

Steelhead Presence/Absence Survey Summary

Arroyo Corte Madera Del Presidio & Old Mill Creeks

Prepared for
Mill Valley StreamKeepers



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Objective

The objective of this project was to conduct a presence/absence survey in order to confirm the current presence and distribution of steelhead (*Oncorhynchus mykiss*), a federally listed threatened species, inhabiting selected pools in Arroyo Corte Madera del Presidio Watershed in Mill Valley, CA. This survey differs from other protocols that seek to obtain information such as watershed-wide population estimates, comparisons between reaches, and relative abundance of a certain species. Answering questions such as those would require a level of monitoring that was not possible given time, staff, and funding constraints. Therefore, it was decided that a basic, presence/absence survey of selected pools in the ACM watershed would suffice for the goal of the project. Therefore, the data derived from this survey were not collected with the intention of conducting population estimates and extrapolations and should not be treated as such.

Methods

The protocol carried out for this survey was relatively basic and followed a loose format. Pools were selected based on accessibility, clarity, and habitat suitability for steelhead. The survey began on Arroyo Corte Madera del Presidio Creek (ACM) in the town of Mill Valley, CA behind a shopping center at a bridge culvert under La Goma Street. The survey progressed upstream to the confluence of ACM and Old Mill Creek. Past this point, the survey progressed along Old Mill Creek into Cascade Canyon. Upon completing snorkel counts in several pools on Old Mill Creek, two pools on ACM, upstream of the confluence, into Blithedale Canyon were surveyed (Table 1). Survey locations can also be viewed on an interactive GoogleTM map that was created explicitly for this project and can be accessed at: <http://maps.google.com/maps/ms?hl=en&gl=us&ie=UTF8&msa=0&msid=113726441880982762351.000494e256f26382ff134&ll=37.906723,-122.551095&spn=0.024244,0.038581&z=15>. The number of pools surveyed was based on time constraints; one eight hour day was allotted for this survey therefore the number of pools chosen fell within that limitation.

Each pool was snorkeled with one pass. During each snorkel pass, the diver estimated the water visibility in tenths of meters. Visibility is estimated to provide an evaluation of water clarity and how close the diver needs to be from a fish before the species can be definitively determined. The diver started at the downstream end of each pool and slowly moved upstream, counting fish and distinguishing among species along the way. The number of steelhead present as well as the estimated size range (fork length in 10 mm increments) was recorded. Steelhead were classified as either young-of-year or 1+ to demonstrate whether more than one age class of steelhead was present in each surveyed pool. Non-salmonid species were also noted as either present or not present. Prior to each dive, a photograph and GPS coordinates of each pool was taken (Figure 1). After each pass, the diver estimated the dimensions (in meters) of the surveyed pool and recorded these numbers along with approximate address or location.

Table 1. Arroyo Corte Madera del Presidio Creek and Old Mill Creek snorkel survey locations descriptions.

Pool Number	Location Description	GPS Coordinates
1	La Goma St., Mill Valley, CA - upstream of bridge	37.89812 N 122.5364 W
2	Locust Ave. bridge	37.89877 N 122.5369 W
3	Park Ave. bridge	37.90213 N 122.5406 W
4	40 m downstream of ACM & Old Mill Creek confluence	37.90487 N 122.5466 W
5	Confluence of ACM & Old Mill Creeks	37.9051 N 122.5469 W
6	84 Cascade Dr. (Old Mill Cr.)	37.90603 N 122.5554 W
7	135 Cascade Dr. (Old Mill Cr.)	37.90648 N 122.5569 W
8	10 upstream of 135 Cascade Dr. (Old Mill Cr.)	37.90658 N 122.557 W
9	145 Cascade Dr. (Old Mill Cr.)	37.90663 N 122.5572 W
10	Three Wells (Old Mill Cr.)	37.91135 N 122.5626 W
11	116 W. Blithedale Ave., Mill Valley (ACM)	37.90994 N 122.54888 W
12	~20 m upstream of Pool 11, downstream end of culvert, W. Blithedale Ave. (ACM)	37.91003 N 122.54890 W

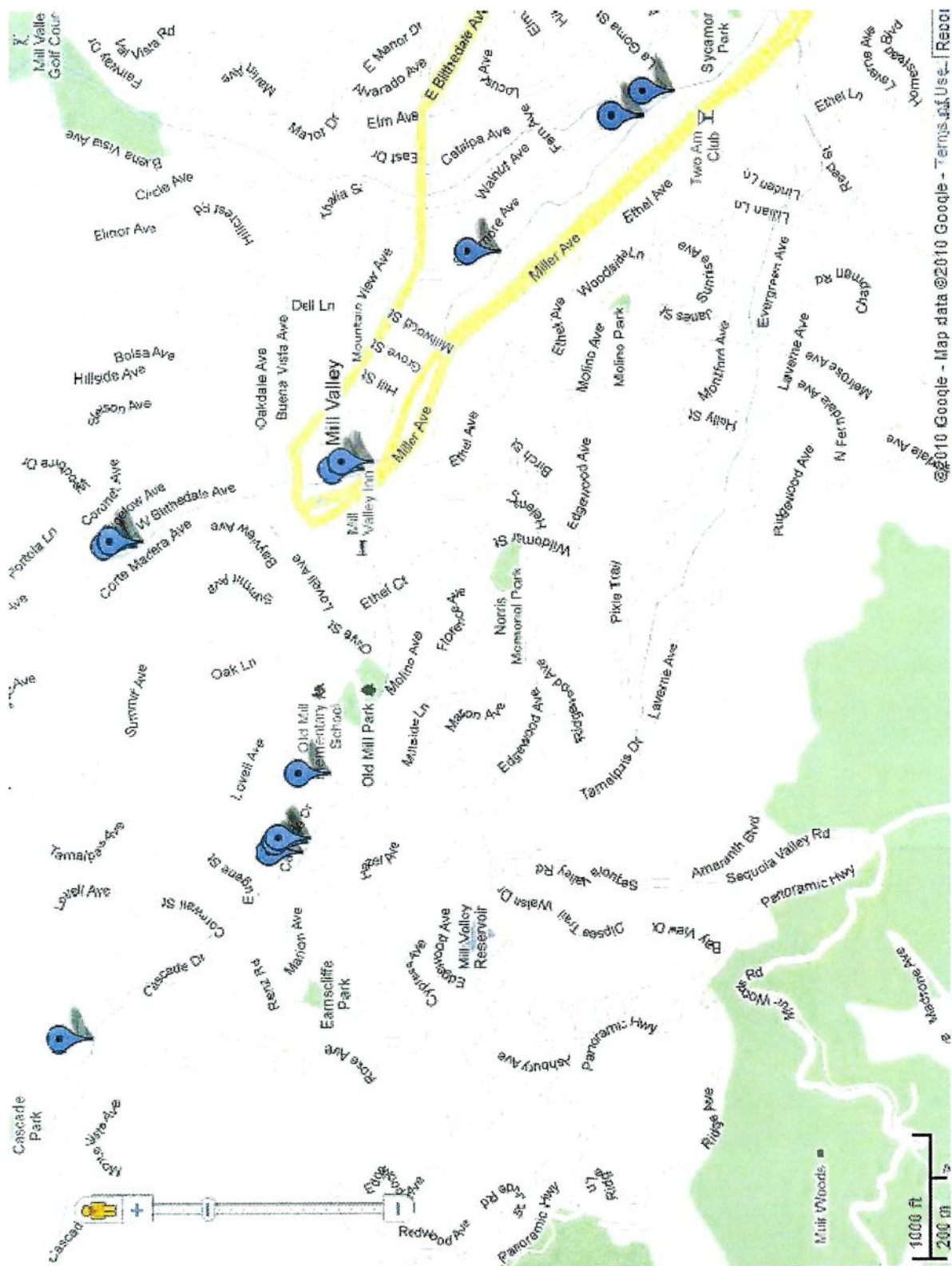
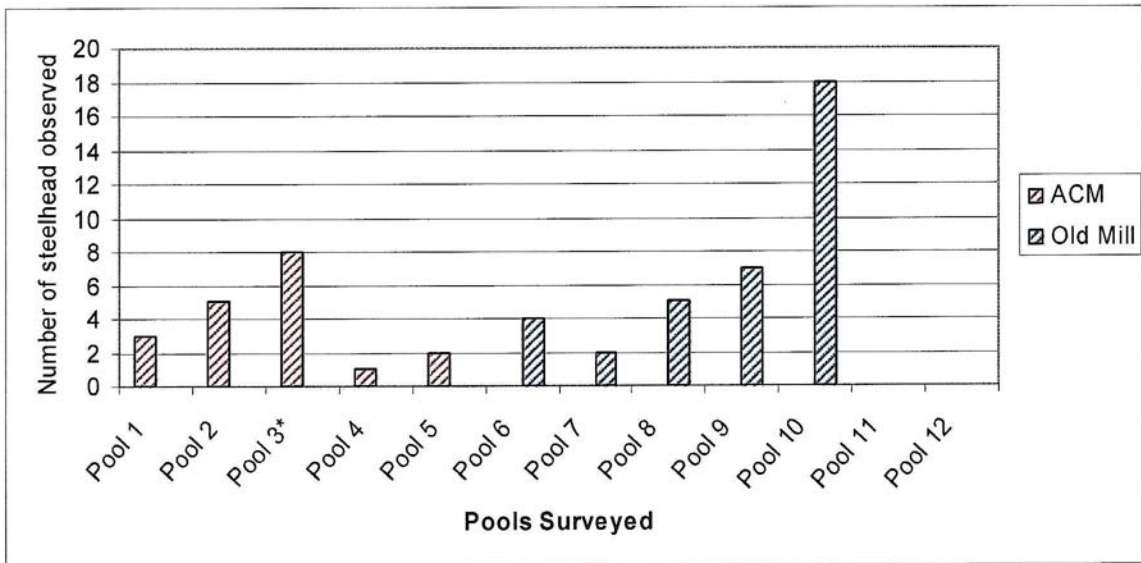


Figure 1. Google map of Arroyo Corte Madera del Presidio Creek and Old Mill Creek snorkel survey locations.

Results

Throughout this survey, a total of 12 pools were snorkeled. Out of the 12 surveyed pools, 10 contained steelhead. A total of 55 steelhead were observed in these 10 pools. No steelhead were observed in pools 11-12 (Figure 2). The most steelhead observed in any one pool was 18 in Pool 10, the Three Wells area of Old Mill Creek in Cascade Canyon.



*Steelhead in Pool 3 observed prior to survey, before river otter disturbance.

Figure 2. Number of steelhead observed in each surveyed pool. Steelhead from Arroyo Corte Madera del Presidio Creek pools are represented in red and steelhead from Old Mill Creek pools are represented in blue.

Fork lengths of steelhead were visually estimated in 10 mm increments. Steelhead with an estimated fork length of <100 mm were determined to be young-of-year, that is, fish that emerged this year. Steelhead with a total estimated length of >100 mm were determined to be greater than one year old or 1+, and could be anywhere from 2-4 years old. ACM pools contained 19 1+ steelhead and zero young-of-year. In contrast, Old Mill Creek pools contained 23 young-of-year and 13 1+ steelhead. Figure 3 illustrates the percent frequency of size distribution among all steelhead observed, distinguished by each creek surveyed. Multiple peaks in this figure represent multiple age classes. In ACM pools, the greatest frequency of steelhead was observed in the 151-160 mm range, 18% of total steelhead observed. In Old Mill Creek pools, the greatest frequency of steelhead was in the 91-100 mm range, 27% of total steelhead observed.

Average visibility for all pools surveyed was a less than ideal 0.35 m (1.15 ft); the maximum distance the diver could be from a fish before the species could be identified. Mean visibility in ACM pools was 0.33 m (1.08 ft), and mean visibility in Old Mill pools was 0.37 m (1.21 ft).

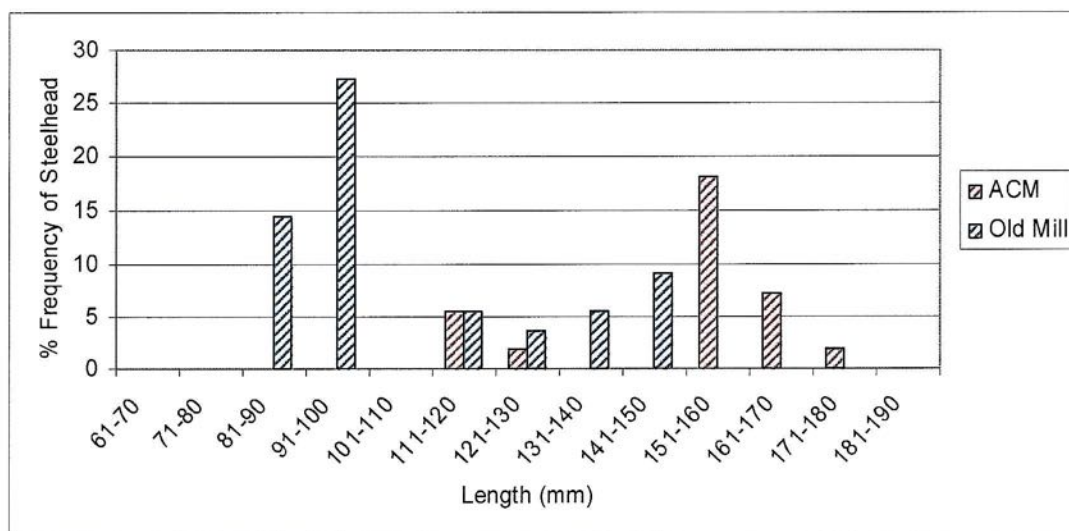


Figure 3. Percent frequency size distribution of steelhead in 10 mm bins. Arroyo Corte Madera del Presidio Creek pools are represented in red and Old Mill Creek pools are represented in blue.

To demonstrate relative size and available potential habitat for steelhead, estimations of length and average width for all surveyed pools were recorded. A summary of surface area calculations and number of fish observed in each pool is shown in Table 2.

Table 2. Summary of pool surface area calculations and number of fish observed per pool.

Location	Pool Number	Pool Area (m ²)	# of Steelhead Observed
ACM	1	135	3
ACM	2	91	5
ACM	3	195	8 ^a
ACM	4	81	1
ACM	5	100	2
Old Mill	6	36	4
Old Mill	7	8	2
Old Mill	8	24	5
Old Mill	9	48	7
Old Mill	10	45	18
ACM (Blithedale Canyon)	11	20	0
ACM (Blithedale Canyon)	12	36	0

^a This number is an average derived from the range of steelhead (6-10) observed just prior to river otters entering the pool. The diver subsequently did not observe any steelhead while snorkeling post-disturbance.

Presence of non-salmonid species was also noted throughout this survey. The following species observed were: California roach, threespine stickleback, crayfish, and North American river otter. The most commonly encountered species was California roach. The summary of these observations is shown in Table 3.

Table 3. Summary of non-salmonid species observed in surveyed pools.

Pool Number	Non-Salmonid Species			
	California Roach	Threespine Stickleback	Crayfish	North American River Otter
1	Present	Present		
2	Present	Present		
3	Present	Present		Present
4	Present			
5				
6				
7			Present	
8			Present	
9				
10			Present	
11			Present	
12			Present	

Conclusion

From these data, it can be noted that out of all the surveyed pools, those within Old Mill Creek contained more steelhead in the smaller, younger age classes. Surveyed pools in mainstem ACM contained much larger steelhead that likely fall in the 2-4 year old range. This may be a result of the larger pools that are on lower ACM and therefore the greater availability of space for these larger fish, which tend to be more solitary compared to their younger counterparts. Pool 10 in the Three Wells area of Old Mill Creek appears to support the greatest number of steelhead out of all the pools surveyed. This greater number of steelhead coincides with the observation that this portion of the watershed seems to be the least impacted by residential and commercial development and reflects more of a natural, unimpaired system. There also seems to be a distinction in the distribution of non-salmonid species between ACM and Old Mill Creeks, with California roach, and threespine stickleback preferring the lower reaches of mainstem ACM and crayfish predominantly present in the upper reaches of ACM and Old Mill.

Discussion

A few potential sources of error should be kept in mind when looking at these data. First, mean visibility for all pools surveyed was mediocre at 0.34 m. Second, the first five snorkeled pools on ACM not only had decreased visibility compared to pools snorkeled on Old Mill but were also 2-3 times larger than any of the Old Mill Creek survey pools. The much larger pools coupled with decreased visibility diminished the ability of the diver to accurately account for all steelhead present, therefore, the number of steelhead identified in the first five snorkeled pools on ACM were most likely underestimated. Pool 3 in particular, below the Park Avenue bridge, contains the largest source of uncertainty in terms of accurate accounting for steelhead. Prior to

diving this pool, 6-10 large (150-170 mm) 1+ steelhead were spotted from the bridge. Just before entering the water, three river otters were spotted swimming into the pool thereby startling the fish and stirring up sediment. The pool was snorkeled 30 minutes later and not only had visibility been altered but the large size of the pool (195 m²), resulted in no steelhead observations from the diver.

Pools 11-12 in the upper reaches of ACM in Blithedale Canyon, near 116 W. Blithedale Ave., did not contain any steelhead. This finding is consistent with the presence of concrete fish passage barriers on this section of the stream. It is surmised that unless flows are high enough for adult fish to jump these barriers in the winter, steelhead juveniles in particular do not have access to stream habitat beyond these barriers.