

CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT
South Branch Robinson Creek
Report Revised April 14, 2006
Report Completed 2005
Assessment Completed 2001

INTRODUCTION

A stream inventory was conducted during 6/11/2001 to 6/18/2001 on South Branch Robinson Creek. The survey began at the confluence with Robinson Creek and extended upstream 1.5 miles.

The South Branch Robinson Creek inventory was conducted in two parts: habitat inventory and biological inventory. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in South Branch Robinson Creek. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species.

The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for 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

South Branch Robinson Creek is a tributary to Robinson Creek which is a tributary to the Russian River, located in Sonoma/Mendocino County, California (see South Branch Robinson Creek map, Appendix A). The legal description at the confluence with the Robinson Creek is T14N, R13W, S11. Its location is 39.088424209572 N. latitude and 123.2515491971 W. longitude, LLID 1232515390884. Year round vehicle access exists by taking Highway 101 to Highway 253.

South Branch Robinson Creek and its tributaries drain a basin of approximately 40 square miles. South Branch Robinson Creek is a fourth order stream and has approximately 3.29 miles of intermittent stream, according to the USGS Boonville and Elledge Peak 7.5 minute quadrangles. In June 2001, summer flow was measured as approximately 0.17 cfs at 0.4 miles upstream from the mouth. Elevations range from about 860 feet at the mouth of the creek to 3058 feet in the headwaters. Oak woodland dominates the watershed, but there are significant zones of Douglas fir forest. There are also some patches of grassland and chaparral in the watershed. The watershed is 99% privately owned and 1% federally owned and is managed for scattered rural-residential development and small amounts of vineyard development. Sensitive plants listed from the California Natural Diversity Data Database in the South Branch Robinson watershed include the Mendocino Bush Mallow (*Malacothamnus mendocinensis*) and the North Coast Semaphore Grass (*Pleuropogon Hooverianus*). The Mendocino Bush Mallow has no federal or California status, was last seen in 1937, and is presumed extinct. The North Coast Semaphore Grass is a candidate for California listing, but has no federal status.

METHODS

The habitat inventory conducted in South Branch Robinson Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The California Conservation Corps (CCC) Technical Advisors and Watershed Stewards Project/AmeriCorps (WSP/AmeriCorps) Members that conducted the inventory were trained in standardized habitat inventory

methods by the California Department of Fish and Game (DFG). This inventory was conducted by a two-person team.

SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the 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. All pools except step-pools are fully sampled.

HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the *California Salmonid Stream Habitat Restoration Manual*. This form was used in South Branch Robinson Creek to record measurements and observations. There are nine components to the inventory form.

1. Flow:

Flow is measured in cubic feet per second (cfs) near the bottom of the stream survey reach using a Marsh-McBirney Model 2000 flow meter.

2. Channel Type:

Channel typing is conducted according to the classification system developed and revised by David Rosgen (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:

Both water and air temperatures are measured and recorded at every tenth habitat unit. The time of the measurement is also recorded. Both temperatures are taken in degrees Fahrenheit at the middle of the habitat unit and within one foot of the water surface.

4. Habitat Type:

Habitat typing uses the 24 habitat classification types defined by McCain and others (1990). Habitat units are numbered sequentially and assigned a type identification number selected from a standard list of 24 habitat types. Dewatered units are labeled "dry". South Branch Robinson 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 are in feet to the nearest tenth. Habitat characteristics are measured using a clinometer, hip chain, and stadia rod.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In South Branch Robinson Creek, embeddedness was ocularly estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3) and 76 - 100% (value 4). Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate like bedrock, log sills, boulders or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide juvenile 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 for prey. The shelter rating is calculated for each fully-described habitat unit by multiplying shelter value and percent cover. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All cover is then classified according to a list of nine cover types. In South Branch Robinson Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:

Substrate composition ranges from silt/clay sized particles to boulders and bedrock elements. In all fully-described habitat units, dominant and sub-dominant substrate elements were ocularly estimated using a list of seven size classes and recorded as a one and two, respectively. In addition, the dominant substrate composing the pool tail-outs is recorded for each pool.

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 South Branch Robinson Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of approximately every third unit in addition to every fully-described unit, giving an approximate 30% sub-sample. In addition, the area of canopy was estimated ocularly into percentages of coniferous or hardwood 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 South Branch Robinson Creek, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully-described unit were selected from the habitat inventory form.

Additionally, the percent of each bank covered by vegetation (including downed trees, logs, and rootwads) was estimated and recorded.

BIOLOGICAL INVENTORY

Data from the habitat inventory form are entered into Habitat, a dBASE IV data entry program developed by 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 Residual Pool Depths by Habitat Types
- Mean Percent Cover by Habitat Type
- Dominant Substrates by Habitat Type
- Mean Percent Vegetative Cover for Entire Stream
- Fish Habitat Inventory Data Summary by Stream Reach (Table 8)
- Mean Percent Dominant Substrate / Dominant Vegetation Type for Entire Stream
- Mean Percent Shelter Cover Types for Entire Stream

Graphics are produced from the tables using Microsoft Excel. Graphics developed for South Branch Robinson Creek include:

- Riffle, Flatwater, Pool Habitat Types by Percent Occurrence
- Riffle, Flatwater, Pool Habitat Types by Total Length
- Total Habitat Types by Percent Occurrence
- Pool Types by Percent Occurrence
- Maximum Residual Depth in Pools
- Percent Embeddedness
- Mean Percent Cover Types in Pools
- Substrate Composition in Pool Tail-outs
- Mean Percent Canopy
- Dominant Bank Composition by Composition Type
- Dominant Bank Vegetation by Vegetation Type

HABITAT INVENTORY RESULTS

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

The habitat inventory of 6/11/2001 to 6/18/2001, was conducted by S. Popek, M. Shugars, J. Wellings, J. Newell, G. Archer, D. Mitchel. The total length of the stream surveyed was 7,998 feet with an additional 257 feet of side channel.

In June 2001, summer flow was measured as approximately 0.17 cfs at 0.4 miles upstream from the mouth.

South Branch Robinson Creek is a F4 channel type for 3,563 feet of the stream surveyed (Reach 1), a B3 channel type for 2,436 feet of the stream surveyed (Reach 2), a G2 channel type for 683 feet of the stream surveyed (Reach 3), a A2 channel type for 1,316 feet of the stream surveyed (Reach 4).

F4 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates.

A2 channels are steep, narrow, cascading, step-pool, high energy debris transporting channels associated with depositional soils, and gravel dominant substrates.

Water temperatures taken during the survey period ranged from 56° to 72° Fahrenheit. Air temperatures ranged from 66° to 89° Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of *occurrence* there were 47% flatwater units, 31% pool units, 7% dry units, 15% riffle units, (Graph 1). Based on total *length* of Level II habitat types there were 38% flatwater units, 14% pool units, 40% dry units, 7% riffle units, (Graph 2).

Fifteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent *occurrence* were 19% Run units, 18% Step Run units, 15% Mid-Channel Pool units, and 11% Glide units, (Graph 3). Most frequent habitat types based on percent total *length* were 40% Dry units, 14% Run units, 14% Step Run units, and 10% Glide units (Table 2).

A total of 33 pools were identified (Table 3). Main Channel pools were the most frequently encountered, at 64%, and comprised 68% 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. Nine of the 31 pools (29%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 31 pool tail-outs measured, one had a value of 1 (3.2%); ten had a value of 2 (32.3%); eleven had a value of 3 (35.5%); two had a value of 4 (6.5%); and seven had a value of 5 (22.6%); (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. Riffle habitat types had a mean shelter rating of 6, flatwater habitat types had a mean shelter rating of 4, and pool habitats had a mean shelter rating of 20 (Table 1). Of the pool types, the Main Channel pools had a mean shelter rating of 23, Scour pools had a mean shelter rating of 18, Backwater 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 South Branch Robinson Creek. Graph 7 describes the pool cover in South Branch Robinson Creek. Boulders (47%) are the dominant pool cover type followed by small woody debris (12%).

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. The dominant types of substrate are gravel observed in 39% of pool tail-outs,

and boulders observed in 32% of pool tail-outs.

The mean percent canopy density for the surveyed length of South Branch Robinson Creek was 42%. The mean percentages of hardwood and coniferous trees were 39% and 61%, respectively. Fifty-eight percent of the canopy was open. Graph 9 describes the mean percent canopy in South Branch Robinson Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 35%. The mean percent left bank vegetated was 36%. The dominant elements composing the structure of the stream banks consisted of 16% bedrock, 33% boulder, 28% cobble/gravel, 21% sand/silt/clay, (Graph 10). Grass was the dominant vegetation type observed in 29% of the units surveyed. Additionally, 25.6% of the units surveyed had hardwood trees as the dominant vegetation type, and 24.4% had coniferous trees as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

On 09/28/01 a biological inventory was conducted at two sites on South Branch Robinson Creek to document fish species composition and distribution. Site 1 began at Lat. 39:4'25.9", Long. 123:15'32.1". Fish from the site were counted by species, and returned to the stream. The air temperature ranged from 58-73°F and the water temperature was 53°F.

The inventory began at 0915 hours in Reach 1 and ended at 1045 hours. Habitat types surveyed were lateral scour pool - bedrock formed, mid-channel pools, runs and glides. The following table displays the information yielded from this site.

Species Observed	Numbers Recorded at Site 1
Steelhead YOY	27
Steelhead Y+	7
Steelhead 2+	1
Newt	3
Salamander	5
Yellow-legged Frog	15

Site 2 on South Branch Robinson Creek began at Lat. 39:4'23.4", Long. 123:15'33.5". Fish from the site were counted by species, and returned to the stream. The air temperature ranged from 72-73°F and the water temperature ranged from 52-53°F.

The inventory began at 1045 hours in Reach 1 and ended at 1223 hours. Habitat types surveyed were lateral scour pool - bedrock formed, mid-channel pools, runs and glides. The following table displays the information yielded from this site.

Species Observed	Numbers Recorded at Site 2
Steelhead YOY	4
Steelhead Y+	18
Steelhead 2+	3
Newt	11
Salamander	104
Yellow-legged Frog	33

Historical records reflect that hatchery raised steelhead yearlings were planted in Robinson Creek in 1938, 1972, and 1975 (Table 1) Steelhead fingerlings were transferred to Robinson Creek from various creeks between 1958-1966 (Table 1). Steelhead fingerlings and yearlings were rescued/transferred from Robinson Creek on various occasions between 1955 and 1966 (Table 2).

Table 1. Summary of fish stocking/transfers into Robinson Creek				
YEAR	SOURCE	SPECIES	#	SIZE
1938	Prairie Creek Hatchery	SH	15.2 (LBS)	YEAR
1958	Crawford Creek	SH	3,060	FING
1958	Dooley Creek	SH	720	FING
1958	Feliz Creek	SH	7,440	FING
1958	Johnson Creek	SH	660	FING
1958	McNab Creek	SH	6,668	FING
1958	Robinson Creek	SH	1,714	FING

Table 1. Summary of fish stocking/transfers into Robinson Creek				
YEAR	SOURCE	SPECIES	#	SIZE
1959	McNab Creek	SH	1,920	FING
1966	Robinson Creek (S. Fork)	SH	2,112	FING
1972	Talmage	SH	2,502	YEAR
1975	Talmage	SH	7,931	YEAR

SH = steelhead

YEAR = yearling

FING = fingerling

Talmage = Fish raised by Fish and Game County Advisory Commission at Talmage Ponds

Table 2. Summary of fish rescues/transfers from Robinson Creek				
YEAR	RELEASE LOCATION	SPECIES	#	SIZE
1955	Russian River	SH	39,462	FING
1956	Russian River	SH	28,006	FING
1957	Russian River	SH	5,657	FING
1959	Russian River	SH	5,936	FING
1960	Cummisky Creek	SH	2,392	FING
1960	Russian River	SH	19	YEAR
1960	Russian River	SH	12,375	FING
1962	Cummisky Creek	SH	2,658	FING

YEAR	RELEASE LOCATION	SPECIES	#	SIZE
1962	Russian River	SH	5,980	FING
1964	Russian River	SH	3,032	FING
1965	Russian River	SH	5,094	FING
1966	Russian River	SH	2,880	FING

SH = steelhead
 FING = fingerling
 YEAR = yearling

DISCUSSION

South Branch Robinson Creek is a F4 channel type for 3,563 feet of the stream surveyed (Reach 1), a B3 channel type for 2,436 feet of the stream surveyed (Reach 2), a G2 channel type for 683 feet of the stream surveyed (Reach 3), a A2 channel type for 1,316 feet of the stream surveyed (Reach 4).

According to the DFG Salmonid Stream Habitat Restoration Manual, F4 is good for bank-placed boulders and fair for plunge weirs, single and opposing wing deflectors, channel constrictors and log cover. Many site specific projects can be designed within this channel type, especially to increase pool frequency, volume and shelter. Any work considered will require careful design, placement, and construction that must include protection for any unstable banks.

B3 is excellent for plunge weirs, boulder clusters and bank-placed boulders, also, single and opposing wing deflectors and log cover. Many site specific projects can be designed within this channel type, especially to increase pool frequency, volume and shelter. 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.

G2 is fair for log cover and A2 is not suitable for fish habitat improvement structures.

The water temperatures recorded on the survey days 6/11/2001 to 6/18/2001, ranged from 56° to 72° Fahrenheit. Air temperatures ranged from 66° to 89° Fahrenheit. To make any further conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling would need to be conducted.

Flatwater habitat types comprised 38% of the total length of this survey, riffles 7%, and pools 14%. The pools are relatively shallow/deep, with only nine of the 31 (29%) pools having a maximum residual depth greater than two 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.

Eleven of the 31 pool tail-outs measured had embeddedness ratings of 1 or 2. Thirteen of the pool tail-outs had embeddedness ratings of 3 or 4. Seven 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 South Branch Robinson Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Eighteen of the 31 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter rating for pools was 20. The shelter rating in the flatwater habitats was 4. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by Boulders in South Branch Robinson Creek. Boulders are the dominant cover type in pools followed by small woody debris. 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 42%. Reach 1 had a canopy density of 13.1%, Reach 2 had a canopy density of 36.3%, Reach 3 had a canopy density of 63.5%, Reach 4 had a canopy density of 68.3%. 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 35% and 36%, 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 RECOMMENDATIONS

South Branch Robinson 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.

RECOMMENDATIONS

- 1) Increase the canopy on South Branch Robinson Creek by planting appropriate native vegetation like willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels. The reaches above this survey section should be inventoried and treated as well, since the water flowing here is affected from upstream. In many cases, planting will need to be

coordinated to follow bank stabilization or upslope erosion control projects.

- 2) Where feasible, design and engineer pool enhancement structures to increase the number of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.
- 3) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover is from Boulders. Adding high quality complexity with woody cover is desirable.
- 4) South Brach Robinson Creek would benefit from the utilizing bio-technical vegetative techniques to re-establish floodplain beches and a defined low flow channel. This would discourage lateral migration of the base flow channel and decrease bank erosion.
- 5) Inventory and map sources of stream bank 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.
- 6) 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.

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.

South Branch Robinson Creek

Position (ft.)	Habitat Unit #	Comments:
0	0001.00	Confluence 68° F
452	0006.00	LB highly eroded
705	0009.00	30+ SH YOY Some newts
739	0010.00	Rock gabions on RB at end of unit
1030	0011.00	Rock gabions at end of unit 200 + SH YOY N 39°05'10" W 123°75'9.6"
2019	0019.00	15+ SH YOY

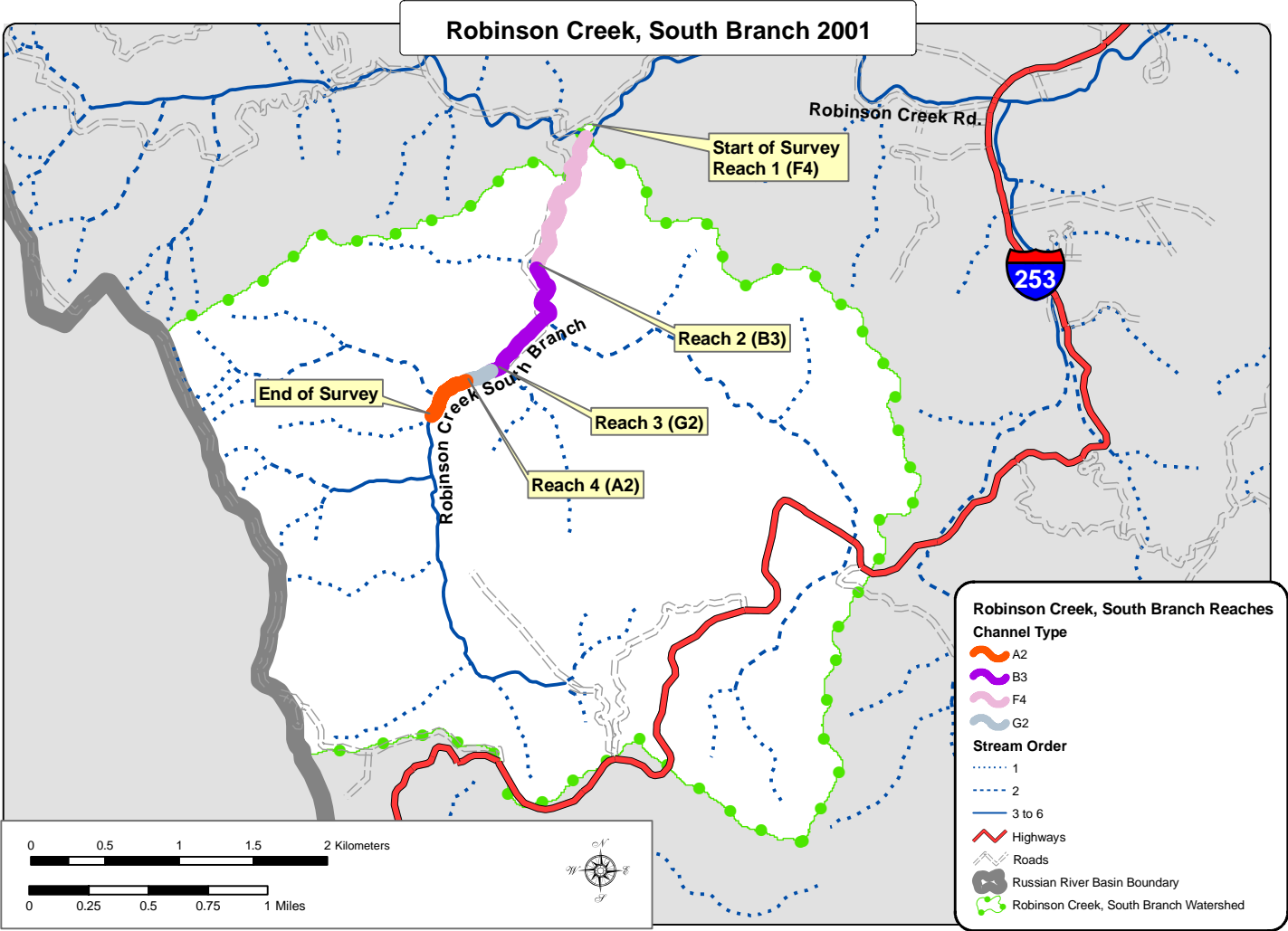
2063	0020.00	RB erosion
2318	0024.00	Boulder gabions LB
2447	0026.00	Boulder gabions LB
2683	0029.00	LB gabions 70+ SH YOY
2878	0033.00	No more gabions
2984	0035.00	Old tractor LB
3281	0039.00	Substrate change to cobble
3446	0043.00	Dry trib and gabions LB Cable across creek, maybe from an old fence
3548	0044.00	2+ salmonids .8' in length (moved upstream 6/14)
3563	0045.00	Large section of boulder gabions, large dry trib RB, large dry trib RB at end of unit, irrigation system RB, 2" water draw, both banks
5846	0047.00	RB 5 metal bed frames and 2 V.W.'s
5999	0050.00	Channel change to G2
6212	0053.00	6 SH YOY
6646	0067.00	Newts and SH YOY utilizing pool
6682	0068.00	Channel change to A2
6752	0070.00	DAM H:1' L:1' W:15' No flashboards, no downcutting, no gravel retained Sill to H2O level: 1'
6796	0071.00	2+ salmonid
6956	0078.00	2" pipe crossing creek 3 ft. jump - passable at high flow
7070	0082.00	2@4' jump/falls 1@6'jump/falls

7090	0083.00	Erosive RB
7102	0084.00	6' jump/falls
7186	0087.00	3" long salamander Dry trib RB
7483	0090.00	Dry trib LB
7534	0091.00	Handful of YOY
7652	0095.00	Erosive banks, fallen trees in channel
7811	0099.00	Dry side channel, not surveyed
7917	0101.00	Series of 2' jumps - no passage problem
7958	0103.00	END SURVEY

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.
- McCain, M., D. Fuller, L. Decker and K. Overton. 1990. Stream habitat classification and inventory procedures for northern California. FHC Currents. No.1. U.S. Department of Agriculture. Forest Service, Pacific Southwest Region.
- Rosgen, D.L., 1994. A Classification of Natural Rivers. *Catena*, Vol 22: 169-199, Elsevier Science, B. V. Amsterdam.

APPENDIX A: MAP



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Prepared by: Celeste Dodge and Colin Brooks, April 4, 2005

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: South Branch Robinson Creek

LLID:

1232515390884

Drainage: Russian River - Upper

Survey Dates: 6/11/2001 to 6/18/2001

Confluence Location:

Quad: BOONVILLE

Legal Description:

T14NR13WS11

Latitude: 39:05:18.0N

Longitude: 123:15:05.0W

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 (%)
3	1	LGR	2.8	29	87	1.1	10	0.1	0.2	300	900	30	90		0	0
3	2	HGR	2.8	23	68	0.8	8	0.3	0.6	34	103	10	31		5	75
7	3	CAS	6.5	56	393	4.8	3	0.3	1.3	32	225	14	95		12	64
3	1	BRS	2.8	19	57	0.7	1	0.1	0.2	8	23	1	2		0	60
12	3	GLD	11.1	69	833	10.1	8	0.6	1.6	427	5128	289	3474		3	8
20	9	RUN	18.5	58	1158	14.0	7	0.5	1.8	479	9588	172	3051		4	33
19	6	SRN	17.6	61	1158	14.0	6	0.4	1.1	323	6134	126	2392		4	56
16	15	MCP	14.8	32	517	6.3	9	0.9	3.7	303	4852	350	5228	239	20	48
5	3	STP	4.6	57	283	3.4	9	3.1	2	538	2690	881	4403	778	33	75
3	3	CRP	2.8	29	86	1.0	8	0.5	1.9	242	725	429	1287	86	40	37
4	4	LSBk	3.7	42	168	2.0	11	1.2	3.1	510	2038	751	3005	669	5	31
2	1	LSBo	1.9	33	66	0.8	9	0.8	2.1	396	792	396	792	317	15	
2	2	PLP	1.9	21	42	0.5	20	1.2	2.7	445	889	622	1245	534	13	68
1	1	SCP	0.9	21	21	0.3	4			74	74				5	5
8	0	DRY	7.4	415	3318	40.2									0	20

Total Units Fully Measured
108 54

Total Length (ft.)
8255

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Total Area (sq.ft.)
34161

Total Volume (cu.ft.)
25095

Table 3 - Summary of Pool Types

Stream Name: South Branch Robinson Creek

LLID:

1232515390884

Drainage:

Russian River - Upper

Survey Dates: 6/11/2001 to 6/18/2001

Confluence Location: Quad: BOONVILLE

Legal Description: T14NR13WS11

Latitude: 39:05:18.0N

Longitude: 123:15:05.0W

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
21	18	MAIN	64	38	800	68	9.2	1.3	342	7190	334	6627	23
11	10	SCOUR	33	33	362	31	11.6	0.9	405	4453	470	4656	18
1	1	BACKWATER	3	21	21	2	3.5		74	74		0	5
Total Units	Total Units Fully Measured				Total Length (ft.)				Total Area (sq.ft.)			Total Volume (cu.ft.)	
33	29				1183				11717			11283	

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

Stream Name: South Branch Robinson Creek

LLID:

1232515390884

Drainage: Russian River - Upper

Survey Dates: 6/11/2001 to 6/18/2001

Confluence Location:

Quad: BOONVILLE

Legal Description:

T14NR13WS11

Latitude: 39:05:18.0N

Longitude: 123:15:05.0W

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
16	MCP	52	1	6	11	69	2	13	2	13	0	0
4	STP	13	1	25	2	50	1	25	0	0	0	0
3	CRP	10	1	33	2	67	0	0	0	0	0	0
4	LSBk	13	0	0	2	50	1	25	1	25	0	0
2	LSBo	6	1	50	0	0	1	50	0	0	0	0
2	PLP	6	0	0	1	50	1	50	0	0	0	0

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
31	4	13	18	58	6	19	3	10	0	0

Mean Maximum Residual Pool Depth (ft.):

1.7

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: South Branch Robinson Creek LLID: 1232515390884 Drainage: Russian River - Upper
 Survey Dates: 6/11/2001 to 6/18/2001 Dry Units: 8
 Confluence Location: Quad: BOONVILLE Legal Description: T14NR13WS11 Latitude: 39:05:18.0N Longitude: 123:15:05.0W

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
3	1	LGR	0	0	0	0	0	0	0	0	0
3	2	HGR	0	13	0	0	0	0	0	88	0
7	3	CAS	0	0	0	0	0	0	0	67	0
3	1	BRS	0	0	0	0	0	0	0	0	0
16	7	TOTAL RIFFLE	0	4	0	0	0	0	0	54	0
12	2	GLD	0	0	0	0	0	0	0	50	0
20	7	RUN	0	0	0	0	19	0	0	31	7
19	5	SRN	0	0	2	0	8	0	0	50	0
51	14	TOTAL FLAT	0	0	1	0	12	0	0	41	4
16	15	MCP	6	11	0	3	9	1	1	45	12
5	4	STP	0	3	0	0	5	0	0	93	0
3	3	CRP	0	33	0	0	5	0	0	28	0
4	4	LSBk	0	0	0	0	20	5	0	25	25
2	2	LSBo	0	0	0	0	15	0	0	35	0
2	2	PLP	0	3	8	0	3	0	5	80	3
1	1	SCP	0	80	0	0	0	0	0	20	0
33	31	TOTAL POOL	3	11	0	1	9	1	1	48	9
108	53	TOTAL	2	7	0	1	8	1	0	46	6

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: South Branch Robinson Creek

LLID:

1232515390884

Drainage: Russian River - Upper

Survey Dates: 6/11/2001 to 6/18/2001

Dry Units: 8

Confluence Location:

Quad:

BOONVILLE

Legal Description: T14NR13WS11

Latitude: 39:05:18.0N

Longitude: 123:15:05.0W

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
3	1	LGR	0	0	100	0	0	0	0
3	2	HGR	0	0	0	0	0	50	50
7	3	CAS	0	0	0	0	0	67	33
3	1	BRS	0	0	0	0	0	100	0
12	3	GLD	33	33	33	0	0	0	0
20	9	RUN	0	11	33	22	0	33	0
19	6	SRN	0	0	17	0	0	83	0
16	9	MCP	0	44	22	0	0	33	0
5	1	STP	0	0	0	0	0	100	0
3	3	CRP	0	33	33	0	0	0	33
4	3	LSBk	33	0	33	0	0	33	0
2	1	LSBo	0	0	0	100	0	0	0
2	1	PLP	0	0	0	0	0	100	0
1	1	SCP	0	0	0	100	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: South Branch Robinson Creek LLID: 1232515390884 Drainage: Russian River - Upper
 Survey Dates: 6/11/2001 to 6/18/2001
 Confluence Location: Quad: BOONVILLE Legal Description: T14NR13WS11 Latitude: 39:05:18.0N Longitude: 123:15:05.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
42	61	39	12	35	36

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: South Branch Robinson Creek LLID: 1232515390884 Drainage: Russian River - Upper
 Survey Dates: 6/11/2001 to 6/18/2001
 Confluence Location: Quad: BOONVILLE Legal Description: T14NR13WS11 Latitude: 39:05:18.0N Longitude: 123:15:05.0W

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	7	7	16.3
Boulder	14	14	32.6
Cobble / Gravel	12	12	27.9
Sand / Silt / Clay	9	9	20.9

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	13	12	29.1
Brush	9	6	17.4
Hardwood Trees	9	13	25.6
Coniferous Trees	10	11	24.4
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 3

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

StreamName: South Branch Robinson Creek LLID: 1232515390884 Drainage: Russian River - Upper
 Survey Dates: 6/11/2001 to 6/18/2001
 Confluence Location: Quad: BOONVILLE Legal Description: T14NR13WS11 Latitude: 39:05:18.0N Longitude: 123:15:05.0W

	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	0	3
SMALL WOODY DEBRIS (%)	4	0	11
LARGE WOODY DEBRIS (%)	0	1	0
ROOT MASS (%)	0	0	1
TERRESTRIAL VEGETATION (%)	0	12	9
AQUATIC VEGETATION (%)	0	0	1
WHITEWATER (%)	0	0	1
BOULDERS (%)	54	41	48
BEDROCK LEDGES (%)	0	4	9

Appendix C - Fish Habitat Inventory Data Summary

Stream Name: South Branch Robinson Creek	LLID: 1232515390884	Drainage: Russian River
Survey Dates: 6/11/2001 to 6/18/2001	Survey Length (ft.): 8255	Main Channel (ft.): 7998 Side Channel (ft.): 257
Confluence Location: Quad: BOONVILLE	Legal Description: T14NR13WS11	Latitude: 39:05:18.0N Longitude: 123:15:05.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: F4	Canopy Density (%): 13.1	Pools by Stream Length (%): 16.6				
Reach Length (ft.): 3563	Coniferous Component (%): 85.0	Pool Frequency (%): 27.3				
Riffle/Flatwater Mean Width (ft.): 8.1	Hardwood Component (%): 15.0	Residual Pool Depth (%):				
BFW:	Dominant Bank Vegetation: Grass	< 2 Feet Deep: 58.3				
Range (ft.): to	Vegetative Cover (%): 43.8	2 to 2.9 Feet Deep: 25.0				
Mean (ft.):	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 16.7				
Std. Dev.:	Dominant Bank Substrate Type: Cobble/Gravel	>= 4 Feet Deep: 0.0				
Base Flow (cfs): 0	Occurrence of LWD (%): 0.0	Mean Max Residual Pool Depth (ft.):				
1.80						
Water (F): 58 - 72	Air (F): 70 - 78	LWD per 100 ft.:				
Dry Channel (ft.): 1278		Riffles:				
		Pools:				
		Flat:				
Pool Tail Substrate (%): Silt/Clay: 0.0	Sand: 0.0	Gravel: 83.3	Sm Cobble: 16.7	Lg Cobble: 0.0	Boulder: 0.0	Bedrock: 0.0
Embeddedness Values (%): 1. 8.3	2. 41.7	3. 25.0	4. 16.7	5. 8.3		

STREAM REACH: 2

Channel Type: B3	Canopy Density (%): 36.3	Pools by Stream Length (%): 2.8				
Reach Length (ft.): 2436	Coniferous Component (%): 32.5	Pool Frequency (%): 40.0				
Riffle/Flatwater Mean Width (ft.): 6.5	Hardwood Component (%): 67.5	Residual Pool Depth (%):				
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 50.0				
Range (ft.): to	Vegetative Cover (%): 29.2	2 to 2.9 Feet Deep: 50.0				
Mean (ft.):	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 0.0				
Std. Dev.:	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0.0				
Base Flow (cfs): 0	Occurrence of LWD (%): 0.0	Mean Max Residual Pool Depth (ft.):				
1.9						
Water (F): 64 - 64	Air (F): 72 - 72	LWD per 100 ft.:				
Dry Channel (ft.): 2040		Riffles:				
		Pools:				
		Flat:				
Pool Tail Substrate (%): Silt/Clay: 0.0	Sand: 0.0	Gravel: 0.0	Sm Cobble: 50.0	Lg Cobble: 0.0	Boulder: 0.0	Bedrock: 50.0
Embeddedness Values (%): 1. 0.0	2. 50.0	3. 50.0	4. 0.0	5. 0.0		

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

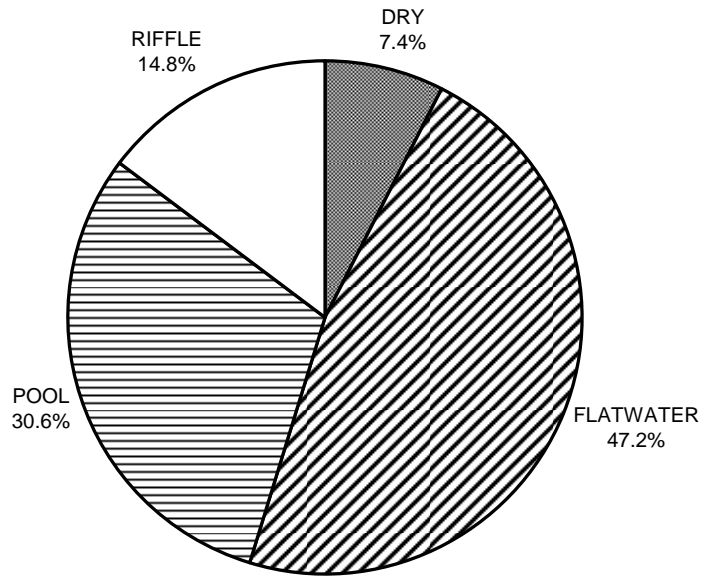
Channel Type: G2	Canopy Density (%): 63.5	Pools by Stream Length (%): 8.3
Reach Length (ft.): 683	Coniferous Component (%): 58.0	Pool Frequency (%): 16.7
Riffle/Flatwater Mean Width (ft.): 7.0	Hardwood Component (%): 42.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 100.0
Range (ft.): to	Vegetative Cover (%): 41.5	2 to 2.9 Feet Deep: 0.0
Mean (ft.):	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 0.0
Std. Dev.:	Dominant Bank Substrate Type: Bedrock	>= 4 Feet Deep: 0.0
Base Flow (cfs): 0 1.56	Occurrence of LWD (%): 0.0	Mean Max Residual Pool Depth (ft.):
Water (F): 58 - 59 Air (F): 79 - 80	LWD per 100 ft.:	Mean Pool Shelter Rating: 18
Dry Channel (ft.): 0	Riffles:	
	Pools:	
	Flat:	
Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 0.0 Gravel: 33.3 Sm Cobble: 33.3 Lg Cobble: 33.3 Boulder: 0.0 Bedrock: 0.0		
Embeddedness Values (%): 1. 0.0 2. 33.3 3. 66.7 4. 0.0 5. 0.0		

STREAM REACH: 4

Channel Type: A2	Canopy Density (%): 68.3	Pools by Stream Length (%): 33.8
Reach Length (ft.): 1316	Coniferous Component (%): 54.0	Pool Frequency (%): 41.7
Riffle/Flatwater Mean Width (ft.): 5.2	Hardwood Component (%): 46.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 78.6
Range (ft.): to	Vegetative Cover (%): 28.0	2 to 2.9 Feet Deep: 14.3
Mean (ft.):	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 7.1
Std. Dev.:	Dominant Bank Substrate Type: Boulder	>= 4 Feet Deep: 0.0
Base Flow (cfs): 0 1.67	Occurrence of LWD (%): 0.7	Mean Max Residual Pool Depth (ft.):
Water (F): 56 - 61 Air (F): 66 - 89	LWD per 100 ft.:	Mean Pool Shelter Rating: 28
Dry Channel (ft.): 0	Riffles:	
	Pools:	
	Flat:	
Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 0.0 Gravel: 7.1 Sm Cobble: 14.3 Lg Cobble: 7.1 Boulder: 71.4 Bedrock: 0.0		
Embeddedness Values (%): 1. 0.0 2. 21.4 3. 35.7 4. 0.0 5. 42.9		

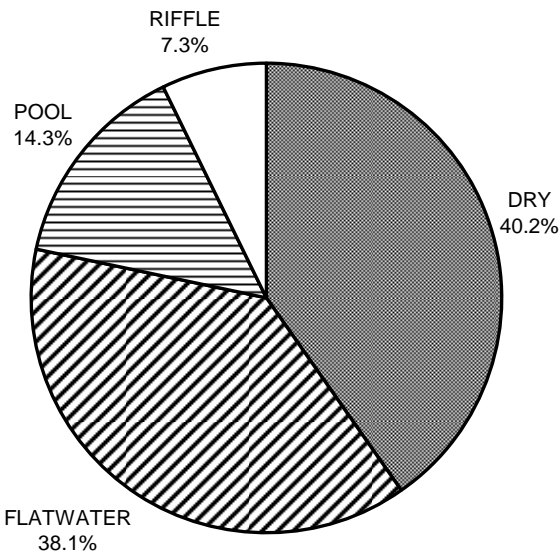
APPENDIX D: GRAPHS

**SOUTH BRANCH ROBINSON CREEK 2001
HABITAT TYPES BY PERCENT OCCURRENCE**



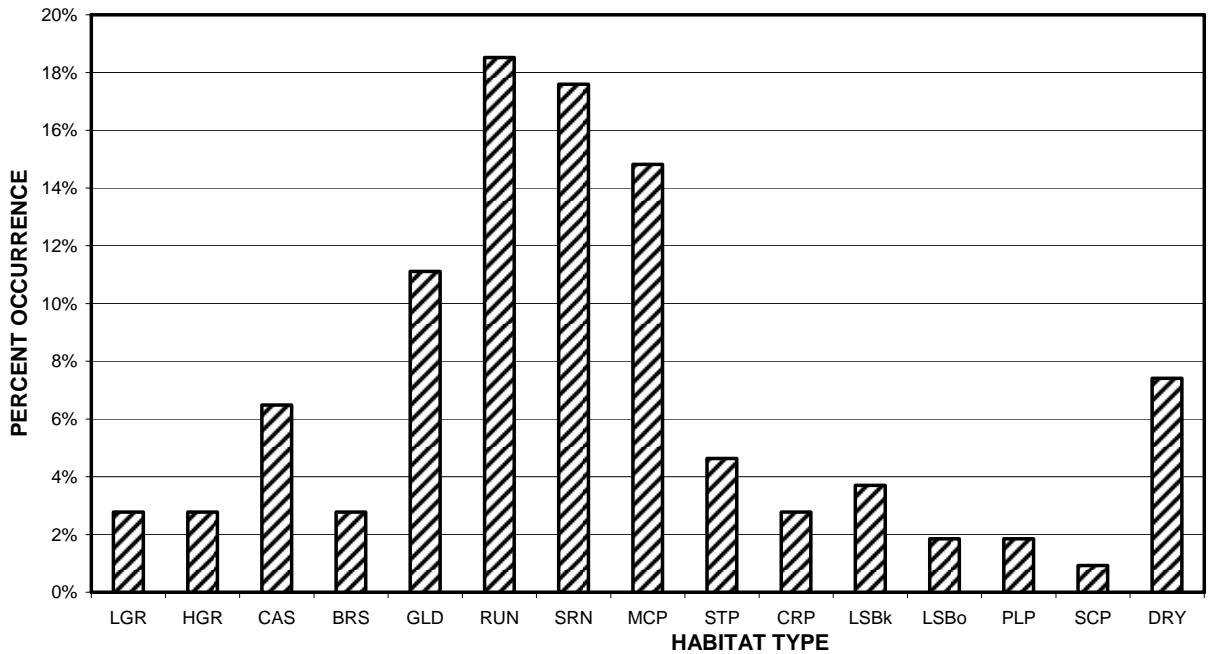
GRAPH 1 Level II habitat types by percent occurrence

**SOUTH BRANCH ROBINSON CREEK 2001
HABITAT TYPES BY PERCENT TOTAL LENGTH**



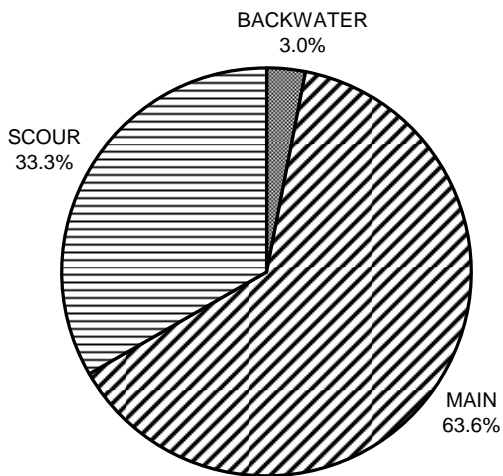
GRAPH 2 Level II habitat types by percent total length

**SOUTH BRANCH ROBINSON CREEK 2001
HABITAT TYPES BY PERCENT OCCURRENCE**



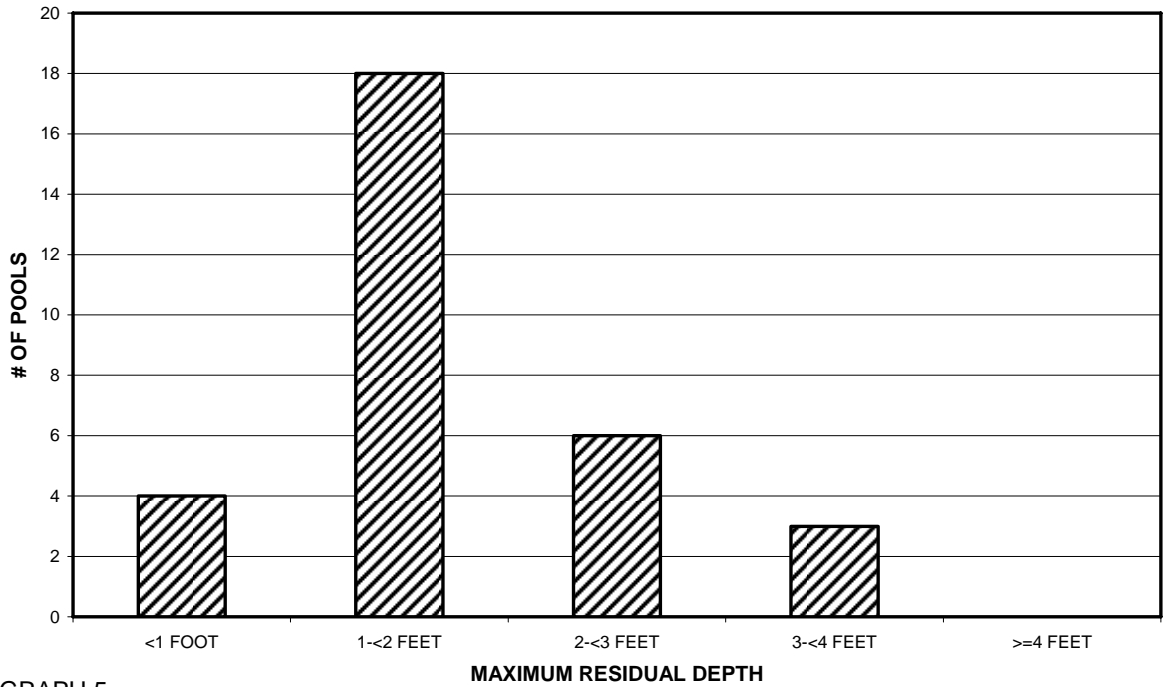
GRAPH 3 Level IV habitat types by percent occurrence

**SOUTH BRANCH ROBINSON CREEK 2001
POOL TYPES BY PERCENT OCCURRENCE**



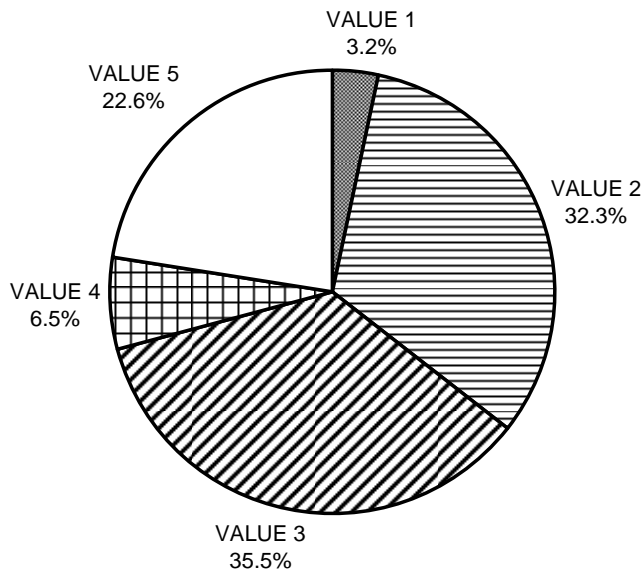
GRAPH 4 Level I pool types by percent occurrence

**SOUTH BRANCH ROBINSON CREEK 2001
MAXIMUM DEPTH IN POOLS**



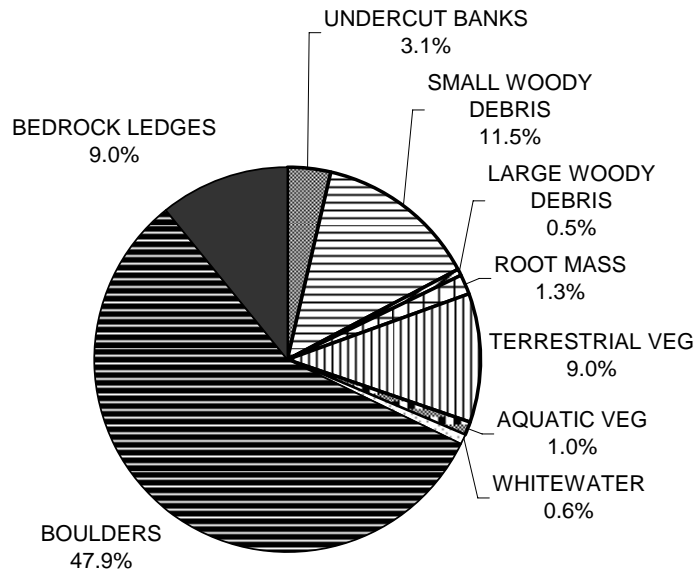
GRAPH 5

**SOUTH BRANCH ROBINSON CREEK 2001
PERCENT EMBEDDEDNESS**



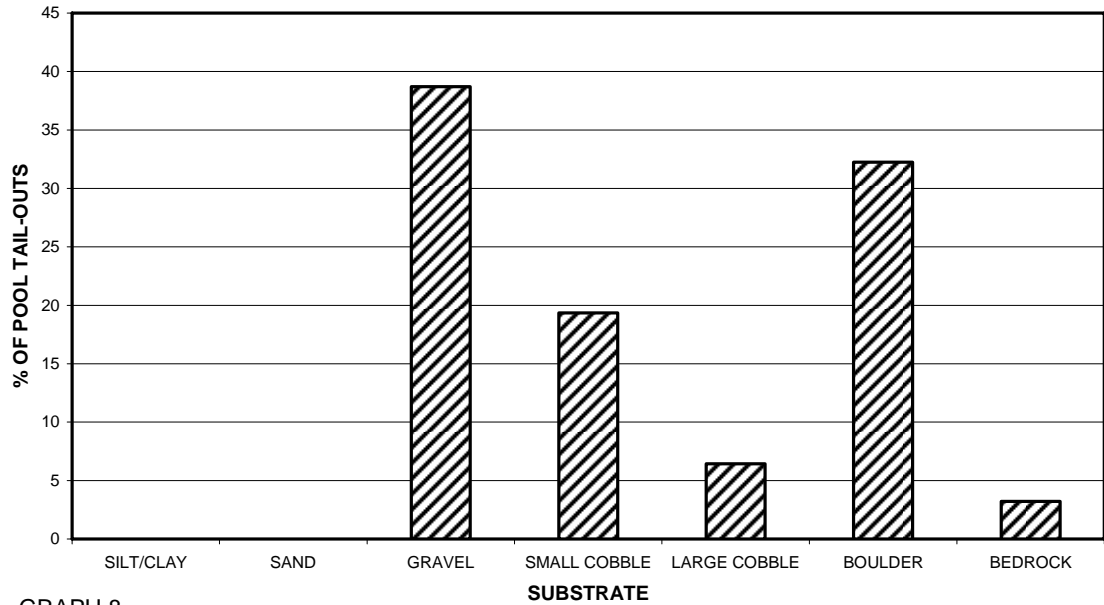
GRAPH 6

**SOUTH BRANCH ROBINSON CREEK 2001
MEAN PERCENT COVER TYPES IN POOLS**



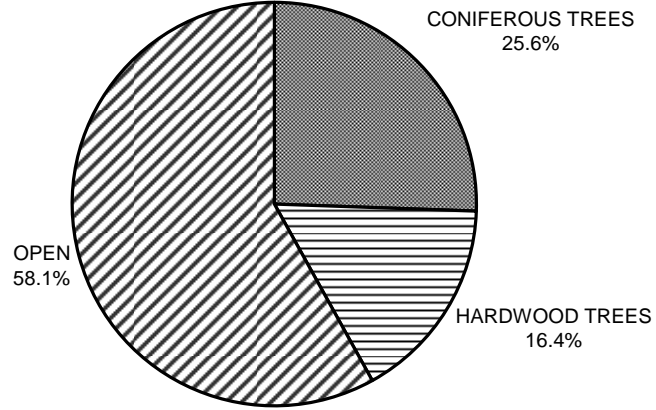
GRAPH 7

**SOUTH BRANCH ROBINSON CREEK 2001
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS**



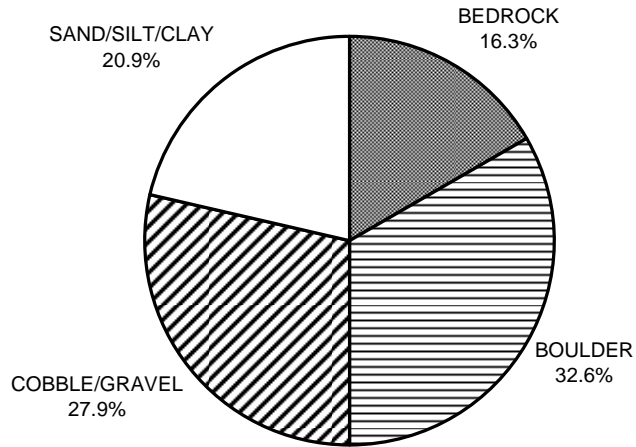
GRAPH 8

**SOUTH BRANCH ROBINSON CREEK 2001
MEAN PERCENT CANOPY**



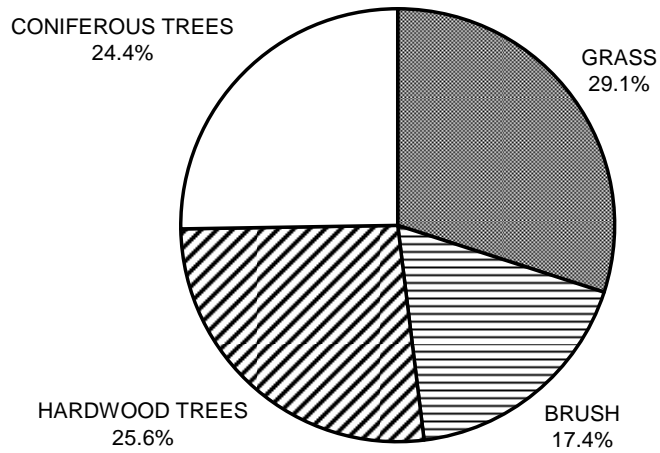
GRAPH 9

**SOUTH BRANCH ROBINSON CREEK 2001
DOMINANT BANK COMPOSITION**



GRAPH 10

**SOUTH BRANCH ROBINSON CREEK 2001
DOMINANT BANK VEGETATION**



GRAPH 11

Hydrologic Sub-Areas covered by the watershed:

Tributary to Robinson Creek

Name: **LLId: (1:24k)** **County:**
 Robinson Creek, South Branch 1232515390884 Mendocino

Tributary to Russian River

Tributary to

Location: **T:** 14N **R:** 13W **S:** 11 **Latitude:** 39.0884242095721 **Longitude** 123.2515491971

Hydrologic Boundary Delineation: Watershed boundaries were delineated using the Watershed Point tool in ArcHydro, running under ArcMap 8.3 (ArcInfo version). A 1:24k stream network was "burned" into the underlying DEM to enforce hydrologic routing.

Aerial Photos (Source): For Mendocino County watersheds, 1993 USGS DOQQs are available in the Teale Albers, NAD27 projection. For Sonoma County watersheds, 2000 County-created orthophotos in the State Plane, NAD83 projection are also available.

Stream Order: <u>4</u>	Total Length: 3.29 Miles	Note: Length is for the USGS blue-line 1:24,000 stream.
Note: Stream order is by Strahler method, recorded in CDF-NCWAP "nhydro1" 1:24k streams layer.	5.31 Km	

Drainage Area:	1562 Hectares
	3860 Acres
	6.03 sq. mi.

Elevations:	Mouth: <u>860</u> feet
	Headwaters: <u>3058</u> feet
	Note: Headwaters elevation is the highest elevation found in the watershed.

Lakes in Watershed: Number: 0 Surface area: 0 sq. mi.
 Note: Source for lakes data is the USGS-DFG 1:100k lakes layer "lakes.shp"

Fish Species (as indicated by historical salmonid streams layer created by Bob Coey): None

Ownership, for the watershed, in acres (and % of total watershed):

Federal:	State:	Local:	Private:
43.6 acres	0.0	0.0	3816.5
1.12 %	0.00 %	0.00 %	98.88 %

Note: Source for ownership data is 2002 DFG-CCR "ccr_public_lands.shp" GIS layer.

Major Land Uses in the Watershed, in acres (and % of total watershed)

Mixed hardwood/conifer:	Hardwood:	Conifer:	Agriculture:	Urban:
928.49 acres	2004.17	105.01	0.61	0.00
24.1 %	51.9 %	2.7 %	0.1 %	0.0 %
Shrub:	Herbaceous:	Barren/rock:	Water:	
183.16	636.29	0.00	0.00	
4.5 %	16.5 %	0.0 %	0.0 %	

Note: Land use areas were calculated using the 1994 CDF-USFS "Calveg" GIS layer.

USGS 7.5' Topographic Quads completely or partially in the watershed:

Quad Name	USGS Code
ELLEDGE PEAK	39123A2
BOONVILLE	39123A3

Endangered/Threatened/Sensitive Species: (California Natural Diversity Database, May 5, 2003 version)

Scientific Name	Common Name
Pleuropogon hooverianus	North Coast semaphore grass
Malacothamnus mendocinensis	Mendocino bush mallow
Malacothamnus mendocinensis	Mendocino bush mallow

Hydrologic Sub-Areas covered by the watershed

Hydrologic Sub-Area Name:	ID code (RBUAS)	Hydrologic Area Name	% of watershed in this HSA
Ukiah	111431	Upper Russian River	99.96
Navarro River	111350	Navarro River	0.04