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

INTRODUCTION

A stream inventory was conducted on 7/24/2001 on McClure Creek. The survey began at the confluence with Russian River and extended upstream 2.4 miles.

The McClure 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 McClure 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

McClure Creek is a tributary to Russian River, which flows into the Pacific Ocean, located in Mendocino County, California (see McClure Creek map, Appendix A). McClure Creek's legal description at the confluence with Russian River is T15N R12W S28. Its location is 39°08'6.3" north latitude and 123°11'6.9" west longitude, LLID number 1231852391350.

McClure Creek is a fourth order stream and has approximately 8.l1 miles of blue line stream according to the USGS Purdy's garden, Elledge Peak, Cow Mountain and Ukiah 7.5 minute quadrangles. McClure Creek drains a watershed of approximately 17.42 square miles. Elevations range from about 581 feet at the mouth of the creek to 3766 feet in the headwater areas. Hardwood forest and Shrub vegetation dominate the watershed. The watershed is primarily federally owned (61.62%) and 37.66% privately owned, a quarter of which is managed for agriculture. Vehicle access exists via Talmage Highway, east of Ukiah. The California Natural Diversity Data Database lists occurrences of other sensitive plants or animals: *Horkelia bolanderi* (Bolander's horkelia), *Arctostaphylos stanfordiana ssp. raichei* (Raiche's manzanita) and *Hesperolinon adenophyllum* (glandular western flax) in the McClure Creek watershed.

METHODS

The habitat inventory conducted in McClure 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 McClure Creek to record measurements and observations. There are eleven 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. Additionally, temperatures were recorded using remote temperature recorders, which logged temperature at set intervals 24 hours/day.

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". McClure 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 McClure 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) 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 McClure 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 visually 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 densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In McClure 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 McClure 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.

10. Large Woody Debris Count:

Large woody debris (LWD) is an important component of fish habitat and an element in channel forming processes. In each habitat unit all pieces of LWD partially or entirely below the elevation of bankfull discharge are counted and recorded. The minimum size to be considered is twelve inches in diameter and six feet in length. The LWD count is presented by reach and is expressed as an average per 100 feet.

11. Average Bankfull Width:

Bankfull width can vary greatly in the course of a channel type stream reach. This is especially true in very long reaches. Bankfull width can be a factor in habitat components like canopy density, water temperature, and pool depths. Frequent measurements taken at riffle crests (velocity crossovers) are needed to accurately describe reach widths. At the first appropriate velocity crossover that occurs after the beginning of a new stream survey page (ten habitat units), bankfull width is measured and recorded in the appropriate header block of the page. These widths are presented as an average for the channel type reach.

BIOLOGICAL INVENTORY

Biological sampling during the stream inventory is used to determine fish species and their distribution in the stream. Fish presence was observed from the stream banks in McClure Creek. 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:

- 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 McClure 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 7/24/2001, was conducted by Laine MacTague and Jeff Facendini of the California Department of Fish and Game. The total length of the stream surveyed was 12,696.

Stream flow was not measured on McClure Creek.

McClure Creek is a F3 channel type for all 12,696 feet of the stream surveyed F3 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and cobble-dominant substrates.

Water temperatures taken during the survey period ranged from 60 to 68 degrees Fahrenheit. Air temperatures ranged from 80 to 89 degrees Fahrenheit. Water temperatures taken with a remote temperature recorder deployed from July 6, 2001 to September 19, 2001, ranged from 54˚ to 69˚ Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of ***occurrence*** there were 10% dry units, 40% flatwater units, 12% pool units, 38% riffle units, (Graph 1). Based on total ***length*** of Level II habitat types there were 73% dry units, 14% flatwater units, 3% pool units, and 10% riffle units (Graph 2).

Eight Level IV habitat types were identified (Table 2). The most frequent habitat types by percent ***occurrence*** were 38% Low Gradient Riffles 37% Glide units, and 6% Mid-Channel Pool units (Graph 3). Based on percent total ***length*** was 73% Dry units, 13% Glide units, and 10% Low Gradient Riffle units.

A total of eight pools were identified. There were 50% each of Main Channel and scour pools (Graph 4). Main Channel pools comprised 54% of the total length of all pools (Table 3).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Three of the eight pools (37.5%) had a residual depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 8 pool tail-outs measured, 3 had a value of 1 (37.5%); 5 had a value of 2 (62.5%); (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 is 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 5 , flatwater habitat types had a mean shelter rating of 50 , and pool habitats had a mean shelter rating of 85 (Table 1). Of the pool types, the Main Channel pools had a mean shelter rating of 158, Scour pools had a mean shelter rating of 37, (Table 3).

Table 5 summarizes mean percent cover by habitat type. Terrestrial Vegetation and Small Woody Debris are the dominant cover types in McClure Creek. Graph 7 describes the pool cover in McClure Creek. Large Woody Debris is the dominant pool cover type followed by root mass.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs.

The mean percent canopy density for the surveyed length of McClure Creek was 86%. The mean percentages of hardwood and coniferous trees were 99% and 1%, respectively (Table 7). Fourteen percent of the canopy was open. Graph 9 describes the mean percent canopy in McClure Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 92.8%. The mean percent left bank vegetated was 92.8%. The dominant elements composing the structure of the stream banks consisted of 93% sand/silt/clay, 4% each of boulder and cobble/gravel, (Graph 10). Brush was the dominant vegetation type observed in 89.3% of the units surveyed. Additionally, 3.6% of the units surveyed had hardwood trees as the dominant vegetation type, and none had coniferous trees as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

On 10/24/01 a biological inventory was conducted at 1 site on McClure Creek to document fish species composition and distribution. The site was between Lat. 39:8’55.4”, Long. 123:8’53.7” and Lat. 30:8’56.2”, Long. 123:8’45.2”. Fish from the site were counted by species, and returned to the stream. The air temperature ranged from 60-68ºF and the water temperature ranged from 52-55ºF.

The inventory began at 10:40 hours in Reach 1 and ended at 12:05 hours 704' upstream. 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	9
Steelhead Y+	2
Newt	14
Sculpin	9
Tree Frog	9
Yellow-legged Frog	12

Also noted were 7 dead newts, a dead frog, and cattle presence in the stream.

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

DISCUSSION

McClure Creek is an F3 channel type for the entire 12,696 feet of the stream surveyed. The suitability of F3 channel types for fish habitat improvement structures is as follows: Good for bank-placed boulders; single and opposing wing deflectors, and fair for plunge weirs; boulder clusters; channel constrictors and log cover.

The water temperatures recorded on the survey date 7/24/2001, ranged from 60˚ to 68˚ Fahrenheit. Air temperatures ranged from 80 to 89 degrees Fahrenheit. If sustained, water temperatures above 65˚ Fahrenheit are unsuitable for salmonid survival.

Flatwater habitat types comprised 73% of the total length of this survey, riffles 10%, and pools 3%. The pools are relatively shallow/deep, with only three of the eight (37.5%) pools having a maximum residual depth greater than three feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In third and fourth order streams, a primary pool is defined to have a maximum residual depth of at least three 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.

All of the eight pool tail-outs measured had embeddedness ratings of 1 or 2. None of the pool

tail-outs had embeddedness ratings of 3 or 4. None of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. Sediment sources in McClure Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.
All of the 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 85. The shelter rating in the flatwater habitats was 50. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by Terrestrial Vegetation and Small Woody Debris in McClure Creek. Large Woody Debris is the dominant cover type in pools followed by root mass. 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 86%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was HIGH at 92% each. 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

McClure 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. There are sections where the stream is being impacted from cattle trampling the riparian zone. Alternatives should be explored with the grazier and developed if possible.

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. McClure Creek would benefit from 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. Increase woody cover in the pools and flatwater habitat units. Most of the existing cover is from terrestrial vegetation. Adding high quality complexity with woody cover is desirable.

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.

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.

McClure Creek

Position (ft.)	Habitat Unit #	Comments:
0	0001.00	General Comment: At 33' LB- Dirt road entering creek to mainstem RR; At 128'-210' *Arundo* patches on both banks and bits of garbage throughout this unit; At 314'-400' *Arundo* patches both banks; At 340'-368'-concrete bed(no crossing); At 479'-Begin concrete slab LB; At 532'-Begin concrete bed from Culvert/Bridge; At 590'-Culvert/Bridge 6.3'H x 2.6W x 32'L with a gradient of 1.8%, not retaining gravel, and fish were observed upstream (N39°08'9.2" W123°10'37.9")(See additional notes in data file); Banks mouth to culvert are artificial dirt/gravel berms; RB concrete slag ends @ 656'; LB *Arundo* @ 665'; *Arundo* and Himalayan blackberries both banks 800'-1260';1.3' metal pipe crossing @ chest height @ 840'; RB *vinca* 1312'-1346'; RB outhouses(old) @ 1388'; RB water pump @ 1444'; 4" pipe crossing head high; powerline crossing; RB Black Walnut at 1497'; At 1632' Bridge-5.7'H x 20'W x 12'L, not retaining gravel, and fish observed upstream(N39°08'3.7" W123°10'47.2")(see additional notes in data file); RB sycamores 1648'-1700'; *Arundo* RB from 1700'-1834'; LB homes 1850'-2424' and various non-natives and trash; RB Himalayan 1840'-1900'; LB concrete 2042'-2451'-non-natives continue; LB dry trib @ 2578'(Mill Creek); @ 2800' Box Culvert(Sanford Ranch Rd.), 10'H x 17'W x 58'L, notretaining gravel, and fish observed upstream(N39°08'05"/W123°10'34.5"); At 3000'-3080' it is like a jungle; 3080' begins healthy Alders(100% canopy); LB houses at 3164'-3750'; LB slash pile in creek and on banks at 3750'-3800'. N39°08'9.9"/W123°11'4.5"
3985	0002.00	Non-natives and alders; *H. regilla* tapoles

4130	0003.00	Wet crossing 175', instream, not retaining gravel, and fish observed upstream (N39°08'6.2"/123°10'18.2") (see form for additional notes); Bike/Foot crossing @ 400'; *Arundo* @ 600'; Pipe crossing head high @ 895'; Native blackberries @ 1010'; RB 8" diversion pipe with concrete housing @ 2165'-2247'(photo) becomes PVC pipe(new); Much *Arundo* @ 2150' to end.
6430	0004.00	Roach fish; Instream Cottonwood accumulation 5'H x 16'W x11'L, not retaining gravel, fish were observed upstream and scouring caused pools beneath the accumulation.[CW 2.5 30 E 6]
6536	0007.00	Instream Willow Accumulation at top of unit 3.5'H x15'W x 5'L, not retaining gravel, fish observed upstream and scour pools beneath[WL 1.5 10 E 6]
6597.6	0009.00	First 71' is an instream Bridge 8.5'H x 65'W, not retaining gravel N39°08'20.7"/W123°09'59.3"
6668.6	0010.00	N39°08'21.3"/W123°09'57.3"
6717.6	0011.00	Bucket of guts at water's edge; Many roach
7158.8	0020.00	N39°08'23.5"/W123°09'54.3"
7252.7	0022.00	More fish. Still Himalayan Blackberries
7766.3	0030.00	N39°08'26.7"/W123°09'50.4"
7796.9	0031.00	LB vertical eroding under brush
7858.2	0032.00	LB vertical eroding under brush
8070.5	0037.00	Plum tree RB top of unit
8124.8	0039.00	LB ranching activity
8178.9	0040.00	Bullfrog, roach and sculpin; 20 RSN; N39°08'30.3"/W123°09'51.3"
8299.1	0042.00	Horse crossing top of unit
8366	0043.00	RB dry gully @ top of unit

8414.3	0044.00	Farm animal tracks in creek at 16'
8588.7	0047.00	Pipe housing electric wire crossing @ 32'
8649.5	0048.00	Mostly a wet crossing, instream, 1.8% grade, not retaining gravel, and fish were observed upstream. N39°08'33.6"/W123°09'48.2"
8688.5	0049.00	RSN, still fish
8776.1	0050.00	N39°08'34.4"/W123°09'46.5"
8824.9	0051.00	R.B Concrete structures; RB is instream diversion pipe and pump station
8922.5	0052.00	RB big diversion pipe @ 43'. Cable crossing overhead @ 58'
9004.3	0053.00	Western toad
9133.3	0056.00	RSN. Lots of fish(no ID)
9228.3	0057.00	Concrete, tires and girders for LB; 0'-26'.
9318.5	0059.00	Lots of Himalayan blackberries
9378.5	0060.00	N39°08'36.6"/W123°09'41.1"
9399.2	0061.00	LB car @ 25'
9781.4	0068.00	LB concrete and slash from 260'-336'; instream trash heap @ 440'; vines planted on RB from 708'-766'; RB eroding from under vines @ 865'(photo): Instream Bridge @ 923', 13'H x 44'L x 10.5'L, not retaining gravel, in ok shape (N39°08'48.1" W123°09'33.7"); LB concrete chunks on banks and instream; No canopy to speak of past bridge; Wet crossing @ 1465', 1% grade, not retaining gravel (N39°08'52.8"/W12309'30.1"); Plywood fence crossing creek@ 1915'; Cow fences in creek upstream from plywood; Broken plywood @2545; RB dry trib @ 2600';END OF SURVEY at plywood @ 2930' (N39°09'0.8"/W123°09'17.8")

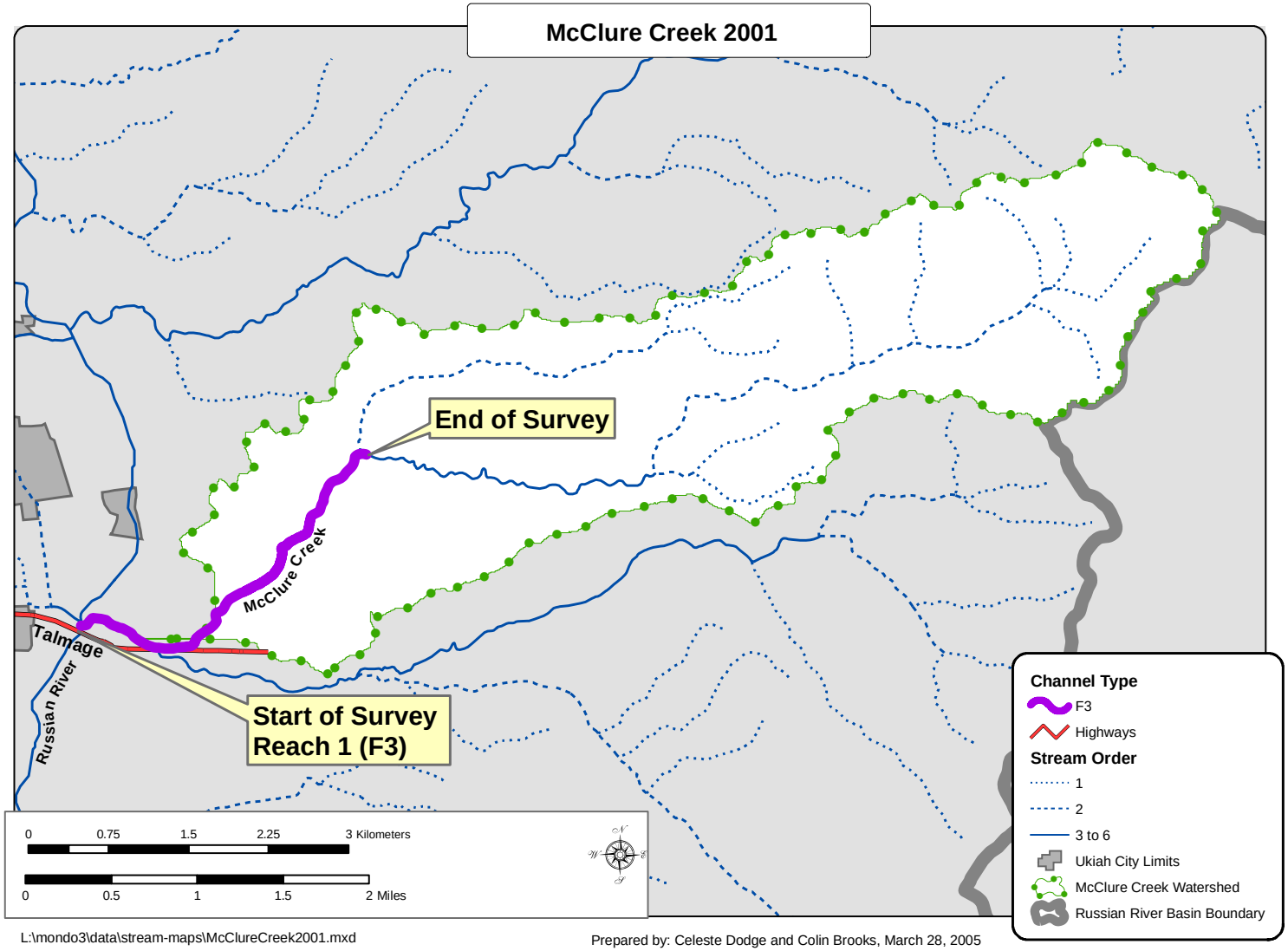
REFERENCES

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, March 28, 2005

Appendix B: Tables

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

Stream Name: McClure Creek

LLID: 1231852391350

Drainage: Russian River - Upper

Survey Dates: 7/24/2001 to 7/24/2001

Confluence Location: Quad: UKIAH Legal Description: T15NR11WS16 Latitude: 39:08:06.0N Longitude: 123:11:07.0W

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
7	0	DRY	10.3	1329	9305.6	73.2									
27	7	FLATWATER	39.7	63	1713.8	13.5	7.7	0.8	1.5	477	12878	414	11183		50
8	8	POOL	11.8	50	398.7	3.1	11.0	1.2	2.8	541	4328	685	5484	633	85
26	2	RIFFLE	38.2	50	1293.3	10.2	3.5	0.2	0.4	150	3892	25	638		5

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
68	17	12711.4	21098	17304

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: McClure Creek

LLID: 1231852391350

Drainage: Russian River - Upper

Survey Dates: 7/24/2001 to 7/24/2001

Confluence Location: Quad: UKIAH Legal Description: T15NR11WS16 Latitude: 39:08:06.0N Longitude: 123:11:07.0W

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 (%)
26	2	LGR	38.2	50	1293	10.2	4	0.2	0.4	150	3892	25	638		5	86
25	6	GLD	36.8	65	1617	12.7	8	0.8	2.4	521	13026	465	11637		50	85
2	1	RUN	2.9	48	97	0.8	4	0.5	0.8	213	425	106	213			85
4	4	MCP	5.9	54	215	1.7	11	1.3	3.85	595	2378	766	3064	740	158	100
1	1	CRP	1.5	60	60	0.5	8	1.2	2.15	456	456	547	547	524	20	100
2	2	LSR	2.9	45	90	0.7	12	0.9	2.45	507	1013	456	912	431	45	88
1	1	PLP	1.5	34	34	0.3	14	1.5	3	480	480	960	960	720	45	
7	0	DRY	10.3	1329	9306	73.2										70

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
68	17	12711.4	21671	17972

Table 3 - Summary of Pool Types

Stream Name: McClure Creek LLID: 1231852391350 Drainage: Russian River - Upper

Survey Dates: 7/24/2001 to 7/24/2001

Confluence Location: Quad: UKIAH Legal Description: T15NR11WS16 Latitude: 39:08:06.0N Longitude: 123:11:07.0W

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
4	4	MAIN	50	54	215	54	10.8	1.3	595	2378	740	2961	158
4	4	SCOUR	50	46	184	46	11.3	1.1	487	1950	527	2106	37

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
8	8	398.7	4328	5067

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

Stream Name: McClure Creek LLID: 1231852391350 Drainage: Russian River - Upper

Survey Dates: 7/24/2001 to 7/24/2001

Confluence Location: Quad: UKIAH Legal Description: T15NR11WS16 Latitude: 39:08:06.0N Longitude: 123:11:07.0W

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
4	MCP	50	0	0	0	0	2	50	2	50	0	0
1	CRP	13	0	0	0	0	1	100	0	0	0	0
2	LSR	25	0	0	0	0	2	100	0	0	0	0
1	PLP	13	0	0	0	0	0	0	1	100	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
8	0	0	0	0	5	62	3	38	0	0

Mean Maximum Residual Pool Depth (ft.): 2.8

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: McClure Creek LLID: 1231852391350 Drainage: Russian River - Upper

Survey Dates: 7/24/2001 to 7/24/2001 Dry Units: 7

Confluence Location: Quad: UKIAH Legal Description: T15NR11WS16 Latitude: 39:08:06.0N Longitude: 123:11:07.0W

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
26	1	LGR	0	100	0	0	0	0	0	0	0
26	1	TOTAL RIFFLE	0	100	0	0	0	0	0	0	0
25	6	GLD	6	5	8	10	73	0	0	0	0
2	0	RUN									
27	6	TOTAL FLAT	6	5	8	10	73	0	0	0	0
4	2	MCP	20	10	40	10	30	0	0	0	0
1	1	CRP	0	0	0	20	0	0	0	80	0
2	1	LSR	0	0	30	60	10	0	0	0	0
1	1	PLP	25	25	25	0	0	25	0	0	0
8	5	TOTAL POOL	13	9	27	20	14	5	0	16	0
68	12	TOTAL	8	15	15	13	43	2	0	7	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: McClure Creek LLID: 1231852391350 Drainage: Russian River - Upper

Survey Dates: 7/24/2001 to 7/24/2001 Dry Units: 7

Confluence Location: Quad: UKIAH Legal Description: T15NR11WS16 Latitude: 39:08:06.0N Longitude: 123:11:07.0W

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
26	2	LGR	0	0	0	100	0	0	0
25	6	GLD	0	83	0	17	0	0	0
2	1	RUN	0	0	0	100	0	0	0
4	1	MCP	0	100	0	0	0	0	0
1	1	CRP	0	100	0	0	0	0	0
2	2	LSR	0	100	0	0	0	0	0
1	0	PLP	0	0	0	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: McClure Creek LLID: 1231852391350 Drainage: Russian River - Upper

Survey Dates: 7/24/2001 to 7/24/2001

Confluence Location: Quad: UKIAH Legal Description: T15NR11WS16 Latitude: 39:08:06.0N Longitude: 123:11:07.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
86	1	99	0	89	80

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: McClure Creek LLID: 1231852391350 Drainage: Russian River - Upper

Survey Dates: 7/24/2001 to 7/24/2001

Confluence Location: Quad: UKIAH Legal Description: T15NR11WS16 Latitude: 39:08:06.0N Longitude: 123:11:07.0W

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	0	0	0.0
Boulder	0	1	3.6
Cobble / Gravel	1	0	3.6
Sand / Silt / Clay	13	13	92.9

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	0	0	0.0
Brush	12	13	89.3
Hardwood Trees	1	0	3.6
Coniferous Trees	0	0	0.0
No Vegetation	1	1	7.1

Total Stream Cobble Embeddedness Values: 2

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

StreamName: McClure Creek LLID: 1231852391350 Drainage: Russian River - Upper

Survey Dates: 7/24/2001 to 7/24/2001

Confluence Location: Quad: UKIAH Legal Description: T15NR11WS16 Latitude: 39:08:06.0N Longitude: 123:11:07.0W

	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	6	13
SMALL WOODY DEBRIS (%)	100	5	9
LARGE WOODY DEBRIS (%)	0	8	27
ROOT MASS (%)	0	10	20
TERRESTRIAL VEGETATION (%)	0	73	14
AQUATIC VEGETATION (%)	0	0	5
WHITEWATER (%)	0	0	0
BOULDERS (%)	0	0	16
BEDROCK LEDGES (%)	0	0	0

Appendix C: Fish Habitat Inventory Summary

Table 8 - Fish Habitat Inventory Data Summary

Stream Name: McClure Creek LLID: 1231852391350 Drainage: Russian River -
Survey Dates: 7/24/2001 to 7/24/2001 Survey Length (ft.): 12711. Main Channel (ft.): 12711. Side Channel (ft.): 0
Confluence Location: Quad: UKIAH Legal Description: T15NR11WS16 Latitude: 39:08:06.0N Longitude: 123:11:07.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: F3
Reach Length (ft.): 12711.4
Riffle/Flatwater Mean Width (ft.): 6.8
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs):
Water (F): 0 - 68 Air (F): 80 - 89
Dry Channel (ft.): 9305.6

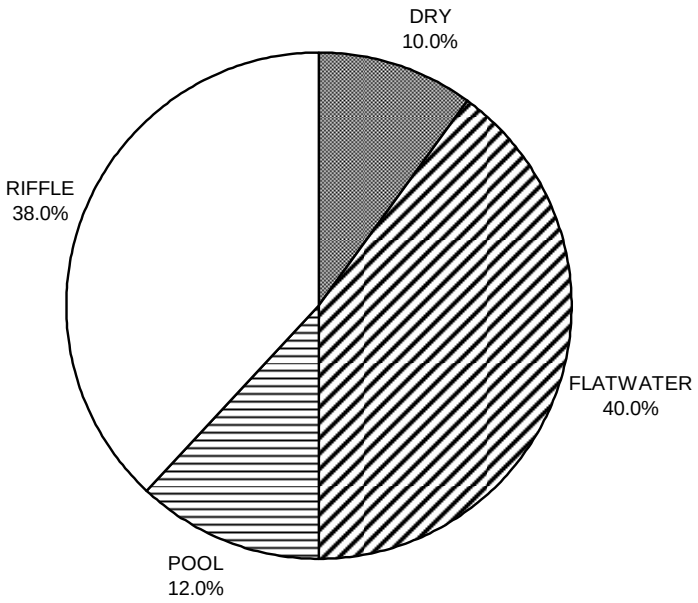
Canopy Density (%): 85.6
Coniferous Component (%): 1.5
Hardwood Component (%): 98.5
Dominant Bank Vegetation: Brush
Vegetative Cover (%): 84.3
Dominant Shelter: Terrestrial Veg.
Dominant Bank Substrate Type:
Occurrence of LWD (%): 13.7
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 3.1
Pool Frequency (%): 11.8
Residual Pool Depth (%):
< 2 Feet Deep: 0.0
2 to 2.9 Feet Deep: 62.5
3 to 3.9 Feet Deep: 37.5
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth (ft.): 2.76
Mean Pool Shelter Rating: 85

Pool Tail Substrate (%): Silt/Clay: Sand: Gravel: Sm Cobble: Lg Cobble: Boulder: Bedrock:
Embeddedness Values (%): 1. 37.5 2. 62.5 3. 0.0 4. 0.0 5. 0.0

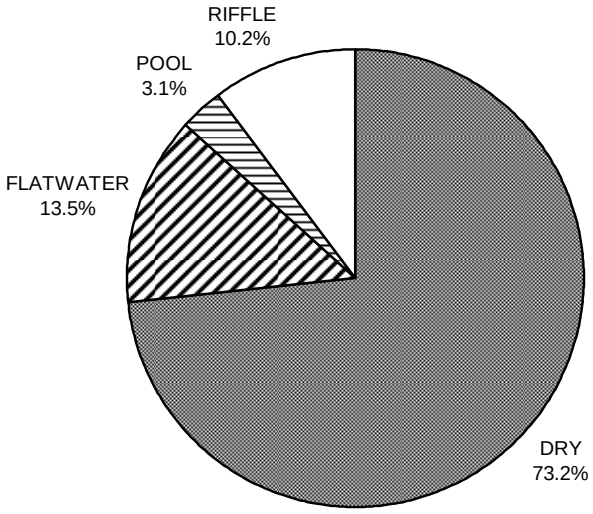
Appendix D: Graphs

MCCLURE CREEK 2001
LEVEL II HABITAT TYPES BY PERCENT OCCURRENCE



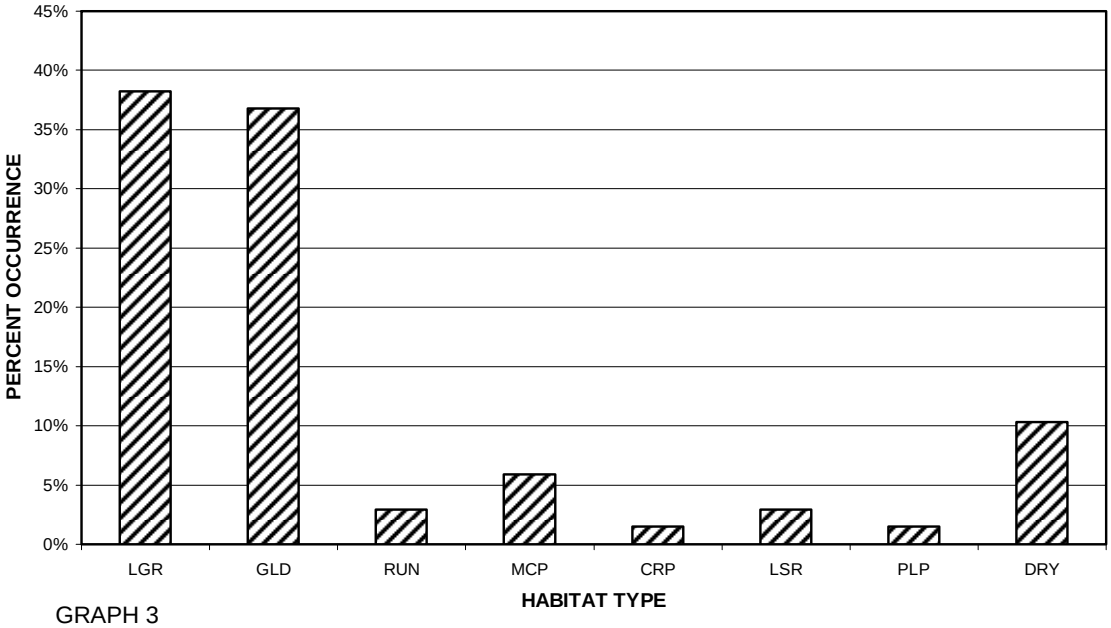
GRAPH 1

MCCLURE CREEK 2001
LEVEL II HABITAT TYPES BY PERCENT TOTAL LENGTH



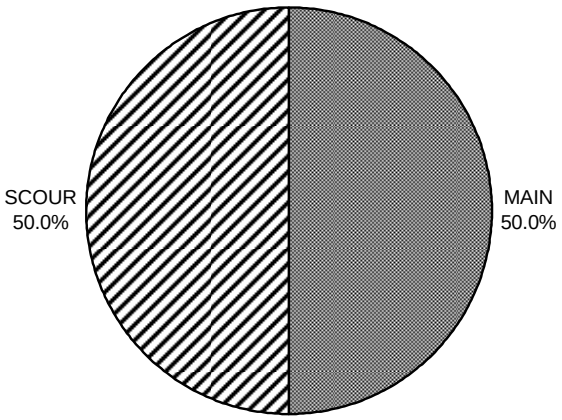
GRAPH 2

MCCLURE CREEK 2001
LEVEL IV HABITAT TYPES BY PERCENT OCCURRENCE



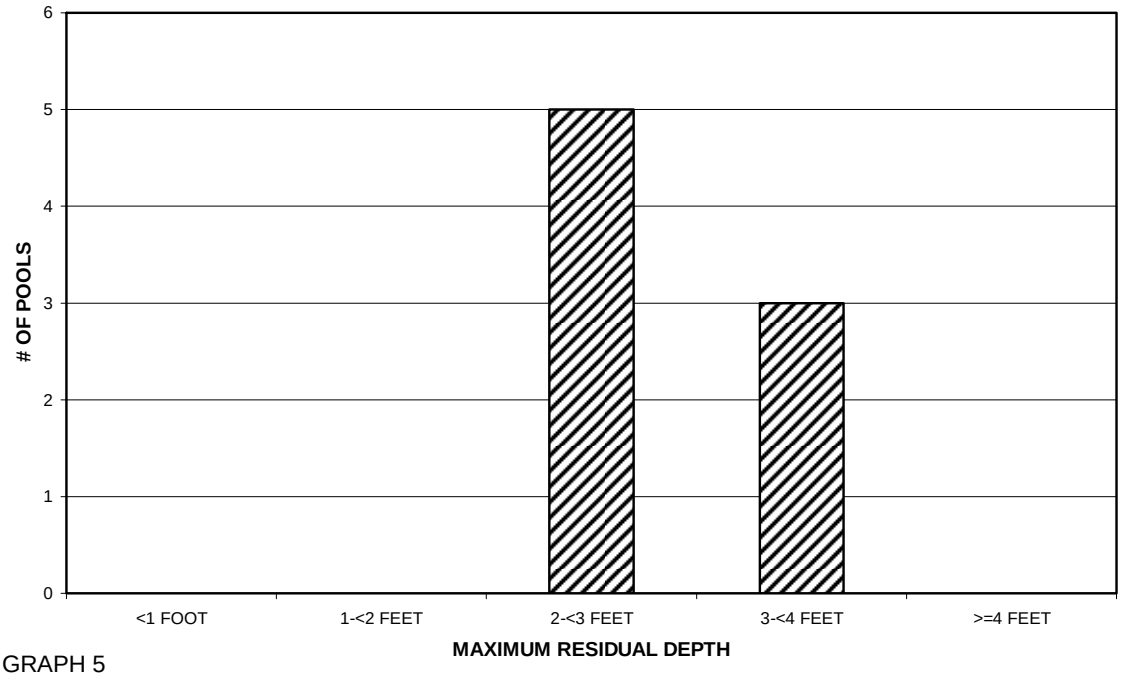
GRAPH 3

MCCLURE CREEK 2001
LEVEL I POOL TYPES BY PERCENT OCCURRENCE



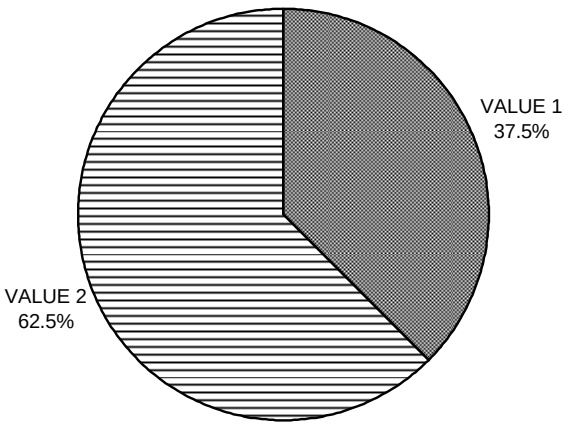
GRAPH 4

MCCLURE CREEK 2001
MAXIMUM DEPTH IN POOLS



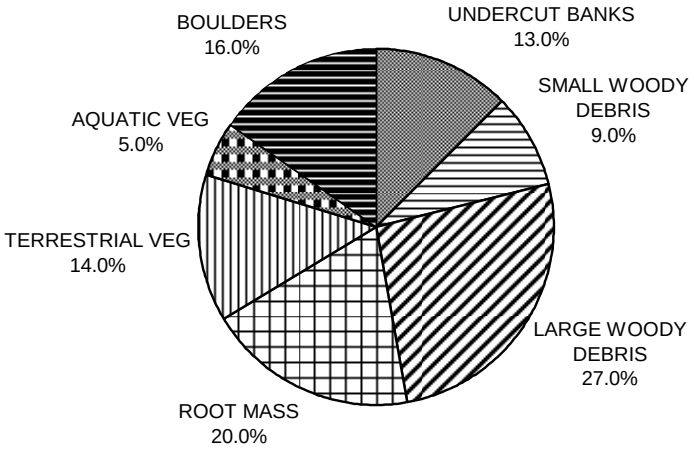
GRAPH 5

MCCLURE CREEK 2001
PERCENT EMBEDDEDNESS



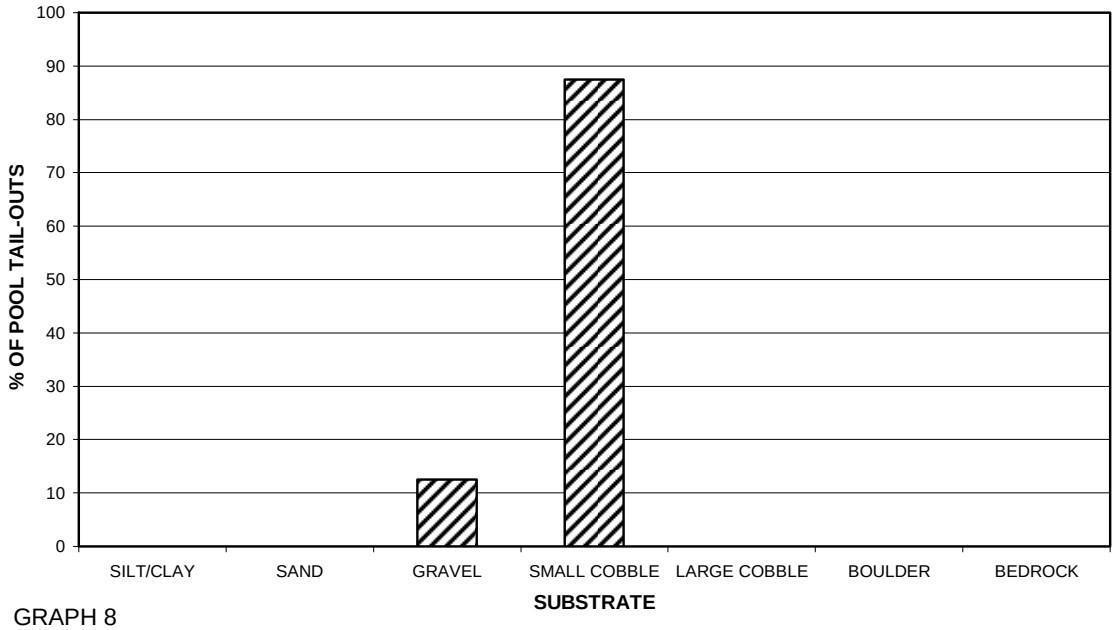
GRAPH 6

MCCLURE CREEK 2001
MEAN PERCENT COVER TYPES IN POOLS



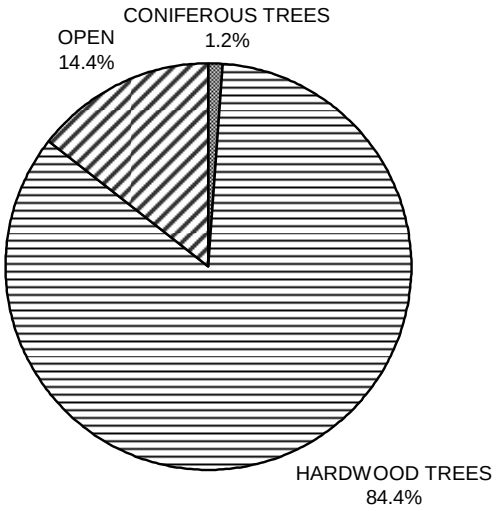
GRAPH 7

MCCLURE CREEK 2001
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



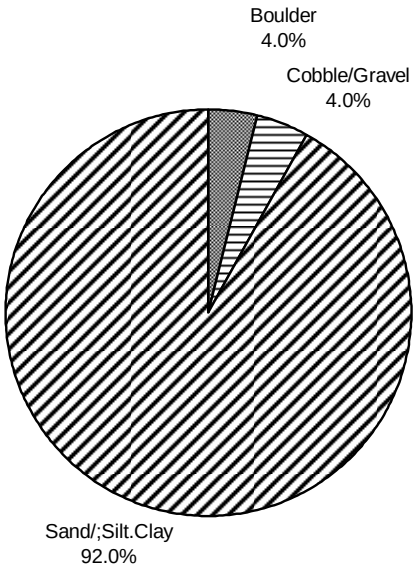
GRAPH 8

MCCLURE CREEK 2001
MEAN PERCENT CANOPY



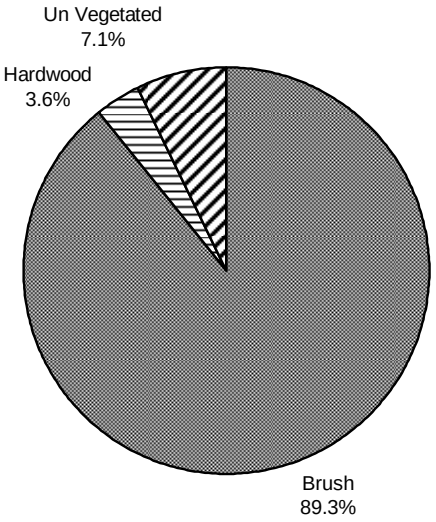
GRAPH 9

MCCLURE CREEK 2001
DOMINANT BANK COMPOSITION IN SURVEY REACH



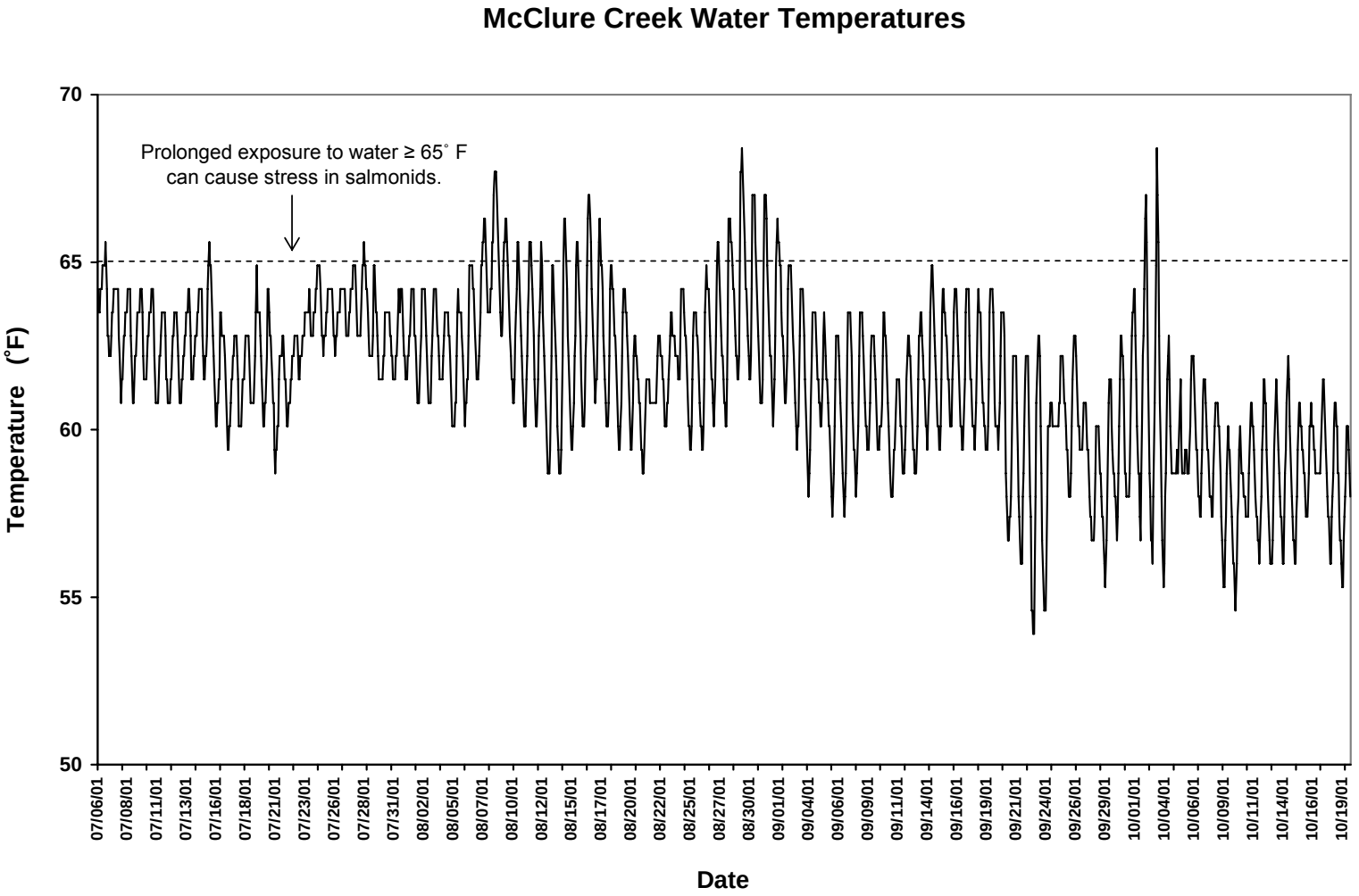
GRAPH 10

MCCLURE CREEK 2001
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

Appendix E


McClure Creek Water Temperatures
Prolonged exposure to water ≥ 65˚ F
can cause stress in salmonids.
Temperature (°F)
70
65
60
55
50
07/06/01
07/08/01
07/11/01
07/13/01
07/16/01
07/18/01
07/21/01
07/23/01
07/26/01
07/28/01
07/31/01
08/02/01
08/05/01
08/07/01
08/10/01
08/12/01
08/15/01
08/17/01
08/20/01
08/22/01
08/25/01
08/27/01
08/30/01
09/01/01
09/04/01
09/06/01
09/09/01
09/11/01
09/14/01
09/16/01
09/19/01
09/21/01
09/24/01
09/26/01
09/29/01
10/01/01
10/04/01
10/06/01
10/09/01
10/11/01
10/14/01
10/16/01
10/19/01
Date

Watershed Hydroid **433** McClure Creek

Hydrologic Sub-Areas covered by the watershed:

Name:	LLId: (1:24k)	County:
McClure Creek	1231852391350	Mendocino

Tributary to Russian River
Tributary to
Tributary to

Location: **T:** 15N **R:** 12W **S:** 28 **Latitude:** 39.1350805779054 **Longitude** 123.185243555963

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: 4

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

Total Length: 8.11 Miles / 13.06 Km

Note: Length is for the USGS blue-line 1:24,000 stream.

Drainage Area: 4512 Hectares / 11149 Acres / 17.42 sq. mi.

Elevations: Mouth: 581 feet; Headwaters: 3766 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:
6871.0 acres	81.2	2.8	4194.1
61.62 %	0.72 %	0.00 %	37.66 %

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:
794.44 acres	3091.12	109.80	1022.39	173.59
7.1 %	27.8 %	0.9 %	9.2 %	1.5 %

Shrub:	Herbaceous:	Barren/rock:	Water:
5726.95	194.59	0.00	18.68
51.4 %	1.7 %	0.0 %	0.2 %

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

Watershed HydroId **433** McClure Creek

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

Quad Name	USGS Code
PURDYS GARDENS	39123A1
ELLEDGE PEAK	39123A2
COW MOUNTAIN	39123B1
UKIAH	39123B2

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

Scientific Name	Common Name
Horkelia bolanderi	Bolander's horkelia
Arctostaphylos stanfordiana ssp. raichei	Raiche's manzanita
Hesperolinon adenophyllum	glandular western flax

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	99.84
Lakeport	551355	Upper Cache Creek	0.15
Coyote Valley	111432	Upper Russian River	0.01