

STREAM INVENTORY REPORT

Russian Gulch

INTRODUCTION

A California Department of Fish and Game (DFG) stream fisheries inventory was conducted in summer 1999 on Russian Gulch. 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; the objective of the biological inventory was to document the presence and distribution of juvenile salmonid species. This report presents the inventory results and recommends options for potential habitat improvements for coho salmon and steelhead trout. The recommendations are based on target habitat values suitable for salmonids in California's north coast streams.

Russian Gulch was surveyed in May 1940 by California Division of Fish and Game biologist Leo Shapovalov (California Division of Fish and Game, 1940). The report described Russian Gulch as having “good” spawning areas, pools, and shelter, with juvenile coho salmon and steelhead common in the lower reaches.

An August 1965 stream survey by DFG (California Department of Fish and Game, 1965) described Russian Gulch as 2.1 miles of spawning and nursery habitat for steelhead trout and coho salmon. Fine sediments in the stream bottom were estimated at 10% sand (estimates likely made by eye). The report described ongoing efforts to clear the stream to prevent road washouts. Cover was provided by roots, undercut banks, and boulders. Juvenile steelhead abundance was estimated at 50 per 100 feet of stream, and juvenile coho at 30 per 100 feet (estimates likely made by eye and by netting).

In October 1988, a DFG electrofishing survey of two locations in Russian Gulch found coho densities of 0.21 and 0.83 fish per square meter, and steelhead densities of 0.08 and 0.14 fish per square meter (California Department of Fish and Game, Unpublished data).

WATERSHED OVERVIEW

Russian Gulch, located in Mendocino County, California, is tributary to the Pacific Ocean (Map 1). Russian Gulch's legal description at the confluence with the Pacific Ocean is T17N R17W S18. Its mouth is located at 39°19'43” north latitude and 123°48'13” west longitude. Russian Gulch is a first order stream and has approximately 6.4 miles of blue line stream according to the USGS Mendocino and Mathison Peak 7.5 minute quadrangle maps. Russian Gulch drains a watershed of approximately 4.0 square miles. Elevations range from about 0 feet at the mouth to 600 feet in the headwater areas. Mixed coniferous forest dominates the watershed. About half the watershed is within Russian Gulch State Park, managed mainly for recreation, and about half is within Jackson Demonstration State Forest, managed for timber production, research, and recreation. Vehicle access exists via Hwy 1, and through the Russian Gulch State Park beach parking lot.

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METHODS

The stream inventory followed the methodology presented in detail in the *California Salmonid Stream Habitat Restoration Manual* (Flosi *et al.*, 1998). The following summarizes the methods.

HABITAT INVENTORY COMPONENTS

The standardized habitat inventory has nine components:

1. Flow:

Flow is measured in cubic feet per second (cfs), usually at the bottom of the stream reach surveyed, using standard flow measuring equipment, if available.

2. Channel Type:

As 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 taken in degrees Fahrenheit at the middle of the habitat unit, within one foot of the water surface. Generally, stream temperatures should not exceed 60 F for coho salmon, and 70 F for steelhead.

4. Habitat Unit Type and Dimensions:

Habitat units are numbered sequentially and assigned a habitat type selected from a standard list of 24 habitat types (Appendix 1). Dewatered units are labeled "dry". The length of a described habitat unit must be equal to or greater than the stream's mean wetted width. Habitat unit dimensions of mean length, mean width, mean depth, and maximum depth are measured. In pool units, maximum depth at the pool tail crest is also measured. Measurements are taken to the nearest 1/10 foot using hip chains, measuring tapes, or stadia rods.

5. 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 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. A standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) is assigned according to the complexity of the cover. Thus

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shelter rating can range from 0-300. A minimum shelter value of 100 is desirable for quality salmonid habitat.

6. Substrate Composition:

Substrate composition ranges from silt/clay sized particles to boulders and bedrock elements. Dominant and sub-dominant substrate elements in the habitat unit are estimated by eye using a list of seven size classes. In addition, the dominant substrate composing the pool tail outs is recorded in pool habitat units.

7. Embeddedness:

Embeddedness is defined as the percent of a cobble that is surrounded or buried by fine sediment. The values are 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 is assigned to substrates deemed unsuitable for spawning due to inappropriate substrate particle size (e.g. bedrock) or other considerations. On this scale, a value of 1 indicates the highest quality of spawning substrate and a value of 5 indicates the tail crest is not suitable for spawning. Embeddedness, estimated by eye, is taken in pool habitat units at the pool tail crest.

8. Streambank Substrate and Vegetation:

Streambank substrate ranges from bedrock to silt/clay/sand, and may be covered with vegetation that indicates and enhances streambank stability. The dominant substrate type and the dominant vegetation type of both the right and left banks of the habitat unit are estimated by eye and recorded. Additionally, the percent of each bank covered by vegetation is estimated by eye and recorded.

9. Canopy:

Canopy density relates to the amount of stream shaded from the sun. Percentage canopy is measured using a handheld spherical densiometer. In addition, the area of canopy is estimated by eye into percentages of coniferous and deciduous trees. Generally, a minimum of 80% canopy is desired to prevent excessively high stream temperatures, especially over streams not in the coastal fog belt.

SAMPLING PROCEDURE

The samplers proceed in the upstream direction. Channel type is determined at the lower end, and again at upstream locations where channel shape changes significantly. Air temperature and water temperature are recorded at every tenth habitat unit (the first unit on each field form page). At a minimum, all habitat units encountered are classified according to habitat type and measured for length. The first time a particular habitat type is encountered in the survey, it is fully sampled for components 4 through 9 above. Additionally, from the ten habitat units on each field form page, one is randomly selected for full sampling. All pool units are surveyed for maximum depth, pool tail crest depth, pool tail crest dominant substrate type, and pool tail crest

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substrate embeddedness. Canopy density is recorded for every third unit, in addition to every fully sampled unit. The survey ends where the samplers determine anadromous salmonid habitat ends.

BIOLOGICAL INVENTORY

Biological sampling during the stream inventory is used to determine fish species and their distribution in the stream. Fish presence is observed from the stream banks during the habitat inventory survey. Additionally, selected sites are sampled using a Smith-Root Model 12-B electrofisher. The sampling techniques are described 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, DFG. This program processes and summarizes the data, and produces the following standard tables:

- Summary of riffle, flatwater, and pool habitat types
- Summary of habitat types and measured parameters
- Summary of pool types
- Summary of maximum pool depths by pool habitat types
- Summary of mean percent cover by habitat type
- Summary of dominant substrates by habitat type
- Summary of mean percent vegetative cover for entire stream
- Fish habitat inventory data summary
- Summary of streambank substrate and vegetation, and pool tail crest cobble embeddedness
- Mean percent of shelter cover types for entire stream

Graphics are produced from the tables using a spreadsheet program. Standard graphics are:

- 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 pool tail crests
- Percent canopy
- Bank composition by composition type
- Bank vegetation by vegetation type

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Standard tables and graphics are selected for inclusion in the stream inventory report based on their importance to the particular stream.

HABITAT INVENTORY RESULTS

Adrienne Carr and Jennifer Jenkins, AmeriCorps Watershed Stewards Project (WSP) members trained in the habitat inventory methods by DFG, conducted the habitat inventory field survey during June 8, 9, 10, and 30, 1999. The total length of stream surveyed was 16,415 feet with an additional 33 feet of side channel.

Flows were not measured in Russian Gulch.

Russian Gulch was classified as channel type B4 for the entire stream reach surveyed. B4 channels are moderately entrenched, of moderate gradient (2-4%), dominated by riffles, with mainly gravel substrate.

Based on frequency of occurrence of Level II habitat types there were 17% riffle units, 42% flatwater units, and 41% pool units (Table 1, Graph 1). Based on total length of Level II habitat types there were 9% riffle units, 54% flatwater units, and 37% pool units (Table 1, Graph 2).

Ten Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pools 40%, runs 19%, low gradient riffles 15%, and step runs 14% (Graph 3). Based on percent total length, mid-channel pools comprised 35%, step runs 29%, and runs 14%.

A total of 101 pools were identified (Table 3). Main channel pools were most frequently encountered at 98% (Graph 4) and comprised 98% of the total length of all pools. Of the 101 pools, 75 (74%) had a depth of two feet or greater (Table 4, Graph 5).

In a first order stream such as Russian Gulch, a primary pool is defined as a pool with a maximum depth of at least 2 feet, occupies at least half the width of the low flow channel, and is as long as the low flow channel width. In Russian Gulch, primary pools totaled 5182 feet, or 32% of the total stream surveyed.

Riffle habitat types had a mean shelter rating of 12, flatwater habitat types had a mean shelter rating of 8, and pool habitats had a mean shelter rating of 5 (Table 1). Mid-channel pools, the dominant pool type, had a mean shelter rating of 4 (Table 2). Shelter in Russian Gulch was provided mainly by a mix of undercut banks, small and large woody debris, terrestrial vegetation, and boulders (Table 5). These same types, with the addition of root masses, provided the main shelter in pools (Graph 6).

Streambed substrate was dominated by sand and gravel in the main habitat types (Table 6). Of the 5 low gradient riffles fully measured, all were dominated by gravel. Of the 5 runs fully measured, 3 were dominated by sand and 2 by gravel. Of the 11 mid-channel pools fully measured, 2 were dominated by silt/clay, 6 by sand, 2 by gravel, and 1 by small cobble. Gravel

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was the dominant pool tail crest substrate in 84 of the 101 pool units (83%), followed by wood (6%) and sand (5%) (Graph 8).

Pool tail crest embeddedness was estimated for 101 pools. Of those, 11 had a value of 1 (11%), 43 had a value of 2 (43%), 26 had a value of 3 (26%), 6 had a value of 4 (6%) and 15 had a value of 5 (15%) (Table 8, Graph 6). Of the 15 pool tail crests with an embeddedness value of 5 (unsuitable for spawning), 5 had silt/clay/sand or gravel too small for spawning. The other 10 were unsuitable for spawning due to the substrate composed of large cobble, boulder, bedrock or wood.

Streambank substrate was dominated by sand/silt/clay (73%) (Table 9, Graph 10). Other values were cobble/gravel 14%, bedrock 11%, and boulder 2%. Streambank vegetative cover averaged 63% on right streambanks and 84% on left streambanks (Table 7). Streambank vegetation was composed mainly of deciduous trees (48%), followed by coniferous trees and brush (30% and 28%, respectively) (Table 9, Graph 11).

Riparian canopy density averaged 79%, with deciduous and coniferous trees comprising 44% and 35%, respectively (Table 7, Graph 9). Water temperatures taken during the survey period ranged from 51 to 56 degrees Fahrenheit (Table 8). Air temperatures ranged from 52 to 67 degrees Fahrenheit.

BIOLOGICAL INVENTORY RESULTS

Four sites were electrofished on August 4, 1999, in Russian Gulch. The sites were sampled by Douglas Albin (DFG) and Adrienne Carr (WSP/AmeriCorps).

The sites sampled were habitat units 55, 59, 77, and 79, with a total length of 558 feet of stream. All units were mid-channel pools. Collectively, the four sites yielded two 1+ steelhead and two sculpin.

DISCUSSION

The suitability of B4 channel types such as Russian Gulch for fish habitat improvement structures is: excellent for low-stage plunge weirs, boulder clusters, bank-placed boulders, single and opposing wing deflectors, and log cover. The road, trail, and campground along the surveyed reach may affect channel morphology. The active channel and extent of meander may be constricted, which in turn may affect the gradient, sinuosity, and riffle-pool ratio.

Water temperatures recorded on the survey days were within the suitable ranges for rearing of coho salmon and steelhead. Continuous monitoring of temperature throughout the warm season would be needed to verify temperature suitability. Given Russian Gulch's location in the coastal fog belt and the canopy density found, it is doubtful that stream temperatures are unsuitable for coho or steelhead.

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Flatwater habitat types comprised 54% of the total length of this survey, riffles 9%, and pools 37%. Primary pools composed 32% of the total length surveyed. DFG data indicate that the better coastal coho streams have as much as 40% of their total habitat length in primary pools. Pool enhancement should be considered when primary pools comprise less than that percentage.

The prevalence of gravel (83%) as the dominant pool tail crest substrate is generally considered suitable for spawning salmonids. However, most embeddedness ratings were 2 or 3 (totaling 68%), indicating lower spawning substrate quality due to the presence of fine sediments. Only a small proportion of the pool tail crests sampled (11%) had the highest quality embeddedness rating of 1.

The mean shelter ratings for pool, flatwater, and riffle habitats were all much below the desirable rating of 100.

The incidence of sand as a dominant substrate in run and pool habitats is undesirably high, and may highly contribute to the absence of coho salmon and the low abundance of steelhead in Russian Gulch.

The mean percent canopy density for the stream (79%) places canopy revegetation at a low priority.

The percentage of right and left bank vegetative cover was moderate at 63% and 84%, respectively.

No coho salmon were found in any of the habitat units electrofished, suggesting that juvenile coho were absent from Russian Gulch in 1999. The number of steelhead found in over 500 feet of stream sampled is alarmingly low relative to the general numbers juvenile salmonids found in prior surveys.

RECOMMENDATIONS

- 1) Russian Gulch should be managed as an anadromous, natural production stream.
- 2) Active and potential sediment delivery from roads and other sources in the watershed should be identified, mapped, and quantified. They should be treated according to their potential for sediment yield to the stream and its tributaries. The assessment of the riparian road should consider effects on channel morphology and consequent habitat quality as well as potential sediment delivery; treatment options should include narrowing, relocation, and removal.
- 3) Greatly increase instream wood to improve cover and increase depth of existing pools.

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COMMENTS AND LANDMARKS

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

Position (ft):	Comments:
0	Begin survey at confluence with Pacific Ocean, unit not surveyed. Highway 1 bridge. Access via Russian Gulch State Park beach parking lot.
686	Tail out is at mouth of stream - not spawnable. Road within 5 ft of left bank.
849	Campground on left bank w/in 15' of creek and road w/in 5' of creek.
922	Road and campground w/in 5' of creek. Tail out was pea gravel.
1146	Road and campground on left bank
1179	Auto bridge: 6.2" high x 35' wide x 8' long.
1217	Cement bags on right bank.
1316	Outhouse on left bank.
1361	Tail out is pea gravel.
1459	1+ fish swam under bank. 1.5' diameter culvert very rusty.
1539	Car bridge: 3.6' high x 25' wide x 15' long.
1576	Left bank campground. Road runs along right bank for long distance.
1590	Left bank campground. Gabions start. 1.5' diameter culvert.
1669	Left bank & right bank campgrounds until unit 0020.
1822	Left bank eroding.
1849	Small debris accumulation.
1967	Left bank road. Right bank campground.
2019	Right bank campground.
2051	Right bank campground. Lots of aquatic insects.

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- 2076 Right bank campground.
- 2086 Right bank campground on bank.
- 2130 Right bank road.
- 2179 1' diameter culvert on right bank. Road and rip-rap on right bank.
- 2196 Right bank- road (2' from bank) and rip rap. Campground on left bank. Also road on left bank that extends downstream several units to last bridge.
- 2305 Car bridge: 3.7' high x 14' long x 20' wide.
- 2343 Left bank- road and campground.
- 2403 Left bank- campgrounds and road.
- 2469 Left bank- campground and road.
- 2484 Right bank and left bank-campsites. Very deep pool here.
- 2540 Right bank- road.
- 2563 Right bank- road.
- 2631 Pea gravel at tail out. Large debris accumulation (LDA) with small woody debris accumulated and beer cans measures 7' high x 11' long x 25' wide. Bad smell from trash cans on right bank. Road within 10' of right bank. Restrooms 100' away, on right bank.
- 2667 Campsite on right bank.
- 2814 Right bank- campsite and road.
- 2927 Right bank- campsite and road.
- 2953 Jenkins saw block 1' x 3". Large concrete blocks in creek. LDA measures 7' high x 7' long x 15' wide. Creek very deep.
- 3105 Right bank- road.
- 3127 Scour from large debris accumulation. 1.5' undercut bank. LDA measures 5' high x 5' long x 20' wide. Two cubic yards of gravel and sand accumulated behind large debris accumulation.
- 3171 Right bank- road approx. 7' away.

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- 3187 Tail out is pea gravel.
- 3228 Right bank- road.
- 3264 Right bank- campsite and road. 1-5"crayfish.
- 3356 Left bank slide: 50 cubic yards of debris. One large tree over creek.
- 3444 LDA above dammed tree from slide measures 5' high x 20' long x 12' wide.
- 3629 Right bank- campsite.
- 3760 Pea gravel at tail out. Nice shelter.
- 3891 Gabions on right bank measure 74' long x 9' high. Road within 3' of right bank. Culvert on right bank with 1.5' diameter. Foot bridge measures 5.6' high x 5' long x 30' wide. Two fish observed.
- 4119 Right bank- road.
- 4164 Right bank- road.
- 4281 LDA. Side channel.
- 4479 LDA with small debris attached measures 5' high x 28' long x 20' wide. Second LDA measures 10' high x 11' long x 35' wide. Small debris here, too. Neither LDA is impeding fish passage.
- 4585 Right bank- well facility and Fern Canyon Trail, which is directly above creek. Reinforced bank- long logs placed on right bank to reinforce, 8' high x 46' long.
- 4735 Right bank- Fern Canyon Trail.
- 4932 Right bank- Fern Canyon Trail and 1.5' diameter culvert.
- 4986 Right bank- Fern Canyon Trail.
- 5090 Right bank- Fern Canyon Trail.
- 5136 Right bank- Fern Canyon Trail. Right bank is lined with logs reinforcing the bank. This extends into the next habitat unit. There is a small debris accumulation behind a piece of large woody debris. There is two cubic yards of sand behind debris jam.
- 5180 Pool tail substrate is wood. Right bank- reinforced with logs for the entire unit. Fern Canyon Trail close on right bank.

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- 5275 Right bank- Fern Canyon Trail. Bank reinforced with 24' long log. 2.5' undercut bank.
- 5381 Young-of-the-year (YOY) salmonids observed. Deep glide - borderline pool.
- 5548 Shaded by close overhanging terrestrial vegetation.
- 5730 LDA. Logs are parallel with stream channel.
- 5749 LDA measures 3' high x 33' long x 18' wide. Small debris accumulation measures 3' high x 2' long x 20' wide. Right bank- Fern Canyon Trail.
- 5852 YOY observed.
- 6013 Pea gravel in tail out. Right bank- Fern Canyon Trail. Saw another dead crayfish.
- 6042 Right bank-Fern Canyon Trail.
- 6084 Pea gravel. Small debris accumulation measures 3' high x 15' wide.
- 6201 1+ fish with spots
- 6322 YOY observed.
- 6356 Logs reinforcing right bank, 76' long x 3' high.
- 6405 Right bank- small debris accumulation.
- 6441 LDA measures 4' high x 10' long x 15' wide.
- 6494 Right bank- Fern Canyon Trail.
- 6656 Right bank- Fern Canyon Trail and road, which is within 10' of bank.
- 6694 Right bank- Fern Canyon Trail.
- 6759 Right bank- Fern Canyon Trail and road. LDA, mostly on left bank, measures 5' high x 36' long x 15' wide. Second LDA, mostly on right bank, measures 6' high x 15' long x 20' wide.
- 6919 Lots of terrestrial vegetation over the entire channel.
- 6976 Right bank- Fern Canyon Trail.
- 7009 Right bank- Fern Canyon Trail <5' from wetted edge along unit. Small debris accumulation on right bank behind tan oak in channel measures 5' high x 30' long

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x 12' wide. Rip rap on right bank measures 70' long x 3' average high. Right bank reinforced with log for five feet.

- 7132 Right bank-rip rap.
- 7151 Pea gravel for tail out.
- 7179 Right bank- fern canyon trail.
- 7203 Right bank- fern canyon trail.
- 7222 Right bank- Fern Canyon Trail. 1+ observed.
- 7333 Right bank- Fern Canyon Trail and road.
- 7365 Right bank- Fern Canyon Trail and road.
- 7421 Right bank- Fern Canyon Trail and road.
- 7466 Right bank- Fern Canyon Trail and road.
- 7501 Right bank- trail and road. Reinforced bank, logs and rip rap, 8' high x 45' long. 1.5' diameter culvert with small plunge pool below. Also a dry culvert clogged with debris.
- 7570 4' high rip-rap.
- 7670 Right bank- road.
- 7702 LDA measures 3' high x 10' long x 15' wide.
- 7805 Right bank- trail and road.
- 7844 Right bank- road and trail.
- 7904 Right bank- road and trail.
- 8063 Right bank- road and trail.
- 8101 Right bank- road.
- 8200 Rip-rap on right bank measures 5' high x 56' long.
- 8258 Rip-rap. Log reinforced right bank: 6' high x 60' long. Culvert sticking out of log reinforced bank. Very old looking, 1' diameter, 1/4 filled with sediment.
- 8303 Right bank composition = wood. Right bank-road, and logs reinforcing bank.

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- 8328 1.5' undercut banks.
- 8453 Right bank- road and Fern Canyon Trail.
- 8477 Right bank- road and Fern Canyon Trail. YOY observed.
- 8529 Right bank- road and Fern Canyon Trail. Scour on right side of channel due to LDA. LDA mostly on right bank, measures 6' high x 17' long x 12' wide.
- 8563 Right bank- road and Fern Canyon Trail.
- 8593 Right bank- road and Fern Canyon Trail.
- 8644 Right bank- road and Fern Canyon Trail.
- 8676 Right bank- road along entire unit. Root wad and slide up 150' on hill slope. Root wad measures 6' high x 8' long x 6' wide. Rip-rap on right bank, 3'high. YOY observed.
- 8784 Right bank- road and Fern Canyon Trail, and rip rap along the entire unit. 8' diameter culvert. Tributary entering on right bank. Culvert-1.5' diameter.
- 8816 Right bank- road.
- 8867 Right bank- road. LDA measures 6' high x 20' long x 10' wide. Saw good shelter for young-of-year.
- 8903 Right bank- Fern Canyon Trail and road.
- 8975 Right bank- Fern Canyon Trail and road.
- 9024 Right bank- Fern Canyon Trail and road very close. YOY observed. Rip-rap on right bank, large boulders, 5' high x 51' long.
- 9434 Right bank- Fern Canyon Trail and road very close. LDA measures 8' high x 13' long x 20' wide. Riprap along right bank, continues through other units.
- 9464 Three YOY observed. Right bank is riprap, not just normal boulders.
- 9539 Right bank- Fern Canyon Trail and road. Right bank rip rap ends.
- 9645 Pea gravel in tail out. 2' undercut bank.
- 9672 Right bank landslide. Tributary.
- 9850 Right bank- Fern Canyon Trail and road.

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- 9913 Right bank- Fern Canyon Trail and road. YOY observed.
- 10013 Right bank- Fern Canyon Trail and road.
- 10055 Right bank- Fern Canyon Trail and road. Tributary enters. Culvert is 12' above creek and 1.5' diameter.
- 10132 Right bank- Fern Canyon Trail and road. Rip rap measures 12' high x 23' long. LDA measures 8' high x 20' long x 12' wide.
- 10160 Right bank- Fern Canyon Trail and road. YOY and sculpin observed.
- 10268 Right bank- Fern Canyon Trail and road. LDA measures 3' high x 6' long x 25' wide.
- 10297 Right bank- Fern Canyon Trail and road. 0.5 cubic yards of sediment behind LDA. Right bank tributary-culvert up hill. Salamander and YOY observed.
- 10380 YOY observed.
- 10489 Left bank historic slide, big huge rotational block, five trees in creek. Small tributary on left bank. Start of recent slide approx. 100 cubic yards + 20 cubic yards on site. Two large trees in creek and other small ones difficult to differentiate. Slide on left bank.
- 10698 Right bank- road and reinforced bank with logs, 14' high x 100' long. LDA measures 4' high x 17' long x 30' wide.
- 10769 LDA measures 7' high x 20' wide.
- 10795 Right bank- trail and road. LDA.
- 10832 Right bank- road. Almost like plunge pools all through unit.
- 10884 Right bank- road.
- 10906 Right bank- road. Lots of large woody debris sticking out of left bank- possible splash from historic dam.
- 10961 Right bank- road and trail.
- 11097 Right bank- road and trail. 2.5' undercut banks.
- 11111 Right bank- road and trail. Reinforced right bank with logs, 160' long.
- 11314 Right bank- road and trail. Rip rap and logs on right bank, 38' long.

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- 11378 Right bank- road and trail.
- 11473 Right bank- road and trail. LDA on left side of channel measures 4' high x 40' long x 10' wide.
- 11631 Right bank- road has ascended to 100' from wetted channel.
- 11790 More dying grand firs on right bank. LDA measures 6' high x 70' long x 25' wide. Large rootwad in LDA.
- 12066 Rip-rap on right bank, 24' long.
- 12218 LDA measures 8' high x 14' long x 30' wide.
- 12299 Road is approx. 100' from right bank.
- 12563 2.5' undercut bank, nice shelter.
- 12907 Road near right bank again.
- 13045 Right bank- road.
- 13087 Right bank- road.
- 13110 Right bank- road.
- 13165 Right bank- road. Restarted survey after 20 days- water level noticeably lower.
- 13185 Right bank- road. 1+ fish and many YOY observed.
- 13293 Right bank- road within 20'.
- 13326 Right bank- road. YOY observed.
- 13411 Right bank- road.
- 13432 Right bank-road.
- 13447 Right bank- road. YOY and 1+ fish observed.
- 13514 Larger tributary on left bank.
- 13538 Right bank-road. 1' undercut bank.
- 13557 Right bank-road.

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- 13619 Right bank- road.
- 13642 Right bank- road.
- 13670 Right bank-road.
- 13696 Foot bridge measures 5.5' high x 4' long x 30' wide. Right bank road ends at bridge. Trail heads uphill near right bank and loops around onto left bank, and heads perpendicularly away from creek.
- 14049 Right bank- trail within 10' of creek.
- 14134 Right bank-trail. YOY observed.
- 14238 Right bank- trail within 3' of wetted channel. Tadpole observed.
- 14272 Rootwad with LDA behind on right bank side, 15' long x 6' wide.
- 14510 LDA measures 5' high x 20' long x 35' wide. 30' up right bank there is a retaining wall, 6' high x 15' long.
- 14689 LDA measures 7' high x 8' long x 25' wide.
- 14916 Large boulders in channel, flow is under boulders. Fish passage under boulders- depth measured at 2' under boulders.
- 15095 Small left bank tributary. Noticed trail again on right bank, continues for entire unit. Banks reinforced with creek boulder and large cobble because trail comes up to creek edge, 10' long.
- 15389 Right bank- trail.
- 15416 Right bank-trail within 8' of channel. LDA, huge old growth root wad with lots of stuff in front of it. Five cubic yards of sediment, sand and gravel. LDA measures 5' high x 50' long x 15' wide.
- 15665 Right bank-trail.
- 15762 Jump on side of unit for fish passage, 2.5' high.
- 15831 Wide, steep trail 5' from creek all the way to trail that runs parallel to the creek 40' up. YOY and a 1+ observed.
- 16150 LDA on top of boulders measures 7' high x 25' long 50' wide. Greater than five cubic yards of sediment behind LDA.
- 16171 Jump of 3'- beginning of unit in LDA. YOY observed.

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- 16248 YOY, and suckerfish observed. LDA measures 16' high x 40' wide. Lots of wood here. Fish passage under. Creek splits around sides of LDA. Most of large debris accumulation over one large log still on right bank side of channel. Second LDA measures 6' high x 12' long x 45' wide.
- 16547 YOY observed.
- 16635 3' high jump at beginning of unit.
- 16653 LDA measures 8' high x 35' wide. Lots of sediment above log jam, more than five cubic yards of sand and gravel. Lots of fish above.
- 16859 LDA measures 6' high x 27' long x 35' wide. Salamander observed.
- 16968 Right bank-large slide with many large boulders. Water goes under boulders. No flow between last pool and last step run, all under rocks
- 17051 YOY observed. End of anadromy, last pool. Bridge measures 5.5' high x 4' long x 20' wide.

Trail crosses creek before waterfall and there is a trail all along left and right banks. Left bank has spot for observing falls.

REFERENCES

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Russian Gulch

LEVEL III and LEVEL IV HABITAT TYPES

RIFFLE

Low Gradient Riffle	(LGR)	[1.1]	{ 1 }
High Gradient Riffle	(HGR)	[1.2]	{ 2 }

CASCADE

Cascade	(CAS)	[2.1]	{ 3 }
Bedrock Sheet	(BRS)	[2.2]	{24}

FLATWATER

Pocket Water	(POW)	[3.1]	{21}
Glide	(GLD)	[3.2]	{14}
Run	(RUN)	[3.3]	{15}
Step Run	(SRN)	[3.4]	{16}
Edgewater	(EDW)	[3.5]	{18}

MAIN CHANNEL POOLS

Trench Pool	(TRP)	[4.1]	{ 8 }
Mid-Channel Pool	(MCP)	[4.2]	{17}
Channel Confluence Pool	(CCP)	[4.3]	{19}
Step Pool	(STP)	[4.4]	{23}

SCOUR POOLS

Corner Pool	(CRP)	[5.1]	{22}
Lateral Scour Pool - Log Enhanced	(LSL)	[5.2]	{10}
Lateral Scour Pool - Root Wad Enhanced	(LSR)	[5.3]	{11}
Lateral Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{12}
Lateral Scour Pool - Boulder Formed	(LSBo)	[5.5]	{20}
Plunge Pool	(PLP)	[5.6]	{ 9 }

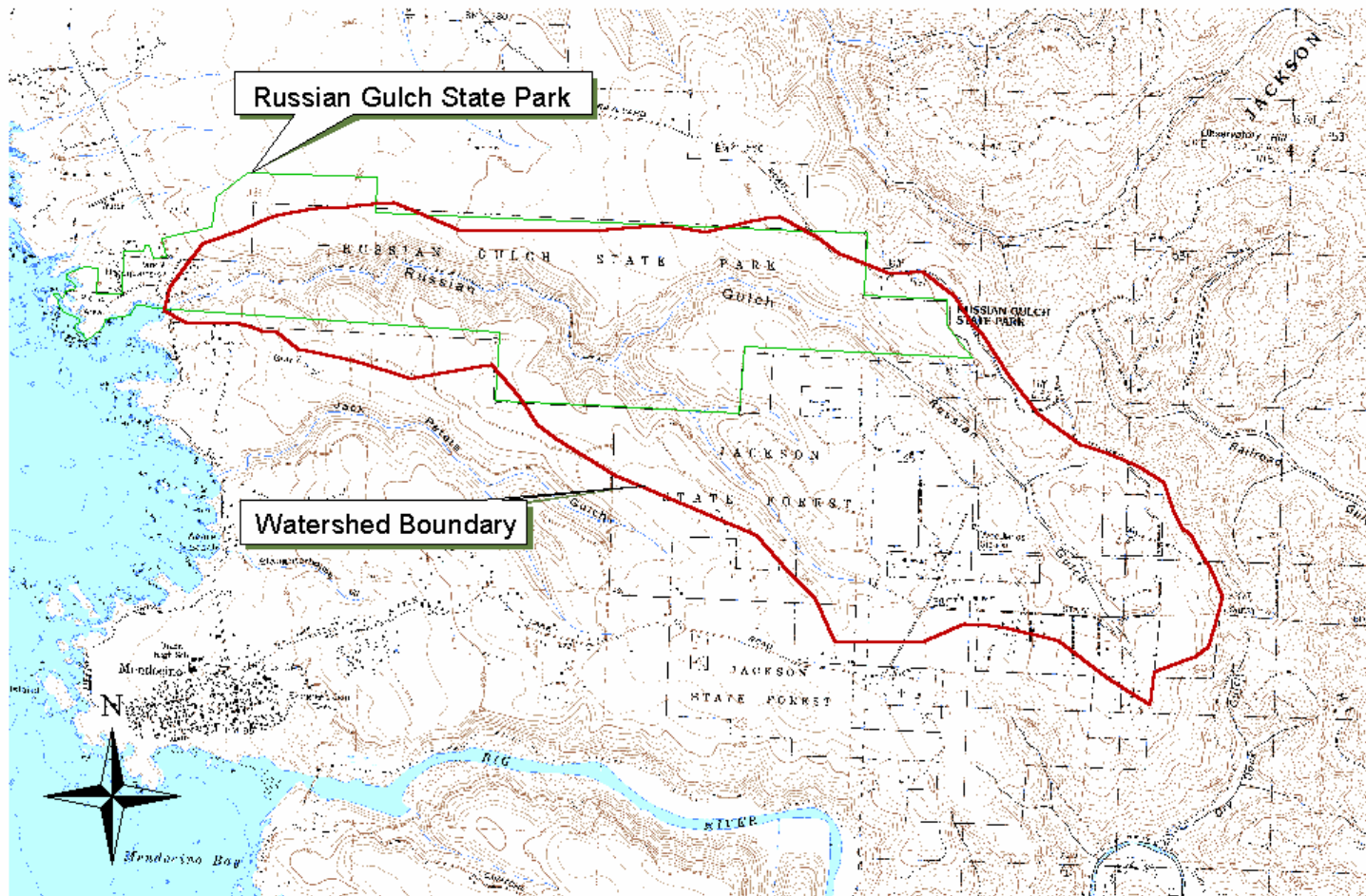
BACKWATER POOLS

Secondary Channel Pool	(SCP)	[6.1]	{ 4 }
Backwater Pool - Boulder Formed	(BPB)	[6.2]	{ 5 }
Backwater Pool - Root Wad Formed	(BPR)	[6.3]	{ 6 }
Backwater Pool - Log Formed	(BPL)	[6.4]	{ 7 }
Dammed Pool	(DPL)	[6.5]	{13}

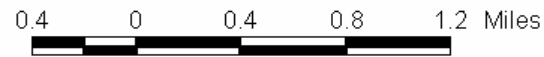
ADDITIONAL UNIT DESIGNATIONS

Dry	(DRY)	[7.0]	
Culvert	(CUL)	[8.0]	
Not Surveyed	(NS)	[9.0]	
Not Surveyed due to a marsh	(MAR)	[9.1]	

Russian Gulch



Map 1



RUSSIAN GULCH

Drainage: PACIFIC OCEAN

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

Survey Dates: 06/08/99 to 06/30/99

Confluence Location: QUAD: MENDOCINO LEGAL DESCRIPTION: T17NR17WS18 LATITUDE:39°19'43" LONGITUDE:123°48'13"

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
42	8	RIFFLE	17	36	1527	9	10.6	0.4	531	22289	264	11092	0	12
103	10	FLATWATER	42	86	8852	54	8.3	0.7	683	70301	397	40934	0	8
101	101	POOL	41	60	6069	37	12.7	1.4	755	76245	1228	124063	921	5
				TOTAL LENGTH (ft.)						TOTAL AREA (sq. ft.)		TOTAL VOL. (cu. ft.)		
				16448						168834		176089		

RUSSIAN GULCH

Drainage: PACIFIC OCEAN

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS

Survey Dates: 06/08/99 to 06/30/99

Confluence Location: QUAD: MENDOCINO LEGAL DESCRIPTION: T17NR17WS18 LATITUDE:39°19'43" LONGITUDE:123°48'13"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT OCCURRENCE	MEAN LENGTH ft.	TOTAL LENGTH ft.	TOTAL LENGTH %	MEAN WIDTH ft.	MEAN DEPTH ft.	MEAN MAXIMUM DEPTH ft.	MEAN AREA sq.ft.	TOTAL AREA sq.ft.	MEAN VOLUME cu.ft.	TOTAL VOLUME cu.ft.	MEAN RESIDUAL POOL cu.ft.	MEAN SHELTER VOL RATING	MEAN CANOPY %
38	5	LGR	15	36	1358	8	10	0.4	0.8	447	16990	174	6595	0	8	78
3	2	HGR	1	47	141	1	14	0.6	1.5	879	2637	610	1830	0	20	93
1	1	BRS	0	28	28	0	9	0.1	0.3	252	252	25	25	0	15	93
22	2	GLD	9	65	1430	8	11	0.7	1.0	645	14190	414	9108	0	8	73
46	5	RUN	19	53	2452	14	6	0.6	1.3	178	8179	118	5412	0	4	81
35	3	SRN	14	142	4970	29	10	0.7	2.2	1549	54207	853	29842	0	13	82
98	98	MCP	40	61	5932	35	13	1.5	26.0	762	74645	1249	122367	936	4	77
1	1	STP	0	42	42	0	10	1.9	4.0	378	378	718	718	605	15	67
1	1	LSL	0	34	34	0	20	0.8	1.4	612	612	490	490	306	60	61
1	1	LSR	0	61	61	0	10	0.8	1.9	610	610	488	488	305	5	83

LENGTH
(ft.)
16448

AREA
(sq. ft)
172699

TOTAL VOL.
(cu. ft)
176875

RUSSIAN GULCH

Drainage: PACIFIC OCEAN

Table 3 SUMMARY OF POOL TYPES

Survey Dates: 06/08/99 to 06/30/99

Confluence Location: QUAD: MENDOCINO LEGAL DESCRIPTION: T17NR17WS18 LATITUDE:39°19'43" LONGITUDE:123°48'13"

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
99	99	MAIN	98	60	5974	98	12.7	1.5	758	75023	1243	123085	933	4
2	2	SCOUR	2	48	95	2	15.0	0.8	611	1222	489	978	306	33
TOTAL UNITS	TOTAL UNITS				TOTAL LENGTH (ft.)				TOTAL AREA (sq.ft.)		TOTAL VOL. (cu.ft.)			
101	101				6069				76245		124063			

RUSSIAN GULCH

Drainage: PACIFIC OCEAN

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

Survey Dates: 06/08/99 to 06/30/99

Confluence Location: QUAD: MENDOCINO LEGAL DESCRIPTION: T17NR17WS18 LATITUDE:39°19'43" LONGITUDE:123°48'13"

UNITS MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	<1 FOOT		1-<2 FT.		2-<3 FT.		3-<4 FT.		>=4 FEET	
			MAXIMUM DEPTH	PERCENT OCCURRENCE	MAXIMUM DEPTH	PERCENT OCCURRENCE	MAXIMUM DEPTH	PERCENT OCCURRENCE	MAXIMUM DEPTH	PERCENT OCCURRENCE	MAXIMUM DEPTH	PERCENT OCCURRENCE
98	MCP	97	0	0	24	24	48	49	16	16	10	10
1	STP	1	0	0	0	0	0	0	0	0	1	100
1	LSL	1	0	0	1	100	0	0	0	0	0	0
1	LSR	1	0	0	1	100	0	0	0	0	0	0

TOTAL

UNITS

101

RUSSIAN GULCH

Drainage: PACIFIC OCEAN

Table 5 - SUMMARY OF MEAN PERCENT COVER BY HABITAT TYPE

Survey Dates: 06/08/99 to 06/30/99

Confluence Location: QUAD: MENDOCINO LEGAL DESCRIPTION: T17NR17WS18 LATITUDE:39°19'43" LONGITUDE:123°48'13"

UNITS MEASURED	UNITS FULLY MEASURED	HABITAT TYPE	MEAN % UNDERCUT BANKS	MEAN % SWD	MEAN % LWD	MEAN % ROOT MASS VEGETATION	MEAN % TERR. VEGETATION	MEAN % AQUATIC VEGETATION	MEAN % WHITE WATER	MEAN % BOULDERS	MEAN % BEDROCK LEDGES
38	5	LGR	20	22	48	0	4	0	6	0	0
3	2	HGR	0	5	15	0	0	0	35	25	20
1	1	BRS	0	0	70	0	30	0	0	0	0
22	2	GLD	38	23	0	0	0	0	0	40	0
46	2	RUN	0	100	0	0	0	0	0	0	0
35	3	SRN	3	17	30	0	7	0	10	33	0
98	11	MCP	18	24	20	7	13	0	3	14	2
1	1	STP	20	0	30	0	0	0	10	20	20
1	1	LSL	0	20	70	0	10	0	0	0	0
1	1	LSR	0	30	0	70	0	0	0	0	0

RUSSIAN GULCH

Drainage: PACIFIC OCEAN

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE

Survey Dates: 06/08/99 to 06/30/99

Confluence Location: QUAD: MENDOCINO LEGAL DESCRIPTION: T17NR17WS18 LATITUDE:39°19'43" LONGITUDE:123°48'13"

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
38	5	LGR	0	0	100	0	0	0	0
3	2	HGR	0	0	50	0	0	0	50
1	1	BRS	0	0	0	0	0	0	100
22	2	GLD	0	50	50	0	0	0	0
46	5	RUN	0	60	40	0	0	0	0
35	3	SRN	0	33	33	33	0	0	0
98	11	MCP	18	55	18	9	0	0	0
1	1	STP	0	0	100	0	0	0	0
1	1	LSL	0	100	0	0	0	0	0
1	1	LSR	0	0	100	0	0	0	0

TABLE 7**RUSSIAN GULCH****Summary of Mean Percent Vegetative Cover for Entire Stream**

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Deciduous	Mean Percent Open Units	Mean Right Bank Percent Cover	Mean Left Bank Percent Cover
79	44	56	0	63	84

Note: Mean percent conifer and deciduous for the entire reach are means of canopy components from units with canopy values greater than zero.

Open units represent habitat units with zero canopy cover.

TABLE 8. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: RUSSIAN GULCH

SAMPLE DATES: 06/08/99 to 06/30/99

STREAM LENGTH: 17101 ft.

LOCATION OF STREAM MOUTH:

USGS Quad Map: MENDOCINO

Legal Description: T17NR17WS18

Latitude: 39°19'43"

Longitude: 123°48'13"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 01

Channel Type: B4

Channel Length: 16415 ft.

Riffle/flatwater Mean Width: 9 ft.

Total Pool Mean Depth: 1.5 ft.

Base Flow: 0.0 cfs

Water: 051- 058°F Air: 052-067°F

Dom. Bank Veg.: Deciduous Trees

Vegetative Cover: 73%

Dom. Bank Substrate: Silt/Clay/Sand

Canopy Density: 79%

Coniferous Component: 44%

Deciduous Component: 56%

Pools by Stream Length: 37%

Pools >=3 ft.deep: 27%

Mean Pool Shelter Rtn: 36

Dom. Shelter: Large Woody Debris

Occurrence of LOD: 26%

Dry Channel: 0 ft.

Embeddness Value: 1. 11% 2. 4.3% 3. 26% 4. 6% 5. 15%

Length of stream section not surveyed within survey reach
and not included in above totals or calculations: 686 ft

TABLE 9**RUSSIAN GULCH**

Mean Percentage of Dominant Substrate

Dominant Class of Substrate	Number Units Right Bank	Number Units Left Bank	Total Mean Percent
Bedrock	4	3	11.67
Boulder	1	0	1.67
Cobble/Gravel	5	4	15
Silt/clay	21	24	75

Mean Percentage of Dominant Vegetation

Dominant Class of Vegetation	Number Units Right Bank	Number Units Left Bank	Total Mean Percent
Grass	0	0	0
Brush	9	8	28.33
Decid. Trees	16	13	48.33
Conif. Trees	7	11	30
No Vegetation	0	0	0

Total stream average embeddedness value for pool tails: 2.69

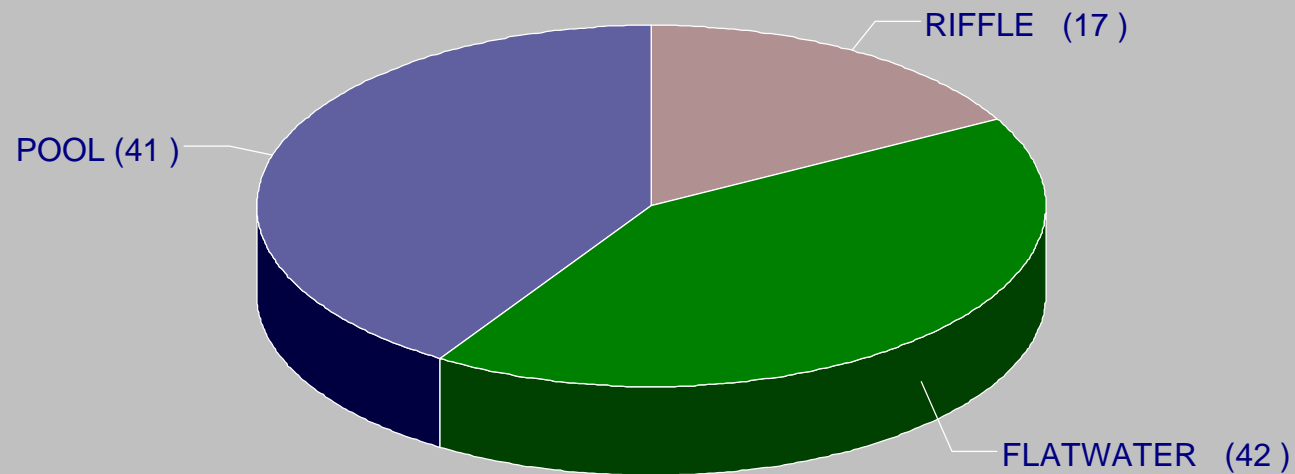
TABLE 10. MEAN PERCENT OF SHELTER COVER TYPES FOR ENTIRE STREAM

Stream: RUSSIAN GULCH Drainage: PACIFIC OCEAN

Survey Date: 06/08/99 to 06/30/99

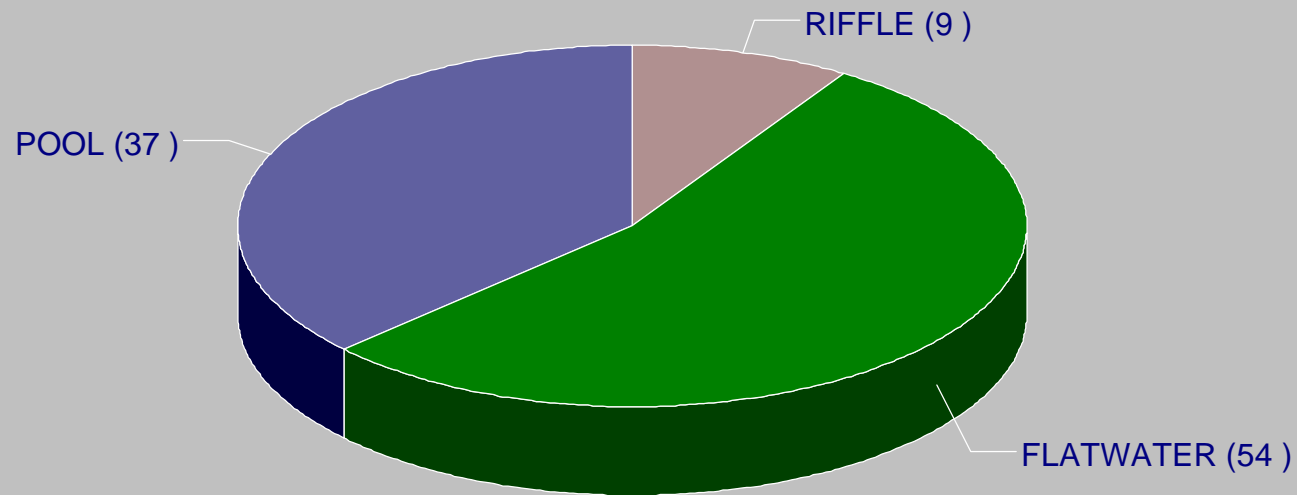
	RIFFLES	FLATWATER	POOLS
UNDERCUT BANKS	13.33	10.63	15.36
SMALL WOODY DEBRIS	24.17	36.88	22.14
LARGE WOODY DEBRIS	25	11.25	22.86
ROOTS	4.83	0	10.36
TERRESTRIAL VEG	7.50	2.50	11.07
AQUATIC VEG	0	0	0
WHITewater	5.67	3.75	2.86
BOULDERS	13.50	22.50	12.50
BEDROCK LEDGES	2.67	0	2.86

HABITAT TYPES BY PERCENT OCCURRENCE



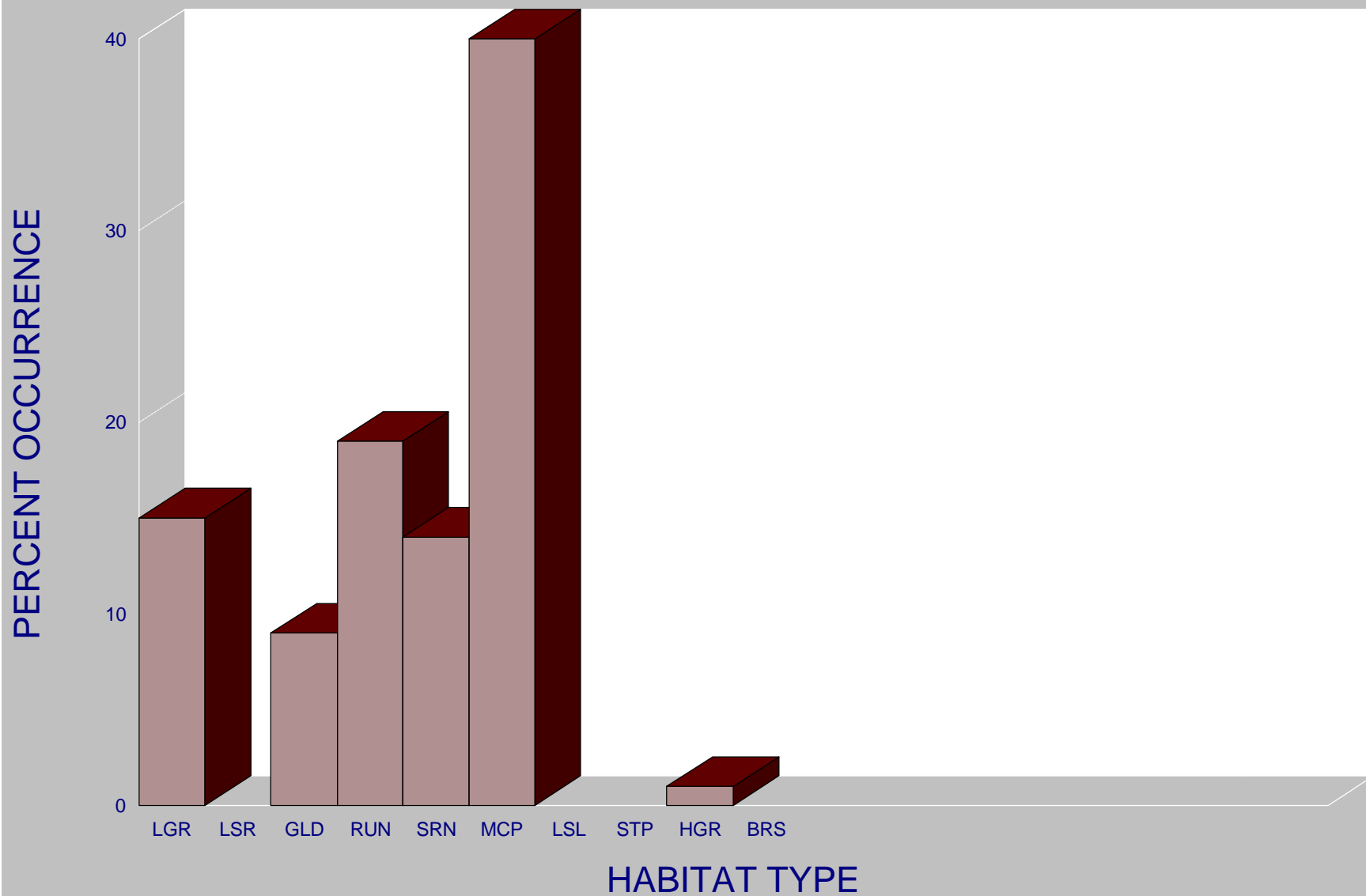
GRAPH 1

HABITAT TYPES BY PERCENT TOTAL LENGTH



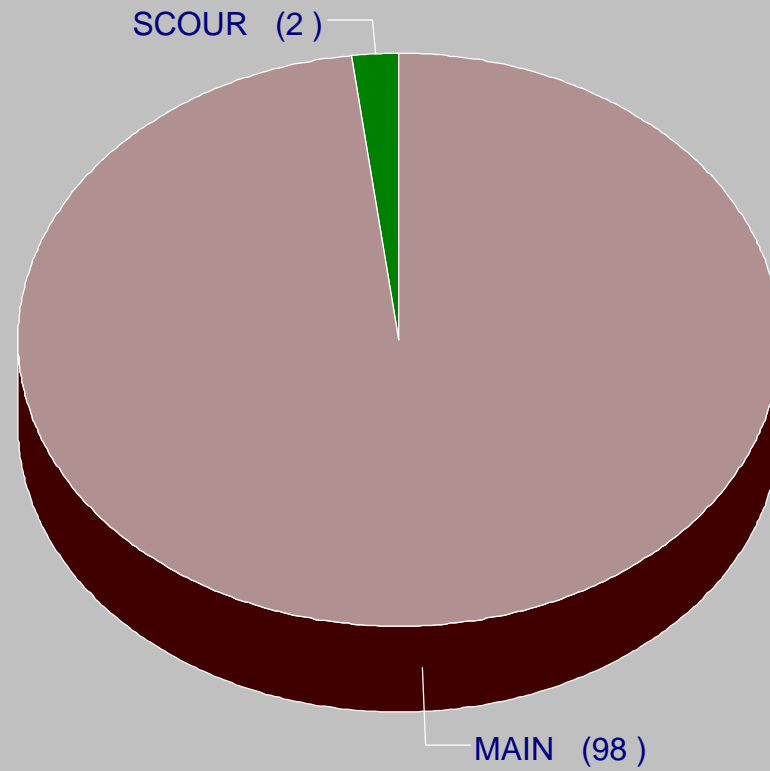
GRAPH 2

HABITAT TYPES BY PERCENT OCCURRENCE



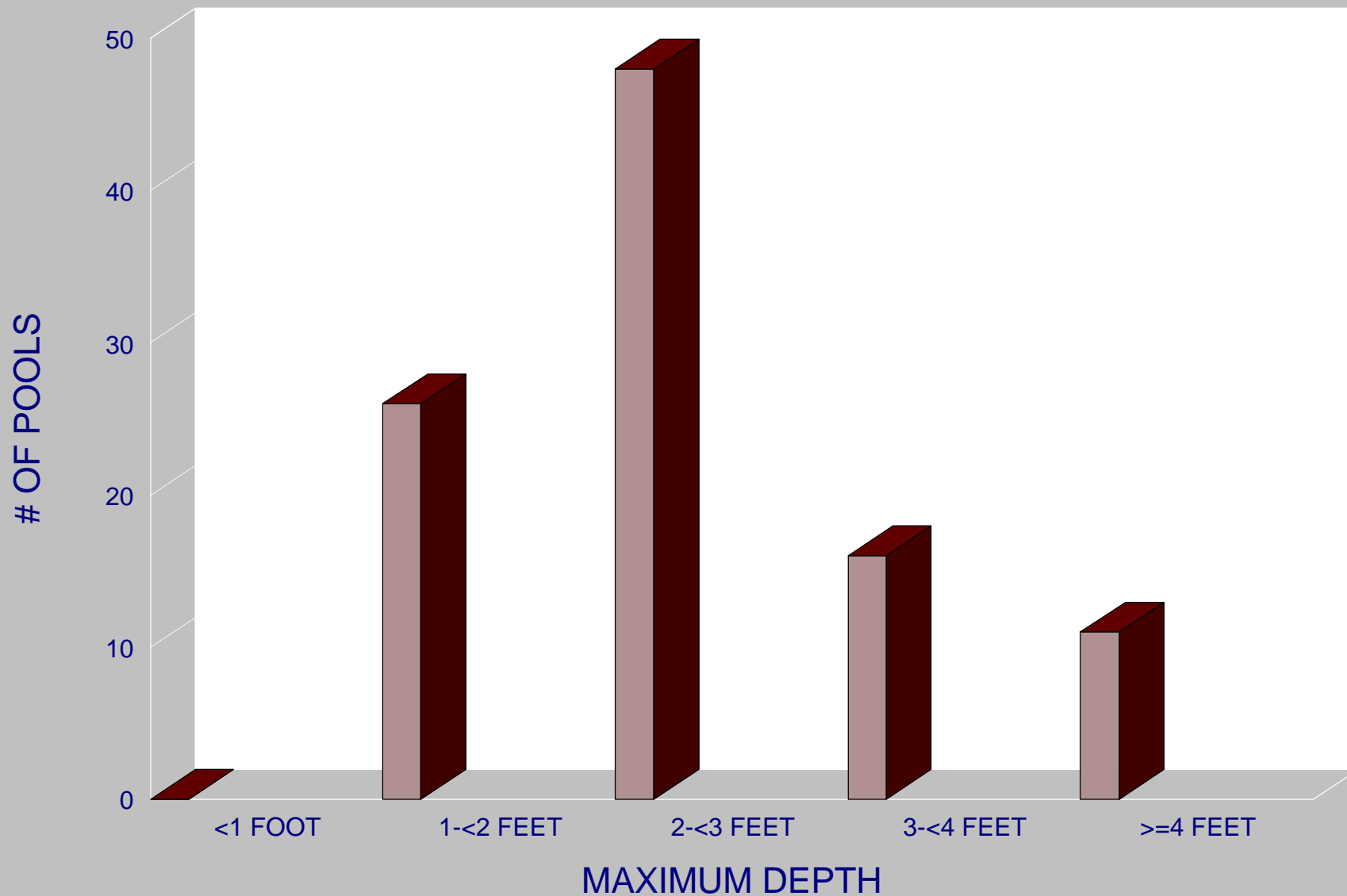
GRAPH 3

POOL HABITAT TYPES BY PERCENT OCCURRENCE



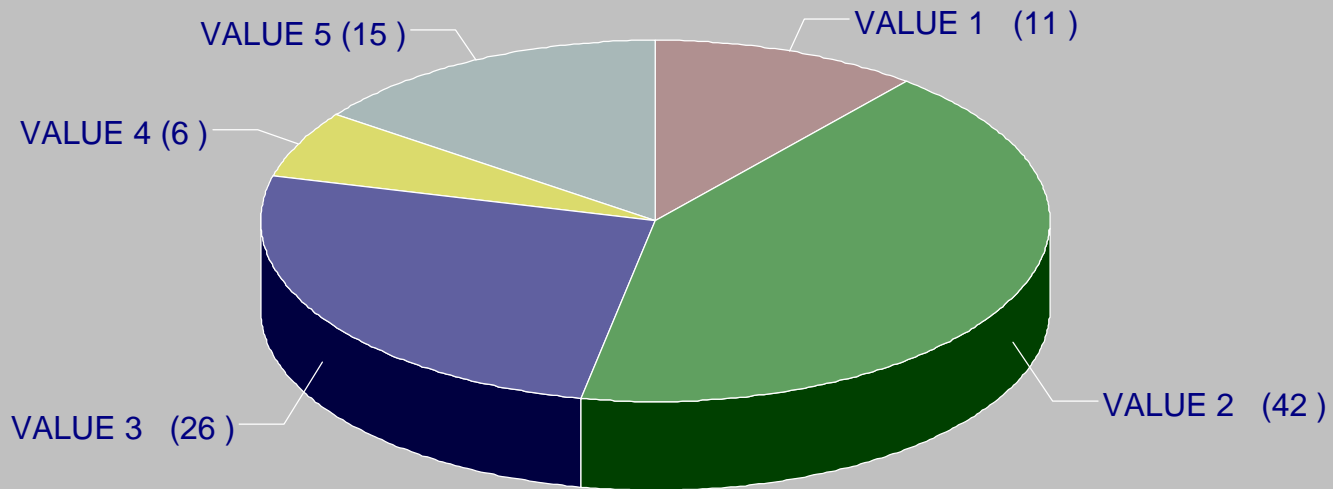
GRAPH 4

MAXIMUM POOL DEPTHS



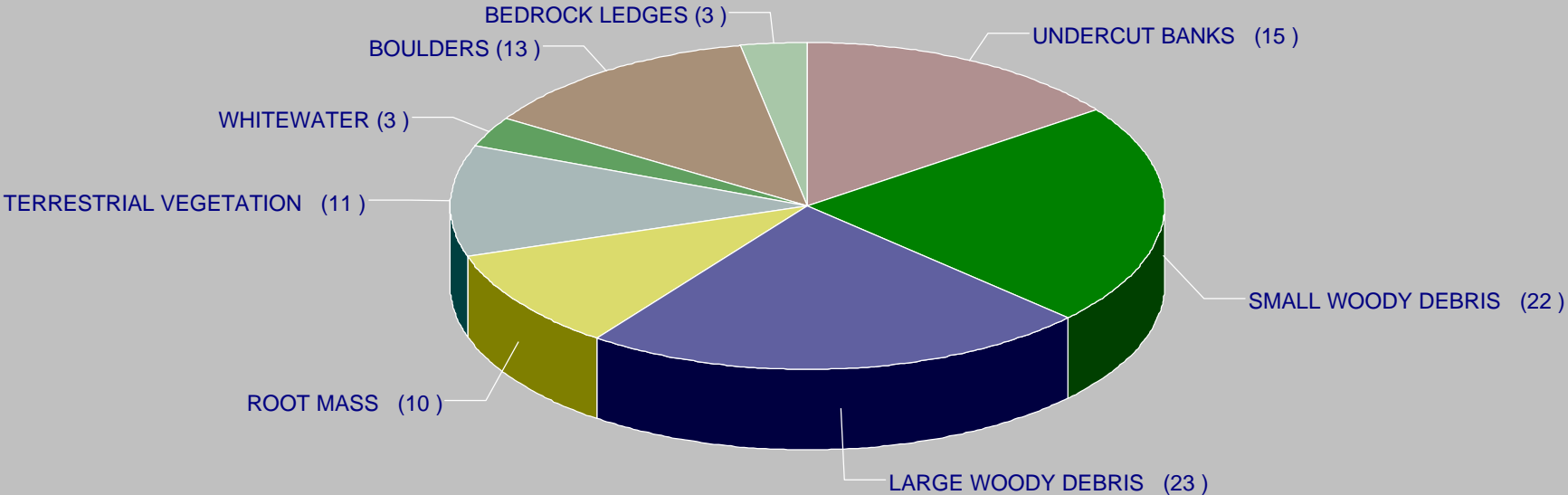
GRAPH 5

PERCENT EMBEDDEDNESS



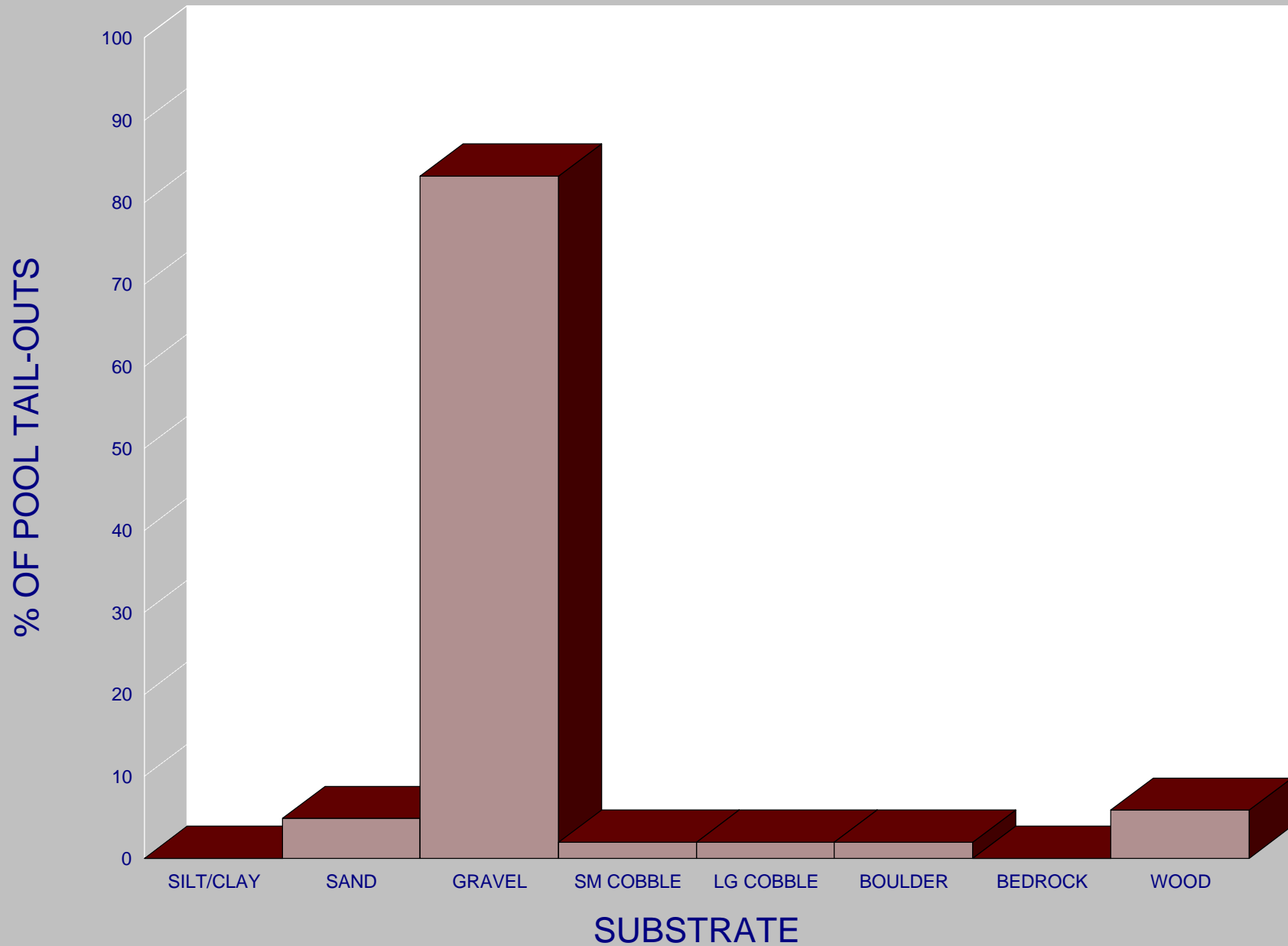
GRAPH 6

MEAN PERCENT COVER TYPES IN POOLS



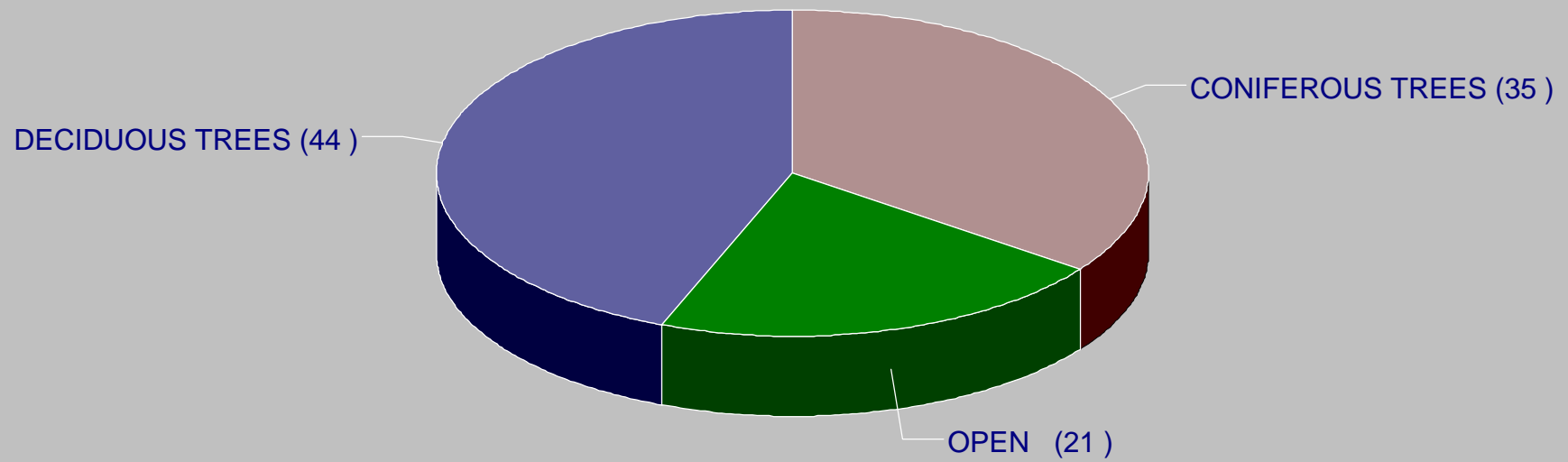
GRAPH 7

SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



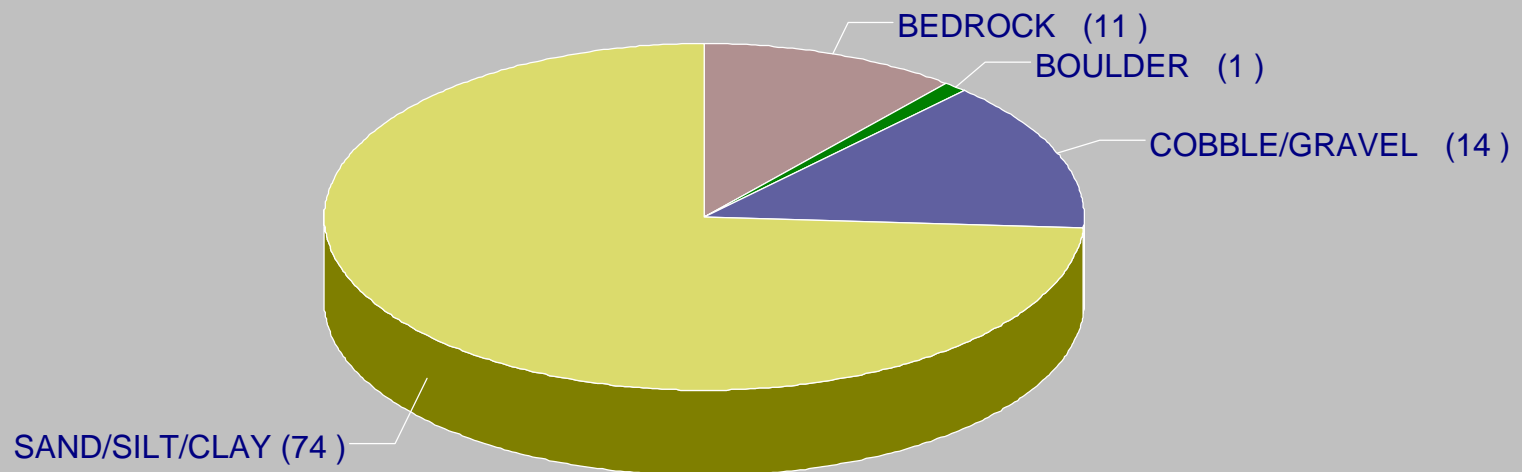
GRAPH 8

PERCENT CANOPY



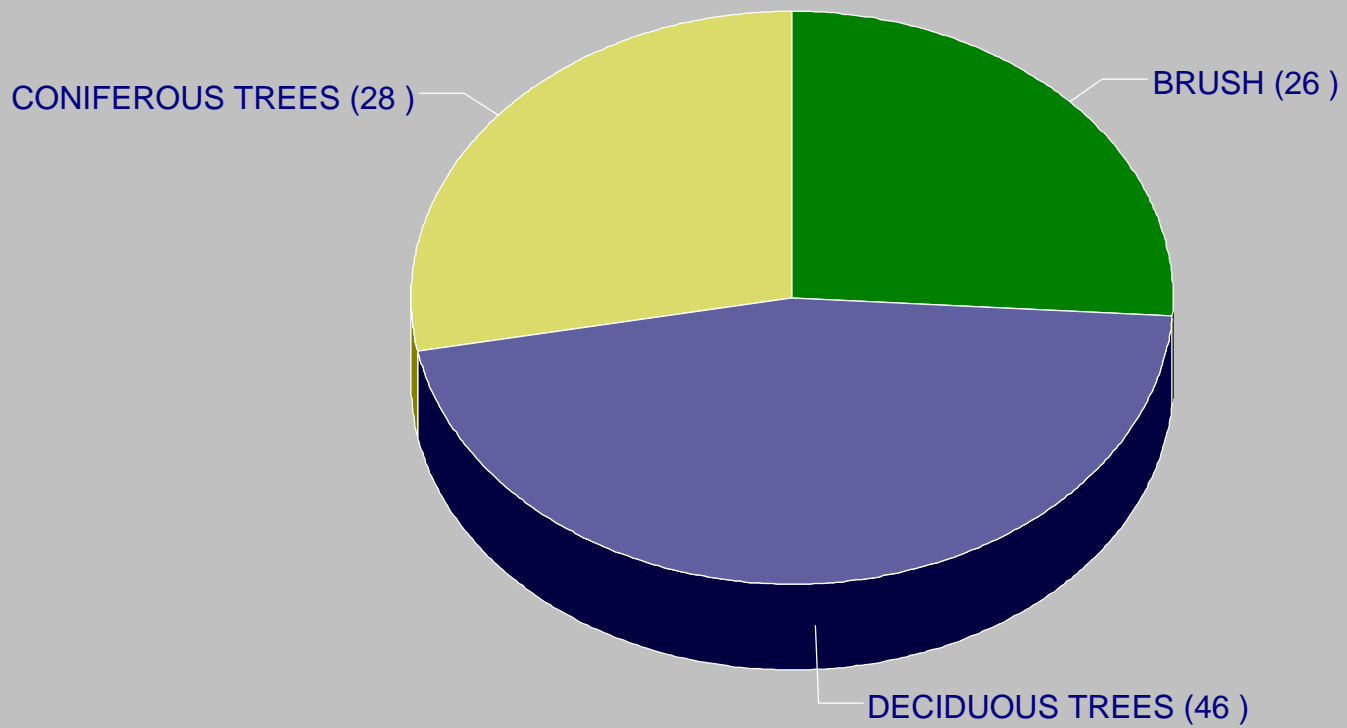
GRAPH 9

PERCENT BANK COMPOSITION



GRAPH 10

PERCENT BANK VEGETATION



GRAPH 11