



## STREAM INVENTORY REPORT

### MILL CREEK

#### INTRODUCTION

A stream inventory was conducted during the summer of 1996 on Mill Creek. 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 Mill Creek. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species.

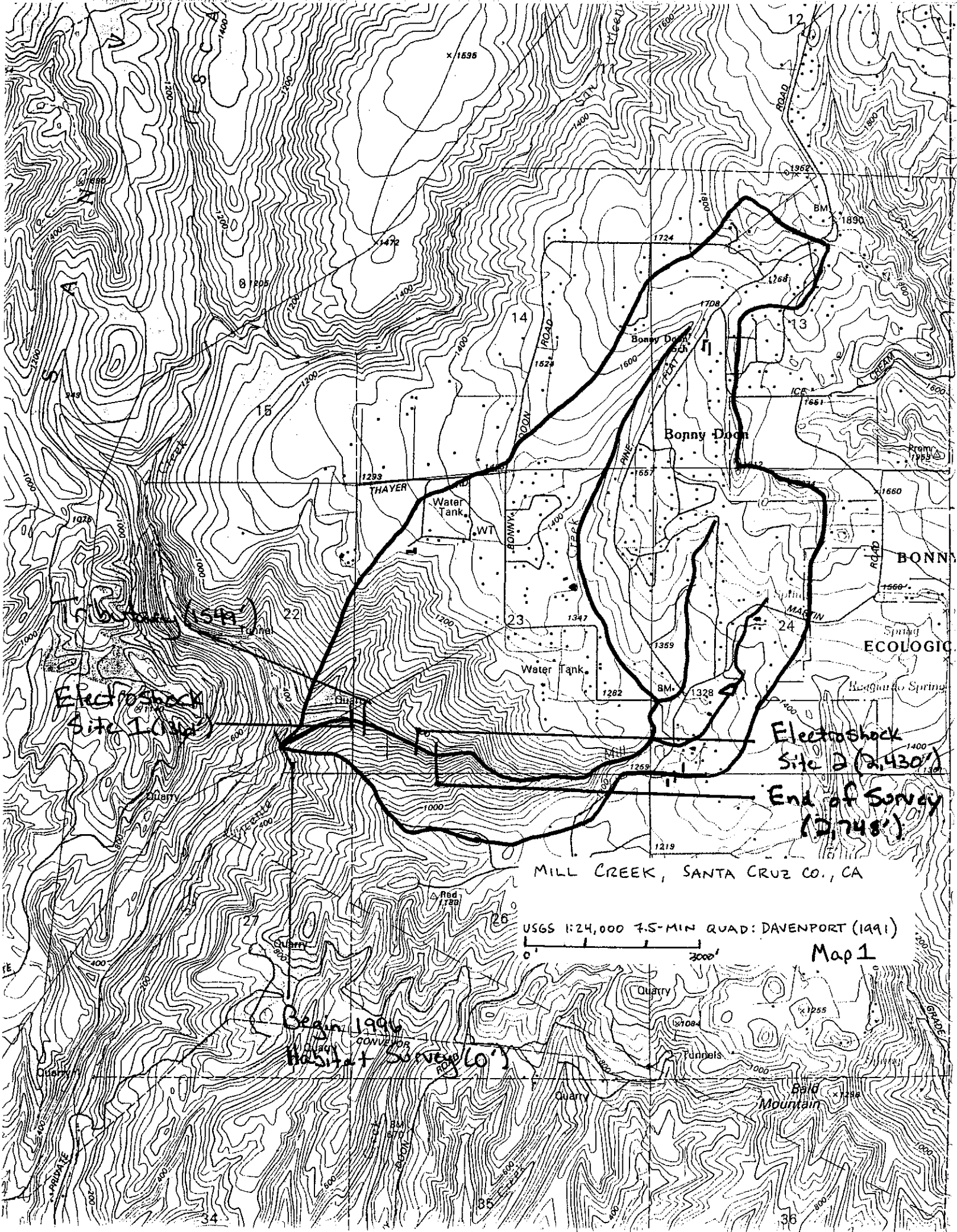
The objective of this report is to document the current habitat conditions, and recommend options for the potential enhancement of habitat for coho salmon and steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's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

#### WATERSHED OVERVIEW

Mill Creek is tributary to San Vicente Creek, tributary to the Pacific Ocean, located in Santa Cruz County, California (Map 1). Mill Creek's legal description at the confluence with San Vicente Creek is T10S R03W S22. Its location is 37°02'29" north latitude and 122°10'23" west longitude. Mill Creek is a first order stream and has approximately 4.3 miles of blue line stream according to the USGS Davenport 7.5 minute quadrangle. Mill Creek drains a watershed of approximately 2.0 square miles. Elevations range from about 230 feet at the mouth of the creek to 1800 feet in the headwater areas. Redwood forest dominates the watershed. The Mill Creek watershed is privately owned and is managed for timber production, City of Santa Cruz water supply and urbanization. Vehicle access exists via private roads off Highway 1.

#### METHODS

The habitat inventory conducted in Mill Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flossi and Reynolds, 1991 rev. 1994). The California Conservation Corps (CCC) Technical Advisors 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 flatwater and riffle habitat units and 55% of the pool habitat within the survey reach (Hopelain, 1994). All habitat units 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, and embeddedness. Complete measurements are taken on 1) flatwater and riffle habitat types encountered for the first time, 2) a randomly selected unit from the ten habitat units on each field form and 3) every third pool.

## 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 Mill Creek to record measurements and observations. There are nine components to the inventory form.

### 1. Streamflow:

Flow was measured in cubic feet per second (cfs) within habitat unit 001 using a Marsh-McBirney Model 2000 Flowmate.

### 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 in 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". Mill 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. Length was measured on all units. All other parameters on the field form were measured on the first occurrence of each habitat type, a randomly selected 10% subset of all flatwater and riffle units, and every third pool (Hopelain, 1995). Pool tail crest depth at each pool unit was measured in the thalweg. All measurements were in feet to the nearest tenth.

#### 5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail crests reaches is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Mill 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 unsuitable for spawning due to inappropriate substrate size (i.e. boulder or 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 Mill 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.

#### 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 Mill 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 Mill 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 was estimated and recorded.

### BIOLOGICAL INVENTORY

Biological sampling during stream inventory is used to determine fish species composition and their distribution throughout the stream. In Mill Creek fish presence was observed from the stream banks, and two sites were sampled using a Smith-Root Model 12 backpack electrofishing unit. 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, 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 Quattro Pro. Graphics developed for Mill 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 July 14 and 15, 1996, was conducted by Allan Renger (WSP\AmeriCorps) and Dawn Fisher (CCC). The total length of the stream surveyed was 2,748 feet (0.52 miles) with an additional 143 feet of side channel.

Stream flow, measured approximately 30 feet upstream from the confluence with San Vicente Creek, was 1.6 cfs on July 14, 1996.

Mill Creek is an F4 channel type for the lower 1,429 feet of stream surveyed and B6 channel type for the remaining 1,319 feet. F4 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates. B6 channels are moderately entrenched, moderate gradient, riffle dominated channels, with infrequently spaced pools, very stable plan and profile, stable banks, and a silt/clay channel.

Water temperatures taken during the survey period ranged from 56 to 60 degrees Fahrenheit. Air temperatures ranged from 57 to 66 degrees Fahrenheit (Table 7).

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 26% riffle units, 33% flatwater units, and 41% pool units (Graph 1). Based on total **length** of Level II habitat types there were 13% riffle units, 81% flatwater units, and 6% pool units (Graph 2).

Six Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were step runs (26%), plunge pools (22%), and low gradient riffles (22%) (Graph 3). Based on percent total **length**, step runs comprised 49%, runs 32%, and low gradient riffles 12%.

A total of eleven pools were identified (Table 3). Of these, 55% were scour pools which comprised 46% of the total length of all pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Pool carrying capacity and quality generally increases with depth, especially if other cover components are present.

Five of the eleven pools (45%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail crests. Of the 11 pool tail crests measured, 0 had a value of 1; 1 had a value of 2 (9%), 2 had a value of 3 (18%), 4 had a value of 4 (36%) and 4 had a value of 5 (36%) (Graph 6). On this scale, a value of 1 indicates the highest quality 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 5, and pool habitats had a mean shelter rating of 17 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 21. Main channel pools had a mean shelter rating of 8 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Mill Creek. Large and small woody debris are lacking in nearly all habitat types (Graph 7).

Table 6 summarizes the dominant substrate by habitat type. Large cobble was the dominant substrate observed in the one low gradient riffle measured (Graph 8). Of the two step runs measured one had a dominant substrate of small cobble and one had a dominant substrate of large cobble.

The mean percent canopy density for the stream reach surveyed was 76%. The mean percentages of deciduous and coniferous trees were 28% and 72%, respectively (Graph 9).

For the stream reach surveyed, the mean percent right bank vegetated was 89.5%. The mean percent left bank vegetated was 91.8%. The dominant elements composing the structure of the stream banks consisted of 4.5% bedrock, 27.3% cobble/gravel, and 68.2% sand/silt/clay (Graph 10). Coniferous trees were the dominant vegetation type observed in 54.6% of the units surveyed including down trees, logs, and root wads (Graph 11). Additionally, 27.3% of the units surveyed had deciduous trees as the dominant vegetation type.

## **BIOLOGICAL INVENTORY RESULTS**

Two sites were electrofished on October 21, 1996 by Jennifer Nelson and Twyla Anderson (DFG).

The first site sampled was located at stream mile 0.26 and included a plunge pool, a high gradient riffle, a mid-channel pool, and a run. The site yielded 33 steelhead ranging in length from 53 to 140 millimeters and one Pacific giant salamander.

The second site was located at stream mile 0.46 and included a step run, a plunge pool and a step run. The site yielded 14 steelhead ranging in length from 72 to 258 millimeters.

## DISCUSSION

Mill Creek is a F4 channel type for the first 0.27 miles (1,429 feet) of stream surveyed and a B6 for the remaining 0.25 miles (1,319 feet).

The water temperatures recorded on the survey days July 14 and 15, 1996, ranged from 56 to 60 degrees Fahrenheit. Air temperatures ranged from 57 to 66 degrees Fahrenheit. The limited water temperature data available suggest that maximum water temperatures may exceed the "optimal" range for juvenile coho salmon and steelhead. To establish more complete temperature regime information, 24-hour monitoring from June through November should be performed.

Flatwater habitat types comprised 81% of the total **length** of this survey, riffles 13%, and pools 6%. The pools are relatively deep, with 5 of the 11 (45%) pools having a maximum depth greater than 2 feet. 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. Fallen trees, log jams, large boulders and other hard substantial elements will allow additional pools to be scoured and in the case of fallen trees and log jams, complex instream cover will also be provided.

Substrate embeddedness in all pool tail-outs exceeded 26%. Cobble embeddedness measured to be 25% or less (a rating of 1) is considered to be good for spawning coho salmon and steelhead. In Mill Creek, sediment sources should be identified, mapped and prioritized according to their potential sediment yields and the appropriate control measures should be taken.

The mean shelter rating for pools was low with a rating of 17. The shelter rating in the flatwater habitats was slightly lower at 5. A pool shelter rating of approximately 100 is desirable. The relatively small amount of cover that now exists is being provided primarily by boulders in all habitat types. Log and root wad cover structure in the pool and flatwater habitats are needed to improve both summer and winter salmonid habitat. Complex woody debris (i.e. roots and fallen trees) provides rearing coho salmon and steelhead with protection from predation and high water velocities in addition to dividing territorial units to reduce density related competition.

Large cobble (5 to 10 inch diameter) was the dominant substrate observed in the one low gradient riffle measured (Graph 8). Of the two step runs measured one had a dominant substrate of small cobble (2.5 to 5 inch diameter) and one had a dominant substrate of large cobble. Gravel and small cobble are the preferred substrate for spawning steelhead and coho salmon.

The mean percent canopy density for the stream was 76%. For coho salmon and steelhead streams, a multilayered canopy between 85% and 90% is recommended to provide the



necessary temperature moderating affect and shade to the stream.

The percentage of right and left bank covered with vegetation was high at 89.5% and 91.8%, 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 revetment, is recommended.

### RECOMMENDATIONS

- 1) Mill Creek should be managed as an anadromous, natural production stream.
- 2) The limited water temperature data available suggest that maximum water temperatures may exceed the "optimal" range for juvenile coho salmon and steelhead. To establish more complete and meaningful temperature regime information, 24-hour monitoring from June through November should be performed to determine the most critical time period.
- 3) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover is from boulders. Adding or allowing for the natural recruitment of complex woody debris (i.e. trees and logs) would provide summer and winter habitat in addition to scaring more pools.
- 4) Active and potential sediment sources need to be identified, mapped, and prioritized according to their potential for sediment yield to the stream and its tributaries.

### COMMENTS AND LANDMARKS

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

- |        |  |
|--------|--|
| 0'     | Begin survey at confluence with San Vicente Creek. Channel type is F4.                     |
| 1,361' | First electrofishing site.   |
| 1,429' | Channel type changes to a B6.  |
| 1,549' | Tributary enters from the right bank. The first 200' was walked and no fish were observed. |
| 2,430' | Second electrofishing site.  |
| 2,748' | End of survey. A diversion dam, approximately 15 feet in height denotes the                |

upper boundary for anadromous salmonids.

#### REFERENCES

- Flosi, G., and F. Reynolds. 1994. California salmonid stream habitat restoration manual, 2nd edition. California Department of Fish and Game, Sacramento, California.
- Hopelain, J. 1995. Sampling levels for fish habitat inventory, unpublished manuscript. California Department of Fish and Game, Inland Fisheries Division, Sacramento, California.

### LEVEL III and LEVEL IV HABITAT TYPE KEY

HABITAT TYPE	LETTER	NUMBER
<b>RIFFLE</b>		
Low Gradient Riffle	[LGR]	1.1
High Gradient Riffle	[HGR]	1.2
<b>CASCADE</b>		
Cascade	[CAS]	2.1
Bedrock Sheet	[BRS]	2.2
<b>FLATWATER</b>		
Pocket Water	[POW]	3.1
Glide	[GLD]	3.2
Run	[RUN]	3.3
Step Run	[SRN]	3.4
Edgewater	[EDW]	3.5
<b>MAIN CHANNEL POOLS</b>		
Trench Pool	[TRP]	4.1
Mid-Channel Pool	[MCP]	4.2
Channel Confluence Pool	[CCP]	4.3
Step Pool	[STP]	4.4
<b>SCOUR POOLS</b>		
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
<b>BACKWATER POOLS</b>		
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

MILL CREEK

Drainage: SAN VICENTE CREEK

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

Survey Dates: 07/14/96 to 07/15/96

Confluence Location: QUAD: Davenport LEGAL DESCRIPTION: T10SR03WS22 LATITUDE: 37°2'29" LONGITUDE: 122°10'23"

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 ESTIMATED VOLUME (cu.ft.)	ESTIMATED TOTAL VOLUME (cu.ft.)	MEAN RESIDUAL POOL VOL (cu.ft.)	MEAN SHELTER RATING
7	2	RIFFLE	26	54	378	13	7.5	0.5	544	3808	239	1674	0	5
9	3	FLATWATER	33	261	2347	81	8.0	0.5	1095	9853	499	4487	0	5
11	6	POOL	41	15	166	6	10.0	1.0	132	1452	142	1563	78	17
TOTAL UNITS	TOTAL UNITS				TOTAL LENGTH (ft.)				TOTAL AREA (sq. ft.)			TOTAL VOL. (cu. ft.)		
27	11				2891				15113			7725		

MILL CREEK

Drainage: SAN VICENTE CREEK

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS

Survey Dates: 07/14/96 to 07/15/96

Confluence Location: QUAD: Davenport LEGAL DESCRIPTION: T10SR03WS22 LATITUDE: 37°2'29" LONGITUDE: 122°10'23"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT OCCURRENCE	MEAN LENGTH	TOTAL LENGTH	TOTAL LENGTH	MEAN WIDTH	MEAN DEPTH	MEAN MAXIMUM DEPTH	MEAN AREA	TOTAL AREA	MEAN VOLUME	TOTAL VOLUME	MEAN RESIDUAL	MEAN SHELTER	MEAN CANOPY
#			%	ft.	ft.	%	ft.	ft.	ft.	sq.ft.	sq.ft.	cu.ft.	cu.ft.	cu.ft.		%
6	1	LGR	22	56	338	12	9	0.4	0.9	872	5233	349	2093	0	5	70
1	1	HGR	4	40	40	1	6	0.6	1.1	216	216	130	130	0	5	9
2	1	RUN	7	468	936	32	8	0.6	1.4	228	456	137	274	0	5	100
7	2	SRN	26	202	1411	49	8	0.5	1.4	1528	10697	679	4756	0	5	93
5	2	MCP	19	18	90	3	8	0.7	2.0	128	640	86	428	17	8	77
6	4	PLP	22	13	76	3	11	1.2	2.5	134	804	170	1022	109	21	73
TOTAL UNITS	TOTAL UNITS				LENGTH (ft.)					AREA (sq.ft.)		TOTAL VOL. (cu.ft.)				
27	11				2891					18045		8702				

MILL CREEK

Drainage: SAN VICENTE CREEK

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 07/14/96 to 07/15/96

Confluence Location: QUAD: Davenport LEGAL DESCRIPTION: T10SR03WS22 LATITUDE: 37°2'29" LONGITUDE: 122°10'23"

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 (sq.ft.)	MEAN VOLUME (cu.ft.)	TOTAL VOLUME (cu.ft.)	MEAN RESIDUAL POOL VOL. (cu.ft.)	MEAN SHELTER RATING
5	2	MAIN	45	18	90	54	7.5	0.7	128	640	86	428	17	8
6	4	SCOUR	55	13	76	46	11.3	1.2	134	804	170	1022	109	21
TOTAL UNITS	TOTAL UNITS				TOTAL LENGTH (ft.)				TOTAL AREA (sq.ft.)		TOTAL VOL. (cu.ft.)			
11	6				166				1444		1450			

MILL CREEK

Drainage: SAN VICENTE CREEK

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

Survey Dates: 07/14/96 to 07/15/96

Confluence Location: QUAD: Davenport LEGAL DESCRIPTION: T10SR03WS22 LATITUDE: 37°2'29" LONGITUDE: 122°10'23"

UNITS	HABITAT	HABITAT	<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
MEASURED	TYPE	PERCENT	MAXIMUM	PERCENT	MAXIMUM	PERCENT	MAXIMUM	PERCENT	MAXIMUM	PERCENT	MAXIMUM	PERCENT
		OCCURRENCE	DEPTH	OCCURRENCE	DEPTH	OCCURRENCE	DEPTH	OCCURRENCE	DEPTH	OCCURRENCE	DEPTH	OCCURRENCE
5	MCP	45	0	0	3	60	2	40	0	0	0	0
6	PLP	55	0	0	3	50	3	50	0	0	0	0

TOTAL

UNITS

11

MILL CREEK

Drainage: SAN VICENTE CREEK

Table 5 - SUMMARY OF MEAN PERCENT COVER BY HABITAT TYPE

Survey Dates: 07/14/96 to 07/15/96

Confluence Location: QUAD: Davenport LEGAL DESCRIPTION: T10SR03WS22 LATITUDE: 37°2'29" LONGITUDE: 122°10'23"

UNITS MEASURED	UNITS FULLY MEASURED	HABITAT TYPE	MEAN % UNDERCUT BANKS	MEAN % SWD	MEAN % LWD	MEAN % ROOT MASS	MEAN % TERR. VEGETATION	MEAN % AQUATIC VEGETATION	MEAN % WHITE WATER	MEAN % BOULDERS	MEAN % BEDROCK LEDGES
6	1	LGR	0	0	0	0	0	0	0	100	0
1	1	HGR	0	0	0	0	0	0	0	100	0
2	1	RUN	0	0	0	0	0	0	0	100	0
7	2	SRN	0	0	0	0	0	0	0	100	0
5	2	MCP	45	0	0	0	5	0	0	50	0
6	4	PLP	0	0	5	0	0	0	48	48	0



MILL CREEK

Drainage: SAN VICENTE CREEK

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE

Survey Dates: 07/14/96 to 07/15/96

Confluence Location: QUAD: Davenport LEGAL DESCRIPTION: T10SR03WS22 LATITUDE: 37°2'29" LONGITUDE: 122°10'23"

TOTAL HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	% TOTAL SILT/CLAY DOMINANT	% TOTAL SAND DOMINANT	% TOTAL GRAVEL DOMINANT	% TOTAL SM COBBLE DOMINANT	% TOTAL LG COBBLE DOMINANT	% TOTAL BOULDER DOMINANT	% TOTAL BEDROCK DOMINANT
6	1	LGR	0	0	0	0	100	0	0
1	1	HGR	0	0	0	0	100	0	0
2	1	RUN	0	0	0	0	100	0	0
7	2	SRN	0	0	0	50	50	0	0
5	2	MCP	0	50	50	0	0	0	0
6	4	PLP	0	25	0	25	50	0	0

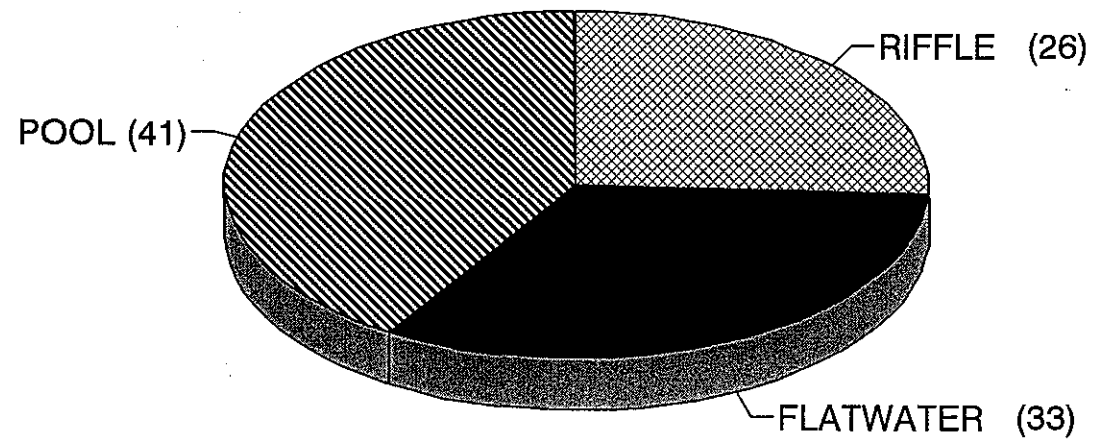
Temperatures

DATE	LOCATION (ft.)	TIME	AIR (°F)	WATER (°F)
7-14	0	1430	66	60
7-15	686	0940	57	56
7-15	826	1100	61	56

Table 7. Air and water temperatures taken during habitat typing survey in Mill Creek, Santa Cruz County.

# MILI CREEK

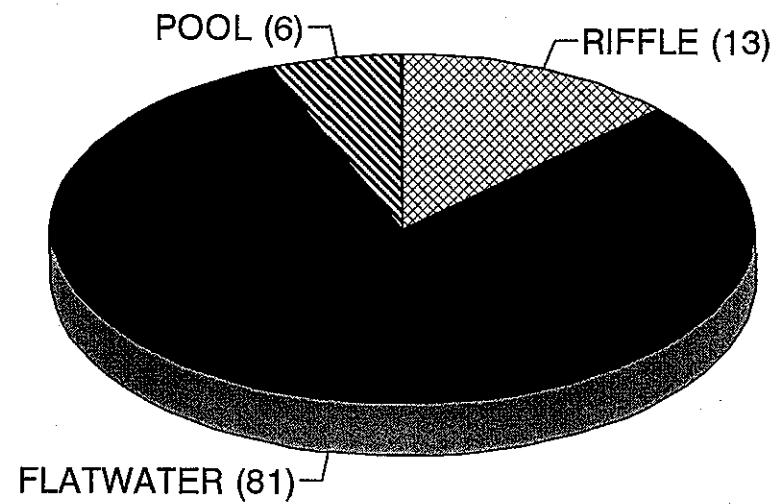
## HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

# MILI CREEK

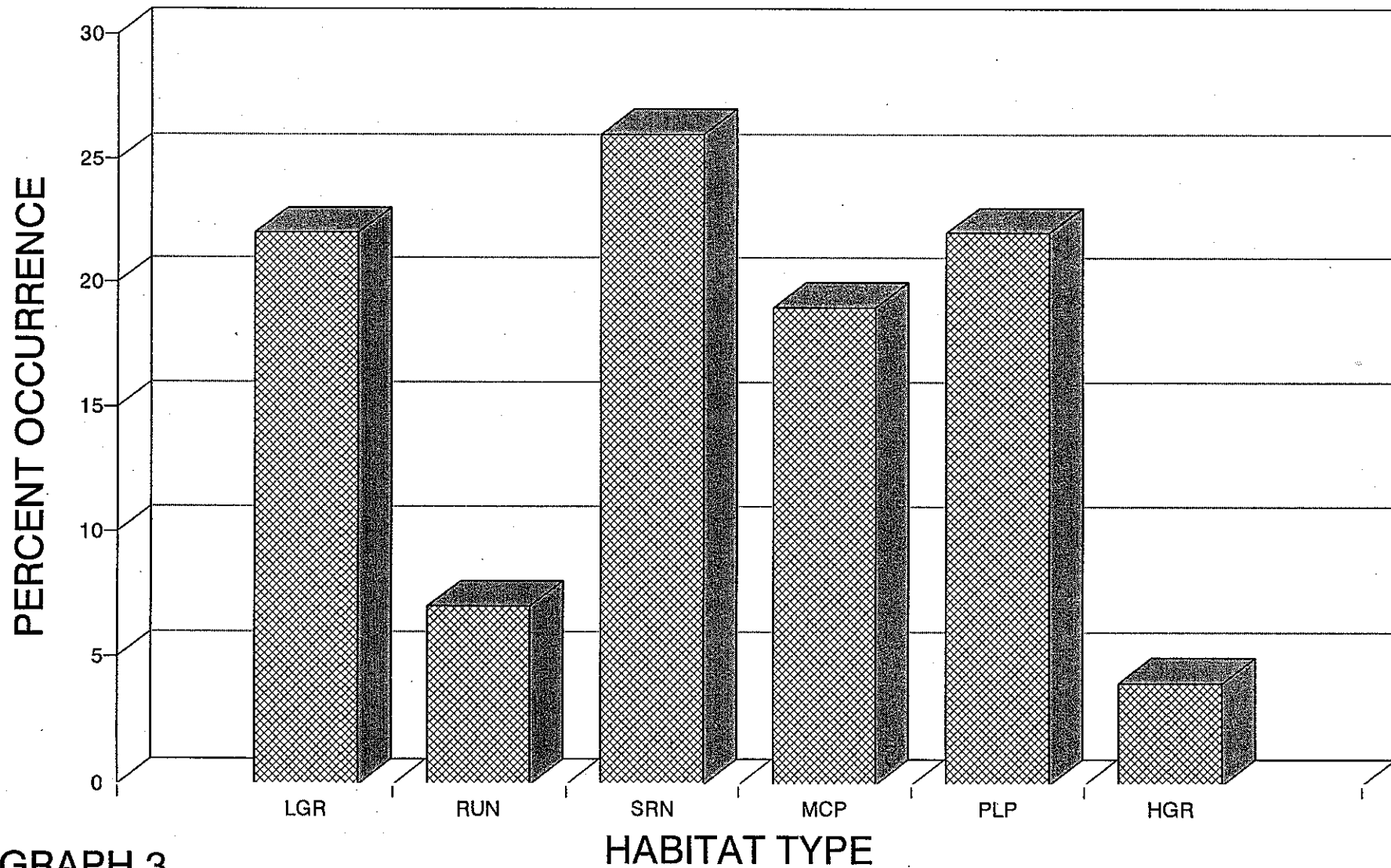
## HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

# MILI CREEK

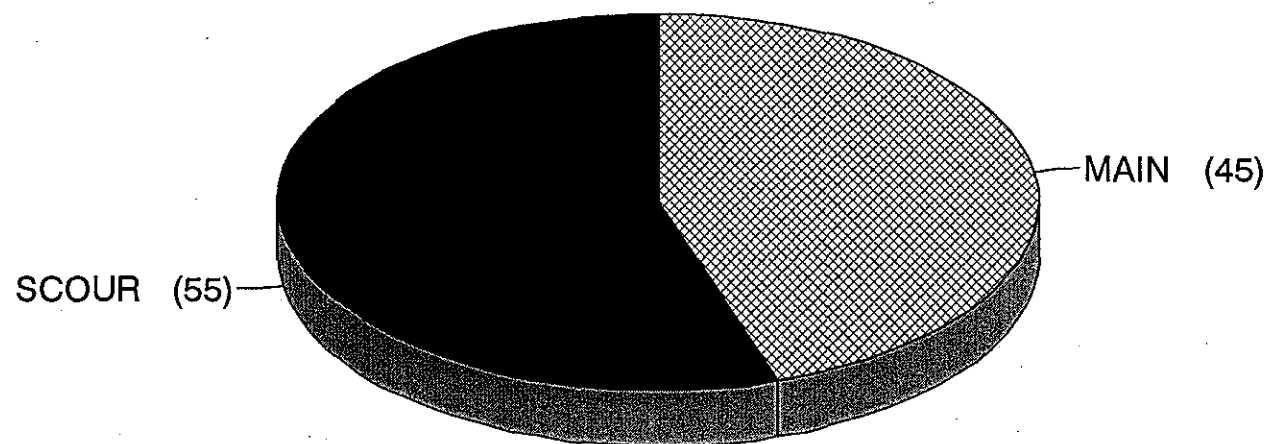
## HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 3

# MILL CREEK

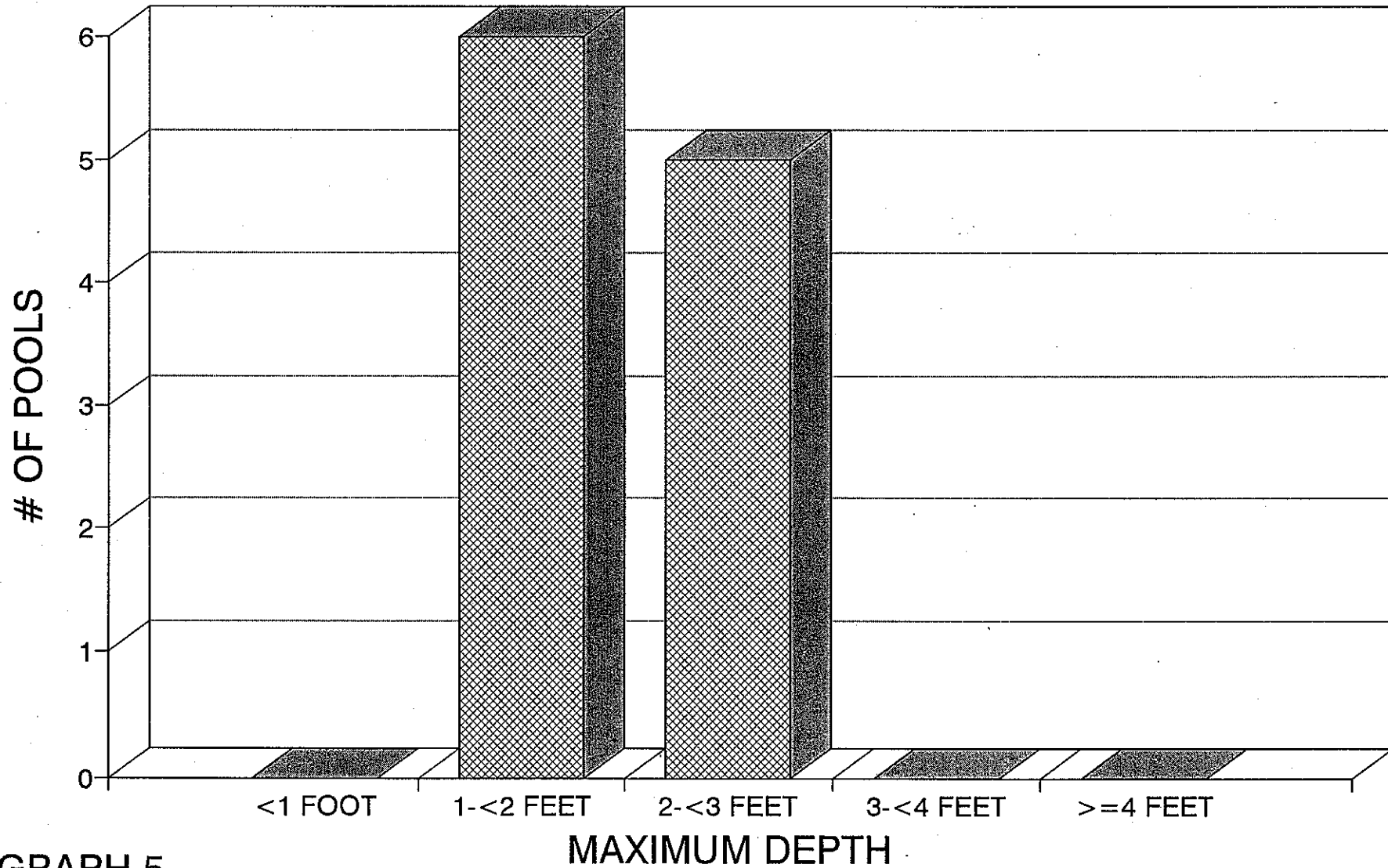
## POOL HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 4

# MILL CREEK

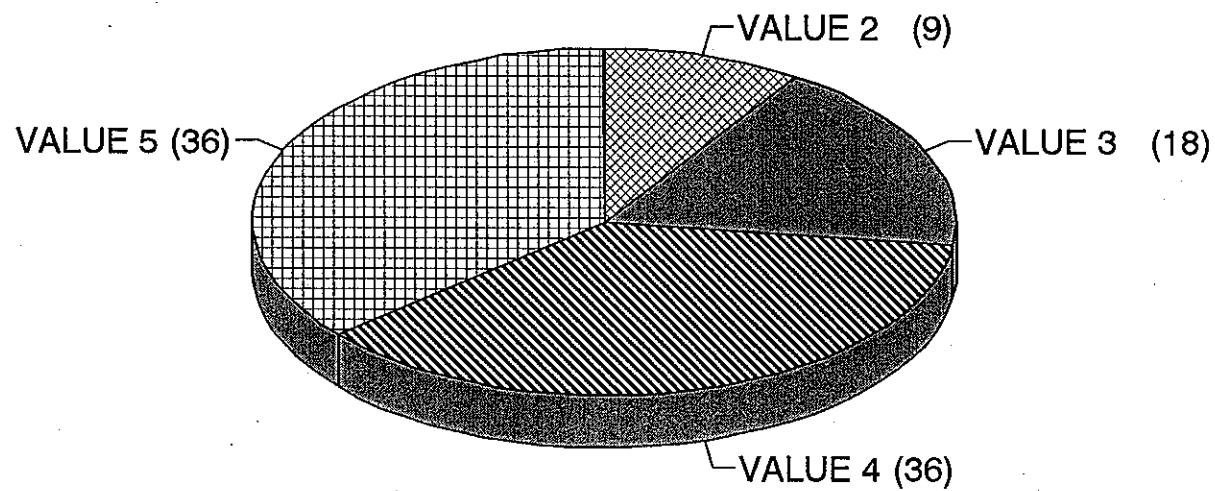
## MAXIMUM POOL DEPTHS



GRAPH 5

# MILL CREEK

## PERCENT EMBEDDEDNESS

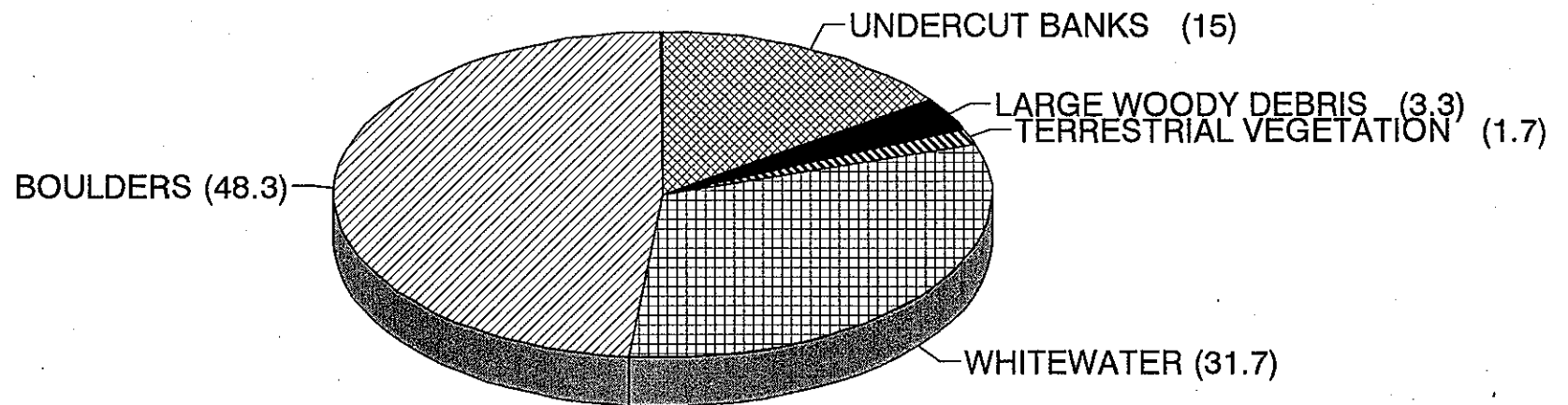


GRAPH 6



# MILL CREEK

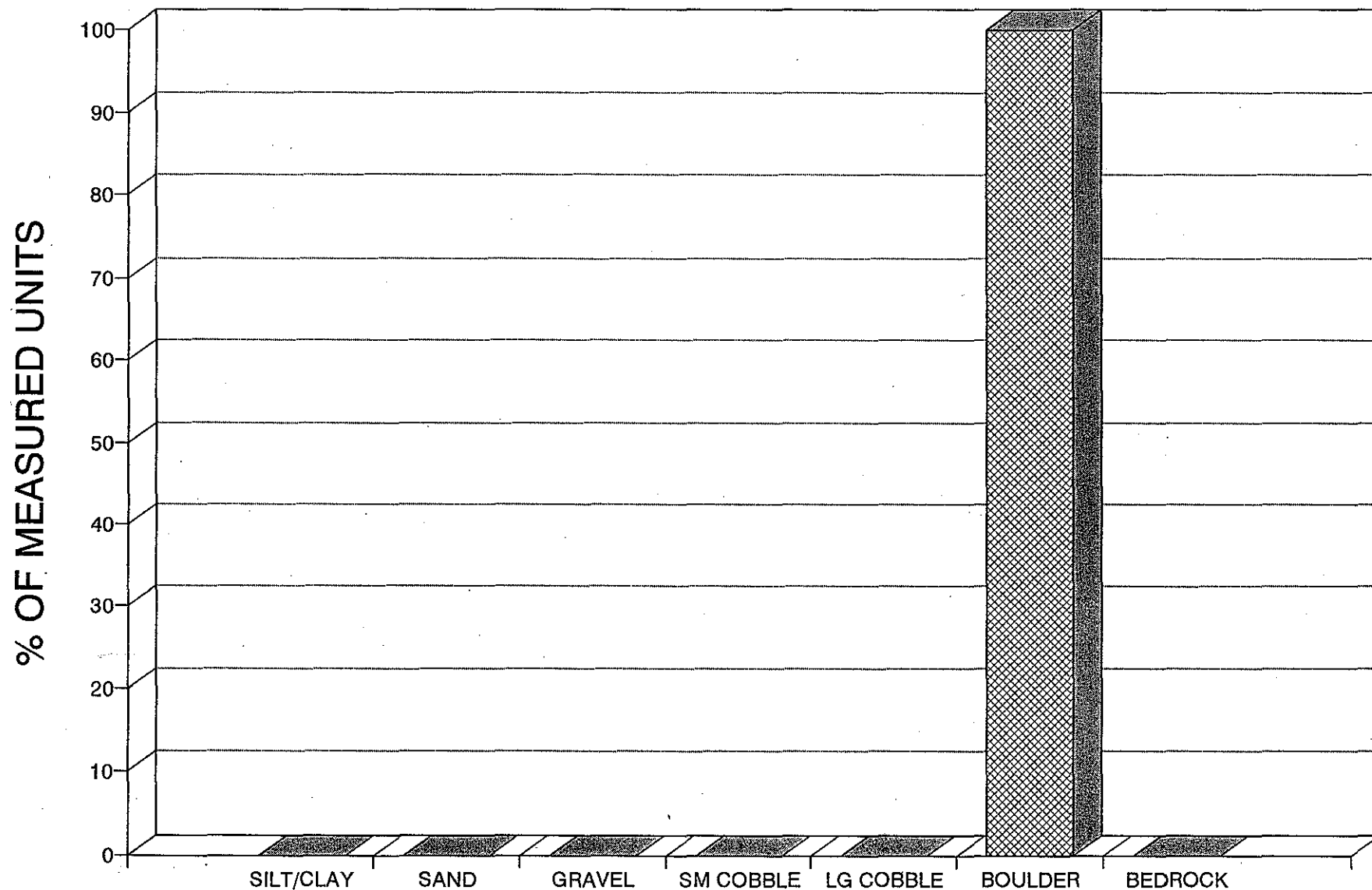
## MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

# MILI CREEK

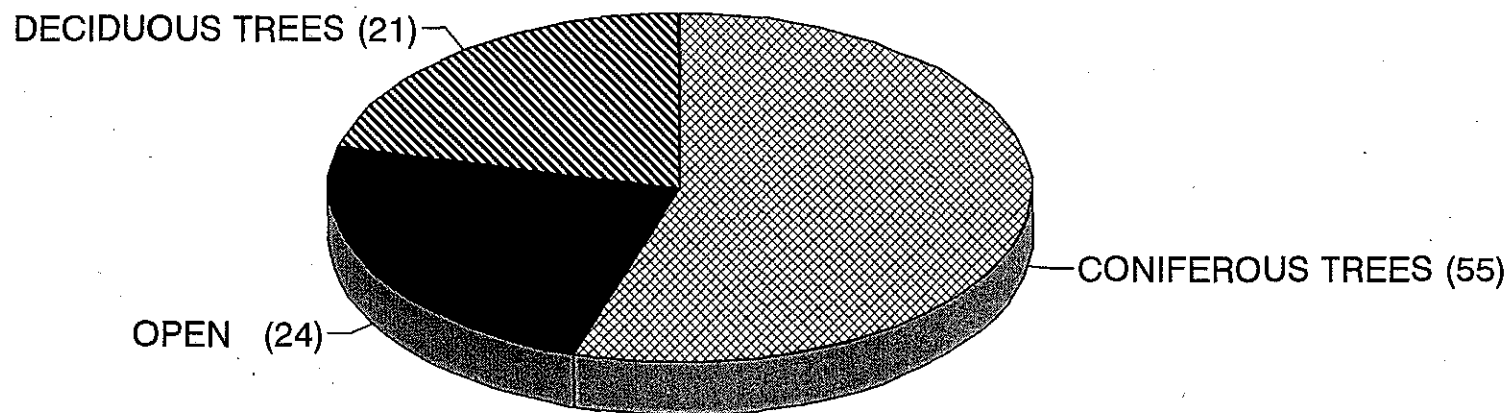
## SUBSTRATE COMPOSITION IN LOW GRADIENT RIFFLES



GRAPH 8

SUBSTRATE

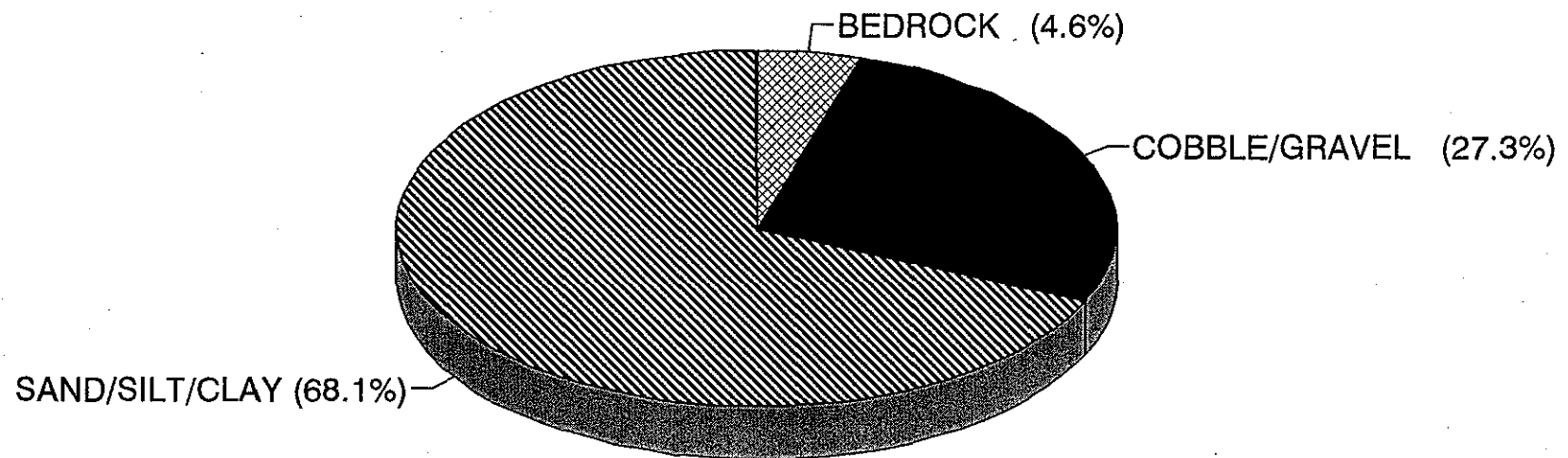
# MILL CREEK PERCENT CANOPY



GRAPH 9

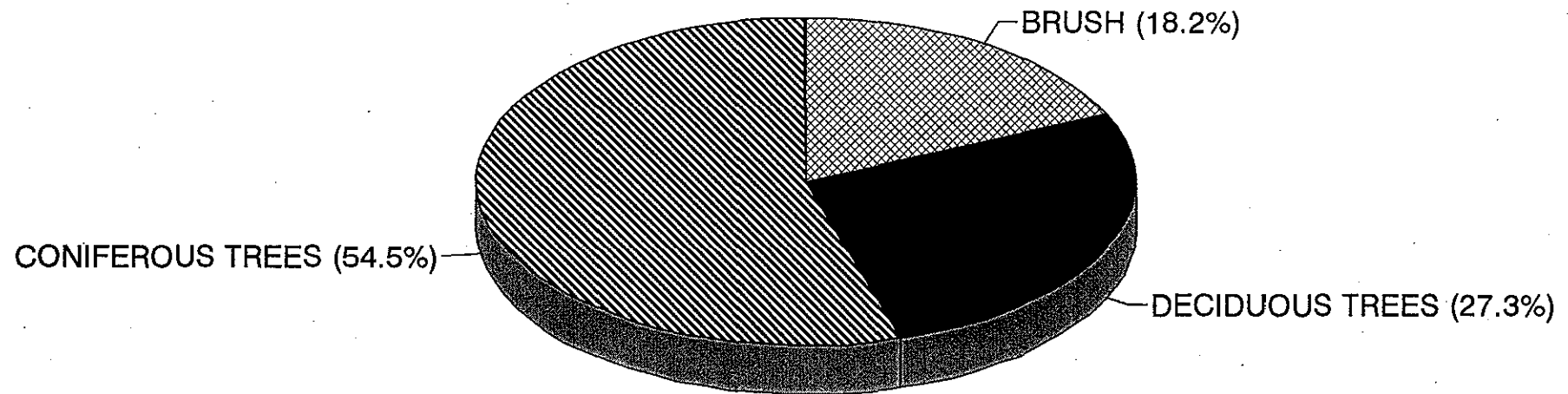
# MILL CREEK

## DOMINANT BANK COMPOSITION IN SURVEY REACH



# MILL CREEK

## DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11