

STREAM INVENTORY REPORT

Left Bank Tributary to Martin Creek

INTRODUCTION

A stream inventory was conducted beginning July 18 and ending July 23, 2002 on Left Bank Tributary to Martin Creek. The survey began at the confluence with Martin Creek and extended upstream 0.56 miles.

The Left Bank Tributary 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 Left Bank Tributary 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

Left Bank Tributary is a tributary to Martin Creek, a tributary to the Big River, located in Mendocino County, California (Map 1). Left Bank Tributary to Martin Creek's legal description at the confluence with Martin Creek is T17N R14W S10. Its location is 39°20'15" north latitude and 123°24'32" west longitude. Left Bank Tributary to Martin Creek is a first order stream and has approximately 0.09 miles of solid blue line stream according to the USGS Greenough Ridge 7.5 minute quadrangle. Left Bank Tributary to Martin Creek drains a watershed of approximately 1.5 square miles. Elevations range from about 990 feet at the mouth of the creek to 1920 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 logging roads were used to reach the tributary.

A reconnaissance survey was conducted on the Left Bank Tributary to Martin Creek by CDFG in 1959 (California Department of Fish and Game 1959). This stream was given the title East Fork Martin Creek at the time. Only steelhead was seen in the 1958 survey.

METHODS

The habitat inventory conducted in Left Bank Tributary 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

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trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). This inventory was conducted by a two-person team.

SAMPLING STRATEGY

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

HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the *California Salmonid Stream Habitat Restoration Manual*. This form was used in Left Bank Tributary 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 Left Bank Tributary 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

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Graphics are produced from the tables using Excel. Graphics developed for Left Bank Tributary 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 18 through 23, 2002, was conducted by Scott Monday and Kristi Knechtle (DFG). The total length of the stream surveyed was 2,950 feet.

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

Left Bank Tributary to Martin Creek is a B3 channel type for the entire 2,950 feet of stream surveyed. B3 channel types are classified as moderately entrenched, moderate gradient, riffle dominated channels with infrequently spaced pools, very stable plan and profile, stable banks, and cobble-dominated substrates.

Water temperatures taken during the survey period ranged from 55 to 60 degrees Fahrenheit. Air temperatures ranged from 65 to 85 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 44% pool units, 28% flatwater units, 23% riffle units, and 5% dry units (Graph 1). Based on total length of Level II habitat types there were 47% flatwater units, 24% riffle units, 19% pool units, and 10% dry units (Graph 2).

Eight Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pools, 38%; step runs, 27%; and low gradient riffles, 23% (Graph 3). Based on percent total length, step runs made up 45%, low gradient riffles 24%, mid channel pools 15%, and dry 10%.

A total of 28 pools were identified (Table 3). Main channel pools were the most frequently encountered, at 86%, and comprised 78% of the total length of all pools (Graph 4).

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Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Eight of the 28 pools (29%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 28 pool tail-outs measured, 0 had a value of 1 (0%); 6 had a value of 2 (21%); 3 had a value of 3 (11%); 1 had a value of 4 (4%); and 18 had a value of 5 (64%) (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. Flatwater habitat types had a mean shelter rating of 29, pool habitats had a mean shelter rating of 25, and riffle habitat types had a mean shelter rating of 5 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 26. Scour pools had a mean shelter rating of 20 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover types in Left Bank Tributary to Martin Creek. Graph 7 describes the pool cover in Left Bank Tributary to Martin Creek. Boulders are the dominant pool cover type followed by large woody debris.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Boulders were the dominant substrate observed in 46% of pool tail-outs while gravel was the next most frequently observed substrate type, at 36%.

The mean percent canopy density for the surveyed length of Left Bank Tributary to Martin Creek was 90%. The mean percentages of deciduous and coniferous trees were 1% and 99%, respectively. Graph 9 describes the mean percent canopy in Left Bank Tributary to Martin Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 58%. The mean percent left bank vegetated was 65%. The dominant elements composing the structure of the stream banks consisted of 71% sand/silt/clay, 14% cobble/gravel, 11% bedrock, and 4% boulder (Graph 10). Coniferous trees were the dominant vegetation type observed in 86% of the units surveyed. Additionally, 14% of the units surveyed had brush as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

No biological inventory was conducted on the Left Bank Tributary to Martin Creek. Young of year salmonid presence was observed from the stream banks in Left Bank Tributary to Martin Creek up to 2,604 feet.

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DISCUSSION

Left Bank Tributary to Martin Creek is a B3 channel type for the entire 2,950 feet of stream surveyed. The suitability of B3 channel type for fish habitat improvement structures is as follows: B3 channel types are excellent for plunge weirs, boulder clusters and bank placed boulders, single and opposing wing deflectors, and log cover

The water temperatures recorded on the survey day July 18, through July 23, 2002 ranged from 55 to 60 degrees Fahrenheit. Air temperatures ranged from 65 to 85 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 47% of the total length of this survey, riffles 24%, pools 19%, and dry 10%. The pools are relatively shallow, with 8 of the 28 (29%) 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.

Six of the 28 pool tail-outs measured had embeddedness ratings of 1 or 2. Four of the pool tail-outs had embeddedness ratings of 3 or 4. Eighteen 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 Left Bank Tributary to Martin Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Twenty-four of the 28 pool tail-outs measured had sand/silt/clay, large cobble, boulders or bedrock as the dominant substrate. This is generally considered unsuitable for spawning salmonids.

The mean shelter rating for pools was 25. The shelter rating in the flatwater habitats was 29. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by boulders in all habitat types. Additionally, large 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 90%. In general, revegetation projects are considered when canopy density is less than 80%.

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The percentage of right and left bank covered with vegetation was moderate at 58% and 65%, 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) Left Bank Tributary 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 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 is from boulders. 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 need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.
- 7) There are several log debris accumulations present on Left Bank Tributary 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.
- 8) 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.

Left Bank Tributary to Martin Creek

Position (ft):	Comment:
0'	Begin survey 45 feet up from the confluence with Martin Creek. The channel type is a B3. Steelhead young-of-the-year (YOY) noted in the first unit.
288'	Newts and steelhead YOY.
620'	Steelhead yearling.
858'	Old log structure on the left bank. Possibly old Humboldt crossing.
1001'	Flowing left bank tributary about 50 feet into unit.
1101'	Three pieces of large woody debris (LWD) at the top of the pool retaining sediment at top of logs.
1114'	Right bank erosion contributing fines.
1284'	Steelhead yearling
1307'	Dry left bank tributary 10 feet into unit.
1453'	Stream is subsurface for two feet then continues to flow.
1501'	36 feet into unit there is a slide on the left bank. Loose dirt contributing fines. Bundle of cable on the bank and in the stream.
1690'	Dry right bank tributary 100 feet into unit.
1805'	Large debris accumulation (LDA) 68 feet into unit. 20 x 10 x 10 feet. Stream is flowing subsurface the last 5 feet of LDA.
2017'	Flowing left bank tributary at the top of unit. No fish observed.
2114'	LDA. 10 x 4 x 4 feet retaining sediment.
2230'	Three foot jump out of pool into boulders.
2408'	Slide on right bank. 50 feet high dumped trees and boulders into stream. Possible wooden structure at top of slide.
2604'	Two steelhead YOY in pool.
2612'	10 feet of subsurface flow at the beginning of unit.

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2682' Dry channel. End of survey at road crossing. Walked an additional 300 feet of dry channel. Believed to have reached end of anadromy.

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.

Left Bank Tributary to Martin Creek

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]	

Left Bank Tributary to Martin Creek

TABLES AND GRAPHS

TABLE 8. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: LEFT BK TRIB MARTIN CREEK
SAMPLE DATES: 07/18/02 to 07/23/02
STREAM LENGTH: 2950 ft.
LOCATION OF STREAM MOUTH:
USGS Quad Map: GREENOUGH Latitude: 39°20'15"
Legal Description: T17NR14WS10 Longitude: 123°24'32"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 01
Channel Type: B3 Canopy Density: 90%
Channel Length: 2950 ft. Coniferous Component: 99%
Riffle/flatwater Mean Width: 5 ft. Deciduous Component: 1%
Total Pool Mean Depth: 1.0 ft. Pools by Stream Length: 19%
Base Flow: 0.0 cfs Pools >=3 ft.deep: 7%
Water: 055- 060°F Air: 065-085°F Mean Pool Shelter Rtn: 26
Dom. Bank Veg.: Coniferous Trees Dom. Shelter: Boulders
Vegetative Cover: 61% Occurrence of LOD: 14%
Dom. Bank Substrate: Silt/Clay/Sand Dry Channel: 300 ft.

Embeddness Value: 1. 0% 2. 2.21% 3. 11% 4. 4% 5. 64%

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LEFT BK TRIB MARTIN CREEK													
Drainage: SF BIG RIVER													
Table 1 - SUMMARY OF RIPPLE, FLATWATER, AND POOL HABITAT TYPES													
Survey Dates: 07/18/02 to 07/23/02													
Confluence Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T17NR14WS10 LATITUDE: 39°20'15" LONGITUDE: 123°24'32"													
HABITAT UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	MEAN ESTIMATED TOTAL AREA (sq.ft.)	MEAN ESTIMATED TOTAL VOLUME (cu.ft.)	MEAN RESIDUAL VOLUME (cu.ft.)	MEAN SHELTER RATING		
15	3	23	47	710	24	5.7	0.3	149	2228	49	735	0	5
18	4	28	77	1377	47	5.0	0.6	264	4760	157	2817	0	29
28	28	44	20	563	19	6.6	1.0	139	3899	143	4015	109	25
3	0	5	100	300	10	0.0	0.0	0	0	0	0	0	0
TOTAL UNITS			TOTAL LENGTH (ft.)		TOTAL AREA (sq. ft.)		TOTAL VOLUME (cu. ft.)						
64			2950		10886		7567						

Left Bank Tributary to Martin Creek

LEFT BK TRIB MARTIN CREEK

Drainage: SF BIG RIVER

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS

Survey Dates: 07/18/02 to 07/23/02

Confluence Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T17NR14WS10 LATITUDE:39°20'15" LONGITUDE:123°24'32"

HABITAT UNITS MEASURED	#	HABITAT FULLY MEASURED	HABITAT OCCURRENCE	HABITAT TYPE	MEAN LENGTH	MEAN WIDTH	MEAN DEPTH	MEAN MAXIMUM DEPTH	MEAN AREA	TOTAL AREA EST.	MEAN VOLUME	TOTAL VOLUME EST.	MEAN RESIDUAL SHELTER RATING	MEAN CANOPY		
			%		ft.	ft.	ft.	ft.	sq.ft.	sq.ft.	cu.ft.	cu.ft.		%		
15	3	LGR	23	47	710	24	6	0.3	0.6	149	2228	49	735	0	5	93
1	1	RUN	2	47	47	2	6	0.6	1.1	268	268	161	161	0	5	90
17	3	SRN	27	78	1330	45	5	0.6	1.1	263	4476	155	2637	0	37	87
24	24	MCP	38	18	440	15	6	1.0	3.1	122	2919	114	2740	83	26	91
1	1	CRP	2	40	40	1	8	1.2	1.9	320	320	384	384	288	30	95
1	1	LSR	2	34	34	1	10	1.8	3.0	340	340	612	612	544	40	95
2	2	LSBK	3	25	49	2	7	0.9	2.3	160	320	139	279	110	5	95
3	0	DRY	5	100	300	10	0	0.0	0.0	0	0	0	0	0	0	85

TOTAL UNITS 64
 TOTAL LENGTH (ft.) 2950

TOTAL AREA (sq.ft.) 19870
 TOTAL VOL. (cu.ft.) 7547

Left Bank Tributary to Martin Creek

LEFT BK TRIB MARTIN CREEK

Drainage: SF BIG RIVER

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 07/18/02 to 07/23/02

Confluence Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T17NR14WS10 LATITUDE: 39°20'15" LONGITUDE: 123°24'32"

HABITAT UNITS MEASURED	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	TOTAL AREA (sq.ft.)	MEAN VOLUME (cu.ft.)	TOTAL VOLUME (cu.ft.)	MEAN RESIDUAL POOL VOL. (cu.ft.)	MEAN SHELTER RATING
24	24	MAIN	86	18	440	6.4	1.0	122	2919	114	2740	83	26
4	4	SCOUR	14	31	123	7.8	1.2	245	980	319	1275	263	20
TOTAL UNITS	28				TOTAL LENGTH (ft.)				TOTAL AREA (sq.ft.)		TOTAL VOL. (cu.ft.)		
					563				3899		4015		

Left Bank Tributary to Martin Creek

Drainage: SF BIG RIVER

LEFT BK TRIB MARTIN CREEK

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES Survey Dates: 07/18/02 to 07/23/02

Confluence Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T17NR14WS10 LATITUDE: 39°20'15" LONGITUDE: 123°24'32"

UNITS MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	<1 FOOT		1-<2 FT.		2-<3 FT.		3-<4 FT.		>=4 FEET	
			MAXIMUM DEPTH OCCURRENCE	PERCENT OCCURRENCE	MAXIMUM DEPTH OCCURRENCE	PERCENT OCCURRENCE	MAXIMUM DEPTH OCCURRENCE	PERCENT OCCURRENCE	MAXIMUM DEPTH OCCURRENCE	PERCENT OCCURRENCE	MAXIMUM DEPTH OCCURRENCE	PERCENT OCCURRENCE
24	MCP	86	0	0	18	75	5	21	1	4	0	0
1	CRP	4	0	0	1	100	0	0	0	0	0	0
1	LSR	4	0	0	0	0	0	0	1	100	0	0
2	LSBK	7	0	0	1	50	1	50	0	0	0	0

TOTAL UNITS 28

Left Bank Tributary to Martin Creek

LEFT BK TRIB MARTIN CREEK Drainage: SF BIG RIVER

Table 5 - SUMMARY OF MEAN PERCENT COVER BY HABITAT TYPE Survey Dates: 07/18/02 to 07/23/02

Confluence Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T17NR14WS10 LATITUDE:39°20'15" LONGITUDE:123°24'32"

UNITS MEASURED	UNITS FULLY MEASURED	HABITAT TYPE	MEAN % UNDERCUT BANKS	MEAN % SWD	MEAN % LWD	MEAN % ROOT MASS VEGETATION	MEAN % TERR. VEGETATION	MEAN % AQUATIC VEGETATION	MEAN % WHITE WATER	MEAN % BOULDERS	MEAN % BEDROCK LEDGES
15	3	LGR	0	23	0	8	7	0	0	62	0
1	1	RUN	0	20	40	0	10	0	0	30	0
17	3	SRN	10	23	7	7	12	0	0	33	8
24	23	MCP	12	8	16	7	0	0	0	49	7
1	1	CRP	20	0	0	40	20	0	0	20	0
1	1	LSR	40	20	30	0	0	0	0	10	0
2	2	LSBK	5	13	0	0	0	0	0	13	70
3	0	DRY	0	0	0	0	0	0	0	0	0

Left Bank Tributary to Martin Creek

LEFT BK TRIB MARTIN CREEK

Drainage: SF BIG RIVER

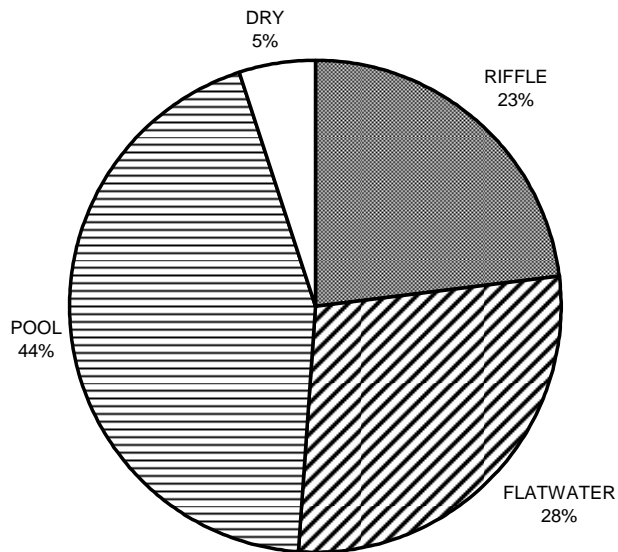
Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE

Survey Dates: 07/18/02 to 07/23/02

Confluence Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T17N R14W S10 LATITUDE: 39°20'15" LONGITUDE: 123°24'32"

TOTAL HABITAT UNITS FULLY MEASURED	HABITAT TYPE	% TOTAL SAND DOMINANT	% TOTAL SILT/CLAY DOMINANT	% TOTAL GRAVEL DOMINANT	% TOTAL SM COBBLE DOMINANT	% TOTAL LG COBBLE DOMINANT	% TOTAL BOULDER DOMINANT	% TOTAL BEDROCK DOMINANT
15	3 LGR	0	0	33	33	33	0	0
1	1 RUN	0	0	0	100	0	0	0
17	3 SRN	0	0	0	33	67	0	0
24	3 MCP	0	0	33	0	0	0	33
1	1 CRP	0	0	100	0	0	0	0
1	1 LSR	0	0	0	0	0	0	0
2	2 LSBk	0	0	50	0	50	0	0
3	0 DRY	0	0	0	0	0	0	0

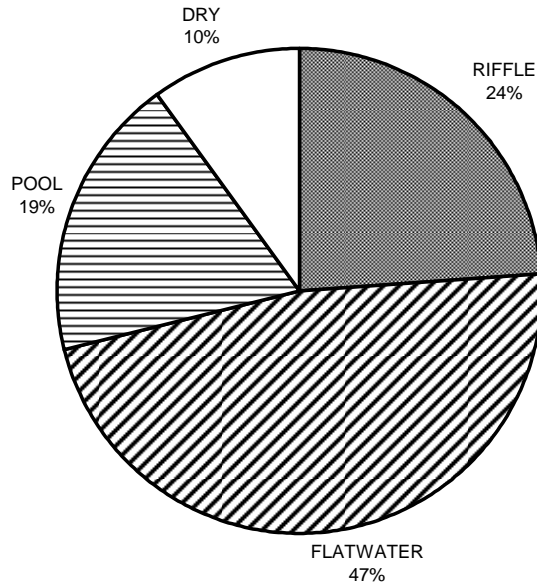
LEFT BANK TRIBUTARY MARTIN CREEK HABITAT TYPES BY PERCENT OCCURENCE



GRAPH 1

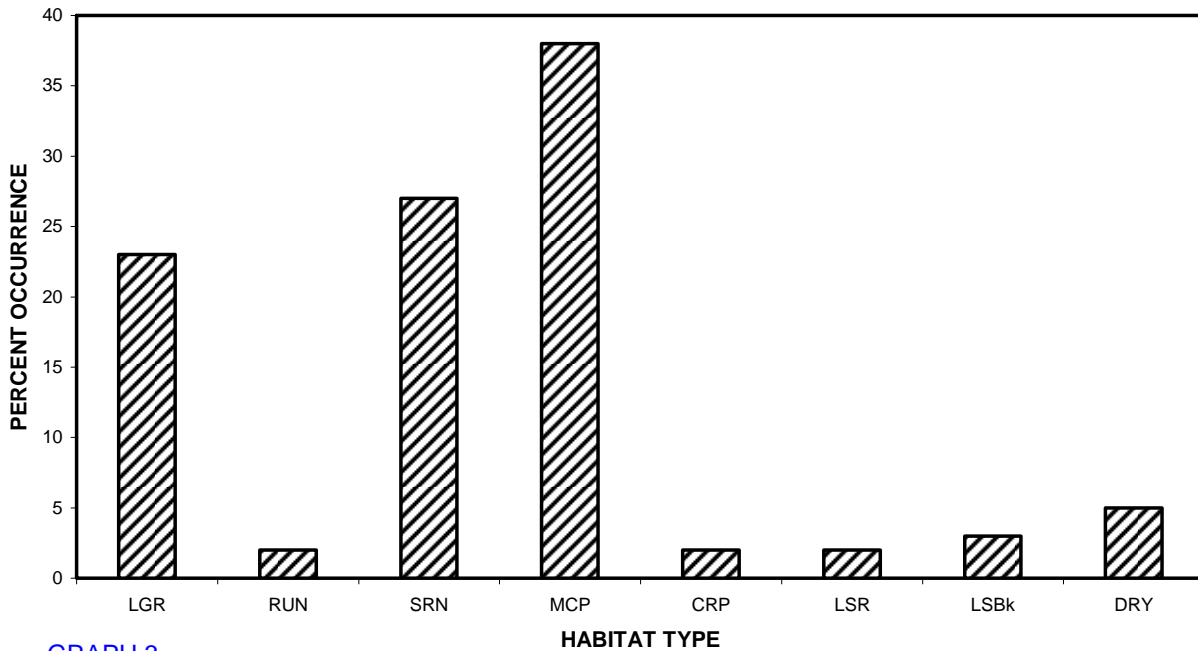
Left Bank Tributary to Martin Creek

**LEFT BANK TRIBUTARY MARTIN CREEK
HABITAT TYPES BY PERCENT TOTAL LENGTH**



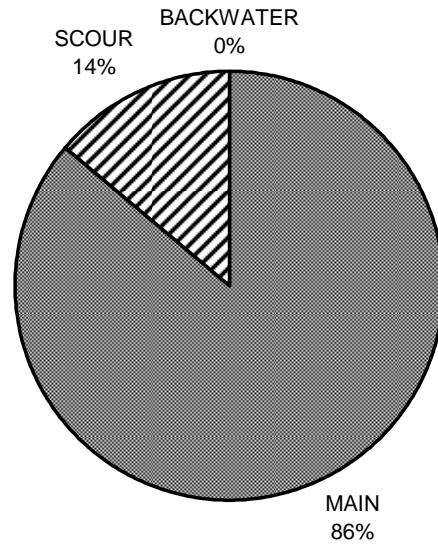
GRAPH 2

**LEFT BANK TRIBUTARY MARTIN CREEK
HABITAT TYPES BY PERCENT OCCURRENCE**



GRAPH 3

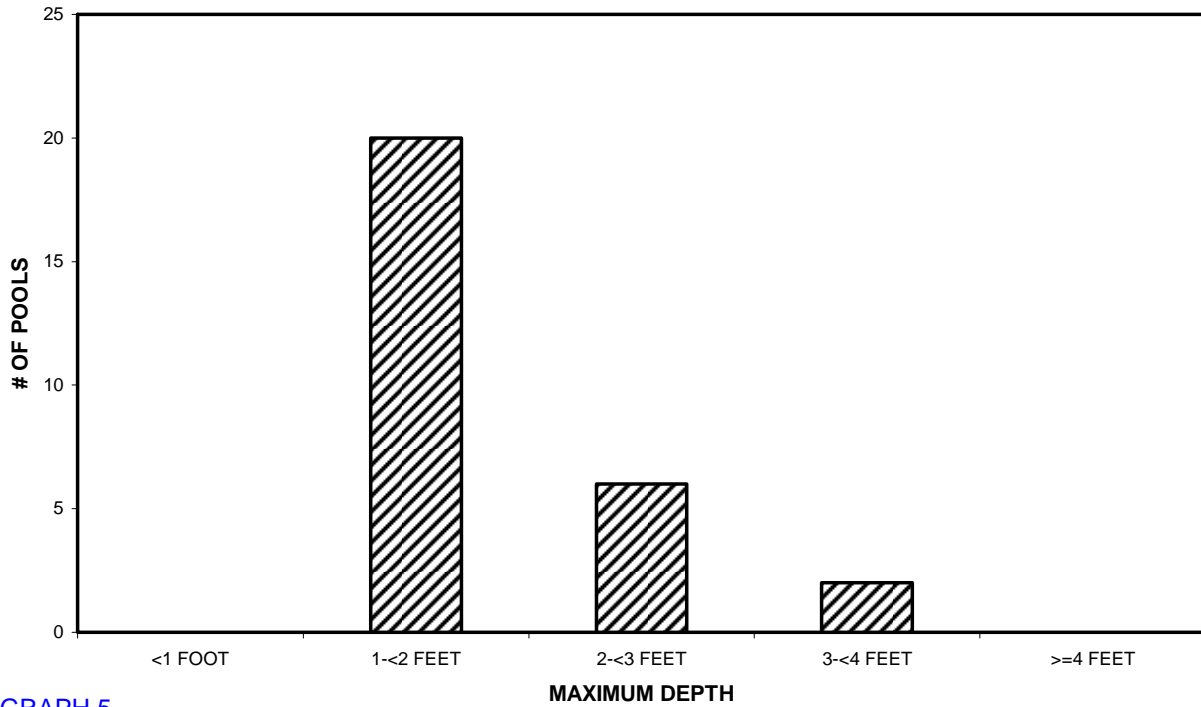
LEFT BANK TRIBUTARY MARTIN CREEK POOL HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 4

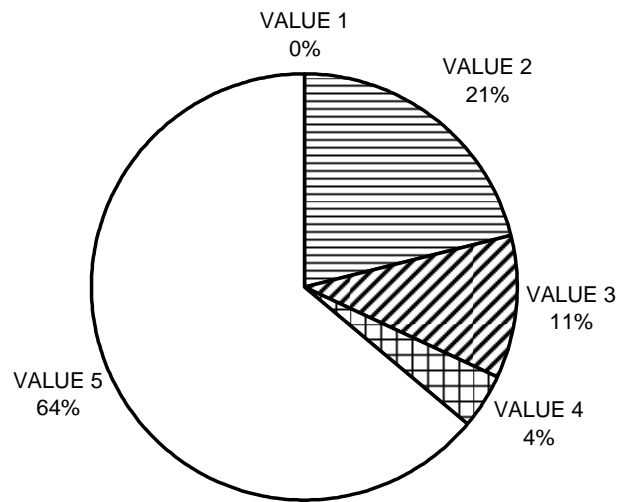
Left Bank Tributary to Martin Creek

LEFT BANK TRIBUTARY MARTIN CREEK MAXIMUM DEPTH IN POOLS



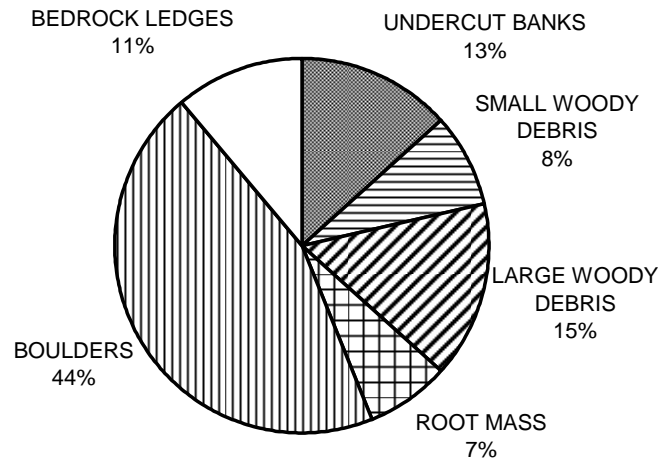
GRAPH 5

LEFT BANK TRIBUTARY MARTIN CREEK PERCENT EMBEDDEDNESS



GRAPH 6

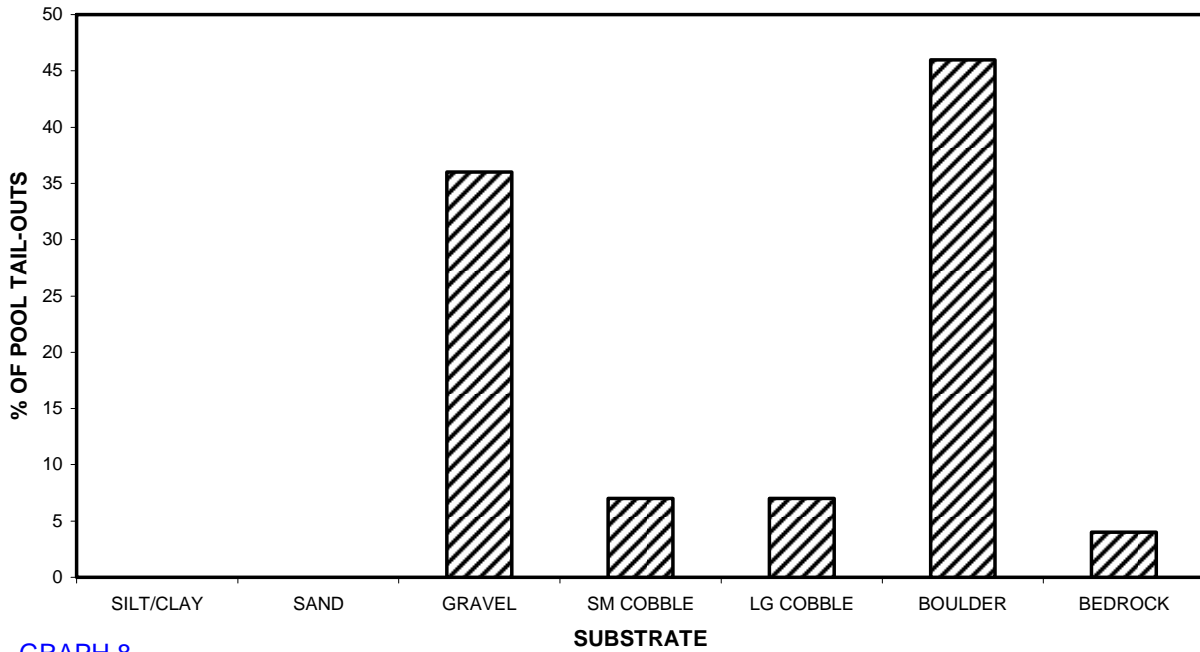
LEFT BANK TRIBUTARY MARTIN CREEK MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

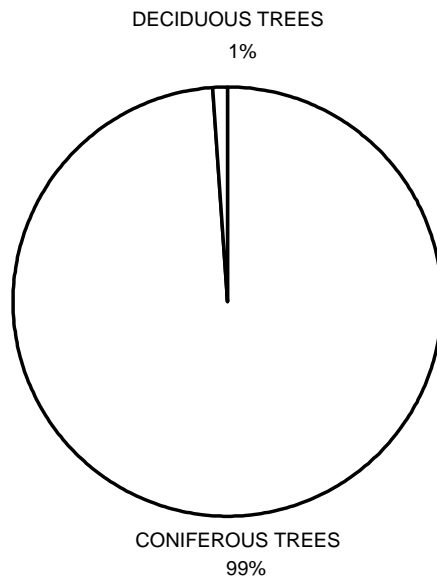
Left Bank Tributary to Martin Creek

**LEFT BANK TRIBUTARY MARTIN CREEK
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS**



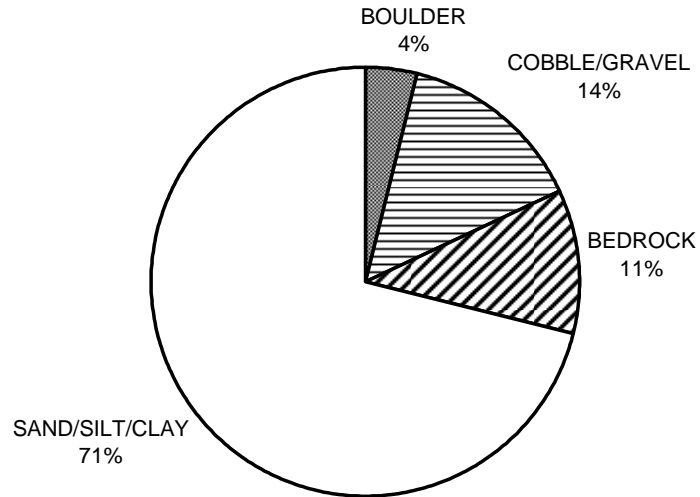
GRAPH 8

**LEFT BANK TRIBUTARY MARTIN CREEK
MEAN PERCENT CANOPY**



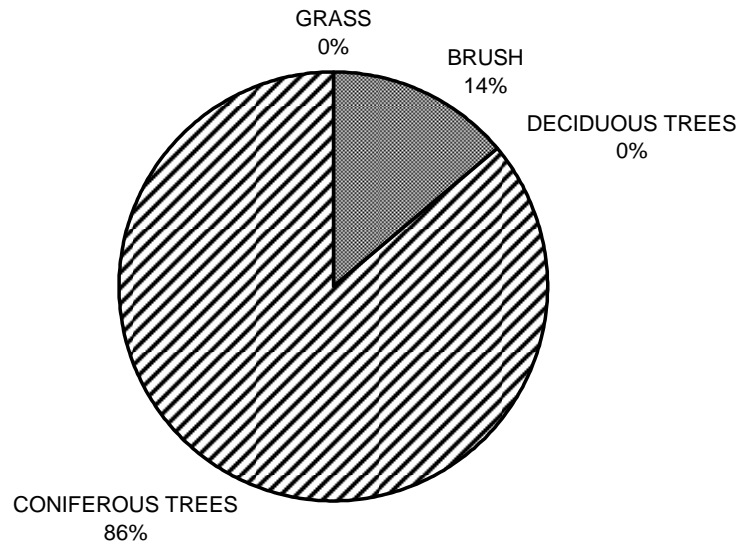
GRAPH 9

LEFT BANK TRIBUTARY MARTIN CREEK DOMINANT BANK COMPOSITION IN SURVEY REACH



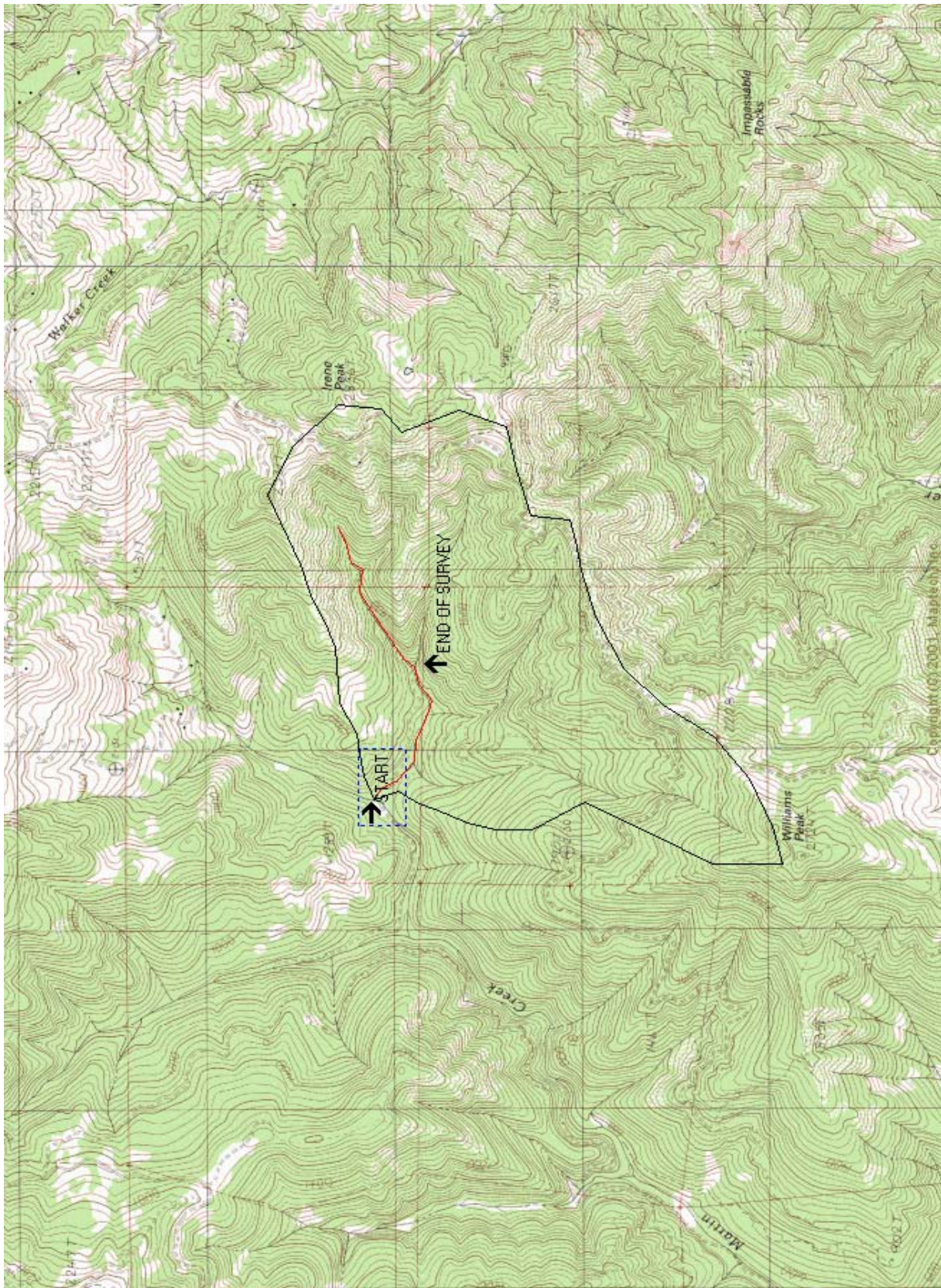
GRAPH 10

LEFT BANK TRIBUTARY MARTIN CREEK DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

Left Bank Tributary to Martin Creek



MAP 1. LEFT BANK TRIBUTARY TO MARTIN CREEK.