STREAM INVENTORY REPORT

Valentine Creek

INTRODUCTION

A stream inventory was conducted on July 30 through August 1, 2002 on Valentine Creek. The survey began at the confluence with Big River and extended upstream 1.8 miles.

The Valentine 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 Valentine 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

Valentine Creek is a tributary to the Big River, a tributary to Pacific Ocean, located in Mendocino County, California (Map 1). Valentine Creek's legal description at the confluence with Big River is T17N R14W S32. Its location is 39°28′9″ North latitude and 123°42′4″ West longitude. Valentine Creek is a first order stream and has approximately 2.5 miles of solid blue line stream according to the USGS Greenough Ridge 7.5 minute quadrangle. Valentine Creek drains a watershed of approximately 2.5 square miles. Elevations range from about 600 feet at the mouth of the creek to 1680 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is owned is entirely privately owned and used for timber production. Vehicle access exists via Highway 20 at mile marker 17. Mendocino Redwood Company logging roads are used to access the stream.

A reconnaissance survey was conducted on Valentine Creek by CDFG in 1959 (California Department of Fish and Game 1959). Only steelhead was observed in the 1959 survey

METHODS

The habitat inventory conducted in Valentine Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The California Department of Fish and Game Scientific Aids (DFG) and Watershed Stewards Project/AmeriCorps (WSP/AmeriCorps) Members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). This inventory was conducted by a two-person team.

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 Valentine 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". Valentine 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 Valentine 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 Valentine 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 Valentine 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 Valentine 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 Valentine 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 Valentine 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

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HABITAT INVENTORY RESULTS

* ALL TABLES AND GRAPHS ARE LOCATED AT THE END OF THE REPORT *

The habitat inventory of July 30 to August 1, 2002, was conducted by Scott Monday and Kristi Knechtle (DFG). The total length of the stream surveyed was 9,600 feet.

Stream flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.027 cfs on September 24, 2002 on Valentine Creek.

Valentine Creek is a B3 channel type for the entire 9,600 feet of stream surveyed. B3 channels are moderately entrenched, moderate gradient, riffle dominated channels with infrequently spaced pools, very stable plan and profile, stable banks, and cobble-dominated substrate.

Water temperatures taken during the survey period ranged from 59 to 64 degrees Fahrenheit. Air temperatures ranged from 66 to 94 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 43% pool units, 36% flatwater units, 15% riffle units, and 13% dry units (Graph 1). Based on total length of Level II habitat types there were 65% flatwater units, 15% pool units, 13% dry, and units 8% riffle units (Graph 2).

Nine Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pools, 34%; step runs, 31%; and low-gradient riffles, 14% (Graph 3). Based on percent total length, step runs made up, 62%, dry channels, 13%, and mid-channel pools, 11%.

A total of 65 pools were identified (Table 3). Main channel pools were the most frequently encountered, at 78%, and comprised 74% 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. Fifteen of the 65 pools (23%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 65 pool tail-outs measured, 10 had a value of 1 (15%); 21 had a value of 2 (32%); 15 had a value of 3 (23%); 6 had a value of 4 (9%); and 13 had a value of 5 (20%) (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. Pool habitats had a mean shelter rating of 19, flatwater habitat types had a mean shelter rating of 11, and riffle habitat types had a mean shelter rating of 7 (Table 1). Of the pool types, scour pools had the highest mean shelter rating at 29. Main channel pools had a mean shelter rating of 16 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Valentine Creek. Graph 7 describes the pool cover in Valentine Creek. Boulders are the

dominant pool cover type followed by bedrock ledges.

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 37% of pool tail-outs while small cobble was the next most frequently observed substrate type, at 28%.

The mean percent canopy density for the surveyed length of Valentine Creek was 84%. The mean percentages of deciduous and coniferous trees were 12% and 88%, respectively. Graph 9 describes the mean percent canopy in Valentine Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 45%. The mean percent left bank vegetated was 47%. The dominant elements composing the structure of the stream banks consisted of 15% bedrock, 15% boulder, 33% cobble/gravel, and 37% sand/silt/clay (Graph 10). Coniferous trees were the dominant vegetation type observed in 67% of the units surveyed. Additionally, 22% of the units surveyed had brush as the dominant vegetation type, and 11% had deciduous trees as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

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

DISCUSSION

Valentine Creek is a B3 channel type for the entire 9,600 feet of stream surveyed. The suitability of B3 channel types 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 days July 30 through August 1, 2002 ranged from 59 to 64 degrees Fahrenheit. Air temperatures ranged from 66 to 94 degrees Fahrenheit. This is an 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 65% of the total length of this survey, pools 15%, dry 13%, and riffles 8%. The pools are relatively shallow, with 15 of the 65 (23%) 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.

Thirty-one of the 65 pool tail-outs measured had embeddedness ratings of 1 or 2. Twenty-one of the pool tail-outs had embeddedness ratings of 3 or 4. Thirteen 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 Valentine Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Forty-two of the 65 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 19. The shelter rating in the flatwater habitats was 11. 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, 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 84%. 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 45% and 47%, 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) Valentine 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 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 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 Valentine Creek by planting willow, white 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 Valentine 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 Valentine Creek that are retaining large quantities of fine sediment. The modification of these debris accumulations is desirable, but must be done carefully, over time, to avoid excessive sediment loading in downstream reaches.

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

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

COMMENTS AND LANDMARKS

The following landmarks and possible problem sites were noted. All distances are approximate and taken from the beginning of the survey reach.

Position (ft):	Comment:
0'	Begin survey 55 feet from the confluence with Big River. The channel type is a B3. Passed one pool before the start of survey with coho, steelhead, and stickleback young-of-the-year (YOY).
27'	Salamander and newt.
500'	Rootwad and bedrock creating scour greater than 60% steelhead yearling.

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1004'	Dry right bank tributary. Sculpin.
1478'	Dry left bank tributary.
1561'	Unidentified frog.
2595'	Measured channel type.
2891'	Dry left bank tributary.
3314'	Dry right bank tributary.
3524'	Right bank slide contributing fine sediments and falling trees into channel.
3539'	Old dry left bank tributary.
4306'	Dry right bank tributary.
4761'	Large woody debris (LWD) accumulation 10 feet wide, 6 feet high, and 20 feet deep, within the channel. Potential barrier at low flow.
5083'	Right bank tributary. High gradient and dry.
5098'	Dry left bank tributary.
5365'	Right bank slide - boulders and trees within the stream. Steelhead in pool. Slide is about 58 feet long, bottom of pool is covered with silt.
5433'	10-20 steelhead YOY in pool. Silty with a sulfurous smell.
5461'	Very silty, top of slide into channel. Water above is stagnant.
5475'	Possible channel change. Channel has been redirected by slide and major silt/gravel build up.
5526'	10 steelhead YOY, pool will probably dry soon.
5546'	Perfect spawning gravel exposed.
5781'	Dry right bank tributary, very steep. Three small patches of water.
6396'	Dry right bank tributary.
6527'	Dry right bank tributary.
6740'	10-20 steelhead YOY.

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6941'	Steelhead YOY and yearling.
7062'	Salamander, steelhead YOY. 2.5 foot gopher snake.
7094'	Few steelhead YOY.
7629'	Three foot jump, steelhead YOY and a newt.
7776'	LWD in stream. Backing up sediment.
7913'	Steelhead YOY.
8880'	Dry right bank tributary.
9179'	Channel becoming very brushy.
9274'	Dry right bank tributary.
9439'	Scour from boulder is greater than 60%.
9458'	End of survey - old log bridge/landing collapsed into the channel. Extends about 60-70 feet upstream creating multiple log jams. No fish. 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.

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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]	

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TABLE 8. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: VALENTINE CREEK
SAMPLE DATES: 07/30/02 to 08/01/02
STREAM LENGTH: 9600 ft.
LOCATION OF STREAM MOUTH:
USGS Quad Map: GREENOUGH — Latitude: 39°28'9"
Legal Description: T17NR14WS32 — Longitude: 123°42'4"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 01

Channel Type: B3	Canopy Density: 84%
Channel Length: 9600 ft.	Coniferous Component: 88%
Riffle/flatwater Mean Width: 5 ft.	Deciduous Component: 12%
Total Pool Mean Depth: 0.8 ft.	Pools by Stream Length: 15%
Base Flow: 0.0 cfs	Pools >=3 ft.deep: 6%
Water: 059- 064°F Air: 066-094°F	Mean Pool Shelter Rtn: 19
Dom. Bank Veg.: Coniferous Trees	Dom. Shelter: Boulders
Vegetative Cover: 46%	Occurrence of LOD: 4%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 1206 ft.

Embeddness Value: 1. 15% 2.32% 3. 23% 4. 9% 5. 20%

VALENTINE CREEK — Drainage: BIG RIVER

Table 1 - SUMMARY OF RIFFLE, FLATWATER, AND POOL HABITAT TYPES — Survey Dates: 07/30/02 to 08/01/02

Confluence Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T17NR14WS32 LATITUDE:39°28'9" LONGITUDE:123°42'4"

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
22	5	RIFFLE	15	35	772	8	3.7	0.2	91	1999	30	651	0	7
54	8	FLATWATER	36	115	6192	65	5.6	0.4	282	15235	121	6510	0	11
65	65	POOL	43	22	1430	15	7.3	0.8	163	10575	142	9232	105	19
9	0	DRY	6	134	1206	13	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.)
150	78	9600	27809	16393

VALENTINE CREEK — Drainage: BIG RIVER

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS — Survey Dates: 07/30/02 to 08/01/02

Confluence Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T17NR14WS32 LATITUDE:39°28'9" LONGITUDE:123°42'4"

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 %
21	4	LGR	14	36	749	8	4	0.3	1.0	107	2249	36	763	0	8	79
1	1	BRS	1	23	23	0	2	0.1	0.2	26	26	3	3	0	5	88
3	2	GLD	2	24	72	1	8	0.6	1.1	227	680	130	390	0	5	83
5	2	RUN	3	25	125	1	4	0.3	1.0	111	554	30	149	0	3	71
46	4	SRN	31	130	5995	62	6	0.4	1.2	396	18201	161	7418	0	18	86
51	51	MCP	34	21	1064	11	7	0.8	3.2	159	8087	140	7117	105	16	84
13	13	LSBk	9	24	316	3	7	0.9	3.2	175	2278	150	1948	106	23	91
1	1	LSBo	1	50	50	1	6	0.8	2.4	210	210	168	168	84	100	95
9	0	DRY	6	134	1206	13	0	0.0	0.0	0	0	0	0	0	0	82

TOTAL UNITS	TOTAL UNITS	LENGTH (ft.)	AREA (sq.ft)	TOTAL VOL. (cu.ft)
150	78	9600	32284	17954

VALENTINE CREEK — Drainage: BIG RIVER

Table 3 - SUMMARY OF POOL TYPES — Survey Dates: 07/30/02 to 08/01/02

Confluence Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T17NR14WS32 LATITUDE:39°28'9" LONGITUDE:123°42'4"

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
51	51	MAIN	78	21	1064	74	7.4	0.8	159	8087	140	7117	105	16
14	14	SCOUR	22	26	366	26	6.8	0.9	178	2488	151	2116	105	29

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq.ft.)	TOTAL VOL. (cu.ft.)
65	65	1430	10575	9232

VALENTINE CREEK — Drainage: BIG RIVER

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES — Survey Dates: 07/30/02 to 08/01/02

Confluence Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T17NR14WS32 LATITUDE:39°28'9" LONGITUDE:123°42'4"

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
51	MCP	78	3	6	39	76	6	12	3	6	0	0
13	LSBk	20	0	0	8	62	4	31	1	8	0	0
1	LSBo	2	0	0	0	0	1	100	0	0	0	0

TOTAL UNITS
65

VALENTINE CREEK — Drainage: BIG RIVER

Table 5 - SUMMARY OF MEAN PERCENT COVER BY HABITAT TYPE — Survey Dates: 07/30/02 to 08/01/02

Confluence Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T17NR14WS32 LATITUDE:39°28'9" LONGITUDE:123°42'4"

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
21	4	LGR	0	14	0	0	20	0	13	54	0
1	1	BRS	0	0	40	0	20	0	0	30	10
3	2	GLD	10	15	0	0	20	0	0	40	15
5	1	RUN	0	10	0	0	40	0	0	50	0
46	4	SRN	0	19	5	0	25	0	0	51	0
51	49	MCP	7	16	3	4	5	0	1	52	12
13	13	LSBk	8	18	5	3	4	0	0	27	35
1	1	LSBo	0	25	0	0	0	0	0	75	0
9	0	DRY	0	0	0	0	0	0	0	0	0

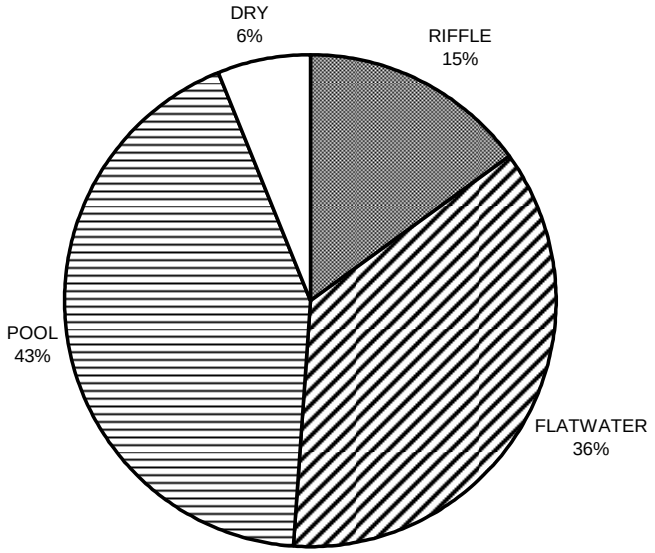
VALENTINE CREEK Drainage: BIG RIVER

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE Survey Dates: 07/30/02 to 08/01/02

Confluence Location: QUAD: GREENOUGH LEGAL DESCRIPTION: T17NR14WS32 LATITUDE:39°28'9" LONGITUDE:123°42'4"

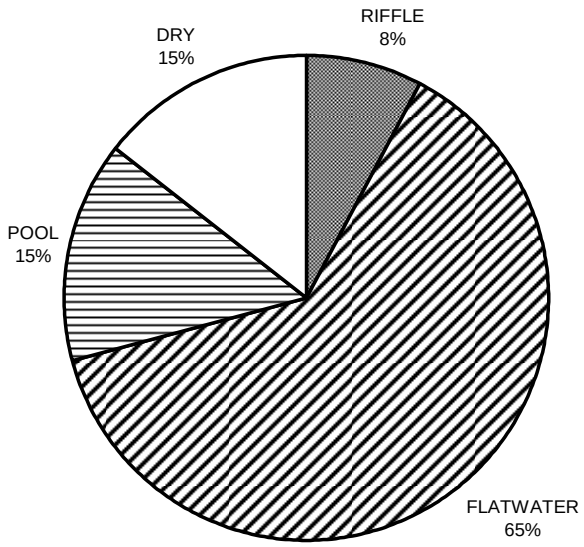
TOTAL HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	% TOTAL SILT/CLAY DOMINANT	% TOTAL SAND DOMINANT	% TOTAL GRAVEL DOMINANT	% TOTAL SM COBBLE DOMINANT	% TOTAL LG COBBLE DOMINANT	% TOTAL BOULDER DOMINANT	% TOTAL BEDROCK DOMINANT
21	4	LGR	0	0	75	25	0	0	0
1	1	BRS	0	0	0	0	0	0	100
3	2	GLD	0	50	0	0	0	0	50
5	2	RUN	0	50	50	0	0	0	0
46	4	SRN	0	0	50	25	25	0	0
51	5	MCP	0	0	0	20	60	20	0
13	4	LSBk	25	25	0	0	25	0	25
1	1	LSBo	0	0	0	0	0	100	0
9	0	DRY	0	0	0	0	0	0	0

VALENTINE CREEK
HABITAT TYPES BY PERCENT OCCURENCE



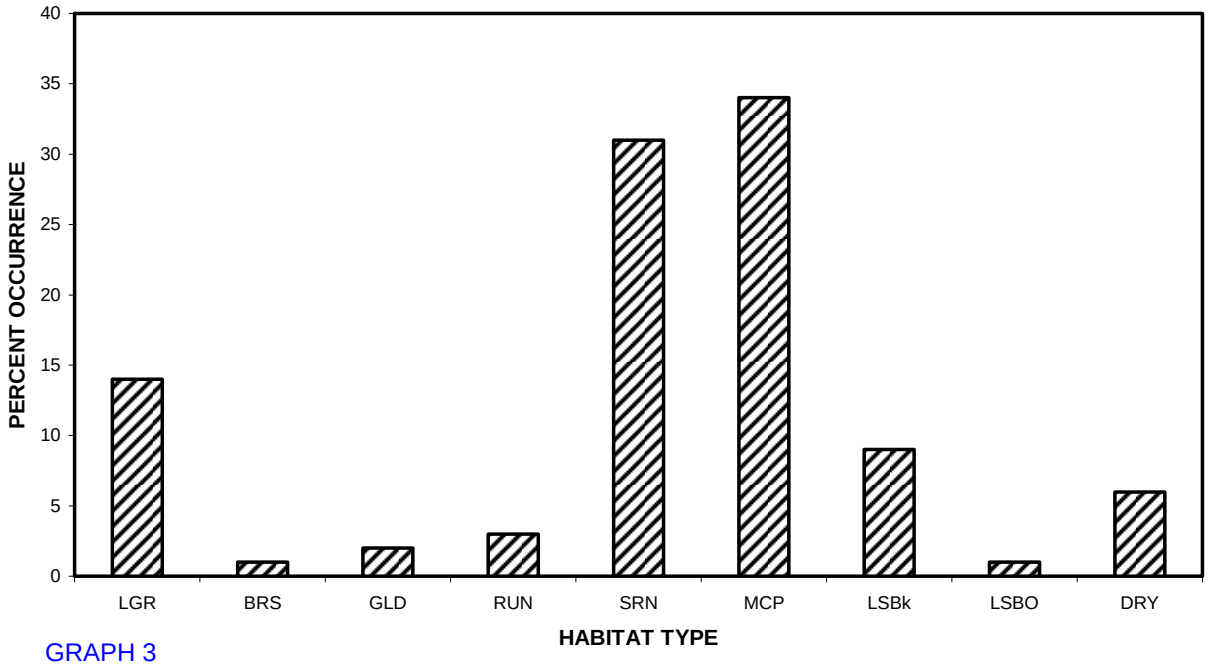
GRAPH 1

VALENTINE CREEK
HABITAT TYPES BY PERCENT TOTAL LENGTH



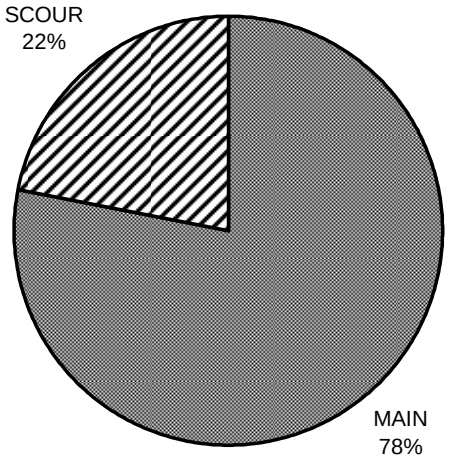
GRAPH 2

VALENTINE CREEK
HABITAT TYPES BY PERCENT OCCURRENCE

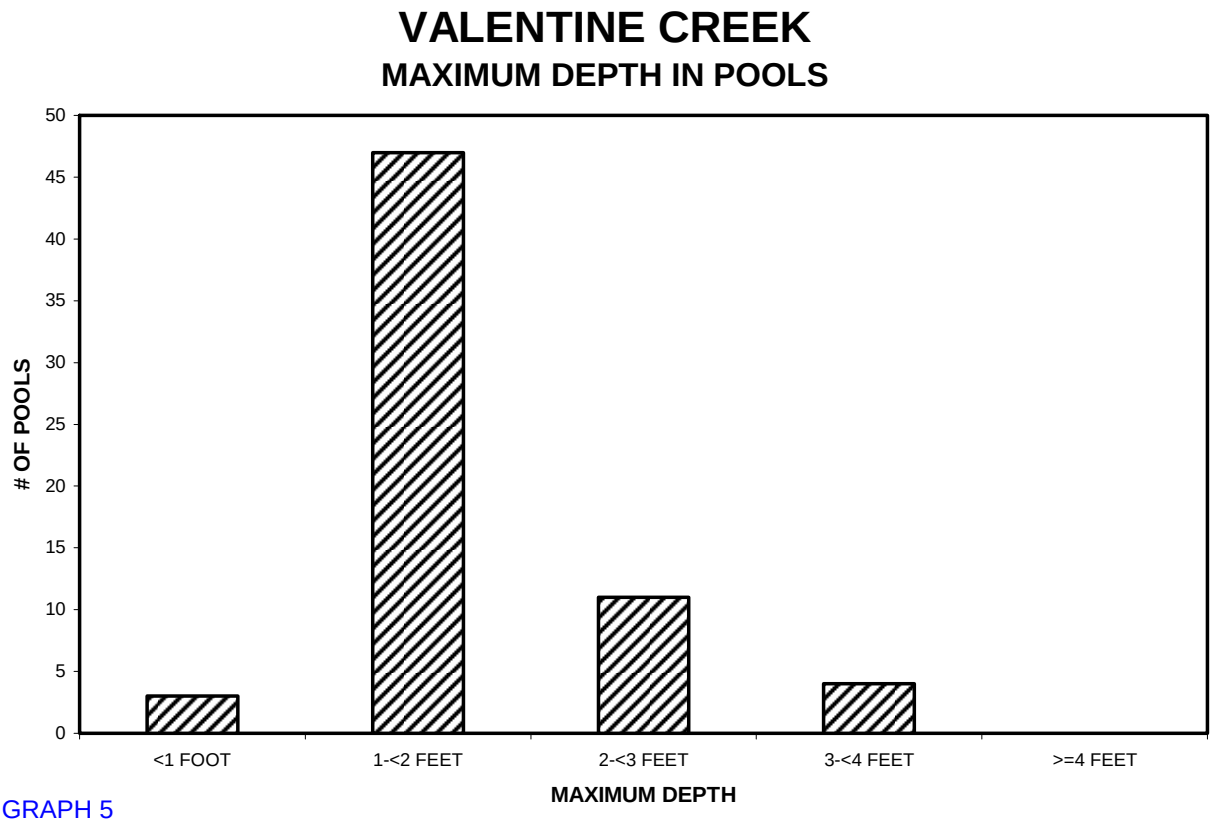


GRAPH 3

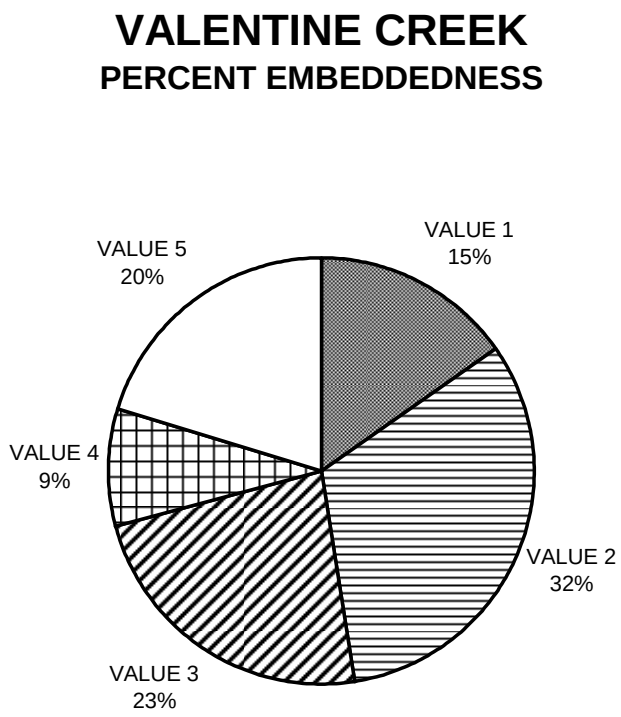
VALENTINE CREEK
POOL HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 4

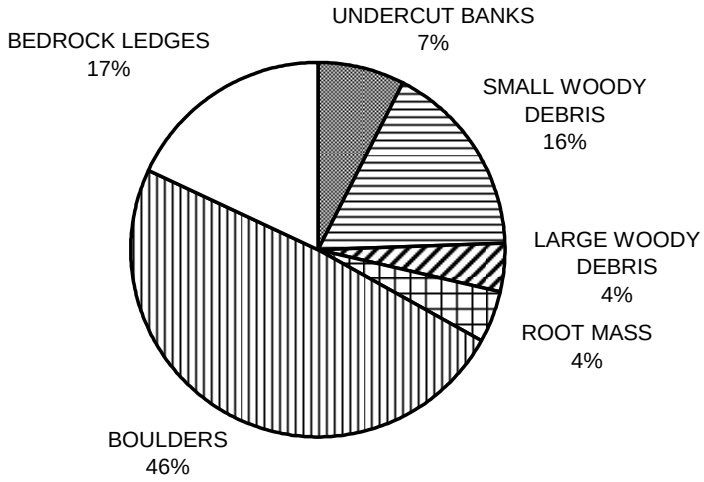


GRAPH 5



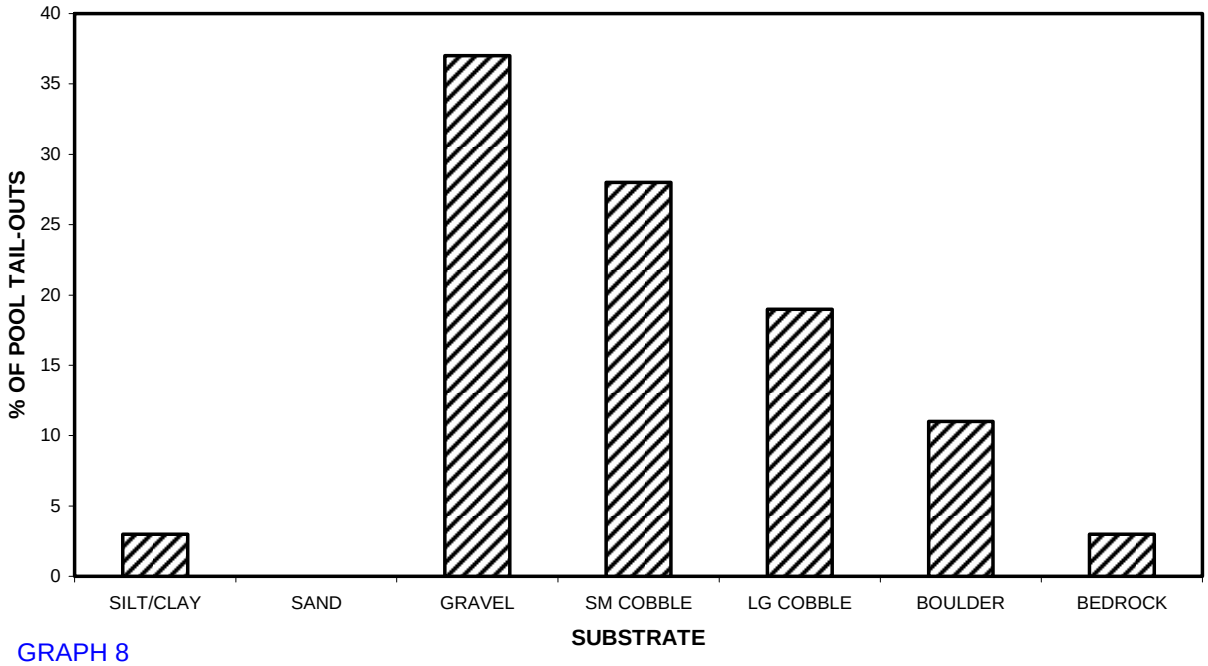
GRAPH 6

VALENTINE CREEK
MEAN PERCENT COVER TYPES IN POOLS



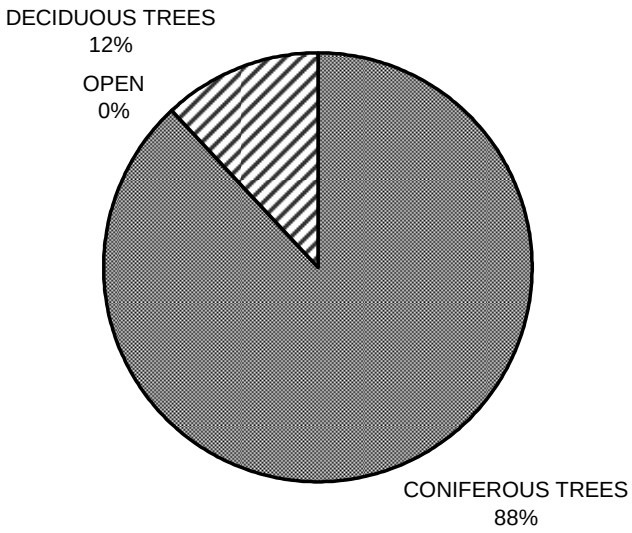
GRAPH 7

VALENTINE CREEK
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



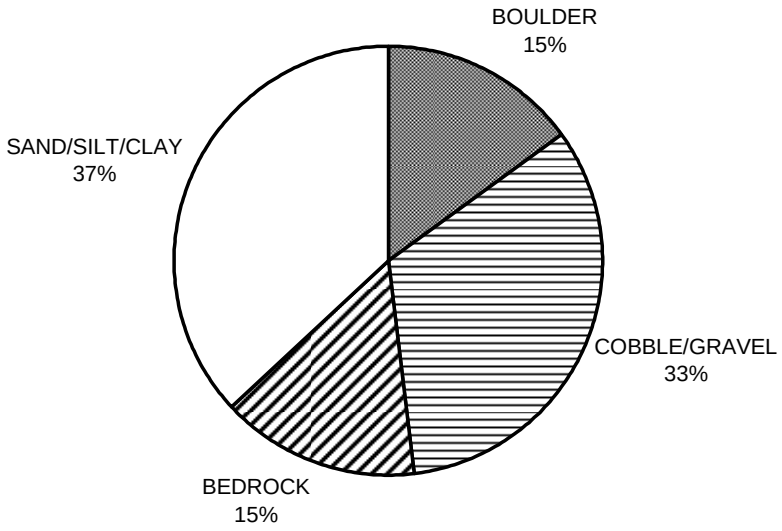
GRAPH 8

VALENTINE CREEK
MEAN PERCENT CANOPY



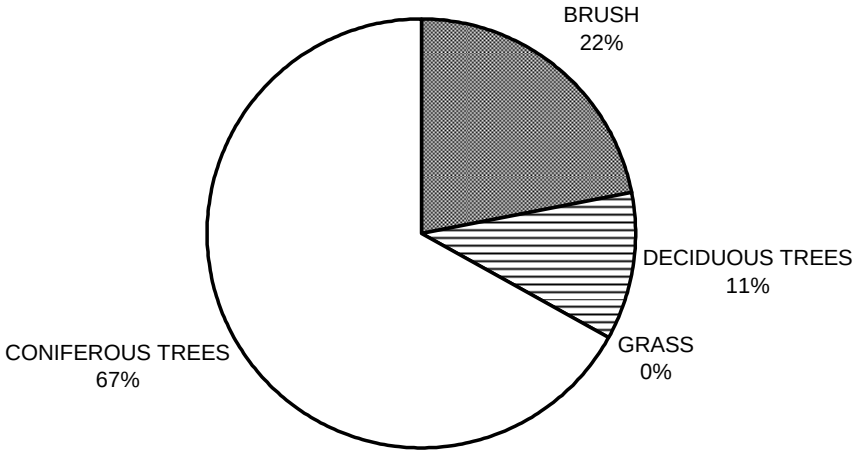
GRAPH 9

VALENTINE CREEK
DOMINANT BANK COMPOSITION IN SURVEY REACH



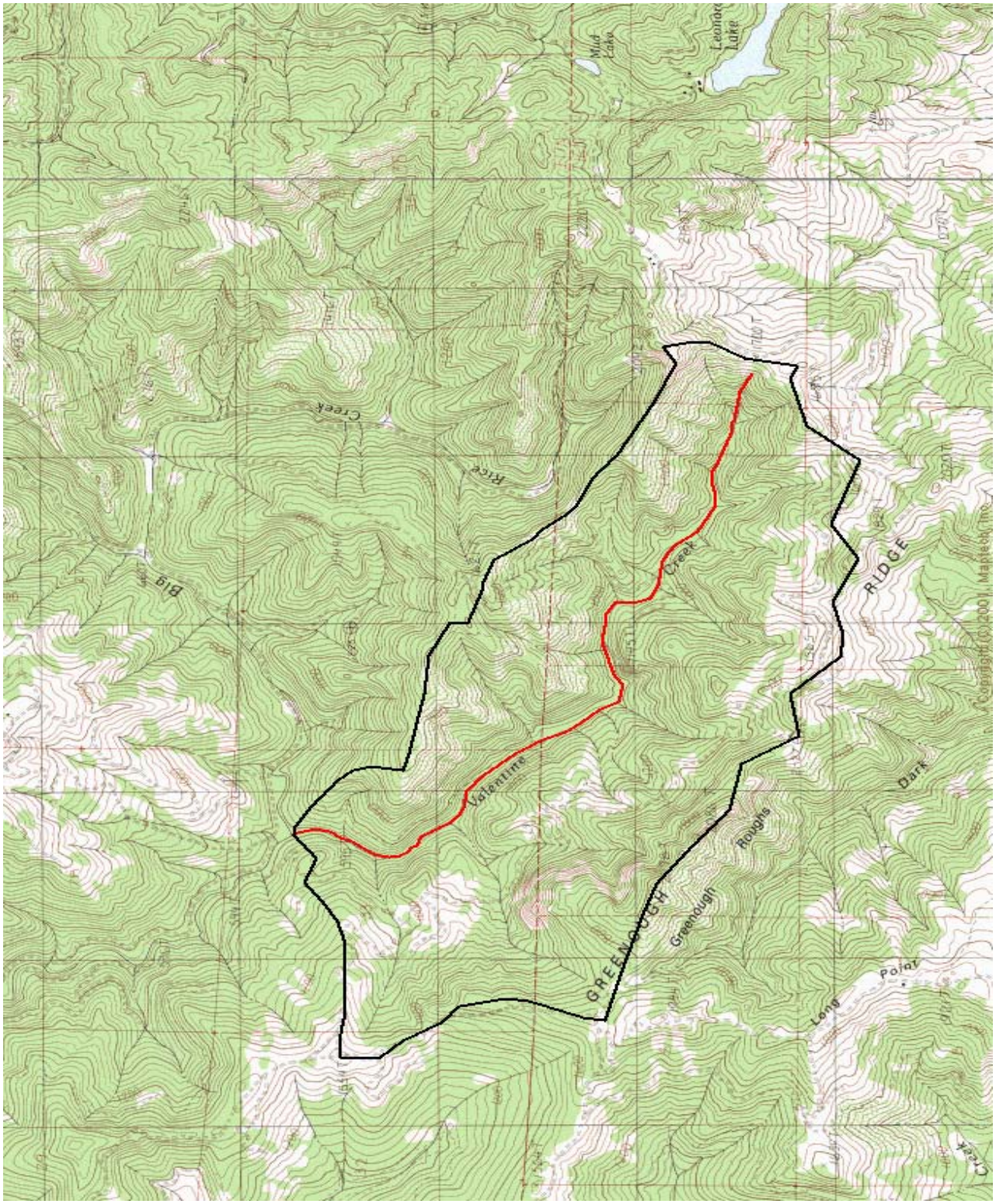
GRAPH 10

VALENTINE CREEK
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

Valentine Creek



Map 1. Valentine Creek