STREAM INVENTORY REPORT

North Fork Ramon Creek

INTRODUCTION

A stream inventory was conducted from June 13 to June 20, 2002 on North Fork Ramon Creek. The survey began at the confluence with Ramon Creek and extended upstream 1.5 miles.

The objective of the habitat inventory was to document the habitat available to anadromous salmonids in North Fork Ramon Creek.

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 Ramon Creek, located in Mendocino County, California (Map 1.1). North Fork Ramon Creek's legal description at the confluence with Ramon Creek is T16N R15W S1. Its location is 39°16′08″ north latitude and 123°29′18″ west longitude. North Fork Ramon Creek is a second order stream and has approximately 9,460 feet of solid blue line stream and 1,183 feet of dashed blue line stream according to the USGS Greenough Ridge 7.5 minute quadrangle. North Fork Ramon Creek drains a watershed of approximately 1.7 square miles. Elevations range from about 423 feet at the mouth of the creek to 1,920 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 17.55. Mendocino Redwood Company logging roads are used to access the stream.

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 field crew 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.

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.

DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat 8.4, a dBASE 4.2 data entry program developed by Tim Curtis, Inland Fisheries Division, California Department of Fish and Game. This program processes and summarizes the data, and produces the following seven tables:

- Summary of riffle, flatwater, and pool habitat types
- Summary of habitat types and measured parameters
- Summary of pool types
- Summary of maximum pool depths by pool habitat types
- Summary of shelter by habitat types

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- Summary of dominant substrates by habitat types
- Summary of fish habitat elements by stream reach

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Ramon Creek and North Fork Ramon Creek include:

- Level II habitat types by % occurrence
- Level II habitat types by % total length
- Level IV habitat types by % occurrence
- Level I pool habitat types by % occurrence
- Maximum depth in pools
- Percent embeddedness estimated in pool tail-outs
- Mean percent cover types in pools
- Substrate composition in pool tail-outs
- Mean percent canopy
- Dominant bank composition in survey reach
- Dominant bank vegetation in survey reach

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 K. Grossman and B. Wood (WSP/AmeriCorps). 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 high width/depth ratios and gravel-dominant substrates.

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

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

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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 best spawning conditions and a value of 4 the worst. Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate such as bedrock, log sills, boulders, or other considerations.

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 37, flatwater habitat types had a mean shelter rating of 15, and riffle habitat types had a mean shelter rating of 9 (Table 1). Of the pool types, the backwater pools had the highest mean shelter rating at 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 the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 11% of the pool tail-outs.

The mean percent canopy density for the surveyed length of North Fork Ramon Creek was 76%. Thirteen percent of the canopy was open. In the closed canopy, 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 61% sand/silt/clay, 20% cobble/gravel, 17% bedrock, and 2% boulder (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).

DISCUSSION

North Fork Ramon Creek is an 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 and fair for plunge weirs, single and 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. 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, pools 19%, and riffles 11%. 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.

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.

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 acceptable 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. Most of the existing cover in the pools is from large woody debris. Adding high quality complexity with woody cover in the pools 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 appropriate native vegetation like 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) There are several log debris accumulations present on North Fork 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.

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. Salmonids present.
90'	Unit completely under bridge. Erosion from bridge on right bank, lots of sediment.
106'	Right bank culvert, possible failure right after bridge. Steelhead yoy and y+ salmonid present.
191'	Bedrock on left bank, steep embankment.

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247'	Right bank bedrock causing scour, completely vertical. Frog and salmonids present.
275'	Right bank bedrock completely vertical.
309'	Left bank bedrock 20 feet vertical cliff, evergreen trees on top, no vegetation on cliff.
328'	Highly entrenched from bedrock on both sides. Left bank bedrocks overhang pool.
335'	Gradient is greater than 5%.
342'	Coming out of bedrock entrenched channel.
355'	Salmonids present. Three foot cascade in middle of pools.
391'	Coho yoy and steelhead yoy.
489'	Highly silted unit.
506'	Redwood down across creek, but 10 feet above surface of water at mid unit.
583'	Salmonids present.
681'	Four 4 pieces of LWD and small woody debris (SWD) creating LDA, 3’ high x 10’ wide x 10’ long.
759'	Three pieces of LWD making “v” across channel, retaining gravel.
793'	Four pieces of LWD with SWD completely crossing width of channel to surface of water. LD is 15’ wide x 6’ high x 7’ deep and retaining gravel.
926'	Two SH yoy present. Five pieces of LWD not retaining sediment.
1028'	Right bank lateral scour enhanced.
1173'	Left bank lateral scour bedrock enhanced. One piece of LWD at top of unit.
1387'	Right bank bedrock scour. Left bank rootwad. Left bank undercut in first pool. Low gradient riffle between pools with boulders. Eight pieces of LWD at top of unit, retaining gravel.
1437'	Many frogs and salmonid yoy present.
1685'	Many frogs in deepest part of pool. Four pieces of LWD creating backwater pool.

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1786'	Lateral scour caused by LDA including 6 pieces of LWD is 12' wide x 20' long. LDA is retaining sediment. Pool is covered in fine sediment.
1903'	Lateral scour caused by LDA on right bank is 12' wide x 10' long.
2024'	Highly sedimented pools with cascade between them.
2120'	Left bank erosion is 6' high x 10' wide, actively bringing sediment into stream. Pool caused by 2 piece of LWD. Root wads on right bank.
2135'	Dry right bank tributary at 83'.
2261'	Channel partially obstructed by log that is 3' diameter x 100' long on right bank.
2627'	Left bank erosion is 11' high x 6' wide section.
2836'	Right bank tributary in middle of unit is flowing but confluence blocked by single piece of LWD which is retaining gravel. Water drops 2’ over a log into pool. Walked approximately 300' up tributary, no fish present. Old Humboldt crossing 50' into tributary.
3025'	LDA includes 5 pieces of LWD and is 60’ long x 3’ high. A lot of gravel/sediment is being retained.
3055'	Possible salmonid redd found measuring pot 3.5 ' long x 2.5' wide.
3223'	Possible redd at 17'.
3511'	One piece of LWD across channel helping to create scour.
3628'	Right bank landslide, contributing fines to stream.
3798'	At 24’ into unit there a right bank tributary enters and is flowing. Walked 150’ up the tributary. Gradient is greater than 5%. No fish observed. Several LDAs, each at least 5’ tall, retaining gravel. Orange algae bacteria about half way up.
3888'	LDA from left bank slide. Four pieces of LWD completely cutting off channel. Retained gravel creating a 6' jump to next unit. Water flow mostly subsurface.
3899'	Two trees down across mid unit, causing some scour and erosion, but not deep water.
4040'	Walked up this ditch and found 2’ foot culvert. Only leads 25' or so and ends up on main channel of creek in unit.
4051'	Culvert enters on left bank is 5.5’ high x 2’ wide.

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4134'	Old log across banks in mid unit. Appears to be very old Humboldt crossing.
4222'	Log lying parallel within channel creating scour. A lot of erosion from both banks. Small gravel bar blocking flow.
4424'	Gravel retained behind LDA which includes a rootwad and 1 piece of LWD.
4547'	Left bank being eroded by downed tree.
4555'	Old skid road on left bank, lots of erosion.
4724'	LDA at top of unit is retaining gravel.
4735'	Several LDAs throughout unit, none retaining gravel.
4998'	Five pieces of LWD covering channel, retaining gravel. Left bank scour.
5078'	Seven pieces of LWD. Pool covered in fine sediment, LDA retaining fine sediment.
5160'	Five pieces of LWD in pool. Three pieces of LWD on left bank, 2 on right bank. One piece of LWD causing lateral scour is 20’ long x 6’ wide with large root wad in pool.
5501'	Pool has a fine sediment.
5637'	Erosion on right bank is 3' wide x 30' long. Culvert in stream causing lateral scour and providing shelter. The culvert is acting as LWD.
5905'	Root wad with 1 piece of LWD and associated SWD causing scour.
5915'	At 184' there is an old Humboldt crossing that has fallen down into stream. A 3' diameter x 30' long culvert is resting on top of logs. At 218' a second culvert 3' diameter x 80' long in streambed on left bank.
6430'	Two pools with 3' riffle between them. SH yoy present.
6493'	Two SH yoy present.
6806'	LDA with 1 piece of LWD plus SWD all about 10’ long.
6875'	LDA is retaining sediment and includes 3 pieces of LWD.
6887'	Water subsurface for 5’. Left bank erosion above pool. Two pieces of LWD retaining gravel.

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7086' There are 2 to 3 recently downed redwoods from left bank debris clogging channel and creating a pool. These redwoods appear dead but newly felled associated with this are 2 to 3 dead down tan oaks, but still on left bank. Fine sediment in pool.

7123' Plunge over 3 boulders at beginning of unit and blocked by single piece of LWD.

7134' LDA at 15' in mid unit retaining gravel, water trickles through and spreads out at base. No significant depth.

7246' Root and LWD enhanced, scours during high flows. Right bank bedrock scour enhanced by 4 pieces LWD.

7307' LDA retaining sediment. Four pieces and roots. LDA almost completely covers pool. Stream goes subsurface for 10' before LDA.

7436' Three small pools separated by either 10' riffle and log jam. A 60' landslide on left bank brought down 10 pieces of LWD and roots creating a potential barrier. The slope is 25% in this unit.

7482' Left bank tributary at 36' into unit, not flowing and non anadramous. Gradient is increasing.

7644' Ended survey due to diminished habitat. Walked upstream approximately 200' and gradient continued to increase. Left bank has no vegetation because it is covered by LWD that has fallen into stream. No salmonids observed since HU 136. Multiple LDA throughout survey.

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.

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LEVEL III and LEVEL IV HABITAT TYPES

RIFFLE			
Low Gradient Riffle	(LGR)	[1.1]	{ 1}
High Gradient Riffle	(HGR)	[1.2]	{ 2}
CASCADE			
Cascade	(CAS)	[2.1]	{ 3}
Bedrock Sheet	(BRS)	[2.2]	{24}
FLATWATER			
Pocket Water	(POW)	[3.1]	{21}
Glide	(GLD)	[3.2]	{14}
Run	(RUN)	[3.3]	{15}
Step Run	(SRN)	[3.4]	{16}
Edgewater	(EDW)	[3.5]	{18}
MAIN CHANNEL POOLS			
Trench Pool	(TRP)	[4.1]	{ 8}
Mid-Channel Pool	(MCP)	[4.2]	{17}
Channel Confluence Pool	(CCP)	[4.3]	{19}
Step Pool	(STP)	[4.4]	{23}
SCOUR POOLS			
Corner Pool	(CRP)	[5.1]	{22}
Lateral Scour Pool - Log Enhanced	(LSL)	[5.2]	{10}
Lateral Scour Pool - Root Wad Enhanced	(LSR)	[5.3]	{11}
Lateral Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{12}
Lateral Scour Pool - Boulder Formed	(LSBo)	[5.5]	{20}
Plunge Pool	(PLP)	[5.6]	{ 9}
BACKWATER POOLS			
Secondary Channel Pool	(SCP)	[6.1]	{ 4}
Backwater Pool - Boulder Formed	(BPB)	[6.2]	{ 5}
Backwater Pool - Root Wad Formed	(BPR)	[6.3]	{ 6}
Backwater Pool - Log Formed	(BPL)	[6.4]	{ 7}
Dammed Pool	(DPL)	[6.5]	{13}

ADDITIONAL UNIT DESIGNATIONS

Dry	(DRY)	[7.0]	
Culvert	(CUL)	[8.0]	
Not Surveyed	(NS)	[9.0]	
Not Surveyed due to a marsh	(MAR)	[9.1]	

TABLES AND GRAPHS

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%

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

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	13	44	873	11	3.5	0.3	143	2868	41	818	0	9
62	14	FLATWATER	40	86	5309	69	4.7	0.3	404	25036	125	7762	0	15
73	73	POOL	47	20	1475	19	6.2	0.7	122	8904	92	6729	69	37

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq. ft.)	TOTAL VOL. (cu. ft.)
155	93	7657	36807	15310

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

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 %
16	3	LGR	10	49	786	10	4	0.3	0.8	257	4109	70	1121	0	2	78
1	1	HGR	1	13	13	0	3	0.4	0.9	31	31	13	13	0	50	24
3	2	BRS	2	25	74	1	3	0.3	0.8	29	88	11	34	0	0	71
6	1	GLD	4	34	202	3	5	0.4	0.6	125	750	50	300	0	5	77
6	2	RUN	4	23	137	2	7	0.2	0.6	105	629	21	126	0	8	77
50	11	SRN	32	99	4970	65	4	0.3	1.5	484	24176	151	7550	0	18	74
1	1	TRP	1	7	7	0	2	0.2	2.2	14	14	3	3	1	30	80
48	48	MCP	31	19	901	12	6	0.7	2.9	112	5395	86	4130	65	34	82
1	1	CCP	1	15	15	0	9	1.7	1.4	135	135	230	230	216	5	88
7	7	STP	5	43	300	4	7	0.6	2.7	275	1926	186	1299	129	52	64
1	1	LSL	1	36	36	0	4	0.6	1.5	144	144	86	86	72	40	85
2	2	LSR	1	14	28	0	7	1.3	2.2	94	188	117	234	103	25	79
6	6	LSBk	4	18	110	1	5	0.7	1.7	100	600	70	419	46	5	73
1	1	LSBo	1	13	13	0	6	0.6	1.0	78	78	47	47	39	10	70
4	4	PLP	3	11	42	1	7	0.7	1.9	73	293	58	230	44	105	70
1	1	BPL	1	15	15	0	6	0.4	1.0	86	86	34	34	17	10	40
1	1	DPL	1	8	8	0	6	0.4	1.8	46	46	18	18	14	80	82

TOTAL UNITS	TOTAL UNITS	LENGTH (ft.)	AREA (sq.ft)	TOTAL VOL. (cu.ft)
155	93	7657	38687	15872

NORTH FORK RAMON CREEK — Drainage: SF BIG RIVER

Table 3 - SUMMARY OF POOL TYPES — Survey Dates: 06/13/02 to 06/20/02

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

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

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

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

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
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

TOTAL UNITS
73

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: GRAHNOUGH 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

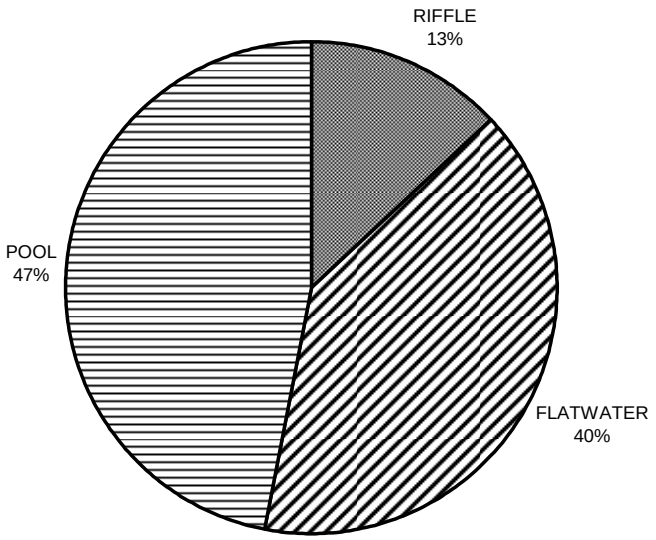
NORTH FORK RAMON CREEK Drainage: SF BIG RIVER

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE Survey Dates: 06/13/02 to 06/20/02

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

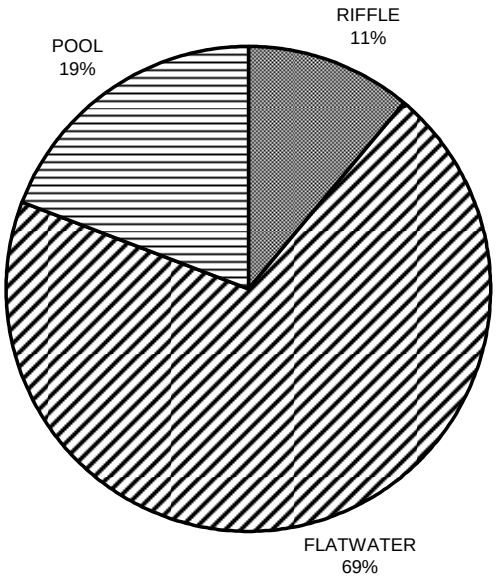
TOTAL HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	% TOTAL SILT/CLAY DOMINANT	% TOTAL SAND DOMINANT	% TOTAL GRAVEL DOMINANT	% TOTAL SM COBBLE DOMINANT	% TOTAL LG COBBLE DOMINANT	% TOTAL BOULDER DOMINANT	% TOTAL BEDROCK DOMINANT
16	3	LGR	0	0	33	0	67	0	0
1	1	HGR	0	0	0	0	100	0	0
3	2	BRS	0	0	0	0	0	0	100
6	1	GLD	0	0	100	0	0	0	0
6	2	RUN	0	0	50	50	0	0	0
50	11	SRN	0	0	55	0	36	9	0
1	1	TRP	0	0	0	0	0	0	100
48	9	MCP	0	0	56	22	22	0	0
1	1	CCP	0	0	0	100	0	0	0
7	1	STP	0	0	100	0	0	0	0
1	1	LSL	100	0	0	0	0	0	0
2	1	LSR	0	0	0	100	0	0	0
6	3	LSBk	0	0	67	33	0	0	0
1	1	LSBo	0	0	100	0	0	0	0
4	2	PLP	0	0	50	50	0	0	0
1	1	BPL	0	0	0	0	100	0	0
1	1	DPL	100	0	0	0	0	0	0

NORTH FORK RAMON CREEK
HABITAT TYPES BY PERCENT OCCURENCE



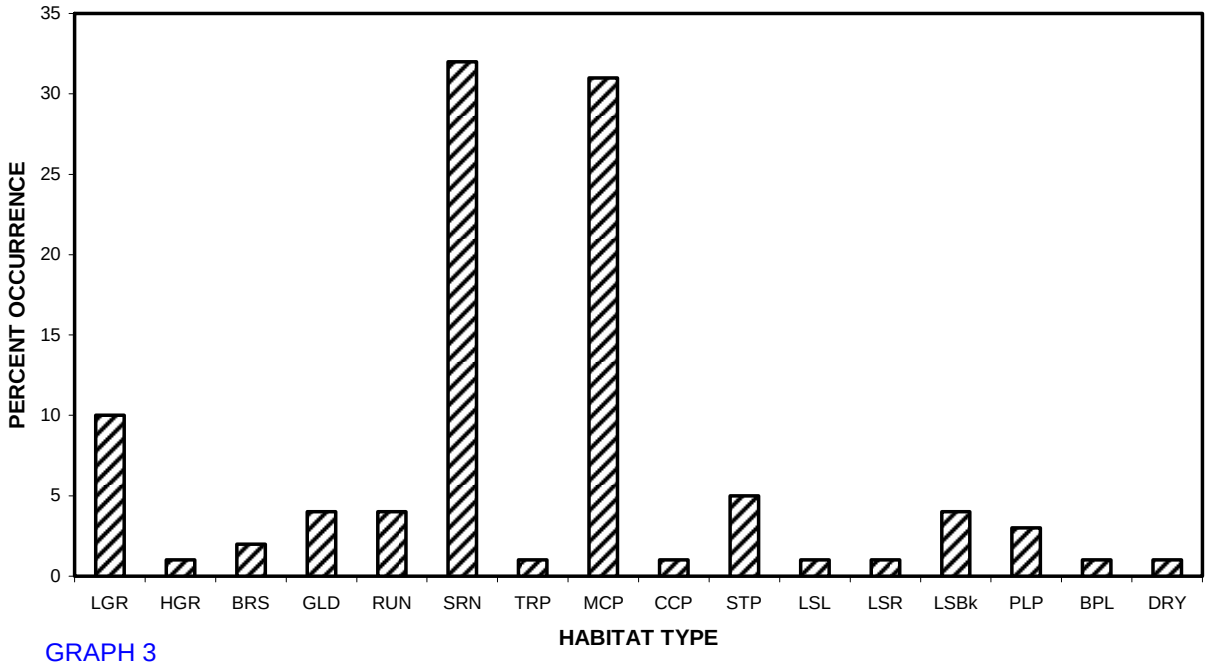
GRAPH 1

NORTH FORK RAMON CREEK
HABITAT TYPES BY PERCENT TOTAL LENGTH



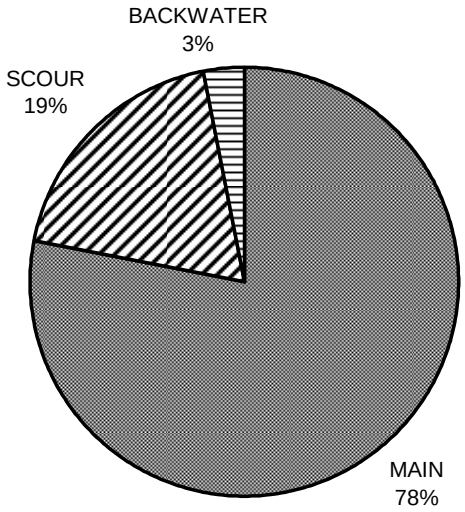
GRAPH 2

NORTH FORK RAMON CREEK
HABITAT TYPES BY PERCENT OCCURRENCE

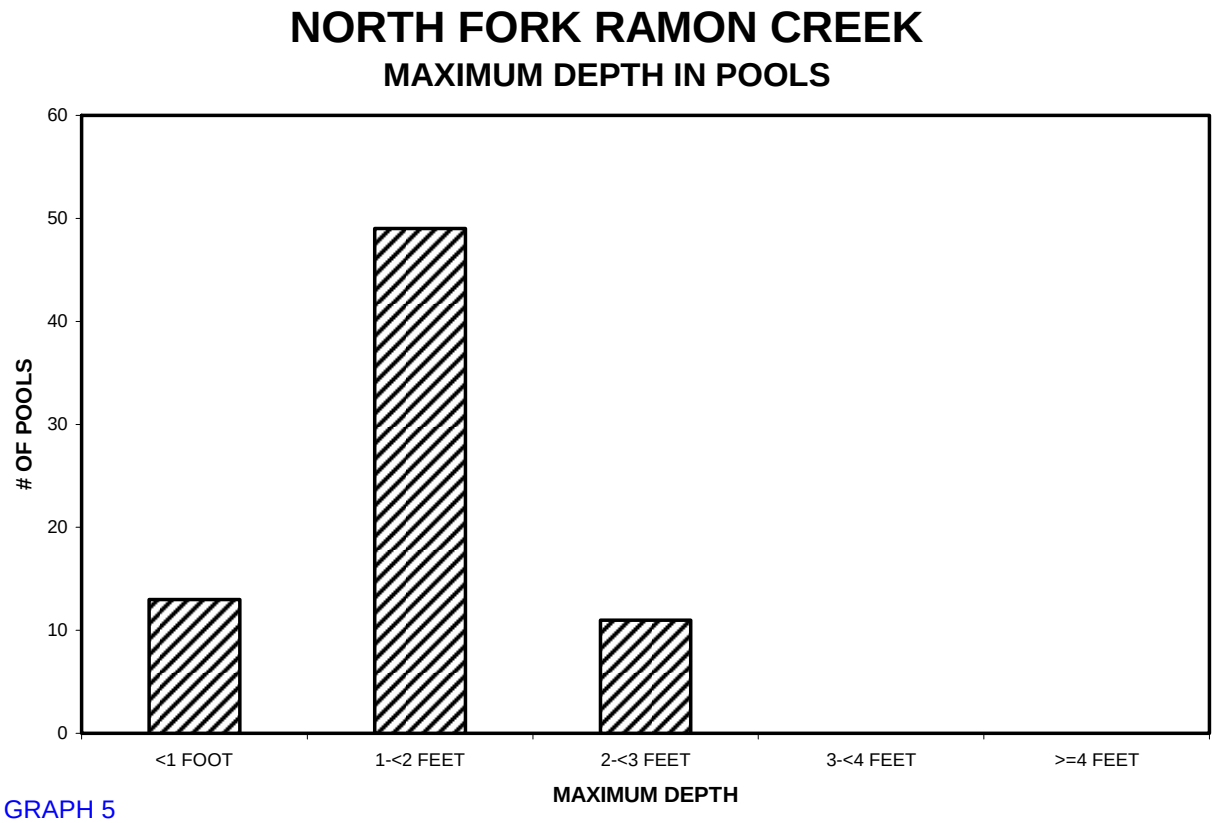


GRAPH 3

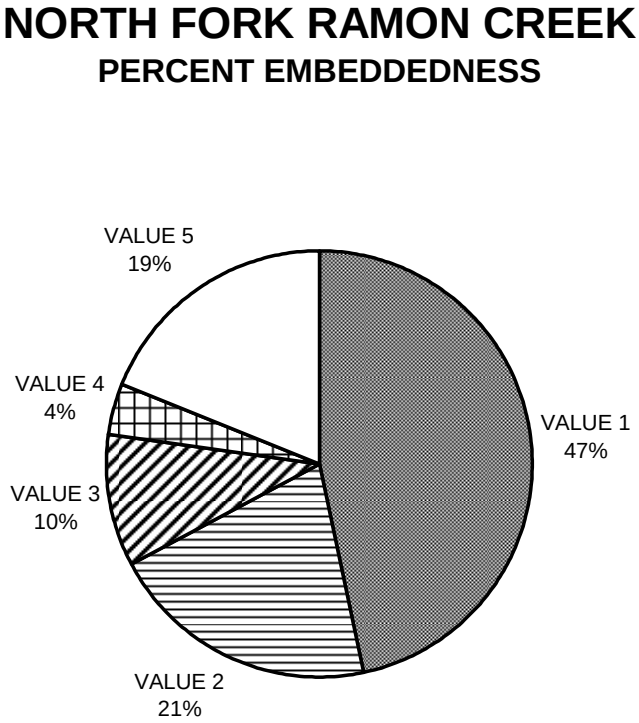
NORTH FORK RAMON CREEK
POOL HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 4

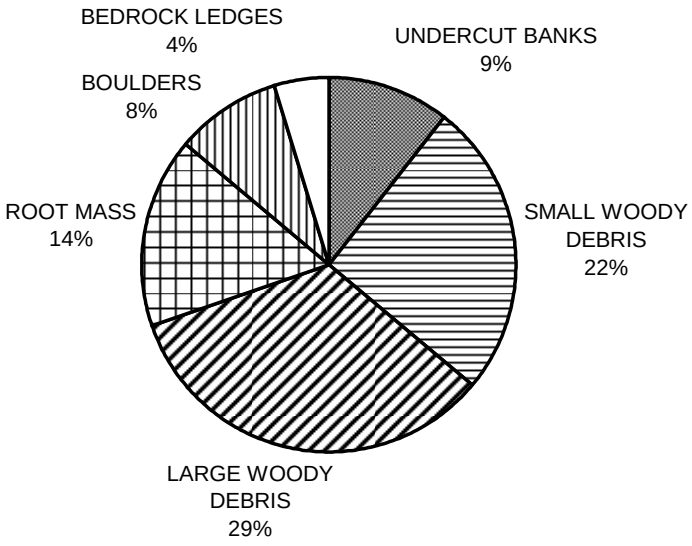


GRAPH 5



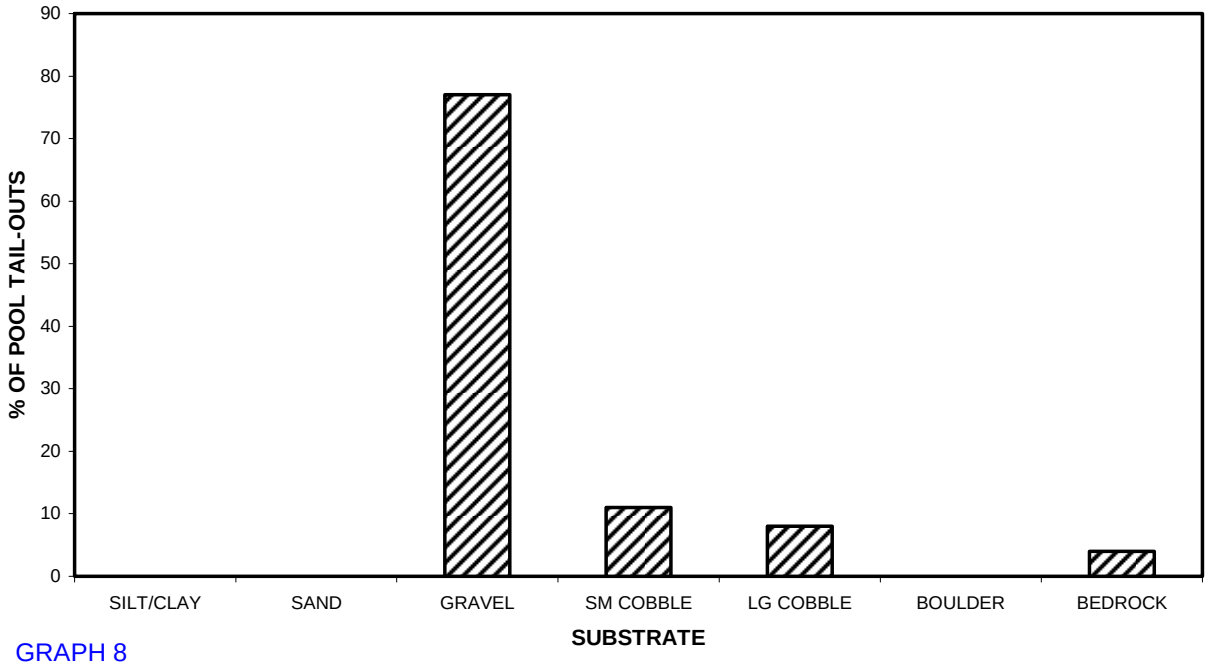
GRAPH 6

NORTH FORK RAMON CREEK
MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

NORTH FORK RAMON CREEK
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS

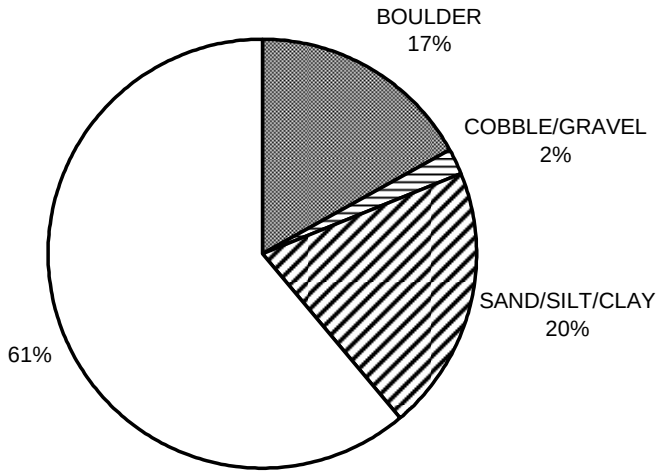


GRAPH 8

NORTH FORK RAMON CREEK
MEAN PERCENT CANOPY

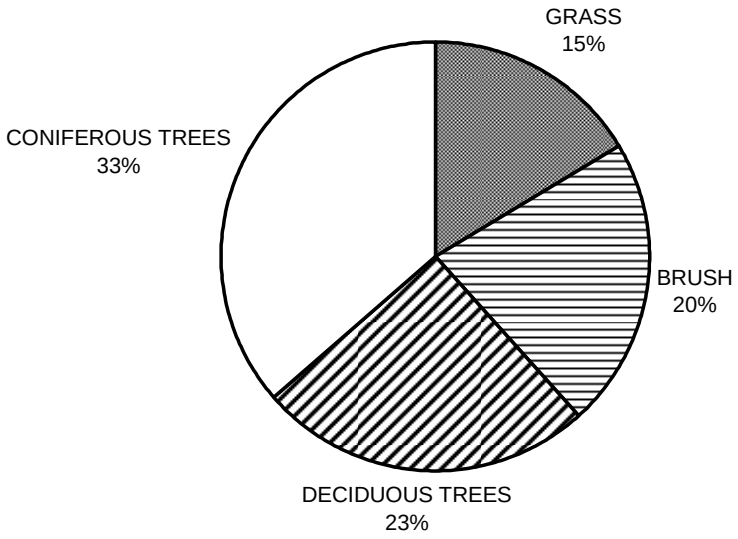
GRAPH 9

NORTH FORK RAMON CREEK
DOMINANT BANK COMPOSITION IN SURVEY REACH



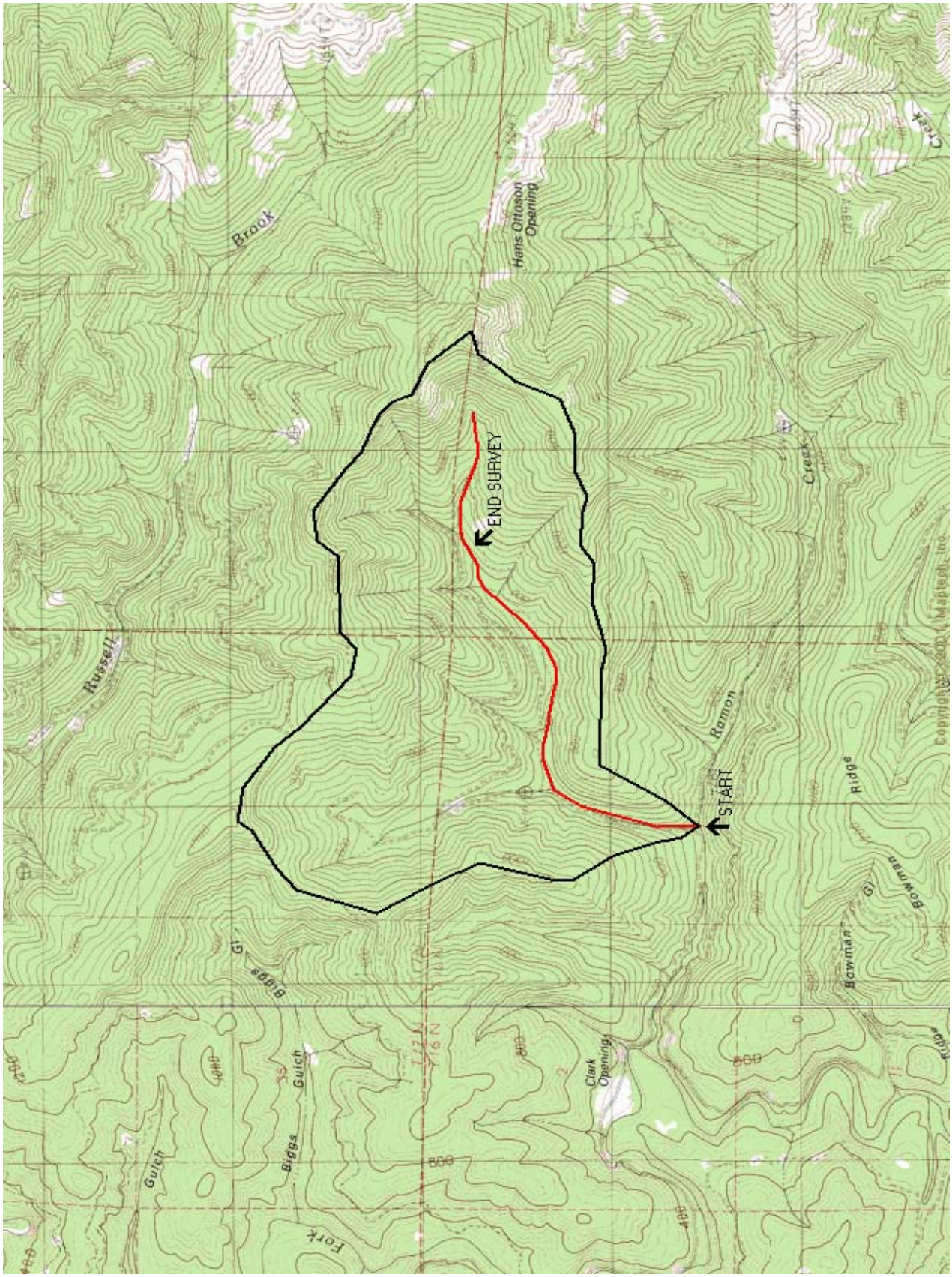
GRAPH 10

NORTH FORK RAMON CREEK
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

North Fork Ramon Creek



MAP 1. NORTH FORK RAMON CREEK.