CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT

Jenner Gulch

Report Revised April 14, 2006
Report Completed 1999
Assessment Completed 1998

INTRODUCTION

A stream inventory was conducted during the summer of 1998 on Jenner Gulch. The inventory was conducted in two parts: habitat inventory and biological inventory. The objective of the habitat inventory was to document the amount and condition of available habitat to fish, and other aquatic species with an emphasis on anadromous salmonids in Jenner Gulch. The objective of the biological inventory was to document the salmonid and other aquatic species present and their distribution.

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. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

WATERSHED OVERVIEW

Jenner Gulch flows into the Russian River, located in Sonoma County, California (see Jenner Gulch Creek map, page 2). The legal description at the confluence with the Russian River is T7N, R11W, S18. Its location is 38°26'56" N. latitude and 123°06'49" W. longitude. Year round vehicle access exists from Highway 1 near Jenner, via Willig Ave.

Jenner Gulch and its tributaries drain a basin of approximately 3.0 square miles. Jenner Gulch Creek is a first order stream and has approximately 3.3 miles of blue line stream, according to the USGS Duncans Mills 7.5 minute quadrangles. Summer flow was measured as approximately 0.41 cfs at 38 feet upstream of Bridge #1 in habitat unit #008. Elevations range from about 0 feet at the mouth of the creek to 1200 feet in the headwaters. The creek originates from mountain springs, runs down a steep, rocky gulch, through a U-shaped canyon, leveling off toward the mouth. The predominant vegetation throughout the area consists of Douglas fir, redwood, willow, maple, and alder. The watershed is entirely privately owned and is managed for timber production. The Northern spotted owl (*Strix occidentalis caurina*) is listed with a federal status of threatened, the bank swallow (*Riparia riparia* (nesting)) is listed with a California status of threatened, and the red tree vole (*Arborimus pomo*) is listed with a federal status of species of concern in the DFG's Natural Diversity Database for occurring within the Jenner Gulch watershed.

METHODS

The habitat inventory conducted in Jenner Gulch follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi et al. 1998). The AmeriCorps Volunteers 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 and was supervised by Bob Coey, Russian River Basin Planner (DFG).

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 Jenner Gulch to record measurements and observations. There are nine components to the inventory form: flow, channel type, temperatures, habitat type, embeddedness, shelter rating, substrate composition, canopy, and bank composition.

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 were also 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:

Water and air temperatures are measured by crew members with hand held thermometers and recorded at each tenth unit typed. Temperatures are measured in 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". Jenner Gulch 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 unit lengths were measured, additionally, the first occurrence of each unit type and a randomly selected 10% subset of all units were completely sampled (length, mean width, mean depth, maximum depth and pool tail crest depth). All measurements were 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 Jenner Gulch, 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) or "not suitable" (value 5) was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate particle size, having a bedrock tail-out, 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. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All shelter is then classified according to a list of nine shelter types. In Jenner Gulch, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the shelter. The shelter rating is calculated for each habitat unit by multiplying shelter value and percent covered. 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 measured habitat units, dominant and sub-dominant substrate elements were ocularly estimated using a list of seven size classes.

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densiometers as described in the California Salmonid Stream Habitat Restoration Manual, 1998. Canopy density relates to the amount of stream shaded from the sun. In Jenner Gulch, 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 evergreen or deciduous trees.

9. Bank Composition:

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 Jenner Gulch, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully measured 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 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.

DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat, a dBASE IV data entry program developed CDFG. This program processes and summarizes the data, and produces the following tables and appendices:

- Riffle, flatwater, and pool habitat types
- Habitat types and measured parameters
- Pool types
- Maximum pool depths by habitat types
- Shelter by habitat types
- Dominant substrates by habitat types
- Vegetative cover and dominant bank composition
- Fish habitat elements by stream reach

Graphics are produced from the tables using Lotus 1,2,3. Graphics developed for Jenner Gulch include:

- Level II Habitat Types by % Occurrence and % Total Length
- Level IV Habitat Types by % Occurrence
- Pool Habitat Types by % Occurrence
- Maximum Depth in Pools
- Pool Shelter Types by % Area
- Substrate Composition in Low Gradient Riffles
- Percent Cobble Embeddedness by Reach
- Mean Percent Canopy
- Mean Percent Canopy by Reach
- Percent Bank Composition and Bank Vegetation

HISTORICAL STREAM SURVEYS:

The Department of Fish and Game conducted a survey of Jenner Gulch on February 24, 1966 and July 8, 1970. The March 1966 survey was a complete survey that started at the mouth and ended at the headwaters. A flow of 6.7 cfs was measured with a pygmy meter at the time of the survey. The water temperature was 50EF and the air temperature was 52EF.

The substrate throughout the stream was estimated as 35% boulder, 30% cobble, 15% bedrock, 15% gravel, 5% sand, and some silt. There were very few spawning areas observed and those that were

present were relatively poor. The gravel was either too large, or small and silted in. The pools were observed as being excellent, caused by undercut banks, log jams, and boulders. Pools predominated in the lower and middle sections of the creek. The frequency of pools to riffles was 70% to 30%. The shelter was good throughout, composed of roots, boulders, overhanging brush, and trees.

The July 1970 survey was a partial survey that started at the mouth and ended at the upper fish limit, approximately 0.8 miles upstream. The flow at the time of the survey averaged 0.25 cfs. The water temperature was 51°F and the air temperature was 60°F.

The substrate of the stream was estimated as 35% boulder, 30% gravel, 15% cobble, 15% silt, and 5% sand. The spawning areas ranged from 40-45% in the lower stretches, decreasing to about 20-30% at the upper fish limit. The pools averaged 20-30% and were mostly formed by large boulders and some logs. The shelter was primarily provided by vegetation, undercut banks, and boulders.

HABITAT INVENTORY RESULTS

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

The habitat inventory of July 6 - 15, 1998 was conducted by Danielle Lefer, Simone Watts, Christy Beard and Marc Miller (AmeriCorps) with supervision and analysis by CDFG. The survey began at the confluence with the Russian River and extended up Jenner Gulch to the end of the survey at a series of rock falls. The total length of the stream surveyed was 4102 feet, with an additional 224 feet of side channel.

A flow of 0.41 cfs was measured July 16, 1998 at habitat unit #008, 38' upstream of Bridge #1 with a Marsh-McBirney Model 2000 flowmeter.

This section of Jenner Gulch has four channel types: from the mouth to 1081 feet an F4; next 635 feet an F3; next 962 feet a B2 and the upper 1424 feet an A2.

F4 channel types are entrenched meandering riffle/pool channels on low gradients (<2%) with a high width/depth ratio and a predominantly gravel substrate. F3 channel types are similar but have a predominately cobble substrate.

B2 channel types are moderately entrenched, moderate gradient (2-4%), riffle dominated channels, with infrequently spaced pools, a very stable plan and profile, stable banks and have a predominantly boulder substrate.

A2 channel types are steep (4-10%), narrow, cascading, step-pool streams with a high energy/debris transport associated with depositional soils and a predominantly boulder substrate.

Water temperatures ranged from 55°F to 60°F. Air temperatures ranged from 58°F to 70°F.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of

occurrence there were 52% pool units, 37% riffle units, 7% flatwater units, and 2% dry streambed units. Based on total **length** there were 49% riffle units, 38% pool units, 10% flatwater units, and 2% dry streambed units (Graph 1).

Fifty-four habitat units were measured and 26% were completely sampled. 14 Level IV habitat types were identified. The data is summarized in Table 2. The most frequent habitat types by percent **occurrence** were low gradient riffles at 22%, step pools 17%, cascades 13% and mid-channel pools 13% (Graph 2). By percent total **length**, cascades made up 28%, step pools 22%, low gradient riffles 20%, and mid-channel pools 6%.

Twenty-eight pools were identified (Table 3). Main Channel pools were most often encountered at 57%, and comprised 72% of the total length of pools (Graph 3). Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Fifteen of the 28 pools (54%) had a depth of two feet or greater (Graph 4). These deeper pools comprised 18% of the total length of stream habitat.

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Riffle types had the highest shelter rating at 45. Pool had the lowest rating with 25 and flatwater rated 30 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 31, main channel pools rated 21, and backwater pools rated 15 (Table 3). Table 5 summarizes fish shelter by habitat type. By percent area, the dominant pool shelter types were boulders at 46%, undercut banks 20%, root masses 13%, and white water 9%. Graph 5 describes the pool shelter in Jenner Gulch.

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in none of the 3 low gradient riffles measured. Small cobble was dominant in 1 of the low gradient riffles (Graph 6). No mechanical gravel sampling was conducted in 1998 surveys due to inadequate staffing levels. The depth of cobble embeddedness was estimated at pool tail-outs. Of the 23 pool tail-outs measured, 4 had a value of 1 (17%); 4 had a value of 2 (17%); 11 had a value of 3 (48%); and 3 had a value of 4 (13%). One pool tail-out (4%) rated a 5 (unsuitable substrate type for spawning). On this scale, a value of one is best for fisheries. Cobble was the dominant substrate observed at pool tail-outs.

The mean percent canopy density for the stream reach surveyed was 75%. The mean percentages of deciduous and evergreen trees were 70% and 30%, respectively. Graph 8 describes the canopy for the entire survey and graph 9 describes the canopy by reach.

For the entire stream reach surveyed, the mean percent right bank vegetated was 70% and the mean percent left bank vegetated was 76%. For the habitat units measured, the dominant vegetation types for the stream banks were: 33% deciduous trees, 29% brush, 23% grass, and 15% evergreen trees. The dominant substrate for the stream banks were: 29% silt/clay/sand, 27% boulder, 23% bedrock and 21% cobble/gravel (Graph 10).

BIOLOGICAL INVENTORY

JUVENILE SURVEYS:

In October 1958, a biological inventory was conducted in two sites of Jenner Gulch. The water temperature was 54°F and the air temperature was 58°F. The first station was at the Highway 1 Bridge and the second station was 100 yards upstream of the mouth. No fish were observed at either location.

In the March 1966 survey, a four inch steelhead/rainbow trout was observed.

In the July 1970 survey, 0+ and 1+ steelhead/rainbow trout were observed at a rate of 25 to 50 fish per 100 feet of stream. Unidentified frogs and salamanders were also observed during the survey.

In October 7, 1998 a recent biological inventory was conducted in four sites of Jenner Gulch to document the fish species composition and distribution at several locations. Each site was single pass electrofished using one Smith Root Model 12 electrofisher. Fish from each site were counted by species, and returned to the stream. The air temperature ranged from 50EF to 55EF and the water temperature was 50°F. The observers were Simone Watts, Dez Mikkelsen (AmeriCorps) and Bob Coey (DFG).

The inventory of Reach 1 started 274 feet downstream of Bridge #1 and continued upstream for approximately 250 feet. In pool, riffle, and glide habitat types 27 0+ and 3 1+ steelhead were observed along with 17 sculpin.

The inventory of Reach 1 was continued starting at Bridge #1 and ending approximately 131 feet upstream. In pool, run, and riffle habitat types 35 0+ and 2 1+ steelhead were observed along with 76 sculpin, many Sacramento suckers, and 12 longfin smelt.

The inventory of Reach 2 started at habitat unit #026 and continued upstream for approximately 407 feet. In pool and riffle habitat types 14 0+, 8 1+, and 3 2+ steelhead were observed along with four sculpin. A suspected barrier was noted during the inventory, and both 0+ and 1+ steelhead were observed above site.

The inventory of Reach 3 and 4 consisted of spot checking areas around potential barriers. Above the 1940's dam at habitat unit #037 (Reach 3), both 0+ and 1+ steelhead were observed along with pacific giant salamanders. Above the log jam at habitat unit #041 (Reach 4), 0+, 1+, and 2+ steelhead were observed along with pacific giant salamanders. No fish were observed in the steep cascade upstream of the log jam in Reach 4.

During the habitat inventory, no salmonids were observed upstream of habitat unit #042 where a series of steep, boulder cascades appears to impede further passage. Resident rainbow trout were not observed above this site.

A summary of historical and recent data collected appears in the table below.

Table 1. Species Observed in Historical and Recent Surveys			
YEARS	**SPECIES**	**SOURCE**	**Native/Introduced**
1966, 1970, 1998	Steelhead	DFG	N
1998	Sculpin	DFG	N
1998	Sacramento Sucker	DFG	N
1998	Pacific Giant Salamander	DFG	N
1998	Longfin Smelt	DFG	N

Historical records reflect that there has been no known stocking, transfer, or rescue operations in Jenner Gulch.

ADULT SURVEYS:

In the March 1966 survey, it was noted that a resident of the area told the survey crew that king salmon had spawned in Jenner Gulch in past seasons, but the eggs failed to hatch due to the high temperature of the water. The spawning was said to have occurred in August.

During the March 1966 survey, one presumably complete log jam barrier was found in the upper-middle section of the stream. Also, there were three to four partial log jam barriers, one small concrete dam (2 feet high), and many complete and partial boulder barriers. The boulder barriers, however, were primarily in the steep, uninhabitable headwaters. No pollution or diversions were noted during the survey.

During the July 1970 survey, five complete log jams hampering salmonid migration were noted along with one incomplete, but potential jam. A 25' bedrock and boulder falls was also noted during the survey. A concrete diversion built in 1943 with a pump house to pump water from the stream to a residence was also noted. No pollution was observed during the survey.

No spawning/carcass survey was conducted in 1998/1999 due to inadequate staffing levels.

DISCUSSION

Jenner Gulch has four channel types: F4, F3, B2 and A2.

There are 1081 feet of F4 channel type in Reach 1. According to the DFG Salmonid Stream Habitat

Restoration Manual, F4 channel types are good for bank-placed boulders and fair for low-stage weirs, single and opposing wing-deflectors, channel constrictors and log cover.

There are 635 feet of F3 channel type in Reach 2. F3 channel types are good for bank-placed boulders as well as single and opposing wing-deflectors. They are fair for low-stage weirs, boulder clusters, channel constrictors and log cover.

There are 962 feel of B2 channel type in Reach 3. B2 channel types are excellent for low and medium-stage plunge weirs, single and opposing wing deflectors and bank cover.

Many site specific projects can be designed within B and F channel types, especially to increase pool frequency, volume and shelter.

There are 1424 feet of A2 channel type in Reach 4. The high energy, steep gradient A2 channel types have stable stream banks and poor gravel retention capabilities and are generally not suitable for instream enhancement structures.

The water temperatures recorded on the survey days July 6 - 15, 1996 ranged from 55°F to 60°F. Air temperatures ranged from 58°F to 70°F. The warmer water temperatures were recorded in Reach 1. This temperature regime is favorable to salmonids.

Pools comprised 38% of the total **length** of this survey. 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. In Jenner Gulch, the pools are relatively deep with 54% having a maximum depth of at least 2 feet. However, these pools comprised only 18% of the total length of stream habitat. In coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total habitat length.

The mean shelter rating for pools was 25. However, a pool shelter rating of approximately 80 is desirable. The relatively small amount of pool shelter that now exists is being provided primarily by boulders (46%), undercut banks (20%), root masses (13%), and white water (9%). Log and root wad cover in the pool and flatwater habitats would improve both summer and winter salmonid habitat. Log cover provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

One of the three low gradient riffles measured (33%) had either gravel or small cobble as the dominant substrate. The majority of the riffles were comprised of larger substrates which are characteristic of this stream.

Sixty-one percent of the pool tail-outs measured had embeddedness ratings of either 3 or 4. Only 17% had a rating of 1. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered best for the needs of salmonids. In a reach comparison, Reach 3 had the best ratings and Reach 1 and 4 had the poorest ratings. However, it should be noted that the dominant substrate in Reach 3 and Reach 4 is boulders, which are generally considered unsuitable for spawning due to the size of

the substrate.

The higher the percent of fine sediment, the lower the probability that eggs will survive to hatch. This is due to the reduced quantity of oxygenated water able to percolate through the gravel, or because of fine sediment capping the redd and preventing fry emergence. In Jenner Gulch, upslope sediment sources should be mapped and rated according to their potential sediment yields, and control measures taken.

The mean percent canopy for the survey was 75%. This is good, since 80 percent is generally considered desirable. However, Reach 1 had a canopy of only 55% with some bank erosion problems. This reach could benefit from bio-technical re-vegetation techniques using native species.

SUMMARY

Biological surveys were conducted to document fish distribution and are not necessarily representative of population information. Steelhead were documented consistently during each past survey year and coho not at all. Stream habitat conditions are suitable for coho rearing although no coho have been observed during the limited observations made over the years. This is likely because of the steeper gradient of this stream which makes passage by salmon difficult, or coho were absent in some years or present only in small numbers. Overall, very few numbers were observed during the past surveys. The 1998 summer surveys documented 0+ fish indicating successful spawning in the lower and middle reaches of Jenner Gulch. Fish (1+) were observed indicating good rearing conditions and holding-over conditions in general. Habitat conditions upstream of our survey reach are suitable although unpassable due to the boulder falls. Based on conditions documented in 1958, overall habitat conditions for both steelhead and coho have improved over time.

The best spawning habitat in the watershed exists within the lower portions of the creek. The best rearing habitat in the watershed exists within the middle and upper portions of the creek. In Reach 1 spawning and rearing habitat quality is low due to the effects of eroding stream banks, lack of riparian habitat, and increased temperatures. It is believed that sediment transported downstream from upslope sources in the winter impacts high quality spawning gravel downstream.

Upstream of Reach 1 conditions are better, and rearing habitat exists, canopy shading is higher, although instream shelter is still lacking. Fewer areas exist for spawning where the natural substrate is large and the gradient is steep.

GENERAL MANAGEMENT RECOMMENDATIONS

Jenner Gulch should be managed as an anadromous, natural production stream.

Recent winter storms brought down many large trees and other woody debris into the stream, which increased the number and quality of pools since the drought years. This woody debris, if left undisturbed, will provide fish shelter and rearing habitat, and offset channel incision. Landowners should be sensitive about the natural and positive role woody debris

plays in the system, and encouraged not to remove woody debris from the stream, except under extreme buildup and only under guidance by a fishery professional.

PRIORITY FISHERY ENHANCEMENT OPPORTUNITIES

1) In Jenner Gulch, active and potential sediment sources related to the road system need to be mapped, and treated according to their potential for sediment yield to the stream and its tributaries.

2) Map sources of upslope and in-channel 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. Near-stream riparian planting along any portion of the stream should be encouraged to provide bank stability and a buffering against agricultural, grazing and urban runoff.

3) Increase the canopy on Jenner Gulch by planting willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels (portions of Reach 1). The reach above the survey section should be assessed for planting and treated as well, since water temperatures throughout are effected from upstream. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.

4) Reach 1 and several of the slides would benefit from the utilizing bio-technical vegetative techniques to re-establish floodplain benches and a defined low flow channel. This would discourage lateral migration of the base flow channel and decrease bank erosion.

5) Where feasible, increase woody cover in the pool and flatwater habitat units along the entire stream. Most of the existing shelter is from vegetation and undercut banks. Adding high quality complexity with larger woody cover is desirable. Combination cover/scour structures constructed with boulders and woody debris would be effective in many flatwater and pool locations in the upper reaches. In many areas the material is at hand.

PROBLEM SITES AND LANDMARKS - JENNER GULCH SURVEY COMMENTS

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

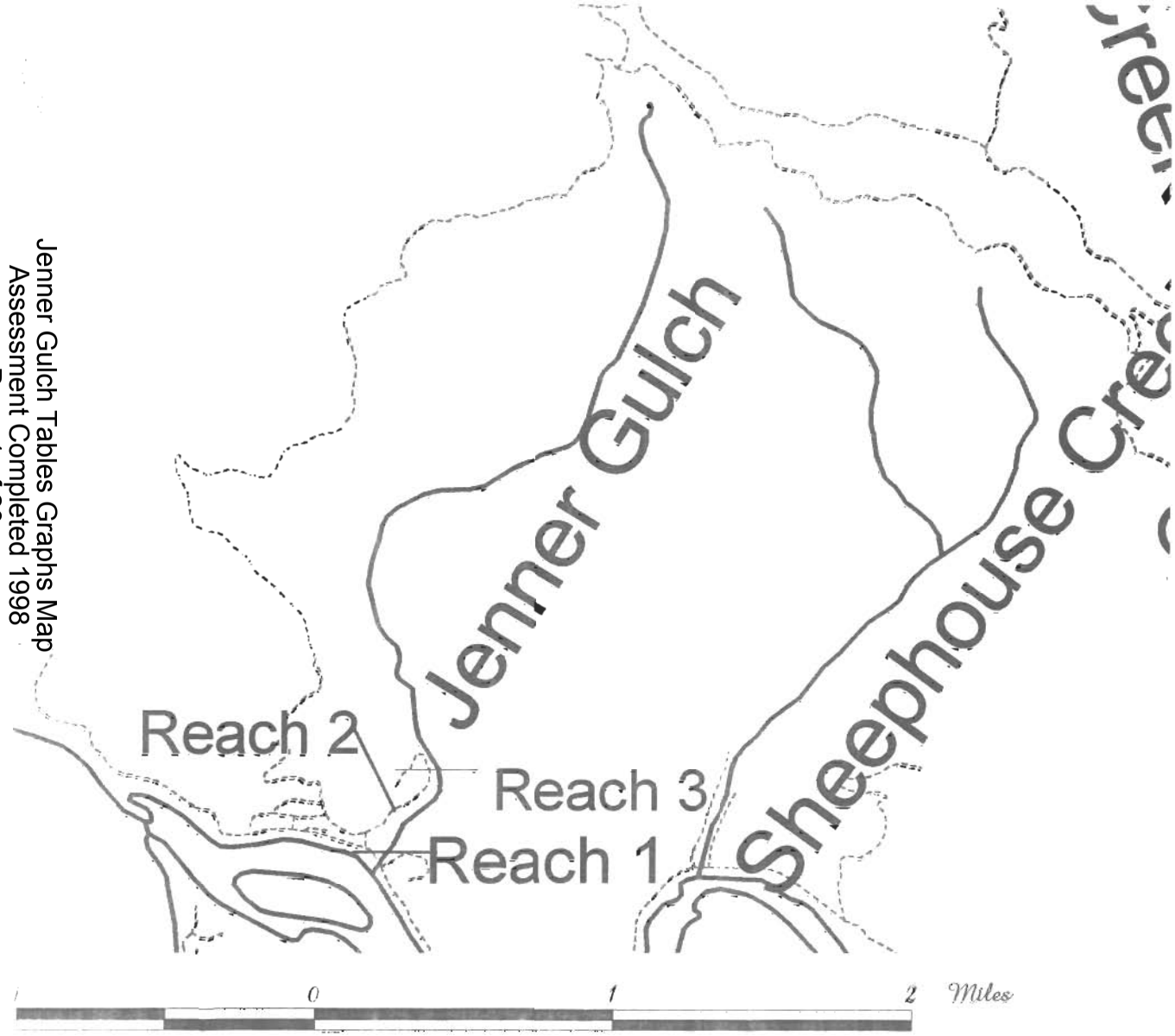
	Habitat Unit #	Stream Length (ft.)	Comments
Reach 1	1.00	85	Mouth backflow from RR lots of algae. Rip-rap, *Arundo*, cape ivy, and pampas Grass.
	2.00	158	Culvert #1. Lots of algae.
	3.00	211	first 26' of riffle totally covered by debris and re-rooting willow.

	4.00	311	Algae covers 100% of substrate.
	5.00	359	12 SHD (2-4")
	6.00	412	Bridge #1 concrete blocks RB
	7.00	443	Water diversion pipe. Algae
	9.00	583	LWD=board
	11.00	736	Lawn RB
	13.00	1047	YOY (6) Pumping hose, RB
Reach 2	15.00	1170	New channel type=F3
	16.00	1218	Generally quite a lot of green algae in creek.
	19.00	1333	Many old growth alders but no other recruitment wood or large trees of any kind.
	21.00	1398	Nice pool=good habitat. Small trib LB
	25.00	1554	steep 4' bedrock fall (vertical)
Reach 3	28.00	1701	Possible channel change F3-B2
	29.00	1867	Small trib LB
	30.00	1896	Large log jam at LB, only partially in wetted channel
	33.00	2041	Landslide LB 60'L X 25'H X 10'D
	34.00	2086	Several landslides in a row in this unit, LB: 25'w X 30'l
	36.00	2327	Unit ends at pool caused by 1940's dam. Lots of pampas grass, LB
	37.00	2344	Dam from 40's at top of pool. Wet slope, LB entering pool.
	38.10	2372	Wet trib., LB side channel. Redwood trees in middle of channel.
	39.00	2602	diversion pipes
Reach 4	41.00	2718	Log jam 41' to 71',
	45.00	2868	7' cascade
	49.00	3256	PGS juv. 145' into unit is a 20' series of falls no fish above here
	50.00	3406	Wet trib LB no fish access
	51.00	4056	End of survey due to extreme gradient and mass obstructions

Continues over a 650' span. Flattens somewhat above the falls. No fish observed above falls.

END of SURVEY

Jenner Gulch Habitat Inventory



Streams
Roads

N
W
E
S

Jenner Gulch

Drainage: Russian River

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

Survey Dates: 07/06/98 to 07/15/98

Confluence Location: QUAD: DUNCAN MILLS LEGAL DESCRIPTION: T7NR11WS18 LATITUDE: 38°26'56" LONGITUDE: 123°6'49"

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
1	0		2	46	46	1	10.0	1.4	391	391	547	547	0	20
20	3	RIFFLE	37	105	2107	49	11.9	0.6	586	11712	404	8083	0	45
4	1	FLATWATER	7	112	446	10	8.5	0.6	620	2479	383	1532	0	30
28	10	POOL	52	59	1641	38	10.2	1.0	502	14052	474	13263	310	25
1	0	DRY	2	86	86	2	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.)
54	14	4326	28633	23426

Jenner Gulch — Drainage: Russian River

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS — Survey Dates: 07/06/98 to 07/15/98

Confluence Location: QUAD: DUNCAN MILLS LEGAL DESCRIPTION: T7NR11WS18 LATITUDE: 38°26'56" LONGITUDE: 123°6'49"

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 %
1	0		2	46	46	1	10	1.4	3.2	391	391	547	547	0	20	0
12	1	LGR	22	71	853	20	13	0.5	1.8	570	6841	261	3133	0	30	77
1	0	HGR	2	45	45	1	20	0.4	1.0	360	360	144	144	0	0	70
7	2	CAS	13	173	1209	28	8	0.8	1.8	676	4734	634	4438	0	53	84
1	0	POW	2	138	138	3	5	0.7	1.2	587	587	411	411	0	0	70
1	0	GLD	2	73	73	2	8	0.1	0.2	584	584	58	58	0	0	0
2	1	SRN	4	118	235	5	11	0.7	2.1	654	1308	532	1063	0	30	63
7	3	MCP	13	34	241	6	12	1.0	3.0	405	2837	390	2729	152	7	63
9	2	STP	17	104	939	22	10	0.7	3.7	795	7158	598	5379	442	28	88
4	2	LSR	7	50	201	5	10	0.9	2.7	522	2088	479	1914	358	20	58
2	2	LSBk	4	40	79	2	8	1.9	2.7	328	657	639	1278	556	35	98
4	0	PLP	7	22	88	2	11	1.6	3.0	237	946	390	1559	250	39	68
1	0	SCP	2	65	65	2	4	0.8	0.8	260	260	208	208	0	0	0
1	1	DPL	2	28	28	1	15	0.8	1.6	399	399	319	319	160	15	80
1	0	DRY	2	86	86	2	0	0.0	0.0	0	0	0	0	0	0	75

TOTAL UNITS	TOTAL UNITS	LENGTH (ft.)	AREA (sq.ft)	TOTAL VOL. (cu.ft)
54	14	4326	29150	23182

Jenner Gulch Tables Graphs Map
Assessment Completed 1998
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Jenner Gulch

Drainage: Russian River

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 07/06/98 to 07/15/98

Confluence Location: QUAD: DUNCAN MILLS LEGAL DESCRIPTION: T7NR11WS18 LATITUDE: 38°26'56" LONGITUDE: 123°6'49"

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
1	0		3	46	46	3	10.0	1.4	391	391	547	547	0	20
16	5	MAIN	55	74	1180	70	10.6	0.8	613	9813	501	8012	284	21
10	4	SCOUR	34	37	368	22	9.7	1.4	369	3691	475	4752	354	31
2	1	BACKWATER	7	47	93	6	9.5	0.8	330	659	264	527	160	15

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq.ft.)	TOTAL VOL. (cu.ft.)
29	10	1687	14554	13838

Jenner Gulch

Drainage: Russian River

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

Survey Dates: 07/06/98 to 07/15/98

Confluence Location: QUAD: DUNCAN MILLS LEGAL DESCRIPTION: T7NR11WS18 LATITUDE: 38°26'56" LONGITUDE: 123°6'49"

UNITS MAX DPTH 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
1		3	0	0	0	0	0	0	1	100	0	0
7	MCP	24	0	0	1	14	5	71	1	14	0	0
8	STP	28	0	0	6	75	1	13	1	13	0	0
4	LSR	14	0	0	2	50	2	50	0	0	0	0
2	LSBk	7	0	0	0	0	2	100	0	0	0	0
4	PLP	14	0	0	1	25	1	25	2	50	0	0
1	SCP	3	1	100	0	0	0	0	0	0	0	0
1	DPL	3	0	0	1	100	0	0	0	0	0	0

TOTAL UNITS 28

Jenner Gulch

Drainage: Russian River

Table 5 - Summary of Shelter by Habitat Type

Survey Dates: 07/06/98 to 07/15/98

Confluence Location: QUAD: DUNCAN MILLS LEGAL DESCRIPTION: T7NR11WS18 LATITUDE: 38°26'56" LONGITUDE: 123°6'49"

UNITS MEASURED	UNITS SHELTER MEASURED	HABITAT TYPE	% TOTAL UNDERCUT BANKS	% TOTAL SWD	% TOTAL LWD	% TOTAL ROOT MASS	% TOTAL TERR. VEGETATION	% TOTAL AQUATIC VEGETATION	% TOTAL WHITE WATER	% TOTAL BOULDERS	% TOTAL BEDROCK LEDGES
1	1		0	0	5	0	0	0	0	95	0
12	1	LGR	10	0	0	0	0	0	0	90	0
1	0	HGR	0	0	0	0	0	0	0	0	0
7	2	CAS	0	20	32	0	0	0	0	48	0
1	0	POW	0	0	0	0	0	0	0	0	0
1	0	GLD	0	0	0	0	0	0	0	0	0
2	1	SRN	0	0	0	0	0	0	0	100	0
7	4	MCP	0	0	35	0	0	0	0	63	2
9	9	STP	22	0	0	16	0	0	10	53	0
4	4	LSR	36	30	6	17	11	0	0	0	0
2	2	LSBk	1	0	26	0	0	0	0	5	68
4	4	PLP	11	0	0	0	0	0	22	67	0
1	0	SCP	0	0	0	0	0	0	0	0	0
1	1	DPL	33	0	7	33	13	0	0	13	0
1	0	DRY	0	0	0	0	0	0	0	0	0
54	29		12	8	11	7	1	0	5	54	2
28	24		20	3	3	13	1	0	9	46	4

All HABITAT TYPES

POOLS ONLY

Jenner Gulch

Drainage: Russian River

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE

Survey Dates: 07/06/98 to 07/15/98

Confluence Location: QUAD: DUNCAN MILLS LEGAL DESCRIPTION: T7NR11WS18 LATITUDE: 38°26'56" LONGITUDE: 123°6'49"

TOTAL HABITAT UNITS	UNITS SUBSTRATE 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
1	1		0	0	0	0	0	100	0
3	3	LGR	0	33	0	33	0	33	0
1	1	HGR	0	0	0	0	0	100	0
3	3	CAS	0	33	0	0	0	67	0
1	1	POW	0	0	100	0	0	0	0
0	0	GLD	0	0	0	0	0	0	0
2	2	SRN	0	0	0	50	0	50	0
5	5	MCP	0	60	0	0	0	40	0
6	6	STP	17	17	17	0	33	17	0
4	4	LSR	0	75	25	0	0	0	0
2	2	LSBk	0	50	50	0	0	0	0
3	3	PLP	0	33	0	33	33	0	0
0	0	SCP	0	0	0	0	0	0	0
1	1	DPL	100	0	0	0	0	0	0
1	1	DRY	0	0	0	0	0	100	0

Jenner Gulch

APPENDIX A. Summary of Mean Percent Vegetative Cover for Entire Stream

Mean Percent Canopy	Mean Percent Evergreen	Mean Percent Deciduous	Mean Right bank % Cover	Mean Left Bank % Cover
74.88	29.84	70.16	69.81	75.77

APPENDIX B.

Mean Percentage of Dominant Substrate

Dominant Class of Substrate	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Bedrock	6	6	23.08
Boulder	10	4	26.92
Cobble/Gravel	5	6	21.15
Silt/clay	5	10	28.85

Mean Percentage of Dominant Vegetation

Dominant Class of Vegetation	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Grass	7	5	23.08
Brush	8	7	28.85
Deciduous Trees	8	9	32.69
Evergreen Trees	3	5	15.38
No Vegetation	0	0	0

APPENDIX C. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: Jenner Gulch
SAMPLE DATES: 07/06/98 to 07/15/98
SURVEY LENGTH:
MAIN CHANNEL: 4102 ft. SIDE CHANNEL: 270 ft.
LOCATION OF STREAM MOUTH:
USGS Quad Map: DUNCAN MILLS Latitude: 38°26'56"
Legal Description: T7NR11WS18 Longitude: 123°6'49"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 1 (Units 1-14)

Channel Type: F4	Mean Canopy Density: 55%
Main Channel Length: 1081 ft.	Evergreen Component: 8%
Side Channel Length: 0 ft.	Deciduous Component: 93%
Riffle/Flatwater Mean Width: 7.5 ft.	Pools by Stream Length: 31%
Pool Mean Depth: 1.0 ft.	Pools >=2 ft. Deep: 67%
Base Flow: 0.4 cfs	Pools >=3 ft. Deep: 0%
Water: 58-60°F Air: 58-62°F	Mean Pool Shelter Rtn: 13
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Large Woody Debris
Bank Vegetative Cover: 85%	Occurrence of LOD: 60%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 0 ft.

Embeddness Value: 1. 0% 2. 20% 3. 40% 4. 40% 5. 0%

STREAM REACH 2 (Units 15-27)

Channel Type: F3	Mean Canopy Density: 82%
Main Channel Length: 635 ft.	Evergreen Component: 2%
Side Channel Length: 111 ft.	Deciduous Component: 98%
Riffle/Flatwater Mean Width: 8.0 ft.	Pools by Stream Length: 53%
Pool Mean Depth: 1.2 ft.	Pools >=2 ft. Deep: 50%
Base Flow: 0.4 cfs	Pools >=3 ft. Deep: 13%
Water: 58-60°F Air: 60-63°F	Mean Pool Shelter Rtn: 31
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 60%	Occurrence of LOD: 38%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 0 ft.

Embeddness Value: 1. 20% 2. 20% 3. 60% 4. 0% 5. 0%

STREAM REACH 3 (Units 28-40)

Channel Type: B2	Mean Canopy Density: 85%
Main Channel Length: 962 ft.	Evergreen Component: 36%
Side Channel Length: 73 ft.	Deciduous Component: 64%
Riffle/Flatwater Mean Width: 15.7 ft.	Pools by Stream Length: 77%
Pool Mean Depth: 1.0 ft.	Pools >=2 ft. Deep: 38%
Base Flow: 0.4 cfs	Pools >=3 ft. Deep: 25%
Water: 55-58°F Air: 58-68°F	Mean Pool Shelter Rtn: 28
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 76%	Occurrence of LOD: 28%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 0 ft.

Embeddness Value: 1. 33% 2. 22% 3. 33% 4. 11% 5. 0%

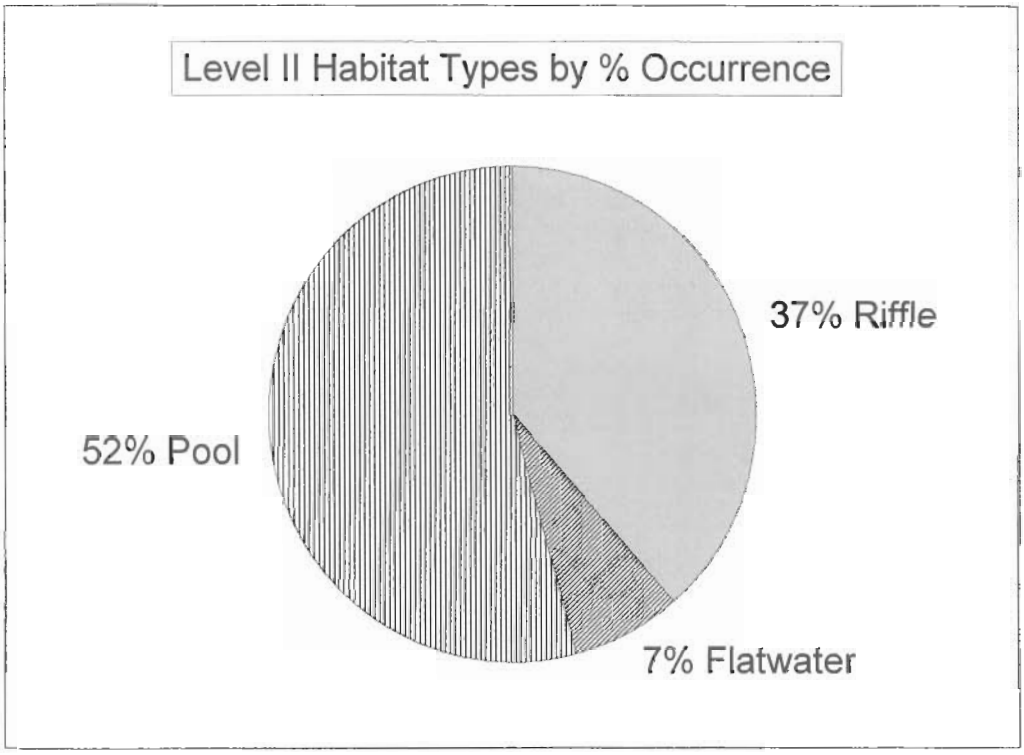
STREAM REACH 4 (Units 41-51)

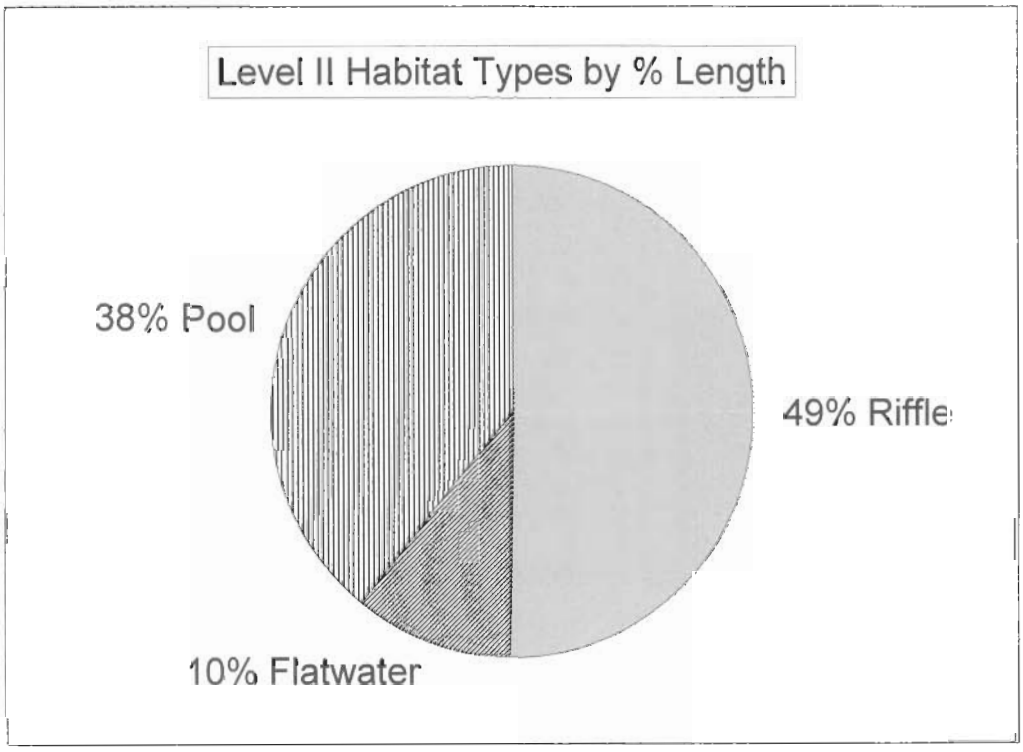
Channel Type: A2	Mean Canopy Density: 77%
Main Channel Length: 1424 ft.	Evergreen Component: 85%
Side Channel Length: 86 ft.	Deciduous Component: 15%
Riffle/Flatwater Mean Width: 11.3 ft.	Pools by Stream Length: 7%
Pool Mean Depth: 1.0 ft.	Pools >=2 ft. Deep: 100%
Base Flow: 0.4 cfs	Pools >=3 ft. Deep: 25%
Water: 58-60°F Air: 68-70°F	Mean Pool Shelter Rtn: 20
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 70%	Occurrence of LOD: 43%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 0 ft.

Embeddness Value: 1. 0% 2. 0% 3. 75% 4. 0% 5. 25%

Jenner Gulch

Level II Habitat Types

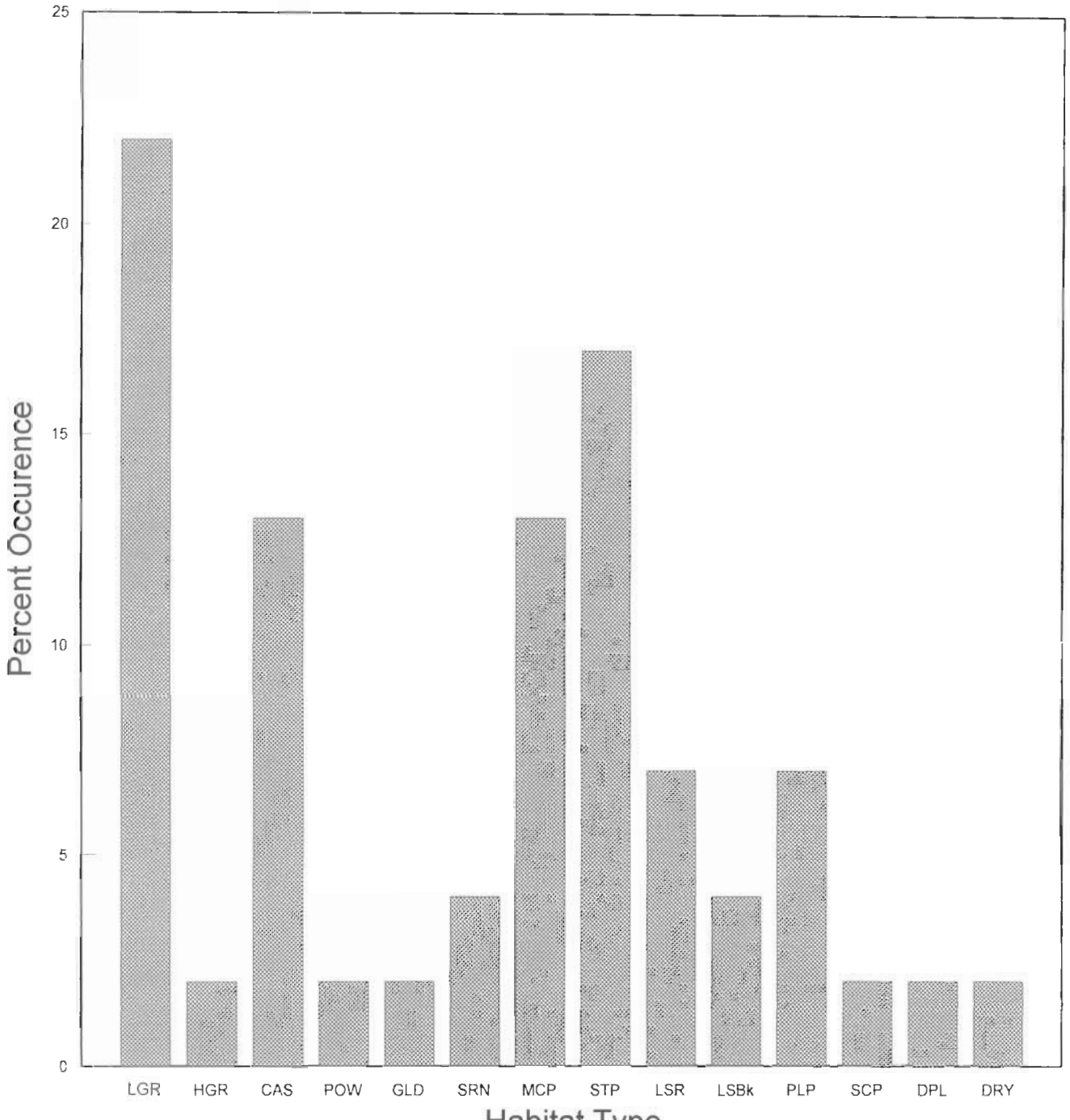




Graph 1

Jenner Gulch

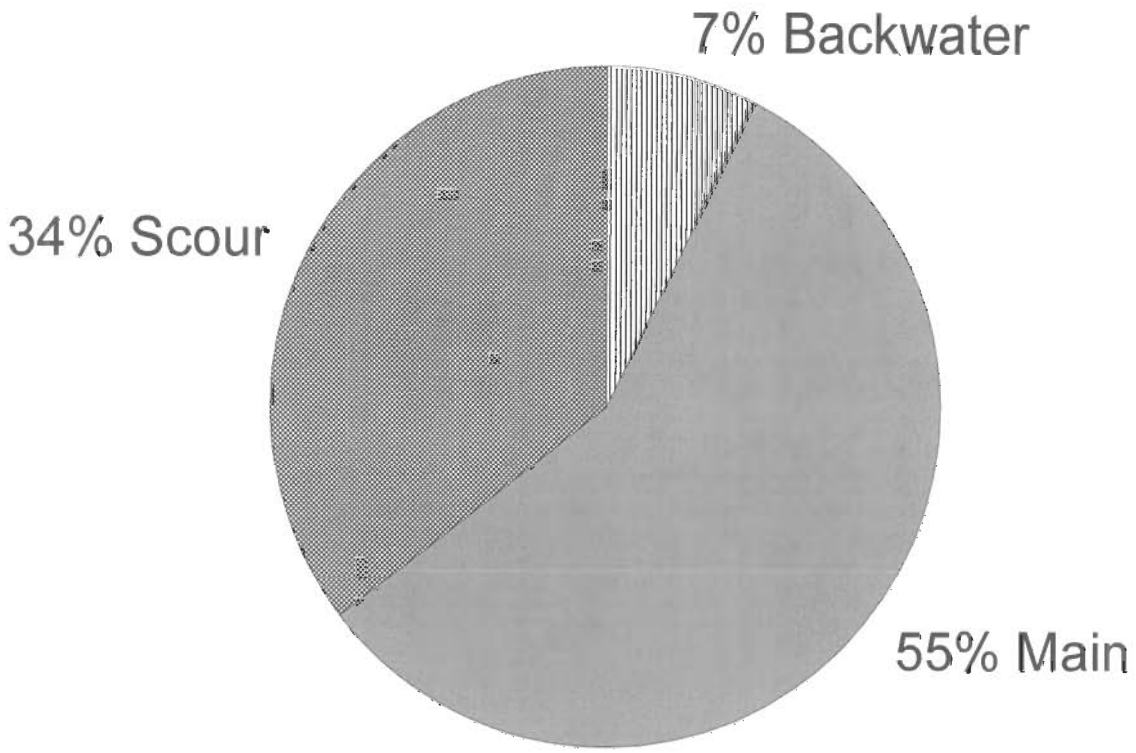
Level IV Habitat Types by % Occurrence



Graph 2

Jenner Gulch

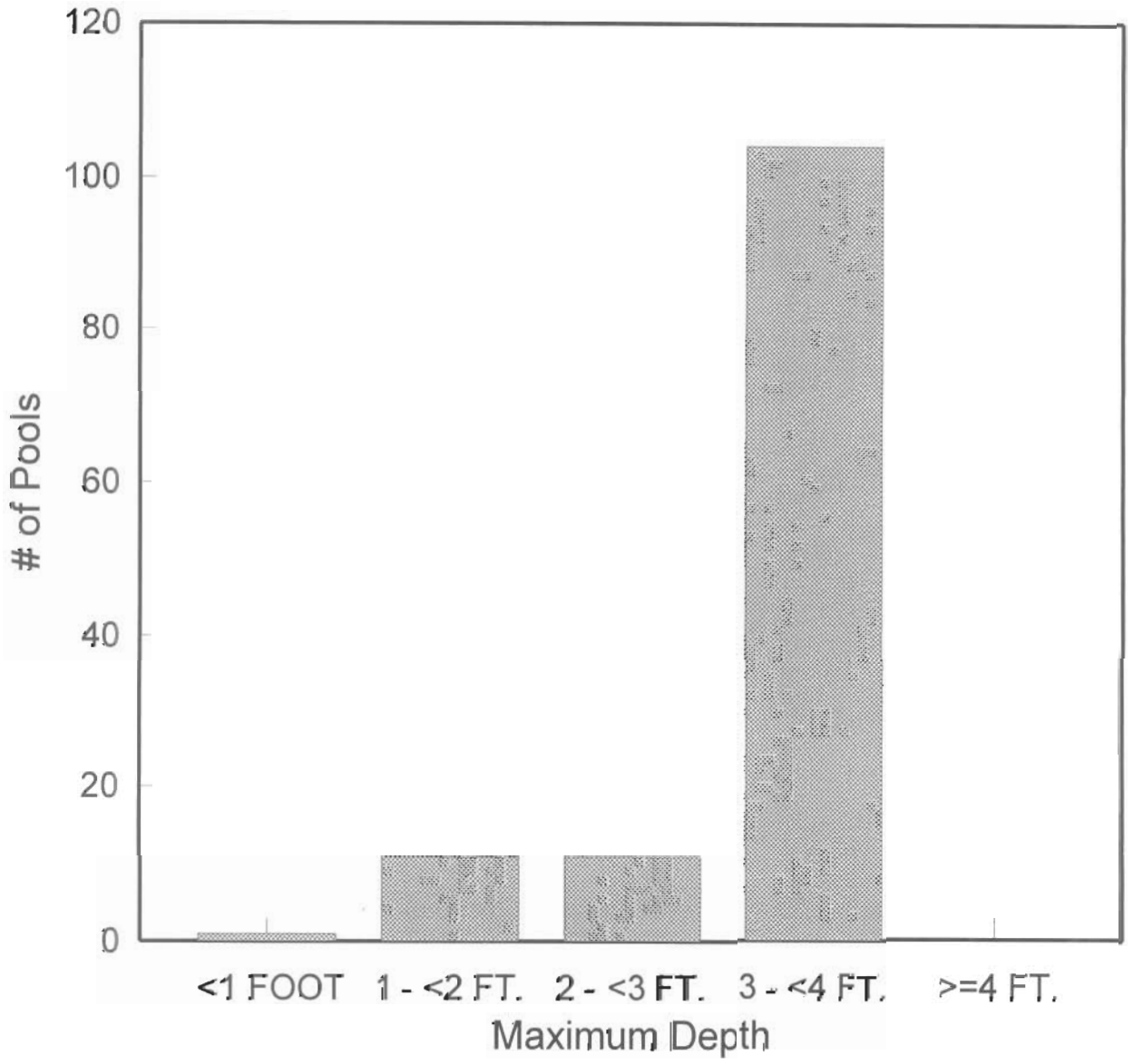
Pool Habitat Types by % Occurrence



Graph 3

Jenner Gulch

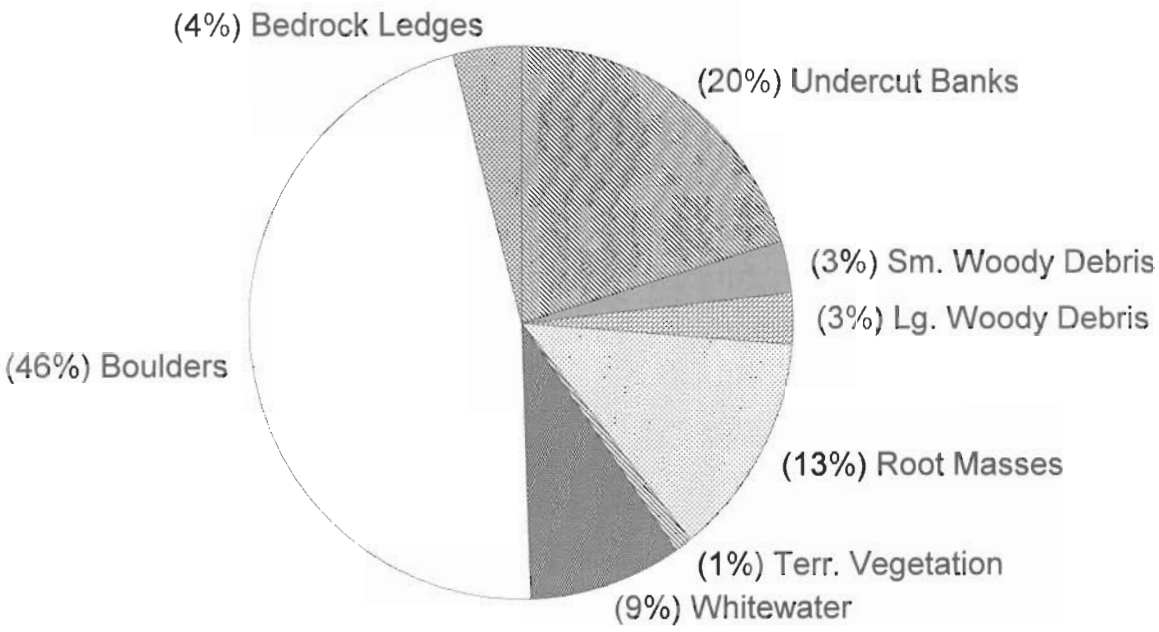
Maximum Depth in Pools



Graph 4

Jenner Gulch

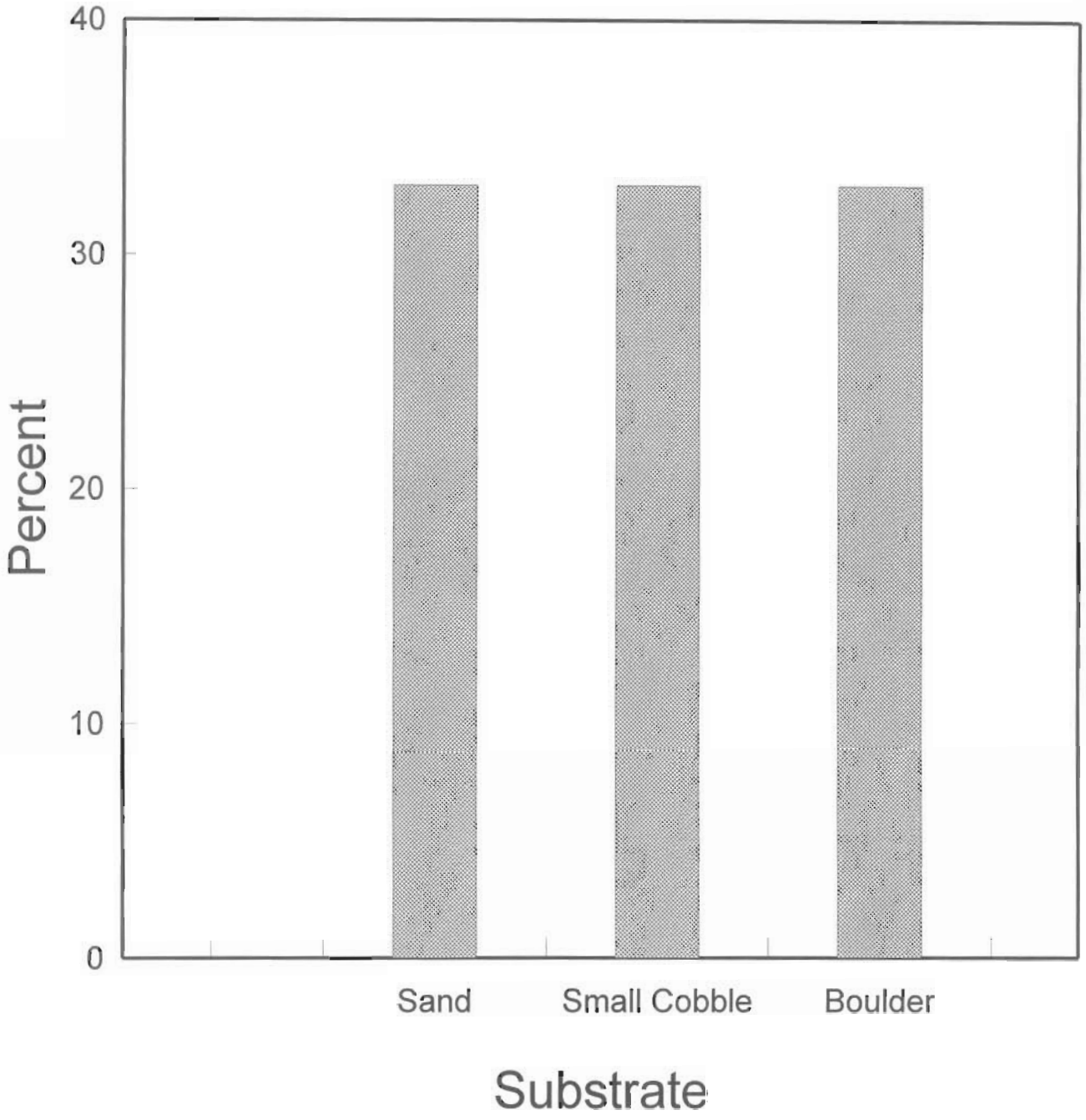
Pool Shelter Types by % Area



Graph 5

Jenner Gulch

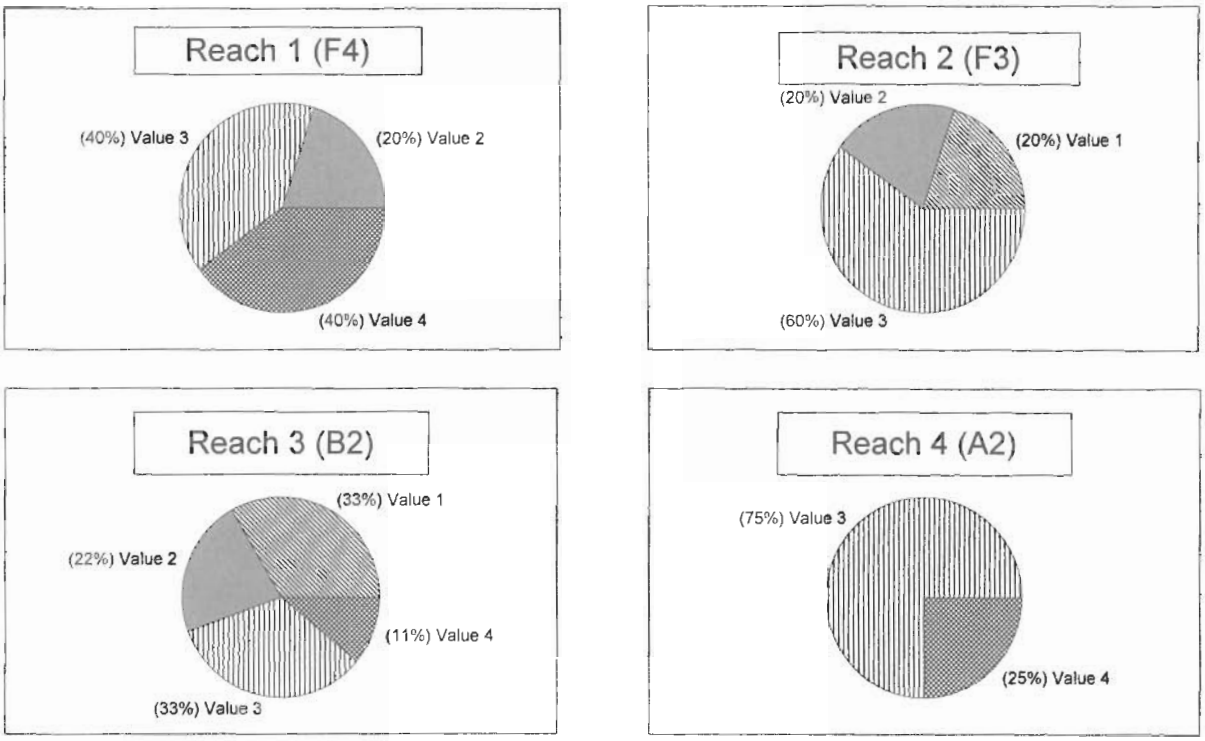
Substrate Composition in Low Gradient Riffles



Graph 6

Jenner Gulch

Percent Cobble Embeddedness by Reach

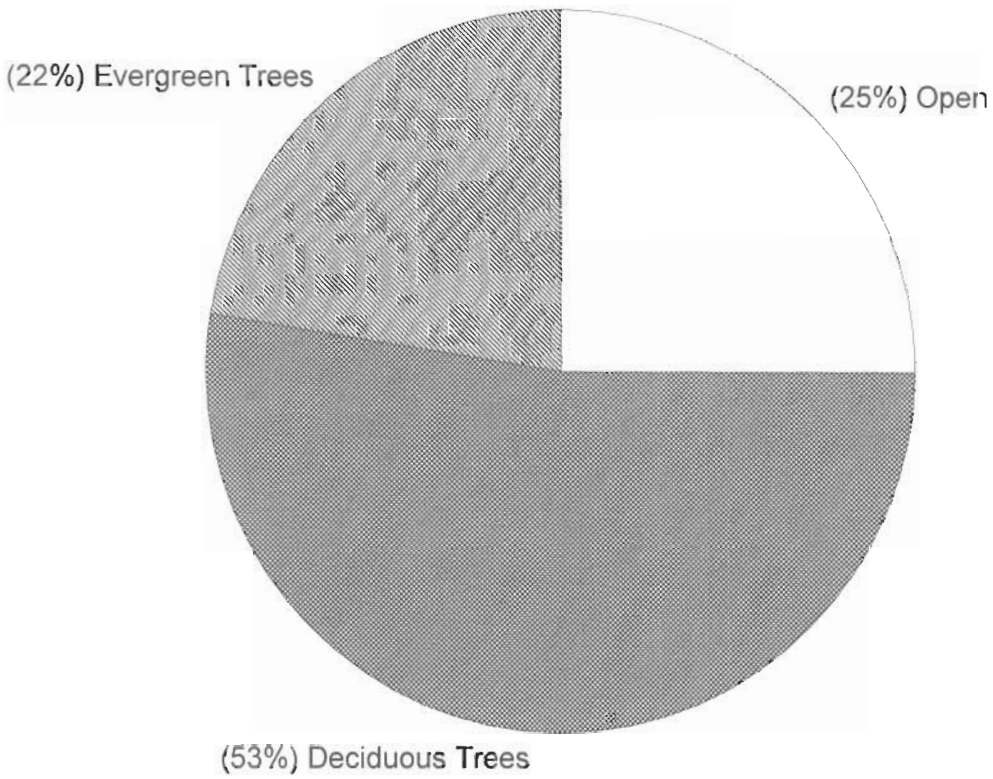


Value 1 = <25% Value 2 = 25-50% Value 3 = 51-75% Value 4 = >76%

Graph 7

Jenner Gulch

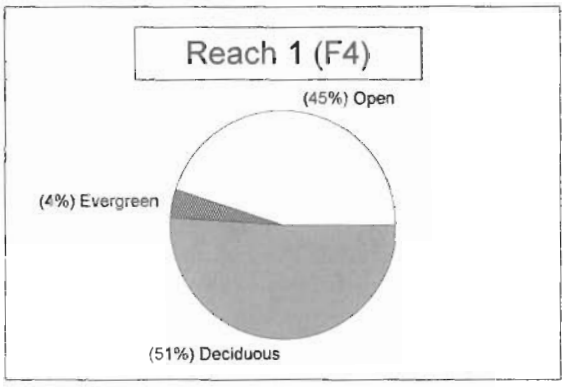
Mean Percent Canopy

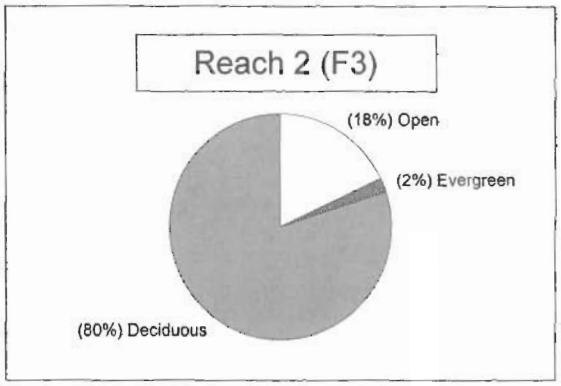


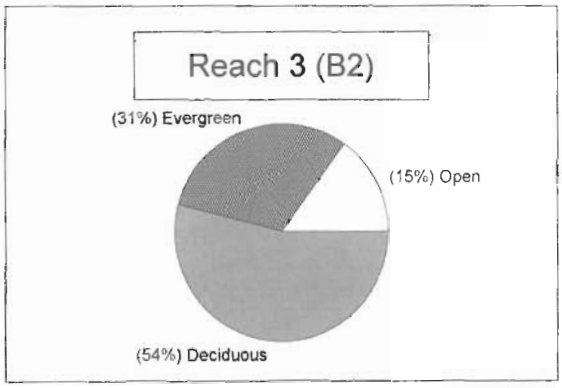
Graph 8

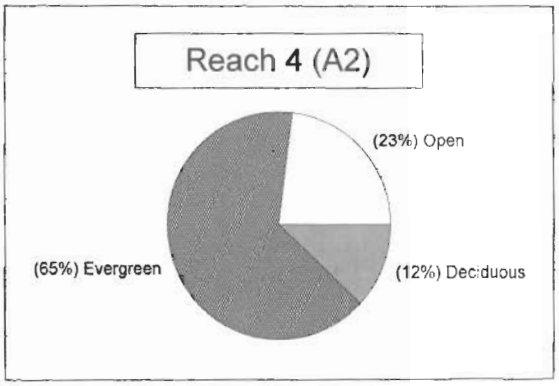
Jenner Gulch

Percent Canopy By Reach





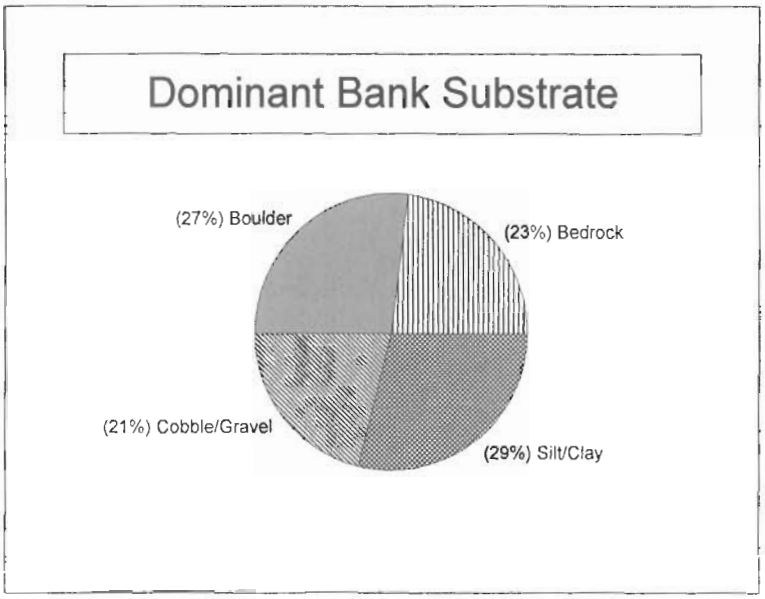


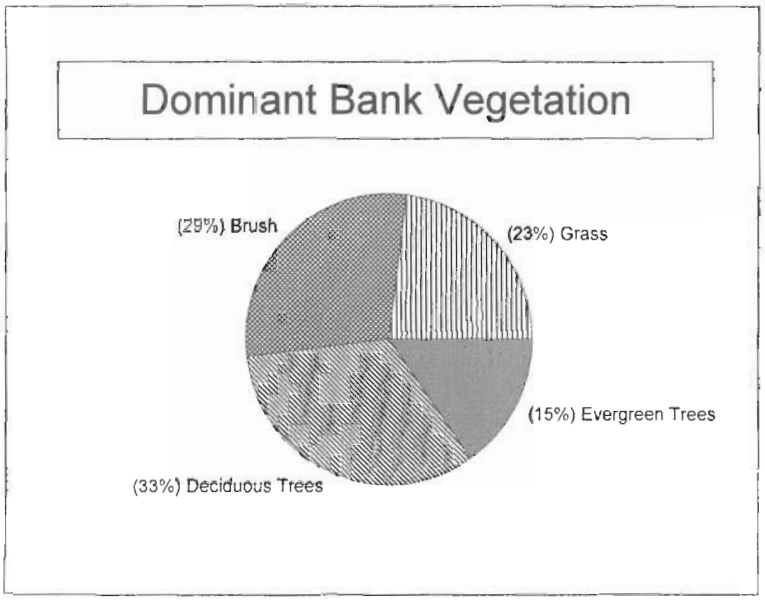


Graph 9

Jenner Gulch

Percent Bank Composition





Graph 10