

STREAM INVENTORY REPORT

SOUTH FORK FRESHWATER CREEK

INTRODUCTION

A stream inventory was conducted during the summer of 1994 on South Fork Freshwater Creek to assess habitat conditions for anadromous salmonids. The 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 South Fork Freshwater Creek. The objective of the biological inventory was to document the salmonid species present and their distribution. After analysis of the information and data gathered, stream restoration and enhancement recommendations are presented.

Spawner surveys were conducted on South Fork Freshwater Creek by the California Department of Fish and Game (DFG), Humboldt Fish Action Council, and Humboldt State University. The data are available from the Eureka DFG office.

The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for chinook salmon, coho salmon and steelhead trout.

WATERSHED OVERVIEW

South Fork Freshwater Creek is tributary to Freshwater Creek, tributary to Humboldt Bay, located in Humboldt County, California. South Fork Freshwater Creek's legal description at the confluence with Freshwater Creek is T04N R01E S15. Its location is 40°43'54" North latitude and 124°02'48" West longitude. South Fork Freshwater Creek is a first order stream and has approximately 3.1 miles of blue line stream according to the USGS McWhinney Creek and Laqua Buttes 7.5 minute quadrangles. South Fork Freshwater Creek drains a watershed of approximately 3.2 square miles. Summer base runoff is approximately 0.04 cubic feet per second (cfs) at the mouth. Elevations range from about 180 feet at the mouth of the creek to 2200 feet in the headwater areas. Redwood and fir forest dominates the watershed. The watershed is privately owned and is managed for timber production. Foot access is available from a Pacific Lumber Company haul road approximately one mile from the terminus of Pacific Lumber Camp Road.

METHODS

The habitat inventory conducted in South Fork Freshwater Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi and Reynolds, 1991 rev.

1994). The California Conservation Corps (CCC) Technical Advisors that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game. South Fork Freshwater Creek personnel were trained in June, 1994, by Gary Flosi and Scott Downie. 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 South Fork Freshwater 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 standard flow measuring equipment, if available. In some cases flows are estimated. Flows should also be measured or estimated at major tributary confluences.

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.

3. Temperatures:

Both water and air temperatures are measured and recorded at each tenth unit typed. 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". South Fork Freshwater 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.

Channel dimensions were measured using hip chains, range finders, tape measures, and stadia rods. Unit measurements included mean length, mean width, mean depth, and maximum depth. Pool tail crest depth at each pool unit was measured in the thalweg. All measurements were taken in feet to the nearest tenth.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out reaches is measured by the percent of the cobble that is surrounded or buried by fine sediment. In South Fork Freshwater 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), 76 - 100% (value 4).

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 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 South Fork Freshwater 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 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.

8. Canopy:

Stream canopy is estimated using handheld spherical densiometers and is a measure of the water surface shaded during periods of high sun. In South Fork Freshwater Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of each unit. The area of canopy was further analyzed to estimate its percentages of coniferous or deciduous trees, and the results recorded.

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 South Fork Freshwater Creek, the dominant composition type and the dominant vegetation type of both the right and left banks were selected from the habitat inventory form. Additionally, the percent of each bank covered by vegetation was estimated and recorded.

BIOLOGICAL INVENTORY

Biological sampling during stream inventory is used to determine fish species and their distribution in the stream. Biological inventory is conducted using one or more of three basic methods: 1) stream bank observation, 2) underwater observation, 3) electrofishing. These sampling techniques are discussed in the California Salmonid Stream Habitat Restoration Manual.

Biological inventory was conducted in South Fork Freshwater Creek to document the fish species composition and distribution. Three sites were electrofished in South Fork Freshwater Creek using one Smith-Root Model 12 electrofisher. Each site was end-blocked with nets to contain the fish within the sample reach. Fish from each site were counted by species, measured, and returned to the stream.

DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat, 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 Lotus 1,2,3. Graphics developed for South Fork Freshwater 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
- 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 August 26, September 26, 27, 28, and 29, and October 3, 4, and 12, 1994, was conducted by Craig Mesman, Chris Coyle, Jason MacDonnell, and Kevan Schukraft (CCC). The total length of the stream surveyed was 11,734 feet with an additional 70 feet of side channel.

Flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.04 cfs on October 11, 1994.

South Fork Freshwater Creek is an F4 channel type for first 3,497 feet of stream reach surveyed, an F2 for the next 1,641 feet, and an B4 for the remaining 6,596 feet. F-type channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios. F2 channels have boulder-dominant substrates. F4 channels have gravel-dominant substrates. B4 channels are moderately entrenched, moderate gradient, riffle dominated channels, with infrequently spaced pools; very stable plan and profile; stable banks; and a gravel channel.

Water temperatures ranged from 50 to 59 degrees Fahrenheit. Air temperatures ranged from 49 to 68 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent **occurrence**, pools made up 44%, flatwater types 26%, and riffles 26% (Graph 1). Flatwater habitat types made up 40% of the total survey **length**, pools 38%, and riffles 20% (Graph 2).

Nineteen Level IV habitat types were identified. The data are summarized in Table 2. The most frequent habitat types by percent **occurrence** were low gradient riffles, 25%; mid-channel pools, 25%; and step runs, 17% (Graph 3). By percent total **length**, step runs made up 31%, mid-channel pools 22%, and riffles 19%.

One-hundred-eighty-three pools were identified (Table 3). Main channel pools were most often encountered at 58% and comprised 61% of the total length of pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Depth is an indicator of pool quality. Sixty-one of the 183 pools (33%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 176 pool tail-outs measured, 53 had a value of 1 (30%); 73 had a value of 2 (41.5%); 36 had a value of 3 (20.5%); and 14 had a value of 4 (8%). On this scale, a value of one is the best for fisheries (Graph 6).

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 habitat types had the highest shelter rating at 36. Flatwater habitats followed with a rating of 14 (Table 1). Of the pool types, the backwater pools had the highest mean shelter rating at 48, and scour pools rated 39 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in South Fork Freshwater Creek. Graph 7 describes the pool cover in South Fork Freshwater Creek.

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in 89 of the 105 low gradient riffles (85%). Small cobble was the next most frequently observed dominant substrate type and occurred in 10% of the low gradient riffles (Graph 8).

Three percent of the survey reach lacked shade canopy. Of the 97% of the stream covered with canopy, 33% was composed of deciduous trees, and 67% was composed of coniferous trees. Graph 9 describes the canopy in South Fork Freshwater Creek.

Table 2 summarizes the mean percentage of the right and left stream banks covered with vegetation by habitat type. For the stream reach surveyed, the mean percent right bank vegetated was 86%. The mean percent left bank vegetated was 87%. The dominant elements composing the structure of the stream banks consisted of 2.4% bedrock, 4.4% boulder, 64.0% cobble/gravel, and 29.2% sand/silt/clay (Graph 10). Brush was the dominant vegetation type observed in 59% of the units surveyed. Additionally, 1% of the units surveyed had deciduous trees as the dominant vegetation type, and 18% had coniferous trees as the dominant vegetation, including down trees, logs, and root wads (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Three sites were electrofished on October 14 and 17, 1994, in South Fork Freshwater Creek. The units were sampled by Chris Coyle and Craig Mesman (CCC) and Heidi Hickethier (Watershed

Stewards Program). All measurements are fork lengths unless noted otherwise.

The first site sampled was habitat units 12 and 13, two mid-channel pools approximately 493 feet from the confluence with Freshwater Creek. This site had an area of 495 sq ft and a volume of 213 cu ft. The unit yielded seven steelhead between 50 and 92 mm, 42 coho between 51 and 70 mm, and four Pacific giant salamanders.

The second site was habitat units 215, 217, and 219, a plunge pool, mid-channel pool, and glide located approximately 6,441 feet above the creek mouth. This site had an area of 756 sq ft and a volume of 631 cu ft. The site yielded three steelhead between 57 and 83 mm and 12 coho between 46 and 59 mm.

The third site sampled was habitat unit 412 upstream to 40' above end of survey, a combination of pools, riffles, and runs located approximately 11,632 feet above the creek mouth. The site had an area of 536 sq ft and a volume of 351 cu ft. The site yielded seven coastal cutthroat trout between 41 and 188 mm.

DISCUSSION

The F2 channel type is considered fair for low-stage weirs, single and opposing wing deflectors, channel constrictors, bank cover, and log cover structures; and poor for medium-stage weirs. The F4 channel type is considered good for bank-placed boulders; fair for low-stage weirs, single and opposing wing deflectors, channel constrictors, bank cover, log cover structures; and poor for medium-stage weirs and random boulder placement. The B4 channel type is considered excellent for low-stage weirs; boulder clusters and bank placed boulders; single and opposing wing-deflectors; and log cover structures. B4 channels are also considered good for medium-stage weirs.

The water temperatures recorded on the survey days August 26, September 26, 27, 28, and 29, and October 3, 4, and 12, 1994, ranged from 50 to 59° Fahrenheit. Air temperatures ranged from 49 to 68° Fahrenheit. This is a very good 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 40% of the total **length** of this survey, pools 38%, and riffles 20%. The pools are relatively shallow, with only 61 of the 183 pools having a maximum depth greater than 2 feet. In coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total 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. The LDA's in the system are retaining needed gravel. Any necessary modifications to them should be done with the intent of metering the gravel out to downstream reaches that will trap the gravel for future spawning use. Therefore, gravel retention features may need to be developed prior to any LDA modification.

Fifty of the 176 pool tail-outs measured had embeddedness ratings of 3 or 4. Only 53 had a 1 rating. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered best for the needs of salmon and steelhead. In South Fork Freshwater Creek, sediment sources should be mapped and rated according to their potential sediment yields, and control measures taken.

The mean shelter rating for pools was low with a rating of 36. The shelter rating in the flatwater habitats was lower at 14. A pool shelter rating of approximately 100 is desirable. The relatively small amount of cover that now exists is being provided primarily by large woody debris in all habitat types. Additionally, small woody debris and boulders contribute a small amount. Log and root wad cover structures in the pool and flatwater habitats are needed to improve 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.

One-hundred of the 105 low gradient riffles had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean percent canopy for the stream was 97%. This is a relatively high percentage of canopy, since 80 percent is generally considered optimum in these north coast streams.

The percentage of right and left bank covered with vegetation was high at 86% and 87%, 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) South Fork Freshwater Creek should be managed as an anadromous, natural production stream.

- 2) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover is from boulders. Adding high quality complexity with woody cover is desirable and in some areas the material is at hand.
- 3) Where feasible, design and engineer pool enhancement structures to increase the number of pools and the depth of the existing pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.
- 4) 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.

PROBLEM SITES AND LANDMARKS

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

- | | |
|-------|--|
| 0' | Begin survey at confluence with Freshwater Creek. Channel type is F4. |
| 786' | Small left bank tributary. Not accessible to anadromous fish. |
| 2254' | Modified log and debris accumulation (LDA) retaining some small woody debris. Not a barrier. |
| 2754' | Small left bank tributary. Not accessible to anadromous fish. |
| 3276' | Two inch diameter cable crossing stream and catching small woody debris, causing stream to undercut standing redwoods. Could eventually lead to bank failure and channel blockage. |
| 3497' | Channel type changes to F2. |
| 4869' | LDA 5' high x 25' wide x 8' long deflecting flow into and eroding left bank. Partial channel obstruction. Braided channel. |
| 5138' | Channel type changes to B4. |
| 5937' | Right bank tributary. No surface flow. |
| 6275' | Left bank trail access. |

6307' Dry left bank tributary.

6710' LDA 8' high x 15' wide x 6' long. Retains gravel 4' deep at base. Possible barrier.

7887' LDA suspended above channel ("raft"). 6' high x 35' wide x 40' long. Retains gravel 1' deep at base. Not a barrier.

7976' Six foot diameter redwood jutting from left bank diverts high flows into right bank.

8003' Dry left bank tributary.

8134' Log raft 5' high x 10' wide x 50' long. Retains gravel 2' deep at base. Not a barrier.

8451' LDA 5' high x 15' wide x 6' long. Partial obstruction.

8538' Log raft 4' high x 14' wide x 73' long. Retains gravel 2' deep at base. Not a barrier.

9282' Dry left bank tributary.

9681' LDA 10' high x 40' wide x 60' long. Retains gravel 1-2' deep at base. Possible barrier.

9770' LDA 6' high x 30' wide x 37' long. Diverts flow into left bank. Partial obstruction.

10187' Left bank tributary with residual surface flow.

10244' LDA 8' high x 30' wide x 45' long. Retains gravel 3-4' deep at base. Possible barrier.

10559' Numerous well-vegetated logs lying in channel. Standing trees have high-water marks 6-7' above current water level.

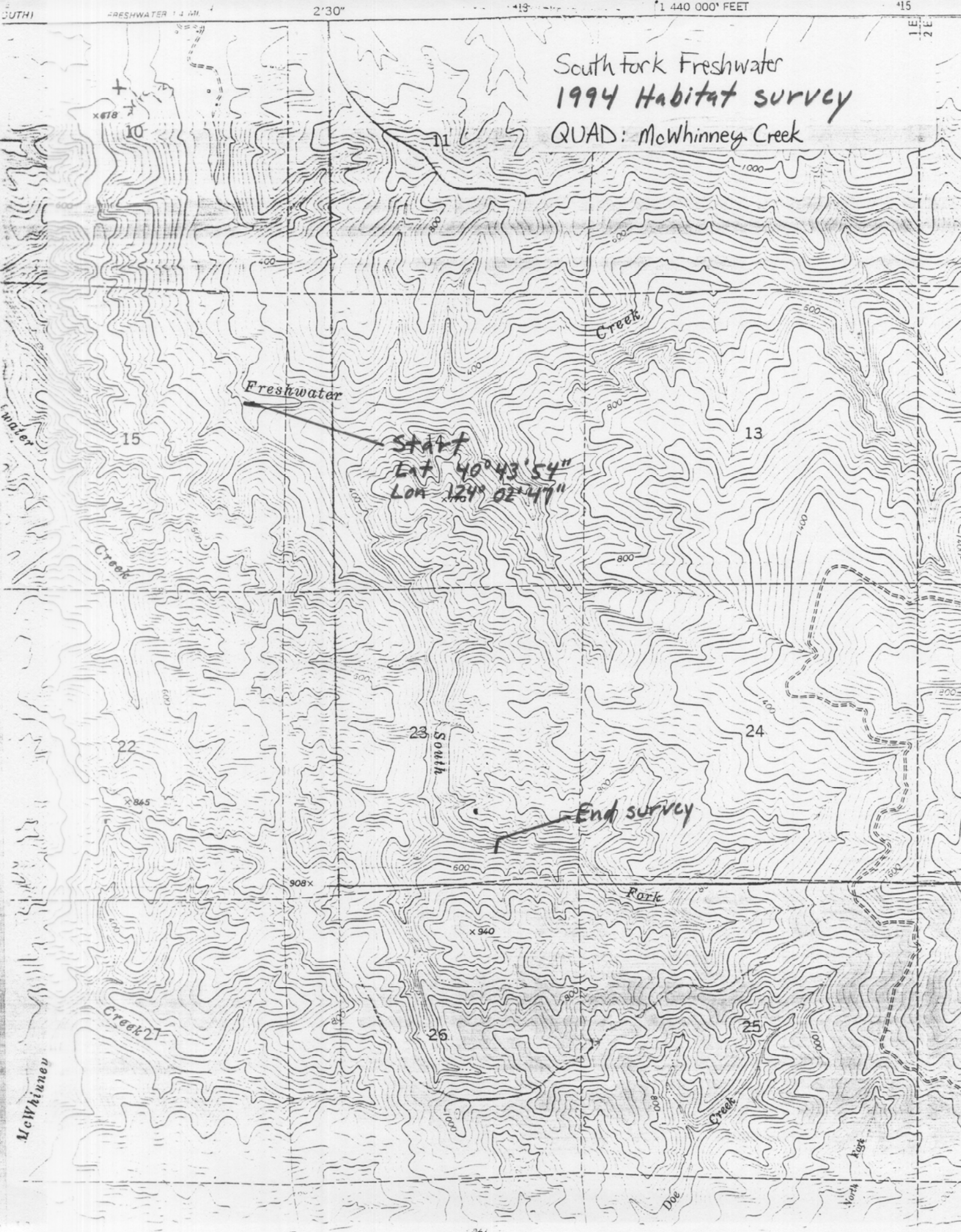
10648' Log raft 8' high x 15' wide x 20' long. Retaining some sediment.

11734' End of survey. Resident trout habitat exists upstream from this point for an undetermined distance.

LEVEL III and LEVEL IV HABITAT TYPE KEY

HABITAT TYPE	LETTER	NUMBER
RIFFLE		
Low Gradient Riffle	[LGR]	1.1
High Gradient Riffle	[HGR]	1.2
CASCADE		
Cascade	[CAS]	2.1
Bedrock Sheet	[BRS]	2.2
FLATWATER		
Pocket Water	[POW]	3.1
Glide	[GLD]	3.2
Run	[RUN]	3.3
Step Run	[SRN]	3.4
Edgewater	[EDW]	3.5
MAIN CHANNEL POOLS		
Trench Pool	[TRP]	4.1
Mid-Channel Pool	[MCP]	4.2
Channel Confluence Pool	[CCP]	4.3
Step Pool	[STP]	4.4
SCOUR POOLS		
Corner Pool	[CRP]	5.1
Lateral Scour Pool - Log Enhanced	[LSL]	5.2
Lateral Scour Pool - Root Wad Enhanced	[LSR]	5.3
Lateral Scour Pool - Bedrock Formed	[LSBk]	5.4
Lateral Scour Pool - Boulder Formed	[LSBo]	5.5
Plunge Pool	[PLP]	5.6
BACKWATER POOLS		
Secondary Channel Pool	[SCP]	6.1
Backwater Pool - Boulder Formed	[BPB]	6.2
Backwater Pool - Root Wad Formed	[BPR]	6.3
Backwater Pool - Log Formed	[BPL]	6.4
Dammed Pool	[DPL]	6.5

South Fork Freshwater
1994 Habitat survey
QUAD: McWhinney Creek



SOUTH FORK FRESHWATER CRK

Drainage: FRESHWATER

Table 1 - SUMMARY OF RIFFLE, FLATWATER, AND POOL HABITAT TYPES

Survey Dates: 08/26/94, 10/12/94

Confluence Location: QUAD: MCWHNY CRK LEGAL DESCRIPTION: T04N01E31S LATITUDE: 40°43'54" LONGITUDE: 124°2'48"

UNITS MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	PERCENT 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
110	RIFFLE	26	21	2310	20	5.2	0.1	103	11363	14	1491	0	6
110	FLATWATER	26	43	4690	40	5.8	0.3	249	27400	74	8162	0	14
183	POOL	44	24	4437	38	9.0	0.9	223	40809	210	38440	184	36
17	DRY	4	22	367	3	0.0	0.0	0	0	0	0	0	0
TOTAL UNITS				TOTAL LENGTH (ft.)				TOTAL AREA (sq. ft.)			TOTAL VOL. (cu. ft.)		
420				11804				79571			48093		

SOUTH FORK FRESHWATER CRK

Drainage: FRESHWATER

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS

Survey Dates: 08/26/94, 10/12/94

Confluence Location: QUAD: MCWHNY CRK LEGAL DESCRIPTION: T04NR01ES15 LATITUDE: 40°43'54" LONGITUDE: 124°2'48"

[illegible]

SOUTH FORK FRESHWATER CRK

Drainage: FRESHWATER

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 08/26/94, 10/12/94

Confluence Location: QUAD: MCWHNY CRK LEGAL DESCRIPTION: T04NR01ES15 LATITUDE: 40°43'54" LONGITUDE: 124°2'48"

UNITS MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	TOTAL PERCENT	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	TOTAL AREA (sq.ft.)	MEAN VOLUME (cu.ft.)	TOTAL VOLUME (cu.ft.)	MEAN RESIDUAL VOL. (cu.ft.)	MEAN SHELTER RATING
106	MAIN	58	25	2685	61	8.7	0.8	229	24268	197	20916	170	33
69	SCOUR	38	24	1645	37	9.6	1.0	227	15688	244	16839	219	39
8	BACKWATER	4	13	107	2	7.9	0.8	107	853	86	685	75	48
TOTAL MEASURED			TOTAL LENGTH (ft.)					TOTAL AREA (sq.ft.)			TOTAL VOL. (cu.ft.)		
183				4437				40809			38440		

SOUTH FORK FRESHWATER CRK

Drainage: FRESHWATER

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES

Survey Dates: 08/26/94, 10/12/94

Confluence Location: QUAD: MCWANY CRK LEGAL DESCRIPTION: T04N01E31S LATITUDE: 40°43'54" LONGITUDE: 124°21'48"

UNITS MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	<1 FOOT		<1 FOOT		1-<2 FT.		1-<2 FOOT		2-<3 FT.		2-<3 FOOT		3-<4 FT.		3-<4 FOOT		>=4 FEET		>=4 FEET	
			MAXIMUM DEPTH	PERCENT OCCURRENCE	MAXIMUM DEPTH	PERCENT OCCURRENCE	MAXIMUM DEPTH	PERCENT OCCURRENCE	MAXIMUM DEPTH	PERCENT OCCURRENCE	MAXIMUM DEPTH	PERCENT OCCURRENCE	MAXIMUM DEPTH	PERCENT OCCURRENCE	MAXIMUM DEPTH	PERCENT OCCURRENCE	MAXIMUM DEPTH	PERCENT OCCURRENCE	MAXIMUM DEPTH	PERCENT OCCURRENCE		
1	TRP	1	0	0	0	0	0	0	0	1	100	0	0	0	0	0	0	0	0	0	0	
103	MCP	56	8	8	8	70	68	21	20	3	3	3	1	1	0	0	0	0	0	0		
1	CCP	1	0	0	0	1	100	0	0	0	0	0	0	0	0	0	0	0	0	0		
1	STP	1	0	0	0	1	100	0	0	0	0	0	0	0	0	0	0	0	0	0		
5	CRP	3	0	0	0	4	80	0	0	1	20	0	0	0	0	0	0	0	0	0		
15	LSL	8	1	7	9	60	5	33	0	0	0	0	0	0	0	0	0	0	0	0		
5	LSR	3	1	20	2	40	2	40	0	0	0	0	0	0	0	0	0	0	0	0		
2	LSBK	1	0	0	2	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
10	LSBO	5	0	0	6	60	4	40	0	0	0	0	0	0	0	0	0	0	0	0		
32	PLP	17	0	0	11	34	16	50	4	13	1	3	0	0	0	0	0	0	0	0		
1	BPB	1	0	0	1	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1	BPL	1	0	0	1	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
6	DPL	3	0	0	4	67	2	33	0	0	0	0	0	0	0	0	0	0	0	0		

TOTAL
UNITS
183

Drainage: FRESHWATER

Survey Dates: 08/26/94, 10/12/94

Confluence Location: QUAD: MCMHNY CRK LEGAL DESCRIPTION: T04NR01ES15 LATITUDE: 40°43'54" LONGITUDE: 124°2'48"

[illegible]

SOUTH FORK FRESHWATER CRK

Drainage: FRESHWATER

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE

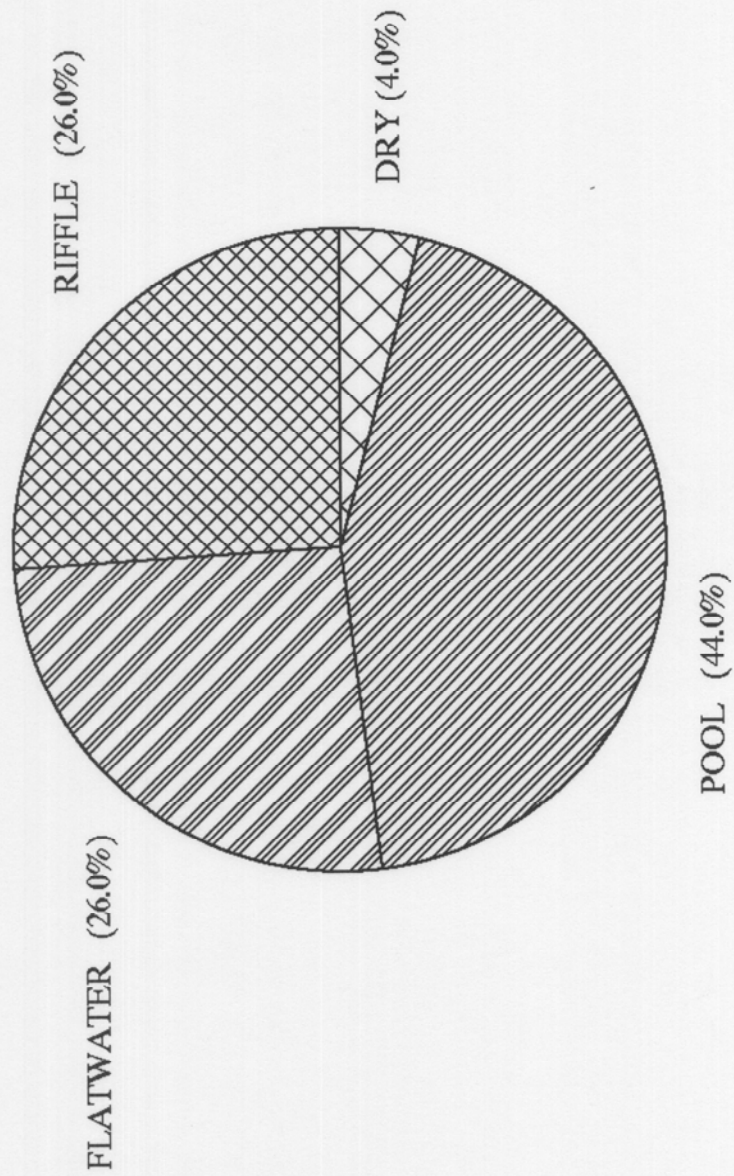
Survey Dates: 08/26/94, 10/12/94

Confluence Location: QUAD: MCWHNY CRK LEGAL DESCRIPTION: T04NR01E1S15 LATITUDE: 40°43'54" LONGITUDE: 124°2'48"

MEASURED	UNITS	HABITAT	TYPE	# UNITS		% TOTAL		# UNITS		% TOTAL		# UNITS		% TOTAL		# UNITS		% TOTAL		# UNITS		% TOTAL		# UNITS		% TOTAL					
				SILT/CLAY	DOMINANT	SILT/CLAY	DOMINANT	SAND	DOMINANT	SAND	DOMINANT	GRAVEL	DOMINANT	GRAVEL	DOMINANT	SM COBBLE	DOMINANT	SM COBBLE	DOMINANT	LG COBBLE	DOMINANT	LG COBBLE	DOMINANT	BOULDER	DOMINANT	BOULDER	DOMINANT	BEDROCK	DOMINANT	BEDROCK	DOMINANT
105		LGR		0		0		2		2		89		85		11		10		2		2		1		1		0		0	
4		HGR		0		0		0		0		0		0		2		50		1		25		1		25		0		0	
1		CAS		0		0		0		0		0		0		0		0		0		0		1		100		0		0	
6		GLD		0		0		1		17		5		83		0		0		0		0		0		0		0		0	
33		RUN		0		0		2		6		29		88		2		6		0		0		0		0		0		0	
71		SRN		1		1		2		3		65		92		1		1		2		3		0		0		0		0	
1		TRP		0		0		1		100		0		0		0		0		0		0		0		0		0		0	
103		MCP		1		1		34		33		67		65		1		1		0		0		0		0		0		0	
1		CCP		0		0		1		100		0		0		0		0		0		0		0		0		0		0	
1		STP		0		0		0		0		1		100		0		0		0		0		0		0		0		0	
5		CRP		0		0		1		20		4		80		0		0		0		0		0		0		0		0	
15		LSL		0		0		8		53		7		47		0		0		0		0		0		0		0		0	
5		LSR		0		0		1		20		4		80		0		0		0		0		0		0		0		0	
2		LSBK		0		0		0		0		2		100		0		0		0		0		0		0		0		0	
10		LSBo		1		10		1		10		8		80		0		0		0		0		0		0		0		0	
32		PLP		0		0		18		56		14		44		0		0		0		0		0		0		0		0	
1		BPB		0		0		0		0		1		100		0		0		0		0		0		0		0		0	
1		BPL		0		0		1		100		0		0		0		0		0		0		0		0		0		0	
6		DPL		1		17		3		50		2		33		0		0		0		0		0		0		0		0	
17		DRY		0		0		1		6		16		94		0		0		0		0		0		0		0		0	

SOUTH FORK FRESHWATER CREEK

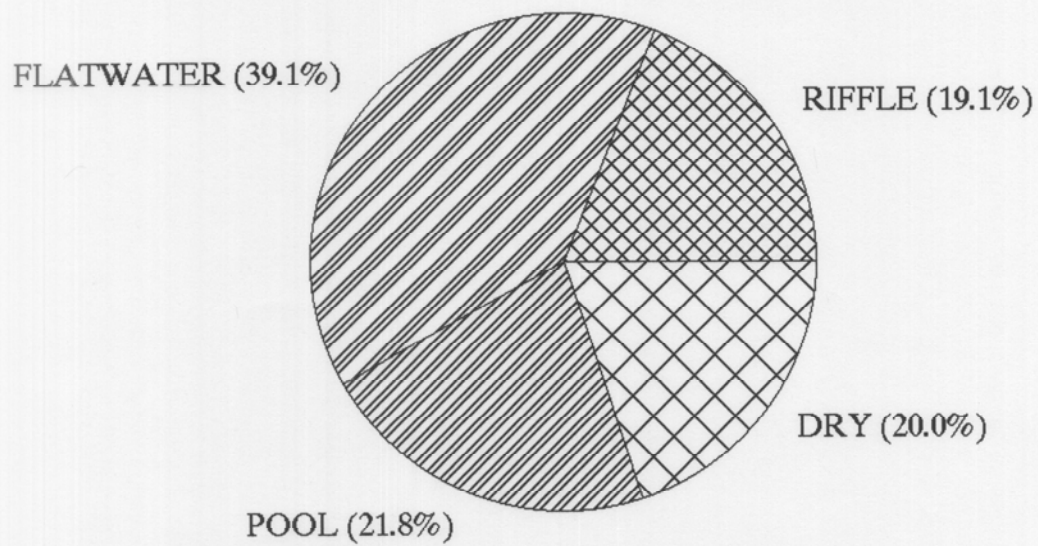
HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

SOUTH FORK FRESHWATER CREEK

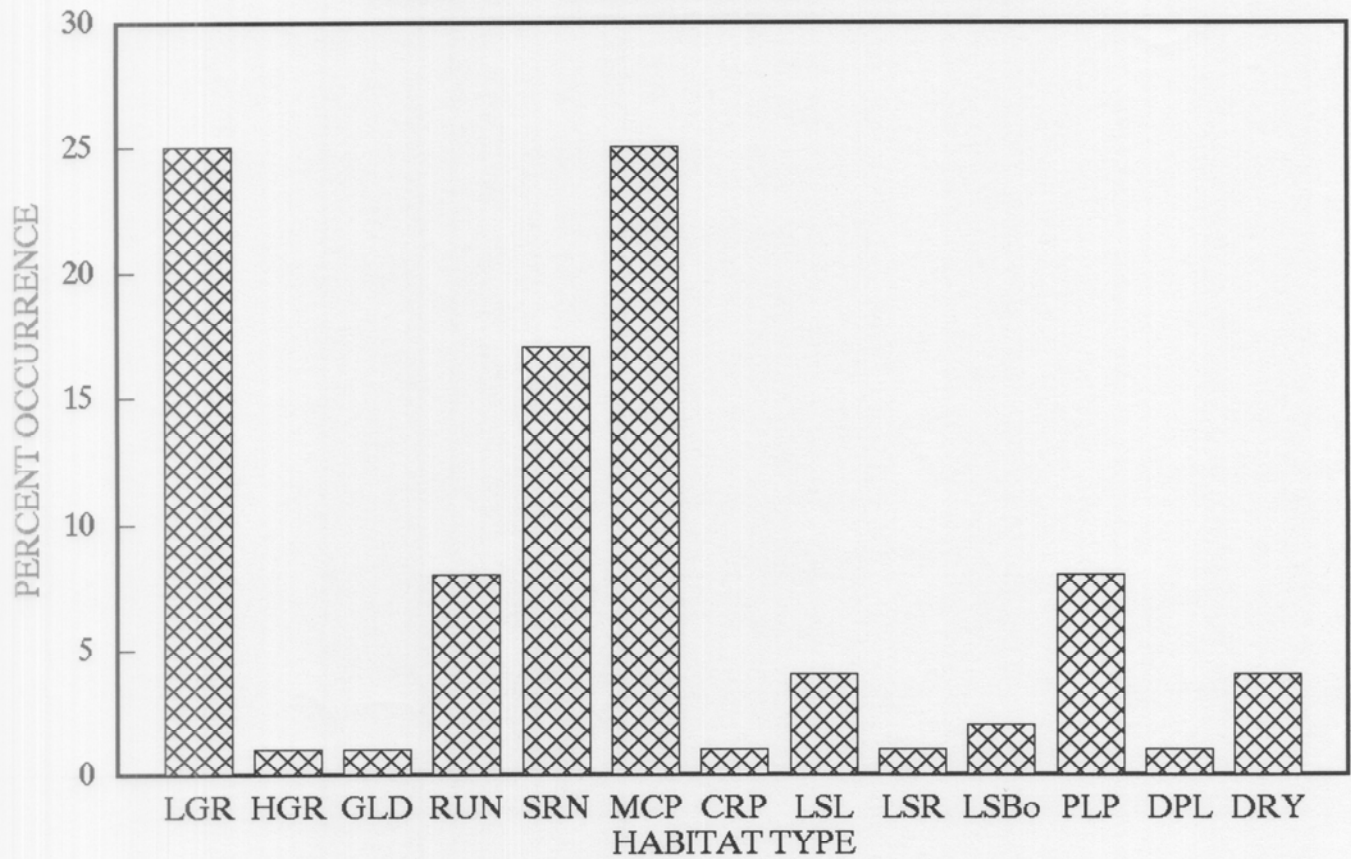
HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

SOUTH FORK FRESHWATER CREEK

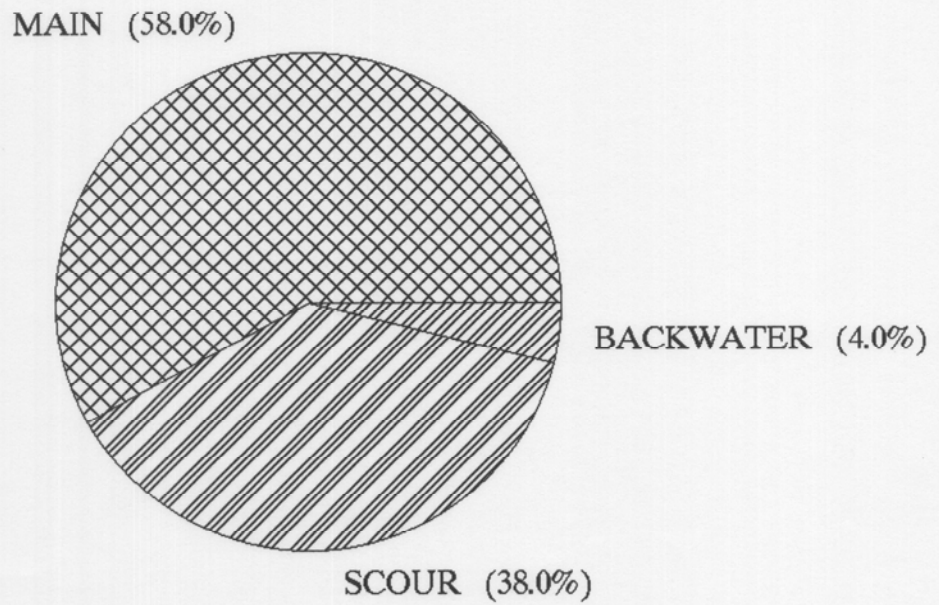
HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 3

SOUTH FORK FRESHWATER CREEK

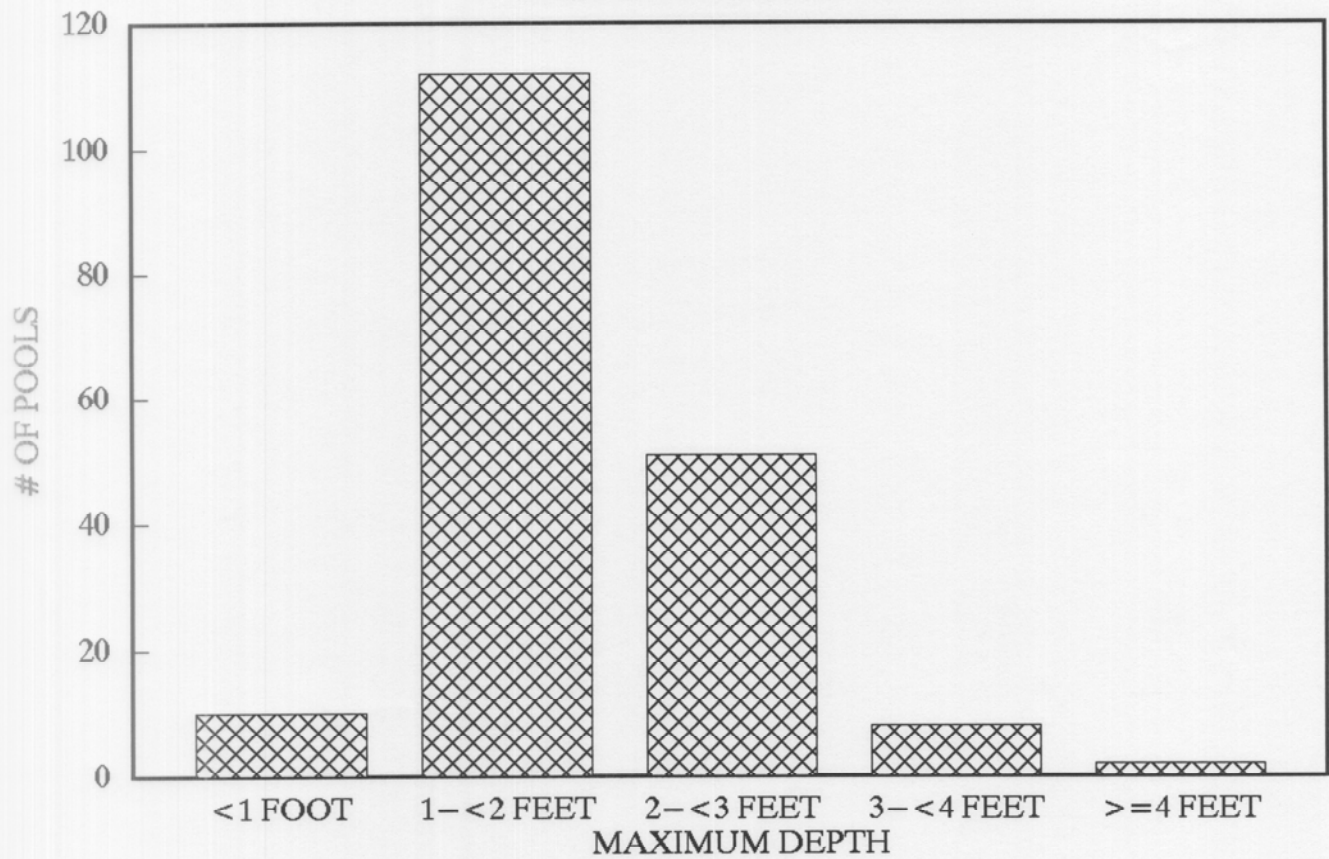
POOL HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 4

SOUTH FORK FRESHWATER

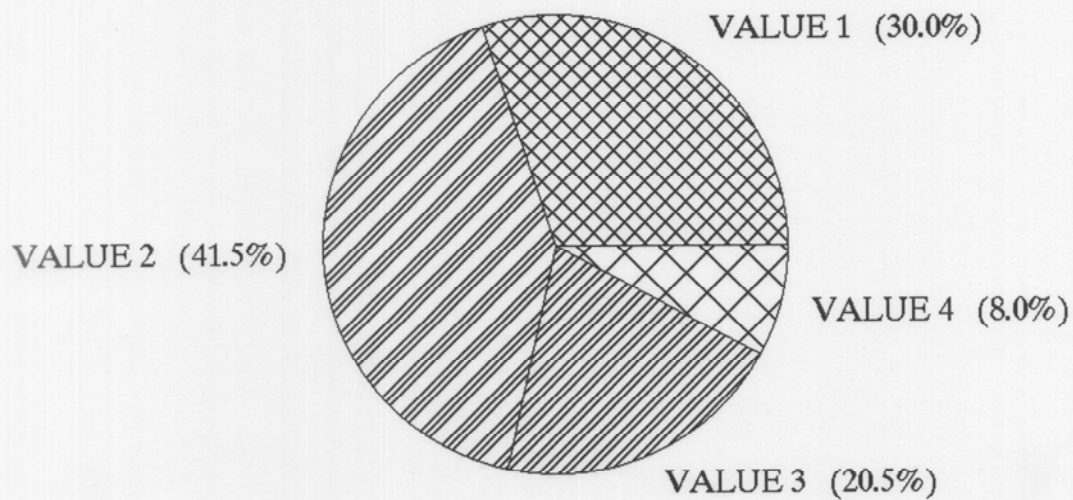
MAXIMUM DEPTH IN POOLS



GRAPH 5

SOUTH FORK FRESHWATER

PERCENT EMBEDDEDNESS

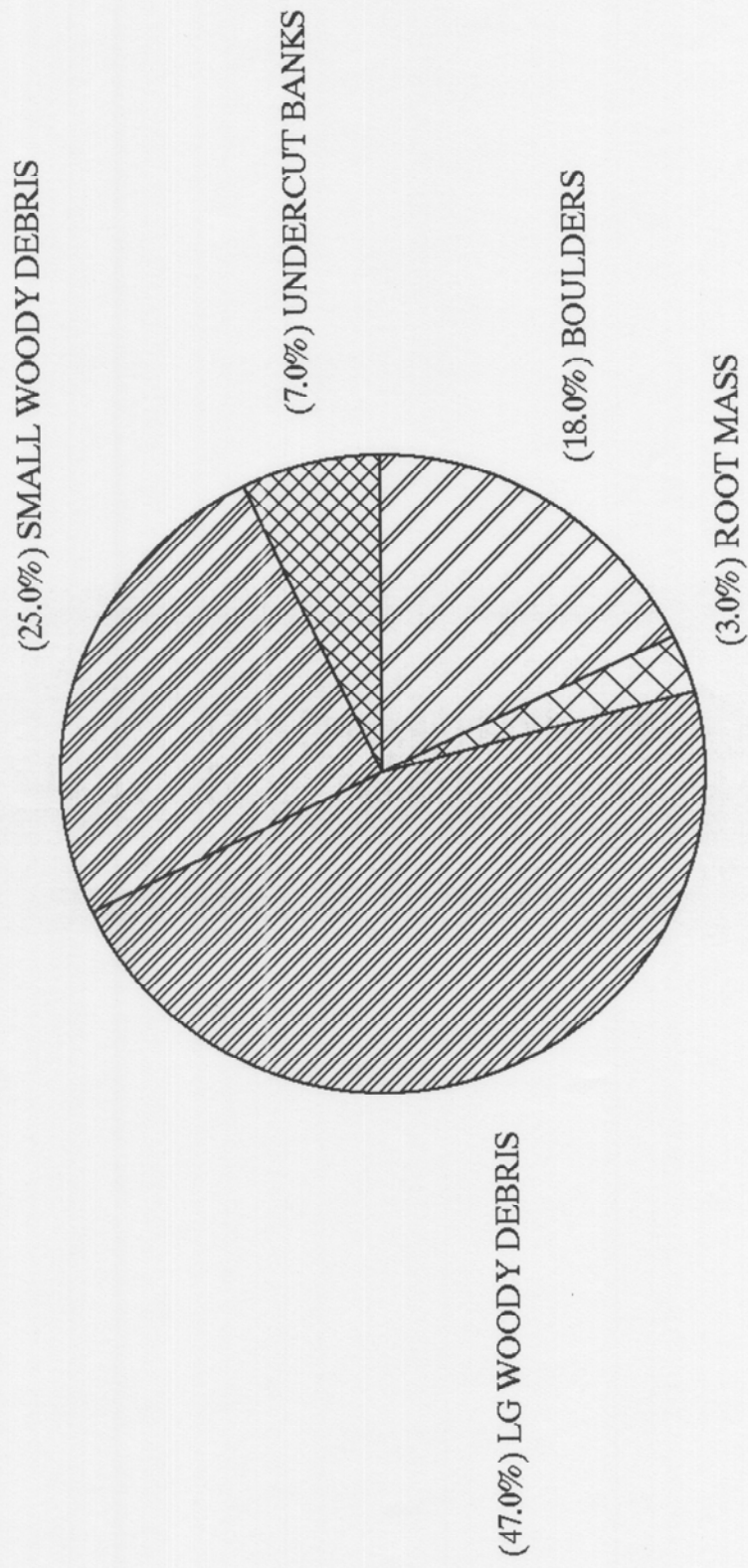


 0-25 %  26-50 %  51-75 %  76-100 %

GRAPH 6

SOUTH FORK FRESHWATER CREEK

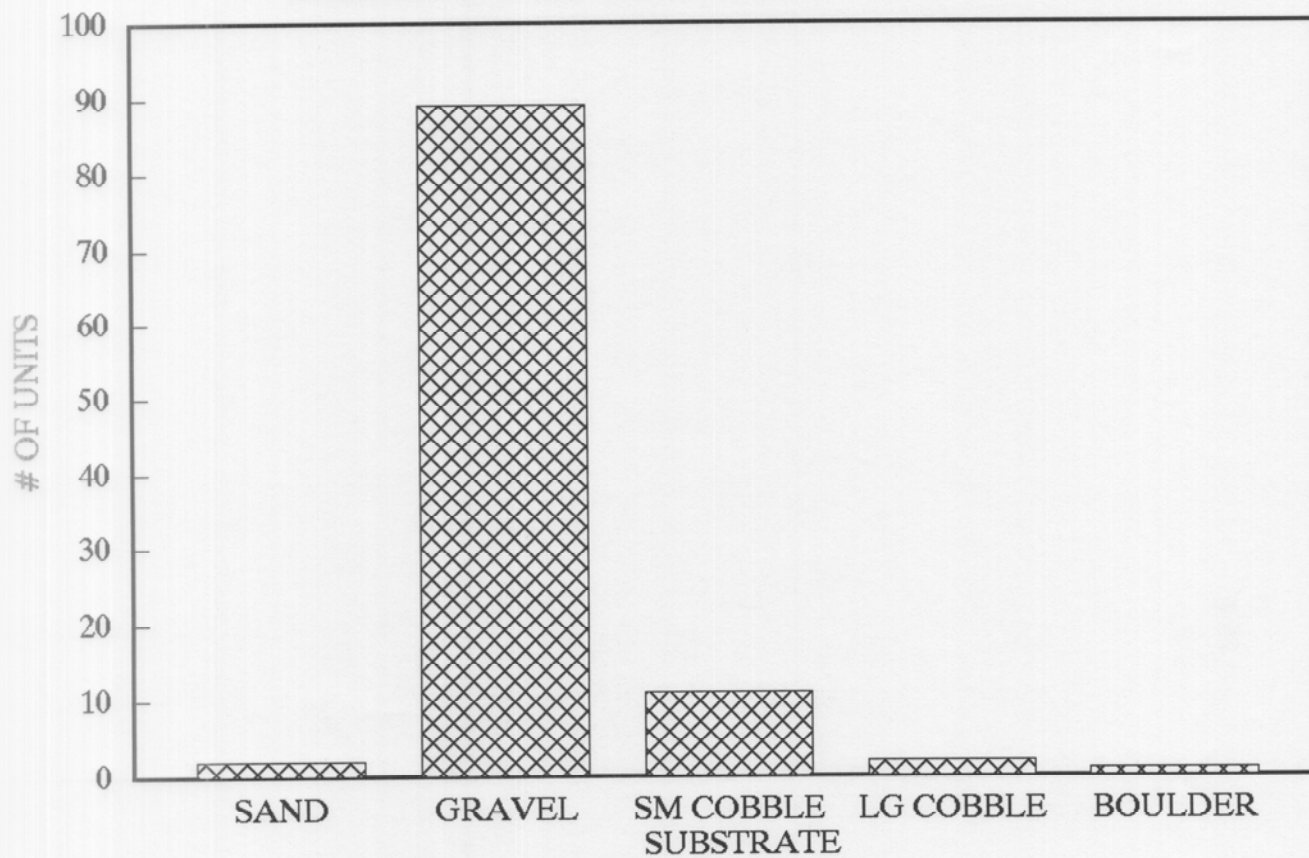
MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

SOUTH FORK FRESHWATER CREEK

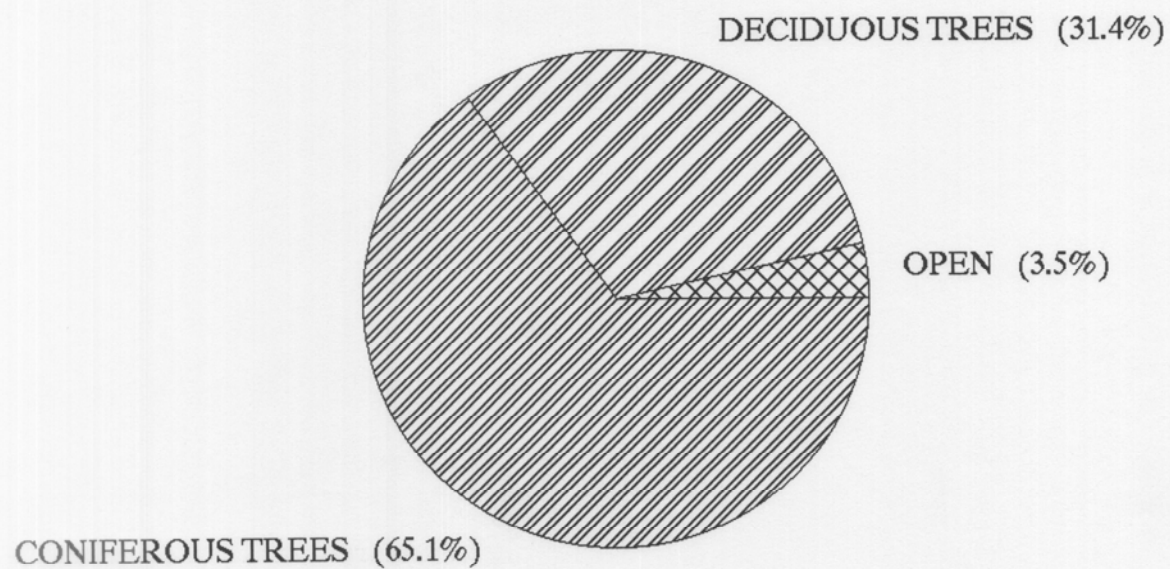
SUBSTRATE COMPOSITION IN LOW GRADIENT RIFFLES



GRAPH 8

SOUTH FORK FRESHWATER CREEK

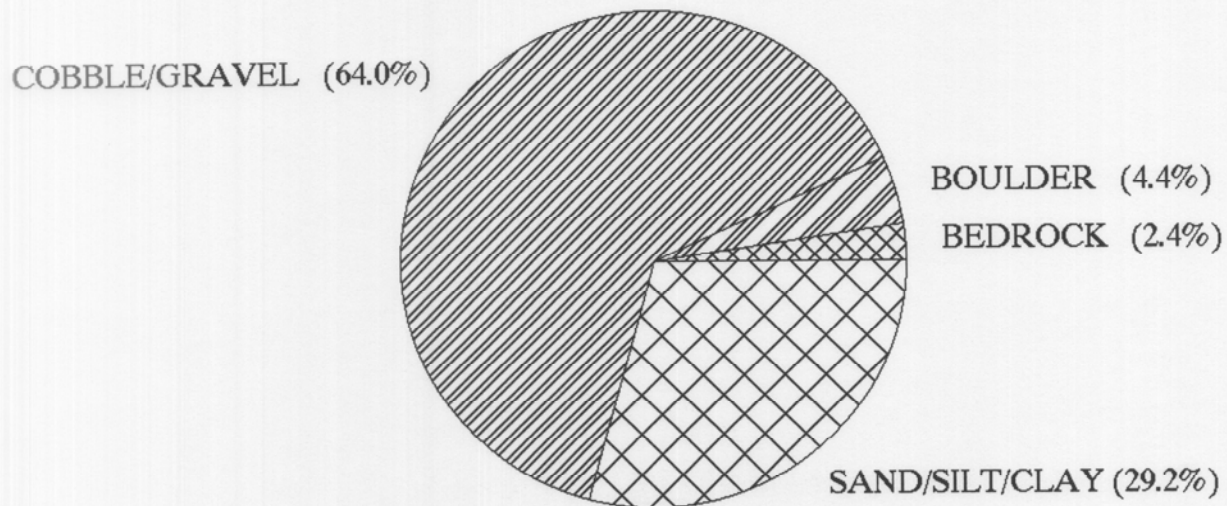
PERCENT CANOPY



GRAPH 9

SOUTH FORK FRESHWATER CREEK

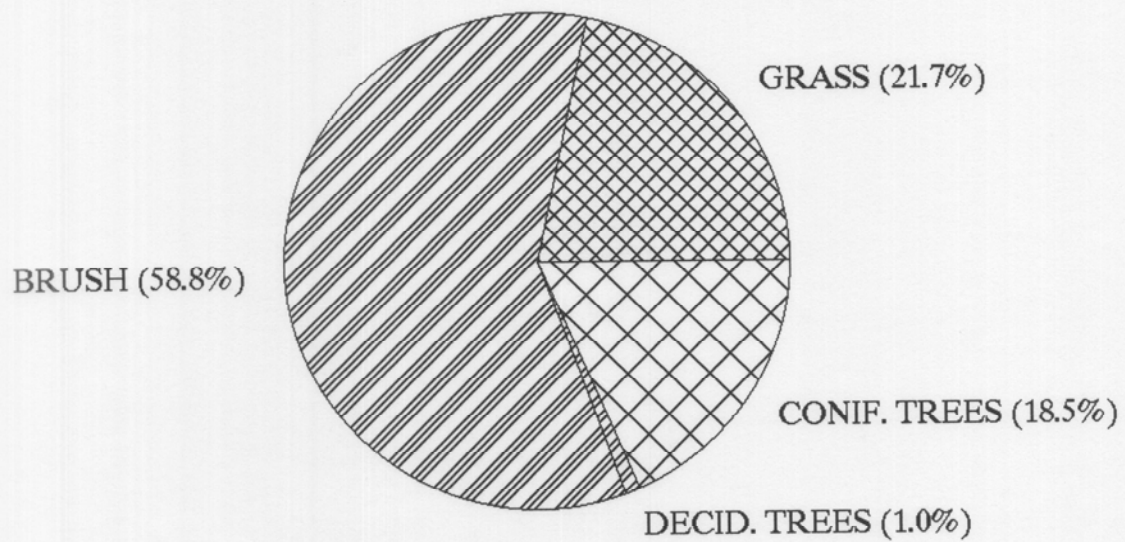
PERCENT BANK COMPOSITION



GRAPH 10

SOUTH FORK FRESHWATER CREEK

PERCENT BANK VEGETATION



GRAPH 11

FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: SOUTH FORK FRESHWATER CRK

SAMPLE DATES: 10/03/94, 10/04/94

STREAM LENGTH: 11734 ft.

LOCATION OF STREAM MOUTH:

USGS Quad Map: MCWHNY CRK

Legal Description: T04NR01ES15

Latitude: 40°43'54"

Longitude: 124°2'48"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 1

Channel Type: F4

Channel Length: 3497 ft.

Flowing Water Mean Width: 7 ft.

Flowing Water Mean Depth: 0.2 ft.

Base Flow: 0.0 cfs

Water: 55F- 59F°F Air: 54F- 68F°F

Dom. Bank Veg.: Brush

Vegetative Cover: 90%

Dom. Bank Substrate: No Data

Embeddness Value: 1. 23% 2. 52%

Canopy Density: 94%

Coniferous Component: 59%

Deciduous Component: 41%

Pools by Stream Length: 11%

Pools >=3 ft.deep: 5%

Mean Pool Shelter Rtn: 25

Dom. Shelter: Large Woody Debris

Occurrence of LOD: 24%

Dry Channel: 0%

3. 18% 4. 7%

STREAM REACH 2

Channel Type: F2

Channel Length: 1641 ft.

Flowing Water Mean Width: 6 ft.

Flowing Water Mean Depth: 0.2 ft.

Base Flow: 0.0 cfs

Water: 54F- 55F°F Air: 54F- 58F°F

Dom. Bank Veg.: Brush

Vegetative Cover: 75%

Dom. Bank Substrate: No Data

Embeddness Value: 1. 22% 2. 52%

Canopy Density: 97%

Coniferous Component: 81%

Deciduous Component: 19%

Pools by Stream Length: 5%

Pools >=3 ft.deep: 0%

Mean Pool Shelter Rtn: 22

Dom. Shelter: Boulders

Occurrence of LOD: 7%

Dry Channel: 0%

3. 7% 4. 19%

STREAM REACH 3

Channel Type: B4

Channel Length: 6596 ft.

Flowing Water Mean Width: 5 ft.

Flowing Water Mean Depth: 0.2 ft.

Base Flow: 0.0 cfs

Water: 50F- 56F°F Air: 49F- 59F°F

Dom. Bank Veg.: Brush

Vegetative Cover: 88%

Dom. Bank Substrate: No Data

Embeddness Value: 1. 37% 2. 34%

Canopy Density: 97%

Coniferous Component: 68%

Deciduous Component: 32%

Pools by Stream Length: 22%

Pools >=3 ft.deep: 7%

Mean Pool Shelter Rtn: 44

Dom. Shelter: Large Woody Debris

Occurrence of LOD: 40%

Dry Channel: 3%

3. 23% 4. 6%