NORTH COAST WATERSHED AND FISHERY IMPROVEMENT PROGRAM

STREAM INVENTORY REPORT

Right Bank Tributary Two to Martin Creek, Big River, 2002

CALIFORNIA DEPARTMENT OF FISH AND GAME

2003

Northern California-North Coast Region

STREAM INVENTORY REPORT

Right Bank Tributary Two to Martin Creek

INTRODUCTION

A stream inventory was conducted July 29, 2002 on Right Bank Tributary Two to Martin Creek. The survey began at the confluence with Martin Creek and extended upstream 0.60 miles.

The Right Bank Tributary Two to Martin 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 Right Bank Tributary Two to Martin Creek. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species.

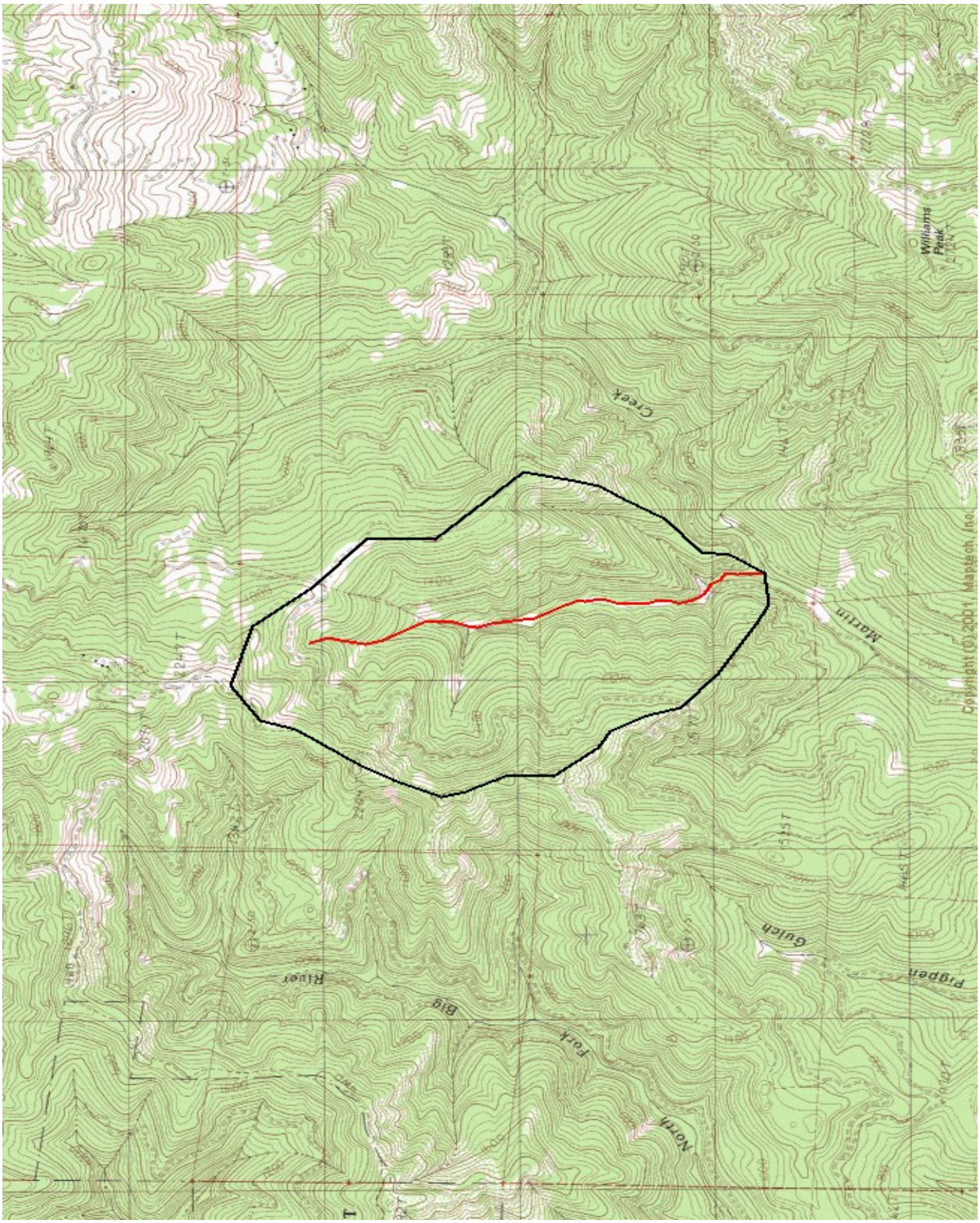
The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for coho salmon, and steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's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

WATERSHED OVERVIEW

Right Bank Tributary Two is a tributary to Martin Creek, a tributary to Big River, located in Mendocino County, California (Map 1). Right Bank Tributary Two to Martin Creek's legal description at the confluence is T17N R14W S16. Its location is 39°19′31″ North latitude and 123°26’1″ West longitude. Right Bank Tributary Two to Martin Creek is a first order stream and has approximately 0.32 miles of solid blue line stream according to the USGS Greenough Ridge 7.5 minute quadrangle. Right Bank Tributary Two to Martin Creek drains a watershed of approximately 1.2 square miles. Elevations range from about 780 feet at the mouth of the creek to 1600 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 27. Pioneer Resources Timber Company’s logging roads were used to reach the tributary.

METHODS

The habitat inventory conducted in Right Bank Tributary Two to Martin 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


Williams Peak
Creek
Martin
Gulch
Pidgeon
River
Big
Fork
North
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MAP 1. RIGHT BANK TRIBUTARY TWO TO MARTIN CREEK.

Game (DFG). This inventory was conducted by a two-person team.

SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach. All habitat units included in the survey are classified according to habitat type and their lengths are measured. All pool units are measured for maximum depth, depth of pool tail crest (measured in the thalweg), dominant substrate composing the pool tail crest, and embeddedness. Habitat unit types encountered for the first time are measured for all the parameters and characteristics on the field form. Additionally, from the ten habitat units on each field form page, one is randomly selected for complete measurement.

HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the *California Salmonid Stream Habitat Restoration Manual*. This form was used in Right Bank Tributary Two to Martin Creek to record measurements and observations. There are nine components to the inventory form. For specific information on the methods used see the Martin Creek report**.**

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 Right Bank Tributary Two to Martin 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 Right Bank Tributary Two to Martin 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 July 29, 2002, was conducted by Scott Monday and Kristi Knechtle (DFG). The total length of the stream surveyed was 3,198 feet.

Stream flow was not measured on Right Bank Tributary Two to Martin Creek.

Right Bank Tributary Two to Martin Creek is a B4 channel type for the entire 3,198 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 substrate.

Water temperatures taken during the survey period ranged from 60 to 62 degrees Fahrenheit. Air temperatures ranged from 70 to 83 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 42% pool units, 40% flatwater units, 12% riffle units, and 6% dry units (Graph 1). Based on total length of Level II habitat types there were 77% flatwater units, 14% pool units, 8% riffle units, and 1% dry (Graph 2).

Eight Level IV habitat types were identified (Table 2). The most frequent habitat types by

percent occurrence were step runs, 38%; mid-channel pools, 36%; and low gradient riffles, 12% (Graph 3). Based on percent total length, step runs made up 77%, mid channel pools 12%, and low gradient riffles 8%.

A total of 21 pools were identified (Table 3). Main channel pools were the most frequently encountered, at 95%, and comprised 98% of the total length of all pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Four of the 21 pools (19%) had a depth of two feet or greater (Graph 5). The depth of cobble embeddedness was estimated at pool tail-outs. Of the 21 pool tail-outs measured, 0 had a value of 1 (0%); 0 had a value of 2 (0%); 12 had a value of 3 (57%); 7 had a value of 4 (33%); and 2 had a value of 5 (10%) (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 0, flatwater habitat types had a mean shelter rating of 100, and pool habitats had a mean shelter rating of 34 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 60. Main channel pools had a mean shelter rating of 33 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover types in Right Bank Tributary Two to Martin Creek. Graph 7 describes the pool cover in Right Bank Tributary Two to Martin 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 38% of pool tail-outs while small cobble was an equally observed substrate type, at 38%.

The mean percent canopy density for the surveyed length of Right Bank Tributary Two to Martin Creek was 86%. The mean percentages of deciduous and coniferous trees were 16% and 84%, respectively. Graph 9 describes the mean percent canopy in Right Bank Tributary Two to Martin Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 30%. The mean percent left bank vegetated was 24%. The dominant elements composing the structure of the stream banks consisted of 50% sand/silt/clay, 14% bedrock, 27% boulder, and 9% cobble/gravel (Graph 10). Coniferous trees were the dominant vegetation type observed in 95% of the units surveyed. Additionally, 5% of the units surveyed had deciduous trees as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Yearling salmonids were detected using streambank observation techniques during the Right Bank Tributary to Two Martin Creek stream survey.

DISCUSSION

Right Bank Tributary Two to Martin Creek is a B4 channel type for the entire 3,198 feet of stream surveyed. The suitability of B4 channel type for fish habitat improvement structures is as follows: B4 channel types are excellent for low-stage plunge weirs, boulder clusters and bank placed boulders, single and opposing wing deflectors, and log cover

The water temperatures recorded on the survey day July 29, 2002 ranged from 60 to 62 degrees Fahrenheit. Air temperatures ranged from 70 to 83 degrees Fahrenheit. This is unsuitable water temperature range for salmonids. Sixty degrees Fahrenheit, 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 77% of the total length of this survey, pools 14%, and riffles 8%. The pools are relatively shallow, with 4 of the 21 (19%) 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.

None of the 21 pool tail-outs measured had embeddedness ratings of 1 or 2. Nineteen of the pool tail-outs had embeddedness ratings of 3 or 4. Two of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. Sediment sources in Right Bank Tributary Two to Martin Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Nineteen of the 21 pool tail-outs measured had gravel and small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter rating for pools was 34. The shelter rating in the flatwater habitats was 100. 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 85%. 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 30% and 24%, 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) Right Bank Tributary Two to Martin 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 Right Bank Tributary Two to Martin 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 Right Bank Tributary Two to Martin 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 Right Bank Tributary Two to Martin 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) Due to the high gradient of the stream, access for migrating salmonids is an ongoing potential problem. 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 15 FEET FROM THE CONFLUENCE WITH MARTIN CREEK. THE CHANNEL IS A B4. 6 PIECES OF LARGE WOODY DEBRIS (LWD) IN STREAM. 3 FOOT JUMP TO THE TOP.
42'	LWD AND BOULDERS STACKING SEDIMENT AND SUBSTRATE BEHIND. WATER FLOWING SUBSURFACE.
72'	SALAMANDER AND FROG. LWD PILE 15 X 4 X 5 BLOCKING SEDIMENT AT TOP.
147'	NEWT
184'	5 INCH STEELHEAD/RESIDENT TROUT. LWD WITH ROOTWAD 20 X 8 X 5 FEET BACKING SEDIMENT. WATER FLOWING SUBSURFACE UPSTREAM FROM LWD PILE.
249'	3 FEET DRY. LWD CAUSING SEDIMENT TO BUILD-UP.
264'	LWD BACKING UP SEDIMENT. FLOW IS SUBSURFACE UNDER LWD.
568'	CHANNEL TYPE TAKEN IN THIS UNIT. B4.
719'	LWD IS BLOCKING THE CHANNEL. 10 X 4 X 5 FEET.

1090' STEELHEAD YEARLING. DRY RIGHT BANK TRIBUTARY.

1282' POSSIBLE RESTORATION WORK. LWD 15 X 4 X 4 FEET AND 2 LOGS WITH NOTCHED WEIR.

1438' CULVERT 6 X 6 FEET THAT IS 71 FEET LONG. BOTTOM OF CULVERT IS RUSTED. WATER IS COMING UP JUST PAST INLET.

1672' 6.5 FOOT JUMP UP ROOTWAD. FLOW IS VERY LOW. LWD PILE IS 15 X 7 X 4 FEET.

1792' LWD PILE 10 X 4 X 4 BUILDING UP SEDIMENT.

1802' LWD ACROSS THE CHANNEL. POSSIBLE OLD BRIDGE CROSSING.

1830' DRY CHANNEL HAS A LAYER OF SEDIEMENT ON TOP.

2110' OLD SLIDE ON THE LEFT BANK. 200 FEET HIGH, 100 FEET WIDE. OLD SLASH ON LANDING SITE.

2858' RIGHT BANK TRIBUTARY - DRY FOR 50 FEET THEN A SMALL WATERFALL.

2870' END OF SURVEY - ONCE UPSTREAM FROM THE CULVERT THERE WERE MULTIPLE LOG JAMS THAT WERE POTENTIAL FISH BARRIERS WITH SUBSTRATE PILED AT THE TOP. ONE OF THE LWD PILES HAD A 6 FOOT JUMP TO THE TOP. THE LAST FISH SEEN ON THIS TRIBUTARY WAS 935 FEET INTO THE 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.

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: RIGHT TRB 2 MARTIN CREEK
SAMPLE DATES:
STREAM LENGTH: 3198 ft.
LOCATION OF STREAM MOUTH:
USGS Quad Map: GREENOUGH — Latitude: 39°19'31"
Legal Description: T17NR14WS16 — Longitude: 123°26'1"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 01

Channel Type: B4	Canopy Density: 86%
Channel Length: 3198 ft.	Coniferous Component: 84%
Riffle/flatwater Mean Width: 8 ft.	Deciduous Component: 16%
Total Pool Mean Depth: 0.9 ft.	Pools by Stream Length: 14%
Base Flow: 0.0 cfs	Pools >=3 ft.deep: 0%
Water: 060- 062°F Air: 070-083°F	Mean Pool Shelter Rtn: 34
Dom. Bank Veg.: Coniferous Trees	Dom. Shelter: Large Woody Debris
Vegetative Cover: 27%	Occurrence of LOD: 53%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 31 ft.

Embeddness Value: 1. 0% 2.0% 3. 57% 4. 33% 5. 10%

RIGHT TRB 2 MARTIN CREEK — Drainage: SF BIG RIVER

Table 1 - SUMMARY OF RIFFLE, FLATWATER, AND POOL HABITAT TYPES — Survey Dates: 7/29/02

Confluence Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T17NR14WS16 LATITUDE:39°19'31" LONGITUDE:123°26'1"

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
6	1	RIFFLE	12	41	247	8	2.0	0.2	12	72	2	14	0	0
20	2	FLATWATER	40	124	2472	77	11.0	0.5	191	3810	95	1905	0	100
21	21	POOL	42	21	448	14	8.0	0.9	213	4474	232	4875	179	34
3	0	DRY	6	10	31	1	0.0	0.0	0	0	0	0	0	0

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq. ft.)	TOTAL VOL. (cu. ft.)
50	24	3198	8356	6794

RIGHT TRB 2 MARTIN CREEK — Drainage: SF BIG RIVER

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS — Survey Dates: 7/29/02

Confluence Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T17NR14WS16 LATITUDE:39°19'31" LONGITUDE:123°26'1"

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 %
6	1	LGR	12	41	247	8	2	0.2	0.4	12	72	2	14	0	0	93
1	1	RUN	2	15	15	0	17	0.5	1.1	255	255	128	128	0	80	80
19	1	SRN	38	129	2457	77	5	0.5	1.1	126	2394	63	1197	0	120	84
18	18	MCP	36	22	387	12	8	0.8	2.8	224	4023	241	4344	186	32	84
1	1	CCP	2	21	21	1	8	0.8	1.8	168	168	134	134	84	60	85
1	1	STP	2	32	32	1	8	1.5	2.5	243	243	365	365	292	15	100
1	1	PLP	2	8	8	0	5	0.8	1.2	40	40	32	32	20	60	85
3	0	DRY	6	10	31	1	0	0.0	0.0	0	0	0	0	0	0	0

TOTAL UNITS	TOTAL UNITS	LENGTH (ft.)	AREA (sq.ft)	TOTAL VOL. (cu.ft)
50	24	3198	7195	6214

RIGHT TRB 2 MARTIN CREEK — Drainage: SF BIG RIVER

Table 3 - SUMMARY OF POOL TYPES — Survey Dates: 7/29/02

Confluence Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T17NR14WS16 LATITUDE:39°19'31" LONGITUDE:123°26'1"

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
20	20	MAIN	95	22	440	98	8.1	0.9	222	4434	242	4843	186	33
1	1	SCOUR	5	8	8	2	5.0	0.8	40	40	32	32	20	60

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq.ft.)	TOTAL VOL. (cu.ft.)
21	21	448	4474	4875

RIGHT TRB 2 MARTIN CREEK Drainage: SF BIG RIVER

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES Survey Dates: 7/29/02

Confluence Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T17NR14WS16 LATITUDE:39°19'31" LONGITUDE:123°26'1"

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
18	MCP	86	0	0	15	83	3	17	0	0	0	0
1	CCP	5	0	0	1	100	0	0	0	0	0	0
1	STP	5	0	0	0	0	1	100	0	0	0	0
1	PLP	5	0	0	1	100	0	0	0	0	0	0

TOTAL UNITS
21

RIGHT TRB 2 MARTIN CREEK — Drainage: SF BIG RIVER

Table 5 - SUMMARY OF MEAN PERCENT COVER BY HABITAT TYPE — Survey Dates: 7/29/02

Confluence Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T17NR14WS16 LATITUDE:39°19'31" LONGITUDE:123°26'1"

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
6	0	LGR	0	0	0	0	0	0	0	0	0
1	1	RUN	0	30	70	0	0	0	0	0	0
19	1	SRN	0	15	40	0	0	0	0	40	5
18	18	MCP	9	18	56	1	0	0	0	14	2
1	1	CCP	0	30	70	0	0	0	0	0	0
1	1	STP	10	0	0	0	0	0	10	70	10
1	1	PLP	0	10	30	0	0	0	30	30	0
3	0	DRY	0	0	0	0	0	0	0	0	0

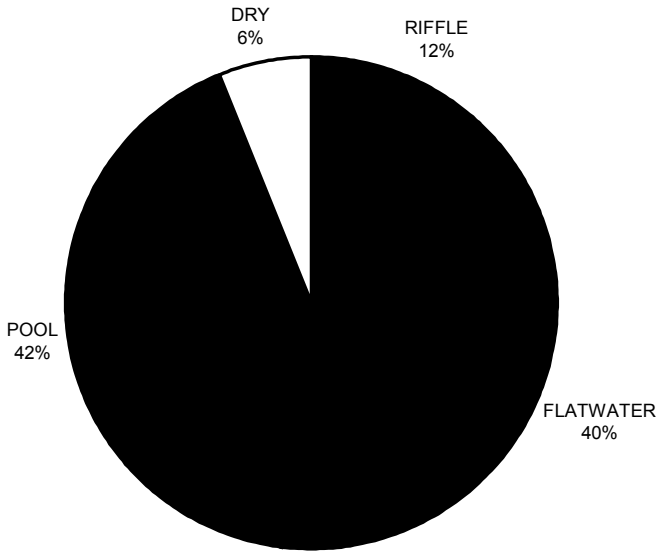
RIGHT TRB 2 MARTIN CREEK Drainage: SF BIG RIVER

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE Survey Dates: 7/29/02

Confluence Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T17NR14WS16 LATITUDE:39°19'31" LONGITUDE:123°26'1"

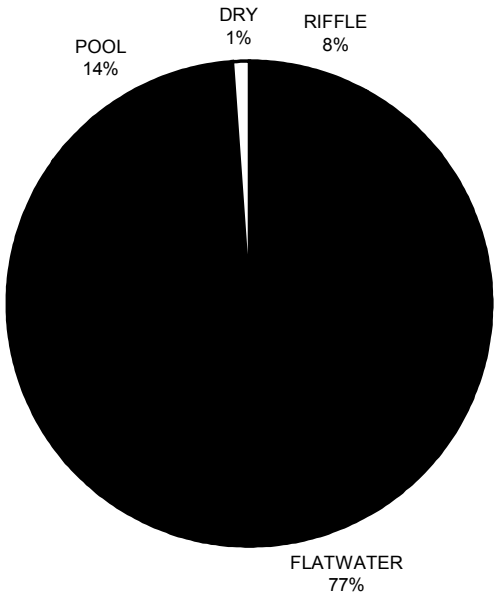
TOTAL HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	% TOTAL SILT/CLAY DOMINANT	% TOTAL SAND DOMINANT	% TOTAL GRAVEL DOMINANT	% TOTAL SM COBBLE DOMINANT	% TOTAL LG COBBLE DOMINANT	% TOTAL BOULDER DOMINANT	% TOTAL BEDROCK DOMINANT
6	1	LGR	0	0	0	0	0	100	0
1	1	RUN	100	0	0	0	0	0	0
19	1	SRN	0	0	0	0	0	100	0
18	5	MCP	40	0	0	0	20	40	0
1	1	CCP	100	0	0	0	0	0	0
1	1	STP	100	0	0	0	0	0	0
1	1	PLP	0	0	0	0	100	0	0
3	0	DRY	0	0	0	0	0	0	0

RIGHT BANK TRIBUTARY 2 MARTIN CREEK
HABITAT TYPES BY PERCENT OCCURENCE



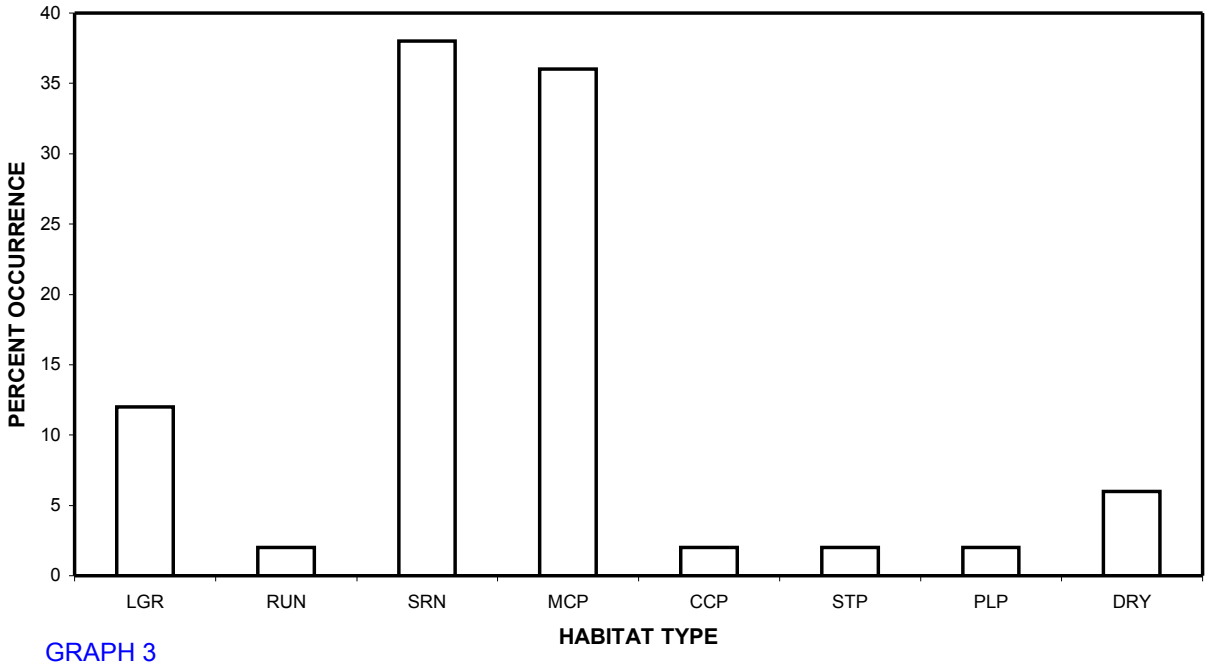
GRAPH 1

RIGHT BANK TRIBUTARY 2 MARTIN CREEK
HABITAT TYPES BY PERCENT TOTAL LENGTH



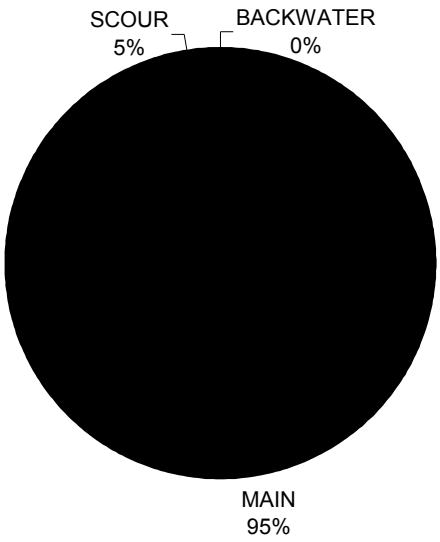
GRAPH 2

RIGHT BANK TRIBUTARY 2 MARTIN CREEK
HABITAT TYPES BY PERCENT OCCURRENCE



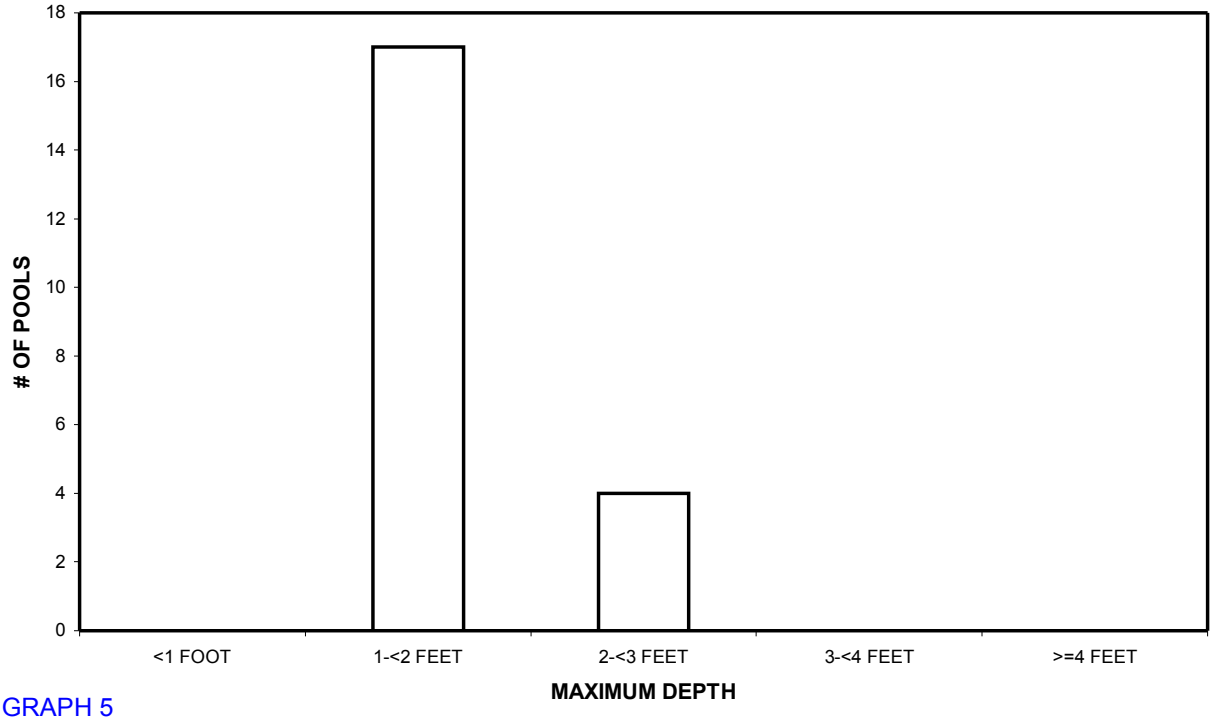
GRAPH 3

RIGHT BANK TRIBUTARY 2 MARTIN CREEK
POOL HABITAT TYPES BY PERCENT OCCURRENCE



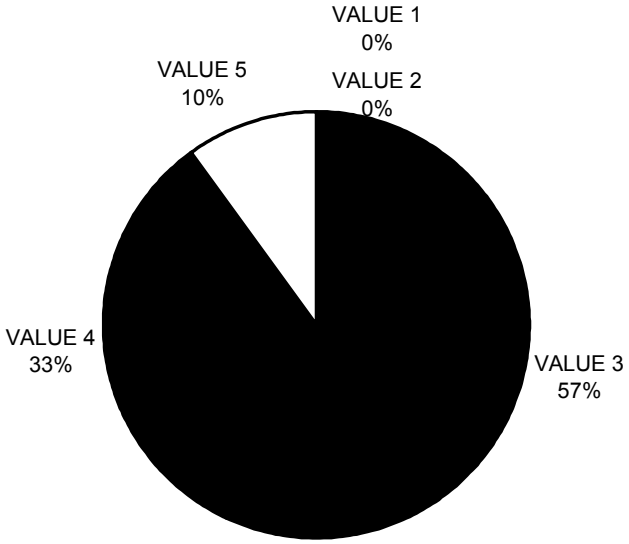
GRAPH 4

RIGHT BANK TRIBUTARY 2 MARTIN CREEK
MAXIMUM DEPTH IN POOLS



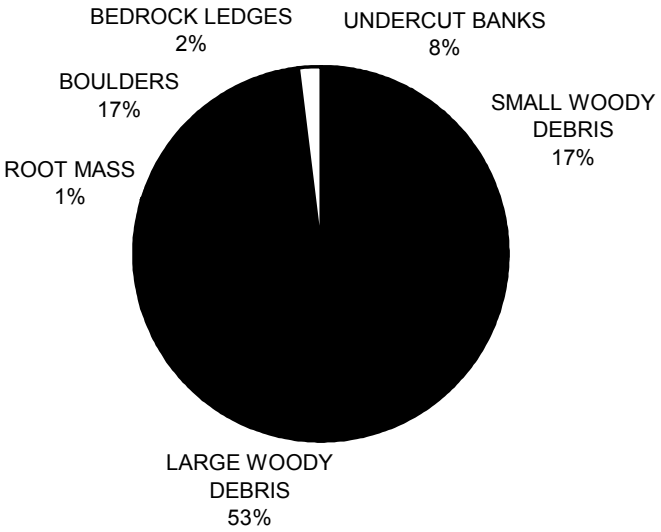
GRAPH 5

RIGHT BANK TRIBUTARY 2 MARTIN CREEK
PERCENT EMBEDDEDNESS



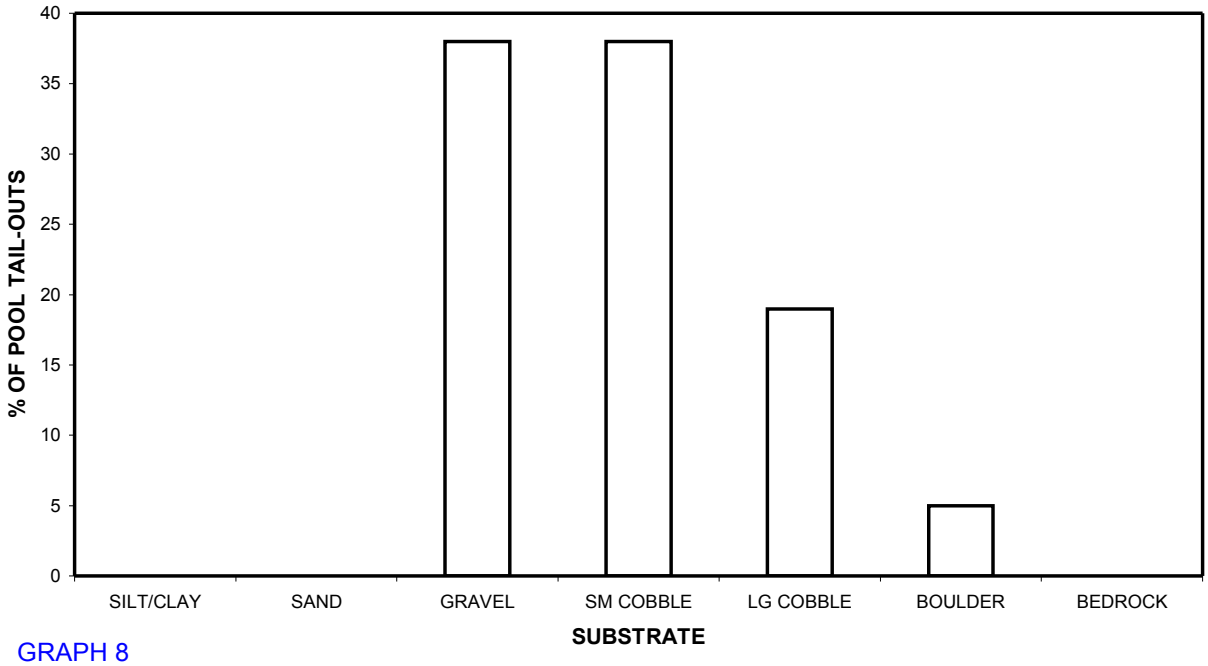
GRAPH 6

RIGHT BANK TRIBUTARY 2 MARTIN CREEK
MEAN PERCENT COVER TYPES IN POOLS



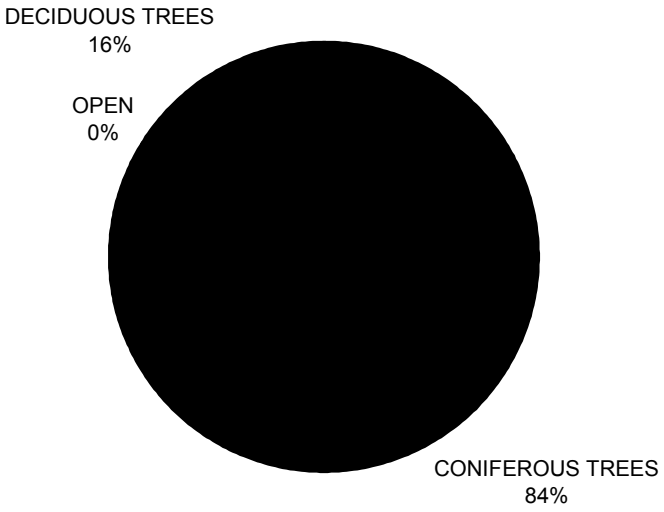
GRAPH 7

RIGHT BANK TRIBUTARY 2 MARTIN CREEK
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



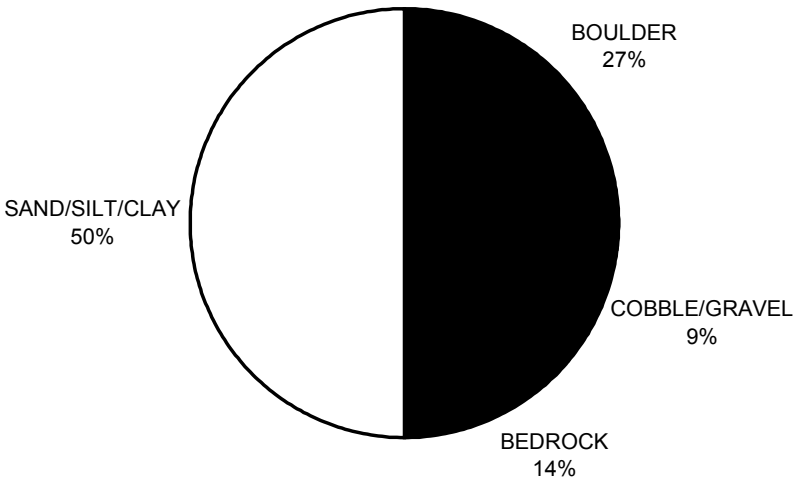
GRAPH 8

RIGHT BANK TRIBUTARY 1 MARTIN CREEK
MEAN PERCENT CANOPY



GRAPH 9

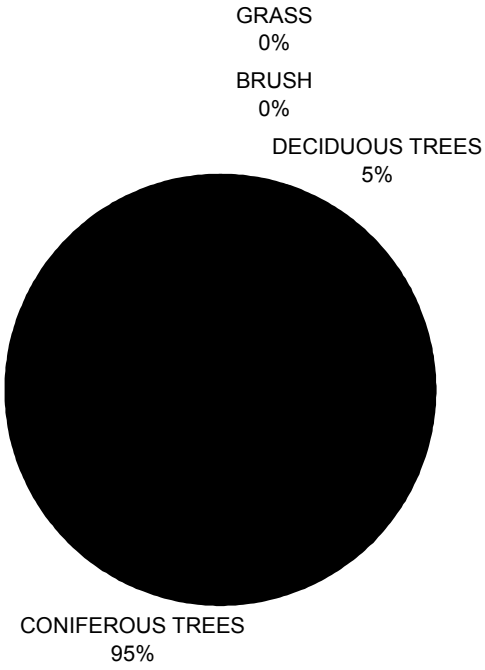
RIGHT BANK TRIBUTARY 2 MARTIN CREEK
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

RIGHT BANK TRIBUTARY 2 MARTIN CREEK

DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11