

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

Mount Jackson Creek
Report Revised April 14, 2006
Report Completed 2005
Assessment Completed 2000

INTRODUCTION

A stream inventory was conducted during the summer of 2000 on Mount Jackson Creek beginning 273 feet downstream of the Westside Road Bridge. 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 Mount Jackson 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

Mount Jackson Creek, located in Sonoma County, California, is a tributary to the Russian River (see Mount Jackson Creek map, page 2). The legal description at the confluence with the Russian River is T8N, R10W, S25. Its location is 38.5109694448189° N. latitude and 122.92206623465° W. longitude. Year round vehicle access exists from Highway 101 near Healdsburg, via Westside Road.

Mount Jackson Creek and its tributaries drain a basin of approximately 1.2 square miles. Mount Jackson Creek is a second order stream and has approximately 3.64 miles of blue line stream, according to the USGS 7.5 minute quadrangle entitled "Guerneville". Summer flow was measured as approximately 0.21 cfs at habitat unit #009, 4 feet downstream of the bridge at address marker 11050. Elevations range from about 75 feet at the mouth of the creek to 1444 feet in the headwaters. Hardwood forest dominates the watershed. The watershed is entirely privately owned. No sensitive species are listed from the CNPS Inventory or DFG's Natural Diversity Database. Steelhead Trout (*Onchorynchus mykiss*), federally listed as threatened, was present in this creek as recently as July 2000.

METHODS

The habitat inventory conducted in Mount Jackson 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 Derek Acomb, Russian River Basin Planner (DFG).

HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the California Salmonid Stream Habitat Restoration Manual. This form was used in Mount Jackson 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 California Salmonid Stream Habitat Restoration Manual. Channel typing is conducted simultaneously with habitat typing and follows a standard form to record measurements and observations. There are five measured parameters used to determine channel type: 1) water slope gradient, 2) entrenchment, 3) width/depth ratio, 4) substrate composition, and 5) sinuosity.

3. Temperatures:

Water and air temperatures, and time, are measured by crew members with hand held thermometers and recorded at each tenth unit typed. Temperatures are measured in degrees Fahrenheit at the middle of the habitat unit and within one foot of the water surface. Temperatures were also recorded using a remote temperature recorder which logged temperature every two hours, 24 hours/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". Mount Jackson 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 Mount Jackson 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) 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 Mount Jackson 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.

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densimeters as described in the California Salmonid Stream Habitat Restoration Manual, 1998. Canopy density relates to the amount of stream shaded from the sun. In Mount Jackson 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 visually 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 Mount Jackson 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 Habitat, a dBASE IV data entry program developed by CDFG. 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 mean percent cover by habitat type
- Summary of dominant substrates by habitat type
- Summary of fish habitat elements by stream reach

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Mount Jackson 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:

There are no historical records of stream surveys conducted by the Department of Fish and Game on Mount Jackson Creek prior to 2000.

HABITAT INVENTORY RESULTS

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

The habitat inventory of July 18, 2000, to September 6, 2000, was conducted by Mike Shugars (Intern), Teresa Wildfong and Jacob Newell (Americorps) and Sarah Nossaman (CDFG) with supervision and analysis by CDFG. The survey 273 feet downstream of the Westside Road Bridge and extended up Mount Jackson to the falls. The total length of the stream surveyed was 7697 feet, with an additional 9 feet of side channel.

A flow of 0.212 cfs was measured on September 5, 2000 at habitat unit #009, 4 feet downstream of the bridge at address marker 11050 with a Marsh-McBirney Model 2000 flowmeter.

This section of Mount Jackson has 5 channel types: from the mouth to 3424 feet a G3; next 446 feet an A2; next 2206 feet a G3; next 477 feet a B3 and the upper 1144 feet a G3.

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.

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

B3 channel types are moderately entrenched, moderate gradient (2-4%), riffle dominated channels, with infrequently spaced pools, a very stable plan and profile, stable banks and have a predominantly cobble substrate.

Water temperatures during the survey dates ranged from 56°F to 60°F. Air temperatures during the survey dates ranged from 56°F to 77°F. Summer temperatures were also measured using remote temperature recorders placed in pools (see Temperature Summary graphs, Appendix E). A recorder in Reach 1 logged temperatures every 2 hours from July 1, 1999, to September 28, 1999. The highest temperature recorded was 58°F in August and the lowest was 54°F in September. The mean of the daily highs was 56°F for the month of July, 57°F for August and 56°F for September.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of *occurrence* there were 48% flatwater units, 38% pool units and 13% riffle units (Graph 1). Based on total *length* there were 79% flatwater units, 13% pool units and 8% riffle units (Graph 2).

One hundred forty-three habitat units were measured and 20% were completely sampled. Sixteen Level IV habitat types were identified. The data is summarized in Table 2. The most frequent

habitat types by percent *occurrence* were runs at 24%, mid-channel pools 21%, glides 13% and low gradient riffles 11% (Graph 3). By percent total *length*, runs made up 43%, step runs 27%, glides 9%, and mid-channel pools 7%.

Fifty-five pools were identified (Table 3). Main Channel pools were most often encountered at 55%, and comprised 54% 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. Seventeen of the 55 pools (31%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 53 pool tail-outs measured, ten had a value of 1 (19%); twenty nine had a value of 2 (55%); eight had a value of 3 (15%); and none had a value of 4 (0%). Six (11%) riffles rated a 5 (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, or 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 types had the highest shelter rating at 32. Riffle had the lowest rating with 5 and pool rated 18 (Table 1). Of the pool types, the backwater pools had the highest mean shelter rating at 35, scour pools rated 20, and main channel pools rated 16 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Undercut banks are the dominant pool cover type followed by large woody debris. Graph 7 describes the pool shelter in Mount Jackson Creek.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 74% of pool tail-outs while small cobble was the next most frequently observed substrate type at 11%.

The mean percent canopy density for the stream reach surveyed was 88%. The mean percentages of hardwood and coniferous trees were 14% and 74%, respectively. Twelve percent of the canopy was open. Graph 9 describes the mean percent canopy in Mount Jackson Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 49% and the mean percent left bank vegetated was 53%. The dominant elements composing the structure of the stream banks consisted of 54% silt/clay/sand, 33% cobble/gravel, 7% boulder and 6% bedrock (Graph 10). Evergreen trees were the dominant vegetation type observed in 61% of the units surveyed. Additionally, 13% of the units surveyed had brush as the dominant vegetation type and 13% had deciduous trees as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY

There are no historical records of biological inventories (juvenile or adult spawning/carcass), conducted by the Department of Fish and Game on Mount Jackson Creek.

No biological surveys were conducted on Mount Jackson Creek in 2000 due to inadequate staffing levels.

There are no historical records indicating that fish rescue/transfer operations have occurred in Mount Jackson Creek.

DISCUSSION

Mount Jackson has five channel types: G3 (3424 ft.), A2 (446 ft.), G3 (2206 ft.), B3 (477 ft.) and G3 (1144 ft.).

There are 6,774 feet of G3 channel type in Reaches 1, 3 and 5. According to the DFG Salmonid Stream Habitat Restoration Manual, G3 channel types are good for bank-placed boulders and fair for low-stage weirs, opposing wing-deflectors and log cover.

There are 446 feet of A2 channel type in Reach 2. The high energy, steep gradient A2 channel types have stable stream banks and poor gravel retention capabilities and are generally not suitable for instream enhancement structures.

There are 477 feet of B3 channel type in Reach 4. 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. 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.

The water temperatures recorded on the survey days July 18, 2000, to September 6, 2000, ranged from 56°F to 60°F. Air temperatures ranged from 56°F to 77°F. The warmer water temperatures were recorded in Reach 1. This temperature regime is favorable to salmonids.

Summer temperatures measured using a remote temperature recorder placed in a shaded pool in Reach 1 ranged from 54° to 57°F. The Temperature Summary graph shows that for all of the summer (July through August) the watershed exhibited temperatures near the optimal for salmonids

Pools comprised 13% 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 Mount Jackson Creek, the

pools are relatively shallow with 40% having a maximum depth of at least 2 feet. These pools comprised 6% 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 18. However, a pool shelter rating of approximately 80 is desirable. The relatively small amount of pool shelter that now exists is being provided primarily by undercut banks (49%), large woody debris (16%), small woody debris (13%), and bedrock ledges (10%). 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.

All of the four low gradient riffles measured (100%) had either gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

Fifteen of the pool tail-outs measured had embeddedness ratings of either 3 or 4. Only 19% 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. In a reach comparison, Reaches 2, 4, and 5 had the best ratings and Reaches 1 and 3 had the poorest ratings.

The mean percent canopy for the survey was 88%. This is good, since 80 percent is generally considered desirable.

However, Reach 3 was plagued with numerous bank erosion problems. This reach as well as other areas with bank erosion could benefit from bio-technical re-vegetation techniques using native species.

Additionally, the riparian buffer is thin or nearly absent in the lower watershed, which is dominated by vineyards. This stretch was not surveyed, and most likely serves not as habitat but as an access route from the river to the upper reaches of the stream. Vineyard development within the riparian corridor could lead to less stream canopy and channel incision causing bank erosion and higher water temperatures.

GENERAL MANAGEMENT RECOMMENDATIONS

Mount Jackson 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) Access for migrating salmonids is a potential problem in Reach 2, therefore, fish passage should be monitored, and improved where possible.
- 2) Map sources of upslope and in-channel erosion, and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediments entering the stream. Near-stream riparian planting along any portion of the stream should be encouraged to provide bank stability and a buffering against agricultural, grazing and urban runoff.
- 3) Mount Jackson 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.
- 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.
- 6) There are log debris accumulations present on Mount Jackson Creek that have the potential for causing bank erosion. The modification of these debris accumulations is not recommended at this time, but they should be monitored. If modification becomes necessary, it must be done carefully to preserve existing habitat provided by the woody debris.

MOUNT JACKSON CREEK SURVEY COMMENTS

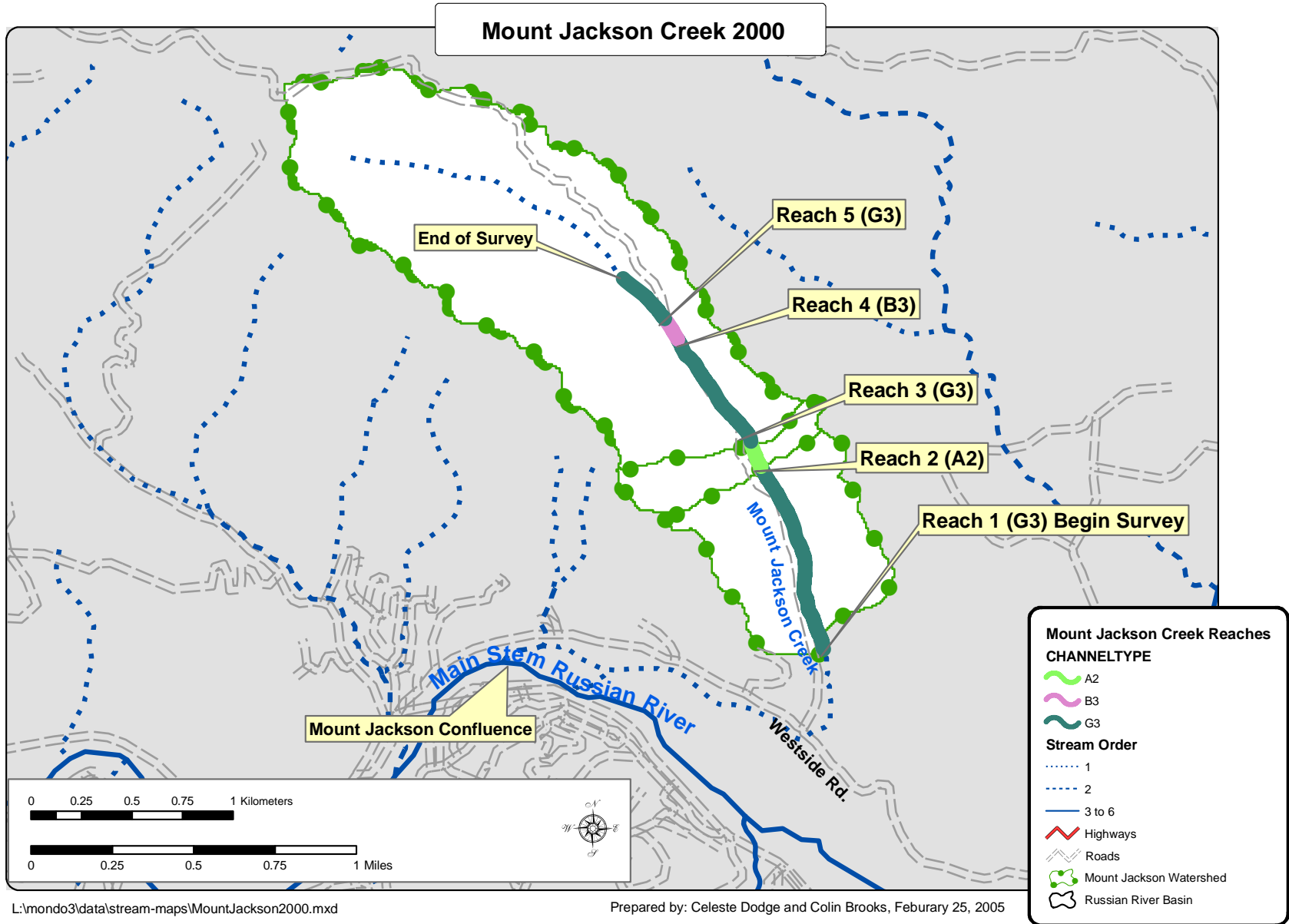
The following landmarks and possible problem sites were noted. All distances are approximate and taken from the beginning of the survey reach.

Habitat Unit #	Distance (ft.)	Comment:
1.00	27	Started survey 273' down stream from bridge - See form
3.00	105	Abundant trash LB (Left Bank)
6.10	198	Heavy sedimentation
8.00	273	Crayfish

9.00	287	Box culvert under bridge (see bridge form)
11.00	400	LB lots of trash
13.00	462	Heavy sedimentation
14.00	515	O+ salmonid, many suckers
15.00	545	Heavy sedimentation
16.00	615	Crayfish 10 salmonids
17.00	644	Signal crayfish
23.00	826	Fence RB
38.00	1303	3 pieces of LWD (Large Woody Debris) holding back gravel 3' high
42.00	1398	Outhouse LB
46.00	1494	Old wooden footbridge crossing; remnants of broken dam
48.00	1528	Old wood flashboard dam-see form
49.00	1562	Cabin RB. GPS F3 Waypoint #002 n38 30.914, w122 54. 424
51.00	1633	Cement sill RB very silted
52.00	1674	Dirt road (looks unused) LB-from unit 48-057
53.00	1689	Clay bank providing scour (not bedrock)
54.00	1783	Channel becomes entrenched
56.00	2230	Road upslope RB
57.00	2248	High siltation log accumulation- see form Trashed dumped RB
59.00	2337	No GPS position available
61.00	2517	Small wet trib RB 100' up from beginning of unit
62.00	2561	Small wet trib RB
63.00	2655	5"long fish possibly salmonid
66.00	2760	No pool tail: debris accumulation/see form
67.00	2846	Small gully RB
69.00	3048	Dry trib LB
73.00	3180	Bank erosion LB-see form
76.00	3271	Water flows underneath gravel bar
77.00	3288	7" fish
80.00	3439	3 jumps: 2:1.5', 1:2.5'
81.00	3501	Dry trib LB, new channel type
85.00	3870	Dry trib RB, dry trib LB
86.00	3997	Redwood across creek: changes grade by 5'
87.00	4013	Fence across creek and along RB
88.00	4210	Blackberry, star thistle
89.00	4227	Fence RB, old cattle pen RB
92.00	4299	Fence RB old cattle crossing-no longer used; road upper RB

93.00	4314	Gully RB
96.00	4428	Massive erosion along RB, debris: see form
99.00	4667	3' silt in unit
100.00	4683	High sediment, erosive RB: see form
101.00	5007	Culvert RB: see form, debris jam: see form
103.00	5052	Massive erosion RB units #099-104
104.00	5069	Culvert RB: see form
106.00	5129	Blackberry patch LB
109.00	5165	SWD build up
112.00	5255	LWD above pool retaining gravel 2'
115.00	5426	A dozen concrete slabs, from old road crossing in creek. Retaining 1ft gravel.
116.00	5464	Old ranch crossing
119.00	5522	Wp#008 N38° 31.456', W122° 54. 793'
123.00	5762	Heavy silt
127.00	6044	Rip rap RB, 10' high, 46' long, O+salmonid; road along creek, LB wooden fence
129.00	6076	Waypoint #009(F3) 38°31'31.2"n 122°54'50 Flows through culvert under road- see form
130.00	6266	Meandering riffles, small pools. Channel change to B3.
132.00	6553	1+ salmonids(?)
133.00	6563	Channel change to G3.
136.00	6756	Spring upslope RB
137.00	6840	1+ salmonid.
138.00	6859	Upstream LWD retains 2.5' gravel.
139.00	6913	No GPS reading possible. Riffles, small pools
141.00	7102	Debris upstream - see form.
142.00	7697	LB gully (road drainage). No visible erosion.

APPENDIX A: MAP



APPENDIX B: TABLES

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

Stream Name: Mount Jackson Creek

LLID:

1229220385109

Drainage:

Russian River - Lower

Survey Dates: 7/18/2000 to 9/6/2000

Confluence Location: Quad: GUERNEVILLE

Legal Description: T08NR10WS25

Latitude: 38:30:39.0N

Longitude: 122:55:19.0W

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
1	0	DRY	0.7	8	8	0.1									
68	16	FLATWATER	47.6	89	6071	78.8	4.7	0.4	0.8	219	14906	101	6855		36
55	54	POOL	38.5	19	1037	13.5	9.5	1.0	1.8	176	9670	244	12667	208	18
19	6	RIFFLE	13.3	31	590	7.7	5.3	0.2	0.5	97	1844	28	541		5
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
143	76				7706					26421			20063		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Mount Jackson Creek

LLID:

1229220385109 Drainage: Russian River - Lower

Survey Dates: 7/18/2000 to 9/6/2000

Confluence Location: Quad: GUERNEVILLE Legal Description: T08NR10WS25 Latitude: 38:30:39.0N Longitude: 122:55:19.0W

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 (%)
16	4	LGR	11.2	35	553	7.2	7	0.3	0.9	137	2184	41	657		5	90
2	2	CAS	1.4	12	23	0.3	2	0.2	0.6	18	36	3	7			90
1	0	BRS	0.7	14	14	0.2										100
18	7	GLD	12.6	38	683	8.9	5	0.5	1.3	214	3849	92	1659	40		88
35	6	RUN	24.5	94	3304	42.9	5	0.4	1.5	169	5920	94	3281	8		88
15	3	SRN	10.5	139	2084	27.0	4	0.4	0.7	332	4978	135	2027	80		91
30	29	MCP	21.0	19	564	7.3	8	1.1	4.1	159	4780	236	6593	207	16	90
4	4	CRP	2.8	20	81	1.1	7	0.7	1.9	126	505	109	438	91	8	93
5	5	LSL	3.5	18	92	1.2	8	0.9	2.2	135	675	147	734	127	37	86
6	6	LSR	4.2	21	128	1.7	7	1.0	2.8	158	945	189	1135	166	13	71
2	2	LSBk	1.4	16	33	0.4	4	1.3	2.2	66	132	93	186	86	50	90
3	3	LSBo	2.1	21	64	0.8	8	0.7	1.9	156	468	143	428	112	8	93
3	3	PLP	2.1	16	49	0.6	9	1.1	2.3	138	413	197	592	166	10	83
1	1	BPR	0.7	9	9	0.1	4			36	36			30		100
1	1	DPL	0.7	17	17	0.2	100	1.2	2.1	1700	1700	2550	2550	2040	40	85
1	0	DRY	0.7	8	8	0.1										95

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
143	76	1000	26622	20286

Table 3 - Summary of Pool Types

Stream Name: Mount Jackson Creek

LLID:

1229220385109

Drainage: Russian River - Lower

Survey Dates: 7/18/2000 to 9/6/2000

Confluence Location: Quad: GUERNEVILLE

Legal Description: T08NR10WS25

Latitude: 38:30:39.0N

Longitude: 122:55:19.0W

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
30	29	MAIN	55	19	564	54	8.2	1.1	159	4780	207	5781	16
23	23	SCOUR	42	19	447	43	7.3	0.9	136	3138	130	2999	20
2	2	BACKWATER	4	13	26	3	52.0	1.2	868	1736	2040	2040	35

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
55	54	1037	9654	10820

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

Stream Name: Mount Jackson Creek

LLID:

1229220385109

Drainage: Russian River - Lower

Survey Dates: 7/18/2000 to 9/6/2000

Confluence Location:

Quad: GUERNEVILLE

Legal Description:

T08NR10WS25

Latitude: 38:30:39.0N

Longitude: 122:55:19.0W

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
28	MCP	54	1	4	18	64	7	25	1	4	1	4
4	CRP	8	0	0	4	100	0	0	0	0	0	0
5	LSL	10	0	0	3	60	2	40	0	0	0	0
6	LSR	12	0	0	4	67	2	33	0	0	0	0
2	LSBk	4	0	0	0	0	2	100	0	0	0	0
3	LSBo	6	0	0	3	100	0	0	0	0	0	0
3	PLP	6	0	0	2	67	1	33	0	0	0	0
1	DPL	2	0	0	0	0	1	100	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
			1	2	34	65	15	29	1	2	1	2

Mean Maximum Residual Pool Depth (ft.): 1.8

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Mount Jackson Creek

LLID:

1229220385109 Drainage: Russian River - Lower

Survey Dates: 7/18/2000 to 9/6/2000

Dry Units: 1

Confluence Location: Quad: GUERNEVILLE

Legal Description: T08NR10WS25

Latitude: 38:30:39.0N

Longitude: 122:55:19.0W

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
16	1	LGR	0	0	0	100	0	0	0	0	0
2	0	CAS									
1	0	BRS									
19	1	TOTAL RIFFLE	0	0	0	100	0	0	0	0	0
18	4	GLD	25	40	0	0	10	25	0	0	0
35	2	RUN	85	0	15	0	0	0	0	0	0
15	1	SRN	25	25	0	0	50	0	0	0	0
68	7	TOTAL FLAT	42	26	4	0	13	14	0	0	0
30	28	MCP	43	12	24	4	3	0	0	13	1
4	4	CRP	83	0	18	0	0	0	0	0	0
5	5	LSL	40	17	39	0	4	0	0	0	0
6	6	LSR	40	23	0	34	0	0	0	3	0
2	2	LSBk	83	5	8	0	0	0	0	0	5
3	3	LSBo	13	0	25	0	0	0	0	62	0
3	2	PLP	35	0	15	0	0	0	0	50	0
1	1	BPR	0	50	0	50	0	0	0	0	0
1	1	DPL	60	10	0	0	0	0	0	0	30
55	52	TOTAL POOL	45	12	20	7	2	0	0	13	1
143	60	TOTAL	44	14	18	8	3	2	0	11	1

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Mount Jackson Creek LLID: 1229220385109 Drainage: Russian River - Lower
 Survey Dates: 7/18/2000 to 9/6/2000 Dry Units: 1
 Confluence Location: Quad: GUERNEVILLE Legal Description: T08NR10WS25 Latitude: 38:30:39.0N Longitude: 122:55:19.0W

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
16	4	LGR	0	0	50	50	0	0	0
2	2	CAS	0	0	0	0	0	50	50
1	1	BRS	0	0	0	0	0	0	100
18	7	GLD	43	0	43	14	0	0	0
35	6	RUN	33	17	50	0	0	0	0
15	3	SRN	33	0	0	33	33	0	0
30	7	MCP	71	14	14	0	0	0	0
4	2	CRP	50	50	0	0	0	0	0
5	3	LSL	67	33	0	0	0	0	0
6	3	LSR	100	0	0	0	0	0	0
2	1	LSBk	100	0	0	0	0	0	0
3	2	LSBo	50	50	0	0	0	0	0
3	2	PLP	100	0	0	0	0	0	0
1	1	BPR	0	100	0	0	0	0	0
1	1	DPL	100	0	0	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Mount Jackson Creek LLID: 1229220385109 Drainage: Russian River - Lower
 Survey Dates: 7/18/2000 to 9/6/2000
 Confluence Location: Quad: GUERNEVILLE Legal Description: T08NR10WS25 Latitude: 38:30:39.0N Longitude: 122:55:19.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
88	84	16	1	49	53

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: Mount Jackson Creek

LLID:

1229220385109 Drainage: Russian River - Lower

Survey Dates: 7/18/2000 to 9/6/2000

Confluence Location: Quad: GUERNEVILLE Legal Description: T08NR10WS25 Latitude: 38:30:39.0N Longitude: 122:55:19.0W

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	2	5.6
Boulder	4	2	6.7
Cobble / Gravel	15	15	33.3
Sand / Silt / Clay	23	26	54.4

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	4	6	11.1
Brush	8	4	13.3
Hardwood Trees	4	8	13.3
Coniferous Trees	28	27	61.1
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 2

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

StreamName: Mount Jackson Creek

LLID:

1229220385109 Drainage: Russian River - Lower

Survey Dates: 7/18/2000 to 9/6/2000

Confluence Location: Quad: GUERNEVILLE Legal Description: T08NR10WS25 Latitude: 38:30:39.0N Longitude: 122:55:19.0W

	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	42	45
SMALL WOODY DEBRIS (%)	0	26	12
LARGE WOODY DEBRIS (%)	0	4	20
ROOT MASS (%)	100	0	7
TERRESTRIAL VEGETATION (%)	0	13	2
AQUATIC VEGETATION (%)	0	14	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	0	0	13
BEDROCK LEDGES (%)	0	0	1

Appendix C - Fish Habitat Inventory Data Summary

Stream Name: 1229220385109 LLID: 1229220385109 Drainage: Russian River -
 Survey Dates: 7/18/2000 to 9/6/2000 Survey Length (ft.): 7706 Main Channel (ft.): 7697 Side Channel (ft.): 9
 Confluence Location: Quad: GUERNEVILLE Legal Description: T08NR10WS25 Latitude: 38:30:39.0N Longitude: 122:55:19.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: G3	Canopy Density (%): 89.8	Pools by Stream Length (%): 19.1
Reach Length (ft.): 3424	Coniferous Component (%): 71.9	Pool Frequency (%): 39.2
Riffle/Flatwater Mean Width (ft.): 5.6	Hardwood Component (%): 28.1	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 65.5
Range (ft.): to	Vegetative Cover (%): 65.7	2 to 2.9 Feet Deep: 31.0
Mean (ft.):	Dominant Shelter: Undercut Banks	3 to 3.9 Feet Deep: 3.4
Std. Dev.:	Dominant Bank Substrate Type: Cobble/Gravel	>= 4 Feet Deep: 0.0
Base Flow (cfs): 0.212	Occurrence of LWD (%): 7.9	Mean Max Residual Pool Depth (ft.): 1.74
Water (F): 56 - 60 Air (F): 56 - 68	LWD per 100 ft.:	Mean Pool Shelter Rating: 24
Dry Channel (ft.): 8	Riffles:	
	Pools:	
	Flat:	
Pool Tail Substrate (%): Silt/Clay: 6.7 Sand: 0.0 Gravel: 66.7 Sm Cobble: 13.3 Lg Cobble: 10.0 Boulder: 3.3 Bedrock: 0.0		
Embeddedness Values (%): 1. 20.0 2. 46.7 3. 20.0 4. 0.0 5. 13.3		

STREAM REACH: 2

Channel Type: A2	Canopy Density (%): 86.0	Pools by Stream Length (%): 1.8
Reach Length (ft.): 446	Coniferous Component (%): 94.0	Pool Frequency (%): 16.7
Riffle/Flatwater Mean Width (ft.): 4.7	Hardwood Component (%): 6.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 100.0
Range (ft.): to	Vegetative Cover (%): 45.0	2 to 2.9 Feet Deep: 0.0
Mean (ft.):	Dominant Shelter: Large Woody Debris	3 to 3.9 Feet Deep: 0.0
Std. Dev.:	Dominant Bank Substrate Type: Bedrock	>= 4 Feet Deep: 0.0
Base Flow (cfs): 0.212	Occurrence of LWD (%): 100.0	Mean Max Residual Pool Depth (ft.): 1.4
Water (F): 58 - 58 Air (F): 60 - 60	LWD per 100 ft.:	Mean Pool Shelter Rating: 30
Dry Channel (ft.): 0	Riffles:	
	Pools:	
	Flat:	
Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 0.0 Gravel: 100.0 Sm Cobble: 0.0 Lg Cobble: 0.0 Boulder: 0.0 Bedrock: 0.0		
Embeddedness Values (%): 1. 100.0 2. 0.0 3. 0.0 4. 0.0 5. 0.0		

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

Channel Type: G3	Canopy Density (%): 84.8	Pools by Stream Length (%): 12.7
Reach Length (ft.): 2206	Coniferous Component (%): 98.2	Pool Frequency (%): 38.6
Riffle/Flatwater Mean Width (ft.): 4.1	Hardwood Component (%): 1.8	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 58.8
Range (ft.): to	Vegetative Cover (%): 32.5	2 to 2.9 Feet Deep: 35.3
Mean (ft.):	Dominant Shelter: Large Woody Debris	3 to 3.9 Feet Deep: 0.0
Std. Dev.:	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 5.9
Base Flow (cfs): 0.212	Occurrence of LWD (%): 32.8	Mean Max Residual Pool Depth (ft.): 1.9
Water (F): 58 - 59 Air (F): 60 - 75	LWD per 100 ft.:	Mean Pool Shelter Rating: 10
Dry Channel (ft.): 0	Riffles:	
	Pools:	
	Flat:	
Pool Tail Substrate (%): Silt/Clay: 5.9 Sand: 5.9 Gravel: 76.5 Sm Cobble: 11.8 Lg Cobble: 0.0 Boulder: 0.0 Bedrock: 0.0		
Embeddedness Values (%): 1. 0.0 2. 76.5 3. 11.8 4. 0.0 5. 11.8		

STREAM REACH: 4

Channel Type: B3	Canopy Density (%): 95.0	Pools by Stream Length (%): 7.8
Reach Length (ft.): 477	Coniferous Component (%): 100.0	Pool Frequency (%): 33.3
Riffle/Flatwater Mean Width (ft.):	Hardwood Component (%): 0.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 100.0
Range (ft.): to	Vegetative Cover (%): 50.0	2 to 2.9 Feet Deep: 0.0
Mean (ft.):	Dominant Shelter: Undercut Banks	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): 0.212	Occurrence of LWD (%): 0.0	Mean Max Residual Pool Depth (ft.): 1.9
Water (F): 60 - 60 Air (F): 77 - 77	LWD per 100 ft.:	Mean Pool Shelter Rating: 5
Dry Channel (ft.): 0	Riffles:	
	Pools:	
	Flat:	
Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 0.0 Gravel: 100.0 Sm Cobble: 0.0 Lg Cobble: 0.0 Boulder: 0.0 Bedrock: 0.0		
Embeddedness Values (%): 1. 0.0 2. 100.0 3. 0.0 4. 0.0 5. 0.0		

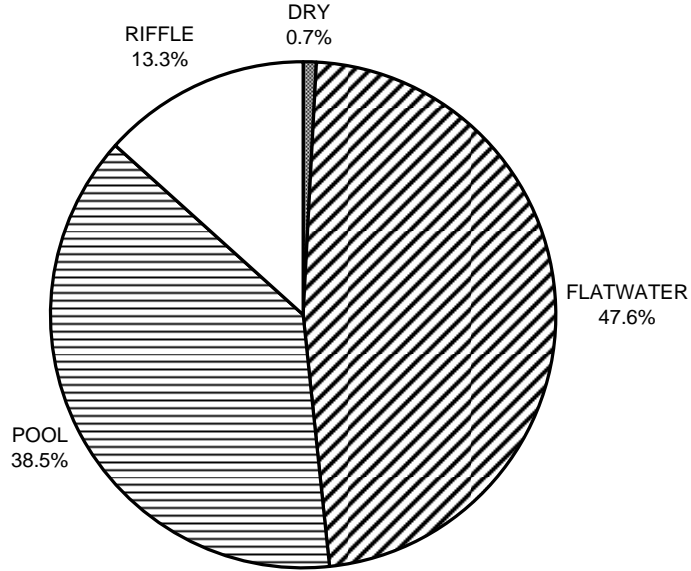
Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 5

Channel Type: G3	Canopy Density (%): 90.8	Pools by Stream Length (%): 4.2
Reach Length (ft.): 1144	Coniferous Component (%): 99.2	Pool Frequency (%): 40.0
Riffle/Flatwater Mean Width (ft.): 5.0	Hardwood Component (%): 0.8	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 100.0
Range (ft.): to	Vegetative Cover (%): 38.3	2 to 2.9 Feet Deep: 0.0
Mean (ft.):	Dominant Shelter: Undercut Banks	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): 0.212	Occurrence of LWD (%): 26.0	Mean Max Residual Pool Depth (ft.): 1.5
Water (F): 60 - 60 Air (F): 77 - 77	LWD per 100 ft.:	Mean Pool Shelter Rating: 11
Dry Channel (ft.): 0	Riffles:	
	Pools:	
	Flat:	
Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 0.0 Gravel: 100. Sm Cobble: 0.0 Lg Cobble: 0.0 Boulder: 0.0 Bedrock: 0.0		
Embeddedness Values (%): 1. 75.0 2. 25.0 3. 0.0 4. 0.0 5. 0.0		

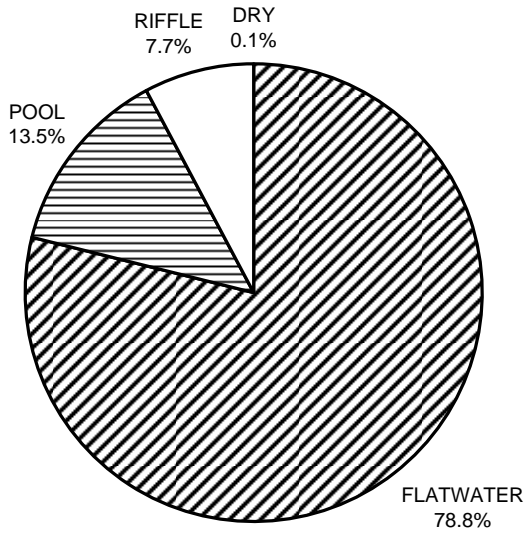
APPENDIX D: GRAPHS

**MOUNT JACKSON CREEK 2000
HABITAT TYPES BY PERCENT OCCURRENCE**



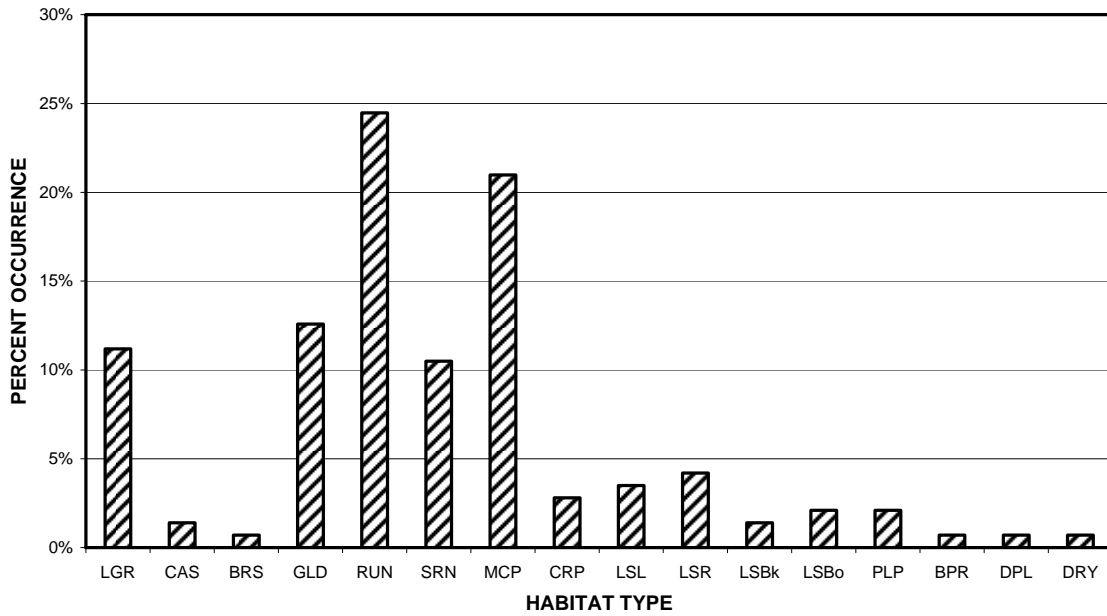
GRAPH 1: Level II habitat types by percent occurrence

**MOUNT JACKSON CREEK 2000
HABITAT TYPES BY PERCENT TOTAL LENGTH**



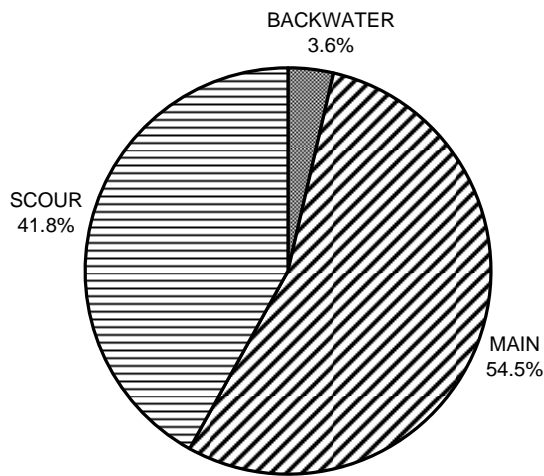
GRAPH 2: Level II habitat types by percent total length

**MOUNT JACKSON CREEK 2000
HABITAT TYPES BY PERCENT OCCURRENCE**



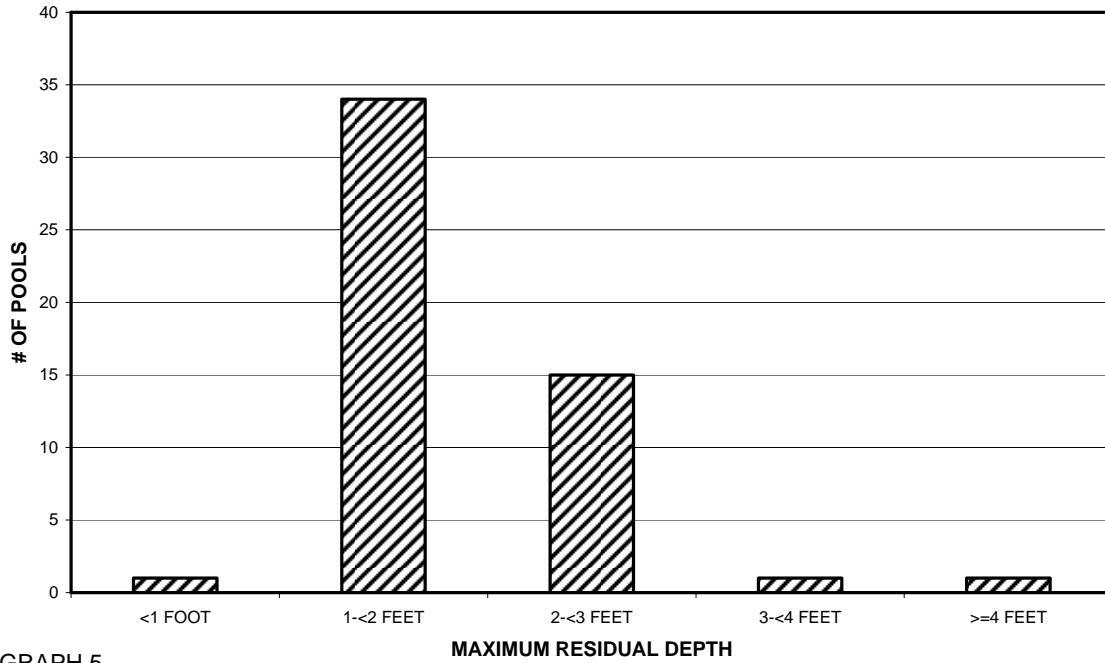
GRAPH 3: Level IV habitat types by percent occurrence

**MOUNT JACKSON CREEK 2000
POOL TYPES BY PERCENT OCCURRENCE**



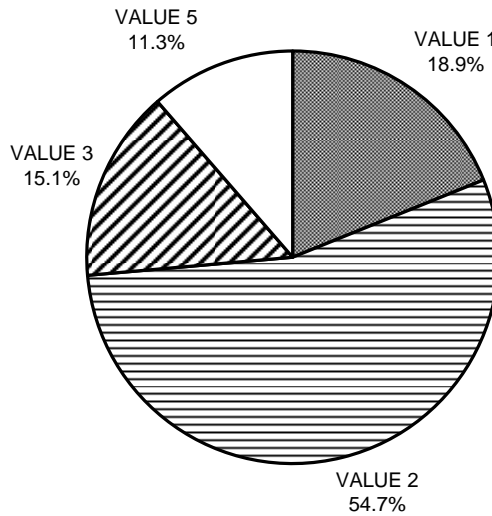
GRAPH 4: Level I pool types by percent occurrence

**MOUNT JACKSON CREEK 2000
MAXIMUM DEPTH IN POOLS**



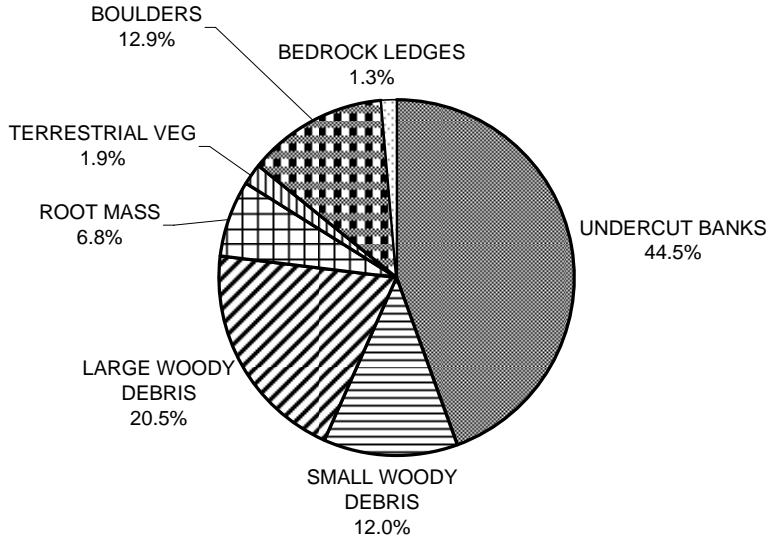
GRAPH 5

**MOUNT JACKSON CREEK 2000
PERCENT EMBEDDEDNESS**



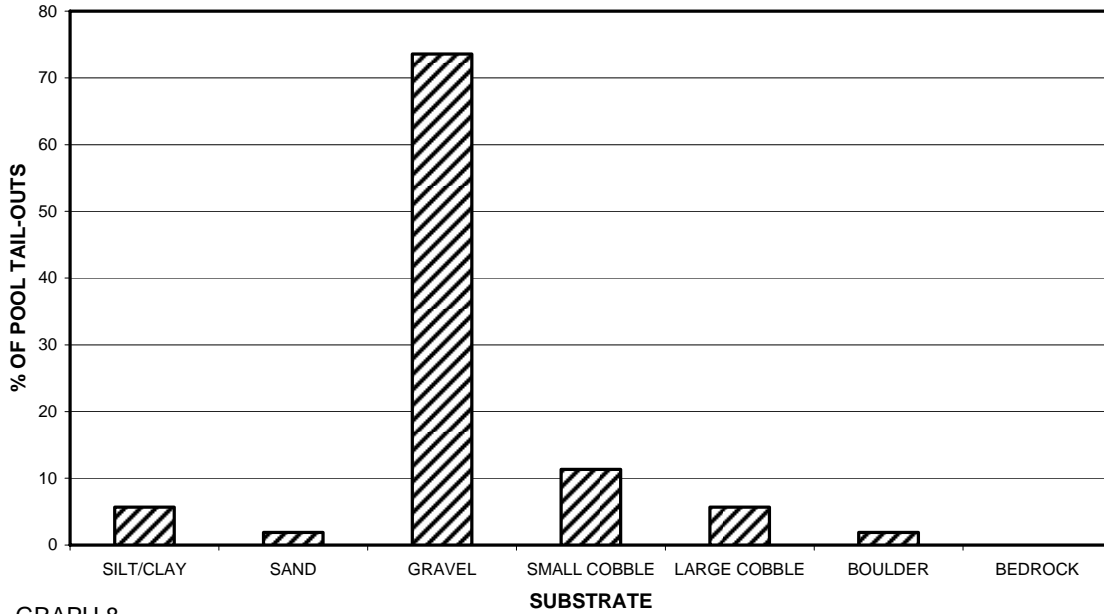
GRAPH 6

**MOUNT JACKSON CREEK 2000
MEAN PERCENT COVER TYPES IN POOLS**



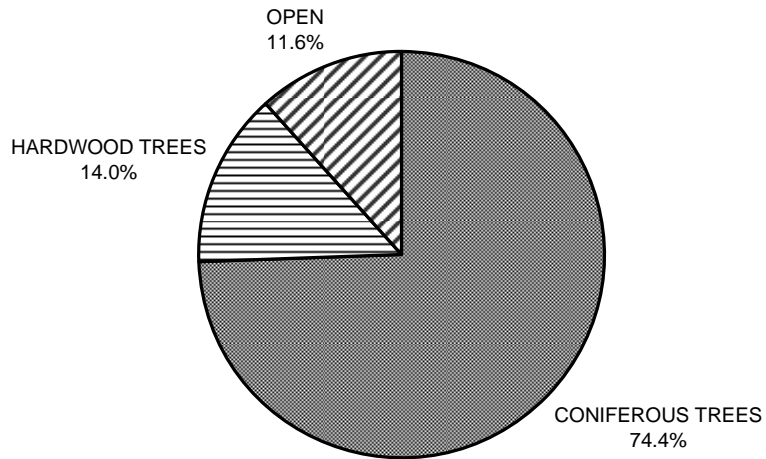
GRAPH 7

**MOUNT JACKSON CREEK 2000
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS**



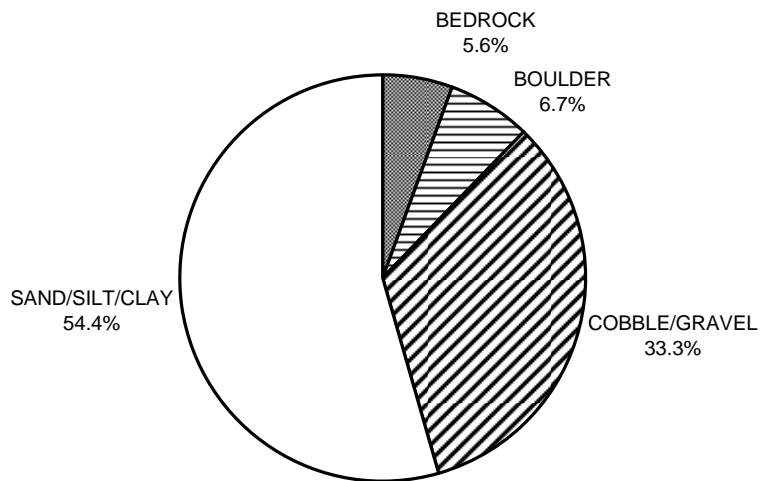
GRAPH 8

**MOUNT JACKSON CREEK 2000
MEAN PERCENT CANOPY**



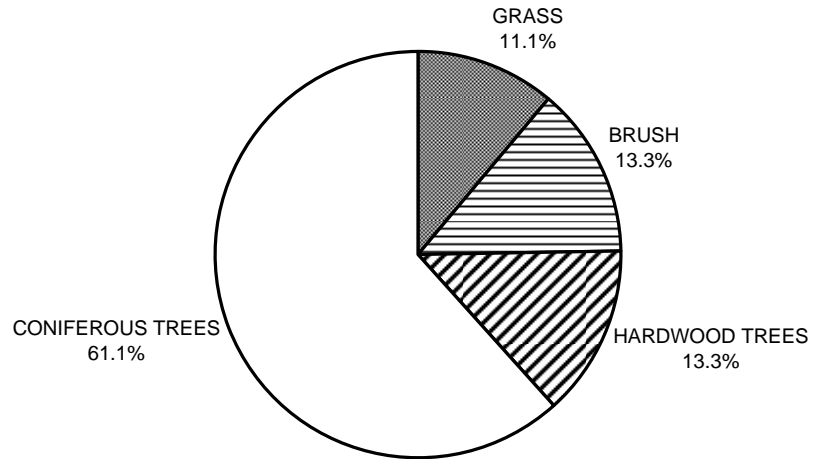
GRAPH 9

**MOUNT JACKSON CREEK 2000
DOMINANT BANK COMPOSITION IN SURVEY REACH**



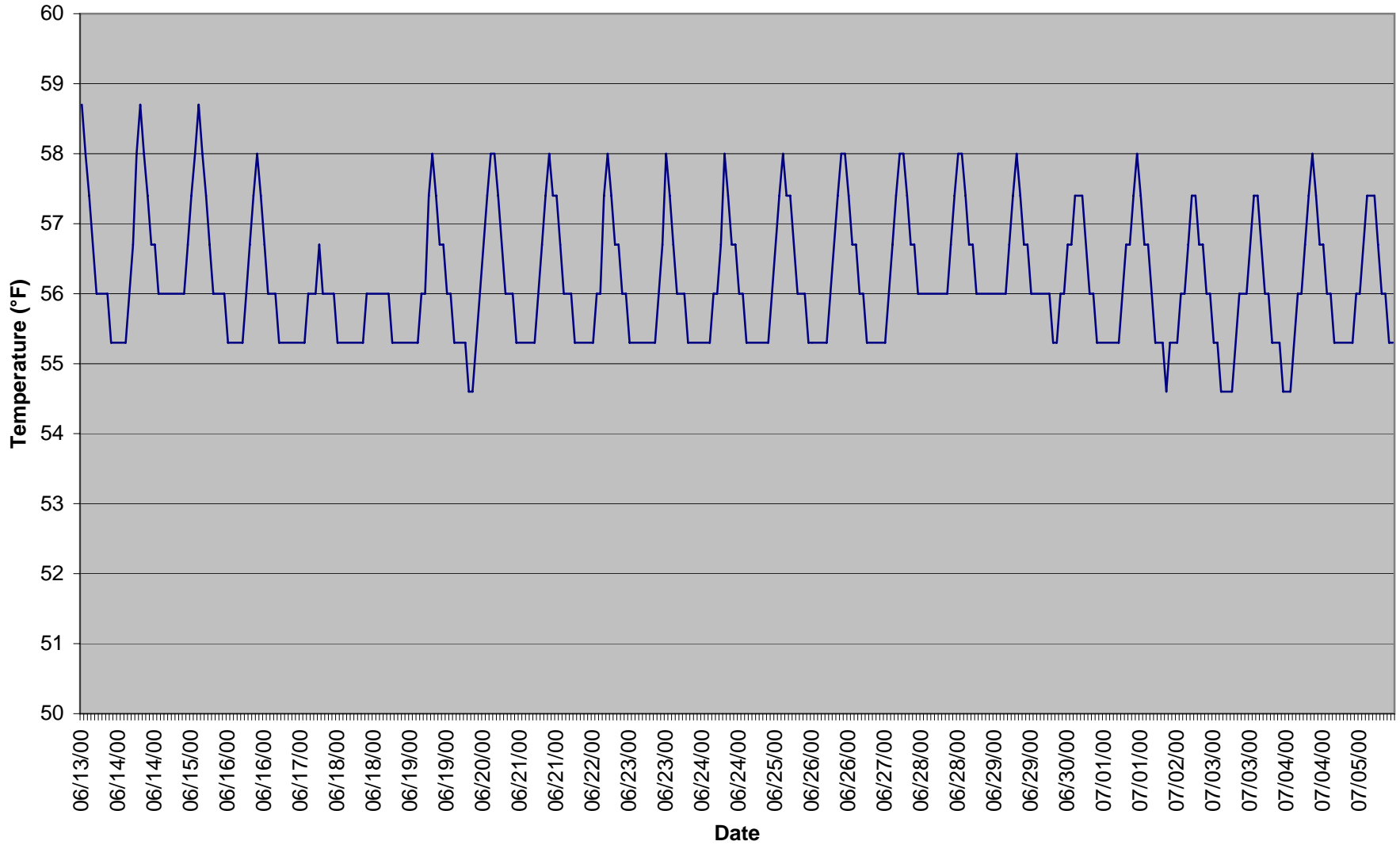
GRAPH 10

**MOUNT JACKSON CREEK 2000
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11

Mt. Jackson Creek



Hydrologic Sub-Areas covered by the watershed:

Tributary to Russian River
Tributary to
Tributary to

Name: Mount Jackson Creek **LLId: (1:24k)** 1229220385109 **County:** Sonoma
Location: **T:** 08N **R:** 10W **S:** 25 **Latitude:** 38.5109694448189 **Longitude** 122.92206623465

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>2</u>	Total Length: 3.64 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.	5.86 Km	

Drainage Area:	311 Hectares
	768 Acres
	1.2 sq. mi.

Elevations:	Mouth: <u>75</u> feet
	Headwaters: <u>1444</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): Steelhead

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

Federal:	State:	Local:	Private:
0.0 acres	0.0	0.0	768.0
0.00 %	0.00 %	0.00 %	100.00 %

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:
113.05 acres	528.64	0.00	0.00	0.00
14.7 %	68.7 %	0.0 %	0.0 %	0.0 %
Shrub:	Herbaceous:	Barren/rock:	Water:	
41.85	86.17	0.00	0.00	
5.4 %	11.2 %	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
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