CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT
Hobson Creek
Report Revised April 14, 2006
Report Completed 2005
Assessment Completed 1999

INTRODUCTION

A stream inventory was conducted during the summer of 1999 on Hobson Creek. 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 Hobson 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 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

Hobson Creek is a tributary of the Russian River, located in Sonoma County, California (see Hobson Creek map, Appendix A). The legal description at the confluence with the Russian River is T8N, R10W, S26. The legal location is 38.505817993653 N latitude and 122.927941184225 W longitude, LLID: 1229279385057. Year round vehicle access exists from Highway 101 near Healdsburg, via Westside Road to River Road at Hacienda.

Hobson Creek and its tributaries drain a basin of approximately 2.25 square miles. Hobson Creek is a second order stream and has approximately 2.91 miles of blue line stream, according to the USGS Guerneville 7.5 minute quadrangles. Elevations range from about 36 feet at the mouth of the creek to 1444 feet in the headwaters.   Hardwood forest with a mix of conifers dominates the watershed, although hardwood forest is more prevalent in the lower watershed and mixed conifer/hardwood forest dominates the upper watershed. There are also herbaceous zones and shrub zones throughout the watershed. The watershed is entirely privately owned.

METHODS

The habitat inventory conducted in Hobson Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi et al. 1998). The Americorps Volunteers that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). This

inventory was conducted by a two person team and was supervised by Bob Coey, Russian River Basin Planner (DFG).

<u>HABITAT INVENTORY COMPONENTS</u>

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the <u>California Salmonid Stream Habitat Restoration Manual</u>. This form was used in Hobson Creek to record measurements and observations. There are nine components to the inventory form: flow, channel type, temperatures, habitat type, embeddedness, shelter rating, substrate composition, canopy, and bank composition.

1. Flow:

Flow is measured in cubic feet per second (cfs) at the bottom of the stream survey reach using standard flow measuring equipment, if available. In some cases flows are estimated. Flows were also measured or estimated at major tributary confluences.

2. Channel Type:

Channel typing is conducted according to the classification system developed and revised by David Rosgen (1985 rev. 1994). This methodology is described in the <u>California Salmonid Stream Habitat Restoration Manual</u>. 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, 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. Temperatures are also recorded using remote Temperature recorders which log temperature every two hours, 24 hours per day.

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". Hobson 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 unit lengths were measured, additionally, the first occurrence of each unit type and a randomly selected 10% subset of

all units were completely sampled (length, mean width, mean depth, maximum depth and pool tail crest depth). All measurements were in feet to the nearest tenth.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out reaches is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Hobson 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), 76 - 100% (value 4) or "not suitable" (value 5) was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate particle size, having a bedrock tail-out, or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow separation of territorial units to reduce density related competition. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All shelter is then classified according to a list of nine shelter types. In Hobson 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 ocularly estimated using a list of seven size classes.

8. Canopy:

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

9. Bank Composition:

Bank composition elements range from bedrock to bare soil. However, the stream banks are usually covered with grass, brush, or trees. These factors influence the ability of stream banks to withstand winter flows. In Hobson 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 was estimated and recorded.

BIOLOGICAL INVENTORY

Biological sampling during stream inventory is used to determine fish species and their distribution in the stream. Biological inventory is conducted using one or more of three basic methods: 1) stream bank observation, 2) underwater observation, 3) electrofishing. These sampling techniques are discussed in the California Salmonid Stream Habitat Restoration Manual.

DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 2.0.14, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and Game. This program processes and summarizes the data, and produces the following ten tables:

- 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 Hobson 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

HISTORICAL STREAM SURVEYS:

There is no historic data for Hobson Creek.

HABITAT INVENTORY RESULTS

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

The habitat inventory of July 6, 1999, through July 29, 1999, was conducted by I. Mion (AmeriCorps), Stephanie Carey, Morgan Knechtle (CDFG), and Sean Higgins (AmeriCorps) with supervision and analysis by CDFG. The survey began at the confluence with the Russian River and extended up Hobson Creek to the end of anadromous fish passage at a rock falls. The stream bed was dry above the falls. The total length of the stream surveyed was 8685 feet.

Flows were not measured on Hobson Creek as there was no flow from the mouth to 1115 feet upstream.

This section of Hobson Creek has two channel types: from the mouth to 5389 feet an F4 and the upper 3296 feet a G3.

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

G3 channel types are characterized as well entrenched "gully" step-pool channels with a low width/depth ratio, a moderate gradient (2-4%) and a predominantly cobble substrate.

Water temperatures ranged from 56ºF to 61ºF. Air temperatures ranged from 70ºF to 88ºF. Summer temperatures were also measured using remote temperature recorders placed in pools (see Temperature Summary graphs at end of report). A recorder in Reach 2, at habitat unit number 70, logged temperatures every two hours from July 1 - September 28, 1999. The highest temperature recorded was 63.5ºF in July and the lowest was 54.4ºF in July.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 36% flatwater units, 35% riffle units, 20% pool units, and 9% dry streambed units (Graph 1). Based on total **length** there were 36% dry streambed units, 34% flatwater units, 23% riffle units, and 7% pool units (Graph 2).

One hundred twenty seven habitat units were measured and 14% were completely sampled. Thirteen Level IV habitat types were identified. The data is summarized in Table 2. The most frequent habitat types by percent **occurrence** were low gradient riffles at 35%, glides 35%, root wad scour pools 10% and dry streambed 9% (Graph 3). By

percent total **length**, dry streambed made up 36%, glides 31%, low gradient riffles 22%, and root wad scour pools 4%.

Twenty five pools were identified (Table 3). Scour pools were most often encountered at 80%, and comprised 78% of the total length of pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Ten of the 22 pools (46%) had a depth of two feet or greater (Graph 5). These deeper pools comprised 5% of the total length of stream habitat.

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Pool types had the highest shelter rating at 73. Riffle had the lowest rating with 20 and flatwater rated 44 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 83 and main channel pools rated 24 (Table 3).

Table 5 summarizes fish shelter by habitat type. By percent area, the dominant pool shelter types were small woody debris at 23%, root masses 30%, boulders at 15%, and undercut banks 14%. Graph 7 describes the pool shelter in Hobson Creek.

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in three of the eight low gradient riffles measured. Small cobble was dominant in four of the low gradient riffles (Graph 8).

No mechanical gravel sampling was conducted in 1999 surveys due to inadequate staffing levels.

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 23 pool tail-outs measured, nine had a value of 1 (39%); six had a value of 2 (26%); seven had a value of 3 (30%); and one had a value of 4 (4%). No (0%) riffles rated a 5 (unsuitable substrate type for spawning). On this scale, a value of 1 is best for fisheries. Gravel/cobble was the dominant substrate observed at pool tail-outs.
The mean percent canopy density for the stream reach surveyed was 92%. The mean percentages of deciduous and evergreen trees were 24% and 68%, respectively. Graph 9 describes the canopy for the entire survey.

For the entire stream reach surveyed, the mean percent right bank vegetated was 63% and the mean percent left bank vegetated was 66%. For the habitat units measured, the dominant vegetation types for the stream banks were: 43% evergreen trees, 25% brush, 20% deciduous trees, 11% grass and 2% bare soil (Graph 11). The dominant substrate for the stream banks were: 66% silt/clay/sand, 21% cobble/gravel, 5% bedrock and 5% boulder (Graph 10).

BIOLOGICAL INVENTORY

JUVENILE SURVEYS:

On October 20, 1999 a biological inventory was conducted, of three sites in Hobson Creek, to document the fish species composition and distribution. Each site was single pass electrofished using one Smith Root Model 12 electrofisher. Fish from each site were counted by species, and returned to the stream. A random sample of fish was selected from each reach and tissues were taken for genetic analysis. The air temperature ranged from 62°F to 74°F and the water temperature ranged from 50°F to 54°F. The observers were Sean Higgins and Bryan Freele of DFG.

The inventory of the first site (reach 1, site 1) started at habitat unit number 25 and ended approximately 288 feet upstream. In glide, pool and riffle habitat types 48 steelhead were observed, along with 63 sculpin and one pike minnow.

The inventory of the second site (reach 1, site 2) started at habitat unit number 62 and ended approximately 343 feet upstream. In glide and pool habitat types nine steelhead were observed, along with five sculpin.

The inventory of the third site (reach 1, site 3) started at habitat unit number 110 and ended approximately 228 feet upstream. In pool and riffle habitat types nine steelhead were observed, along with four pacific giant salamanders and one bullfrog.

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

Table 1. Species Observed in Historical and Recent Surveys			
YEARS	**SPECIES**	**SOURCE**	**Native/Introduced**
1999	Steelhead	DFG	N
1999	Pike Minnow	DFG	N
1999	Sculpin	DFG	N
1999	Pacific Giant Salamander	DFG	N

There is no record of hatchery stocking or fish rescue/transfer operations in Hobson Creek.

DISCUSSION

Hobson Creek has two channel types: F4 (5389 ft.) and G3 (3296 ft.).

There are 5389 feet of F4 channel type in Reach 1. According to the DFG Salmonid Stream Habitat Restoration Manual, F4 channel types are good for bank-placed boulders and fair for low-stage weirs, single and opposing wing-deflectors, channel constrictors and log cover. 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.

There are 3296 feet of G3 channel type in Reach 2. According to the DFG <u>Salmonid Stream Habitat Restoration Manual</u>, G3 channel types are good for bank-placed boulders and fair for low-stage weirs, opposing wing-deflectors and log cover.

The water temperatures recorded on the survey days, July 6 to July 29, 1999, ranged from 56°F to 61°F. Air temperatures ranged from 70°F to 88°F. The warmer water temperatures were recorded in Reach 1. A recorder in Reach 2, at habitat unit number 70, logged temperatures every two hours from July 1 - September 28, 1999. The highest temperature recorded was 63.5ºF in July and the lowest was 54.4ºF in July. This temperature regime is favorable to salmonids.

Summer temperatures measured using remote temperature recorders placed in pools ranged from 54.5°F to 63.5°F for Reach 2.

The Temperature Summary graph (Appendix E) shows that for much of the summer (July through August) the watershed exhibited temperatures near the optimal for salmonids.
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It is unknown if this thermal regime is typical, but our electrofishing samples found steelhead more frequently in the lower, cooler sample sites. To make any further conclusions, temperatures need to be monitored for a longer period of time through the critical summer months, and\or more extensive biological sampling conducted.

Pools comprised 7% of the total length of this survey. In first and second order streams a primary pool is defined to have a maximum depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low-flow channel width. In Hobson Creek, the pools are relatively shallow with 46% having a maximum depth of at least two feet. These pools comprised 5% of the total length of stream habitat. In coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total habitat length.

The mean shelter rating for pools was 73. However, a pool shelter rating of approximately 80 is desirable. The relatively large amount of pool shelter that now exists is being provided primarily by small woody debris (23%), root masses (30%), boulders (15%) and undercut banks (14%). Log and root wad cover in the pool and flatwater habitats would improve both summer and winter salmonid habitat. Log cover provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

Seven of the eight low gradient riffles measured (88%) had either gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

Thirty-five of the pool tail-outs measured had embeddedness ratings of either 3 or 4. Only 39% had a rating of 1. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered best for the needs of salmon and steelhead

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

The mean percent canopy for the survey was 92%. This is very good, since 80 percent is generally considered desirable.

GENERAL MANAGEMENT RECOMMENDATIONS

Hobson 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)   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.

3)   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.

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

End of Survey

Reach 2 Type G3

Start of Survey Type F4
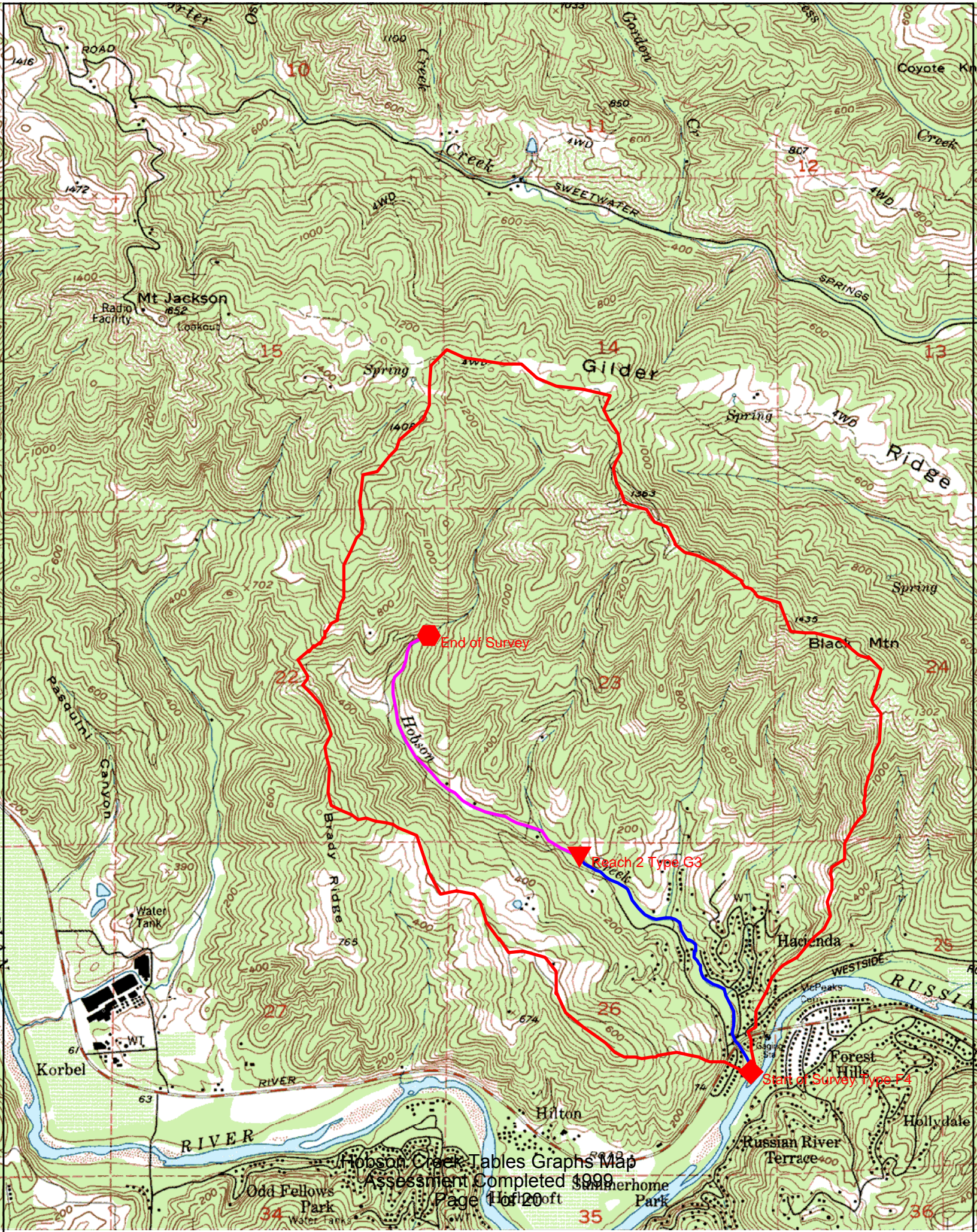
Hobson Creek Tables Graphs Map
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Table 1 - Summary of Riffle, Flatwater, and Pool Habitat Types

Stream Name: Hobson Creek   LLID:

                                             1229279385057   Drainage:

                                             Russian River - Lower

Survey Dates: 7/6/1999 to 7/29/1999

Confluence Location: Quad: GUERNEVILLE   Legal Description: T08NR10WS26   Latitude: 38:30:21.0N   Longitude: 122:55:40.0W

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
11	0	DRY	8.7	281	3093	35.6									
46	45	FLATWATER	36.2	64	2946	33.9	5.2	0.6	1.2	305	14042	187	8610		44
25	25	POOL	19.7	25	628.5	7.2	7.5	1.2	1.9	177	4435	234	5156	212	73
45	45	RIFFLE	35.4	45	2017	23.2	4.7	0.3	0.5	213	9574	60	2697		20

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
127	115	8684.5	28050	16463

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Hobson Creek

LLID: 1229279385057   Drainage: Russian River - Lower

Survey Dates: 7/6/1999 to 7/29/1999

Confluence Location: Quad: GUERNEVILLE   Legal Description: T08NR10WS26   Latitude: 38:30:21.0N   Longitude: 122:55:40.0W

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 (%)
44	44	LGR	34.6	44	1940	22.3	5	0.3	1.1	212	9324	59	2597		24	92
1	1	HGR	0.8	77	77	0.9	5	0.4	0.8	250	250	100	100		5	90
44	43	GLD	34.6	61	2686	30.9	5	0.6	1.9	294	12940	181	7950		78	93
2	2	SRN	1.6	130	260	3.0	5	0.6	1.3	545	1090	327	654		10	90
1	1	TRP	0.8	47	47	0.5	5	1.9	3.5	165	165	362	362	313	70	100
2	2	MCP	1.6	12	24	0.3	10	1.0	1.8	120	240	160	320	132	10	88
2	2	STP	1.6	32	65	0.7	8	1.3	2.7	200	400	405	810	350	5	93
1	1	CRP	0.8	21	21	0.2	7	1.0	2	147	147	176	176	147	240	95
13	13	LSR	10.2	27	348	4.0	6	1.2	3.2	174	2267	220	2418	210	83	95
1	1	LSBk	0.8	48	48	0.6	8	1.3	1.8	384	384	538	538	499	40	97
1	1	LSBo	0.8	12	12	0.1	5	0.5	1	57	57	46	46	29	75	90
4	4	PLP	3.1	16	64	0.7	11	1.1	2.7	194	775	162	487	134	56	89
11	0	DRY	8.7	281	3093	35.6										82

Total Units	Total Units Fully Measured		Total Length (ft.)			Total Area (sq.ft.)	Total Volume (cu.ft.)
127	115		8684.5			28039	16457

Table 3 - Summary of Pool Types

Stream Name: Hobson Creek

LLID: 1229279385057   Drainage: Russian River - Lower

Survey Dates: 7/6/1999 to 7/29/1999

Confluence Location: Quad: GUERNEVILLE   Legal Description: T08NR10WS26   Latitude: 38:30:21.0N   Longitude: 122:55:40.0W

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
5	5	MAIN	20	27	136	22	8.4	1.3	161	805	255	1277	24
20	20	SCOUR	80	25	493	78	7.2	1.1	182	3630	199	3388	83

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
25	25	628.5	4434	4665

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

Stream Name: Hobson Creek   LLID:
1229279385057   Drainage: Russian River - Lower

Survey Dates: 7/6/1999 to 7/29/1999

Confluence Location: Quad: GUERNEVILLE   Legal Description: T08NR10WS26   Latitude: 38:30:21.0N   Longitude: 122:55:40.0W

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
1	TRP	5	0	0	0	0	0	0	1	100	0	0
2	MCP	9	0	0	2	100	0	0	0	0	0	0
2	STP	9	0	0	1	50	1	50	0	0	0	0
1	CRP	5	0	0	0	0	1	100	0	0	0	0
11	LSR	50	2	18	3	27	5	45	1	9	0	0
1	LSBk	5	0	0	1	100	0	0	0	0	0	0
1	LSBo	5	0	0	1	100	0	0	0	0	0	0
3	PLP	14	1	33	1	33	1	33	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
22			3	14	9	41	8	36	2	9	0	0

Mean Maximum Residual Pool Depth (ft.):   1.9

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Hobson Creek LLID: 1229279385057 Drainage: Russian River - Lower

Survey Dates: 7/6/1999 to 7/29/1999 Dry Units: 11

Confluence Location: Quad: GUERNEVILLE Legal Description: T08NR10WS26 Latitude: 38:30:21.0N Longitude: 122:55:40.0W

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
44	4	LGR	0	18	0	0	50	0	0	33	0
1	1	HGR	0	0	0	0	0	0	0	100	0
45	5	TOTAL RIFFLE	0	14	0	0	40	0	0	46	0
44	2	GLD	42	17	25	0	0	0	0	17	0
2	2	SRN	50	0	0	50	0	0	0	0	0
46	4	TOTAL FLAT	46	8	13	25	0	0	0	8	0
1	1	TRP	0	0	0	0	0	0	0	30	70
2	2	MCP	38	0	0	0	0	0	0	63	0
2	1	STP	0	0	0	0	0	0	0	100	0
1	1	CRP	30	70	0	0	0	0	0	0	0
13	12	LSR	5	30	4	48	0	0	0	0	0
1	1	LSBk	20	20	0	0	0	0	0	0	0
1	1	LSBo	80	0	0	0	0	0	0	20	0
4	4	PLP	15	18	18	31	0	0	0	19	0
25	23	TOTAL POOL	14	23	5	30	0	0	0	15	3
127	32	TOTAL	16	19	5	25	6	0	0	19	2

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Hobson Creek   LLID:

                                                                                               1229279385057   Drainage: Russian River - Lower

Survey Dates: 7/6/1999 to 7/29/1999   Dry Units: 11

Confluence Location: Quad: GUERNEVILLE   Legal Description: T08NR10WS26   Latitude: 38:30:21.0N   Longitude: 122:55:40.0W

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
44	8	LGR	0	0	38	50	13	0	0
1	1	HGR	0	0	0	0	0	100	0
44	4	GLD	0	25	0	25	50	0	0
2	1	SRN	0	0	0	0	100	0	0
1	1	TRP	0	100	0	0	0	0	0
2	2	MCP	0	50	50	0	0	0	0
2	1	STP	0	0	100	0	0	0	0
1	1	CRP	0	0	0	100	0	0	0
13	5	LSR	0	40	60	0	0	0	0
1	1	LSBk	0	0	100	0	0	0	0
1	1	LSBo	0	0	100	0	0	0	0
4	3	PLP	0	0	100	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Hobson Creek

LLID: 1229279385057   Drainage: Russian River - Lower

Survey Dates: 7/6/1999 to 7/29/1999

Confluence Location: Quad: GUERNEVILLE   Legal Description: T08NR10WS26   Latitude: 38:30:21.0N   Longitude: 122:55:40.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
92	74	26	0	63	66

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:	Hobson Creek				LLID:		
					1229279385057	Drainage:	Russian River - Lower
Survey Dates:	7/6/1999 to 7/29/1999						
Confluence Location:	Quad: GUERNEVILLE	Legal Description:	T08NR10WS26	Latitude: 38:30:21.0N	Longitude: 122:55:40.0W		

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	1	2	5.4
Boulder	2	1	5.4
Cobble / Gravel	6	6	21.4
Sand / Silt / Clay	19	18	66.1

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	3	3	10.7
Brush	5	9	25.0
Hardwood Trees	6	5	19.6
Coniferous Trees	14	10	42.9
No Vegetation	0	1	1.8

Total Stream Cobble Embeddedness Values: 2

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

StreamName: Hobson Creek

LLID: 1229279385057   Drainage: Russian River - Lower

Survey Dates: 7/6/1999 to 7/29/1999

Confluence Location: Quad: GUERNEVILLE   Legal Description: T08NR10WS26   Latitude: 38:30:21.0N   Longitude: 122:55:40.0W

	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	46	14
SMALL WOODY DEBRIS (%)	14	8	23
LARGE WOODY DEBRIS (%)	0	13	5
ROOT MASS (%)	0	25	30
TERRESTRIAL VEGETATION (%)	40	0	0
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	46	8	15
BEDROCK LEDGES (%)	0	0	3

APPENDIX C - Fish Habitat Inventory Data Summary

Stream Name: Hobson Creek   LLID: 1229279385057   Drainage: Russian
                                                                                                River -
Survey Dates: 7/6/1999 to 7/29/1999   Survey Length (ft.): 8684.5   Main Channel (ft.): 8684.5   Side Channel (ft.):   0
Confluence Location: Quad: GUERNEVILLE   Legal Description: T08NR10WS26   Latitude: 38:30:21.0N   Longitude: 122:55:40.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: F4	Canopy Density (%): 88.9	Pools by Stream Length (%): 7.7
Reach Length (ft.): 5388.5	Coniferous Component (%): 70.9	Pool Frequency (%): 25.0
Riffle/Flatwater Mean Width (ft.): 5.1	Hardwood Component (%): 29.1	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Brush	< 2 Feet Deep: 46.2
Range (ft.): to	Vegetative Cover (%): 74.2	2 to 2.9 Feet Deep: 46.2
Mean (ft.):	Dominant Shelter: Root masses	3 to 3.9 Feet Deep: 7.7
Std. Dev.:	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0.0
Base Flow (cfs): 0	Occurrence of LWD (%): 3.1	Mean Max Residual Pool Depth (ft.): 1.87
Water (F): 56 - 61 Air (F): 72 - 80	LWD per 100 ft.:	Mean Pool Shelter Rating: 91
Dry Channel (ft.): 3093	Riffles:	
	Pools:	
	Flat:	

Pool Tail Substrate (%): Silt/Clay: 0.0   Sand: 7.1   Gravel: 71.4   Sm Cobble: 21.4   Lg Cobble: 0.0   Boulder: 0.0   Bedrock: 0.0
Embeddedness Values (%):   1. 35.7   2. 28.6   3. 35.7   4. 0.0   5. 0.0

STREAM REACH: 2

Channel Type: G3	Canopy Density (%): 94.2	Pools by Stream Length (%): 6.4
Reach Length (ft.): 3296	Coniferous Component (%): 77.0	Pool Frequency (%): 14.9
Riffle/Flatwater Mean Width (ft.): 4.8	Hardwood Component (%): 23.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 66.7
Range (ft.): to	Vegetative Cover (%): 57.0	2 to 2.9 Feet Deep: 22.2
Mean (ft.):	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 11.1
Std. Dev.:	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0.0
Base Flow (cfs): 0	Occurrence of LWD (%): 5.2	Mean Max Residual Pool Depth (ft.): 1.84
Water (F): 56 - 61 Air (F): 70 - 88	LWD per 100 ft.:	Mean Pool Shelter Rating: 44
Dry Channel (ft.): 0	Riffles:	
	Pools:	
	Flat:	

Pool Tail Substrate (%): Silt/Clay: 0.0   Sand: 0.0   Gravel: 77.8   Sm Cobble: 22.2   Lg Cobble: 0.0   Boulder: 0.0   Bedrock: 0.0
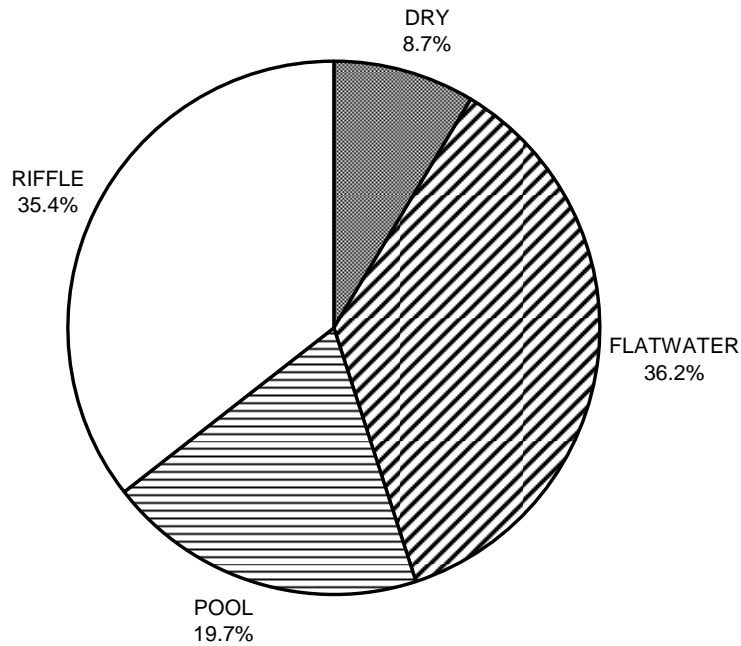Embeddedness Values (%):   1. 44.4   2. 22.2   3. 22.2   4. 11.1   5. 0.0

HOBSON CREEK 1999
HABITAT TYPES BY PERCENT OCCURRENCE

DRY
8.7%

RIFFLE
35.4%

FLATWATER
36.2%

POOL
19.7%

GRAPH 1 Level II habitat types by percent occurence

HOBSON CREEK 1999
HABITAT TYPES BY PERCENT OCCURRENCE
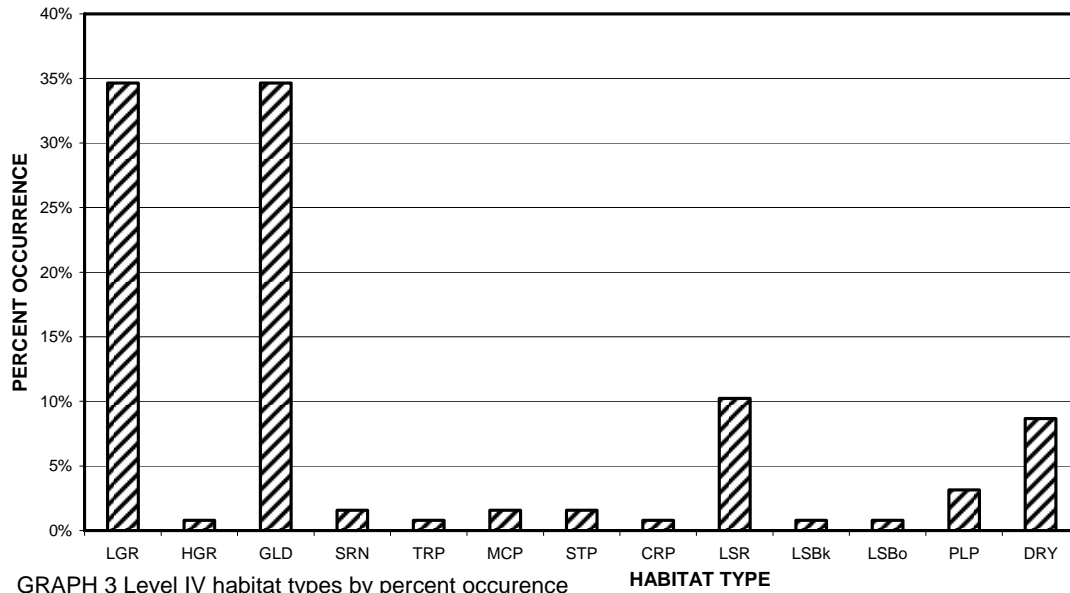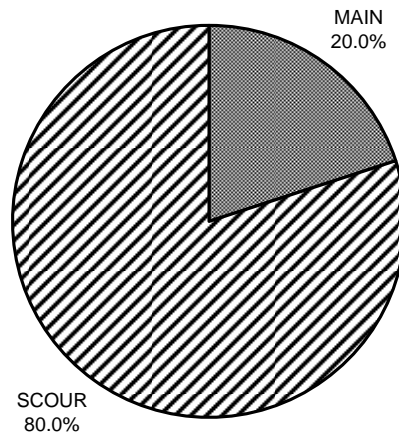
DRY
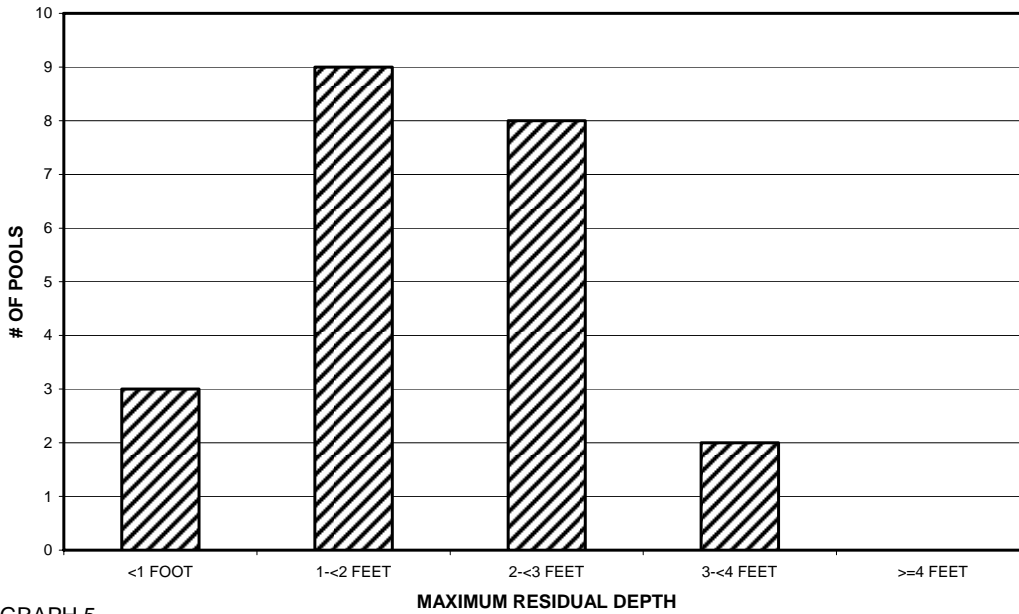8.7%

RIFFLE
35.4%

FLATWATER
36.2%

POOL
19.7%

GRAPH 1 Level II habitat types by percent occurence

HOBSON CREEK 1999
HABITAT TYPES BY PERCENT OCCURRENCE

GRAPH 3 Level IV habitat types by percent occurence

HOBSON CREEK 1999
POOL TYPES BY PERCENT OCCURRENCE

GRAPH 4 Level I pool types by percent occurence

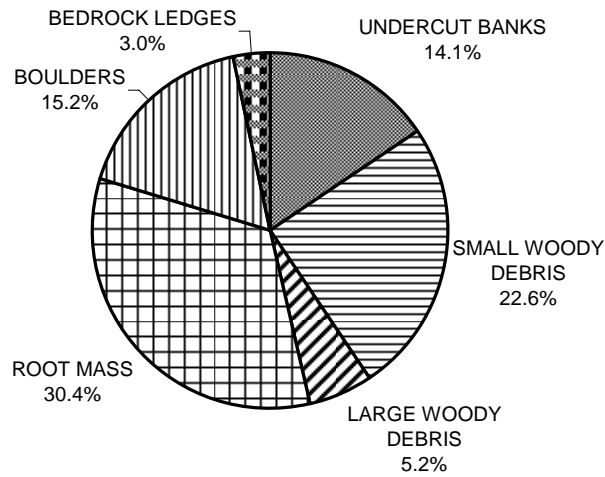**HOBSON CREEK 1999**
MAXIMUM DEPTH IN POOLS

GRAPH 5

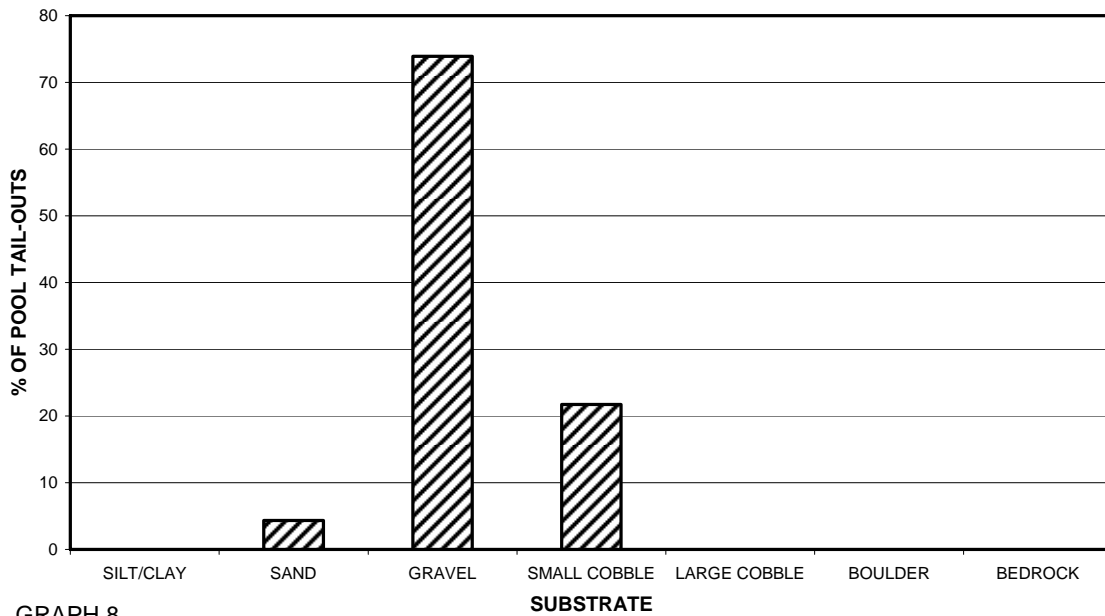**HOBSON CREEK 1999**
PERCENT EMBEDDEDNESS
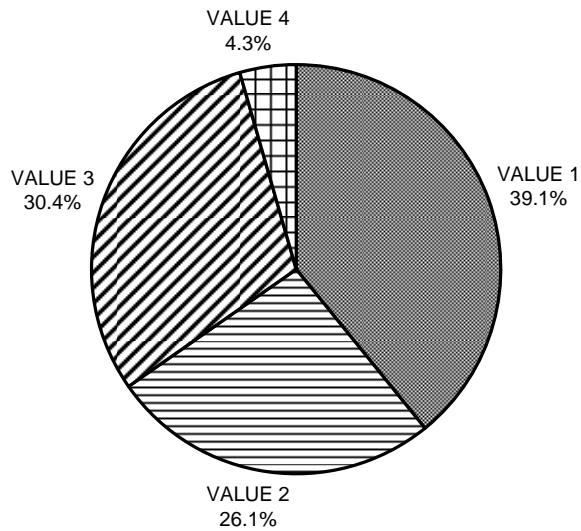
GRAPH 6
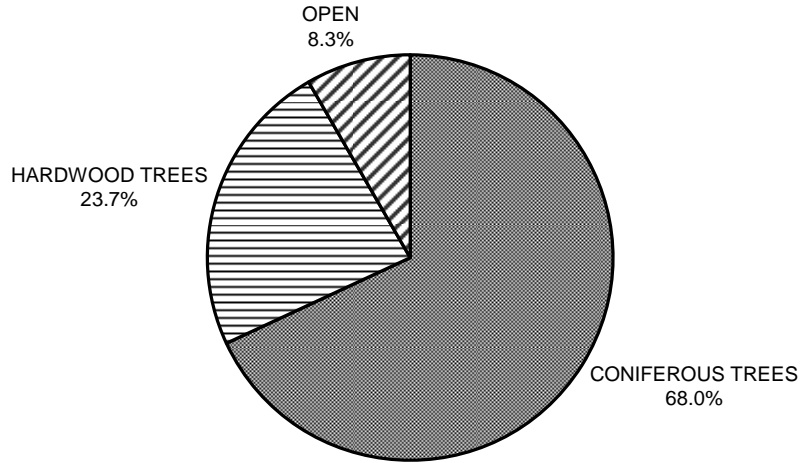
HOBSON CREEK 1999
MEAN PERCENT COVER TYPES IN POOLS

BEDROCK LEDGES
3.0%

UNDERCUT BANKS
14.1%

BOULDERS
15.2%

SMALL WOODY
DEBRIS
22.6%

ROOT MASS
30.4%

LARGE WOODY
DEBRIS
5.2%

GRAPH 7

HOBSON CREEK 1999
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS

GRAPH 8

HOBSON CREEK 1999
MEAN PERCENT CANOPY

OPEN
8.3%

HARDWOOD TREES
23.7%

CONIFEROUS TREES
68.0%

GRAPH 9

HOBSON CREEK 1999
DOMINANT BANK COMPOSITION

BEDROCK
5.4%

BOULDER
5.4%

COBBLE/GRAVEL
21.4%

SAND/SILT/CLAY
66.1%
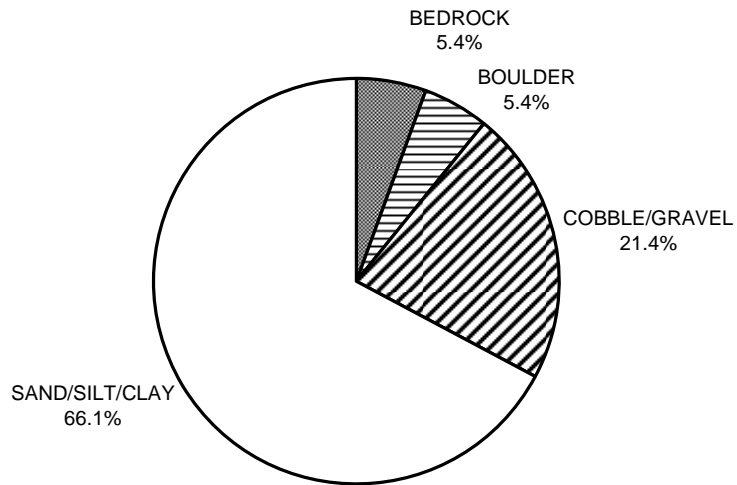
GRAPH 10

HOBSON CREEK 1999
DOMINANT BANK VEGETATION

NO VEGETATION
1.8%

GRASS
10.7%

CONIFEROUS TREES
42.9%

BRUSH
25.0%

HARDWOOD TREES
19.6%

GRAPH 11

Hobson Creek Water Temperatures
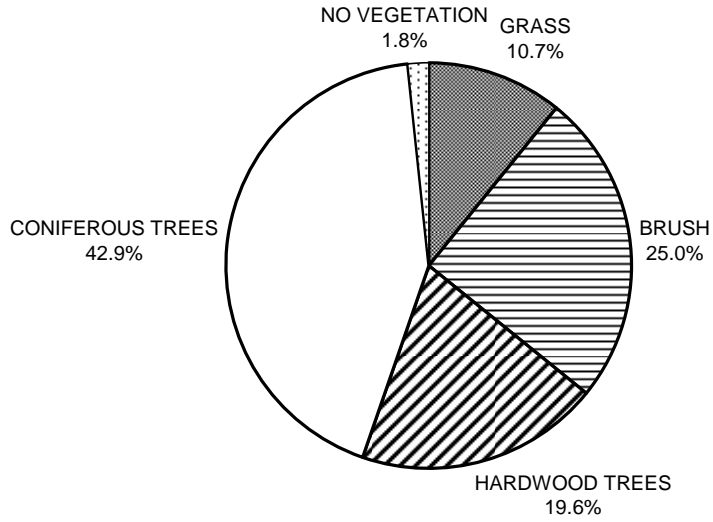
Hydrologic Sub-Areas covered by the watershed:
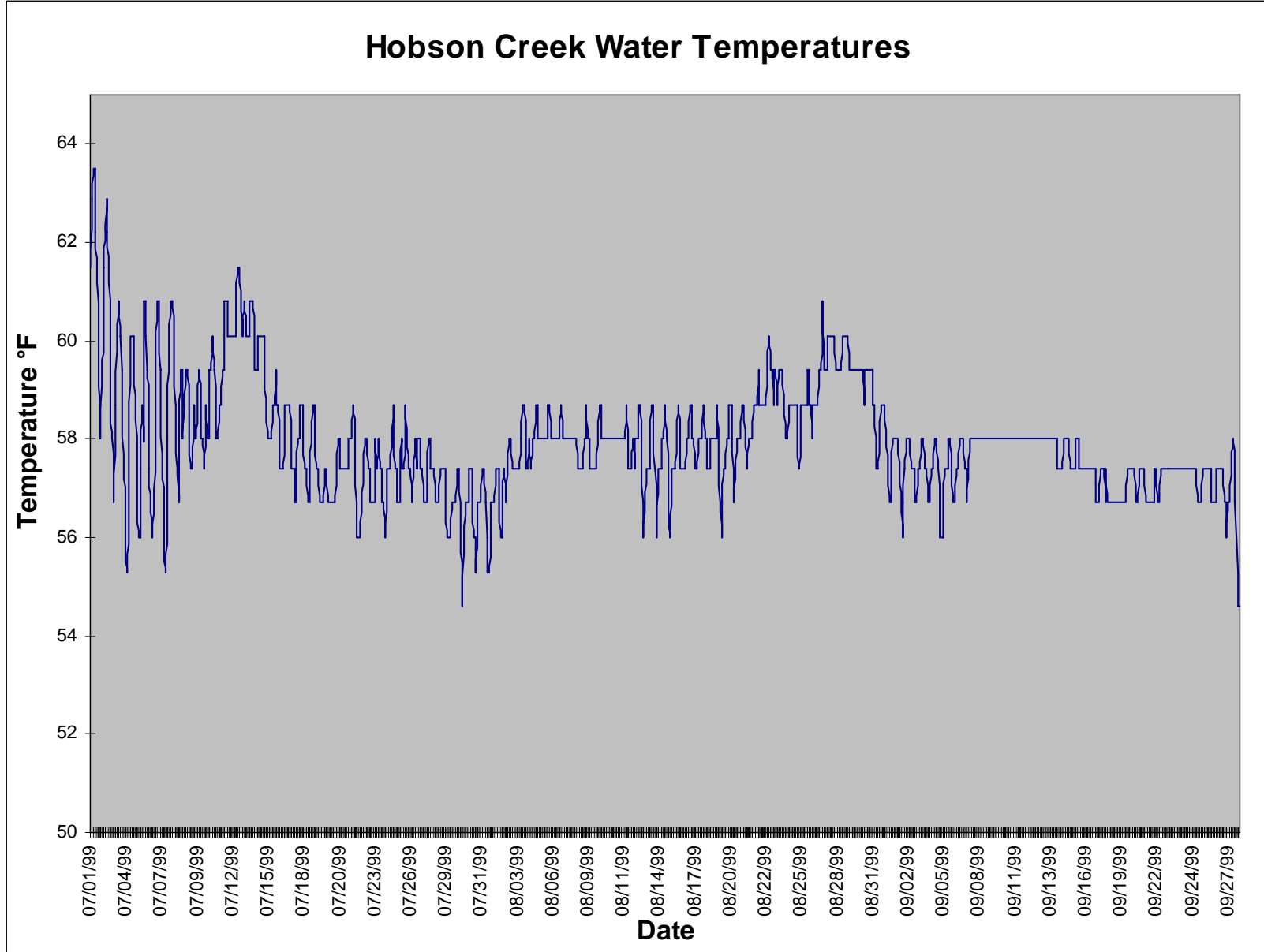
Name:	**LLId: (1:24k)**	**County:**	**Tributary to**	Russian River
Hobson Creek	1229279385057	Sonoma	**Tributary to**	
			Tributary to	

Location: **T:** 08N   **R:** 10W   **S:** 26   **Latitude:** 38.505817993653   **Longitude** 122.927941184225

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: 2   **Total Length:**   2.91 Miles   Note: Length is for the USGS blue-line 1:24,000 stream.

Note: Stream order is by Strahler method, recorded in CDF-NCWAP "nchydro1" 1:24k streams layer.   4.69 Km

Drainage Area: 584 Hectares

1443 Acres

2.25 sq. mi.

Elevations: Mouth: 36 feet

Headwaters: 1444 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):   Steelhead

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

Federal:	State:	Local:	Private:
0.0 acres	0.0	0.0	1442.7
0.00 %	0.00 %	0.00 %	100.00 %

Note: Source for owneship 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:
488.18 acres	511.04	335.75	0.00	2.00
33.8 %	35.4 %	23.3 %	0.0 %	0.1 %

Shrub:	Herbaceous:	Barren/rock:	Water:
51.89	52.97	0.00	0.61
3.6 %	3.7 %	0.0 %	0.1 %

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
GUERNEVILLE	38122E8

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

Hydrologic Sub-Areas covered by the watershed

Hydrologic Sub-Area Name:	ID code (RBUAS)	Hydrologic Area Name	% of watershed in this HSA
Guerneville	111411	Lower Russian River	100