

**CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT**

Jakes Creek

Report Revised April 14, 2006

Report Completed 2005

Assessment Completed 2002

INTRODUCTION

A stream inventory was conducted during the summer of 2002 on Jakes Creek, a stream in the Russian River Basin. 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 Jakes Creek. 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, after analyzing historical and recent data, 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

Jakes Creek is located in Mendocino County, California and is a tributary to Vasser Creek, a tributary of Coleman Creek, a tributary of Pieta Creek, which drains into the Russian River (see Jakes Creek map, APPENDIX A). The legal description at the confluence with Vasser Creek is T13N, R10W, S32. Its location is 38°55'48.53"N latitude and 123°00'15.54"W longitude. Vehicle access to the Jakes Creek reservoir exists from High Valley Ranch Road south off of Old Toll Road from Hwy 175, Hopland. Foot access to the mouth exists from Vasser Creek.

Jakes Creek and its tributaries drain a basin of approximately 1792.9 acres (2.8 square miles). Jakes Creek is a maximum second order stream and has approximately 19393.0 feet (3.67 miles) of blue line stream, according to the USGS "Hopland" 7.5 minute quadrangles. Elevations range from about 1155 feet at the mouth of the creek to 3291 feet in the headwaters. The vegetation is primarily shrub (48%) and hardwood (41%) with minor amounts of mixed hardwood/conifer (5%), conifer (3%), and herbaceous vegetation (2%). None of the watershed is agricultural or urban. A small reservoir catches runoff near the headwaters. The watershed is 78.1% privately owned and 21.9% federally owned which is managed by the BLM for Cow Mountain Recreation Area. Salmonid fish species historically present include steelhead trout. Endangered, threatened, or sensitive species present include Bell's sage sparrow (*Amphispiza belli belli*) (Nddb source).

METHODS

The habitat inventory conducted in Jakes Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi, et al., 1998). The California Department of Fish and Game (DFG) field crew that conducted the inventory was trained in standardized habitat inventory methods by DFG. This inventory was conducted by two person teams and was supervised by Derek

Acomb, Russian River Planner (DFG).

SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach. All habitat units included in the survey are classified according to habitat type and their lengths are measured. All pool units are measured for maximum depth, depth of pool tail crest (measured in the thalweg), dominant substrate composing the pool tail crest, and embeddedness. Habitat unit types encountered for the first time are measured for all the parameters and characteristics on the field form. Additionally, from the ten habitat units on each field form page, one is randomly selected for complete measurement.

HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the California Salmonid Stream Habitat Restoration Manual. This form was used in Jakes Creek to record measurements and observations. There are nine components to the inventory form: flow, channel type, air and water 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. Channel characteristics are measured using a clinometer, hand level, hip chain, tape measure, and a stadia rod.

3. Temperatures:

Water and air temperatures, and time, 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. Jakes Creek habitat typing used standard basin level measurement criteria. These parameters require that the minimum length of a described habitat unit must be equal to or greater than the stream's mean wetted width. All measurements were in feet to the nearest tenth. All measurements are in feet to the nearest tenth. Habitat characteristics are measured using a hip chain and a stadia rod.

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 Jakes Creek, embeddedness was visually 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). Additionally, a rating of "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 Jakes Creek, 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 visually estimated using a list of seven size classes which are defined in the California Salmonid Stream Habitat Restoration Manual.

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densimeters as described in the California Salmonid Stream Habitat Restoration Manual. Canopy density relates to the amount of stream shaded from the sun. In Jakes Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the top 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 visually into percentages of evergreen 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 Jakes Creek, 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, including downed trees, logs and rootwads, 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) electro fishing. These sampling techniques are discussed in the California Salmonid Stream Habitat Restoration Manual.

IMPACT INVENTORY & ANALYSIS

Problems such as migration barriers, streambed erosion, poor water quality or temperatures are noted in the comments and landmarks section. In some cases measurements are taken, an analysis of what caused the problem is made and restoration potential and alternatives are recommended.

DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat for data storage and analysis. Habitat is a Visual Basic extension to Microsoft Access, developed by Zebulon Young, University of California, Berkeley. This program processes and summarizes the data, and produces the following tables and appendices:

- 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 shelter by habitat types
- Summary of dominant substrates by habitat types
- Summary of fish habitat elements by stream reach

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Jakes Creek include:

- Level II habitat types by % occurrence
- Level II habitat types by % total length
- Level IV habitat types by % occurrence
- Level I pool habitat types by % occurrence
- Maximum depth in pools
- Percent embeddedness estimated in pool tail-outs
- Mean percent cover types in pools
- Substrate composition in pool tail-outs
- Mean percent canopy
- Dominant bank composition in survey reach

- Dominant bank vegetation in survey reach

HISTORICAL STREAM SURVEYS:

The Department of Fish and Game has not conducted previous surveys of Jakes Creek.

HABITAT INVENTORY RESULTS FOR JAKES CREEK

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

The habitat inventory of Jakes Creek, 9/7/2002, was conducted by Amy Livingston (Americorps) and Douglas Mitchel (DFG) with supervision and analysis by California Department of Fish and Game (DFG). The survey began at the confluence with Vasser Creek and extended up Jakes Creek to a very steep portion of channel. The total length of stream surveyed was 6637 feet.

Flows were not measured on Jakes Creek.

Jakes Creek is a B3 channel type for 6637 feet of the stream surveyed.

B4 channels are moderately entrenched riffle dominated channels with infrequently spaced pools, very stable plan and profile, stable banks on moderate gradients with low width /depth ratios and gravel dominant substrates.

Water temperatures taken during the survey period ranged from 52 to 60 degrees Fahrenheit. Air temperatures ranged from 65 to 70 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 43% flatwater units, 16% pool units, 37% dry units, 4% riffle units, (Graph 1). Based on total **length** of Level II habitat types there were 34% flatwater units, 3% pool units, 62% dry units, 1% riffle units, (Graph 2).

Eight Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were 33% Step Run units, 14% Mid-Channel Pool units, 37% Dry units, 3% Low Gradient Riffle units, 9% Glide units, 1% Run units, 1% High Gradient Riffle units, 1% Lateral Scour Pool - Root Wad Enhanced units, (Graph 3). Based on percent total **length**, 32% Step Run units, 3% Mid-Channel Pool units, 62% Dry units, 1% Low Gradient Riffle units, 1% Glide units, 1% Run units.

A total of 11 pools were identified (Table 3). Main Channel pools were the most frequently encountered, at 91%, and comprised 89% of the total length of all pools (Graph 4).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. One of the 11 pools (9%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the eleven pool tail-outs

measured, one had a value of 1 (9.1%); six had a value of 2 (54.5%); four had a value of 3 (36.4%); (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst. Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate like bedrock, log sills, boulders.

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 13, and pool habitats had a mean shelter rating of 13 (Table 1). Of the pool types, the Main Channel pools had a mean shelter rating of 14, Scour pools had a mean shelter rating of 5, (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover types in Jakes Creek. Graph 7 describes the pool cover in Jakes Creek. Boulders is the dominant pool cover type followed by undercut banks.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was observed in 27% of pool tail-outs and boulders observed in 36% of pool tail-outs.

The mean percent canopy density for the surveyed length of Jakes Creek was 83%. The mean percentages of hardwood and coniferous trees were 48% and 52%, respectively. Seventeen percent of the canopy was open. Graph 9 describes the mean percent canopy in Jakes Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 12%. The mean percent left bank vegetated was 12%. The dominant elements composing the structure of the stream banks consisted of 8% bedrock, 52% boulder, 29% cobble/gravel, 10% sand/silt/clay, (Graph 10). Grass was the dominant vegetation type observed in 12% of the units surveyed. Additionally, 33% of the units surveyed had hardwood trees as the dominant vegetation type, and 27% had coniferous trees as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY

JUVENILE SURVEYS:

Department of Fish and Game has not conducted previous biological inventories of Jakes Creek nor are there any records of hatchery releases or fish rescues in the Jakes Creek watershed. A biological inventory was not conducted in 2002. However, during the habitat inventory survey, the field crew observed steelhead 0+, 1+, and 2+, newts, frogs, salamanders, and snakes.

DISCUSSION FOR JAKES CREEK

Jakes Creek has one channel type: 6637 feet a B3. Many site specific projects can be designed within this channel type, especially to increase pool frequency, volume and shelter.

According to the DFG Salmonid Stream Habitat Restoration Manual, B3 channel types are excellent for low-stage plunge weirs, boulder clusters, bank placed boulders, single and opposing

wing-deflectors and log cover. They are also good for medium-stage plunge weirs. These channel types have suitable gradients and the stable stream banks that are necessary for the installation of instream structures designed to increase pool habitat, trap spawning gravels, and provide protective shelter for fish.

The water temperatures recorded on the survey day 9/7/2002 ranged from 52°F to 60°F. Air temperatures ranged from 65°F to 70°F. This temperature regime is favorable to salmonids. Water temperatures above 65°F, if sustained, are above the threshold stress level for salmonids.

Flatwater habitat types comprised 34% of the total length of this survey, riffles 1%, and pools 3%. The pools are shallow, with only one of the eleven (9%) pools having a maximum residual depth greater than 2 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In first and second order streams, a primary pool is defined to have a maximum residual depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. Installing structures that will increase or deepen pool habitat is recommended for locations where their installation will not be threatened by high stream energy, or where their installation will not conflict with the modification of the numerous log debris accumulations (LDA's) in the stream.

Seven of the 11 pool tail-outs measured had embeddedness ratings of 1 or 2. Four of the pool tail-outs had embeddedness ratings of 3 or 4. None of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. Sediment sources in Jakes Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Seven of the eleven pool tail-outs had silt, sand, large cobble, boulders or bedrock as the dominant substrate. This is generally considered unsuitable for spawning salmonids.

The mean shelter rating for pools was 13. The shelter rating in the flatwater habitats was 13. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by Boulders in Jakes Creek. Boulders are the dominant cover type in pools followed by undercut banks. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

The mean percent canopy density for the stream was 83%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was low at 12% and 12%, respectively. In areas of stream bank erosion or where bank vegetation is sparse, planting endemic species of coniferous and hardwood trees, in conjunction with bank stabilization, is recommended.

GENERAL MANAGEMENT RECOMMENDATIONS

Jakes Creek should be managed as an anadromous, natural production stream.

Winter storms often bring down large trees and other woody debris into the stream, which increases the number and quality of pools. 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. 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.
2. Jakes Creek would benefit from the utilization of 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.
3. Active and potential sediment sources related to the road system need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.
4. 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. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion. In some areas the material is at hand.
5. Where feasible, design and engineer pool enhancement structures to increase the number of pools in the upper reaches. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

COMMENTS AND LANDMARKS

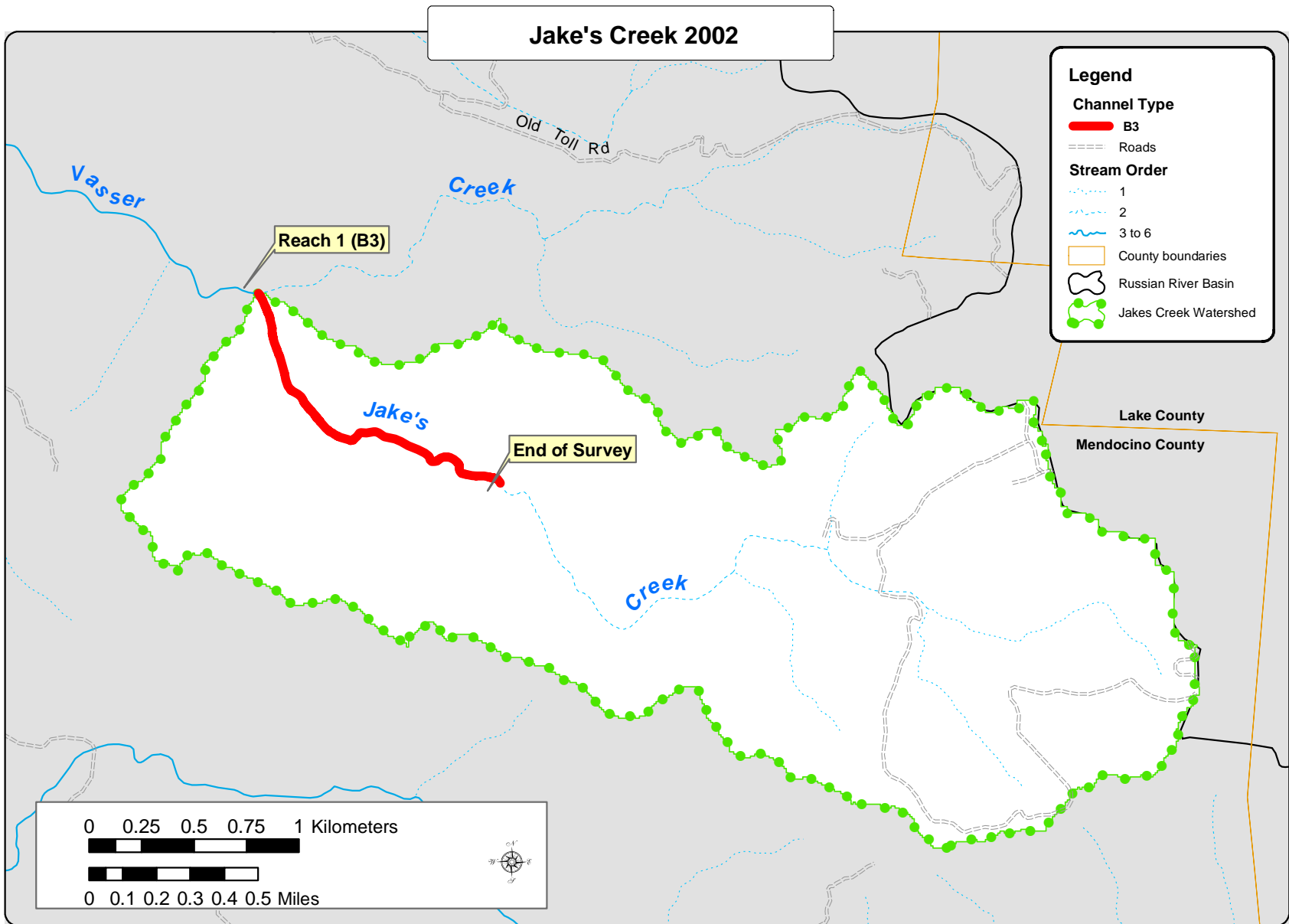
The following landmarks and possible problem sites were noted. All distances are approximate and taken from the beginning of the survey.

- 152' Steelhead 0+, 1+, 2+ were observed frequently throughout the creek from 152' to 3364'.
345' Scattered small pockets of water in unit - some large and small debris in unit
787' Log at the top of the unit retaining 2' of gravel/cobble.

- 1192' Boulder in creek (photo# 22)
- 1621' Lots of SWD and LWD throughout unit. At 35 ft, LWD with gravel build up 2 ft. Left bank (LB) EROSION, dimensions: 50'L x 30'H x 10'D, dumping fines, exposed roots, 75 ft – 125 ft into unit. LB tributary/gully at 200ft, dry and steep. Channel has A3 characteristics for a short distance.
- 1921' At 15ft into unit, LB tributary/gully, steep and dry.
- 2238' Right bank (RB) EROSION not serious but dumping fines into creek.
- 2569' RB EROSION not serious but dumping fines into creek.
- 2605' RB gully at bottom of unit. LB EROSION
- 3429' Channel gradient steepens. Abundant SWD and LWD. EROSION of RB with serious gully. Wood debris accumulation at 375 ft, 400 ft, and 450ft, photos 23-25. At 1200 ft into unit RB EROSION/gully.
- 5222' LB EROSION /gully; huge boulders entering system.
- 5400' RB EROSION at 100' into unit, dimensions: 100'H x 6'L x 10'D, dumping fines into creek.
- 5694' Trickle of water at parts, but grade is steep and water is minor. Channel gradient lessens.
- 6144' HU 056: RB spring wetting RB at 52' into unit
- 6368' LB EROSION in HU 065 and 066, dimensions: 75'L x 35'H x 20'D, dumping fines through boulders and lots of shale cobbles and gravel. Exposed roots and three trees have already fallen into the creek.
- 6461' LB minor EROSION dumping fines through cobbles into pool. There were no fish on 09/07/2002 when this survey was completed, however, one week before that, eight, 2+ fish were observed in the pool.
- 6507' END OF SURVEY. Channel steep

REFERENCES

Flosi, G., Downie, S., Hopelain, J., Bird, M., Coey, R., and Collins, B. 1998. California Salmonid Stream Habitat Restoration Manual, 3rd edition. California Department of Fish and Game, Sacramento, California.



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Prepared by: Jacob Newell and Ann Marie Osterback, May 6, 2003

APPENDIX B: TABLES

Table 1 - Summary of Riffle, Flatwater, and Pool Habitat Types

Stream Name: Jakes Creek

LLID:

1230043389301

Drainage:

Russian River - Upper

Survey Dates: 9/7/2002 to 9/7/2002

Confluence Location: Quad: HOPLAND

Legal Description: T13NR10WS32

Latitude: 38:55:48.0N

Longitude: 123:00:15.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Mean Max 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
26	0	DRY	37.1	157	4093	61.7									
30	11	FLATWATER	42.9	75	2239	33.7	4.5	0.4	0.9	164	4926	63	1890		13
11	11	POOL	15.7	21	232	3.5	8.9	1.2	1.8	180	1983	259	2854	209	13
3	3	RIFFLE	4.3	24	73	1.1	2.6	0.1	0.2	13	38	1	4		
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
70	25				6637					6947			4748		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Jakes Creek

LLID:

1230043389301

Drainage: Russian River - Upper

Survey Dates: 9/7/2002 to 9/7/2002

Confluence Location: Quad: HOPLAND

Legal Description: T13NR10WS32

Latitude: 38:55:48.0N

Longitude: 123:00:15.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Max 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	Mean Canopy (%)
2	2	LGR	2.9	28	55	0.8	2	0.1	0.2	16	31	2	3			74
1	1	HGR	1.4	18	18	0.3	4	0.1	0.2	7	7	1	1			89
6	4	GLD	8.6	16	95	1.4	5	0.5	1.4	92	554	53	320		19	79
1	1	RUN	1.4	52	52	0.8	6	1.0	1.8	187	187	187	187		5	77
23	6	SRN	32.9	91	2092	31.5	4	0.3	1.2	208	4790	49	1122		5	84
10	10	MCP	14.3	21	206	3.1	9	1.3	3.5	180	1801	269	2690	217	14	83
1	1	LSR	1.4	26	26	0.4	7	0.7	1.8	182	182	164	164	127	5	97
26	0	DRY	37.1	157	4093	61.7										86
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)		Total Volume (cu.ft.)				
70	25				6637					7553		4487				

Table 3 - Summary of Pool Types

Stream Name: Jakes Creek

LLID:

1230043389301

Drainage: Russian River - Upper

Survey Dates: 9/7/2002 to 9/7/2002

Confluence Location: Quad: HOPLAND

Legal Description: T13NR10WS32

Latitude: 38:55:48.0N

Longitude: 123:00:15.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Residual Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Residual Pool Vol (cu.ft.)	Estimated Total Resid.Vol. (cu.ft.)	Mean Shelter Rating
10	10	MAIN	91	21	206	89	9.1	1.3	180	1801	217	2171	14
1	1	SCOUR	9	26	26	11	7.0	0.7	182	182	127	127	5
Total Units	Total Units Fully Measured				Total Length (ft.)				Total Area (sq.ft.)			Total Volume (cu.ft.)	
11	11				232				1983			2298	

Table 4 - Summary of Maximum Residual Pool Depths By Pool Habitat Types

Stream Name: Jakes Creek

LLID:

1230043389301 Drainage: Russian River - Upper

Survey Dates: 9/7/2002 to 9/7/2002

Confluence Location: Quad: HOPLAND Legal Description: T13NR10WS32 Latitude: 38:55:48.0N Longitude: 123:00:15.0W

Habitat Units	Habitat Type	Habitat Occurrence (%)	< 1 Foot Maximum Residual Depth	< 1 Foot Percent Occurrence	1 < 2 Feet Maximum Residual Depth	1 < 2 Feet Percent Occurrence	2 < 3 Feet Maximum Residual Depth	2 < 3 Feet Percent Occurrence	3 < 4 Feet Maximum Residual Depth	3 < 4 Feet Percent Occurrence	>= 4 Feet Maximum Residual Depth	>= 4 Feet Percent Occurrence
10	MCP	91	1	10	8	80	0	0	1	10	0	0
1	LSR	9	0	0	1	100	0	0	0	0	0	0

Total Units

Total Units	Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1 < 2 Foot Max Resid. Depth	Total 1 < 2 Foot % Occurrence	Total 2 < 3 Foot Max Resid. Depth	Total 2 < 3 Foot % Occurrence	Total 3 < 4 Foot Max Resid. Depth	Total 3 < 4 Foot % Occurrence	Total >= 4 Foot Max Resid. Depth	Total >= 4 Foot % Occurrence
11	1	9	9	82	0	0	1	9	0	0

Mean Maximum Residual Pool Depth (ft.): 1.8

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Jakes Creek LLID: 1230043389301 Drainage: Russian River - Upper
 Survey Dates: 9/7/2002 to 9/7/2002 Dry Units: 26
 Confluence Location: Quad: HOPLAND Legal Description: T13NR10WS32 Latitude: 38:55:48.0N Longitude: 123:00:15.0W

Habitat Units	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
2	0	LGR									
1	0	HGR									
3	0	TOTAL RIFFLE									
6	4	GLD	8	0	4	0	5	0	0	84	0
1	1	RUN	0	0	0	0	0	0	0	100	0
23	2	SRN	0	0	0	0	0	0	0	100	0
30	7	TOTAL FLAT	4	0	2	0	3	0	0	91	0
10	9	MCP	17	0	0	0	0	0	0	83	0
1	1	LSR	45	0	0	45	0	0	0	10	0
11	10	TOTAL POOL	20	0	0	5	0	0	0	76	0
70	17	TOTAL	13	0	1	3	1	0	0	82	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Jakes Creek LLID: 1230043389301 Drainage: Russian River - Upper
 Survey Dates: 9/7/2002 to 9/7/2002 Dry Units: 26
 Confluence Location: Quad: HOPLAND Legal Description: T13NR10WS32 Latitude: 38:55:48.0N Longitude: 123:00:15.0W

Habitat Units	Units Fully Measured	Habitat Type	% Total Silt/Clay Dominant	% Total Sand Dominant	% Total Gravel Dominant	% Total Small Cobble Dominant	% Total Large Cobble Dominant	% Total Boulder Dominant	% Total Bedrock Dominant
2	2	LGR	0	0	0	50	0	50	0
1	1	HGR	0	0	0	0	100	0	0
6	4	GLD	0	0	50	0	0	50	0
1	1	RUN	0	0	100	0	0	0	0
23	6	SRN	0	0	0	17	0	83	0
10	4	MCP	25	25	0	0	0	50	0
1	1	LSR	100	0	0	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Jakes Creek LLID: 1230043389301 Drainage: Russian River - Upper
 Survey Dates: 9/7/2002 to 9/7/2002
 Confluence Location: Quad: HOPLAND Legal Description: T13NR10WS32 Latitude: 38:55:48.0N Longitude: 123:00:15.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
83	52	48	0	12	12

Note: Mean percent conifer and hardwood 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 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Jakes Creek

LLID:

1230043389301 Drainage: Russian River - Upper

Survey Dates: 9/7/2002 to 9/7/2002

Confluence Location: Quad: HOPLAND

Legal Description: T13NR10WS32 Latitude: 38:55:48.0N Longitude: 123:00:15.0W

Mean Percentage of Dominant Stream Bank Substrate

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Bedrock	3	1	8.3
Boulder	9	16	52.1
Cobble / Gravel	8	6	29.2
Sand / Silt / Clay	4	1	10.4

Mean Percentage of Dominant Stream Bank Vegetation

Dominant Class of Vegetation	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Grass	2	4	12.5
Brush	1	3	8.3
Hardwood Trees	8	8	33.3
Coniferous Trees	7	6	27.1
No Vegetation	6	3	18.8

Total Stream Cobble Embeddedness Values: 2

Table 10 - Mean Percent of Shelter Cover Types For Entire Stream

StreamName: Jakes Creek

LLID:

1230043389301 Drainage: Russian River - Upper

Survey Dates: 9/7/2002 to 9/7/2002

Confluence Location: Quad: HOPLAND

Legal Description: T13NR10WS32 Latitude: 38:55:48.0N Longitude: 123:00:15.0W

	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)		4	20
SMALL WOODY DEBRIS (%)		0	0
LARGE WOODY DEBRIS (%)		2	0
ROOT MASS (%)		0	5
TERRESTRIAL VEGETATION (%)		3	0
AQUATIC VEGETATION (%)		0	0
WHITEWATER (%)		0	0
BOULDERS (%)		91	76
BEDROCK LEDGES (%)		0	0

Appendix C - Fish Habitat Inventory Data Summary

Stream Name: Jakes Creek	LLID: 1230043389301	Drainage: Russian River -
Survey Dates: 9/7/2002 to 9/7/2002	Survey Length (ft.): 6637	Main Channel (ft.): 6637 Side Channel (ft.): 0
Confluence Location: Quad: HOPLAND	Legal Description: T13NR10WS32	Latitude: 38:55:48.0N Longitude: 123:00:15.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: B3	Canopy Density (%): 82.7	Pools by Stream Length (%): 5.4
Reach Length (ft.): 4311	Coniferous Component (%): 54.1	Pool Frequency (%): 16.9
Riffle/Flatwater Mean Width (ft.): 4.2	Hardwood Component (%): 45.9	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 90.9
Range (ft.): to	Vegetative Cover (%): 11.2	2 to 2.9 Feet Deep: 0.0
Mean (ft.):	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 9.1
Std. Dev.:	Dominant Bank Substrate Type: Boulder	>= 4 Feet Deep: 0.0
Base Flow (cfs): 0	Occurrence of LWD (%): 2.6	Mean Max Residual Pool Depth (ft.): 1.84
Water (F): 52 - 60	Air (F): 65 - 70	LWD per 100 ft.:
Dry Channel (ft.): 1968		Riffles:
		Pools:
		Flat:
Pool Tail Substrate (%): Silt/Clay: 0.0	Sand: 0.0	Gravel: 27.3
Embeddedness Values (%): 1. 9.1	2. 54.5	3. 36.4
	4. 0.0	5. 0.0
		Sm Cobble: 9.1
		Lg Cobble: 27.3
		Boulder: 36.4
		Bedrock: 0.0

STREAM REACH: 2

Channel Type: B3	Canopy Density (%): 89.0	Pools by Stream Length (%): 0.0
Reach Length (ft.): 1876	Coniferous Component (%): 20.0	Pool Frequency (%): 0.0
Riffle/Flatwater Mean Width (ft.):	Hardwood Component (%): 80.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep:
Range (ft.): to	Vegetative Cover (%): 20.0	2 to 2.9 Feet Deep:
Mean (ft.):	Dominant Shelter:	3 to 3.9 Feet Deep:
Std. Dev.:	Dominant Bank Substrate Type: Bedrock	>= 4 Feet Deep:
Base Flow (cfs): 0	Occurrence of LWD (%):	Mean Max Residual Pool Depth (ft.):
Water (F): 60 - 60	Air (F): 70 - 70	LWD per 100 ft.:
Dry Channel (ft.): 1876		Riffles:
		Pools:
		Flat:
Pool Tail Substrate (%): Silt/Clay:	Sand:	Gravel:
Embeddedness Values (%): 1.	2.	3.
		4.
		5. 0.0
		Sm Cobble:
		Lg Cobble:
		Boulder:
		Bedrock:

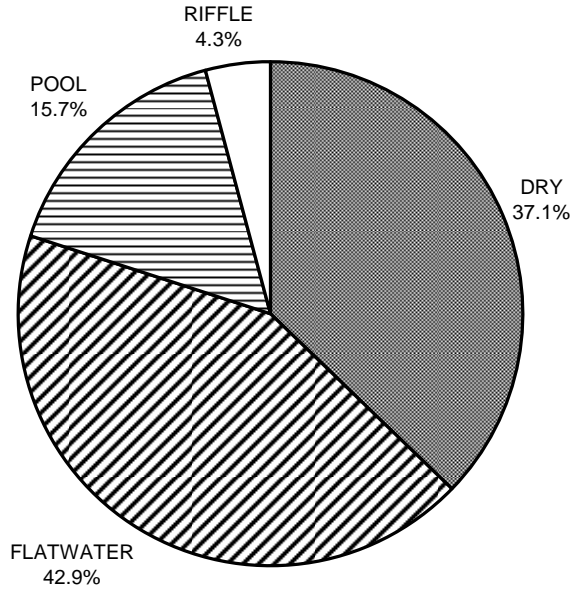
Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

Channel Type: B3	Canopy Density (%): 90.5	Pools by Stream Length (%): 0.0
Reach Length (ft.): 450	Coniferous Component (%): 25.0	Pool Frequency (%): 0.0
Riffle/Flatwater Mean Width (ft.): 3.0	Hardwood Component (%): 75.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep:
Range (ft.): to	Vegetative Cover (%): 20.0	2 to 2.9 Feet Deep:
Mean (ft.):	Dominant Shelter:	3 to 3.9 Feet Deep:
Std. Dev.:	Dominant Bank Substrate Type: Boulder	>= 4 Feet Deep:
Base Flow (cfs): 0	Occurrence of LWD (%): 0.0	Mean Max Residual Pool Depth (ft.):
Water (F): 56 - 56 Air (F): 68 - 68	LWD per 100 ft.:	Mean Pool Shelter Rating:
Dry Channel (ft.): 249	Riffles:	
	Pools:	
	Flat:	
Pool Tail Substrate (%): Silt/Clay:	Sand:	Gravel:
Embeddedness Values (%): 1.	2.	3.
		Sm Cobble:
		4.
		Lg Cobble:
		5. 0.0
		Boulder:
		Bedrock:

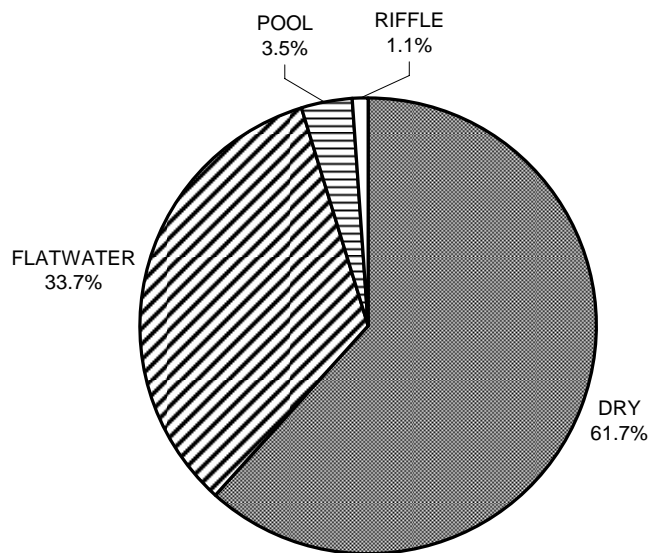
APPENDIX D: GRAPHS

**JAKES CREEK 2002
HABITAT TYPES BY PERCENT OCCURRENCE**



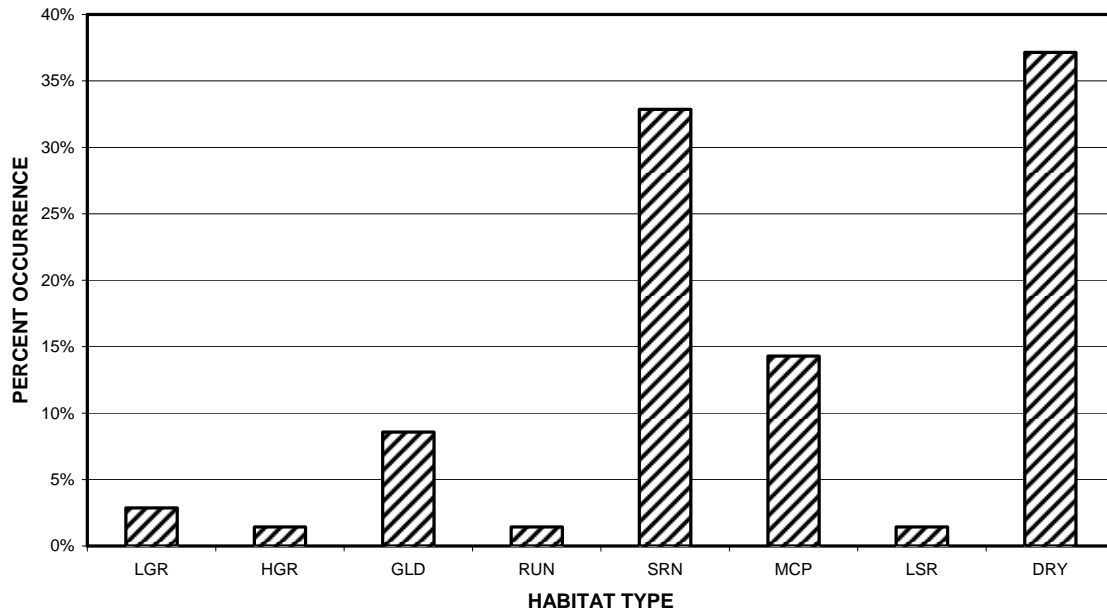
GRAPH 1: Level II habitat types by percent occurrence

**JAKES CREEK 2002
HABITAT TYPES BY PERCENT TOTAL LENGTH**



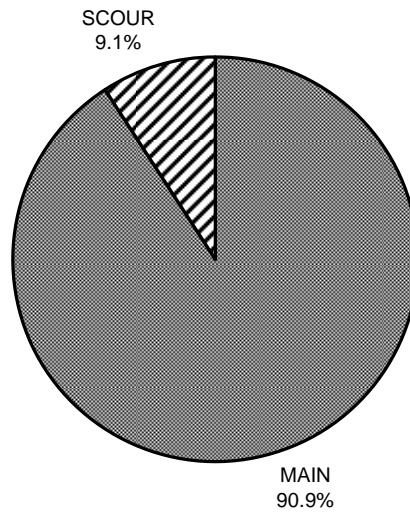
GRAPH 2: Level II habitat types by percent total length

**JAKES CREEK 2002
HABITAT TYPES BY PERCENT OCCURRENCE**



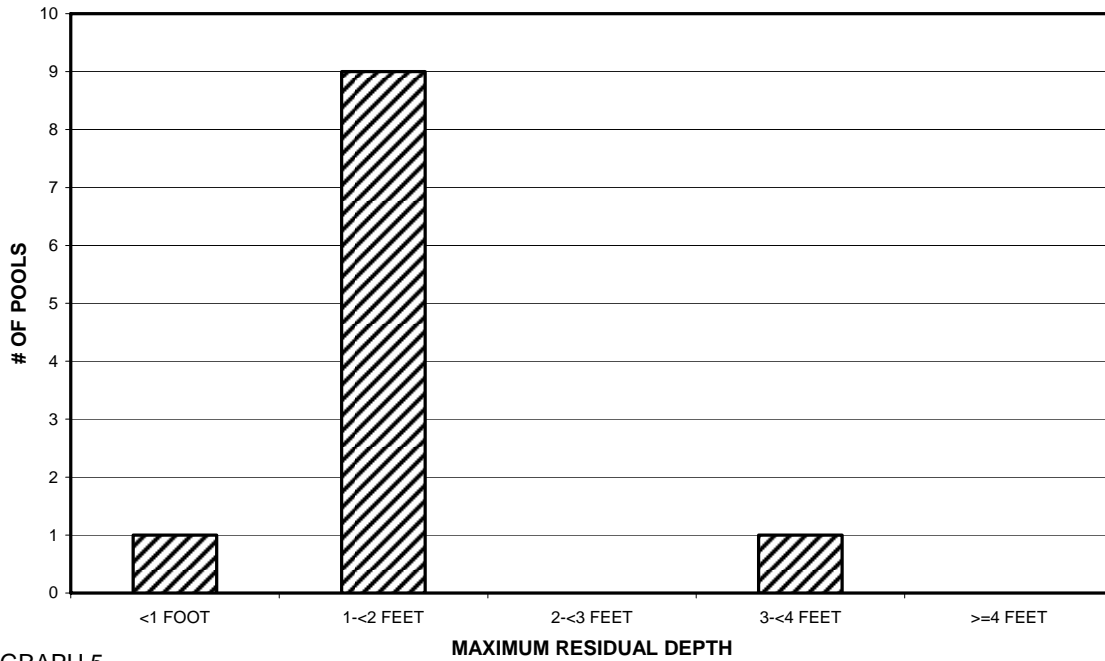
GRAPH 3: Level IV habitat types by percent occurrence

**JAKES CREEK 2002
POOL TYPES BY PERCENT OCCURRENCE**



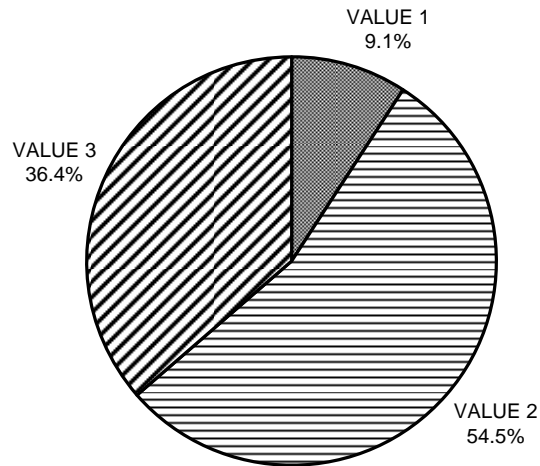
GRAPH 4: Level I pool types by percent occurrence.

**JAKES CREEK 2002
MAXIMUM DEPTH IN POOLS**



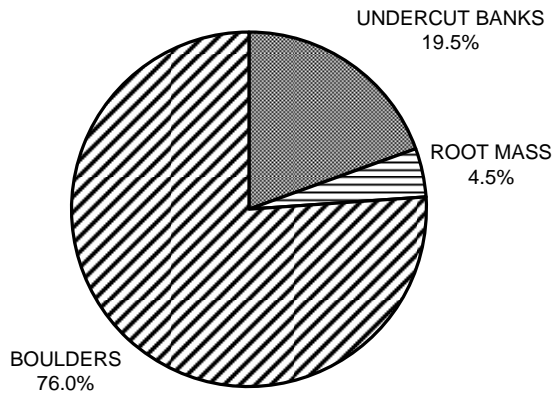
GRAPH 5

**JAKES CREEK 2002
PERCENT EMBEDDEDNESS**



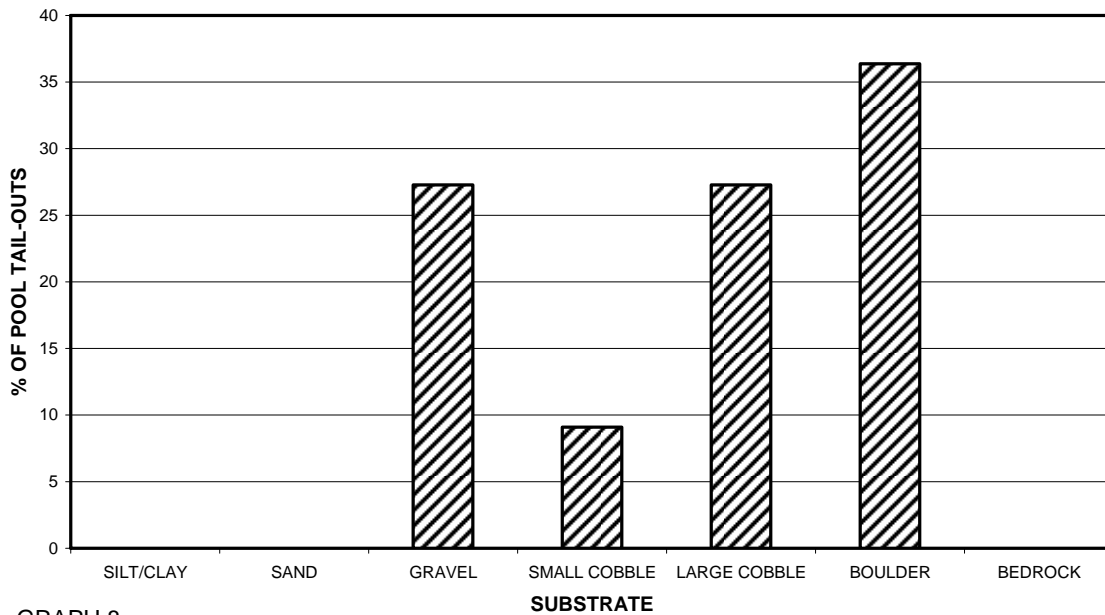
GRAPH 6

**JAKES CREEK 2002
MEAN PERCENT COVER TYPES IN POOLS**



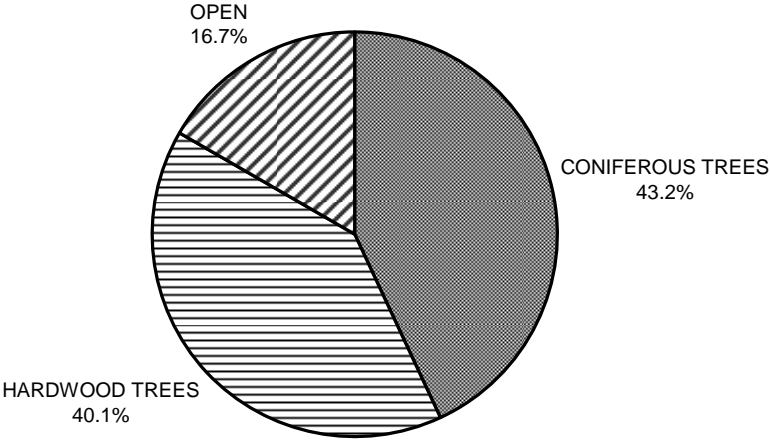
GRAPH 7

**JAKES CREEK 2002
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS**



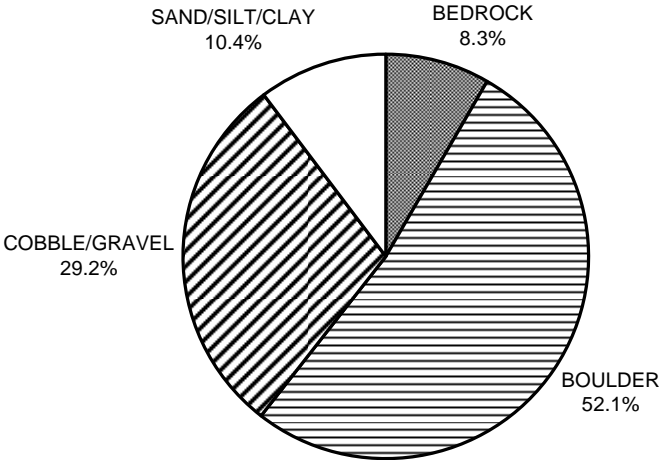
GRAPH 8

**JAKES CREEK 2002
MEAN PERCENT CANOPY**



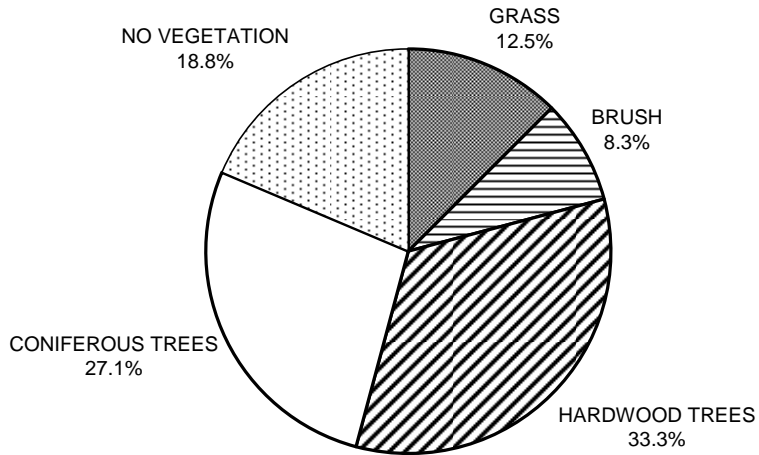
GRAPH 9

**JAKES CREEK 2002
DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10

**JAKES CREEK 2002
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11