JAM ENHANCED. 5 PIECES LWD NOT RETAINING SEDIMENT.

950' STEELHEAD YOY PRESENT.

1028' RED LEGGED FROG PRESENT. SALMONIDS PRESENT. RIGHT BANK LATERAL SCOUR ENHANCED.

1096' SALMONIDS PRESENT.

1138' SALMONIDS PRESENT.

1173' LEFT BANK LATERAL SCOUR BEDROCK ENHANCED. ONE PIECE LWD

1194' SALMONID YOY PRESENT.

1387' SALMONIDS PRESENT. RIGHT BANK BEDROCK SCOUR, LEFT BANK ROOT WAD, LEFT UNDERCUT BANK, FIRST POOL. LOW GRADIENT RIFFLE BETWEEN POOLS WITH BOUILDERS. 8 PIECES OF LWD AT TOP OF UNIT, RETAINING SOME GRAVEL, BUT NO SEDIMENT, SWD ALSO WITH LARGER PIECES.

1437' MANY FROGS AND SALMONID YOY PRESENT.

1685' MANY FROGS IN DEEPEST PART OF POOL. 4 PIECES OF LWD CREATING BACKWATER POOL.

1786' LATERAL SCOUR CAUSED BY LOG JAM, 6 LWD ALL 12'WIDE X 20' LONG. LOG JAM HOLDING SEDIMENT BEHIND IT. POOL IS LIGHTLY COVERED IN SEDIMENT.

1903' LATERAL SCOUR CAUSED BY LWD ON RIGHT BANK 12' WIDE X 10' LONG AND SWD FOUND WITH LWD.

2024' HIGHLY SEDIMENTED, 2 POOLS WITH CASCADE BETWEEN THEM.

2120' 6'x10' NO VEGETATIONON LEFT BANK THAT IS DROPPING SEDIMENT INTO STREAM. POOL CAUSED BY 2 LWD ROOT WADS ON RIGHT BANK.

2225' RIGHT BANK TRIBUTARY DRY.

2261' CHANNEL PARTIALLY OBSTRUCTED BY 1 LWD(3' WIDTH 100' LONG) ON RIGHT BANK.

2484' 1 FROG.

2836' RIGHT BANK TRIBUTARY IS FLOWING BUT CONFLUENCE BLOCKED BY SINGLE PIECE OF LWD RETAINING GRAVEL BEHIND IT. WATER DROPS 2 FEET OVER LOG INTO POOL. WALKED APPROXIMATELY 300' OF TRIBUTARY, NO FISH PRESENT. OLD HUMBOLDT CROSSING 50' INTO TRIBUTARY.

3025' LOG JAM 5 LWD 60 FEET LONG 3 FEET DROP FROM LWD TO POOL. A LOT OF GRAVEL/SEDIMENT BEING HELD BACK BY LOG JAM.

3055' POSSIBLE REDD FOUND, POT 3.5 ' LONG 2.5' WIDE.

3223' 17' POSSIBLE REDD.

3351' SWD AT BOTTOM THAT IS CAUSING IT TO POOL UP AT BOTTOM.

3393' PEA GRAVEL MIXED WITH REGULAR GRAVEL AND COBBLE AND BOULDERS.

3511' CHANNEL TYPE TAKEN. 1 PIECE OF LWD ACROSS CHANNEL, SOME SCOUR

3628' RIGHT BANK LANDSLIDE-OLD AND CONTRIBUTING FINES TO POOL. VERY SILTY. LEFT BANK UNDERCUT 1 FOOT.

3820' RIGHT BANK TRIBUTARY, FLOWING. WALKED 150 FEET OF TRIBUTARY. GRADIENT IS GREATER THAN 5%. NO FISH OBSERVED. SEVERAL LOG JAMS EACH AT LEAST 5 FEET TALL, EACH RETAINING GRAVEL ON TOP. ORANGE ALGAE BACTERIA ABOUT HALF WAY UP

3888' LWD ACCUMULATION FROM OLD LEFT BANK SLIDE. ONE TREE STILL ALIVE (TAN OAK). 4 PIECES OF LWD COMPLETELY CUTTING OFF CHANNEL. 6' DROP FROM TOP OF GRAVEL TO SURFACE OF WATER. LOT OF SWA ON TOP. RETAINING GRAVEL. WATER FLOW MOSTLY BEING

3899' 2 TREES DOWN, CAUSING SOME SCOUR AND EROSION, BUT NOT DEEP WATER.

4040' FORMED ON CORNER BUT SCOUR IS IN MID CHANNEL. LEFT BANK RUN OFF DITCH ENTERS. WALKED UP THIS DITCH AND FOUND 2-3 FOOT CULVERT. ONLY LEADS 25' OR SO AND ENDS UP ON MAIN CHANNEL OF CREEK.

4051' CULVERT ENTERS ON LEFT BANK ,5.5 FEET HIGH 2-3 FEET WIDE.

4121' FROGS PRESENT.

4134' OLD LOG ACROSS CHANNEL. APPEARS TO BE VERY OLD HUMBOLDT CROSSING.

4222' HUGE LOG IN CHANNEL UP AND DOWN STREAM. SCOUR IS ALONG AND UNDER THIS LOG. A LOT OF EROSION FROM BOTH BANKS. WATER GOES UNDERGROUND FOR 3 FEET. SMALL GRAVEL BAR BLOCKING FLOW.

4376' LOTS OF SWA.

4424' RETAINING GRAVEL BEHIND LOG JAM ROOTWAD AND 1 PIECE LWD.

4547' LDA CAUSED BY DEAD TAN OAK FALLEN IN CHANNEL. LEFT BANK BEING ERODED BY WATER SCOURING AROUND TREE.

4555' OLD SKID ROAD ON LEFT BANK, POSSIBLE LOTS OF EROISION.

4670' ROOT ENHANCED.

4724' ENHANCED BY LWD AND SWA AT TOP OF UNIT-RETAINING GRAVEL.

4735' SEVERAL LWD ACCUMULATION THROUGHOUT UNIT, NONE RETAINING GRAVEL.

4998' CAUSED BY 5 PIECES OF LWD COVERING CHANNEL, RETAINING GRAVEL. WATER SCOURS LEFT BANK DURING HIGH FLOW.

5078' 7 PIECES OF LWD. POOL COVERED IN FINE SEDIMENT, LOG JAM RETAINING FINE SEDIMENT.

5096' SALMONID-STEELHEAD YOY.

5160' HEAVY SEDIMENT BUILD UP IN POOL. 5 LWD FOUND IN POOL. 3 LWD ON LEFT BANK, 2 ON RIGHT BANK. 1 LWD CAUSING LATERAL SCOUR IS 20 FEET LONG 6 FEET WIDE WITH LARGE ROOT WAD IN POOL.

5281' 1 SALMONID SEEN IN POOL.

5323' 2 POOLS WITH 6' LENGTH OF RIFFLES BETWEEN THEM.

5501' POOL HAS A SEDIMENT BUILD UP COVERING IT.

5637' TWO 1+ STEELHEAD. RIGHT BANK 3' WIDE AND 30' LONG. CULVERT IN STREAM CAUSING LATERAL SCOUR AND PROVIDING SHELTER. CULVERT IS ACTING AS LWD.

5905' ROOT WAD WITH 1 LWD AND ASSOCIATED SWP CAUSING SCOUR.

5280' OLD HUMBOLDT CROSSING THAT HAS FALLEN DOWN WITH NO SEDIMENT. ON TOP OF THE CROSSING LOGS IS A 3 'WIDE X 30' LONG CULVERT. THIS ONE IS RESTING ON TOP OF LOGS(FROM HUMBOLDT CROSSING).

5300'	SECOND CULVERT 3' W X 80' L IN STREAMBED ON LEFT BANK.
6430'	2 POOLS WITH 3' RIFFLE IN BETWEEN THEM. STEELHEAD YOY PRESENT.
6493'	CHANNEL TYPE TAKEN ON 6/20. 2 STEELHEAD YOY PRESENT.
6806'	LOG JAM: 1 LWD PLUS SWD; ALL ABOUT 10 FEET LONG.
6875'	HIGHLY SEDIMENT IMPACTED RETAINING GRAVEL ABOVE LOG JAM OBSTRUCTION. 3 PIECES OF LWD.
6887'	WATER GOES UNDERGROUND FOR 5 FEET. LEFT BANK EROSION ABOVE POOL, 2 SMALL LOG JAMS, NOT POOLING BUT RETAINING GRAVEL.
6979'	2 SALAMANDERS.
7086'	2-3 RECENTLY DOWNED REDWOODS FROM LEFT BANK; DEBRIS CLOGGING CHANNEL AND CAUSING POOL. THESE REDWOODS APPEAR DEAD BUT NEWLY FELLED. ASSOCIATED WITH THIS ARE 2-3 DEAD AND DOWN TAN OAKS, BUT STILL ON LEFT BANK. A LOT OF FINE SEDIMENT ON TOP OF COBBLE
7123'	PLUNGE OVER 3 BOULDERS BLOCKED BY SINGLE LWD.
7134'	HUGE LOG JAM (15') BUT WATER TRICKLES THROUGH AND SPREADS OUT AT BASE. NO SIGNIFICANT DEPTH. RETAINING GRAVEL.
7246'	ROOT AND LWD ENHANCED, SCOURS DURING HIGH FLOWS. RIGHT BANK BEDROCK SCOUR ENHANCED BY 4 PIECES LWD.
7307'	LWD OBSRUCTION CHOKING CHANNEL. 4 PIECES AND ROOTS. LOTS OF SWA AND GRAVEL PILED ON TOP. LOG JAM ALMOST COMPLETELY COVERS POOL. WATER STARTS GOING UNDERGROUND 10 FEET BEFORE LOG JAM.
7436'	3 SMALL POOLS SEPERATED BY EITHER 10 FEET RIFFLE OR LOG JAM. 60 FOOT LANDSLIDE ON LEFT BANK BROUGHT WITH IT 10 PIECES OF LWD AND ROOTS. AT LEAST 25% SLOPE. POSSIBLE BARRIER.
7918'	LEFT BANK TRIBUTARY, MOIST BUT NOT FLOWING. INCREASE IN GRADIENT.
7644'	LEFT BANK HAS NO VEGITATION BECAUSE IT IS COVERED BY LWD THAT IS FALLEN INTO STREAM. ENDED SURVEY DUE TO DIMINISHED HABITAT. WALKED UP 150-200 FEET AND GRADIENT CONTINUED TO INCREASE. CONTINUOUS LOG JAMS THROUGHOUT.

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: NORTH FORK RAMON CREEK
SAMPLE DATES: 06/13/02 to 06/20/02
STREAM LENGTH: 7657 ft.
LOCATION OF STREAM MOUTH:
USGS Quad Map: GREENOUGH — Latitude: 39°26'9"
Legal Description: T16NR15WS1 — Longitude: 123°48'8"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 1

Channel Type: F4	Canopy Density: 76%
Channel Length: 7657 ft.	Coniferous Component: 91%
Riffle/flatwater Mean Width: 4 ft.	Deciduous Component: 9%
Total Pool Mean Depth: 0.7 ft.	Pools by Stream Length: 19%
Base Flow: 0.0 cfs	Pools >=3 ft.deep: 0%
Water: 053- 059°F Air: 056-071°F	Mean Pool Shelter Rtn: 39
Dom. Bank Veg.: Coniferous Trees	Dom. Shelter: Large Woody Debris
Vegetative Cover: 41%	Occurrence of LOD: 29%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 0 ft.

Embeddness Value: 1. 48% 2.20% 3. 8% 4. 4% 5. 20%

CREEK Drainage: SF BIG RIVER

Y OF RIFFLE, FLATWATER, AND POOL HABITAT TYPES Survey Dates: 06/13/02 to 06/20/02

ion: QUAD: GREENOUGH LEGAL DESCRIPTION: T16NR15WS1 LATITUDE:39°26'9" LONGITUDE:123°48'8"

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
RIFFLE	13	44	873	11	3.5	0.3	143	2868	41	818	0	9
FLATWATER	40	86	5309	69	4.7	0.3	404	25036	125	7762	0	15
POOL	47	20	1475	19	6.2	0.7	122	8904	92	6729	69	37

TOTAL LENGTH (ft.)	TOTAL AREA (sq. ft.)	TOTAL VOL. (cu. ft.)
7657	36807	15310

)RK RAMON CREEK — Drainage: SF BIG RIVER

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

ıce Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T16NR15WS1 LATITUDE:39°26'9" LONGITUDE:123°48'8"

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 %
3	LGR	10	49	786	10	4	0.3	0.8	257	4109	70	1121	0	2	78
1	HGR	1	13	13	0	3	0.4	0.9	31	31	13	13	0	50	24
2	BRS	2	25	74	1	3	0.3	0.8	29	88	11	34	0	0	71
1	GLD	4	34	202	3	5	0.4	0.6	125	750	50	300	0	5	77
2	RUN	4	23	137	2	7	0.2	0.6	105	629	21	126	0	8	77
11	SRN	32	99	4970	65	4	0.3	1.5	484	24176	151	7550	0	18	74
1	TRP	1	7	7	0	2	0.2	2.2	14	14	3	3	1	30	80
48	MCP	31	19	901	12	6	0.7	2.9	112	5395	86	4130	65	34	82
1	CCP	1	15	15	0	9	1.7	1.4	135	135	230	230	216	5	88
7	STP	5	43	300	4	7	0.6	2.7	275	1926	186	1299	129	52	64
1	LSL	1	36	36	0	4	0.6	1.5	144	144	86	86	72	40	85
2	LSR	1	14	28	0	7	1.3	2.2	94	188	117	234	103	25	79
6	LSBk	4	18	110	1	5	0.7	1.7	100	600	70	419	46	5	73
1	LSBo	1	13	13	0	6	0.6	1.0	78	78	47	47	39	10	70
4	PLP	3	11	42	1	7	0.7	1.9	73	293	58	230	44	105	70
1	BPL	1	15	15	0	6	0.4	1.0	86	86	34	34	17	10	40
1	DPL	1	8	8	0	6	0.4	1.8	46	46	18	18	14	80	82

TOTAL UNITS	LENGTH (ft.)	AREA (sq.ft)	TOTAL VOL. (cu.ft)
93	7657	38687	15872

K RAMON CREEK — Drainage: SF BIG RIVER

SUMMARY OF POOL TYPES — Survey Dates: 06/13/02 to 06/20/02

e Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T16NR15WS1 LATITUDE:39°26'9" LONGITUDE:123°48'8"

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
57	MAIN	78	21	1223	83	6.3	0.7	131	7470	99	5661	74	36
14	SCOUR	19	16	229	16	6.0	0.8	93	1303	73	1016	55	39
2	BACKWATER	3	12	23	2	6.0	0.4	66	131	26	52	15	45

TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq.ft.)	TOTAL VOL. (cu.ft.)
73	1475	8904	6729

FORK RAMON CREEK Drainage: SF BIG RIVER

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

ence Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T16NR15WS1 LATITUDE:39°26'9" LONGITUDE:123°48'8"

TS ED	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
1	TRP	1	0	0	0	0	1	100	0	0	0	0
48	MCP	66	11	23	30	63	7	15	0	0	0	0
1	CCP	1	0	0	1	100	0	0	0	0	0	0
7	STP	10	0	0	5	71	2	29	0	0	0	0
1	LSL	1	0	0	1	100	0	0	0	0	0	0
2	LSR	3	1	50	0	0	1	50	0	0	0	0
6	LSBk	8	0	0	6	100	0	0	0	0	0	0
1	LSBo	1	0	0	1	100	0	0	0	0	0	0
4	PLP	5	1	25	3	75	0	0	0	0	0	0
1	BPL	1	0	0	1	100	0	0	0	0	0	0
1	DPL	1	0	0	1	100	0	0	0	0	0	0

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TS
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NORTH FORK 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: GREENOUGH LEGAL DESCRIPTION: T16NR15WS1 LATITUDE:39°26'9" LONGITUDE:123°48'8"

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
16	1	LGR	0	60	25	15	0	0	0	0	0
1	1	HGR	0	0	0	0	10	0	75	15	0
3	0	BRS	0	0	0	0	0	0	0	0	0
6	1	GLD	0	60	0	40	0	0	0	0	0
6	2	RUN	0	0	35	0	0	65	0	0	0
50	9	SRN	4	11	36	3	7	11	1	27	0
1	1	TRP	0	0	0	0	0	0	100	0	0
48	46	MCP	11	25	33	14	7	2	5	1	4
1	1	CCP	0	0	0	0	0	0	100	0	0
7	7	STP	16	19	37	6	3	1	4	9	4
1	1	LSL	0	60	30	10	0	0	0	0	0
2	2	LSR	5	0	5	85	5	0	0	0	0
6	4	LSBk	0	0	0	0	1	1	0	73	25
1	1	LSBo	0	10	10	0	0	0	0	80	0
4	4	PLP	10	16	13	23	3	0	14	23	0
1	1	BPL	0	20	80	0	0	0	0	0	0
1	1	DPL	0	70	30	0	0	0	0	0	0

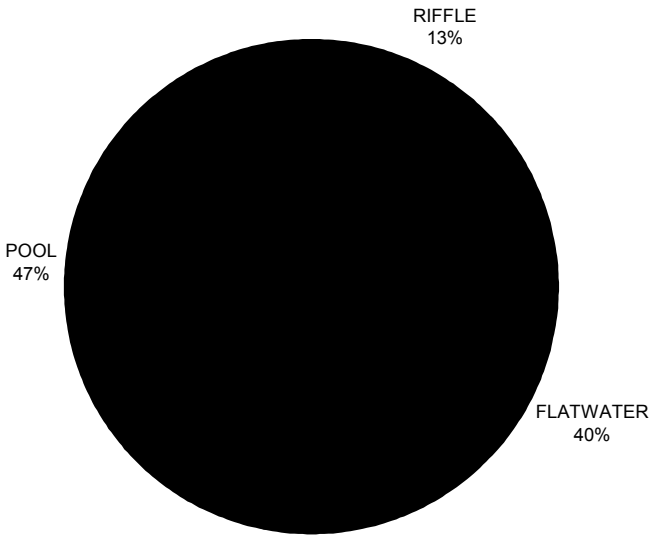
AMON CREEK — Drainage: SF BIG RIVER

MARY OF DOMINANT SUBSTRATES BY HABITAT TYPE — Survey Dates: 06/13/02 to 06/20/02

ocation: QUAD: GREENOUGH LEGAL DESCRIPTION: T16NR15WS1 LATITUDE:39°26'9" LONGITUDE:123°48'8"

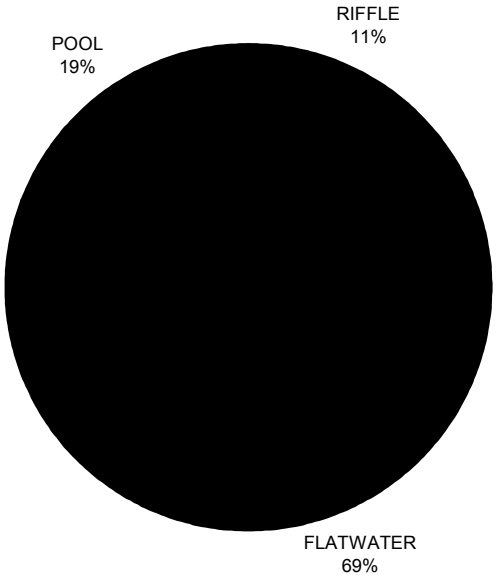
UNITS FULLY ASURED	HABITAT TYPE	% TOTAL SILT/CLAY DOMINANT	% TOTAL SAND DOMINANT	% TOTAL GRAVEL DOMINANT	% TOTAL SM COBBLE DOMINANT	% TOTAL LG COBBLE DOMINANT	% TOTAL BOULDER DOMINANT	% TOTAL BEDROCK DOMINANT
3	LGR	0	0	33	0	67	0	0
1	HGR	0	0	0	0	100	0	0
2	BRS	0	0	0	0	0	0	100
1	GLD	0	0	100	0	0	0	0
2	RUN	0	0	50	50	0	0	0
11	SRN	0	0	55	0	36	9	0
1	TRP	0	0	0	0	0	0	100
9	MCP	0	0	56	22	22	0	0
1	CCP	0	0	0	100	0	0	0
1	STP	0	0	100	0	0	0	0
1	LSL	100	0	0	0	0	0	0
1	LSR	0	0	0	100	0	0	0
3	LSBk	0	0	67	33	0	0	0
1	LSBo	0	0	100	0	0	0	0
2	PLP	0	0	50	50	0	0	0
1	BPL	0	0	0	0	100	0	0
1	DPL	100	0	0	0	0	0	0

NORTH FORK RAMON CREEK
HABITAT TYPES BY PERCENT OCCURENCE



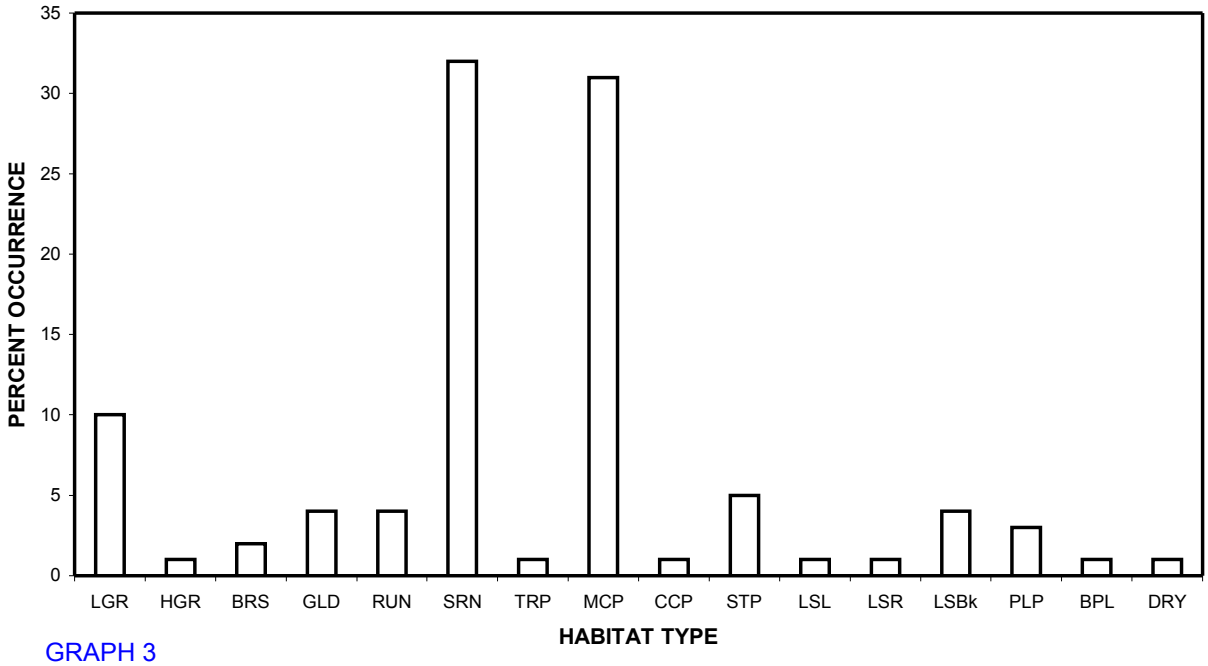
GRAPH 1

NORTH FORK RAMON CREEK
HABITAT TYPES BY PERCENT TOTAL LENGTH



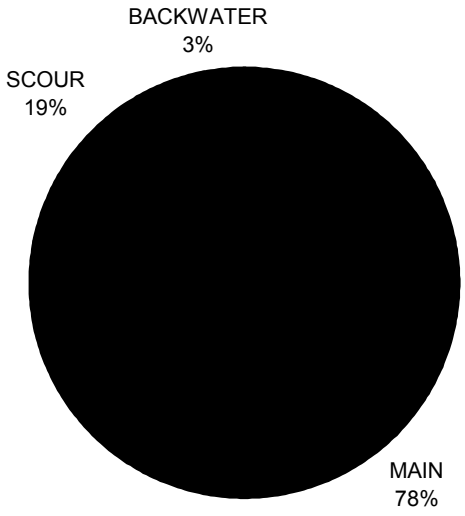
GRAPH 2

NORTH FORK RAMON CREEK
HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 3

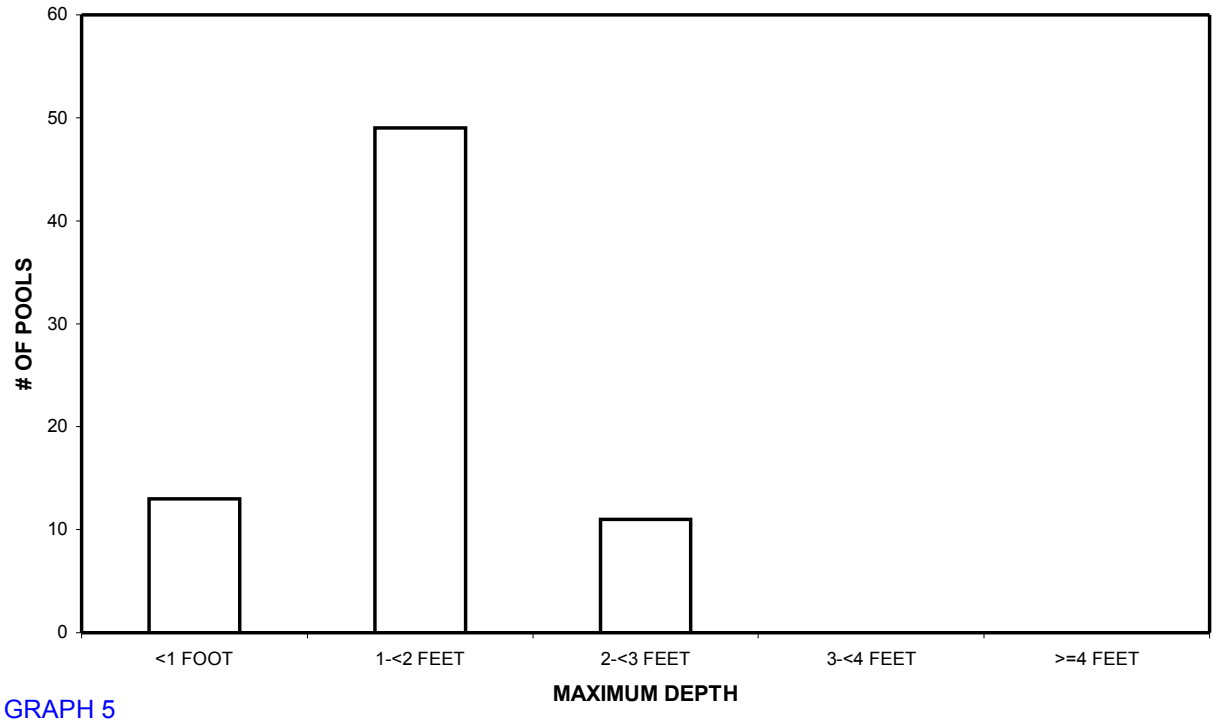
NORTH FORK RAMON CREEK
POOL HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 4

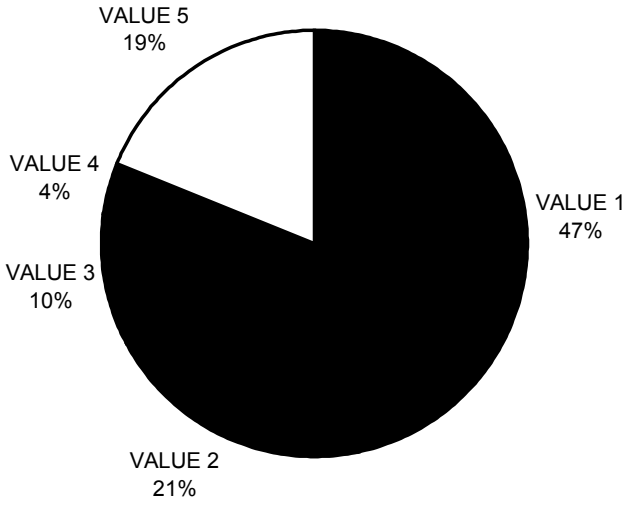
NORTH FORK RAMON CREEK

MAXIMUM DEPTH IN POOLS



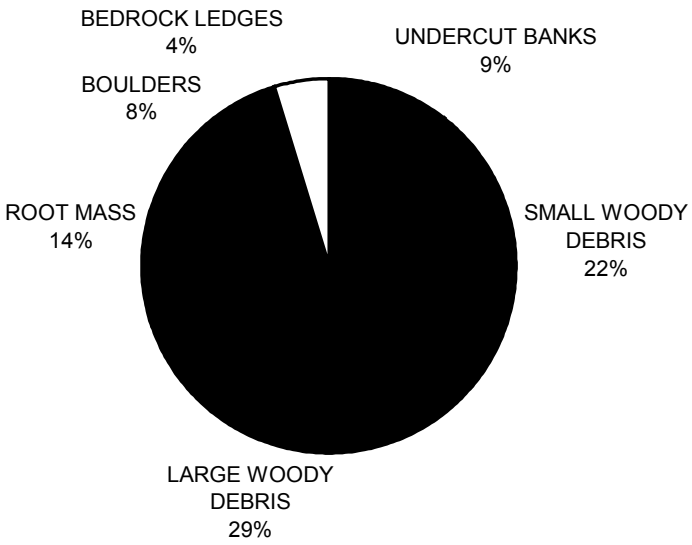
GRAPH 5

NORTH FORK RAMON CREEK
PERCENT EMBEDDEDNESS



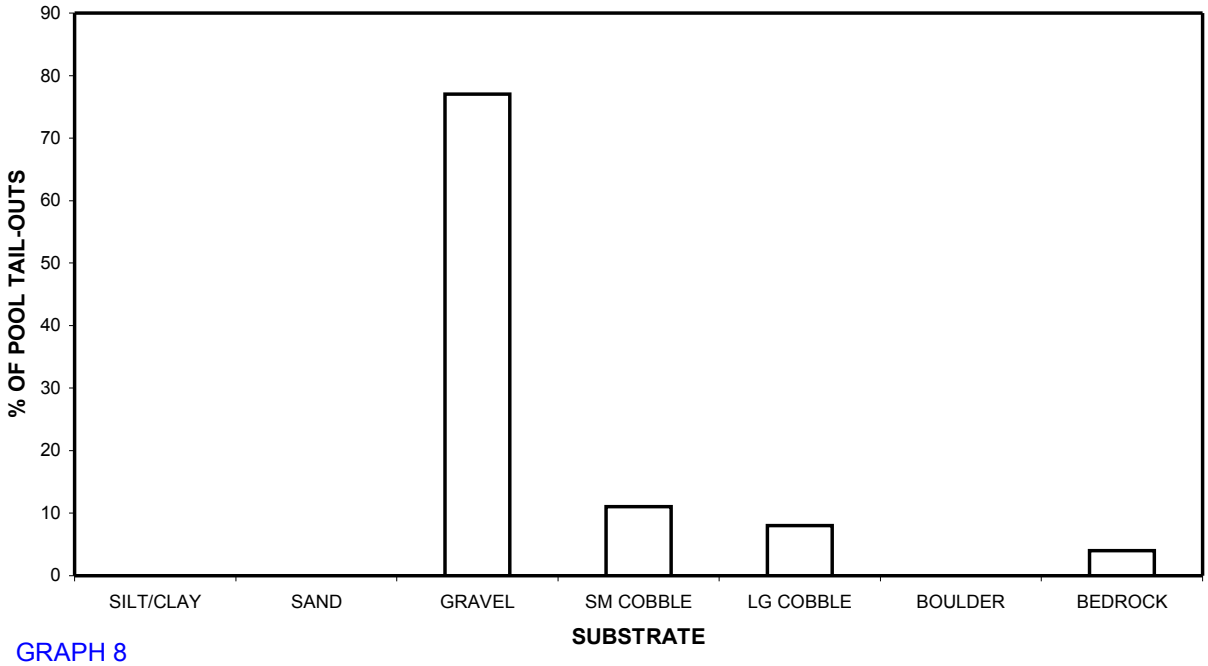
GRAPH 6

NORTH FORK RAMON CREEK
MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

NORTH FORK RAMON CREEK
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS

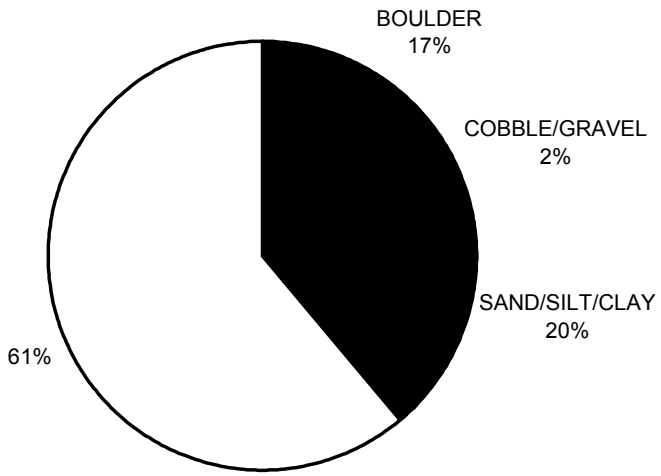


GRAPH 8

NORTH FORK RAMON CREEK
MEAN PERCENT CANOPY

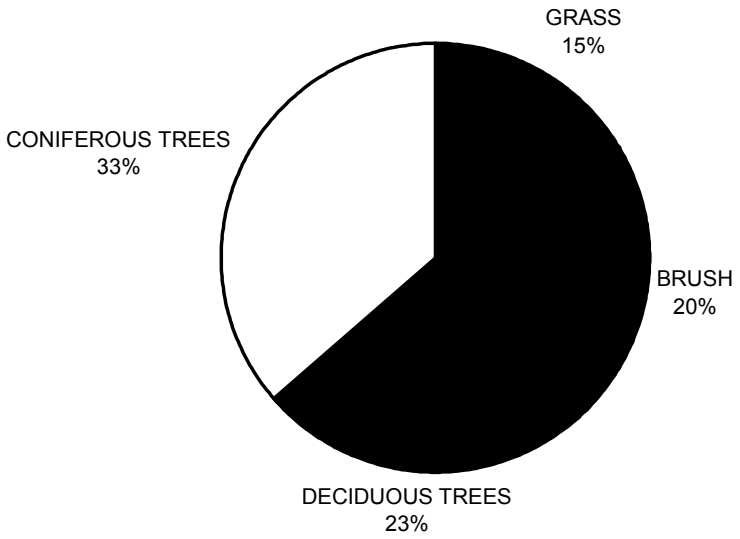
GRAPH 9

NORTH FORK RAMON CREEK
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

NORTH FORK RAMON CREEK
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11