ASSESSMENT OF STEELHEAD HABITAT

IN UPPER MATILIJA CREEK BASIN

Stage One: Qualitative Stream Survey

Report Prepared For:

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9 June 2003

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INTRODUCTION

The upper Matilija Creek watershed and the Coyote/ Santa Anna Creek watershed have both provided historic steelhead spawning and rearing habitats in the Ventura River system. The Matilija Dam was constructed in 1947 on lower Matilija Creek for the purpose of supplying water storage and flood control, but reservoir sedimentation and construction of newer projects has reduced the necessity of the dam (Figure 1). When built, the Matilija Dam blocked access of anadromous steelhead (*Oncorhynchus mykiss*) to upstream spawning areas. In subsequent years, the Robles Diversion Dam was constructed downstream of Matilija Dam and further blocked access. Declines in local steelhead populations led to a federal listing of steelhead as "endangered" in the Southern California Steelhead ESU. In attempts to help restore the Ventura Basin steelhead population, efforts are underway to provide access across Robles Diversion Dam, which would again allow migratory fish to reach Matilija Dam as well as the Lower North Fork Matilija. Because of Matilija Dam's limited function, an Ecosystem Restoration Feasibility Study was conducted by a multidisciplinary team to determine the ecological benefits of removing Matilija Dam for steelhead and other riverine dependent species. One recommendation of the feasibility study was to acquire additional data assessing the habitat quality of the Matilija Basin above the existing dam for spawning and rearing steelhead.

STUDY OBJECTIVES

In recent years, information has been assembled indicating that Matilija Creek above the dam may provide an abundance of high quality habitat if access is provided to upstream migrant steelhead (Chubb 1997). This first stage survey will provide a qualitative assessment of habitat characteristics and quality that can be compared to previous studies.

The first-stage survey will be used to accomplish four principal goals:

1) to provide detailed first-hand knowledge of the entire study area
2) to provide qualitative evaluations of habitat characteristics and quality for comparison with earlier work (e.g., Chubb 1997)
3) to fully describe the length of habitat accessible to anadromous steelhead, and
4) to adequately describe the sampling "universe" for the second-stage survey; from this information, efficient habitat stratifications can be employed to accurately estimate stream habitat characteristics in a statistically rigorous manner (i.e., to produce valid and comparable total and mean values with minimal variances)

The first-stage survey encompassed the entire length of stream accessible to anadromous steelhead, from the lower reaches upstream to the first naturally occurring absolute (or,

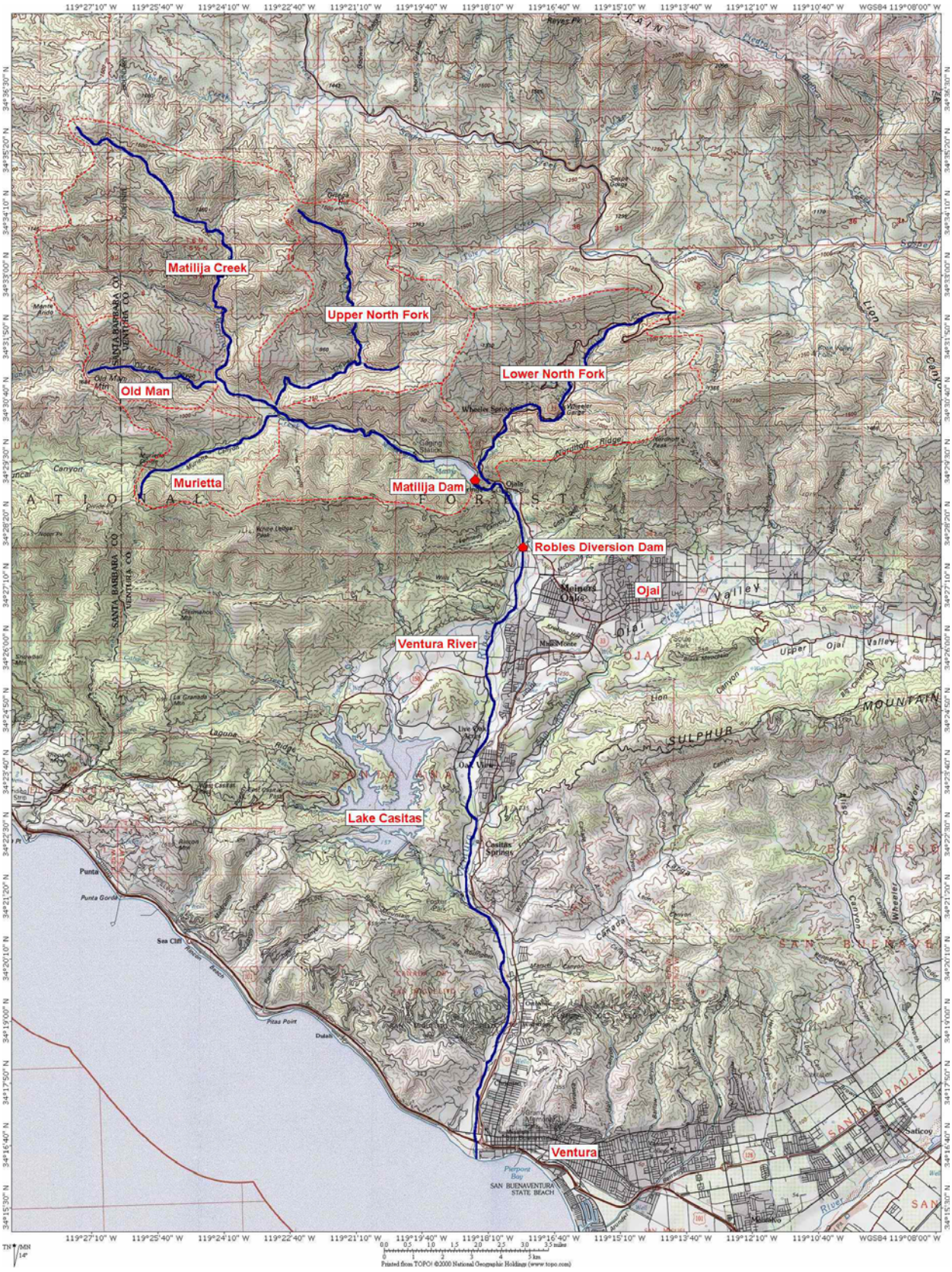

Figure 1. Map of upper Matilija Basin showing sub-watersheds and significant geographical features.

"definite") barrier to upstream migrating adult steelhead. The first-stage survey was conducted from March 9th through March 14th, 2003. This survey will be followed by a second-stage survey to collect more quantitative data within discrete reaches that will provide a more detailed assessment of habitat quantity and quality, however this report only describes the methodologies and preliminary results of the first-stage survey. A following report will detail results of the second-stage survey after it is completed, which is anticipated to occur by late-April 2003. Refer to the study proposal (TRPA 2003) for details regarding the methodologies anticipated for use in the second-stage survey.

METHODS

During the first-stage survey two fisheries biologists walked the full length of all targeted stream reaches, including the mainstem Matilija Creek above the reservoir and it's principal tributaries: Murietta Creek, Old Man Creek, the Upper North Fork Matilija Creek, and an unnamed tributary of the Upper North Fork. The Lower North Fork Matilija Creek (below Matilija Dam) was also surveyed in part (that survey will be completed in April 2003). First-stage surveys were used to visually assess the nature of and changes in the following habitat characteristics:

- stream flow
- water temperature (measured)
- pH (measured)
- channel type (gradient, confinement, dominant substrate)
- riparian type (dominant vegetation type and density)
- general appearance of adult steelhead resting pools

In addition to the above variables, the biologists also noted:

- number and size range of observed salmonids (and other significant aquatic species such as frogs and turtles)
- water diversions or other man-made structures
- tributary confluences
- average length of individual mesohabitat units

More detailed information was collected for the following habitat components:

- frequency, size, and quality of gravel deposits suitable for steelhead spawning
- potential barriers to upstream migration for adult steelhead

Each significant change in habitat characteristics or physical feature (i.e., barriers) was geo-referenced by pulling biodegradable hip chain while walking upstream, and by reference to topographical maps and Global Positioning System (GPS) coordinates (where coverage permitted). GPS waypoints and photographs were taken at (approximately) 1,000 ft intervals, which were also marked with a labeled flag. Water temperatures were measured with a hand-held thermometer at frequent intervals. Dissolved oxygen and pH were measured periodically using an YSI meter (model #550) and a Pinpoint pH monitor.

Channel Type

Channel types were visually classified as A, B, C, or D type channels (Rosgen 1994). The biologists used visual estimates of channel confinement, entrenchment, sinuosity, slope (calibrated with several measurements using a hand-held clinometer), and dominant substrate type to assess channel type.

Riparian Vegetation Type

The dominant vegetation observed along the streambanks was visually assessed using a simplified version of the Cowardin system (Cowardin et al. 1979) that was adapted for the Ventura Watershed (Mertes et al. 1995), by using the following categories:

Freshwater Marsh (FM): Emergents such as cattails, sedges, etc. in perennial/seasonal pools and ponds.

Alluvial Scrub (AS): Composed of drought tolerant chaparral species and scattered herbs in open cobble-dominated stream areas. Few willows and emergents only along water edge.

Riparian Scrub (RS): Composed of willow/mule fat thickets along channel and low flood benches. Most vegetation shorter than 6m (20 feet).

Riparian Forest (RF): Dominant cover of trees along stream with varying degrees of shrub and herbaceous understory. Common trees include cottonwood, alder, oak, bay laurel, maple, and willow.

Spawning Gravel

The approximate patch and particle size, percentage fines, and percentage embeddedness of spawning gravels were visually assessed if:

the dominant particle sizes were ½ to 3 inches in diameter
patches were at least 20 ft^2 in area
the deposit was no greater than (approximately) six inches above the water surface (at the time the survey was conducted)

The criteria for gravel particle and patch sizes were based on steelhead redd studies from a variety of locations (Orcutt et al. 1968, Reiser and White 1981, Raleigh et al. 1984, Hampton 1988, Pearsons et al. 1996), although comparative data was not found from the Southern California ESU. The criteria for gravel being no more than six inches above the water surface was subjectively chosen based on site-specific observations of gravel patch characteristics and professional judgment. Because streamflows in southern California streams are extremely "flashy" during the rainy season, and anadromous fish in general

appear to avoid spawning in areas that are prone to dewatering (Shapovalov and Taft 1954), selecting an elevation criteria that is too high would likely result in an overestimation of gravel availability during most years, however a criterion too low would, on average, produce underestimates of gravel availability. Because spawning gravels need to be wetted with flowing water during an extended period of incubation for eggs and sac-fry (typically at least one month or more, Barnhart 1986, Moyle 2002), gravel deposits perched significantly above winter and spring base flow levels for a given year would not likely be usable by spawning steelhead.

A more accurate determination of the "optimal" height criterion would likely require the establishment of stage-discharge relationships in typical spawning areas, or repeated visits to gravel deposits under a variety of spring streamflows. Although neither of these options was feasible for this short-term study, one storm event did occur during data collection that allowed a qualitative evaluation of the stage-discharge relationship. During the March 15th storm event, a temporary gage placed in the Matilija above the reservoir increased from at height of 8 inches (at 12 cfs) to 18 inches (approximately 400 cfs according to the USGS gage), a difference of 10 inches. Thus, an increase of six inches (the gravel height criterion) from the existing base flow would likely result in flows of 200 cfs or more. Tracking the USGS gage data following the March storm event showed that flows dropped to below 200 cfs within one day and below 50 cfs within three days.

Thus, under the dry conditions that existed in the spring of 2003, the six inch criteria would be expected to include the majority of spawning gravels potentially available to steelhead. However, under wetter years, higher base flows during the winter and spring and a more frequent occurrence of storm events could make gravels deposits perched at higher levels available for spawning. Although historical streamflow data shows that mean monthly flows in January, February, and March were less than 20 cfs in 11 to 13 of the 21 years of records, mean monthly statistics are not highly descriptive of the flashy, dynamic nature of streamflows in Southern California steelhead streams. Southern stocks of steelhead are thought to be particularly adapted to take advantage of seasonal and annual cycles of high precipitation, and thus evaluation of gravel deposits using two or more elevation criteria would likely provide more options for assessing gravel availability under a variety of water years.

Many of the gravel patches in the Upper Matilija Basin were "cemented" by mineral deposits. The degree of cementation was qualitatively assessed by dislodging particles in the streambed. Some cemented patches were assessed both before and after the March 15th storm event to determine if such deposits were physically loosened by the high flows.

Barriers to Upstream Migration

Whenever a potential barrier to upstream migration was encountered, the survey paused to conduct a detailed assessment of the barrier characteristics. Each potential barrier was photographed from several angles and sketched to clearly illustrate each barrier

component including the barrier materials, the jump pool depth, the vertical and horizontal extent of each required jump or chute, etc. In addition, each barrier was evaluated in terms of its expected likelihood of blockage (e.g., "possible", "probable", or "definite"), while using professional judgment to attempt to account for a range of seasonal streamflows and adult jumping abilities.

All first-stage surveys were terminated at a definite barrier except in two circumstances:

1. the barrier was man-made, in which case it might be removed through future mitigation or enhancement measures, and
2. in the upper mainstem Matilija Creek where we were requested to survey up to the prominent "falls", which were approximately 2,000 ft above an impassable falls 18 ft in height

To assist the evaluation of each potential barrier, the biologists referred to a figure quantifying the relationship between jump height and jump distance for adult steelhead (Figure 2). The figure was a composite of data representing the jumping ability of steelhead in "bright" condition and in "good" condition (Orsborn 1985). It was further assumed that the maximum jumping height of a steelhead was no greater than the depth of the jumping location (for pools less than eight feet deep, Reiser and Peacock 1985). This 1:1 ratio is a liberal estimate compared to the traditional estimate of 0.8:1 from Stuart 1964. We then used the jumping charts for the "good" condition fish to distinguish between passable barriers and possible barriers. The jumping charts for bright steelhead were used to distinguish between possible barriers and definite barriers. Possible barriers were sometimes classified as "probable" barriers if additional factors, such as characteristics of the jumping or landing areas, appeared to reduce the efficiency of a jump.

Several barriers were revisited on 14 and 15 April 2003 immediately after a storm event in order to assess these barriers at a flow higher than observed during the March survey. However, the rapidly dropping flows were not substantially higher than the previous survey and thus were probably not representative of higher flows when steelhead migration would be expected to occur. Physical characters of these barriers were re-measured and photographed. Ideally, all barriers are best evaluated at higher flows, however such flows were so flashy during this survey that a complete reassessment of all barriers could not be accomplished within the scope of this study. Consequently, the ultimate evaluation of passage over "probable" or "possible" barriers will likely be dependent upon further study and the presence of migrating steelhead.

RESULTS

The upper Matilija Basin study area was divided into 22 reaches above the reservoir and two reaches for the Lower North Fork Matilija Creek. Reach boundaries were delineated based on stream channel characteristics, particularly streamflow, channel type, riparian type, and presence of definite barriers (Table 1). Figure 3 shows the upper basin study area with streamflow characteristics (flowing versus dry or intermittent), reach

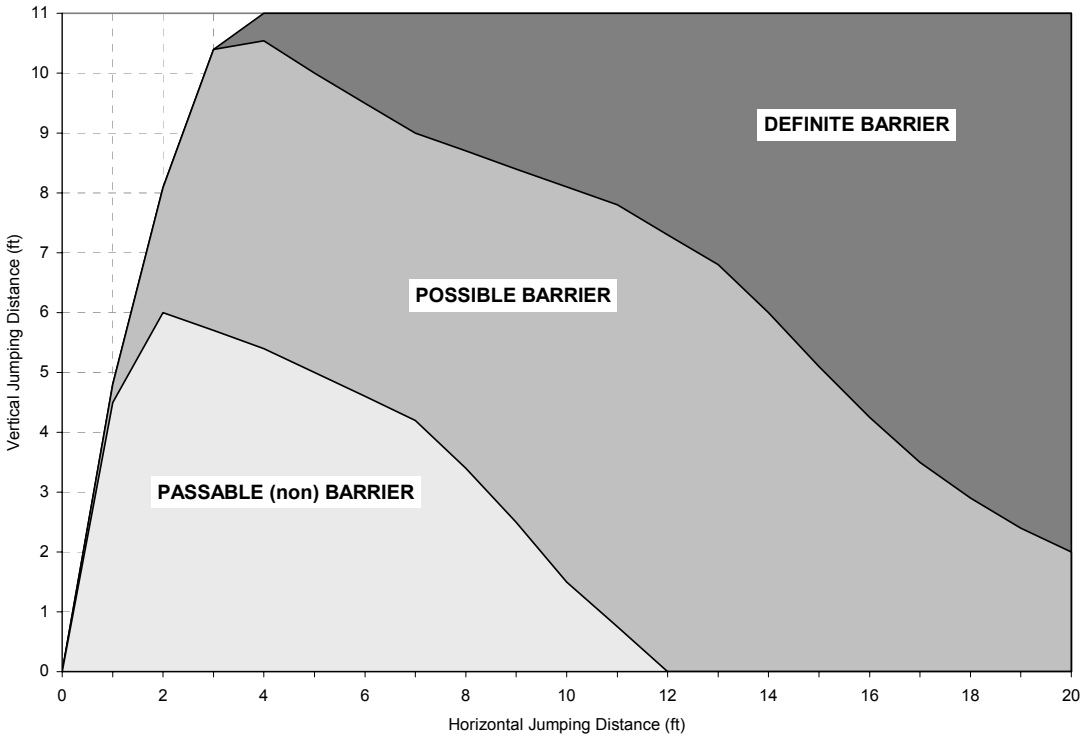

Figure 2. Barrier jumping chart used to assess degree of passage for upstream migrating adult steelhead. Based on data from Orsborn (1985).

boundaries, approximate river miles, and all identified barriers (possible or definite). Barriers are identified by the GPS waypoint number associated with each barrier (Table 2). See Appendix A for a list of waypoint information, Appendix B for stage-one mapping data, and Appendix C for photos of barriers. Approximate boundaries of channel types and riparian types in the upper basin are shown in Figures 4 and 5, respectively. Data pertaining to the Lower North Fork is shown in Figure 6. Physical and biological characteristics of each reach will be described individually. All data (except for the upper portion of the Lower North Fork) were collected during March 2003 following one of the driest water years in the past 100 years, consequently the following descriptions of streamflows, barrier dimensions, and fish populations should be interpreted in light of the existing drought conditions.

Upper Matilija Creek (mainstem)

The mainstem Matilija was mapped for 8.60 miles on 9, 10, and 13 March 2003, by two biologists. Water temperatures measured throughout the day ranged from 59-66^{o}F in the lower mainstem (above the reservoir) and 53-58^{o}F in the upper mainstem (above the Upper North Fork). Dissolved oxygen (D.O.) and pH were measured in the lower mainstem at 10.2 mg/l and 8.25, respectively. In the upper mainstem, D.O. was 8.4 mg/l. Measured streamflows during the survey were 12.4 cfs in the lower mainstem, 0.9 cfs above the Upper North Fork confluence, and approximately 5 cfs (eye-estimated) in the upper mainstem above Old Man Creek.

Table 1. Physical characteristics of reaches in the upper Matilija Basin and the Lower North Fork Matilija Creek based on first-stage surveys, March 2003 (April for LNF 2). Gravel density is in ft^2/1,000 lineal feet, and only includes deposits within six inches of the March/ April water surface elevation. Refer to map for reach and barrier locations. Reaches not included for selection of HSI study sites are shown with an asterisk, the reason for exclusion is given in the notes (additional HSI details will be in a following report). Riparian types are FM=freshwater marsh, AS=alluvial scrub, RS=riparian scrub, RF=riparian forest. Fish are NGF=non-game fry, RBT=rainbow trout.

Stream	Reach	Waypoints	River Mile	Reach Length (ft)	Flow Status	Barrier ID #'s poss / definite	Channel Type	Riparian Type	Gravel Density	Gravel Cementation	Fish Observed	Notes
Matilija (mainstem)	* MAT 1	1-4	0.00-0.36	1,900	flowing	- / -	C - D	RS, FM	372.1	low	0	1
	* MAT 2	4-11	0.36-1.14	4,100	flowing	- / -	C - D	RS	0	high	10 NGF	2
	MAT 3	11-22	1.14-2.80	8,779	flowing	- / -	C	RS	14.2	medium	~ 900 NGF	3,4
	* MAT 4	22, 500	2.80-4.10	6,860	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5
	MAT 5	500-517	4.10-5.01	4,826	flowing	- / -	B	AS,RS,RF	50.6	high	0	
	MAT 6	517-535	5.01-6.48	7,731	flowing	- / -	B	AS, RS	67.8	low	0	
	MAT 7	535-550	6.48-8.18	9,018	flowing	"steepchut",544 / 550	B	RF	67.2	low	4 RBT	
	* MAT 8	550-"Falls"	8.18-8.60	2,171	flowing	552 / "falls"	B - A	RF	0	low	0	6
Old Man	* OLD 1	64-70	0.00-0.37	1,960	intermittent/dry	65 / -	A - B	AS	0	high	0	7
	OLD 2	70-79	0.37-1.16	4,146	flowing	74 / -	B	RF	50.7	medium	2 RBT	
	* OLD 3	79-85	1.16-1.67	2,737	dry	- / -	A - B	AS	135.9	medium	0	7
	* OLD 4	85-90	1.67-2.15	2,532	flowing	- / -	A	RF	11.1	medium	0	8
	* OLD 5	90-91+	2.15-2.29 *	710	dry	91 / -	A	AS	n/a	n/a	0	7,12
Upper NF Matilija	UNF 1	23-34	0.00-1.26	6,649	flowing	- / -	B	RF	81.1	medium	5+ RBT	9
	UNF 2	34-39	1.26-1.99	3,851	flowing	- / -	C	AS	0	high	1 RBT	
	UNF 3	39-47	1.99-2.70	3,743	flowing	45 / -	B	RF	17.6	medium	1 "fish"	9
	UNF 4	47-63	2.70-4.08	7,291	flowing	49,51,62 / 63	B - A	RF	15.9	medium	12 RBT	10
Upper NF Trib	UNFT 1	92-99	0.00-0.82	4,318	flowing	- / 100	B	RF,AS	42.6	low	5 RBT	10
Murietta	* MUR 1	600-601	0.00-0.17	909	flowing	- / -	B	RF,RS	0	none	1 RBT	11
	* MUR 2	601-602	0.17-0.26	467	dry	- / -	B	RS	0	none	0	7
	MUR 3	602-620	0.26-1.62	7,154	flowing	611,612,613,617 / -	B	RF	82.9	none	1 RBT	
	* MUR 4	620-627+	1.62-2.13 *	2,700	intermittent/dry	622 / 625	B	RF	0	none	0	7,12
Lower NF Matilija	LNF 1	101-123,701-710	0.00-4.26	22,493	flowing	- / 710	B	RF	416.1	medium	26 RBT, redds	
	LNF 2	710-728	4.26-6.85	13,675	flowing	721,722	B-A	RF,RS	0.02	medium	7 RBT	13

Notes: 1 reach appeared to be backwater (lake) influenced
2 most of reach w/in historic lake zone and thus likely to be modified after dam removal
3 4,909 ft of this mapped reach is private, HSI study site selection restricted to remaining 3,870 ft
4 HSI study site will be approximately 3,000 ft long due to longer habitat unit lengths (all other sites are ~2,000 ft long)
5 private land, not mapped, reach length estimated from map
6 reach above definite barrier, will not provide steelhead habitat
7 channel dry or intermittent during spring survey, therefore not expected to provide summer rearing habitat
8 flow minimal during spring survey, therefore not expected to provide summer rearing habitat
9 reaches 1 and 3 similar, therefore combined prior to selection of HSI study site
10 5,870 ft of UNF above a highly probable barrier, therefore HSI site selected from lower 1,421 ft and UNFT 1 (tributary) combined
11 flowing section short, therefore excluded from selection of HSI study site
12 reach length includes additional dry channel above last WP
13 LNF 2 survey completed in April 2003

Table 2. Physical characteristics of potential barriers in the upper Matilija Basin and the Lower North Fork Matilija Creek. See Figures 3 and 6 for barrier locations.

Reach	Barrier ID#	River Mile	Barrier Type	Barrier Composition	Jump Pool Depth (ft)	Jump Distances (ft) Vertical	Jump Distances (ft) Horizontal	Barrier Category	Notes
MAT 7	"steepchut"	7.09	chute	bedrock	n/a	n/a	n/a	possible	45 ft long chute at 30 deg.; 2 ft wide, 3-4 in deep
MAT 7	544	7.51	chute	bedrock	n/a	n/a	n/a	probable	50+15 ft long chutes at 30-50 deg.; 3 ft wide, 2-3 in deep
MAT 7	550	8.18	falls	bedrock	4	18	40	definite	
MAT 8	552	8.38	falls	bedrock	3	10	5	probable	
MAT 8	"falls"	8.6	falls	bedrock	n/a	50*	n/a	definite	* visual estimate
OLD 1	65	0.02	falls	boulder	3*	7.5*	8*	possible	* dry channel; possible side channel at high flows
OLD 2	74	0.66	falls	boulder	2.5	6	12	possible	
OLD 5	91	2.14	falls	bedrock	1.2 / 1.2	4.5 / 3.8	11 / 7.5	probable	two distinct jumps at current flow
UNF 3	45	2.43	falls	bedrock	5	5	12	possible	
UNF4	49	2.85	falls	bedrock	2.0 / 2.0	8.5 / 3.5	22 / 10	probable	two distinct jumps at current flow
UNF4	51	2.97	falls	bedrock	2	5.7	29	probable	
UNF4	62	4.00	falls	bed/bldr	5	7.5	14	probable	
UNF4	63	4.08	falls	bedrock	5	11	16	definite	
UNFT	100	0.82	falls	bedrock	5	100*	190*	definite	* visual estimate of several large drops combined
MUR 3	611	0.89	falls	boulder	2	4	8	possible	
MUR 3	612	0.94	falls	boulder	2	5	12	possible	
MUR 3	613	1.01	falls	boulder	4	7	7	probable	
MUR 3	617	1.5	falls	boulder	4.5	4	8	possible	
MUR 4	622	1.74	falls	boulder	1	5	6	possible	
MUR 4	625	1.94	falls	boulder	1.5	11	10	definite	after rain distance was 7.3' vert & 15' horiz, depth 4.3'
LNF 1	710	4.26	road Xing	concrete	2.5	11	18	definite	man made
LNF 2	721	~6.00	cascade	boulder	1.3	8	13	probable	
LNF 2	722	6.07	falls	boulder	2.6	6.5	28	probable	

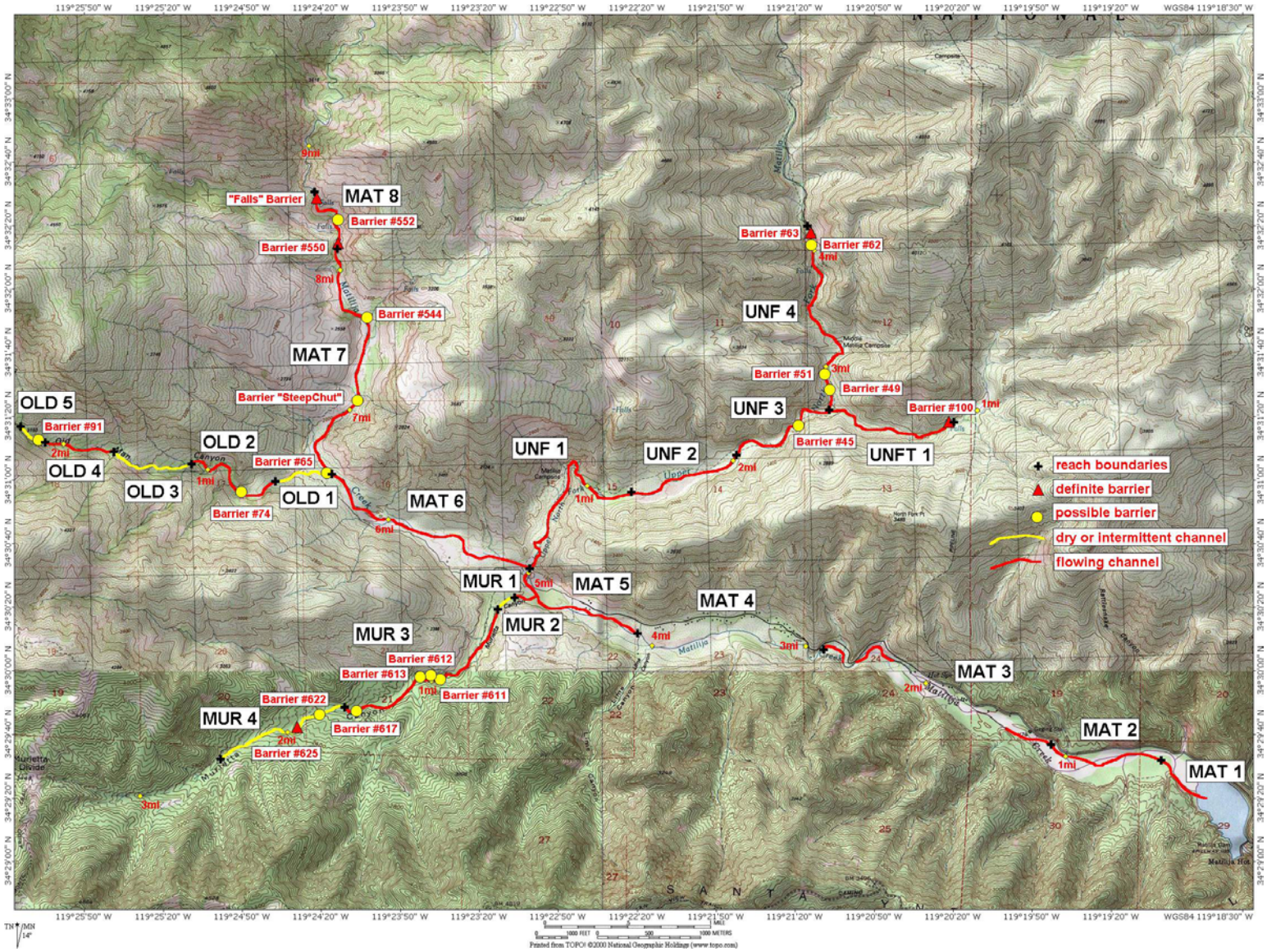

Figure 3. Map of the upper Matilija Basin showing reach boundaries, dominant streamflow characteristics (colored lines), and barrier locations. Channels not outlined were not mapped.

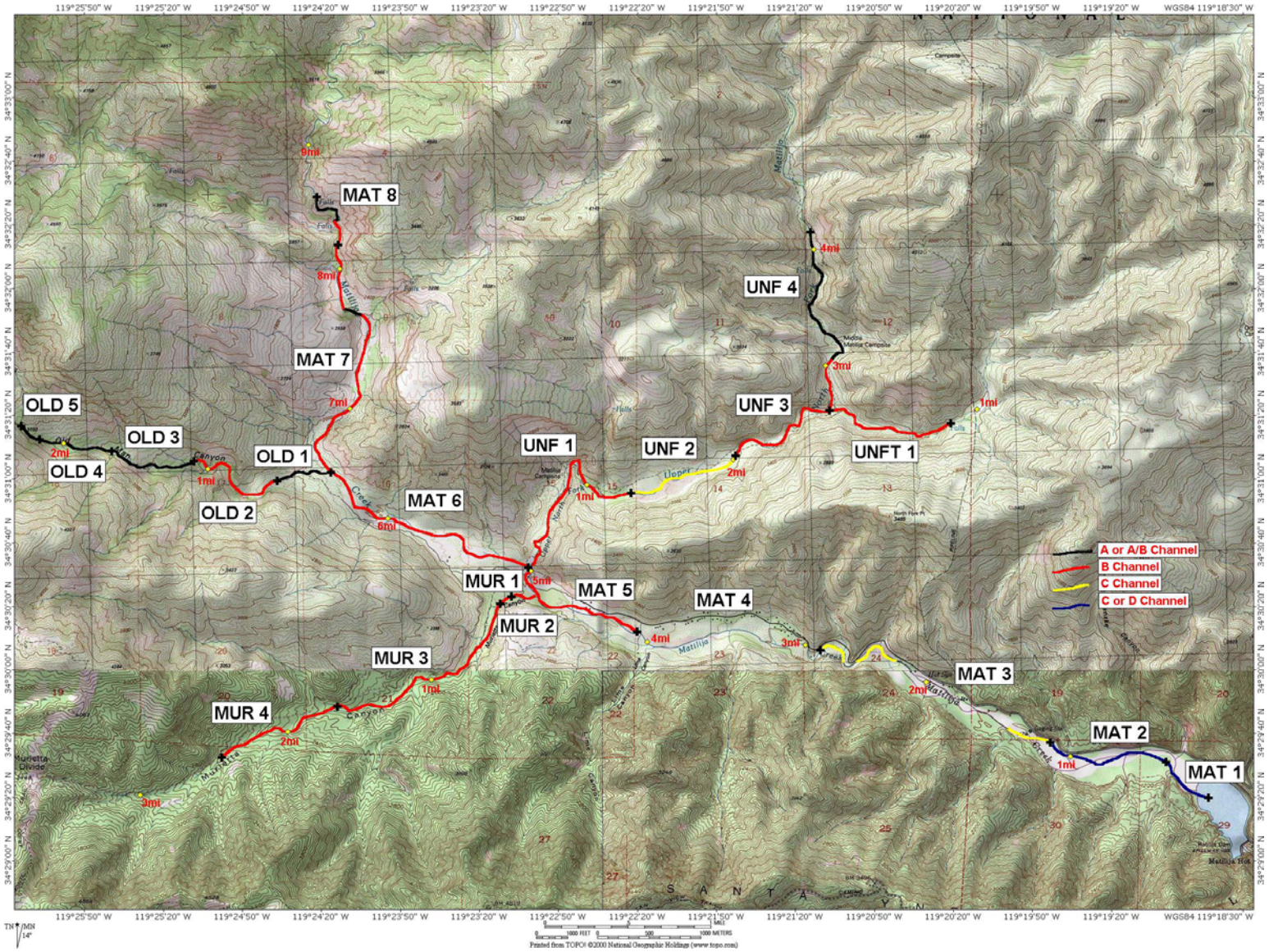

Figure 4. Map of the upper Matilija Basin showing reach boundaries and dominant channel types (colored lines). Channels not outlined were not mapped.

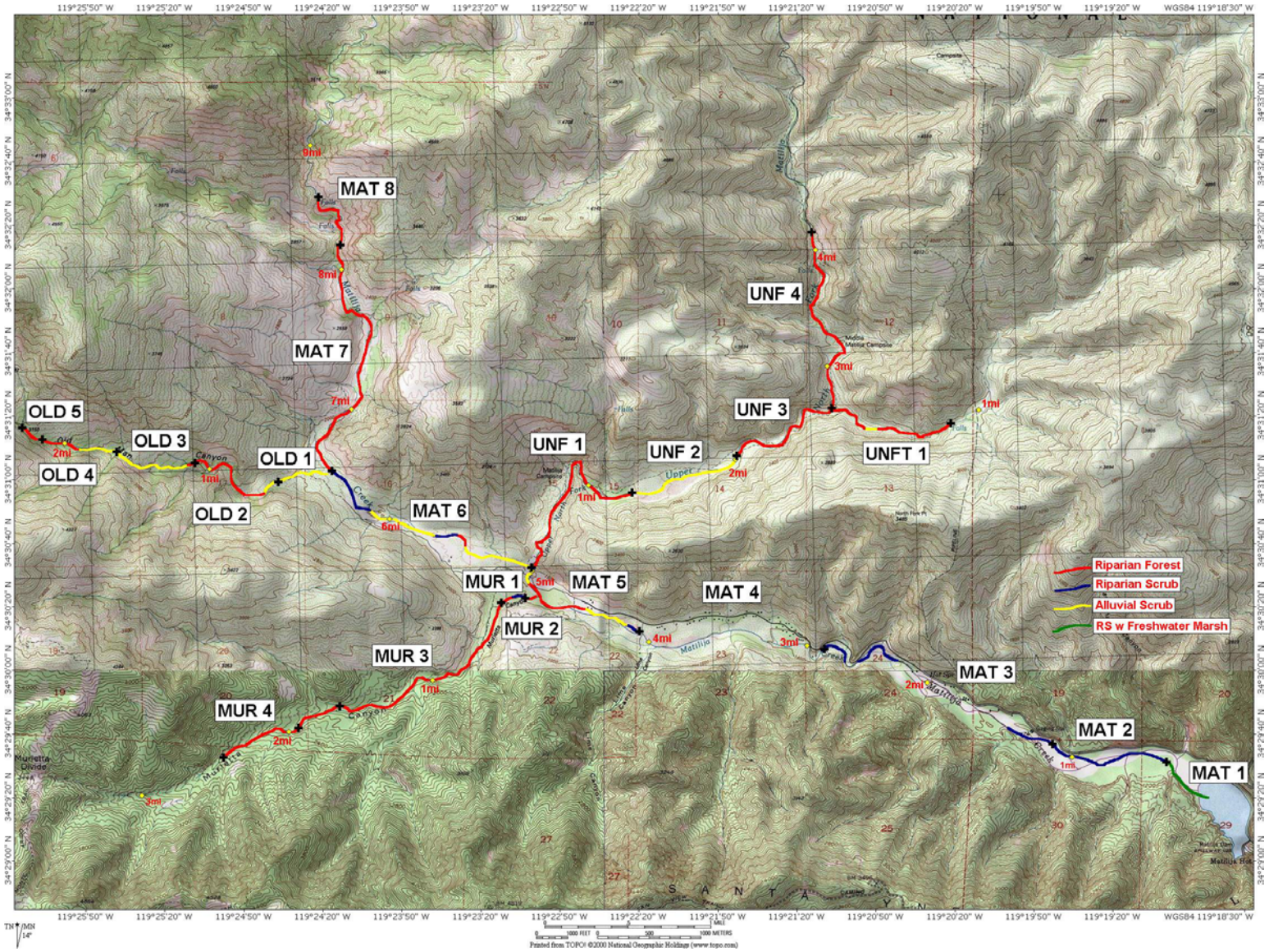

Figure 5. Map of the upper Matilija Basin showing reach boundaries and dominant riparian types (colored lines). Channels not outlined were not mapped.

MAT 1

This portion of the Matilija is probably under the direct effect of the reservoir, becoming inundated at higher flows. Consequently, finer substrates including gravel were relatively abundant within this section of the stream. The relative density and quality of gravel in this reach was exceeded only in the Lower North Fork (Table 1). The stream channel was frequently braided, and many were lined with *Arundo*, willow, mule-fat, and some marsh species such as cattails (Figure 5). Algae and other aquatic vegetation were common. No fish or potential barriers were observed. Overall, the spawning habitat in this reach was good, but the rearing habitat was judged to be fair to good.

MAT 2

Older topographic maps (i.e., Figure 1) and personal communications with Water Department personnel have indicated that much of this reach is within the historical lake level (Table 1). Consequently, channel characteristics in this section could change considerably following removal of the dam. The flood plain was wide with some split channels. The riparian vegetation was dominated by *Arundo*, mule fat, and willow (Figure 5). There were several good holding pools in this reach. Substrate was cobble dominated, and no spawning gravel was observed in this section. Mineral deposits were beginning to be more evident in this section. The surfaces of gravel, cobbles, and boulders were physically gritty due to the deposits, which effectively "cemented" the particles together. These deposits appeared to significantly reduce substrate quality for spawning, and benthic invertebrate production appeared to be very low. However, it is unknown to what degree these depositions are removed or if gravels are significantly loosened during winter and spring high-flow events. Several gravel deposits were revisited in April following the March 15th storm event, but such deposits showed little evidence of becoming significantly loosened following that event. This mineral cementation is seen throughout most of the basin. There were about 10 non-game fry observed in this section, but no trout were observed. No potential barriers were encountered. Despite the mineral effects and paucity of fish, the overall physical appearance of this reach was fair to good.

MAT 3

This reach was mapped in its entirety, however further access will be restricted to small, disjunct portions of this reach due to private property (Table 1). In this section of the river the slope increased slightly, and there were more boulders. The flood plain alternately widened and then narrowed, but the overall channel character of the stream was similar (Figure 4). There was much less *Arundo* through this reach where mule fat and willow dominated (Figure 5). There were good holding pools, and no barriers, but good spawning gravel was rare. Several hundred non-game fry (probably arroyo chub, *Gila orcutti*, and/or stickleback, *Gasterosteus aculeatus*) were observed throughout this reach, however no rainbow trout were observed. This reach would probably not be a significant spawning area, but for rearing it appeared to provide fair to good habitat.

MAT 4

This reach was not surveyed due to private property. It is unlikely that barriers to upstream migration exist in this reach due to the channel's low gradient.

MAT 5

The first portion of this reach was visually characterized as a C channel type, however after 800 ft the creek transitioned into a more confined B channel and remained that way throughout the remainder of the reach (Table 1, Figure 4). Riparian forest species dominate the banks, although short areas of riparian scrub and alluvial scrub also occurred (Figure 5). There were few holding pools in this reach, and streambanks appeared highly unstable in some locations. No barriers were observed, although the road crossing would prevent passage during periods of low flow. At the time of this survey, Murietta Creek, which enters the mainstem in the upper portion of this reach, and the Upper North Fork, which enters at the upper reach boundary, contributed a significant portion of the streamflow within this reach. There were also numerous sulfur springs contributing flow to this reach approximately 500-1,000 ft below Murietta Creek, and the few spawning gravels available were highly cemented. There were no trout observations in this reach. The overall rating for rearing habitat in this reach is fair.

MAT 6

During this survey the streamflow in the mainstem decreased significantly above the Upper North Fork confluence (0.9 cfs versus 12.4 cfs in the lower reaches), and local landowners indicated that this portion of the channel frequently goes dry or intermittent during periods of low flow. However, this reach contained many holding pools and good spawning gravels, with some occasional light cementing (Table 1). Boulders were the dominant substrate type in this B channel (Figure 4). Alluvial scrub dominated most of this reach but the upper end transitions into riparian scrub then riparian forest (Figure 5). No barriers were encountered in this reach. The overall habitat rating was judged as good.

MAT 7

This long reach contained good spawning gravels and numerous deep holding pools (Table 1). Large boulders dominated the substrate with short sections of bedrock canyon with low and high-angled bedrock ledges. Riparian forest species dominated the bank and contributed more woody debris than was observed in lower reaches (Figure 5). There were four rainbow trout, five western pond turtles, and a few frogs observed in this reach. However, access for steelhead will be difficult in the upper portion of this reach due to two probable barriers (barriers "steepchut" and #544) before the definite barrier (barrier #550) at the top of the reach (Table 2, Figure 3, Appendix C). Overall, the spawning and rearing habitat rating for this reach was judged as good.

MAT 8

This reach is believed to be inaccessible to steelhead because of barrier #550, which is an 18 ft bedrock falls at the downstream boundary (Table 2, Figure 3). In this steep, confined reach the weathered bedrock walls contributed lots of gravel-sized rock that were noticeably sharper and more angular than the downstream gravels. Riparian forest dominated this B and A channel reach (Table 1, Figures 4 and 5). In addition to a significant 10 ft falls halfway up this reach (barrier #552), the reach was terminated by a spectacular 50 ft waterfall (Table 2, Appendix C). This waterfall is a frequent destination for local hikers, which has a highly distinctive appearance due to the bedrock geology and heavy mineral deposition.

Upper North Fork Matilija Creek

The Upper North Fork Matilija was mapped for 4.08 miles by one biologist on 10 and 11 March 2003, and 0.82 miles of an unnamed tributary was mapped on 13 March. Streamflow measured at the mouth was 3.2 cfs on 7 March, and was eye-estimated at approximately 1½ cfs in both the mainstem and the unnamed tributary at that confluence. Water temperatures ranged from 50-58^{o}F, and the D.O. and pH measured near the confluence with the Matilija were 8.4 mg/l and 8.23, respectively.

UNF 1

Good spawning gravel was observed throughout this reach with some patches of excellent gravel, although some cementing was evident (Table 1). Overall, the substrate in this B channel was boulder dominated and the riparian vegetation was dominated by alder (Figures 4 and 5). Good holding pools were present with some large woody debris. No barriers were observed. Five rainbow trout were observed in this reach, as well as many non-game fish. Overall rating for spawning and rearing in this reach was judged as good to excellent.

UNF 2

This reach abruptly opened up into a C channel with a much wider flood plain, some split channels, and a relatively low slope (Table 1, Figure 4). Very little canopy cover was present in this reach, the dominant vegetation was sparse mule fat and willow (Figure 5). Despite the lower gradient, there was virtually no spawning gravel, but more silt in this reach than in UNF 1. Cobble substrates were highly cemented. There were some good holding pools in this reach, however only one rainbow trout was observed. No barriers were observed in this reach. Overall the habitat rating for rearing was judged as fair to good, with little spawning habitat.

UNF 3

In this reach the flood plain narrowed and the riparian forest returned (Table 1, Figures 4 and 5). The substrate was dominated by boulders and bedrock, but slack water areas frequently contained fine silt. Although there was some good spawning gravel

throughout this reach, the cementing of some gravel was still evident. Access was good with one possible barrier (barrier #46, Table 2, Figure 3, Appendix C). One unidentified fish was observed in this reach. Overall, the habitat rating for this reach was good.

UNF 4

This reach begins immediately above the confluence with the unnamed tributary (Figure 3). Here, the stream channel became narrower and steeper, and transitioned from a B channel to an A channel (Figure 4). In this reach several potential barriers were encountered (barriers #49, #51, #62, and #63). Barrier #63 was judged as a definite barrier to upstream migrant steelhead, but barrier #49 also appeared formidable (Table 2, Appendix C). The substrate was dominated by boulders and bedrock, with fine silt in deep pools. Overhead, the channel was enclosed by thick riparian forest (Figure 5). There were 12 positive rainbow trout observations in this reach. The overall habitat quality appeared good, but access may be restricted to a short length below barrier #49.

UNFT 1

This is an unnamed tributary entering the Upper North Fork from the east approximately 2.7 miles upstream from its mouth (Table 1). With an estimated 1.5 cfs of flow, this stream was very similar to reach UNF 4. The channel was largely a B type with a dominant substrate of boulders, and a riparian forest dominated by alders (Figures 4 and 5). There were holding pools throughout the reach with good patches of spawning gravel having fairly little cementation. Five rainbow trout were observed in this reach. This reach terminated at a definite barrier (#100) composed of several waterfalls with a combined vertical drop of approximately 100 ft (Table 2, Figure 3, Appendix C). Overall the habitat quality rating for this tributary was judged as good.

Murietta Creek

Murietta Creek was mapped for 2.13 miles by one biologist on 11-12 March 2003. Streamflow on 7 March was 1.2 cfs at the mouth, but surface flow varied considerably along the mapped length. D.O. and pH measured at the mouth were 9.2 mg/l and 7.5, respectively (the pH value is approximate). Water temperatures ranged from 53-58^{o}F.

MUR 1

The lower 900 ft of Murietta Creek contained flowing water to its confluence with Matilija Creek (Table 1, Figure 3). On March 7th this flow was measured at 1.2 cfs. No barriers or spawning gravels were observed in this reach, and boulders dominated the substrate. Riparian scrub dominated the vegetation but riparian forest species (alder and oak) were present on upper flood terraces and they provided some woody debris in the stream channel (Figure 5). One rainbow trout was observed. The rearing habitat in this reach appeared good, but the stability of surface flow during summer months is unknown.

MUR 2

This reach consisted of approximately 500 ft of dry B channel (Table 1, Figure 4). Stream channel was less confined than downstream and contained a large split channel. Riparian forest species dominated banks on the upper flood terrace but riparian scrub dominated the channel margins (Figure 5). Because of the dry channel it is doubtful that this reach provides much rearing habitat, except during intermittent periods of higher flow. No barriers were observed, although assessment of barriers is difficult in the absence of surface flow.

MUR 3

Steelhead access to this long reach could be difficult given the periodically dry channel downstream and the presence of several possible barriers (barriers #611, #612, #613, #617, Table 2, Appendix C). At approximately 5,900 ft upstream, an unnamed tributary adds significant flow. Gradient in this B channel varies between 2 to 4% with small to medium boulders (and occasional large boulders) dominating substrate (Table 1, Figure 4). Spawning gravels were numerous and showed none of the mineral cementing found in most other sub-basins. Riparian forest was dense throughout most of the reach and woody debris was plentiful. Although many excellent holding pools were present, only one rainbow trout was observed. Overall the spawning and rearing habitat in this reach was judged as good, although the access and stability of streamflows remains questionable.

MUR 4

This upper reach had intermittent flow or was dry. Occasional holding pools were found to have water, but they were stagnant and choked with algae and surface flow was inconsistent. One possible barrier (barrier #622) exists halfway up this reach and a barrier initially classified as definite (barrier #625) was located near the top boundary (Figure 3, Table 2, Appendix C). The channel remained dry for approximately one-half mile above the last barrier. The dry or intermittent nature of flow in this reach suggests very poor habitat potential in most normal or dry water years. When originally evaluated barrier #625 occurred in a dry channel, however when re-visited under flowing conditions the barrier exhibited less severe passage characteristics (Table 2, Appendix C).

Old Man Creek

Old man Creek was mapped for 2.29 miles by one biologist on 12 March 2003. Surface flow was absent at the confluence with the mainstem Matilija and in some upstream reaches, in other reaches flows were eye estimated at ½ to 1 cfs. Water temperatures in flowing reaches ranged from 55-62^{o}F. D.O. and pH were not measured.

OLD 1

Most of this reach was completely dry making access to the rest of the stream impossible at the current flow (Table 1). Access at higher flows would probably be difficult, due to some steep cascades and falls (barrier #65, Table 2, Figure 3, Appendix C). Less than 300 ft of this reach contained intermittent flow (<0.5 cfs), and no fish observed in this portion of the stream. No spawning gravel was observed in this reach, and the overall habitat rating for this reach was poor.

OLD 2

This relatively long B reach contained surface flow with good riparian forest cover and good patches of gravel (Table 1, Figures 3, 4, and 5), although some gravels were cemented. Two rainbow trout observed in this reach. Overall, the habitat rating for this reach was judged to be good, although the dry channel downstream and a possible barrier (barrier # 74, Table 2, Appendix C) could restrict access to this habitat.

OLD 3

This reach was dry with a few intermittent pools (Table 1, Figure 3). Although good spawning gravel was abundant in this reach, it is difficult to tell how much would be usable during higher flows. This reach was relatively open with alluvial scrub vegetation and increasing gradient, although no barriers were observed (Figures 4 and 5). Due to the instability of flows in this reach, the habitat potential was judged as poor except perhaps during wet years.

OLD 4

Although surface flow existed in this steep reach, it was very minimal. There was only one patch of spawning gravel noted in this reach, and no fish were observed (Table 1). No barriers were observed. Overall, the habitat quality in this reach was judged as poor.

OLD 5

This reach was relatively steep, open, and dry (Table 1, Figures 4 and 5). The survey ended at a potential barrier (barrier #91, Figure 3, Table 2, Appendix C), but the channel continued dry for at least another 500 ft. The habitat quality in this reach was judged as poor.

Lower North Fork Matilija Creek

The lower 5.12 miles of the Lower North Fork were mapped by two biologists on 14 March 2003, and an additional 1.95 miles was mapped on 13 April 2003. On 9 March, streamflow was measured at 3.9 cfs, and D.O. and pH were 9.15 mg/l and 7.8, respectively. Measured water temperatures ranged from 55-60^{o}F.

LNF 1

The Lower North Fork of the Matilija appeared to contain some of the best habitat for steelhead spawning and rearing within the upper basin. The majority of the channel was type B and was enclosed by riparian forest or, in Wheeler Gorge, by canyon walls (Table 1, Figure 6). Spawning gravels were very abundant and in good condition, although there was some mineral cementation in areas. Rainbow trout were frequently observed, and several redds and spawning adults were also seen during the March survey. Potential access for steelhead was good throughout most of this reach, despite some steep cascades and falls in the lower end that were expected to be passable at higher flows. There was, however, a definite man-made barrier at a road crossing in the Wheeler Gorge Campground (barrier #710, Table 2, Figure 6, Appendix C).

LNF 2

Most of this reach was surveyed on 13 April 2003 during a rainstorm. Streamflow above the confluence with Cannon Creek was approximately one-half of the flow in LNF 1. The flow continued to decrease further upstream and was eye-estimated at 0.5 cfs at waypoint #715, but was dry for a distance of 160 ft between waypoints 724 and 725 (Figure 6). There were two probable barriers in this reach (barrier #'s 721 and 722, Table 2, Appendix C). There was 220 ft^2 of spawning gravel, and one 4 inch trout noted in this reach. Most of the stream channel was type B with some sections of A channel. The vegetation was predominantly riparian forest with some riparian scrub with dense brush. The survey ended approximately 0.45 miles below the Highway 33 barrier at waypoint #728, due to inclement weather and thick brush.

At the Highway 33 crossing a definite barrier exists, however detailed data was not collected at this barrier. It consisted of a long (~100 ft), sloped concrete culvert that dropped 6-8 ft into a shallow plunge pool. It appeared to be impassable to steelhead due to both the vertical jump into the culvert and the extreme velocities that would be expected to occur in the sloped culvert during passage flows. During a preliminary site visit in March the channel was dry above the Highway 33 barrier for a distance of approximately ¼ mile, however perennial surface flow is reported to occur farther upstream where a spring enters the channel (Mark Capelli, NMFS, personal communication). Unless the downstream barriers at the campground and at the Highway 33 crossing were removed, this upper portion of the Lower North Fork would not be available for steelhead rearing.

DISCUSSION

Summary of First-Stage Survey Results

If Matilija Dam is removed and passage is provided past Robles Diversion Dam, steelhead could potentially have access to approximately 8.2 miles of habitat in the mainstem Matilija Creek, 4.9 miles in the Upper North Fork (including the unnamed tributary), at least 2.3 miles in Old Man Creek, 1.9 miles in Murietta Creek, and 4.3 miles in the Lower North Fork (Table 2). Together, approximately 21.6 miles of habitat could

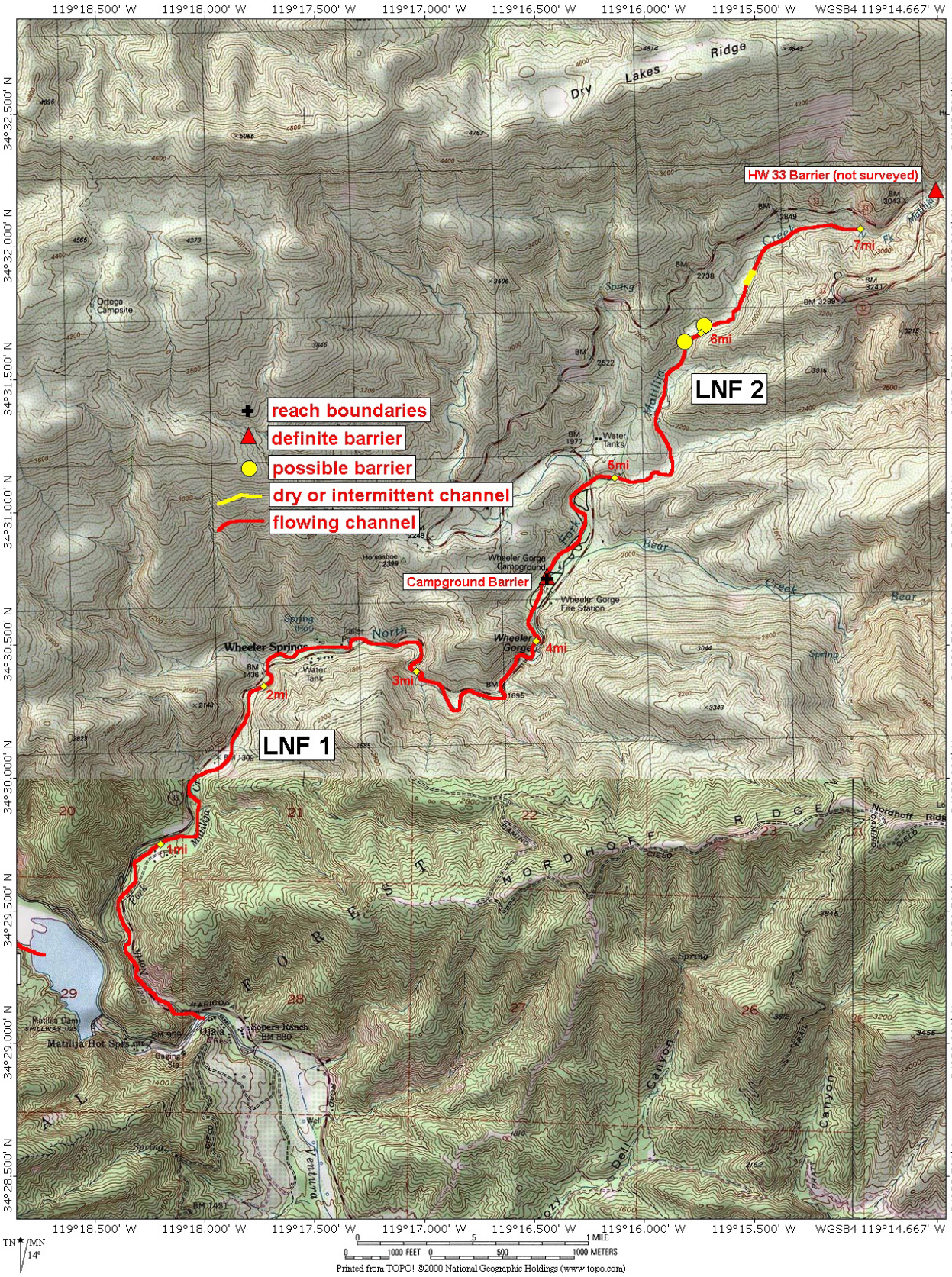

Figure 6. Map of Lower North Fork Matilija Creek showing reach boundaries and barrier locations. Most of the channel was B-type with surface flow and riparian forest. Channels not outlined were not mapped.

be provided, with an additional two to three miles of habitat if the definite barrier at the Wheeler Campground was removed. Of the 21.6 miles, 6.7 miles occur above "possible" barriers to upstream migration (Table 2), and thus such areas may not be accessible to steelhead. Also, 1.5 miles of the potentially accessible habitat were either dry or intermittent during the March survey, and thus such areas would be unlikely to provide summer rearing habitat except during wetter years (Table 1, Figure 3).

Of the 21.6 miles of potentially accessible habitat, 1.3 miles were visually judged as being "good to excellent" habitat (UNF 1), 12.7 miles were judged as "good" habitat, 3.5 miles were judged as "fair to good" habitat, 0.9 miles was judged as "fair" habitat, and 1.9 miles were judged as "poor" quality habitat, mostly because of unstable flow regimes. The remaining 1.3 miles were not mapped due to private property (Table 1).

Most of the "good" spawning and rearing habitat in the mainstem Matilija was located in the upper portions of the watershed, whereas the lower reaches typically contained little spawning habitat and only "fair" or "fair to good" rearing habitat (the exception being Mat 1, which contained abundant gravels due to the lake influence). In contrast, the smaller tributaries Old Man Creek and Murietta Creek contained the best habitat in their lower or middle reaches. The uppermost reaches of both streams contained very low flows or were already dry during the March surveys. The intermediate-sized tributaries (the Upper North Fork and the Lower North Fork) contained consistently good habitat throughout all of the mapped reaches.

More quantitative habitat measurements will be collected during the second-stage survey in April 2003 and should help to refine these subjective classifications of habitat quality.

Comparison of First-Stage Assessments with Existing Data

The most comprehensive source of previously existing habitat data is from U.S. Forest Service (USFS) reports (Chubb 1997), which gives a good overviews of the Matilija and adjacent basins and the historical land-use activities, and summarizes stream survey information collected in 1979 (Moore 1980). Some data contained in the "Chubb Report" will be more thoroughly evaluated following the second-stage survey in April 2003, which is intended to collect quantitative information on specific habitat parameters. However, some information from the first-stage survey can be compared to data presented in the Chubb Report, although photo replication of the Chubb maps showing barrier locations, streamflow characteristics, fish densities, etc. is inadequate to exactly compare locations between the USFS report and our results. Also, the Chubb Report bases several conclusions on detailed habitat or fisheries information that is not clearly described, hence it is difficult to make direct comparisons without knowledge of the methodologies employed.

Barriers to Upstream Migration

A rough comparison of the number and locations of barriers shows several similarities and dissimilarities. For example, the Chubb Report shows some barriers classified as

"complete" that are relatively close to the barriers we classified as "definite" in the upper mainstem Matilija and the Upper North Fork (Figure 3, Table 2). However, the Chubb Report also shows complete barriers in the Lower North Fork that we did not encounter (or, that we judged differently). Also, we identified a number of "possible" barriers in Old Man Creek and in Murietta Creek that were not identified in the Chubb Report. Given the lack of detail in how barriers were assessed for the Chubb Report, it is difficult to give a cause for these differences. Even with the semi-quantitative methodology that we employed, a significant amount of "professional opinion" is ultimately involved in most evaluations, and the streamflow conditions that exist during the survey can also have a large effect on the final assessment. Despite the ambiguities inherent to barrier assessment, the results can clearly have significant effects on the overall estimation of potential steelhead habitat. As previously discussed, a thorough barrier analysis is best performed under flow conditions typical during upstream migration and, ideally, in the presence of migratory steelhead. Neither option was feasible during this short-term study.

Channel Streamflow Characteristics

The Chubb Report's characterizations of channel flow regimes also differed significantly from the conditions that we encountered in the March survey. For example, the Chubb Report appeared to classify the flow regime in Old Man Creek as perennial, whereas we found alternating sections of dry, intermittent, and flowing channels (Table 1). We also suspect that the mainstem Matilija above the Upper North Fork (Mat 6) may become intermittent by late-summer, based on the very low flows measured in March (<1 cfs) prior to the spring rain events, and based on reports from local landowners. Obviously, the assessment of a streams flow regime as dry or intermittent is best done during the summer low flow period, and such conditions will vary annually depending upon preceding rainfall history. However, one might expect that dry or intermittent channels during a March survey would likely be dry during the summer and fall months, despite the occurrence of late-spring rain events as experienced in 2003. Additional details regarding the flow history in the upper Matilija Basin preceding this survey will be discussed in a following report describing the analysis of Habitat Suitability Index (HSI) data.

Availability of Spawning Gravels

The Chubb Report indicated that spawning habitat was most common in the Lower North Fork, the upper reaches of the mainstem, portions of the Upper North Fork, and in Murietta Creek. In general, our assessment of the availability of spawning gravels is similar, with highest densities (>400 ft^2/1,000 ft) of spawnable gravel in the Lower North Fork, and intermediate densities (50-100 ft^2/1,000) in the upper mainstem, the lower portion of the Upper North Fork, and in Murietta Creek. We also found substantial gravels in the lowest reach of the mainstem and in middle reaches of Old Man Creek. The gravels in the lower mainstem may not persist following dam removal, however, and those in Old Man Creek may only be occasionally available during years of adequate streamflows.

Mineral Deposition on Substrate Materials

The Chubb Report describes the mineral depositions found within substrate materials in much of the upper basin. We found lower levels of mineralization in the Lower North Fork, the upper mainstem, and Murietta Creek, than in other portions of the basin. The report suggests that high winter and spring flows will adequately loosen cemented gravel deposits, as has been suggested by other local biologists (Mark Capelli, NMFS, personal communication). We found that gravel cementation was prevalent in most areas of the upper basin during our March survey, which suggests that mineralization may be common during the period of steelhead egg and fry incubation in some years. A number of gravel deposits were revisited in April to assess whether the 15 March storm event did loosen cemented gravels. There appeared to be very little loosening of gravels, however the winter and early spring of 2003 produced very few high flow events and thus the degree of cementation observed during this survey may be significantly greater than in an "average" year.

The Chubb Report also suggested that the mineral content in the surface waters would produce a productive environment for aquatic invertebrates and abundant food supplies for fish. However, our cursory evaluation of the benthic community (i.e., looking under rocks) suggested that invertebrate production was relatively low. Additional work on water quality and benthic production would help to determine if food supplies would be expected to limit growth and survival of juvenile steelhead.

Fish Population Information

As part of our first-stage survey, biologists scanned pool habitats and other rearing areas for the presence of fish. Bankside observation can be expected at best to produce only a rough idea of relative fish distribution and abundance, and should not be assumed to represent fish densities that are representative of the true population. The Chubb Report does not state how trout density estimates were derived, but clearly the densities they reported far exceeded the fish observations we made during our March surveys. Nevertheless, some similarities are evident. For example, the Chubb Report indicated highest densities of trout fry in the Lower North Fork, the upper portion of the Upper North Fork, and the upper mainstem. Likewise, our observations suggested highest abundance of trout in the Lower North Fork and in the Upper North Fork.

Because of the highly unstable nature of streamflows in many areas of the Matilija Basin, it is likely that extreme annual variation will occur in fish population abundance. Consequently, such "snapshot" assessments of fish distribution and abundance can be highly misleading and should be viewed with caution. Additional details regarding the potential effects of drought conditions on fish populations and habitat characteristics in the upper Matilija Basin will be discussed in following report describing the HSI study.

CONCLUSIONS

The upper Matilija Basin (including the Lower North Fork) has the potential to provide significant spawning and rearing habitat for steelhead, if access is provided past Robles Diversion Dam and Matilija Dam. The qualitative first-stage assessment suggested that the "best" habitat, in terms of accessibility, flow characteristics, gravel quality, and instream habitat, was present in the upper mainstem, the Lower North Fork, and the Upper North Fork. Seasonally dry or intermittent channels (during spring incubation and summer rearing periods), barriers to upstream migration, and mineralized cementation of spawning and food production areas are several significant factors that may limit potential production of steelhead in portions of the upper basin, particularly during drought conditions like those existing during this survey in March 2003.

A more quantitative second-stage survey was subsequently conducted in April within specified reaches selected to represent differences in habitat character. Quantitative habitat values (HSI scores) will then be expanded for comparison with qualitative assessments, and to provide overall estimates of habitat quality/habitat area for spawning and rearing steelhead in the upper Matilija Basin. These results will be presented in a following report.

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Appendix A. Waypoint list (NAD83) from first-stage survey. Barriers and photos are labeled by the waypoint numbers. Refer to MatilijaGPSall.txt for a downloadable waypoint file.

		North			West			
Stream	Waypoint	Deg	Min	Sec	Deg	Min	Sec	Notes
Matilija Creek	1	34	29	20	-119	18	44	LAKEHEAD,PHOTO
	2	34	29	23	-119	18	52	
	3	34	29	26	-119	18	55	PHOTO
	4	34	29	31	-119	19	0	
	5	34	29	33	-119	19	14	PHOTO
	6	34	29	30	-119	19	25	
	7	34	29	30	-119	19	25	
	8	34	29	30	-119	19	25	
	9	34	29	30	-119	19	25	
	10	34	29	33	-119	19	34	PHOTO
	11	34	29	37	-119	19	43	PHOTO
	12	34	29	39	-119	19	54	PHOTO
	13	34	29	44	-119	20	4	
	14	34	29	49	-119	20	14	PHOTO
	15	34	29	51	-119	20	18	
	16	34	29	54	-119	20	24	
	17	34	29	57	-119	20	33	PHOTO
	18	34	30	3	-119	20	43	PHOTO
	19	34	30	4	-119	20	54	
	20	34	30	3	-119	20	57	
	21	34	30	6	-119	21	2	PHOTO
	22	34	30	7	-119	21	9	
	500	34	30	12	-119	22	20	PHOTO
	501	34	30	12	-119	22	20	
	502	34	30	14	-119	22	24	
	503	34	30	16	-119	22	29	
	504	34	30	17	-119	22	30	PHOTO
	505	34	30	17	-119	22	33	
	506	34	30	19	-119	22	41	PHOTO
	507	34	30	20	-119	22	46	PHOTO
	508	34	30	20	-119	22	48	
	509	34	30	20	-119	22	50	
	510	34	30	20	-119	22	53	PHOTO
	511	34	30	20	-119	22	55	
	512	34	30	22	-119	22	57	
	513	34	30	22	-119	22	58	PHOTO
	514	34	30	26	-119	23	0	PHOTO
	515	34	30	28	-119	23	3	PHOTO
	516	34	30	31	-119	23	2	PHOTO
	517	34	30	33	-119	23	1	PHOTO
	518	34	30	34	-119	23	4	PHOTO
	519	34	30	35	-119	23	7	
	520	34	30	35	-119	23	10	
	521	34	30	36	-119	23	12	
	522	34	30	36	-119	23	14	PHOTO
	523	34	30	37	-119	23	25	PHOTO
	524	34	30	39	-119	23	26	
	525	34	30	40	-119	23	26	
	526	34	30	41	-119	23	27	PHOTO
	527	34	30	43	-119	23	35	PHOTO
	528	34	30	43	-119	23	38	
	529	34	30	45	-119	23	45	PHOTO

Appendix A. (continued)

Stream	Waypoint	North Deg	North Min	North Sec	West Deg	West Min	West Sec	Notes
Matilija Creek	END09	34	30	48	-119	23	51	
	530	34	30	47	-119	23	51	PHOTO
	531	34	30	50	-119	24	1	PHOTO
	532	34	30	52	-119	24	7	
	533	34	30	57	-119	24	9	PHOTO
	534	34	30	58	-119	24	10	
	535	34	31	3	-119	24	17	PHOTO
	536	34	31	9	-119	24	21	PHOTO
	537	34	31	11	-119	24	24	PHOTO
	538	34	31	18	-119	24	17	PHOTO
	539	34	31	23	-119	24	8	PHOTO
	STEEPCHUT	34	31	25	-119	24	7	POSSIBLE BARRIER
	540	34	31	32	-119	24	7	PHOTO
	541	34	31	37	-119	24	6	
	542	34	31	41	-119	24	4	PHOTO
	543	34	31	45	-119	24	4	PHOTO
	544	34	31	52	-119	24	3	POSSIBLE BARRIER
	545	34	31	52	-119	24	5	PHOTO
	546	34	31	54	-119	24	12	
	547	34	31	55	-119	24	12	PHOTO
	548	34	32	5	-119	24	14	
	549	34	32	10	-119	24	14	PHOTO
	550	34	32	14	-119	24	14	DEFINITE BARRIER
	551	34	32	16	-119	24	13	PHOTO
	552	34	32	22	-119	24	14	POSSIBLE BARRIER
	FALLS	34	32	28	-119	24	22	DEFINITE BARRIER-MAP LOCATED
Upper North Fork	23	34	30	34	-119	23	1	MOUTH,PHOTO
	24	34	30	39	-119	22	59	
	25	34	30	41	-119	22	59	
	26	34	30	49	-119	22	54	
	27	34	30	53	-119	22	52	PHOTO
	28	34	31	2	-119	22	47	
	29	34	31	5	-119	22	46	
	30	34	31	5	-119	22	44	
	31	34	31	3	-119	22	44	PHOTO
	32	34	30	57	-119	22	38	
	33	34	30	55	-119	22	27	
	34	34	30	56	-119	22	23	
	35	34	30	55	-119	22	17	PHOTO
	36	34	30	59	-119	22	9	
	37	34	31	2	-119	21	58	
	38	34	31	5	-119	21	47	
	39	34	31	7	-119	21	43	
	40	34	31	9	-119	21	42	PHOTO
	41	34	31	12	-119	21	34	
	42	34	31	11	-119	21	32	PHOTO
	43	34	31	11	-119	21	28	
	44	34	31	17	-119	21	22	PHOTO
	45	34	31	17	-119	21	19	POSSIBLE BARRIER
	46	34	31	22	-119	21	15	
	47	34	31	21	-119	21	8	
	48	34	31	25	-119	21	7	

Appendix A. (continued)

Stream	Waypoint	North Deg	North Min	North Sec	West Deg	West Min	West Sec	Notes
Upper North Fork	49	34	31	28	-119	21	7	POSSIBLE BARRIER
	50	34	31	32	-119	21	9	
	51	34	31	34	-119	21	9	POSSIBLE BARRIER
	52	34	31	37	-119	21	7	
	53	34	31	42	-119	21	2	
	54	34	31	43	-119	21	4	CAMPSITE,PHOTO
	55	34	31	50	-119	21	12	
	56	34	31	54	-119	21	14	
	57	34	31	55	-119	21	15	
	58	34	31	57	-119	21	13	
	59	34	32	2	-119	21	11	
	60	34	32	7	-119	21	12	
	61	34	32	12	-119	21	13	
	62	34	32	14	-119	21	14	POSSIBLE BARRIER
	63	34	32	18	-119	21	14	DEFINITE BARRIER
UNF Tributary	93	34	31	23	-119	21	7	270 FT ABOVE MOUTH,PHOTO
	94	34	31	20	-119	20	58	
	95	34	31	16	-119	20	52	
	96	34	31	16	-119	20	49	
	97	34	31	15	-119	20	38	
	98	34	31	15	-119	20	26	
	99	34	31	16	-119	20	24	
	100	34	31	18	-119	20	22	DEFINITE BARRIER
Old Man Creek	64	34	31	3	-119	24	17	MOUTH,PHOTO
	65	34	31	2	-119	24	18	POSSIBLE BARRIER
	66	34	31	2	-119	24	26	
	67	34	31	2	-119	24	28	
	68	34	31	2	-119	24	31	PHOTO
	69	34	31	0	-119	24	34	
	70	34	31	0	-119	24	37	
	71	34	30	57	-119	24	43	
	72	34	30	54	-119	24	46	PHOTO
	73	34	30	54	-119	24	50	
	74	34	30	56	-119	24	50	POSSIBLE BARRIER
	75	34	31	5	-119	24	55	PHOTO
	76	34	31	4	-119	25	2	PHOTO
	77	34	31	5	-119	25	5	
	78	34	31	7	-119	25	7	
	79	34	31	6	-119	25	10	PHOTO
	80	34	31	6	-119	25	12	PHOTO
	81	34	31	4	-119	25	20	
	82	34	31	4	-119	25	22	
	83	34	31	5	-119	25	25	
	84	34	31	7	-119	25	33	
	85	34	31	10	-119	25	38	
	86	34	31	9	-119	25	50	
	87	34	31	11	-119	25	55	
	88	34	31	11	-119	25	58	PHOTO
	89	34	31	13	-119	26	7	
	90	34	31	13	-119	26	8	
	91	34	31	13	-119	26	7	POSSIBLE BARRIER

Appendix A. (continued)

Stream	Waypoint	North Deg	North Min	North Sec	West Deg	West Min	West Sec	Notes
Murietta Creek	600	34	30	22	-119	22	58	MOUTH,PHOTO
	601	34	30	24	-119	23	8	PHOTO
	602	34	30	21	-119	23	12	
	603	34	30	19	-119	23	15	PHOTO
	604	34	30	16	-119	23	16	PHOTO
	605	34	30	13	-119	23	17	
	606	34	30	10	-119	23	21	
	607	34	30	9	-119	23	21	PHOTO
	608	34	30	5	-119	23	22	
	609	34	30	0	-119	23	29	PHOTO
	611	34	29	58	-119	23	35	POSSIBLE BARRIER
	612	34	29	59	-119	23	39	POSSIBLE BARRIER
	613	34	29	58	-119	23	42	POSSIBLE BARRIER
	614	34	29	53	-119	23	49	PHOTO
	615	34	29	49	-119	23	56	
	616	34	29	49	-119	24	0	PHOTO
	617	34	29	48	-119	24	7	POSSIBLE BARRIER
	618	34	29	48	-119	24	11	
	619	34	29	52	-119	24	23	
	620	34	29	49	-119	24	14	PHOTO
	621	34	29	47	-119	24	19	PHOTO
	622	34	29	46	-119	24	21	POSSIBLE BARRIER
	623	34	29	44	-119	24	28	
	624	34	29	43	-119	24	28	PHOTO
	625	34	29	42	-119	24	29	DEFINITE BARRIER
	626	34	29	42	-119	24	36	
	627	34	29	36	-119	24	53	
Lower North Fork	101	34	29	6	-119	18	1	MOUTH,PHOTO
	102	34	29	7	-119	18	8	
	103	34	29	9	-119	18	11	
	104	34	29	15	-119	18	19	
	105	34	29	19	-119	18	20	
	106	34	29	21	-119	18	22	
	107	34	29	23	-119	18	20	
	108	34	29	35	-119	18	20	
	109	34	29	41	-119	18	18	
	110	34	29	48	-119	18	7	PHOTO
	111	34	29	53	-119	18	2	
	112	34	29	53	-119	18	2	
	113	34	29	59	-119	18	4	
	114	34	30	0	-119	18	2	
	115	34	30	8	-119	17	53	
	116	34	30	9	-119	17	53	
	117	34	30	10	-119	17	53	
	118	34	30	16	-119	17	49	
	119	34	30	24	-119	17	44	
	120	34	30	28	-119	17	36	
	121	34	30	28	-119	17	34	
	122	34	30	30	-119	17	30	
	123	34	30	30	-119	17	30	
	700	34	30	29	-119	17	30	PHOTO
	701	34	30	30	-119	17	16	

Appendix A. (continued)

Stream	Waypoint	North Deg	North Min	North Sec	West Deg	West Min	West Sec	Notes
Lower North Fork	702	34	30	30	-119	17	8	
	703	34	30	26	-119	17	5	
	704	34	30	21	-119	16	59	
	705	34	30	17	-119	16	51	
	706	34	30	18	-119	16	43	
	707	34	30	24	-119	16	37	WHEELER GORGE, PHOTO
	708	34	30	34	-119	16	31	WHEELER GORGE
	709	34	30	37	-119	16	31	PHOTO
	710	34	30	46	-119	16	27	CAMPGROUND BARRIER
	711	34	30	54	-119	16	20	CAMPGROUND
	712	34	31	1	-119	16	19	CAMPGROUND,PHOTOS
	713	34	31	7	-119	16	16	CANNON CREEK
	714	34	31	7	-119	16	4	
	715	34	31	8	-119	16	1	
	716	34	31	8	-119	15	56	
	717	34	31	12	-119	15	53	
	718	34	31	20	-119	15	58	
	719	34	31	28	-119	15	56	
	720	34	31	35	-119	15	50	
	721	34	31	39	-119	15	49	PROBABLE BARRIER
	722	34	31	43	-119	15	44	PROBABLE BARRIER
	723	34	31	47	-119	15	36	
	724	34	31	52	-119	15	33	
	725	34	31	54	-119	15	31	
	726	34	32	4	-119	15	19	
	727	34	32	4	-119	15	7	
	728	34	32	5	-119	15	2	

Appendix B. Mapping data from first-stage survey of the Upper Matilija Basin. Distances and areas are in feet and square feet. See text for descriptions of channel and riparian types.

Stream	Hipchain Distance	Way Pt Label	Channel Type[1]	Riparian Type[2]	Avg Unit Length	Photo #	Flag Label	Spawning Areas Area	%Fine	%Embed	Water Temp °F	Comments (barriers, fish, springs, LWD, misc. notes)
Matilija	start at head of reservoir, 3/9/03, Scott Riley, Est flow=10cfs											
	0	1	C-D	RS	150	2	start	32	25-50	0-25	59	Est flow: 10cfs, Mule fat, willow, cat tail, Arrundo
	792	2	C-D	RS-FM	150			600	25-50	25-50		most gravel ~ 0.5"; lots of algae and aquatic veg.
	1,152	3	C-D	RS-FM	150	3	1,152				60	Some gravel mixed w/ larger cobble; no disticnt patches.
	1,300		C	RS			1,300	75	0-25	0-25		flag @ top of gravel; channel narrows, gradient increasing.
	1,908	4	D	RS	60		1,908				60	split, some trees-Alder
	2,004											good holding pool
	2,484		D	RS	50							mineral cementing
	2,670		D	RS	50							Split; ~ 10 NGF
	3,165	5	D	RS	40	4	3,170				62	
	4,160	006-009	D	RS	30		4,160				64	road x-ing
	4,626											Deep holding pool
	5,013	10	C-D	RS	30	5	5,013					Steep cut bank R.
	5,634		C									gage 7.5"
	6,000	11	C-D	RS	30	6	6,000				65	at1310 Road close
	6,249		C	RS								Rip Rap RB.
	7,000	12	C	RS	30	7	7,000				65	Larger substrate, Bldrs. ~500 NGF
	7,978	13	C	RS	30		7,978	24	25-50	25-50	65	~ 200 NGF
	9,009	14	C	RS	30	8	9,009				66	
	9,357	15						21	25-50	50-75		cemented, Sulphur spg RB. Private
	9,942	16	C	RS	30							Trib?/SC? RB
	10,005											old footbridge
	10,868	17	C	RS	40	9	10,868				66	split enters 10800-10860 came up LB side ch.
	11,680											sulphur sprg RB. Split
	11,705											Deep holding pool
	12,000	18	C-D	RS-AS	40	10	12,000				65	split ch. End spilt ~12500. A few Alders
	13,011	19	C	RS	45		13,011					small alders and willow
	13,431	20	C	RS	45							entering Gorge-like area.
	13,609											corner pool. Add 60' from here on
	14,033	21	C	RS	60	11	14,033	40	50-75	25-50	63	wide, large bldrs. 2 patches of gravel
	14,033							40	25-50	25-50		some trees
	14,739	22	C	RS	50		14,739				63	at1612. End.
Matilija	start at rusty gate just past prvt property, 3/9/03, Sean Thobaben											
	0	500	C	AS	80	2	SCT 000				61	started under power line, side chnl on R.
	70	501	C	RS	60		SA1	64	10	25-50		at head of side ch.
	424	502	B	RS	50		SA2	50	20	50-75		on RB, 3/4 out of water by 1' or more
	453							40	5	25-50		2' out of water on RB
												another perched SA just above boulder from prior
	881	503	B	AS	30		SA3	30	20	50-75		LB
	892		B	AS	30			40	15	25-50		just above prior
	996											good SA (8x12) on RB, but 2' out of water
	1,000	504	B	RS	40	3	SCT 1000				61	patch of arrundo on LB
	1,157											forest service gate on road above creek
	1,277	505										fence across creek, good gravel patch up high on RB (4')

Appendix B. (continued)

Stream	Hipchain Distance	Way Pt Label	Channel Type[1]	Riparian Type[2]	Avg Unit Length	Photo #	Flag Label	Spawning Areas Area	%Fine	%Embed	Water Temp °F	Comments (barriers, fish, springs, LWD, misc. notes)
Matilija	1,426											4x4 road crosses creek
	1,650											creek channelizes, RS much more dense
	2,002	506	B	RF	20	4	SCT 2002				61	flag on RB alder
	2,397	507	B	RF	25	5					60	trib on RB, 60°F, ~0.5cfs, same one we drive through
	2,604	508	B	RF							60	spring enters creek on Rb 61 F.
	2,771	509	B	RF	25						60	spring enters creek on Rb 60 F. <0.25 cfs
	2,903											many small seeps on RB for 100'
	3,002	510	B	RF	30	6	SCT 3002				60	~180' of very low gradient here
												but most of this reach has been 1-3% grade
	3,044										60	many sulphur springs in creek, yellow staining on
												rocks very prevalent.
	3,140	511	B	RF								stream more contained, bedrock cliff on LB
	3,230		B	RF								6x15 gravel bed perched 2' up on RB
	3,342		B	RF								out of bedrock canyon and deep pool area
	3,460	512	B	RF	25		SA4	20	30	25-50	60	~ 60' below Murietta Cr., barely 20' in mid channel.
												arrundo on LB.
	3,515	513	B	RF	20	7	Murietta					Murietta Cr. Enters on LB (gage 27 9/16.
	3,613		B	RF	20							split ch., frog.
	3,759											end split; leaving RF
	3,955	514	B	RS	20	8	SCT 3955				61	fence on top RB
	4,222	515	C(B)	AS	10		9					water flow really spread out between bldrs.
	4,510	516	B	AS	20	10,11						road x-ing, 4' wall built for road; not a barrier.
	4,727		B	AS	20	12						deep pool below confluence w/ upper NF.
	4,826	517	B	RS		13	U.N.F.					upper north fork confluence
	4,860											30' patch of gravel ~2' out of water
	5,023	518	B	AS	20	14	SCT 5023				65	UNF trail X-ing; frog
	5,385	519	B	AS	15		SA 5	45	20	25-50		1/2 out of water, on RB
	5,460		B	AS	15							gradient> 4%; split ch.
	5,606	520	B	AS	10		SA 6	20	40	50-75		mostly small gravel; 0.5-1' out of water
	5,629		B	AS	15							end of split and high gradient
	5,829	521	B	AS	20		SA 7	29	40	25-50	64	at tail of pool; dry trib on RB
	5,900		B	AS								series of cascades through large boulders for ~80',
												overflow channel on RB
	5,922	522	B	AS	20	15	SA 8	20	60	>75	65	on LB partially out of water
	6,576											6x15 gravel patch on RB 2-3' out of water. Also from
												5900 several 10' patches close to each other on LB
	6,720		B	AS	20	16						just came out of ~800' of large bldr and pool section.
	6,906	523	B	AS	40	17	6906/SA 9	24	20	25-50	65	gravel on LB, 1/4 ~1' out of water
	6,990		B	AS	10							stream breaks into multiple channels with dry channels
	7,075		B	AS	20			20	25	>75		gravel is cemented w/ mineral deposit
	7,130	524	B	AS	25		SA 10	20	30	50-75		cemented, 1/2 above water by 1' on LB
	7,187	525	B	AS	20		no	35	5	25-50		lightly cemented,1/2 1' above water
	7,229		B	RF	10	17						lrg. Bldrs and change in veg type.
	7,320	526	B	RF		18	SA 12	70	20	50-75		gravel bar at tail of deep pool in small bedrock gorge.
	7,398											upper end of pool, several more gravel patches that

Appendix B. (continued)

Stream	Hipchain Distance	Way Pt Label	Channel Type[1]	Riparian Type[2]	Avg Unit Length	Photo #	Flag Label	Spawning Areas Area	%Fine	%Embed	Water Temp °F	Comments (barriers, fish, springs, LWD, misc. notes)
Matilija												are ~ 6x6 but deep water and poor access prevent measuring
	7,872		B	RS	25	19						4" falls w/ 3' deep pool @ base; passable.
	7,916											frog
	7,942											5x8 gravel patch 1- 1.5' above water RB
	8,127	527	B	RS	25	20	SCT 8127				62	4x4 road crossing, flag on RB
	8,337	528	B	AS			SA 13	25	15	25-50		heavily cemented gravel @ tail of big pool
	8,965											frog
	9,002	529	B	AS	20	21	SCT 9002				60	flag on RB dead alder
	9,557	end09	B	AS			SCT 9557				60	out of string
	start at end of above, 3/10/03, Sean Thobaben											
	0	530	B	AS		22	begin				53	below large square rock on road above.
	52		B	AS				55	25	>75		highly cemented, several gravel areas close by
	238		B	AS				24	25	25-50		on RB but mostly out of water by > 1'
	319											several more gravel patches just above water
	915											small step cascade through boulders, boulder choke
												at bottom of chute could make passage difficult,
												but still passable at this flow.
	954		B	RS				27	45	>75		good gravel patch in pool on RB
	1,004	531	B	RS	30	24	SCT 1004				55	new roll of film
	1,159											side channel drops in w/ steep 5' cascade on RB
	1,420											upper end of side channel, ~1/3 flow uses side ch.
	1,506	532	B	RS			1506 SA	30	20	25-50	55	good gravel in deep pool, lightly cemented.
	1,550											entering a long series of cascade and pool
	1,670											woody debris jam under large boulder
	1,913					2						bedrock falls, ~ 3' high x 8' horizontal, deep pool
												below, shouldn't be a problem for passage.
	2,079	533	B	RS	15	3	SCT 2079				57	
	2,178	534	B	RS				80	5	0-25		very good gravel in deep pool, beach w/ structure
												on LB just above pool.
	2,250											below last property at end of road
	2,367										55	sulphur smell strong, spring close, pH=8.0, yellow
												staining on rocks, woody debris, dry channel comes in on LB
	2,512											many more srings in creek
	2,613											woody debris, more springs
	3,000	535	B	RF	20	4	SCT 3000				54	old flagging just below
	3,062											Old man creek enters LB
	3,193		B	RF				20 (2)	10	25-50		2 patches in pool below cascade
	3,312											multiple 2-4' falls, all easily passable
												lots of BLDRS small falls and deep pools
	3,682	536	B	RF	40	5	3682 SA	40	25	25-50		good spawning fravel a tail of deep pool
	3,821											4' falls, passable
	3,877											Large(40x30) deep cover, 10' pool w/ 5' falls
	4,040	537	B	RF	40	6	SCT 4040				54	long pool along bedrock slab, good trail access.
	4,228		B	RF				24	15	25-50		spawnig area in pool, trout feeding
	4,262											substrate changes to angular bedrock, about to

Appendix B. (continued)

Stream	Hipchain Distance	Way Pt Label	Channel Type[1]	Riparian Type[2]	Avg Unit Length	Photo #	Flag Label	Spawning Areas Area	%Fine	%Embed	Water Temp °F	Comments (barriers, fish, springs, LWD, misc. notes)
Matilija												enter canyon, water fast and shallow.
	4,602		B	RF								out of canyon, back to boulders
	4,752		B	RF		7						long series of bedrock poor-overs
	4,830											small log jam, 4' falls 50' US
	4,969	538	B	RF	40	8	SCT 4969	25	30	25-50	55	spawning area on RB
	5,071		B	RF				30, 50	20	50-75		2 spawning areas in large deep pool below falls
												camp area w/ sone work up on LB. Good trail access
	5,124		B	RF								5' falls not passable, small "ladder" channelon RB
												provides passage at current flow, but probably not at lower flow.
	5,264											frog
	5,390					9						bedrock water slide
	5,504					10						many bedrock sills, water shallow where it
												poors over, trout in pool
	5,747											channel split
	6,043	539	B	RF	50	11	SCT 6043				57	bedrock poor-overs w/ long pools in between
												under large boulder perched 50' on RB
	6,200	steep chu	B	RF	20	12,13						3' falls with steep, narrow chute above;
												45' of steep chute then 45' of lower angle chute.
												Boulder at bottom makes leap up falls difficult. Possible barrier.
	6,348							40	10	25-50		spawning area in pool
	6,470											60' bedrock chute, low angle, cascade at top, passable
	6,606							20	10	0-25		2 spawning areas
								20	35	50-75		
	6,664											turtle
	7,000	540	B	RF	30	14	SCT 4000				56	
	7,516	541	B	RF				32	40	>75		gravel in middle of long pool
	7,734							60	15	25-50		pile in deep pool below bedrock cascade
	7,945	542	B	RF	50	15	SCT 7945	20	20	25-50	58	pool at base of bedrock poor-over; more gravel in pool above.
	8,410	543				16						steep 45' long bedrock slide
	8,481											woody debris
	8,591							40	60	>75		gravel at tail of large pool
	8,807											50' long BRK chute, 4 % grade
	8,977	544	B	RF	25	17,18	SCT 8977	30	40	50-75	58	gravel pile in big pool, possible barrier
	start at end of above, 3/13/03, Sean Thobaben											
	0	544	B	RF			8977 end				56	
	158	545	A	RF	15	19						Channel more confined, BDRK subsrate, pool/slide/falls series
	277							40	10	25-50		gravel bed in tail of large pool
	344											35' bedrock cascade, not barrier
	633		A	RF	15			20	15	50-75		gravel sharp and angular. Part of larger pile on finer substr.
	872	546	B	RF	20							out of narrow bedrock canyon, bldr and Cobble dominate substr.
	906											5-6" RBT
	959											stream flows over bdrk as far as I can see
	1,003	547	B	RF	25	20	SCT 1003	25	25	>75	56	gravel bed in pool
	1,094											3' falls to bdrk chute 30' long
	1,234					21						55' low angle bedrock chute

Appendix B. (continued)

Stream	Hipchain Distance	Way Pt Label	Channel Type[1]	Riparian Type[2]	Avg Unit Length	Photo #	Flag Label	Spawning Areas Area	%Fine	%Embed	Water Temp °F	Comments (barriers, fish, springs, LWD, misc. notes)
Matilija	1,391											long, deep pool w. 5"RBT feeding
	1,462							20	15	50-75		in tail of pool
	?							30	15	25-50		gravel in deep water at head of long, deep pool
	1,906											2 snakes on LB
	1,973											4' falls, not a barrier
	2,048	548	B	RF								entering bdrk cnyn, sulphur sprgs in stream.
	2,156					22						bdrk cascade; 8' high 30'long
	2,216											5' falls at head of deep pool; not a barrier
	2,326											two western pond turtles
	2,634	549	B	RF	25	23	SCT 2634				56	5' falls at head of deep pool, camp on RB
	2,896					2						very large, deep pool w/ sprgs along LB
												3 western pond turtles
	3,041	550	B	RF	40	3,4,5	SCT 3041				56	18' high, 56' long high angle bdrk falls/chute
	3,252											garter snake
	3,370	551	B	RF		6						entering highly eroded bdrk cnyn. Channel full of sharp,
												angular gravel
	3,669					7						spectacular geology, bdrk layers tilted to near verticle
	3,865											5' falls w/ deep pool at base
	3,951											snake
	4,095	552	A	RF	30	8	SCT4095				57	10' falls followed by 5' falls w/ deep pool separating.
												although there are large quantities of spaawning sized gravel
												through this canyon reach it is sharp and angular rock that looks
												like it would lacerate any fish attempting to dig in it
	4,509											bdrk chute 4' wide 24' long; not very steep
	4,732											chute along near verticle bdrk wall
	4,963											channel highly confined by bdrk walls
	5,033											springs cascade into creek on LB
	5,212		A/B	RF	15	9,10,11	none					50' falls; 2 stripe racer
Up NF Matilija	start at confluence w mainstem Matilija, 3/10/03, Scott Riley, est. Flow=4cfs											
	0	23	B	RF	20	14 US	start				50	at 0845
	154		B	RF				35	25-50	25-50		velocity 1 rebar
	725	24	B	RF	20			21	50-75	25-50		in pool; lots of fines
	961	25	B	RF	20		961	35	25-50	25-50	50	most< 6" OW at pool tail
	1,175		B	RF	25			21	25-50	25-50		
	1,175							32	50-75	25-50		
	1,896	26	B	RF	25		1,896	30	50-75	25-50	50	most gravel ~0.5"
	2,144											LWD: 3 downed alders
	2,224											plunge pool w/ 3' drop; passable
	2,365											pool w/ LWD
	2,450	27	B	RF	25	15 US	2,450	21	25-50	25-50	51	trail X-ing; slightly less slope
	2,950							60	25-50	75-100		very cemented
	3,015							20	50-75	50-75		lots of fines; slope increasing
	3,191											2' plunge passable
	3,490	28	B	RF	25		3,490				52	good trail access
	3,532							28	25-50	0-25		very lrg bldrs/bdrk

Appendix B. (continued)

Stream	Hipchain Distance	Way Pt Label	Channel Type[1]	Riparian Type[2]	Avg Unit Length	Photo #	Flag Label	Spawning Areas Area	%Fine	%Embed	Water Temp °F	Comments (barriers, fish, springs, LWD, misc. notes)
Up NF Matilija	3,835	29	B	RF								trail x-ing
	3,983		B	RF				24	25-50	0-25		in bend
	4,028											2.5' plunge, passable
	4,146	30	B	RF	20		4,146	40	25-50	0-25	54	pool tail; less canopy
	4,430	31	B	RF	25		4,430	49	0-25	0-25	54	trail x-ing; 3 3-5" RBT
	4,430					16		21	25-50	0-25		"best" patches so far; more smaller patches in unit
	4,557		B	RF				32	50-75	25-50		lots of fines; 2 YOY
	4,710											trail x-ing
	5,235											no bdrk, lrg bldrs; steeper open
	5,301	32	B	RF	20		5,301	49	50-75	25-50	55	orange X on rock MC
	5,488											slope decreasing; out of canyon like area, wider flood plain
	6,291	33	B	RF	20		6,291				58	at 1146; alder and berryvines
												many fish observed; a few RBT mostly other NG
	6,332							21	50-75	25-50		most OW
	6,432											many small, disjunct patches of gravel
	6,649	34	B	RS	20							willow, mule fat very open. Abrupt transition
	7,134	35	C-B	AS	20	17					58	substrate very imbeded; lots of silt; 1snake, 2 frogs
	7,625											RBT
	7,894											split
	8,048	36	C	AS	20		8,048				58	
	9,006	37	C	AS	20		9,006					
	9,454											plunge pool; passable
	9,732											good holding pool, >4' deep
	10,067	38	C-B	AS	20		10,067				56	a few trees begining to appear, valley becoming narrow, steeper
	10,500	39	C-B	RF/AS	20							
	10,684	40	B	RF	20	18	10,684	24	25-50	25-50	55	Trail x-ing; orange flag in tree no #; steep rock face RB
	11,060											deep (>4') pool; ~15 fish
	11,460											channell becomes steeper
	11,526											plunge pool, 2.5' falls passable
	11,643	41										trail x-ing
	0	42	B	RF	25	19-21	0				58@1433	re-zero at possible barrier ~ 200' US of 11643
	0	43					000B					re-zero, hipchain not working properly. Trail x-ing
	641		B									steep walls on either side of stream
	922	44	B/A	RF	25	22	922				58	lots of silt, not very steep
	1,210	45										possible barrier
	1,660		B/A	RF								getting steeper
	2,011	46	B/A	RF	25		2,011	42	25-50	75-100	56	cemented. Some small patches of very imbedded gravels
	2,600	47	B	RF	25		2,600				56	trib. RB ~1.5 cfs; 57 deg.F
	2,678											end 03/10/03; Start 03/11/03
	2,911											fish
	3,019	48	B	RF	20		3,019	20	25-50	25-50	54	many small falls with shallow jump pools that make
												passage difficult at current flow, passable at
												higher flow
	3,137											~ 5 fish 3-5"
	3,160							24	25-50	25-50		~ 75% OW; most gravel <0.5"

Appendix B. (continued)

Stream	Hipchain Distance	Way Pt Label	Channel Type[1]	Riparian Type[2]	Avg Unit Length	Photo #	Flag Label	Spawning Areas Area	%Fine	%Embed	Water Temp °F	Comments (barriers, fish, springs, LWD, misc. notes)
Up NF Matilija	3,247											3' falls, passable
	3,387	49					3,387					possible barrier
	3,875	50						27	25-50	0-25		from shale face LB
	4,021	51	B/A	RF			4,021					barrier
	4,295											steep 2.5' falls w/ poor jump pool. Passable at higher flow
	4,341											nice holding pool. 4.7' deep.
	4,515	52	A	RF								Trail x-ing
	4,545											3.5' falls, passable
	4,663											3.5' falls, passable
	5,239											LWD
	5,260	53	A/B	RF	20							Trail x-ing
	5,414											cascade. Passge difficult but not impossible
	5,503	54	A	RF	20	11 US	5,503				56	Campground RB
	5,663											LWD
	5,708					12						Photo typical of stream/cascades
	5,920											4' falls possible barrier at current flow, passable at higher flow
	6,203											RBT
	6,510	55	A	RF	20		6,510					bdrk/bldr dominant
	6,840	56										Trail x-ing
	7,159	57										Trail x-ing
	7,243											possible barrier at current flow
	7,453											possible barrier at current flow
	7,476	58	A	RF	20						56	Trail x-ing. 2RBT ~6-7"
	7,578											1 RBT 7-8"
	7,926											1 RBT ~7"
	7,953	59										Trail x-ing
	8,158		A	RF	30		8,518				57	RBT throughout; Trail x-ing
	8,655	60						40	50-75	50-75		lots of fines
	8,940											LWD
	9,230	61	A	RF	25		9,230					
	9,300											RBT
	9,473	62	A	RF								barrier
	9,574											cascade currently impassable
	9,860					21						9860-9881 cascade probable barrier
	9,891	63	A	RF	25		9,891				57	barrier
unnamed trib	start at confluence w Up NF Matilija, 3/10/03, Scott Riley, Est. flow=1.5cfs											
to Up NF	0	92	B	RF	15-20	17 US					55	
	94											fish in pool. LWD.
	235											small patches of small gravel, lots of fines.
	271	93	B	RF	20							Trail x-ing
	770											LWD
	1,012	94	B	RF	20		1,012					small patches of gravel throughout. ~4 fish observed.
	1,067							20	25-50	25-50		gravel small
	1,112											lots of bdrk
	1,448											cascade/falls; passable at higher flows

Appendix B. (continued)

Stream	Hipchain Distance	Way Pt Label	Channel Type[1]	Riparian Type[2]	Avg Unit Length	Photo #	Flag Label	Spawning Areas Area	Spawning Areas %Fine	Spawning Areas %Embed	Water Temp °F	Comments (barriers, fish, springs, LWD, misc. notes)
unnamed trib	1,462							24	25-50	25-50		
to Up NF	1,592							28	25-50	25-50		
	1,736											LWD
	1,770	95	B	AS-RF								much less canopy
	1,911											5' falls, barrier at present flow
												possible high flow channel on left
	2,034	96	B	AS-RF	20		2,034				58	fish throughout.
	3,075	97	B	RF-AS	20		3,075					More alder and shade
	3,399											Deep pool >4'
	3,809							21	25-50	25-50		small gravel tallus from shale wall LB
	3,858							21	25-50	25-50		most just OW
	4,143	98	B	RF	20		4,143					Deep pool
	4,318	99	B	RF	20		4,318	70	25-50	25-50	58	Barrier; large pile of tallus at base of falls
Old Man	start at confluence with mainstem Matilija, 3/12/03, Scott Riley, Est. flow=0-1cfs											
	0	64	A	AS		22 US						No water; difficult to determine barriers
	102	65				23,24						falls; assume passable
	806		A	AS								small falls assume passable
	901	66	B-A	AS			a few small patches					trail X-ing; substrate embeded and cemented.
	1,014	67										photo #1 cover
	1,345	68	A	AS/RF		2 US	1,345				55	begin wetted channel
	1,510		A-B	RF								flow< 0.5 cfs. Sulphur springs; LWD; frogs.
	1,626	69	A	AS								loose water
	1,960	70	A	AS			1,960					flow begins ~0.5 cfs
	2,714	71	B-A	RF	15-20							small patches of very cemented gravel; flow ~1cfs
	2,850							20	25-50	50-75		out of water, cemented.
	3,010	72	B	RF	15-20	3	3,010				57	downed alder
	3,215											LWD
	3,285	73										spring/seep LB
	3,472	74	B	RF/AS	20-25	4						potential barrier
	3,925											LWD
	4,084		B	RF								
	4,438	75	B-A	RF	20	6		some patches very cemented				falls/cascade passable at higher flow;
	4,688											small falls, 3.5', paassable at higher flow
	4,929											several small falls and cascades which make passage difficult, but proba
	5,089		A	RF								Cascade difficult but passable
	5,202	76	A-B	RF	20	7	5,202	small patches, cemented			60	1 RBT ~6"; Bldr dominated; some WD
	5,260							24	25-50	75-100		cemented; RBT in pool
	5,527											good small (3x5) patches of gravel
	5,530	77						20	0-25	25-50		25% Out of Water
	5,729											barrier at current flow; 5.5' jump from 2.5' deep pool; distance ~8'
	5,855	78	A-B	AS	20		5,855	96	25-50	25-50		10% OW
	5,946		A-B	RF				30	0-25	25-50		not cemented
	6,062							20	25-50	25-50		
	6,106	79	A-B	RF/AS		8	6,106					loose flow@ btm of CAS. Rattler Photo #9
	6,156							20	25-50	25-50		dry 2 patches

Appendix B. (continued)

Stream	Hipchain Distance	Way Pt Label	Channel Type[1]	Riparian Type[2]	Avg Unit Length	Photo #	Flag Label	Spawning Areas Area	Spawning Areas %Fine	Spawning Areas %Embed	Water Temp °F	Comments (barriers, fish, springs, LWD, misc. notes)
Old Man	6,185							20	25-50	25-50		
	6,266							24	25-50	0-25		most prob. OW, but w/ in bankful
	6,350	80	A-B	AS		10		20	25-50	25-50		most prob. OW, but w/ in bankful
	6,873							84	25-50	25-50		most of this patch would be wetted with most flows
												there are lots of highly perched gravel patches
	6,991	81	A-B	AS/RF			6,991				62	wetted channel returns
	7,124											barrier: jump height 4.5', dist 6'. definite barrier at current flow
	7,151	82						50	25-50	25-50		30% barely OW. Loose flow
	7,194											channel totally dry
	7,501	83										two Isolated pools wetted channel returning
	7,526							24	0-25	0-25		gravell in isolated pool; virtually 0 flow
	7,531											channel dry
	7,696											possible barrier; w/water jump may only be 3'
	8,038							80	25-50	25-50		Dry
	8,357	84	A	AS								Dry
	8,843	85										isolated pools
	8,961											some flow; very little
	9,973	86	A	AS/RF		12					57	4.5' bdrk falls barrier at current flow, flow ~ 1cfs
	10,152		A	RF								
	10,334											LWD
	10,404	87						28	25-50	50-75		string broke
	0	88	A	RF	20	13	0				58	out of string; re-zero
	790											LWD; trees growing in channel
	896	91										barrier #91bdrk falls/cascade
	971	92	A	RF								channel dry
	1,181											very dry; end survey; no fish obsereved in upper wetted section
Murietta	start at confluence with mainstem Matilija, 3/11/03, Sean Thobaben, Est. flow=0-1.5 cfs											
	0	600	B	RF		20	0				57	woody debris in tail at confluence; gage=27.25"
	161											large overhead logs
	660		B	RF/RS		21						although riparian tree species are present on banks
												the channel opens up here and has drought tolerant
												species as well. Water noticeably less
	728		B	RS/RF								60' w/ no surface flow
	791		B	RS/RF								dry channel enters on RB
	872		B	RS/RF								significant woody debris for several hundred feet
	909	601	B	RF	10	22	SCT 909				53	end surface flow
	996											channel "bone" dry.
	1376	602	B	RF			1376				53	pool (2' deep)along bdrk bank for 45'
	1488		B	RF	5							flow same as below
	1697	603	B	RF	20	23	SCT 1697	25	20	50-75		gravel in 65' pool below confluence w/ trib.
	1967		B	RF	10							trib. Is a split that reenters here, but is dry at top
	2041	604	B	RF	15	24	SCT 2041				55	at tail of pool w/ small falls
	2312		B	RF	20							3' falls, not a barrier
	2347	605	B	RF	10			30	20	25-50		gravel on LB, more available at high flow
	2725		B	RF	20							split channel w/ 5' cascade, not a barrier

Appendix B. (continued)

Stream	Hipchain Distance	Way Pt Label	Channel Type[1]	Riparian Type[2]	Avg Unit Length	Photo #	Flag Label	Spawning Areas Area	Spawning Areas %Fine	Spawning Areas %Embed	Water Temp °F	Comments (barriers, fish, springs, LWD, misc. notes)
Murietta	2785	606	B	RF	10	25						gradient steepens ahead (~4%)
	2908											grade relaxes again, split ends
	2939	607	B	RF	10	2	SCT 239				56	Trail x-ing; Trib. LB; pH~7.5
	3065											3' falls w/ log jam above, not a barrier.
	3140											trib enters on RB
	3305	608	B	RF			3305 SA	24	10	25-50		spawning gravel in pool
	3580							25	15	25-50		gravel in pool on RB below 2' falls
	4107	609	B	RF	10	3	SCT 4107				55	Lots of large bldrs and pools
	4309		B	RF				24	20	50-75		This stream does not have the mineral "cementing"
	4653	610	B	RF			SCT 4653	35	15	25-50		
	4694	611	B	RF		4	SCT 4694					4' falls possible barrier
	4731		B	RF				30	20	50-75		gravel in pool above falls
	4756											4' falls, at higher flow not a barrier.
	4967	612	B	RF	25	5,6,7	SCT 4967				54	5' falls possible barrier.
	4987											Trail x-ing just above falls
	5030							30	10	25-50		gravel in pool on LB
	5128							20	10	25-50		gravel in pool on LB
	5239							20	20	25-50		gravel in pool on LB. Blue Heron hunting
	5278							30	25	50-75		at tail of large, deep pool w/ falls above
	5332	613	B	RF	30	8,9	SCT 5332				54	7' falls- barrier
	5456											trout in pool ~ 4"
	5550							20	10	25-50		gravel in pool mid-channel
	5770							40	20	50-75		more gravel in pool. Trout 5".
	5869							80	20	50-75		most of gravel pile is in >4" of water
	5883											trib or split entering on LB
	6139	614	B	RF	15	10	SCT 6139				58	valley walls opening up, canopy opening up
	6270							80	20	25-50		good gravel pile
	6674											flow decreasing
	6987	615				11						small black bear! On RB
	7211	616	B	RF	10	12	SCT 7211				56	back in dense overhead canopy. Graedietn increasing
	7605							50	20	25-50		gravel pile at tail of deep pool
	7922	617	B	RF	20	13	SCT 7922					4' falls; possible barrier.
	7982							30	20	25-50		gravel patch in pool
	8325	618	B	RF	15		SCT 8325					out of string. End 03/11/03
	8455											sub-surface flow for 25'
	8530	620	B	RF		13	8530 dry					no more surface flow
	8968	621	B	RF		14	8968 wet				56	surface flow again
												pools have 0 flow, almost sagnant w/ algae and
												surface scum.
	9090											dry channel again
	9169											seep from RB
	9175	622	B	RF		15	9175					5' falls definite barrier at this flow. Dry channel
												above 1' deep pool from seep.
	9327											3' falls through narrow bldr slot.
	9346											pool holding water 2' deep.

Appendix B. (continued)

Stream	Hipchain Distance	Way Pt Label	Channel Type[1]	Riparian Type[2]	Avg Unit Length	Photo #	Flag Label	Spawning Areas Area	Spawning Areas %Fine	Spawning Areas %Embed	Water Temp °F	Comments (barriers, fish, springs, LWD, misc. notes)
Murietta	9380											4' falls looks passable when water is flowing
	9593											very small surface flow over bdrk.
	9645											channel dry again
	9718											3' falls through bldrs.
	9878	623										2.5' holding pool w/ water
												gradient has been steepeningand channel has
												numerous large bldrs and 2-3' falls/cascades
	10012	624	B/A	RF	15	16	CT 10012					
	10225	625	B	RF	15	17,18	CT 10225					11' falls definite barrier
Low NF	start at confluence with mainstem Matilija, 3/14/03, Scott Riley, Est. flow=3-4 cfs											
Matilija	0	101	B	RF	35	20 US					55	flags at bottom w/ orange plaque "0 +00 Hab Type
												9 Jan. 03 Matilija"
	130							24	25-50	50-75		under bridge
	231							60	25-50	0-25		deep pool
	388							45	50-75	25-50		deep pool
	465							24	25-50	25-50		small gravel
	605	102	B	RF	40			98	25-50	25-50		
	634							54	25-50	25-50		
	679											bridge 33
	998	103	B	RF-AS	40		998					Bldr & Bdrk dominant some steep sections.
	1328											Steep cascade, possible barrier at current flow;
												passable at higher flow.
	1745											Cacade, Total height 6' w/2-3 steps.
	1800							21	25-50	25-50		
	1826							20	25-50	25-50		
	1897							24	25-50	25-50		
	1923	104	B	AS-RF	35		1923	20	25-50	25-50	56	BLdr & Bdrk
	1987							70	25-50	25-50		
	2020							40	25-50	25-50		
	2189											slope decreasing
	2322											bridge
	2350							21	25-50	25-50		possible redd in small patch US
	2439											old bridge abutment
	2594							42	25-50	25-50		possible redd
	2654	106						20	0-25	0-25		probable redd
	2704											steep Bdrk LB
	3010	107	B	RF	35-40		3010	140	25-50	25-50		possible redds
	3144							20	25-50	25-50		
	3222											small patches of gravel w/ possible redds
	3244							40	25-50	25-50		
	3341											good road access
	3455											series of man made dams
	3524							91	25-50	0-25		
	3682							28	25-50	25-50		
	3771							50	0-25	0-25		continue series of dams

Appendix B. (continued)

Stream	Hipchain Distance	Way Pt Label	Channel Type[1]	Riparian Type[2]	Avg Unit Length	Photo #	Flag Label	Spawning Areas Area	Spawning Areas %Fine	Spawning Areas %Embed	Water Temp °F	Comments (barriers, fish, springs, LWD, misc. notes)
Low NF	3792							40	0-25	0-25		
Matilija	3889							30	25-50	25-50		hip chain broke; re-zero
	0		B	RF	40		0	600	25-50	25-50		Bridge and gage housing. Lost GPS.
												flag US of bridge. Several NG fish 1-2"
												throughout. Many more small patches of gravel
												3 possible redds
	225	108										gage 27 7/8". Good road access.
	560							280	25-50	50-75		some cementing.
	870											RBT ~6". ~20 NG fish
	897							24	25-50	50-75		
	993	109	B	RF	40							No flag. Private proerty sign & water tanks RB.
	1246											houses RB
	1358							60	25-50	25-50		
	1560							20	25-50	25-50		
	1674							35	25-50	50-75		
	2002	110	B	RF	30	21 up	2002				58	seems to be more cementing
	2170											LWD, alder
	2320											good pool
	2715							24	25-50	50-75		cemented
	3029	112	B	RF	30							Trib? RB. ~1 cfs
	3065						3065					flag
	3280							20	25-50	25-50		
	3310											pond turtles
	3661	113						675	25-50	25-50		2 possible redds. Some aquatic veg growing out of
												gravels. Cemented Rip-Rap LB.
	3800							390	25-50	50-75		some cementing
	3942	114	B	RF	25		3942					LWD
	4052							24	25-50	50-75		~30% OW. Some cementing. Possible redd.
	4112							30	25-50	75-100		x2. cemented
	4295							96	25-50	75-100		cemented
	4467							20	25-50	75-100		cemented
	4902											RBT 4"
	5076	115	B	RF	25		5076				61	at 1241
	5143	116										Split. LWD tree across stream
	5380	117						700	25-50	50-75		cemented
	5693							450	25-50	50-75		Some cemented. Several probable/definite redds.
	5716											deep pool
	6002							200	25-50	25-50		
	6020	118	B	RF	30		6020				61	fish, some LWD
	6188							60	25-50	50-75		culvert. Steel bank stabilization.
	6229							40	25-50	25-50		
	6279											good deep pools
	6462											Large Bldrs dominant, some Bdrk.
	6677							50	25-50	25-50		no GPS.
	6789											RBT 1 ~4-5". Lots of algae on rocks

Appendix B. (continued)

Stream	Hipchain Distance	Way Pt Label	Channel Type[1]	Riparian Type[2]	Avg Unit Length	Photo #	Flag Label	Spawning Areas Area	Spawning Areas %Fine	Spawning Areas %Embed	Water Temp °F	Comments (barriers, fish, springs, LWD, misc. notes)
Low NF	6892							24	25-50	25-50		Deep pool
Matilija	7055	119	B	RF	25		7055				60	Bdrk &Bldr. Steeper.
	7232							45	25-50	25-50		Definite redd. 1 RBT ~7-8" seen on redd. Bridge no GPS
	7289											dry trib RB. Private property LB
	7435							72	0-25	0-25		
	7494											dammed pool w/ slide RB.
	7514							28	0-25	0-25		
	7827							70	25-50	50-75		Cemented. Concrete shelf RB. Big hse LB
	8010	120	B	RF	25		8010	60				1 RBT ~5".
	8135							40	25-50	25-50		
	8272	121						24	25-50	25-50		definite redd
	8333							150	25-50	25-50		bridge x-ing. Most large gravel.
	8576	122	B	RF	25			108	25-50	25-50		definite redds. 2-3 RBT in pool.
												warm (85oF) water coming out of culvert LB. Prob
												from Wheeler springs. <1cfs.
												Temp. below sprg. 59; above 58.
	8589	123										end. SCT 0.0
	start at Wheeler Springs Spa, 3/14/03, Sean Thobaben, Est. Flow=3 cfs											
	0	700	B	RF		12	SCT 0.0				55	log across channel; culvert on RB.
	26											house LB
	208							24	20	25-50		gravel in run.
	240											trout ~ 3"
	332											several hundred foot cement wall on RB
	520							36	15	50-75		lightly cemented gravel.
	697											overhead bridge. Good size gravel bed under bridge
												but only 0-3" submerged.
	900											Sulphur springs in stream for last 100'
	1020											possible redds.
	1161											Highway 33 overpass.
	1319											lots of gravel through this section but not meeting
												6" depth requirement.
	1352	701	B	RF	50	13	SCT 1352	20	10	50-75	54	trib enters from LB, good gravel at confluence.
	1780							50	15	50-75		on LB
	1797							many areas	25	50-75		long pool behind hand built dam has lots of gravel.
	1902											end of pool
	2008	702	B	RF	20		SCT 2008				54	Road on left
	2401							48	20	>75		woody debris forms partial dam. Cemented gravel
												above dam.
	2618							24	15	50-75		gravel on RB.
	2730											3' falls formed by rip-rap and logs.
	2785											cement retaining wall LB.
	3113	703	B	RF	40		SCT 3113	40	20	>75		highly cemented gravel. Entering steep Bdrk canyon
	3283							80	15	>75		Highly cemented gravels; Cant break up with boot.
	3379											5' bdrk falls.
	3466							21	20	50-75		in bedrock pool.

Appendix B. (continued)

Stream	Hipchain Distance	Way Pt Label	Channel Type[1]	Riparian Type[2]	Avg Unit Length	Photo #	Flag Label	Spawning Areas Area	%Fine	%Embed	Water Temp °F	Comments (barriers, fish, springs, LWD, misc. notes)
Low NF	3702											3' falls
Matilija	3797											trib entering on RB.
	4017	704	B	RF	40		SCT 4017				55	out of canyon.
	4833											5' bldr falls.
	5040	705	B	RF	40		SCT 5040	100+	20	50-75	54	lots of gavel @ min depth. More avail at higher flow
	5239											"bridge construction ahead sign"
	5421											logs across channel
	6016	706	B	RF	40		SCT 6016				54	no change in channel or veg for some time
	6105											camp on LB; good rad access
	6343											substrate sharp, angular slate fragments.
	6383											several trout in pool.
	6477											entering bdrk canyon.
	6584											Hwy 33 overpass. Wheeler gorge.
	7092	707	B/A	RF	30	14	SCT 7092				56	Bdrk is dominant substrate.
	7446											hand built 2' tall rock dam forming long pool entering
												wheeler gorge, lots of gravel.
	7530		B/A	RF				65	10	25-50		in mouth of gorge
	7659		A	RF		15						channel highly confined,cascades and runs.
	7682											hwy 33 overpass between tunnels.
	7792							20	10	25-50		in tail of pluge pool
	7870											several RBT (3-5")
	8025								15	25-50		channel full of gravel for ~150'
	8157	N/A	A/B	RF	30		SCT 8157				58	Hwy 33 overpass
	8257											lots of piled up woody debris
	8320											Bdrk substrate for 150'
	8637							25	10	25-50		leaving wheeler gorge
	8836	708	B	RF				60	10	0-25		good gravel w/ twice as much area on exposed
												gravel bar 4-5" OW.
	8887											8-10 RBT 5-6"
	9088	709	B	RF	25	16	SCT 9088				58	overall this section of the N. fork has much more
												gravel than the mainstem and its upper tribs.
	9200											pool w/trout
	9230											bridge (wheeler campground)
	9539							25	20	25-50		another gravel bed 20+ just above.
	9705							20	10	25-50		several spawning beds in this pool
	9945											3' bedrock poorover
	10015	710	B	RF	15	17,18	SCT 10015				57	barrier. Wheeler CG road x-ing.
	10816							20	10	25-50		hand built rock dam. Gravell in pool above.
	11014	711	B	RF	25		SCT 11014				58	boulder cascade
	11110							30	10	25-50		good gravel but 4" deep at this flow
	11422											6 5-7" RBT in pool
	11884											long pool formed by rock dam
	12120	712	B	RF	15	19,20	SCT 12120				59	road crosses creek (upper wheeler CG) forms 5'
												cascade then 20' wide sheet flow, not a barrier
												but could be improved for fish x-ing. Big gravel pile

Appendix B. (continued)

Stream	Hipchain Distance	Way Pt Label	Channel Type[1]	Riparian Type[2]	Avg Unit Length	Photo #	Flag Label	Spawning Areas Area	%Fine	%Embed	Water Temp °F	Comments (barriers, fish, springs, LWD, misc. notes)
Low NF												up on upstream side of road x-ing.
Matilija	12469											long shallow pool.
	12956											3' falls into deep plunge pool.
	13100											Cannon cr. Enters on LB (59oF), Hwy 33 bridge
												crosses over N.F. Wheeler gorge traill head on RB.
												Good access from road.
	13255		B	RF	15						58	channel splits up and goes through several bldr falls
												(up to 6' high) not a barrier.
	13340											4' falls into plunge pool.
	13500											woody debris dam w/ small pool above
	13668		A/B									Bdrk domnates substrate.
	13910		B	RF								out of bdrk.
	14018	N/A	B	RF	15		SCT 14018				58	channel confined in steep canyon walls w/ off and
												on Bdrk substrate. Hyla.
	14058											4' bdrk falls. Noticeably less water flow in stream
												More Hyla.
	14169											out of narrow bdrk canyon.
	14260	714										GPS signal returns. Hyla.
	14547	715	B	RF			SCT 14547					End. Stream flow really petering out. Getting very
												dense w/ brush in channel.
	start at end of above, 4/13/03 (one month later), Scott Riley and Sean Thobaben, Est. flow=1.5 cfs											
	0		B	RS								thick brush
	362		B	RS	20			20	25-50	25-50		
	552	716	B	RS	15							split
	890											trib. Approximate distance
	1021	717	B	RS	15							
	1400							35	25-50	25-50		
	1829											split
	2053	718	B	RF	15							
	2520		B	RS	15							opens up
	3013	719	B	RS	15		3013					
	3535		B	RS	15			20	25-50	25-50		some cementing
	3636		B	RF	15							
		720	B	RF	15							Heavy cementing. Most distances from this point on
												are illegible due to wet weather.
												log jam
			B	RF	15			28	25-50	0-25		4' falls
		721				27						probable barrier
												RBT ~ 4"
	5012	722	B/A	RF	15	28	5012					probable barrier
												~ 4' drop
			A	RF	15							bedrock chute
			A									flow decreasing, lots of boulders
			B	RF				18	25-50	0-25		
	5842			RS/RF	20							more open

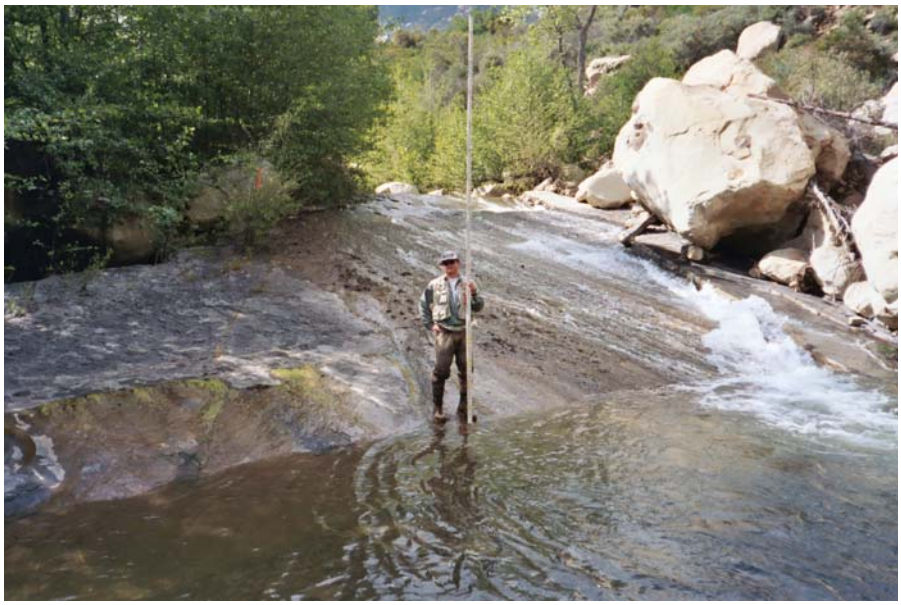
Appendix B. (continued)

Stream	Hipchain Distance	Way Pt Label	Channel Type[1]	Riparian Type[2]	Avg Unit Length	Photo #	Flag Label	Spawning Areas Area	Spawning Areas %Fine	Spawning Areas %Embed	Water Temp °F	Comments (barriers, fish, springs, LWD, misc. notes)
Low NF												LWD, old log
Matilija	6039	723	B	RS	15							
			B	RF	15			24	25-50	0-25		
			B	RS								
		724										Dry
		725										flow returns
			B/A		20			36	25-50	25-50		falls, passable
	7586											falls 5.5' high w/ poor landing area. Jump pool ~3.6' deep.
	8017		A/B	RF	20		8017					10' jump diatance. Prob. Passable at higher flow.
	8336											good pool. 4.6' deep
	8470											good pool. 3.6' deep
	8704	726										out of string; WP 30' out of stream.
		727	B	RS								
	~10,288	728	B	RS								end. Weather very poor. Dense brush. Dist est on map w WP

Appendix C. Photographs of all possible barriers identified during the first-stage survey. Photos are labeled by the waypoint numbers. See Figures 3 and 6 for locations and Table 2 for barrier descriptions. All photos taken during March survey unless otherwise noted.

Barrier "steepchut" in mainstem Matilija Creek. Visible portion of stadia rod is approximately 8 ft long. See Figure 3 for location and Table 2 for barrier details.

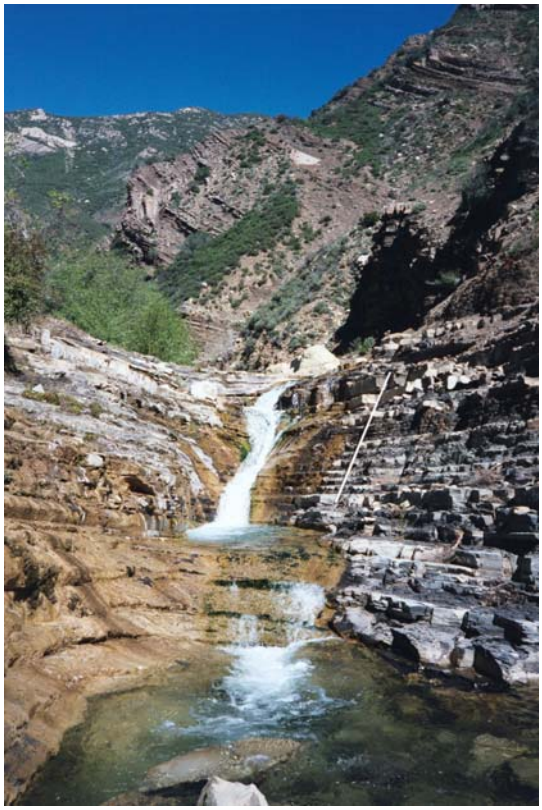
Barrier "steepchut" in mainstem Matilija Creek. See Figure 3 for location and Table 2 for barrier details.



Barrier #544 in mainstem Matilija Creek, April survey. Visible portion of stadia rod is approximately 14 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #544 in mainstem Matilija Creek, April survey. Visible portion of stadia rod is approximately 14 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #550 in mainstem Matilija Creek. See Figure 3 for location and Table 2 for barrier details.



Barrier #550 in mainstem Matilija Creek. Visible portion of stadia rod is approximately 14 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #550 in mainstem Matilija Creek. Visible portion of stadia rod is approximately 14 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #550 in mainstem Matilija Creek. Visible portion of stadia rod is approximately 11 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #552 in mainstem Matilija Creek. Visible portion of stadia rod is approximately 14 ft long. See Figure 3 for location and Table 2 for barrier details.

"Falls" barrier in mainstem Matilija Creek. See Figure 3 for location and Table 2 for barrier details.

"Falls" barrier in mainstem Matilija Creek. See Figure 3 for location and Table 2 for barrier details.

"Falls" barrier in mainstem Matilija Creek. Visible portion of stadia rod (1/2 way up right edge of second falls) is approximately 14 ft long. See Figure 3 for location and Table 2 for barrier details.

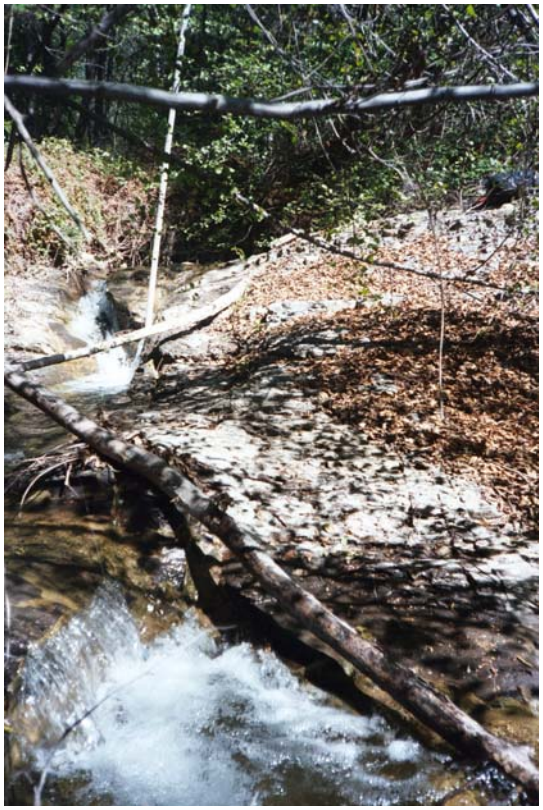
Barrier #45 in Upper North Fork Matilija Creek, April survey. Visible portion of stadia rod is approximately 10 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #45 in Upper North Fork Matilija Creek, April survey. Visible portion of stadia rod is approximately 14 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #49 (right side) in Upper North Fork Matilija Creek. Visible portion of stadia rod is approximately 12 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #49 (right side) in Upper North Fork Matilija Creek. Visible portion of stadia rod is approximately 7 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #49 (right side) in Upper North Fork Matilija Creek. Visible portion of stadia rod is approximately 10 ft long. See Figure 3 for location and Table 2 for barrier details.



Barrier #49 (left side) in Upper North Fork Matilija Creek. Visible portion of stadia rod is approximately 13 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #49 (left side) in Upper North Fork Matilija Creek. Visible portion of stadia rod is approximately 7 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #51 in Upper North Fork Matilija Creek. Visible portion of stadia rod is approximately 8 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #51 in Upper North Fork Matilija Creek. Visible portion of stadia rod is approximately 8 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #51 in Upper North Fork Matilija Creek. Visible portion of stadia rod is approximately 11 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #51 in Upper North Fork Matilija Creek, April survey. Visible portion of stadia rod is approximately 14 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #62 in Upper North Fork Matilija Creek. Visible portion of stadia rod is approximately 11 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #62 in Upper North Fork Matilija Creek. Visible portion of stadia rod is approximately 7 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #62 in Upper North Fork Matilija Creek. Visible portion of stadia rod is approximately 3.5 ft long. See Figure 3 for location and Table 2 for barrier details.

Cascade immediately above barrier #62 in Upper North Fork Matilija Creek. Visible portion of stadia rod is approximately 5 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #63 in Upper North Fork Matilija Creek. Visible portion of stadia rod is approximately 13 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #63 in Upper North Fork Matilija Creek. Visible portion of stadia rod is approximately 12 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #63 in Upper North Fork Matilija Creek. See Figure 3 for location and Table 2 for barrier details.

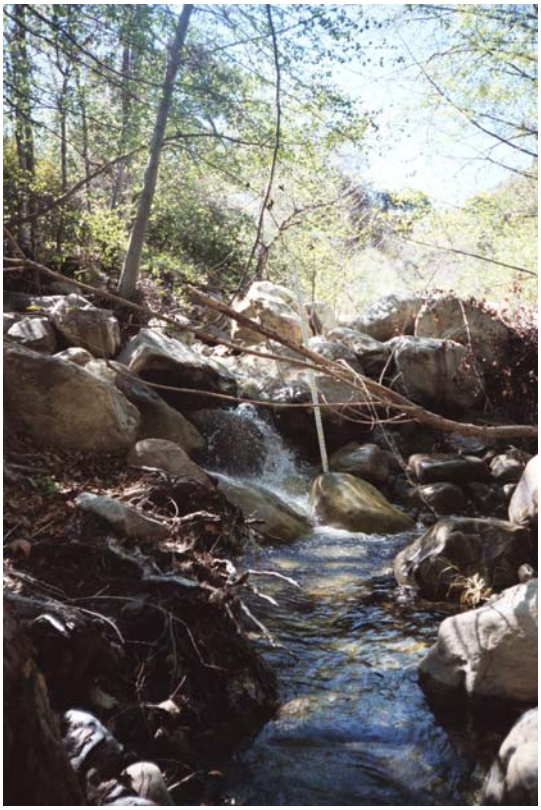
Cascade immediately below barrier #63 in Upper North Fork Matilija Creek. Visible portion of stadia rod is approximately 9 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #100 on unnamed tributary to the Upper North Fork Matilija Creek. Visible portion of stadia rod is approximately 13 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #100 on unnamed tributary to the Upper North Fork Matilija Creek. Visible portion of stadia rod is approximately 14 ft long. See Figure 3 for location and Table 2 for barrier details.

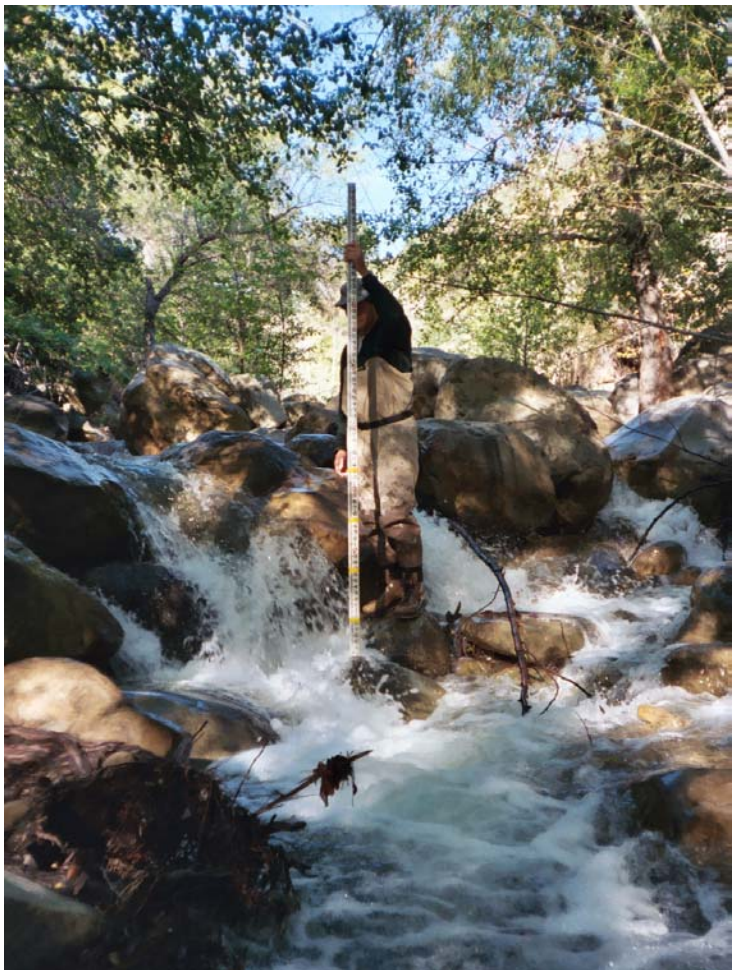
Top end of barrier #100 on unnamed tributary to the Upper North Fork Matilija Creek. Visible portion of stadia rod is approximately 14 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #611 in Murietta Creek. Visible portion of stadia rod is approximately 6.5 ft long. See Figure 3 for location and Table 2 for barrier details.



Barrier #612 in Murietta Creek. Visible portion of stadia rod is approximately 8 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #612 in Murietta Creek. Visible portion of stadia rod is approximately 7 ft long. See Figure 3 for location and Table 2 for barrier details.



Barrier #612 in Murietta Creek, April survey. Visible portion of stadia rod is approximately 8 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #613 in Murietta Creek. Visible portion of stadia rod is approximately 10 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #613 in Murietta Creek, April survey. Visible portion of stadia rod is approximately 9 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #617 in Murietta Creek. Visible portion of stadia rod is approximately 5 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #622 in Murietta Creek. Visible portion of stadia rod is approximately 7 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #625 in Murietta Creek. Visible portion of stadia rod is approximately 11 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #625 in Murietta Creek, April survey. Visible portion of stadia rod is approximately 10 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #65 in Old Man Creek. Visible portion of stadia rod is approximately 11 ft long. See Figure 3 for location and Table 2 for barrier details.

Side channel around barrier #65 in Old Man Creek. Visible portion of stadia rod is approximately 9 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #74 in Old Man Creek. Visible portion of stadia rod is approximately 9 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #74 in Old Man Creek. Visible portion of stadia rod is approximately 9 ft long. See Figure 3 for location and Table 2 for barrier details.

Side channel around barrier #74 in Old Man Creek. See Figure 3 for location and Table 2 for barrier details.

Barrier #91 in Old Man Creek. Visible portion of stadia rod is approximately 9 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #91 in Old Man Creek. Visible portion of stadia rod is approximately 11 ft long. See Figure 3 for location and Table 2 for barrier details.

Barrier #91 in Old Man Creek. See Figure 3 for location and Table 2 for barrier details.

Barrier #710 in Lower North Fork. See Figure 6 for location and Table 2 for barrier details.

Barrier #710 in Lower North Fork during 15 March storm event. See Figure 6 for location and Table 2 for barrier details.

Barrier #721 on Lower North Fork, April survey. Visible portion of stadia rod is approximately 8 ft long. See Figure 6 for location and Table 2 for barrier details.

Barrier #722 on Lower North Fork, April survey. Visible portion of stadia rod is approximately 7 ft long. See Figure 6 for location and Table 2 for barrier details.