

Olema Creek Watershed and
Cheda Creek Fish Surveys

The objectives of this limited survey were several. First, we wanted to qualitatively assess changes in fish species composition and relative abundance as a result of management actions in Olema Creek (@Bear Valley) and Cheda Creek. In addition, tissue samples from coho and steelhead were collected for future genetic analyses. An attempt was also made to calibrate steelhead and coho estimates (via snorkeling) with an estimate from electrofishing.

Methods

Electrofishing. Electrofishing surveys were conducted on June 27 and 28, 1995 by local volunteers (J. West, J. O'Connor, G. Murphy, K. Fox, and B. Farnsevor), Point Reyes National Seashore, Golden Gate National Recreation Area, and California Department of Fish and Game (B. Cox). Sample site locations included portions of Bear Valley creek, Cheda Creek, "Five Brooks" Creek, "Olema Cemetary" Tributary, Olema Creek, Wilkins Gulch, and an unnamed Gulch (See Map). Collected information included air and water temperature, taxa, total length (sculpins) or fork length, and abundance. Typically, one pass with the electrofishing unit was attempted.

Snorkel. Pools and flatwater habitats on Olema Creek at Five Brooks, Stewart Ranch, and Olema Valley Trail were snorkeled on June 26 and July 3, 1995. Recorded physical information included stream discharge, air and water temperature, habitat type, volume and area of sampled habitat unit. Biological information included species identification and length class. On Olema Creek, a main channel pool below the Stewart Ranch trail crossing was blocked at upper and lower ends by seines. Fish species and length class information was obtained through snorkeling. The next day, 3 electrofishing passes were conducted in this same pool.

Results

The results of the electrofishing and snorkel surveys are summarized in Tables 1-2. Eight different fish taxa were collected as well as rough-skinned newts (Tables 1-2). Collected fish included prickly sculpin (*Cottus asper*), unidentified sculpins, lamprey ammocete/larvae, California roach (*Hesperoleucus symmetricus*), Sacramento sucker (*Catostomus occidentalis*), threespine stickleback (*Gasterosteus aculeatus*), steelhead juveniles (*Oncorhynchus mykiss*), and coho salmon juveniles (*Oncorhynchus kisutch*).

Briefly, coho and steelhead juveniles were found together in Cheda Creek and at all sampling sites in Olema Creek (Bear Valley, Stewart Ranch, Five Brooks, and Olema Valley trail crossing). No locations

contained only coho. "Five Brooks" Creek, "Olema Cemetary" Tributary, and an Unnamed Gulch contained steelhead juveniles.

The length-frequency data indicate that almost all of the collected coho were young of the year. On Cheda Creek, a 95 mm coho was caught. An individual of this size is likely from the previous year class. Although scales were not taken, 1+ coho from Waddell Creek in late-June were generally >90-95 mm (Shapovalov and Taft 1954). In this area, coho typically spend just over one year in freshwater before leaving for the sea. This individual may reside in freshwater for the summer because the period of outmigration likely passed. Smolts from similarly sized creeks in the Lagunitas drainage (San Geronimo and Devils Gulch Creeks) were found to emigrate in greatest abundance in April (Bratovich and Kelley 1988).

At least two or three year classes of steelhead were collected from various sites. Individuals less than 90 mm were likely young of the year. As expected, young of the year steelhead were the most abundant year class.

Although only one pool was sampled using both snorkel and electrofishing, the results were nonetheless interesting. Snorkel counts at the pool below the Stewart Ranch trail crossing estimated 14 coho and 46 steelhead juveniles, with the majority of the fish in the 30-60 mm size range. Using the De Lury method of estimating population using repeated sampling (a simple linear regression) (Hellawell 1978), an estimated 9 coho and 36 steelhead population were present. A more conservative estimate of 7 coho and 15 steelhead was calculated using the Zippin method (Platts et al., 1983).

The estimates were confounded by a low correlation coefficient because captured fish did not decline linearly over successive passes. In addition, water surface glare, undercut banks with roots, and relatively deep waters (max depth = 0.9 m) made capture of stunned fish very difficult.

Because of injury and mortality associated with electrofishing and the apparent inefficiencies in sampling pool habitats, snorkel counts may be a better monitoring and assessment tool for assessing changes in coho and steelhead numbers in pools. Conversely, direct observation was not particularly useful in estimating species composition. Lamprey ammocetes and a single California roach collected during electrofishing were not observed during snorkelling. In addition, 15 sculpins were collected using electrofishing and only 1 was observed visually.

Specific Site Notes:

Olema Creek in Bear Valley. Bill Cox (CDFG) sampled Olema Creek in Bear Valley at roughly the same location as this year's sample site. According to Bill's note, habitat conditions in 1988 indicated little

riparian canopy cover. A fish species indicative of slow, warm water conditions, the California roach dominated the catch. They were almost 10 times more abundant than steelhead. Furthermore, no coho were caught. This year coho and steelhead were present and were almost 5 times more abundant than California roach. Such shifts in species composition may reflect beneficial changes in riparian habitat conditions. The recovery riparian habitat has resulted in undercut banks, habitat units with woody debris, and the development of some pools.

Olema Creek at Stewart Ranch Crossing. The sampled main channel/lateral scour pool unit was roughly 20 meters below the trail crossing. The sampled unit was 15.3 m long, an average 4.7 m wide, and a maximum depth of 0.9 m by the undercut right bank. Other physical stream data are present in Table 3. A gravel bar was present on the left bank (facing downstream). During snorkeling, most of the fish were located near the right bank.

Olema Creek at Five Brooks. Most of the snorkeled pools had undercut banks with root structure. Maximum depth of pool units was 0.7 m. Other physical stream data are present in Table 3. Riffle and flatwater units had a high percentage of gravels.

Olema Creek at Olema Valley Trail Crossing. Because of its location higher in the drainage, the snorkeled habitat units had slightly narrower wetted channel widths and depths than units sampled further downstream (Table 3). Furthermore, the channel has an extensive riparian canopy and was often impassable along the creek due to extensive amounts of blackberry, nettles, and poison oak. The pool directly above the pedestrian and horse crossing had extensive amounts of fines. Most habitat units had an abundance of woody cover.

"Five Brooks" Tributary to Olema Creek. When this unit was sampled, the portions of this creek were dry with isolated pools. These areas had sloughing banks with limited canopy cover. Photographs were taken. Further upstream, in areas with canopy cover, deep pools with maximum depths of nearly 1 meter were present. Large numbers of steelhead were collected. John O'Connor indicated that this tributary had grazing activities on it. There did not appear to be fencing along the creek.

"Olema Cemetary" Tributary to Olema Creek. Like "Five Brooks," there were areas lacking flow. Roughly a 100 meters or so upstream of Highway 1 were dry. The channel was well shaded partly because it was deeply incised and had an intact riparian zone. Thimbleberry, California laurel, and ferns were the dominant plants. A red-legged frog (juvenile/adult) was captured and photographed in this area. Snout-vent length = 80 mm.

The area downstream of Highway 1 flowed initially in a slow-flowing drainage ditch that paralleled the road. Extensive amounts of algae were present and no riparian cover was present. The extensive algal bloom may severely depress oxygen levels at night or following die-off

of the bloom. Bill Cox heard two unidentified frogs leave the bank for the water. No fish were collected along the drainage ditch.

A section of the tributary was sampled further downstream where the creek veers west through a cattle pasture. A pool below a culvert approximately 10 feet above the creek channel contained steelhead. It appears that most of the channel is unfenced. The banks of this creek are extremely unstable and steep. Cattle paths lead to the Channel. Habitat quality is markedly different than the section above Highway 1.

Bear Valley Creek. This creek was electrofished above the road crossing at the Bear Valley Ranger Station. The channel was relatively narrow and scour pools were present below culverts. This creek yielded the largest trout. The numerous black spotting along the bodies and large size suggests that these trout were resident rather than anadromous.

Cheda creek above 1st Barn. This creek was sampled starting at the first barn at the downstream section of Cheda creek. Although the intent of the survey was not to obtain an estimate of density, this creek probably had the highest densities of steelhead YOY. In addition, numerous rough-skinned newts were present in the channel. The creek in this area contained abundant canopy cover and a mix of both pools, riffles, and flatwater habitats. A few deep pools (approx 1 m) contained coho juveniles.

Cheda Creek above Restoration Site. This section was sampled just upstream from the removed road crossing on Cheda Creek. Cattle have unrestricted access to the creek. Numerous hoof prints lined the bank and little riparian vegetation was present at the starting site. Receding flows left pockets of water in hoofprint depressions. One of these pockets of water contained two dead YOY steelhead. The channel in this location was relatively shallow and wide with little canopy cover. Filamentous green algae (*Spirogyra* and *Cladophora*) and an unidentified blue-green algae were present in great abundance. It is likely that dissolved oxygen levels will be depressed at night and following die-off of the bloom. Numerous juvenile steelhead were found throughout the sampled area. No coho juveniles were found despite the presence of a few pools with suitable instream cover. Downstream of the sampled area, two "falls" of approximately 1-1.5 m may preclude access by coho.

Literature Cited:

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Length-frequency distribution of coho salmon at sample sites, Marin Co.

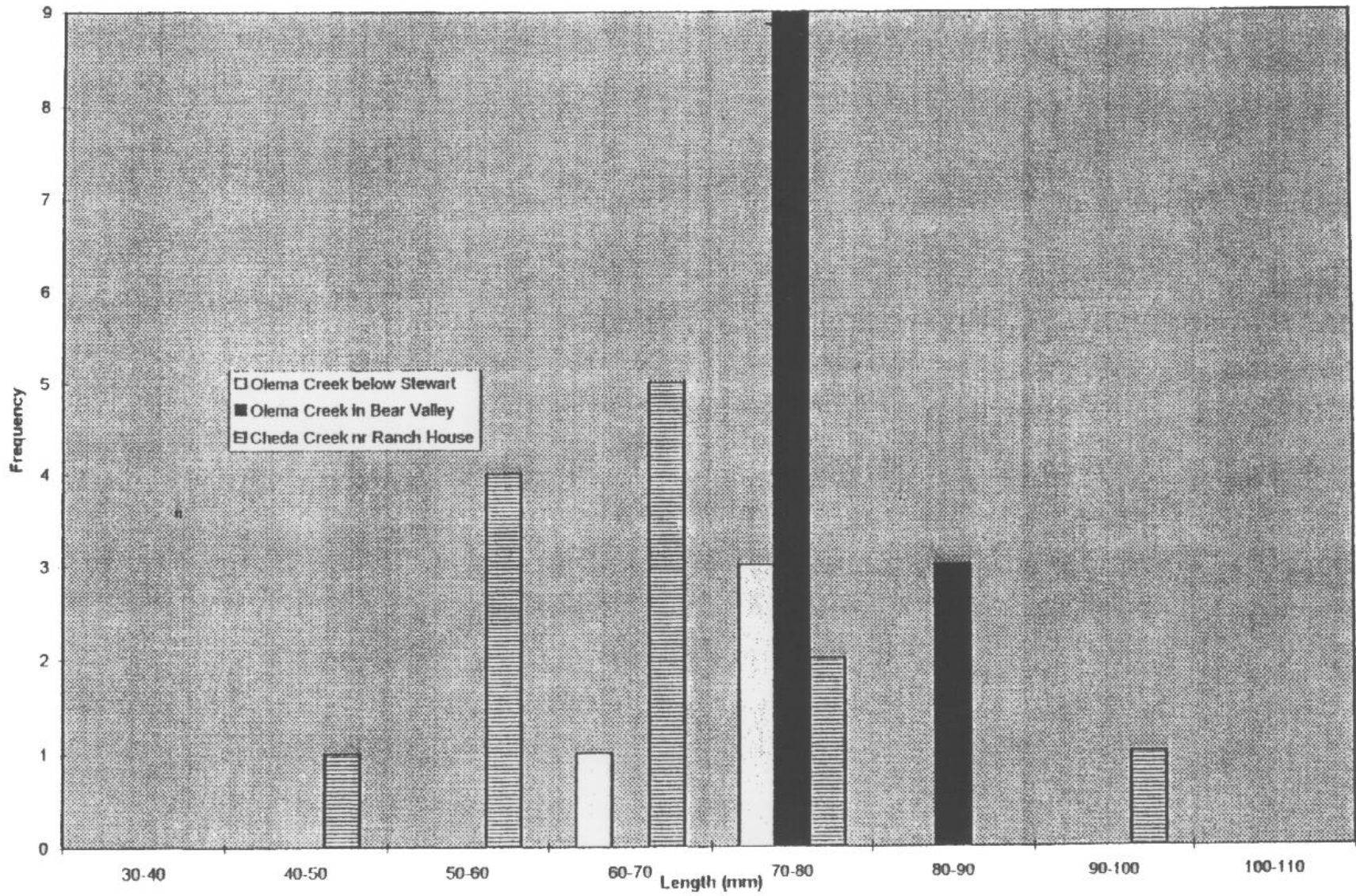


Table 1 : Size-frequency distribution of fish collected via electrofishing on June 27-28, 1995 in PORE/GGNRA streams.*

	Length (mm)	CR	LA	PS	SB	SC	SS	SH	CO
Bear Creek Valley above Ranger Station	N.A.	0	0	0	0	21	0	0	0
	30-60	0	0	0	0	1	0	1	0
	60-90	0	0	0	0	2	0	1	0
	90-120	0	0	1	0	3	0	1	0
	120-150	0	0	0	0	1	0	4	0
	150-180	0	0	0	0	0	0	2	0
	180-210	0	0	0	0	0	0	8	0
TOTALS =>		0	0	1	0	28	0	17**	0
Cheda Creek above restoration site	N.A.	0	0	0	0	0	0	40	0
	TOTALS =>	0	0	0	0	0	0	40	0
Cheda Creek nr 1st barn	N.A.	0	0	0	0	0	0	35	1
	30-60	0	0	0	0	0	0	28	5
	60-90	0	0	0	0	0	0	6	7
	90-120	0	0	0	0	0	0	1	1
	150-180	0	0	0	0	0	0	1	0
TOTALS =>		0	0	0	0	0	0	71	14
Five Brooks Creek	30-60	0	0	0	0	0	0	16	0
	60-90	0	0	0	0	0	0	12	0
	TOTALS =>	0	0	0	0	0	0	28	0
Olema Cemetary Trib (above Highway 1)	N.A.	0	0	0	0	0	0	1	0
	30-60	0	0	0	0	0	0	1	0
	60-90	0	0	0	0	0	0	6	0
	90-120	0	0	0	0	0	0	1	0
TOTALS =>		0	0	0	0	0	0	9	0
Olema Cemetary Trib (below Highway 1)	60-90	0	0	0	0	0	0	7	0
	90-120	0	0	0	0	0	0	5	0
	120-150	0	0	0	0	0	0	1	0
TOTALS =>		0	0	0	0	0	0	13	0
Olema Creek below Stewart Ranch X-ing	30-60	0	0	0	0	4	0	3	0
	60-90	0	0	3	0	4	0	3	4
	90-120	1	0	1	0	0	0	1	0
	120-150	0	2	2	0	1	1	2	0
	150-180	0	0	0	0	0	0	1	0
TOTALS =>		1	2	6	0	9	1	15	4
Olema Creek in Bear Valley	N.A.	3	0	0	2	13	0	0	0
	30-60	8	0	0	4	3	0	5	0
	60-90	3	0	0	0	0	0	37	12

Table 2 : Size-frequency distribution of fish collected via snorkeling on June 26 and July 3, 1995 in PORE/GGNRA streams.

Locale	Habitat Unit	Length (mm)	Species						
			SB	SC	SH	CO	SH (#/m ²)	CO (#/m ²)	
Olema Creek @ Five Brooks	BW	<30	0	0	18	0			
		30-60	0	0	6	4			
		60-90	0	0	1	0			
		N.A.	0	2	0	0			
	<i>BW Total</i>			0	2	25	4	0.67	0.77
	FW	<30	0	0	3	0			
		30-60	0	0	7	1			
	<i>FW Total</i>			0	0	10	1	0.78	0.08
	MC 3	<30	0	0	2	0			
		30-60	0	0	9	18			
		N.A.	2	0	0	0			
	<i>MC 3 Total</i>			2	0	11	18	0.72	1.18
	MC/SC 1	<30	0	0	2	0			
		30-60	0	0	21	4			
		60-90	0	0	0	0			
		90-120	0	0	4	0			
		120-150	0	0	2	0			
150-180		0	0	1	0				
<i>MC/SC 1 Total</i>			0	0	30	4	0.31	0.04	
MC/SC 2	<30	0	0	13	0				
	30-60	0	0	11	11				
	N. A.	1	1	0	0				
<i>MC/SC 2 Total</i>			1	1	24	11	0.66	0.30	
TOTAL =>			3	3	100	38	0.50	0.19	
Olema Creek above Olema Valley X-ing	MC	<30	0	0	0	0			
		30-60	0	0	13	10			
		60-90	0	0	0	2			
	<i>MC Total</i>			0	0	13	12	0.90	0.83
	MC/SC	<30	0	0	5	0			
		30-60	0	0	10	40			
		60-90	0	0	0	5			
<i>MC/SC Total</i>			0	0	15	45	1.23	3.68	
TOTAL =>					28	57	1.05	2.14	
Olema Creek below Stewart Ranch X-ing	MC	<30	0	0	4	0			
		30-60	0	0	40	14			
		60-90	0	0	0	0			
		90-120	0	0	1	0			
		120-150	0	0	1	0			
	N.A.	3	1	0	0				
<i>MC Total</i>			3	1	46	14			
TOTAL =>			3	1	46	14	0.64	0.19	

Key to Abbrev.: CO-coho, SH-steelhead, SB-stickleback, SC-sculpins
FW-flatwater, MC-main channel pool, SC-scour pool, BW-backwater pool.

Table 3 : Physical measurements at select stream sites, Marin County.

Locale	Date	Air T. (°C)	H ₂ O T. (°C)	Q (m ³ /s)	Max Z (m)	n	Ave. Z (m)	n	Ave. W (m)	n
Cheda Creek above Highway 1	6/28/95			0.003						
Bear Valley Creek above Ranger Station	6/27/95		16.7							
Olema Creek in Bear Valley	6/27/95	21.1	18.9							
Olema Creek below Stewart Ranch X-ing	6/27/95	15	14		0.9	1	0.34	9	4.7	3
Olema Creek @ Five Brooks	7/3/95			0.109	0.65	3	0.21	42	3.8	14
Olema Creek above Olema Valley X-ing	7/3/95	17.5	14.5	0.002	0.4	2	0.19	12	2.4	4
Five Brooks Creek below Highway 1	6/26/95			0.003						

Note: Q = discharge computed using weighted area, Z = wetted channel depth, W = wetted channel width, n = sample size

