

Final Report
Summer Steelhead Survey, 2007 Season
Mattole River Watershed

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Introduction

The 12th annual Summer Steelhead Dive surveys were conducted in the Mattole Watershed (Figure 1) on July 13-14, 2007. Additional Summer Steelhead snorkel surveys were conducted on July 23, July 27, and August 27-28, 2007.

The purpose of the summer steelhead survey was to enumerate summer-run adult steelhead and “half-pounders” holding in the Mattole River during the summer months and identify their preferred habitat in the mainstem Mattole River and the lower sections of two major tributaries, Bear Creek and Honeydew Creek. In addition, locating “cold-water areas” in the survey reaches and identifying the distribution of three species of juvenile salmonids was of prime concern.

Adult Summer Steelhead enter the river in spring, before the river mouth closes for the summer. They spend the summer instream before spawning during the ensuing rainy season usually between January and March. “Half-pounders” are 99% immature male and female steelhead. “Half-pounders” enter the river in the spring, then ascend the mainstem and some large tributaries. They feed instream through the winter, after which they return to the ocean. Some “half-pounders” spend only a few months in the ocean before they return to freshwater as maturing fish (Barnhart and Gerstung 1996), while others spend 1-2 years in the ocean before returning to spawn (Busby et al. 1996). “Half-pounders” are typically steelhead between 12 and 16 inches in length without parr marks.

Forty-three surveyors, working in teams of two or more, performed direct underwater observation counts in approximately 56.4 river miles of the Mattole (59.3 accumulated miles of the mainstem were surveyed due to slight overlapping of reaches in some cases) and 6.25 miles of tributaries. In total, 65.55 miles were surveyed in 2007. The survey comprised twenty-four reaches, varying in length from 1.3 to 6.5 miles (Table 1).

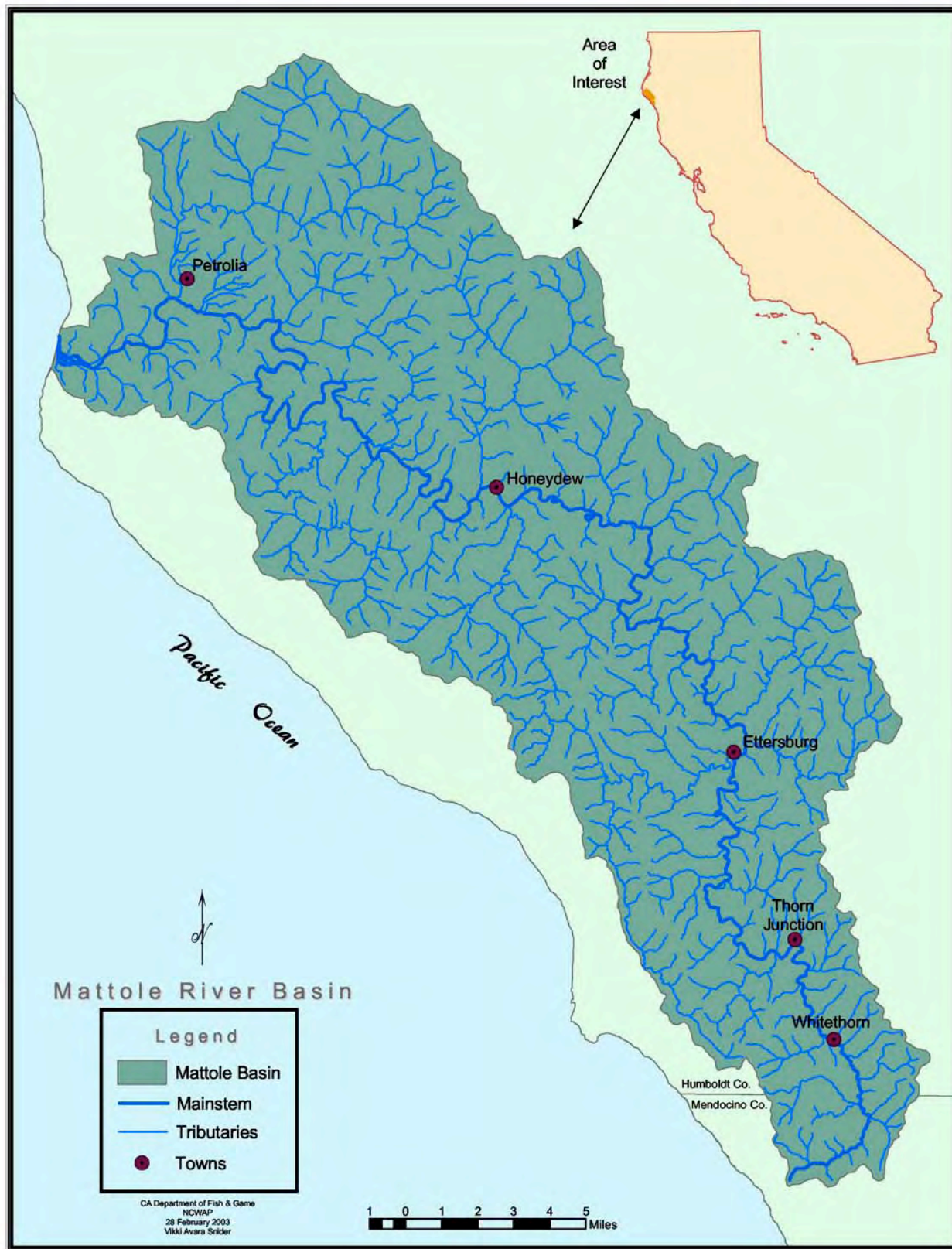
A total of 16 adult summer steelhead (>16 inches in length) and 79 half-pounders (12-16 inches in length) were counted during the 2007 surveys. Divers saw fewer adult summer steelhead in 2007 than in 2006 (19) and 2005 (20). In contrast, more “half-pounders” were observed in 2007 in comparison with 2006 (38) or 2005 (34). The number of adults observed per mile of survey effort in 2007 was the second lowest recorded over the past twelve years (0.24 adults per mile). The lowest number of adult sightings per stream mile ever recorded was in 2003 (0.19 adults per mile, Figure 4). Adult observations per mile fell noticeably in 2007 compared to the past three years (an average of 0.32 per mile in 2004-2006). Conversely, “half-pounders” observed per mile of survey effort in 2007 (1.21) was significantly higher than “half-pounders” observed per mile in 2006 (0.59), and 2005 (0.56) (Figure 4). The greatest number of adults counted was 45 in 44.9 miles surveyed (0.98 adults per mile) in 1998 (Figure 3). The maximum count for “half-pounders” was in 2000; 96 were observed in 32.7 miles surveyed (2.95 per mile; Table 2).

Juvenile steelhead were noted in all survey reaches, while juvenile coho salmon were observed in only 6 reaches (Table 3). Most juvenile coho were observed in the upper mainstem, where they were most abundant in the uppermost four reaches surveyed. Juvenile Chinook salmon were observed in four reaches in 2007, including the two uppermost reaches (2 and 19) and reach 12, in the lower mainstem (Table 3). Both coho and Chinook salmon were also observed in the Mattole Estuary. Cold areas were noted in all survey reaches (Appendix B, Table B-2). Temperatures recorded in 2007 were similar to

those recorded in 2006 and comparable to typical temperatures documented since the 2000 Summer Steelhead Dive (Appendix B, Table B-2).

This report includes information on survey reach lengths, location and personnel (Table 1), observations of steelhead greater than or equal to 12 inches in fork length (Table 3), and 1996-2007 summer steelhead counts (Table 2). In addition, the presence of all observed juvenile steelhead and coho and Chinook salmon was noted (Table 3). This report also includes discussion, habitat descriptions and future recommendations. Appendices include 1996-2007 results by reach (Appendix A) and observations of other species and temperatures recorded in the 2007 summer steelhead surveys (Appendix B) This type of information can be useful in determining the needs and habits of local riverine fauna, and establishing land-use practices that promote stewardship and conservation.

Figure 1. Mattole Watershed



Source: Downie et al. 2003

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Methods

Summer steelhead surveys were conducted in as few consecutive days as possible to ensure similar hydrologic and thermal conditions on survey days. Each reach was surveyed by a team of two or more people, at least one of which had prior experience participating in summer steelhead surveys and/or experience identifying juvenile salmonids. At least one surveyor from each team participated in an in-field juvenile salmonid identification workshop with a qualified biologist in waters bearing juvenile coho salmon and steelhead, and was oriented to field methods and protocols with the project coordinator.

Surveyors snorkeled every area of the mainstem in their assigned reach that was deep enough to snorkel. Steelhead observations were recorded by size class. Steelhead with an estimated fork length of greater than sixteen inches were designated adult summer steelhead, and those with a fork length between 12 and 16 inches were recorded as “half-pounders”. Length was the primary feature used in identifying “half-pounders;” therefore, some number of the observed “half-pounders” may have been resident rainbow trout. It is unknown whether 12”-16” steelhead seen in the Mattole are true “half-pounders;” however, the term is used hereafter in this report for this size-class of fish.

Each summer steelhead sighting was marked on a topographic map with a corresponding case number. For each individual sighted fork length was estimated and recorded, and the location and habitat in which it was sighted was described. For each “half-pounder” sighting, a fork length estimate and habitat description was recorded. Juvenile salmonids were not counted, rather noted for presence or absence, and the habitat and location in which they were observed was recorded. In a few cases where surveyors did count juvenile salmonids, that data is provided in Table 3.

Air and water temperatures were recorded at the beginning and end of each survey reach with calibrated hand-held thermometers. Temperatures were also recorded in tributaries, cold pools and seeps throughout the reach (Appendix B, Table B-2). The time of day of the temperature reading was noted. Additionally, crayfish, bullfrog, tadpole, and freshwater mussel sightings were recorded and mapped (Appendix B, Table B-1).

Results

In 2007, MSG divers observed 16 adult summer steelhead and 79 “half-pounders” in 65.55 miles surveyed (24 reaches; Table 1). Surveys occurred throughout the Mattole watershed, including the upper Mattole (river miles 57.1 to 46.0; reaches 2, 19, 24, 3, 4, 5, and 6), middle Mattole (river miles 46.0 to 27.0; reaches 20, 7, 21, 22, 8, and 23), and the lower Mattole (river miles 27.0 to the ocean; reaches 9, 10, 25, 11, 12, 13, 14, 15, 15B, and 16). In addition, surveys occurred within three tributaries: Thompson Creek [river mile (RM) 58.4, part of reach 2], Bear Creek (RM 42.8 +3.6, reach 17) and Honeydew Creek (RM 26.5 +2.5, reach 18). Eleven adult summer steelhead and 66 “half-pounders” were observed in the Mattole mainstem, while 5 adult summer steelhead and 13 “half-pounders” were observed in tributaries.

Adult summer steelhead were concentrated in the middle Mattole and lower reaches of the upper mainstem in 2007 (Figure 2). Surveyors documented 3 adult summer steelhead in the upper Mattole [reaches 19(1), 5(1) and 6(1)]. No adult summer steelhead were observed in the lower Mattole this year. The greatest number of adult summer steelhead observations (8) was in the middle Mattole

[reaches 20(1), 21 (2), 22(4), and 23 (1)]. Notably, a high number of observations of adults and “half-pounders” occurred in the two major tributaries surveyed in 2007. Five adult steelhead and six “half-pounders” were observed in Bear Creek. Surveys in Honeydew Creek documented seven “half-pounders” but no adult summer steelhead. Neither adults nor “half-pounders” were observed in Thompson Creek.

“Half-pounders” were also observed throughout the Mattole mainstem. There were more observations of this size-class of steelhead than adults, and they were more widely distributed (“half-pounders” were sighted in 20 reaches, while adults were observed in 8).

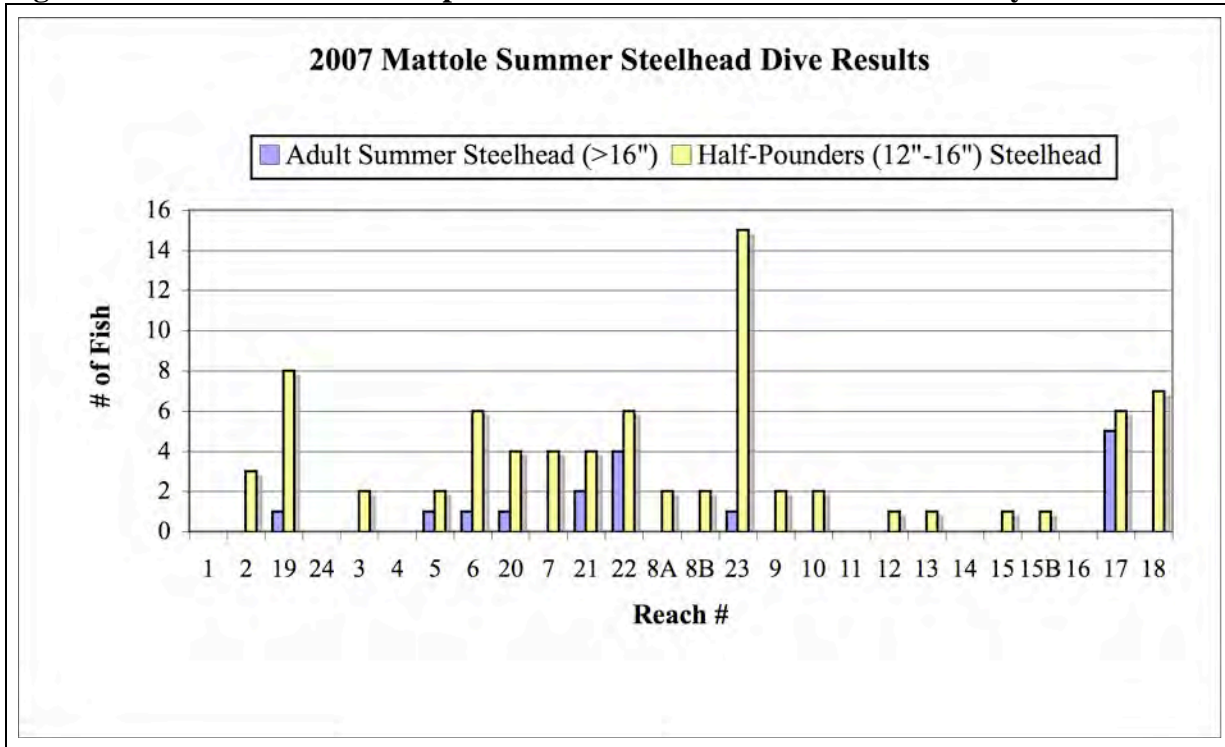
Table 1. 2007 Adult and “Half-pounder” Summer Steelhead Dive Results

Reach #	River Mile (RM) Location	Location and Reach Name	Survey Date	Personnel	Mileage	Adult Summer Steelhead (>16")	"Half-Pounders" (12"-16")
1	RM 60.4 - RM 58.8	Upper Mattole: Phillips Creek to Lost River Creek	N/A	N/A	N/A (1.6)	N/A	N/A
2	RM 58.8 - RM 57.1	Upper Mattole: Lost River Creek to Stanley Creek, including partial survey (0.15 miles) of Thompson Creek (RM 58, mouth to confluence with Yew Creek)	7/23	Maureen Roche*,	1.7 (+0.15)	0	3
19	RM 57.1 - RM 55.6	Upper Mattole: Stanley Creek to Anderson Creek	7/13	Natalie Arroyo*, Jen Hayes*	~1.5	1	8
24	RM 55.6 - RM 54.0	Upper Mattole: Anderson Creek to Van Arken Creek	7/13	Steve Gough*, Daniel Huddleston	~1.6	0	0
3	RM 52.8 - RM 51.3	Upper Mattole: McKee Creek to Crook's	7/13	Sean James*, Monica Scholey*	~1.5	0	2
4	RM ~51.3 - RM ~49.4	Upper Mattole: Crook's to Tom's Hole (Patty's)	7/13	Keytra Meyer*, Tom Rosin, Harmony Giugino	~1.9	0	0
5	RM ~49.4 - RM 47.4	Upper Mattole: Tom's Hole to Big Finley Creek	7/13	Cam Thompson*, Kenny DeLury	~2.0	1	2
6	RM 47.4 - RM ~46.0	Upper Mattole: Big Finley Creek to Schepp's	7/13	Kate Cenci*, Aaron Johnson, Will Kelly	~1.4	1	6
20	RM ~46.0 - RM 42.7	Middle Mattole: Schepp's to upstream of Bear Creek	7/14	Jill Grbavac*, Steph Cepellos	~3.3	1	4
7	RM 42.7 - RM ~ 39.9	Middle Mattole: Upstream of Bear Creek to Klossen's Hole (downstream of Mattole Canyon Creek)	7/14	Sean James*, Will Kelly	2.8	0	4
21	RM 41.1 - RM 34.6	Middle Mattole: Mattole Canyon Creek to Fourmile Creek	8/27-28	Jill Grbavac*, Kate Cenci*	6.5	2	4
22	RM 34.6 - RM 32.8	Middle Mattole: Fourmile Creek to Gilham Creek	7/13	Jamie Schnably*, Flora Brain, Nathan Queener	1.8	4	6
8A	RM 32.8 - RM 31.3	Middle Mattole: Gilham Creek to Middle Creek	7/14	Tabi Bolton*, John Isom	1.5	0	2
8B	RM 31.3 - RM 30.4	Middle Mattole:	7/27	Kate Cenci*, Dakota Rigby, Nochella	0.9	0	2

		Middle Creek to Dry Creek		Ozard			
23	RM 30.4 - RM 27.0	Middle Mattole: Dry Creek to Honeydew Slide	7/14	Tony Heacock*, Mai Kobayashi, Kate Cenci*	3.4	1	15
9	RM 27.4 - RM 24.4	Lower Mattole: Honeydew Slide to Bundle Prairie Creek	7/14	Aaron Johnson*, Monica Scholey*	3.3	0	2
10	RM 24.4 - RM 21.3	Lower Mattole: Bundle Prairie Creek to Triple Junction High School	7/14	Mike Gordon*, Ken Lindke*, Dakota Rigby, Nochella Ozard	3.1	0	2
11	RM 19.7 - RM14.9	Lower Mattole: Saunders Creek to Squaw Creek	7/14	Steve Gough*, Brian Jenke	4.8	0	0
12	RM 14.9 - RM 12.6	Lower Mattole: Squaw Creek to Lindley Bridge	7/14	Natalie Arroyo, Hilary Sgalitzer*, Andy Chitick*, Kate Proctor	2.3	0	1
13	RM 12.6 – RM 7.8	Lower Mattole: Lindley Bridge to Conklin Creek	7/14	Ken Lindke*, Tom Rosin, Nathan Queener	4.8	0	1
14	RM 7.8 – RM 5.2	Lower Mattole: Conklin Creek to Hideaway Bridge	7/14	Keytra Meyer*, Wendy Cole, Harmony Giugino	2.6	0	0
15	RM 5.2 – RM 1.3	Lower Mattole: Hideaway Bridge to Stansberry Creek	7/13	Tom Campbell*, Wendy Cole, Karissa Willits, Aerial	3.9	0	1
15B	RM 3.0 – RM 1.3	Lower Mattole: Mattole Salmon Group office to Stansberry Creek	7/14	Michael Evenson*, Nathan Scheinman	1.7	0	1
16	RM 1.3 – RM 0.0	Lower Mattole: Stansberry Creek to Ocean	7/14	Scott Silloway*, Brian Haas, Pete Tans, Katie Cowan	1.3	0	0
17	RM 42.8 + 3.6	Bear Creek (Geppert/Spence's to mouth)	7/13	Jill Grbavac*, Hillary Sgalitzer*, Katie Cowan	(+~3.6)	5	6
18	RM 26.5 + 2.5	Honeydew Creek (Maureen Catalina's to 2.5 miles upstream of Bear Wallow Slide)	7/13	Tony Heacock*, Mai Kobayashi, Steph Cepellos	(+~2.5)	0	7
		Totals			65.55 total survey miles**	16	79

Key: *denotes prior survey experience, + denotes tributary mileage, N/A=not applicable, **65.55 total survey miles includes 6.25 miles of Mattole tributaries, 59.3 total mainstem survey miles, and 56.4 mainstem river miles surveyed (due to slight overlap of reaches in a few cases).

Figure 2. Mattole Salmon Group Summer Steelhead Dive Observations by reach.



See Table 1 for 2007 reach locations. Reaches 1 through 16 are Mattole mainstem reaches, listed from the headwaters (1) to the Pacific Ocean (16); however, reach 2 contains 0.15 miles of Thompson Creek. Reaches 17 and 18 are tributaries: Bear Creek and Honeydew Creek, respectively. Letter codes refer to variations of past reaches (See Appendix A, Table A-1 and A-2, for reach locations surveyed in 1996-2007).

1996-2007

The greatest number of adult summer steelhead documented in the Mattole was 44 in 1998 (Table 2). The greatest number of “half-pounders” documented was 96 in 2000. In 2003, divers observed only 9 adult summer steelhead and 21 “half-pounders.” Adult summer steelhead observations over the past twelve years have been at a consistent low; approximately 14-20 individuals have been documented in most years of the Summer Steelhead Dive despite more miles surveyed over the past three years (Figure 3).

Steelhead observed per mile of survey effort has been the MSG’s primary means of comparing survey results from the Summer Steelhead Dive over the twelve years of surveys. In 2007, MSG divers observed approximately 0.24 adults per mile (16 adults in 65.55 miles, Table 2), slightly less than the 0.29 adults per mile seen in 2006. MSG surveyors documented 0.34 and 0.33 adults per mile in 2004 and 2005, respectively (Table 2). 2007 was the second lowest number of adults per mile recorded in the past twelve years; the minimum of 0.19 adults per mile was recorded in 2003.

Steelhead counts by MSG divers during the Summer Steelhead Dive have shown a noticeable decline in recent years. Over the past five years, MSG divers observed less steelhead per mile (both adults and “half-pounders”) than in the seven years prior (Figure 4). From 1996-2002, the average numbers of adults observed per mile was 0.56; in comparison, an average of 0.28 adults per mile were seen during the 2003-2007 survey years. “Half-pounder” sightings per mile have shown an even more severe

decline; an average of 1.57 “half-pounders” per mile were seen in 1996-2002, while an average of 0.75 “half-pounder” sightings per mile occurred in 2003-2007. However, 2007 observations did not follow the declining trend. Notably, in 2007 surveyors observed the greatest number of “half-pounders” per mile (1.21) since the maximum in 2000.

Figure 3. Mattole Salmon Group Summer Steelhead Dive Counts. Direct dive observation of adult steelhead (>16”), "half-pounders" (12"-16”) and miles surveyed in the summer months, 1996-2007.

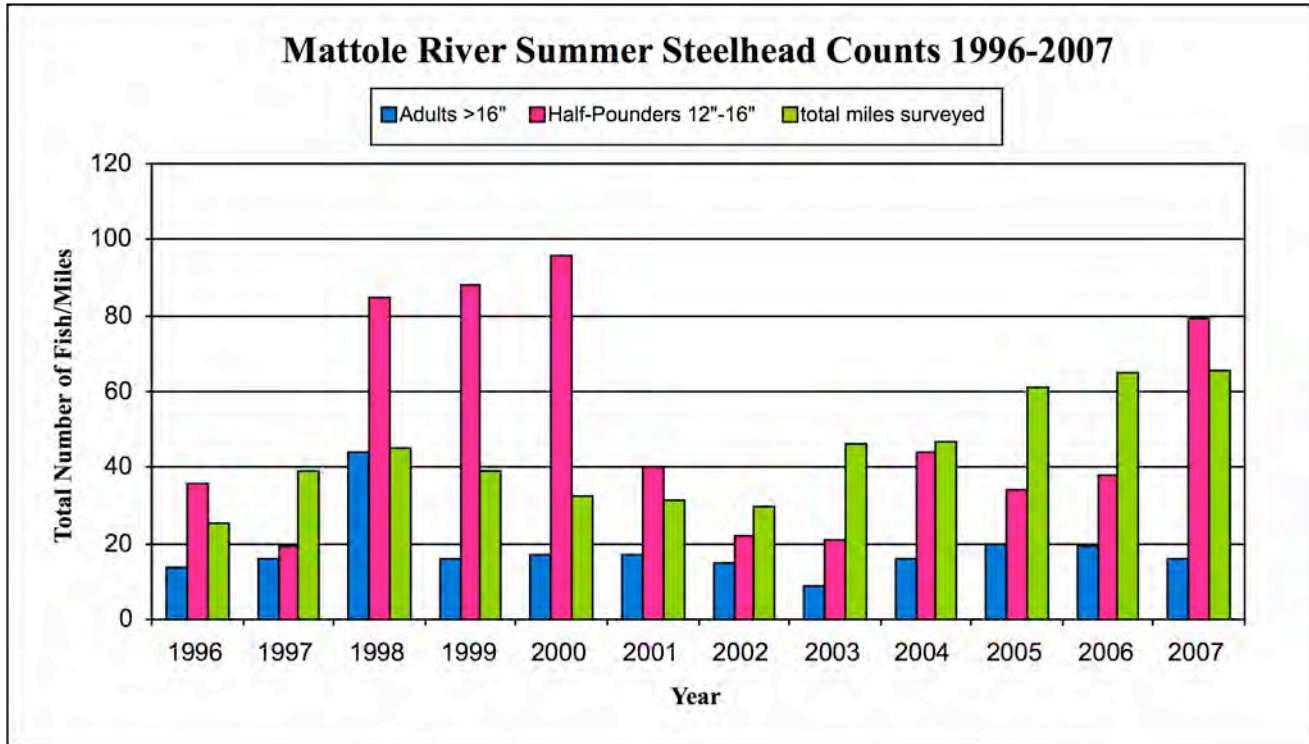
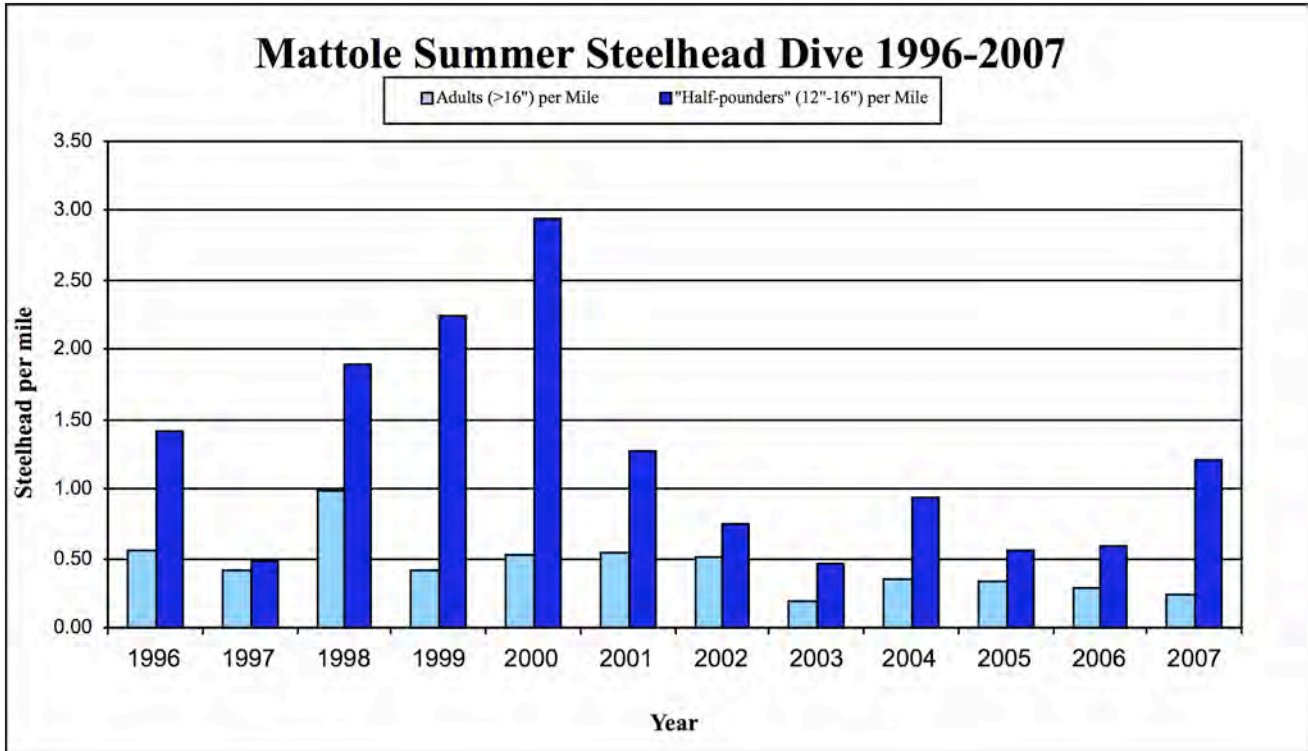


Table 2. Adult Summer Steelhead and “half-pounder” Counts in the Mattole River and tributaries, 1996-2007.

YEAR	ADULTS	HALF-POUNDERS	MS Miles	Trib Miles	MILES	Adults (>16") per Mile	"Half-pounders" (12"-16") per Mile
1996	14	36	23.6	1.7	25.3	0.55	1.42
1997	16	19	38	1.3	39.3	0.41	0.48
1998	44	85	44.6	0.3	44.9	0.98	1.89
1999	16	88	37.4	1.9	39.3	0.41	2.24
2000	17	96	32.4	0.15	32.55	0.52	2.95
2001	17	40	31.2	0.15	31.35	0.54	1.28
2002	15	22	29.3	0.15	29.45	0.51	0.75
2003	9	21	40	6.25	46.25	0.19	0.45
2004	16	44	40.5	6.25	46.75	0.34	0.94
2005	20	34	54.6	6.25	60.85	0.33	0.56
2006	19	38	58.6	6.25	64.85	0.29	0.59
2007	16	79	59.3	6.25	65.55	0.24	1.21

Figure 4. Steelhead per mile observed during MSG Summer Steelhead Dives, 1996-2007.



Results by Reach, 1996-2007

See Table 1 and Appendix A, 1996-2007 Summer Steelhead Dive Tables and Figures, for data on results per reach from 1996 to 2007. Note that letter codes refer to variances between current and past reaches. Contact the MSG for a map of 2000-2007 Summer Steelhead Sightings.

Upper Mattole

Summer steelhead are rarely spotted in the upper headwaters of the Mattole. MSG surveyors have never observed adult summer steelhead in reach 1 (RM 60.4 – RM 58.8), the uppermost reach, despite 6 years of surveys (1997-2000, 2002, 2004). The lack of observations may be due to the small size of the stream itself and lack of deep pool habitat. However, naturally occurring and MSG-constructed complex large woody debris structures provide relatively abundant cover in reach 1; therefore, a small population of elusive summer steelhead may have evaded observation. In the past few years, reach one has not been surveyed.

Over twelve years of surveys, two adult steelhead have been observed in reach 2/2A (RM 58.8 – RM 57.1; 1999 & 2003). Both of these observations occurred in the same location, which is the largest, deepest pool in the Mattole basin upstream of Upper Mill Creek (RM 56.2) and features two complex LWD structures constructed by the MSG (MSG 2005). However, “half-pounders” are often observed in reach 2/2A. Three “half-pounders” were observed in reach 2 in 2007. In twelve years of surveys, a total of 44 “half-pounders” have been observed (24 were observed during the 1999 survey).

Prior to 2005, 4.3 miles of unsurveyed river separated reach 2 (RM 58.8 – RM 57.1) and reach 3/3A (RM 52.8 – 52.1). Some deep pools are present in this stretch of the river, but there had never been a

confirmed summer steelhead sighting due to the lack of surveys. In 2005, MSG added Reach 19 to the Summer Steelhead Dive (RM 57.1 - RM 55.6). Divers found one adult steelhead in 2007 and one in 2005, both in deep pools. In three years of surveys, divers have seen 11 “half-pounders” in reach 19. Eight were observed during the 2007 survey. Reach 24 (RM 55.6 - RM 54.0, between reach 19 and reach 3/3A) was added in 2006. Surveyors did not observe any summer steelhead or “half-pounders” in reach 24 and reported the reach was less than ideal for summer steelhead, mainly shallow with few deep pools or woody debris cover, so it was not surveyed in 2007.

Multiple sightings of adult summer steelhead and “half-pounders” have occurred in reaches 3/3A through 6 (RM 52.8 – RM 46.0) every year since 1996. This 6.8-mile stretch of the Mattole River contains habitat considered favorable for summer steelhead. Here the river flows through bedrock gorges and contains deep cold pools. In addition to large deep pools, this stretch of the Mattole also contains numerous large boulders and logs, which improve cover and habitat complexity. Water temperatures remain cooler here than in the lower Mattole, thus it is more favorable for over-summering. Out of a total of 219 adult summer steelhead observed in the Mattole River over the past twelve years of surveys, 84 of those sightings occurred in reaches 3 through 6, representing ~38% of total summer steelhead sightings over twelve years. In 2007, two of 16 adult summer steelhead and 10 of 79 “half-pounder” observations occurred in these reaches.

In the upper Mattole, divers consistently observe more summer steelhead downstream of McKee Creek (RM 52.8) than in the three upstream reaches near the Mattole headwaters (reach 2, 19, and 24). 2007 dive counts followed this historical trend, but not as noticeably as in some years. One summer steelhead was observed in reach 19, while two were observed downstream of RM 52.8 in reaches 5 and 6. Steelhead observations per mile did not vary noticeably throughout the Upper Mattole as in some years past. Throughout the upper Mattole, (reaches 2, 19, 24, and 3A through 6 (RM 58.8 – RM 46.0)), ~0.30 summer steelhead were observed per mile surveyed in 2007 (3 in 9.9 miles). In comparison, 0.29 summer steelhead were observed per mile of survey effort (2 in 6.8 miles) in reaches 3A through 6 (RM 52.8 – 46.0) during the 2007 dives. In the upper Mattole, summer steelhead utilize the deep pools and cool water temperatures found in the mainstem downstream of McKee Creek.

Middle Mattole

Reaches 7 (RM 42.7 – RM 39.9) and 8 (RM 32.8 – RM 30.4) are widely separated from each other as well as other reaches. This section of the mid-Mattole is noted for few road access points and relatively large property ownerships. In the 2005 State of the Salmon report, the MSG recommended efforts to add survey reaches in this part of the river. Winter survey work by boat revealed the presence of many large deep pools in this area, which are relatively well shaded by steep ridges on both sides, making this likely habitat for summer steelhead.

The MSG surveyed Reach 7 every year from 1996-2007. A total of 10 adult summer steelhead and 62 “half-pounders” were seen in the past twelve years of dives. The greatest number of adults seen in reach 7 was 4 in 1999. In the past five years of surveys, MSG divers observed one adult summer steelhead in reach 8 (2003). Seven “half-pounders” have also been observed in reach 8 over the past five years. In 2007, divers observed four “half-pounders” in reach 7 and four “half-pounders” in reach 8. Relatively consistent sightings over previous years support the conclusion that these reaches do provide suitable habitat that is utilized by summer steelhead.

Reaches 20-22 were added in 2005 as part of efforts to expand the MSG Summer Steelhead Dive and quantify summer steelhead presence/absence throughout the Mattole mainstem. Reach 20 is the stretch of the Mattole River between reaches 6 & 7 (RM 46.0 - RM 42.7). Reach 21 (RM 41.1 - RM 34.6) and reach 22 (RM 34.6 - RM 32.8) comprise the stretch between reaches 7 & 8.

Since surveys began in reach 20, divers have observed one adult in each of the three years surveyed. In 2007, surveyors also saw four “half-pounders”. Both the adult and the “half-pounders” were seen in the bottom of deep pools or under woody debris cover. Reach 21 (6.5 miles) is the longest reach ever surveyed by MSG divers in the Summer Steelhead Dive. Divers have seen a remarkable number of summer steelhead and “half-pounders” in this long, remote stretch of the middle Mattole. Over the past three years, 12 summer steelhead and 12 “half-pounders” have been observed in reach 21. Two adults and four “half-pounders” were observed in 2007. Adult sightings occurred in deep pools, while “half-pounders” were seen utilizing cover provided by rootwads, riparian vegetation, and boulders. In Reach 22, divers located two adult summer steelhead and four “half-pounders” during the 2007 survey. Reach 22 was not surveyed in 2006, but MSG surveyors observed one adult and one “half-pounder” in 2005. Continuing survey of reaches 20-22 is recommended in the future due to sightings over the past three years as well as presence of favorable summer steelhead habitat in this middle section of the Mattole.

Reach 23 (RM 30.4-RM 27.0), from Dry Creek to the Honeydew Slide, was also added in 2005 in efforts to expand the mainstem mileage in the summer steelhead survey. Reach 23 is the downstream extent of what we call the middle Mattole, and it is the section of river between reaches 8 and 9. Favorable habitat for summer steelhead does exist in reach 23, but prior to this year, there were few observations of steelhead greater than 12”. The first confirmed sighting of a summer steelhead occurred in 2007. Fifteen “half-pounders” were also observed in reach 23 in 2007, an unusually high number of observations.

In comparison with the 0.24 adults observed per mile during the 2007 Summer Steelhead Dive, surveyors observed 0.60 adults/mile in reaches 20-22 in 2007. In the middle 19 mile section of the Mattole, reaches 7 and 8 and reaches 20-23, summer steelhead sightings were 0.40 fish/mile in 2007 (8 adults in 20.2 miles surveyed due to a slight overlap of reaches), suggesting that deep, cool pools in the mid-river are crucial habitat for summer steelhead in the Mattole. Cooler summer water temperatures than the lower mainstem Mattole and presence of deep pools in the mid-river represent some of the best oversummering habitat for steelhead. Additionally, summer fishing is prohibited in this area, and its remoteness makes poaching less likely. Survey observations support that Mattole summer steelhead utilize these favorable conditions for oversummering.

Lower Mattole

Reaches 9/9A (RM 27.4 - RM 24.1) and 10/10A (RM 24.4 – RM 21.3) mark the emergence of the river from the mid-river canyon into the broad valley of the lower Mattole. The river channel here is frequently wide and shallow, lacking sufficient riparian cover or proximity to hill slopes to provide shade from solar radiation. From the confluence of Honeydew Creek and further on downstream, the county road is in close proximity to the river. Despite these issues, adult steelhead have been spotted

every year in these reaches. 2007 marked the first year without a single summer steelhead observation in reaches 9 and 10.

In 2007, MSG divers spotted two half-pounders in reach 9 and two “half-pounders” in reach 10. Steelhead in reaches 9 and 10 have been observed in pools, in high gradient riffles and other areas with shallow-fast-moving water under riparian cover. The lack of deep pool habitat and shallow, aggraded channel may force any larger size-class steelhead caught in these reaches during the low flow of summer to hold in less than ideal habitat until the river rises with the fall rains. Divers found three adults in reach 9A last year. During the survey in 2000, five adults were observed in reach 9. Eight adult summer steelhead were observed in the two reaches in 1998. In total, thirty-eight adult summer steelhead were documented in reaches 9/9A and 10/10A from 1996-2007 (~17% of 219 sightings over the twelve years of surveys).

Reach 25 (RM 21.3 – RM 19.7) was added to the Summer Steelhead Dive in 2006. No adult summer steelhead or “half-pounders” were seen in the reach. The reach is mainly shallow and aggraded, with little area deep enough to snorkel or provide habitat for summer steelhead. Due to lack of habitat, reach 25 was not surveyed in 2007.

Summer steelhead sightings are infrequent in the lower 20 miles of the Mattole River (reaches 11-16). The lower mainstem has a wide, shallow, meandering channel, and deep pool habitat is rare. High air and water temperatures characterize the lower river, and there is a lack of riparian cover or habitat for summer steelhead, although a few deep pools and cold refugia do exist. Nevertheless, there are a small number of sightings in each reach over the years. Sightings of summer steelhead in this stretch of the lower river tend to occur in isolated pools where local conditions have permitted coexistence of complex cover with a localized cold seep. In 2007, surveyors did not find a single adult summer steelhead in the lower 20 miles, which is unusual. A few “half-pounders” are usually spotted in the lower river each year; there were eight “half-pounders” observed in reaches 11-16 in 2007.

In the lower Mattole (RM 27.0 – 0), there were no summer steelhead observations in 2007, despite 27.5 miles surveyed. In comparison, 0.3 summer steelhead were observed per mile in the Upper Mattole (RM 58.8 – RM 46.0) and 0.40 summer steelhead per mile were found in the middle Mattole (RM 46.0 – 27.0). A low number of summer steelhead observations in the lower Mattole is typical of past survey years, but 2007 was notable due to the complete lack of adult observations. Considering the high water temperatures and lack of oversummering habitat in the lower river, low numbers of observed steelhead is not surprising.

Mattole Tributaries

The MSG has also examined presence of summer steelhead in tributaries of the Mattole by conducting snorkel surveys in three creeks over the past eleven years (Figure 5). The tributaries include Thompson Creek, Bear Creek, and Honeydew Creek. Only the largest, lower portions of each are surveyed.

Figure 5. 1996-2007 Summer Steelhead Counts in Mattole Tributaries.

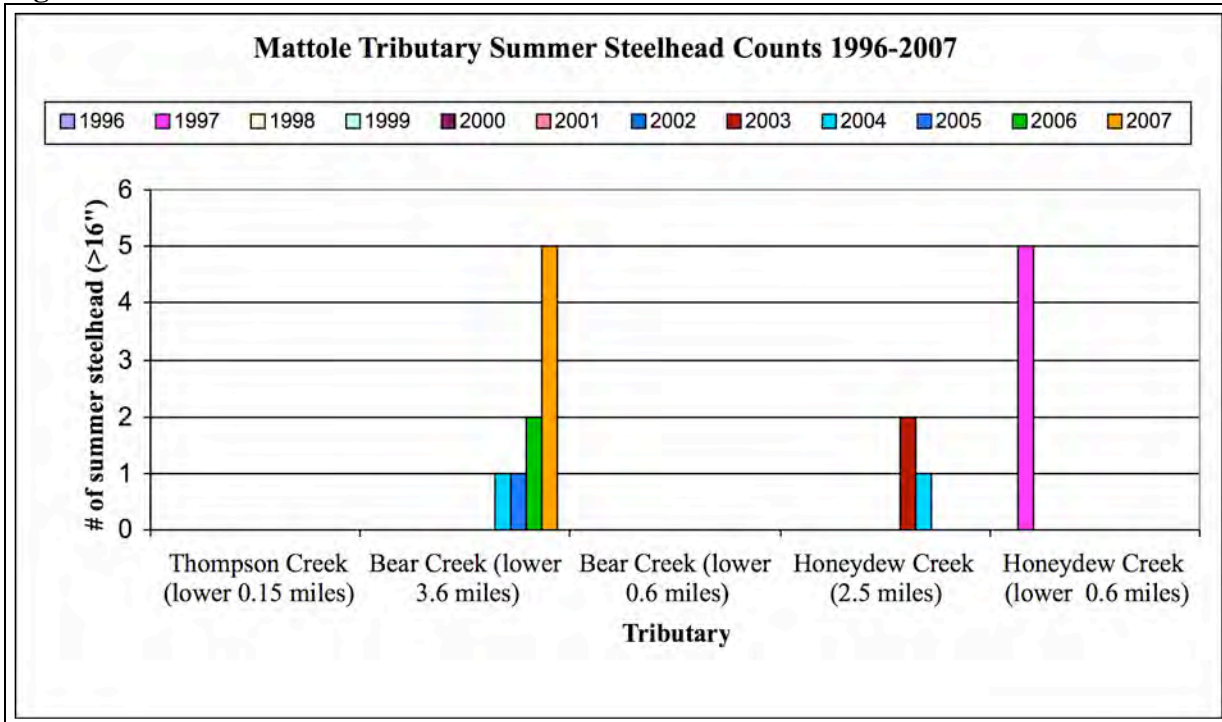
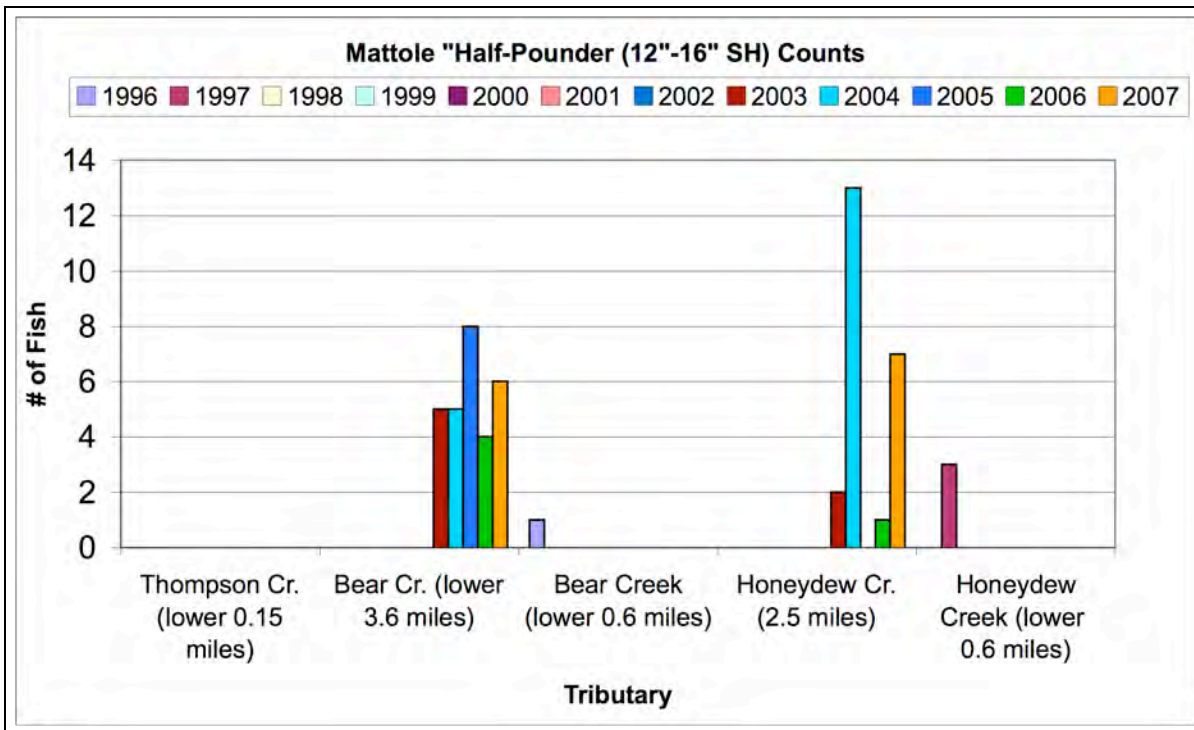


Figure 6. 1996-2007 "Half-pounder" Counts in Mattole Tributaries.



Despite twelve years of surveys in Thompson Creek (which enters the Mattole at RM 58.4), summer steelhead have never been observed. Thompson Creek is near the Mattole headwaters. Relative to the Mattole's major tributaries it is small, lacking large, deep pools, which are usually prime summer steelhead habitat (Nakamoto 1994). The small size of the stream may prevent large numbers of summer steelhead from overwintering in Thompson Creek. Nonetheless, a small population of summer steelhead may have eluded observation in Thompson Creek and may be present in other tributaries that have not been surveyed.

The lower 0.6 miles of Bear Creek (reach 17; RM 42.8 + 0.6) was surveyed in 1996, although no summer steelhead were located. In 2003-2007, MSG divers surveyed the lower 3.6 miles of Bear Creek. Nine adult summer steelhead have been observed in the past five years, five of those in 2007 (See Figure 5). In 2007, divers also found six "half-pounders" in Bear Creek. Last year, MSG surveyors located 2 adult summer steelhead and 4 "half-pounders" (See Figure 6). Bear Creek maintains significant summer flow and cool temperatures throughout the summer. The upper section of the 3.6 mile reach contains numerous bedrock and boulder pools and is shaded by a deep bedrock gorge, prime summer steelhead habitat, and this is where most sightings do occur. The upper section of the Bear Creek reach is also very remote; much of the upper subshed is owned and protected by the BLM and is not accessible by road. The lower section is characterized by large land ownerships, cattle-grazing and sedimentation, but still contains pools and relatively cool water; thus it meets minimum requirements for summer steelhead habitat.

Honeydew Creek (reach 18, RM 26.5 +2.5) has produced observations of adult summer steelhead (record number of summer steelhead sightings was 5 in 1997) (See Figure 5). "Half-pounders" are consistently observed in Honeydew Creek; surveyors found a record number of thirteen "half-pounders" in 2004 (See Figure 6). The lower 0.6 miles of Honeydew Creek was surveyed from 1996 - 1999, and a 2.5 mile mid-section of Honeydew Creek was surveyed from 2003 -2007. This year, MSG surveyors found no summer steelhead in Honeydew Creek, although seven "half-pounders" were observed. Over the past five survey years, three adult summer steelhead were located in the mid-section of Honeydew, suggesting that summer steelhead utilize habitat throughout this tributary. Honeydew Creek contains deep pools and significant cool summer flow, thus it is able to support at least a small number of overwintering steelhead greater than 12".

It is likely that additional survey effort in lower reaches of the largest Mattole tributaries may increase our observed population size. It should be noted however that these two streams are the least impacted by human land practices of all the large tributaries due the large proportion of their watersheds that are part of the King Range National Conservation Area (MSG 2005).

Juvenile Salmonid Distribution

Juvenile steelhead were found in all survey reaches in 2000 through 2007. Juvenile coho were observed in six reaches, while juvenile Chinook were found in four reaches (Table 3). Juvenile coho were most numerous in the three uppermost reaches, upstream of RM 54.0 (reaches 2, 19, and 24). Downstream of RM 54.0, coho were observed in two isolated locations in the upper Mattole, including the deep pool at Junction Hole and cooler spots near the Nooning Creek Gorge. In comparison with the 2006 Summer Steelhead Dive, juvenile coho were seen in more reaches. Juvenile coho distribution data collected in 2007 was similar to data collected in 2000-2005. Woody cover seemed to influence

coho habitat utilization. In 2007, juvenile Chinook were found in the upper mainstem (reaches 2 and 19), in the lower mainstem (reach 12). Both juvenile Chinook and juvenile coho were observed in the estuary (reach 16). According to diver observations, juvenile Chinook appeared to be more widely distributed in 2007 than in 2006, when they were observed in only two reaches. Juvenile Chinook were also observed in four reaches in 2005.

As in past years, the difference in distribution of coho and Chinook was noticeable. Coho have been observed oversummering almost exclusively in the upper mainstem. Chinook have been distributed in favorable microhabitats throughout the river, although more are usually found in the upper mainstem.

Juvenile salmonids in the Mattole during the summer months are exposed to increased water temperature, low flows and lack of riparian shading. Temperatures of 68°F and higher have been documented as stressful to juvenile Chinook and coho, while temperatures over 77°F may result in mortality (Brett 1952). Summer water temperatures in some reaches of the lower Mattole regularly reach 78°F, and temperatures over 68°F in many locations are not uncommon. Thermal refugia such as tributaries, cold seeps, and isolated pools provide critical summer habitat for juvenile salmonids. Habitat complexity and shading provided by woody debris is also essential for oversummer survival.

Table 3. Summary of adult summer steelhead, “half-pounders,” and juvenile salmonid observations between the headwaters and the mouth of the Mattole River, July-August, 2007.

Reach #	River Mile (RM) Location	Location and Reach Name	Adults (>16")	Half-Pounders (12-16")	Juvenile COHO	Juvenile CHINOOK	Juvenile STEELHEAD (<12")
1	RM 60.4 - RM 58.8	Upper Mattole: Phillips Creek to Lost River Creek	N/A	N/A	N/A	N/A	N/A
2	RM 58.8 - RM 57.1	Upper Mattole: Lost River Creek to Stanley Creek, including partial survey (0.15 miles) of Thompson Creek (RM 58, mouth to confluence with Yew Creek)	0	3	Yes, entire reach in woody pools	Yes, in schools in large volume pools	Yes, throughout
19	RM 57.1 - RM 55.6	Upper Mattole: Stanley Creek to Anderson Creek	1	8	Yes, entire reach	Yes, entire reach	Yes, entire reach
24	RM 55.6 - RM 54.0	Upper Mattole: Anderson Creek to Van Arken Creek	0	0	Yes, entire reach	No	Yes, entire reach
3	RM 52.8 - RM 51.3	Upper Mattole: McKee Creek to Crook's	0	2	Yes, in Junction Hole	No	Yes, throughout
4	RM ~51.3 - RM ~49.4	Upper Mattole: Crook's to Tom's Hole (Patty's)	0	0	No	No	Yes, entire reach, lots of fish
5	RM ~49.4 - RM 47.4	Upper Mattole: Tom's Hole to Big Finley Creek	1	2	Yes, few just ds Tom' Hole, top 1/3 of reach in cooler spots	No	Yes, throughout
6	RM 47.4 - RM ~46.0	Upper Mattole: Big Finley Creek to Schepp's	1	6	No	No	Yes
20	RM ~46.0 - RM 42.7	Middle Mattole: Schepp's to upstream of Bear Creek	1	4	No	No	Yes, minimal numbers of SH
7	RM 42.7 - RM ~	Middle Mattole:	0	4	No	No	Yes, entire

	39.9	Upstream of Bear Creek to Klossen's Hole (downstream of Mattole Canyon Creek)						reach
21	RM 41.1 - RM 34.6	Middle Mattole: Mattole Canyon Creek to Fourmile Creek	2	4	No	No		Yes, entire reach
22	RM 34.6 - RM 32.8	Middle Mattole: Fourmile Creek to Gilham Creek	4	6	No	No		Yes
8A	RM 32.8 - RM 31.3	Middle Mattole: Gilham Creek to Middle Creek	0	2	Maybe	No		Yes, entire reach
8B	RM 31.3 - RM 30.4	Middle Mattole: Middle Creek to Dry Creek	0	2	No	No		Yes, entire reach
23	RM 30.4 - RM 27.0	Middle Mattole: Dry Creek to Honeydew Slide	1	15	No	No		Yes
9	RM 27.4 - RM 24.4	Lower Mattole: Honeydew Slide to Bundle Prairie Creek	0	2	No	No		Yes, entire reach
10	RM 24.4 - RM 21.3	Lower Mattole: Bundle Prairie Creek to Triple Junction High School	0	2	No	No		Yes
11	RM 19.7 - RM 14.9	Lower Mattole: Saunders Creek to Squaw Creek	0	0	No	No		Yes, entire reach but patchy
12	RM 14.9 - RM 12.6	Lower Mattole: Squaw Creek to Lindley Bridge	0	1	No	Yes, beginning of reach, very few		Yes, throughout
13	RM 12.6 - RM 7.8	Lower Mattole: Lindley Bridge to Conklin Creek	0	1	No	No		Yes, entire reach
14	RM 7.8 - RM 5.2	Lower Mattole: Conklin Creek to Hideaway Bridge	0	0	No	No		Yes, only parts
15	RM 5.2 - RM 1.3	Lower Mattole: Hideaway Bridge to Stansberry Creek	0	1	No	No		Yes
15B	RM 3.0 - RM 1.3	Lower Mattole: Mattole Salmon Group office to Stansberry Creek	0	1	No	No		Yes
16	RM 1.3 - RM 0.0	Lower Mattole: Stansberry Creek to Ocean	0	0	Yes, sections 6, 3, 4 & 5 in woody cover	Yes, sections 6 (bottom open water) & 3 (in structure)		Yes, entire reach
17	RM 42.8 + 3.6	Bear Creek (Geppert/Spence's to mouth)	5	6	No	No		Yes, throughout. Lots of 6"-10" SH
18	RM 26.5 + 2.5	Honeydew Creek (Maureen Catalina's to 2.5 miles upstream of Bear Wallow Slide)	0	7	Maybe 2	No		Yes, entire reach
		Totals	8 reaches	20 reaches	6 reaches	4 reaches		All reaches

Non-salmonid Species

Observations of non-salmonid species, including western pond turtles, freshwater mussels, bullfrog tadpoles, crayfish, and notes recorded by divers during the 2007 Summer Steelhead Dives are summarized in Appendix B, Table B-1.

Since 1999, MSG divers have noted western pond turtle sightings during the Summer Steelhead Dive. Over the past nine years, MSG divers have observed well over 200 turtles throughout the middle and lower river. For the first time, divers mapped turtle sightings in 2007. A summary table of turtle sightings is available upon request.

Temperatures

A summary of incidental stream and air temperature data gathered during the Summer Steelhead Dive is also provided in Appendix B, Table B-2. The temperatures recorded during this year's Summer Steelhead Dive were similar to those recorded in 2006 and comparable to prior years. The 2007 Summer Steelhead Dive occurred during the period where many of the maximum temperatures were reached at MSG Temperature Monitoring sites (See 2007 Temperature Monitoring Report for further information). Temperatures recorded during the 2007 Summer Steelhead Dive are likely to represent peak or near-peak temperatures during summer 2007.

During recent summers (since 2005), June rains have delivered needed flow and lowered water temperatures in the Mattole, creating more favorable conditions than in the few years prior. In 2007, an unusual July rain occurred three days after the Summer Steelhead Dive, further boosting flow and cooling river temperatures. These conditions were generally more favorable for both migration and overwintering salmonids. However, summer water temperatures in the Mattole remained much warmer than ideal for overwintering juveniles and summer steelhead (Barnhardt 1986). Excessively high summertime water temperatures in the Mattole have been identified as a primary limiting factor in the survival of native anadromous fish stocks (Downie et al. 2002, Coates et al. 2002). Temperatures in the middle and lower mainstem were often between 75-80°F, which is considered detrimental to all juvenile salmonid survival (Brungs and Jones 1977, Brett 1952).

Habitat Utilization

Although steelhead are highly-adaptable, watersheds must meet certain habitat requirements to support these fish. Steelhead have a greater physiological tolerance to water temperature than other salmonids; nevertheless, they require cool water throughout their life history (Israel 2003). Habitat complexity is also important. According to Nakamoto (1994), "Adult summer steelhead typically overwinter in the deepest pools (Jones 1980; Freese 1982) where instream cover or riparian shading is available. Maximum water temperature may also determine habitat use (Hooper 1973; Freese 1982; Barnhardt 1986)."

During the MSG 2007 dives, most summer steelhead were observed in characteristic overwintering habitat: deep pools, under large wood or riparian cover, and in thermal refugia such as stratified pools, cold seeps, and near cool-water tributaries. To a lesser extent, summer steelhead were also observed in riffles and fast-moving water in areas without ideal habitat. Over the past twelve years of dive surveys on the Mattole, identification of summer steelhead distribution, habitat and cold water refugia indicate that temperature is a major factor influencing summer steelhead distribution in the Mattole.

Nielsen and Lisle (1994) found thermally stratified pools provided refuge for young-of-the-year, yearling, and adult steelhead in marginal habitats of the Eel River, where water temperatures reached

“upper incipient lethal levels.” Past Summer Steelhead Dives have documented some pools in the Mattole with thermal stratification of up to ten degrees Fahrenheit.

Habitat utilization by adult summer steelhead is affected by habitat complexity as well as temperature. While many of the adult steelhead (>16”) observed in the Mattole during the summer were seen in cold pools, they were also observed in shallow water in areas with riparian cover. Nakamoto (1994) reported that distribution of adult summer steelhead was more strongly correlated with physical stream characteristics than available thermal refugia. Boulder, large woody debris, and undercut banks create physical structure and provide hydraulic heterogeneity, increasing the habitat available for steelhead in the form of cover from predators, visual separation of juvenile territories, and refuge during high flows (Everest et al., 1985).

According to Bjornn and Reiser [(1991) in Spence et al. 1996], steelhead require approximately 18cm water depth for passage. Thus the river’s small channel size near its source and discontinuous pools increasingly observed in late summer present a threat to both juvenile salmonids and adult summer Mattole steelhead.

While the extent to which water temperature or physical habitat characteristics affect the distribution of summer steelhead in the Mattole is unknown, a combination of thermal stress, habitat preferences and migratory barriers are likely to guide their habitat selection. Results seem to indicate mid-river pools, thermal refugia and vegetative cover are vital habitat needs of the species. Further study is needed to quantify the habitat needs of Mattole summer steelhead in order to ensure the efficacy of future restoration efforts.

Conclusion

Over the past twelve years of Summer Steelhead Dives, divers observed an average of 18.25 adult (>16”) steelhead. The lowest number of summer steelhead observed was 9 in 2003, while the highest number observed was 44 in 1998. The number of summer steelhead observed in most survey years is between fifteen and twenty individuals. Consistent observations of adult steelhead over sixteen inches throughout twelve survey years confirm that a small population of adult steelhead inhabits the Mattole River during the summer months. It is unknown whether these fish represent a genetically distinct population or if they are fish genetically similar to the winter steelhead run with a variant of life cycle behavior. In either case, these fish contribute greatly to the diversity of life history in the Mattole steelhead population, and are therefore important to study and preserve.

The MSG has learned much about the habitat distribution of summer steelhead throughout the Mattole Watershed. Upstream of McKee Creek (RM 42.8), near the Mattole headwaters, few summer steelhead are observed, likely due to the small size of the mainstem and hence lack of deep pool habitat, as well as recent issues with low flow during the summer months. Consistently, the greatest number of summer steelhead per mile have been observed from McKee Creek (RM 52.8) to Dry Creek (RM 30.4). Cooler summer water temperatures here (in comparison with the lower river) and presence of deep pools in the upper and middle river represent the best oversummering habitat for adult steelhead in the Mattole. Less frequently, summer steelhead are observed in cool, favorable microsites such as deep pools and areas with instream cover such as large wood and boulders in the lower river. Summer steelhead also oversummer in Honeydew Creek and Bear Creek, the two largest tributaries to the Mattole.

While there is some uncertainty about the true genetic lineage of Mattole summer steelhead, consistent observations combined with historical evidence strongly suggest that a summer run of Mattole steelhead does exist. Given the extent of habitat degradation within the watershed and the increased susceptibility of summer steelhead to threats ranging from elevated water temperatures to poachers, it is quite likely that the current summer steelhead population may be but the last vestige of what was once the epitome of diversity and strength among Mattole salmonids.

Analysis of summer steelhead and “half-pounders” observed per mile, as a measure of relative abundance, is one of the MSG’s most consistent means of evaluating annual summer steelhead returns (Table 2). For the period from 1996 through 2002 the average number of adult summer steelhead observed per mile was 0.56. Over the past five survey years, 2003 to 2007, that average has fallen to 0.28 adult summer steelhead per mile. An even more dramatic reduction can be seen in the average “half-pounders” per mile during the same periods. From 1996 to 2002 an average of 1.57 “half-pounders” were seen per mile. Since 2003 the average per mile has been 0.75.

Recognizing the need to learn more about Mattole summer steelhead the MSG has initiated discussions with Research Geneticist Dr. Carlos Garza, NOAA Fisheries – Santa Cruz, CA. Dr. Garza, among whose specialties are genetic population analyses of Pacific salmonids, has indicated a strong interest in incorporating the study of Mattole summer steelhead into his current research. According to his preliminary assessment based on data supplied by the MSG and his extensive knowledge of current summer steelhead populations, Dr. Garza believes that the Mattole summer steelhead population may be the southernmost of coastal summer steelhead populations on the Pacific Coast (Carlos Garza, pers comm.).

With potential sample sizes likely to be below 50 individuals for any given year it is clear that any sample collection must be performed with the utmost respect and concern for the individual fish sampled. Needless to say, the mortality rate for sample collection must be kept to a minimum. Fortunately, Dr. Garza is collaborating with a graduate student who is particularly adept at taking small tissue samples from live summer steelhead in the wild. The MSG is confident that with proper precautions threats to fish being sampled can be sufficiently reduced.

The research proposed by Dr. Garza offers great potential for increasing our understanding of Mattole summer steelhead in a manner that minimally impacts the survival of each individual fish. However, if the benefits of a partnership with Dr. Garza are to be realized the MSG must first insure the support of all applicable government agencies, including CDFG.

However, directed research alone will not improve the recovery prospects for Mattole summer steelhead. In order to ensure their survival in the short-term it is imperative to restore known mainstem and tributary habitat. Many of the instream habitat and riparian revegetation projects proposed in the Mattole Watershed Plan (MRC 2005) are designed to benefit known summer steelhead habitat. Instream habitat enhancement projects can provide nearly immediate benefits by deepening pools, providing complex cover and adding organic debris to the river channel. Riparian revegetation projects keep water temperatures cool and provide bank stability once mature.

With over two decades of habitat restoration experience, the Mattole Salmon Group is uniquely familiar with the opportunities for restoration in the Mattole Watershed and the steps needed to make restoration a reality.

Recommendations

- A genetic microsatellite investigation of Mattole steelhead to determine the variability in life history, migration, and behavior of Mattole summer and winter steelhead runs.
- Depending on results from genetic analysis revise appropriate management plans (Mattole Watershed Plan, California Steelhead Restoration and Management Plan, protections, King Range Management Plan, etc.) and protections (ESA, CESA, etc.).
- Develop and implement a quantitative monitoring protocol for determining specific habitat needs for recovery of the Mattole summer steelhead population.
- Continue the MSG Summer Steelhead Dive in future years. Continue monitoring of the thirteen index reaches, tributary reaches in Honeydew and Bear Creeks, and new mainstem reaches added in 2005 and 2006.
- Expand the MSG Summer Steelhead Dive to include previously unsurveyed areas, and expand summer steelhead monitoring in creeks whose habitat and thermal conditions could support summer steelhead.
- Implement habitat restoration projects developed and proposed in the Mattole Watershed Plan (2005) to protect and enhance known summer steelhead habitat
- Include consideration of summer steelhead populations and habitat needs in future restoration projects.
- Educate the local community about this rare neighbor and encourage community stewardship of the small summer steelhead population.

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Appendix A. Mattole Salmon Group Summer Steelhead Dive Summary Tables, 1996-2007

Table A-1. Adult Summer Steelhead Observations, MSG Summer Steelhead Dives

Number	Reach Description	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	Total
1	Phillips Cr. (RM 60.4) to Lost River Cr. (RM 58.8)				0		0		0	0	0	0		0
2	Lost River Cr. (RM 58.8) to Stanley Cr. (RM 57.1) & Thompson Cr. (RM 58.4+ 0.15, mouth to confluence with Yew Ck.)	0	0	0	0	1	0							1
2A	Lost River Cr. (RM 58.8) to Stanley Cr. (RM 57.1)							0	0	1	0	0	0	1
2B	Thompson Cr. (RM 58.4+0.15, mouth to confluence with Yew Cr.)				0			0	0	0	0	0	0	0
19	Stanley Cr. (RM 57.1) to Anderson Cr. (RM ~55.6)	1	0	1										2
24	Anderson Creek (RM 55.6) to Van Arken Creek (RM 54.0)	0	0											0
3	McKee Cr. (RM 52.8) to Crooks (RM 51.3)	0				0	0	0	4	3	5	0		12
3A	McKee Cr. (RM 52.8) to Bridge Cr. (RM 52.1)		0	0	1									1
4	Crook's (RM ~51.3) to Tom's Hole (Patty's) (RM ~49.4)	0	2	2	0	3	5							12
4A	Crooks RM (51.3) to Big Finley Ck. (RM 47.4)							2	3	1	9	7	4	26
5	Tom's Hole (RM ~49.4) to Big Finley Cr. (RM 47.4)	1	0	0	4	0	1							6
6	Big Finley Cr. (RM 47.4) to Shepp's (RM~46.0)	1	1	6	0	0	2							10
6A	Big Finley Cr. (RM 47.4) to Deer Lick Cr. (RM 45.8)							1	1	2	7	0	6	17
20	Schepps' (RM ~46.0) to us Bear Cr. (RM 42.7)	1	1	1										3
7	Us. Bear Cr. (RM 42.7) to Klossen's Hole (ds Mattole Canyon Cr.)(RM~39.9)	0	1	0	0	0	3	0	1	4	1	0	0	10
21	Mattole Canyon Cr. (RM 41.1) to Fourmile Cr. (RM 34.6)	2	6	4										12
22	Fourmile Cr. (RM 34.6) to Gilham Cr. (RM 32.8)	4		1										5
8	Gilham Cr. (RM 32.8) to Dry Cr. (RM 30.4)		0	0	0	1								1
8A	Gilham Cr. (RM 32.8) to Middle Cr. (RM 31.3)	0												0
8B	Middle Cr. (RM 31.3) to Dry Cr. (RM 30.4)	0												0

23	Dry Creek (RM 30.4) to Honeydew Slide (RM 27.0)	1	0	0										1
9	Honeydew Slide (RM 27.0) to Bundle Prairie Cr. (RM 24.4)	0		3	1	2		3	5				2	16
9A	Honeydew Slide (27) to Woods Ck. (24.1)		3							2	4	1		10
10	Bundle Prairie Cr. (RM 24.4 to Triple Junction High School (RM 21.3)	0	0	0	3	0	0	3						6
10A	Woods Ck. (RM 24.1 to Triple Junction HS (RM 21.3)								0		5	1		6
25	Triple Junction High School (RM 21.3) to Saunders Creek (RM 19.7)		0											0
11	Saunders Cr. (RM 19.7) to Squaw Cr. (RM 14.9)	0	0	0	1	0		0		0	0		0	1
12	Squaw Cr. (RM 14.9) to Lindley Bridge (RM 12.6)	0	0	0	0	0	1	1	0	0	1	0	0	3
13	Lindley Bridge (RM 12.6) to Conklin Cr. (RM 7.8)	0	0	0	0	0	2		1	1	1	0		5
14	Conklin Cr. (RM 7.8) to Hideaway Bridge (RM 5.2)	0	0	0	2	0	0	1	1	0	8	1		13
15	Hideaway Bridge (RM 5.2) to Stansberry Cr. (RM 1.3)	0	1	1	0	0	1	3	0	2	3		2	13
15A	Hideaway Bridge (RM 5.2) to Rex's (MSG Office) (RM 3.0)											1		1
15B	MSG Office (RM 3.0) to Stansberry Creek (RM 1.3)	0	1											1
16	Stansberry Cr. (RM 1.3) to Ocean (RM 0.0)	0	1	0	2	0		3	1	0	0		0	7
16A	Rex's (MSG Office)(RM 3.0) to Ocean											0		0
17	Bear Cr. (Geppert/Spencer's to mouth) (lower 3.6 miles)	5	2	1	1	0								9
17A	Bear Creek (lower 0.6 miles)												0	0
18	Honeydew Cr. Maureen Catalina's to 2.5 miles us Bear Wallow Slide	0	0		1	2								3
18A	Honeydew Creek (lower 0.6 miles)									0	0	5	0	5
	Totals	16	19	20	16	9	15	17	17	16	44	16	14	219

Table A-2. “Half-pounder” (12”-16” steelhead) Observations, MSG Summer Steelhead Dive

Number	Reach Description	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	Total
1	Phillips Cr. (RM 60.4) to Lost River Cr. (RM 58.8)				0		0		0	4	3	0		7
2	Lost River Cr. (RM 58.8) to Stanley Cr. (RM 57.1) & Thompson Cr. (RM 58.4+ 0.15, mouth to confluence with Yew Ck.)	3	0	2	3	2	1							11
2A	Lost River Cr. (RM 58.8) to Stanley Cr. (RM 57.1)							0	8	24	0	1	0	33
2B	Thompson Cr. (RM 58.4+0.15, mouth to confluence with Yew Cr.)				0			0	0	0	0	0	0	0
19	Stanley Cr. (RM 57.1) to Anderson Cr. (RM 55.6)	8	3	0										11
24	Anderson Creek (RM 55.6) to Van Arken Creek (RM 54.0)	0	0											0
3	McKee Cr. (RM 52.8) to Crooks (RM 51.3)	2				2	2	7	13	9	1	3		39
3A	McKee Cr. (RM 52.8) to Bridge Cr. (RM 52.1)		0	1	0									1
4	Crook’s (RM ~51.3) to Tom’s Hole (Patty’s) (RM ~49.4)	0	4	0	3	2	5							14
4A	Crooks RM (51.3) to Big Finley Ck. (RM 47.4)							3	5	10	21	0	3	42
5	Tom’s Hole (RM ~49.4) to Big Finley Cr. (RM 47.4)	2	1	5	3	1	2							14
6	Big Finley Cr. (RM 47.4) to Shepp’s (RM~46.0)	6	3	2	4	0	0							15
6A	Big Finley Cr. (RM 47.4) to Deer Lick Cr. (RM 45.8)							5	1	1	9	0	6	22
20	Schepps’ (RM ~46.0) to us Bear Cr. (RM 42.7)	4	1	2										7
7	Us. Bear Cr. (RM 42.7) to Klossen’s Hole (ds Mattole Canyon Cr.)(RM~39.9)	4	0	1	0	2	1	1	30	17	3	2	1	62
21	Mattole Canyon Cr. (RM 41.1) to Fourmile Cr. (RM 34.6)	4	7	1										12
22	Fourmile Cr. (RM 34.6) to Gilham Cr. (RM 32.8)	6		1										7
8	Gilham Cr. (RM 32.8) to Dry Cr. (RM 30.4)		1	1	0	1								3
8A	Gilham Cr. (RM 32.8) to Middle Cr. (RM 31.3)	2												2
8B	Middle Cr. (RM 31.3) to Dry Cr. (RM 30.4)	2												2

23	Dry Creek (RM 30.4) to Honeydew Slide (RM 27.0)	15	0	0										15
9	Honeydew Slide (RM 27.0) to Bundle Prairie Cr. (RM 24.4)	2		2	4	0		2	15				14	39
9A	Honeydew Slide (27) to Woods Ck. (24.1)		5							3	2	4		14
10	Bundle Prairie Cr. (RM 24.4 to Triple Junction High School (RM 21.3)	2	3	3	3	1	5	11						28
10A	Woods Ck. (RM 24.1 to Triple Junction HS (RM 21.3)								0		20	0		20
25	Triple Junction High School (RM 21.3) to Saunders Creek (RM 19.7)		0											0
11	Saunders Cr. (RM 19.7) to Squaw Cr. (RM 14.9)	0	0	0	0	1		0		1	0		1	3
12	Squaw Cr. (RM 14.9) to Lindley Bridge (RM 12.6)	1	1	1	0	1	0	8	0	2	0	3	8	25
13	Lindley Bridge (RM 12.6) to Conklin Cr. (RM 7.8)	1	1	0	0	1	2		3	2	2	1		13
14	Conklin Cr. (RM 7.8) to Hideaway Bridge (RM 5.2)	0	1	2	4	0	0	1	1	7	12	0		28
15	Hideaway Bridge (RM 5.2) to Stansberry Cr. (RM 1.3)	1	1	0	2	0	4	0	4	6	12		2	32
15A	Hideaway Bridge (RM 5.2) to Rex's (MSG Office) (RM 3.0)											1		1
15B	MSG Office (RM 3.0) to Stansberry Creek (RM 1.3)	1	1											2
16	Stansberry Cr. (RM 1.3) to Ocean (RM 0.0)	0	0	2	0	0		2	16	2	0		0	22
16A	Rex's (MSG Office)(RM 3.0) to Ocean											1		1
17	Bear Cr. (Geppert/Spencer's to mouth)	6	4	8	5	5								28
17A	Bear Creek (lower 0.6 miles)												1	1
18	Honeydew Cr. Maureen Catalina's to 2.5 miles us Bear Wallow Slide	7	1		13	2								23
18A	Honeydew Creek (lower 0.6 miles)									0	0	3	0	3
	Totals	79	38	34	44	21	22	40	96	88	85	19	36	602

Figure A-1. Upper Mattole: Summer Steelhead Sightings by Reach, 1996-2007.

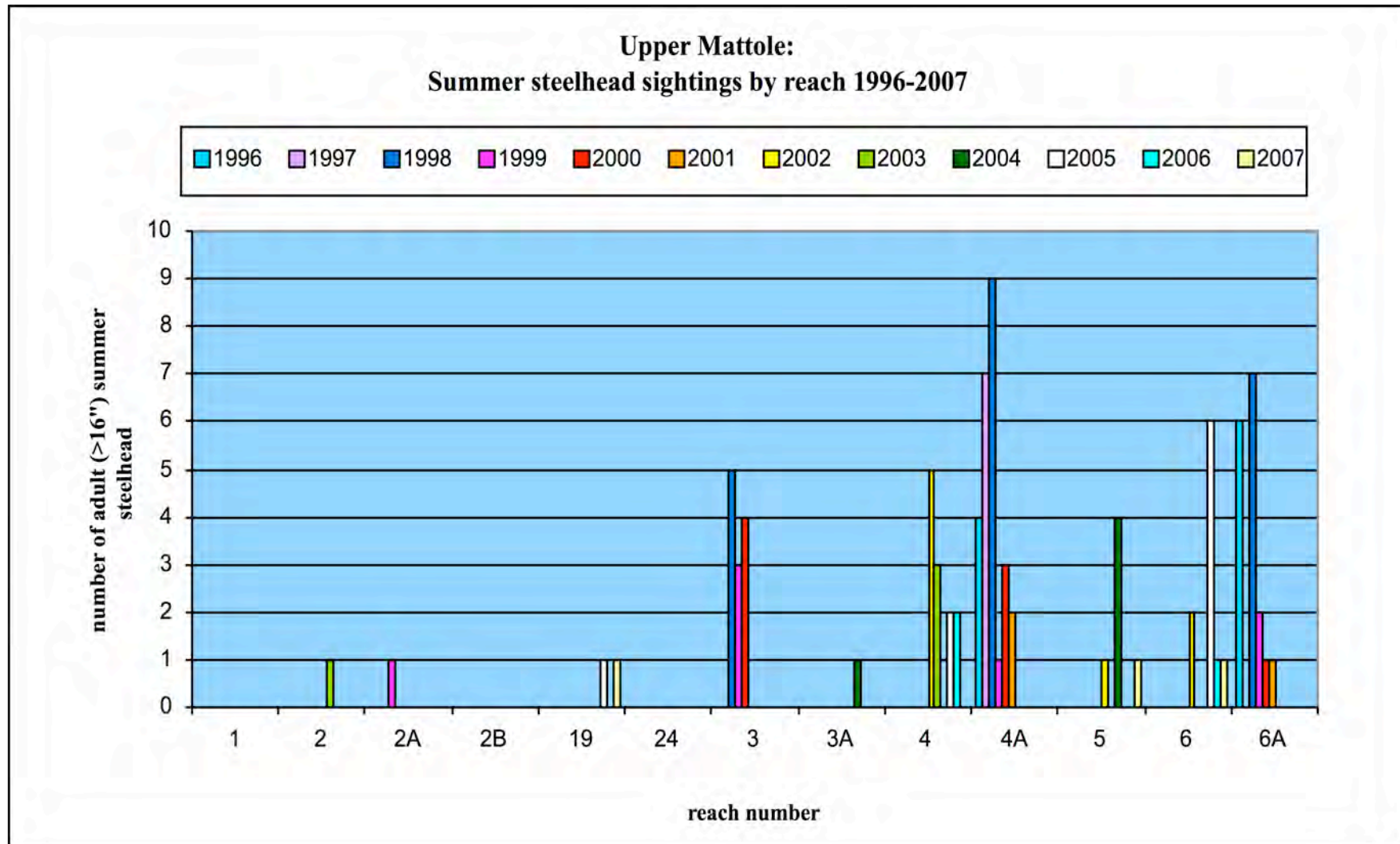


Figure A-2. Middle Mattole: Summer Steelhead Sightings by Reach, 1996-2007.

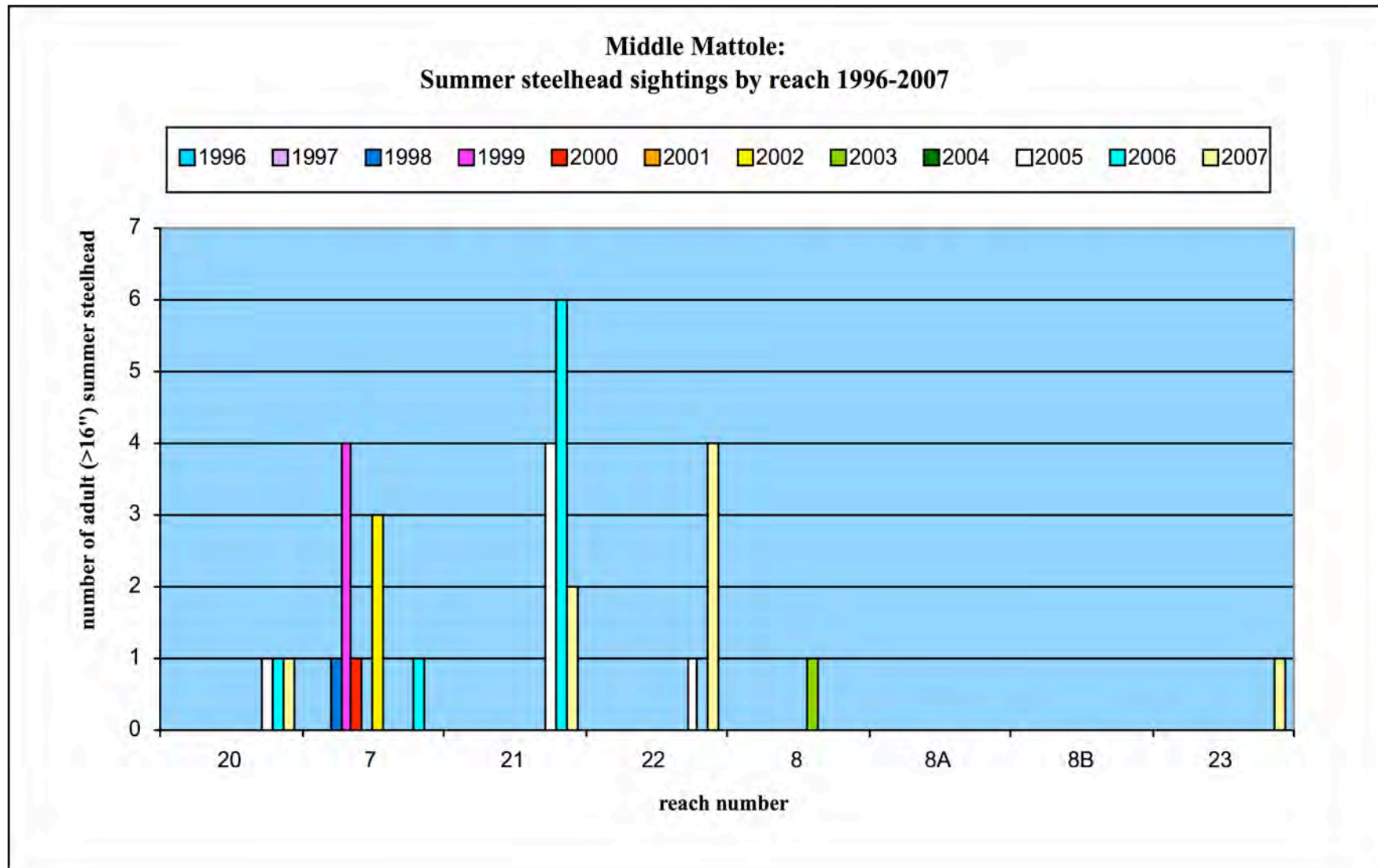
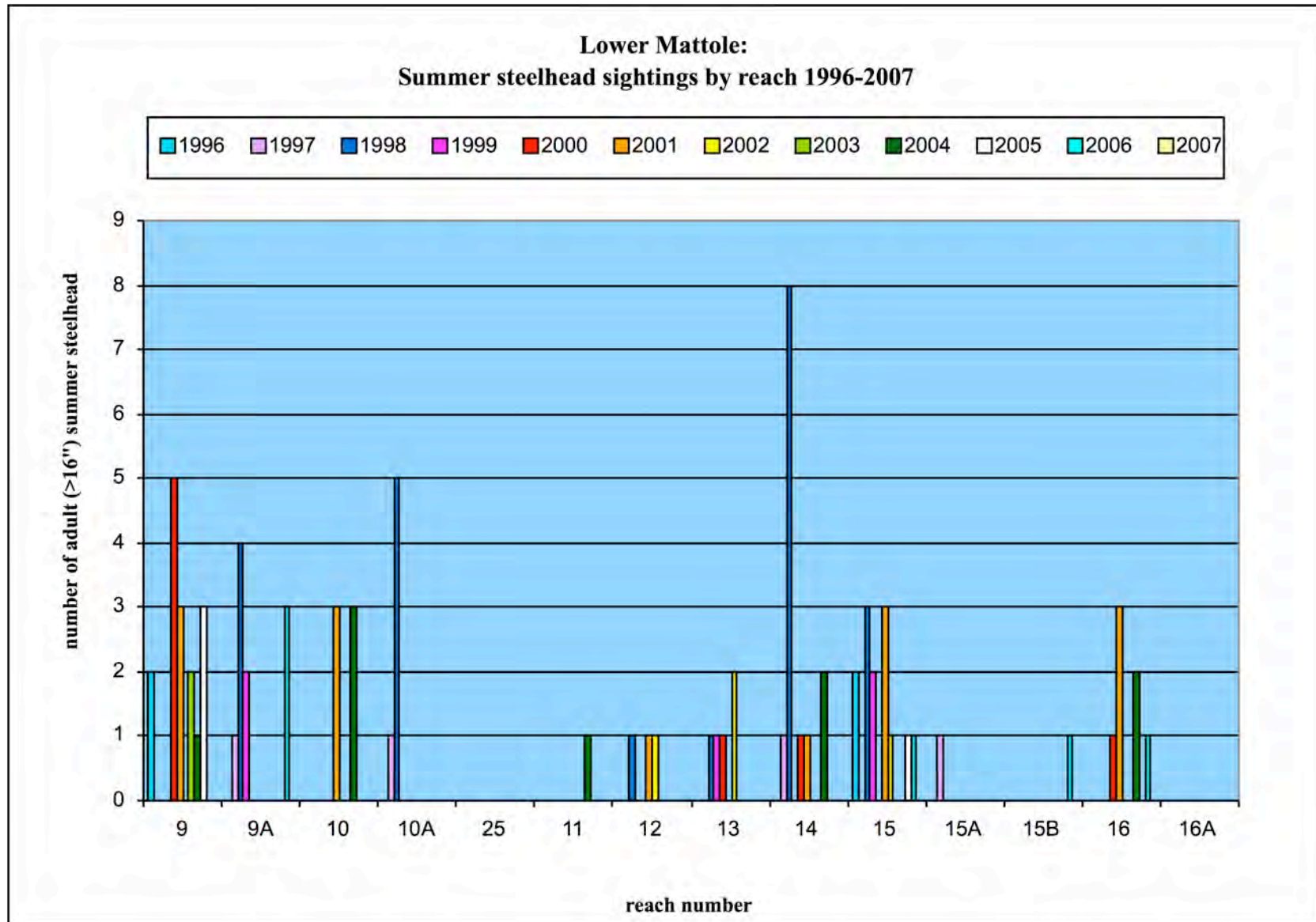


Figure A-3. Lower Mattole: Summer Steelhead Sightings by Reach, 1996-2007.



Appendix B. Temperature recordings and other species observed during the MSG 2007 Summer Steelhead Dive

Table B-1. Summary of Freshwater Mussels, Bull Frog Tadpoles, Crayfish, Western Pond Turtles, and other species seen by divers between the headwaters and the mouth of the Mattole River, during summer steelhead surveys, July-August 2007.

Reach #	River Mile (RM) Location	Location and Reach Name	Freshwater Mussels	Bull Frog Tadpoles	Crayfish	Western Pond Turtles	Other
1	RM 60.4 - RM 58.8	Upper Mattole: Phillips Creek to Lost River Creek	N/A	N/A	N/A	N/A	N/A
2	RM 58.8 - RM 57.1	Upper Mattole: Lost River Creek to Stanley Creek, including partial survey (0.15 miles) of Thompson Creek (RM 58, mouth to confluence with Yew Creek)	Yes, >100	No	No	No	9 vultures, leopard lily 4 sites, 2 rough-skinned newts
19	RM 57.1 - RM 55.6	Upper Mattole: Stanley Creek to Anderson Creek	No	No	No	No	4 newts, people, dead lamprey
24	RM 55.6 - RM 54.0	Upper Mattole: Anderson Creek to Van Arken Creek	7 sites, ~5-50 mussels at each site	No	No	No	Snakes (small aquatic garter?), sticklebacks, 1 lamprey carcass
3	RM 52.8 - RM 51.3	Upper Mattole: McKee Creek to Crook's	0	2	Yes, in Junction Hole	No	Yes, throughout
4	RM ~51.3 - RM ~49.4	Upper Mattole: Crook's to Tom's Hole (Patty's)	0	0	No	No	Yes, entire reach, lots of fish
5	RM ~49.4 - RM 47.4	Upper Mattole: Tom's Hole to Big Finley Creek	1	2	Yes, few just ds Tom' Hole, top 1/3 of reach in cooler spots	No	Yes, throughout
6	RM 47.4 - RM ~46.0	Upper Mattole: Big Finley Creek to Schepp's	1	6	No	No	Yes
20	RM ~46.0 - RM 42.7	Middle Mattole: Schepp's to upstream of Bear Creek	1	4	No	No	Yes, minimal numbers of SH
7	RM 42.7 - RM ~39.9	Middle Mattole: Upstream of Bear Creek to Klossen's Hole (downstream of Mattole Canyon Creek)	0	4	No	No	Yes, entire reach
21	RM 41.1 - RM 34.6	Middle Mattole: Mattole Canyon Creek to Fourmile Creek	2	4	No	No	Yes, entire reach

22	RM 34.6 - RM 32.8	Middle Mattole: Fourmile Creek to Gilham Creek	4	6	No	No	Yes
8A	RM 32.8 - RM 31.3	Middle Mattole: Gilham Creek to Middle Creek	0	2	Maybe	No	Yes, entire reach
8B	RM 31.3 - RM 30.4	Middle Mattole: Middle Creek to Dry Creek	0	2	No	No	Yes, entire reach
23	RM 30.4 - RM 27.0	Middle Mattole: Dry Creek to Honeydew Slide	1	15	No	No	Yes
9	RM 27.4 - RM 24.4	Lower Mattole: Honeydew Slide to Bundle Prairie Creek	0	2	No	No	Yes, entire reach
10	RM 24.4 - RM 21.3	Lower Mattole: Bundle Prairie Creek to Triple Junction High School	0	2	No	No	Yes
11	RM 19.7 - RM14.9	Lower Mattole: Saunders Creek to Squaw Creek	0	0	No	No	Yes, entire reach but patchy
12	RM 14.9 - RM 12.6	Lower Mattole: Squaw Creek to Lindley Bridge	0	1	No	Yes, beginning of reach, very few	Yes, throughout
13	RM 12.6 - RM 7.8	Lower Mattole: Lindley Bridge to Conklin Creek	0	1	No	No	Yes, entire reach
14	RM 7.8 - RM 5.2	Lower Mattole: Conklin Creek to Hideaway Bridge	0	0	No	No	Yes, only parts
15	RM 5.2 - RM 1.3	Lower Mattole: Hideaway Bridge to Stansberry Creek	0	1	No	No	Yes
15B	RM 3.0 - RM 1.3	Lower Mattole: Mattole Salmon Group office to Stansberry Creek	0	1	No	No	Yes
16	RM 1.3 - RM 0.0	Lower Mattole: Stansberry Creek to Ocean	0	0	Yes, sections 6, 3, 4 & 5 in woody cover	Yes, sections 6 (bottom open water) & 3 (in structure)	Yes, entire reach
17	RM 42.8 + 3.6	Bear Creek (Geppert/Spence's to mouth)	5	6	No	No	Yes, throughout. Lots of 6"-10" SH
18	RM 26.5 + 2.5	Honeydew Creek (Maureen Catalina's to 2.5 miles upstream of Bear Wallow Slide)	0	7	Maybe 2	No	Yes, entire reach
		Totals	8 reaches	20 reaches	6 reaches	4 reaches	All reaches

Table B-2. Mattole stream and air temperatures were recorded by handheld thermometers during Summer Steelhead Survey dates, July-August 2007.

Date	Location	Reach # / Letter Code	Time	Tributary Temp (°F)	Mattole Temp (°F)	Depth	Air Temp (°F)
7/23	Lost River Creek (RM 58.8)	2/A	10:30	60	60	6"/12"	70
7/23	Helen Barnum Creek (RM 58.7)	2/B	10:35	60	60	6"/12"	70
7/23	Thompson Creek (RM 58.4)	2/C	12:30	62	62	12"/12"	74
7/23	Baker Creek (RM 57.6)	2/D	15:00	62	64	12"/12"	74
7/23	Stanley Creek (RM 57.1)	2/E	17:00	62	66	3"/12"	71
7/13	Mattole @ Stanley Creek Pool (RM 57.1)	19/A	10:30	--	57	6"	68
7/13	Gibson Creek (RM 56.8)	19/B	11:30	55	58	6"	70
7/13	Harris Creek (RM 56.5)	19/C	11:55	55	57	2'	70
7/13	Upper Mill Creek (RM 56.2)	19/D	12:45	56	58	1'	70
7/13	East Anderson Creek (RM 55.8)	19/E	13:35	57	60	2'	69
7/13	Anderson Creek (RM 55.6)	19/F	14:30	55	60	6"	70
7/13	Takeout - Mattole ds Anderson	19/G	15:55	--	59	8"	70
7/13	Anderson Creek (RM 55.6)	24/A	11:00	54	56	10 cm	66
7/13	Trib on Right if facing ds	24/B	13:15	54	59	20 cm	65
7/13	Van Arken Creek (RM 54.0)	24/C	14:45	56	59	40 cm	65
7/13	Mattole @ McKee Creek (RM 52.8)	3/A	11:00	56	59	--	76
7/13	Bridge Creek (RM 52.1)	3/B	--	57	59	--	77
7/13	Crook's (RM 51.3)	3/C	--	--	59	--	77
7/13	Crook's (RM 51.3)	4/A	13:45	--	63	1"	79
7/13	Small trib LB	4/B	--	55	63	1"	68
7/13	Nooning Creek (RM 50.2)	4/C	16:30	55	63	1"	68
7/13	Trib RB	4/D	17:15	59	64	1"	65
7/13	Tom's Hole (RM ~49.4)	4/E	18:15	--	65	1"	--
7/13	Tom's Hole (RM ~49.4)	5/A	14:45	--	65	6"	79
7/23	Put-in us Tom's Hole	5/A	11:45	--	66	6"	77
7/23	Put-in us Tom's Hole	5/B	12:25	--	67	surface	79
7/23	Tom's Hole (RM ~49.4)	5/C	13:00	--	66	1'	--
7/23	Tom's Hole (RM ~49.4)	5/D	15:40	--	71/68	surface/ 3'	--
7/23	biggest waterfall in reach	5/E	16:30	--	70	1'	--
7/23	Big Finley Creek Hole	5/F	17:20	61	72	--	--
7/13	Big Finley Hole	6/A	12:30	60	63	2-3'	71
7/13	Mattole @ Big Finley deep	6/B	12:30	--	63	15'	71
7/13	Little Finley Creek	6/C	--	60	62	1'	71
7/13	End of Reach (Schepp's)	6/D	--	--	67	0.5'	65
7/14	Put-in @ Schepp's (RM 46.0)	20/A	12:00	--	63	1'	78
7/14	left bank trib (Grasshopper Hill Creek (RM 45.0))	20/B	14:00	57	68	1'	74
7/14	MSG adult trap site: Mattole us Bear (RM 42.7)	20/C	18:30	--	73	<1'	68
7/14	~ 1 mile us Bear Creek confluence	7/A	--	--	77	--	79
7/14	Bear Creek (RM 42.8)	7/B	--	69	77	--	79
7/14	Mattole ~ 1 mile us Bear Creek	7/A	--	--	77	--	79
7/14	Mattole @ Bear Creek (RM 42.8)	7/B	--	69	77	--	79
8/27	Mattole @ Mattole Canyon Creek	21/A	12:45	--	73	4"	84
8/27	Grindstone Creek	21/B	16:00	66	77	6"	78
8/27	Harrow Creek	21/C	16:20	60	77	2"	75
8/28	RB trib	21/D	11:30	59	67	1'	65

8/28	Takeout, Mattole us Fourmile Creek	21/E	12:30	--	73	1'	83
7/13	Takeout near Gilham Creek (RM 32.8)	22/A	17:30	--	68	surface	80
7/14	tiny tributary downstream of Gilham Cr.	8A/A	13:00	59.5	78	2"	79
7/14	Gilham Creek start (RM 32.8)	8A/B	13:50	63	78	3"	81
7/14	mainstem Mattole cold seep	8A/C	15:25	76	81	4'	82
7/14	Westlund Creek (RM 31.7)	8A/D	16:32	65	79.5	2"	82
7/14	Middle Creek (RM 31.3)	8A/E	17:36	70.5	79	1.5"	79
7/27	Middle Creek (RM 31.3)	8B/A	10:30	--	72	1'	--
7/27	pool by LB bedrock point	8B/B	--	--	74	2'	--
7/27	long pool	8B/C	--	--	75.5	1'	--
7/27	pool ds Dry Creek	8B/D	--	--	72	5'	--
7/27	Mattole @ Dry Creek (RM 30.4)	8B/E	--	--	76	--	--
7/27	Dry Creek (RM 30.4)	8B/F	--	70	--	"	--
7/14	Dry Creek (RM 30.4)	23/A	11:25	65	72	3'	75
7/14	Honeydew Slide (RM 27.4)	9/A	11:00	--	72	2"	76
7/14	Honeydew Creek (RM 26.5)	9/B	--	65	76	2"	79
7/14	Upper North Fork (RM 25.5)	9/C	~14:00	79	77	6"	73
7/13	Bundle Prairie Creek - dry (RM 24.5)	10/A	10:15	dry	68	~6"	--
7/13	Bedrock Formation, RB cold seep	10/B	12:00	--	63	5'	--
7/14	Saunders Creek (RM 19.9)	11/A	11:00	--	69	10 cm	71
7/14	Granny Creek (RM 19.2), mainstem pool	11/B	12:00	54	70	pool	--
7/14	Thornton Creek (RM 17.2), mainstem pool	11/C	13:30	56	75	pool	83
7/14	Squaw Creek (RM 14.9)	11/D	16:00	--	76	30 cm	--
7/14	Mattole @ Squaw Creek (RM 14.9)	12/A	11:00	--	71	6"	71
7/14	Small Trib (Green Fir Creek, RM 13.2)	12/B	11:15	64	78	18"	71
7/14	Wild Turkey Creek (RM 12.7)	12/C	14:30	58	73	18"	73
7/14	Lindley Bridge takeout (RM 12.6)	12/D	15:00	--	75	6"	72
7/14	Lindley Bridge (RM 12.6)	13/A	11:00	--	71	10"	71
7/14	Indian Creek (RM 11.7)	13/B	--	--	74	6"	--
7/14	Unnamed trib- 5 gallon per minute	13/C	--	60	74	1'	70
7/14	McGinnis Creek (RM 8.0)	13/D	17:30	70	78	1'	67
7/14	Conklin Creek (survey end) (RM 7.8)	13/E	18:30	72	77	1'	70
7/14	Conklin Creek (RM 7.8)	14/A	10:30	65	74	--	--
7/14	Clear Creek (RM 6.1)	14/B	11:45	60	75	--	--
7/14	East Mill Creek (RM 5.4)	14/C	1:50	65	77	--	--
7/13	Hideaway Bridge (RM 5.2)	15/A	10:00	--	67	2'	75
7/14	Wingdam 2	15B/A	13:30	--	74	3'	--
7/14	Lower Mill Creek (RM 2.9)	15B/B	--	59	66	3'	72
7/14	Groeling Run	15B/C	--	--	75	4'	--
7/14	Jim Goff Gulch	15B/D	--	--	75	6'	--
7/14	Moore Hill Springs	15B/E	--	--	73	3'	--
7/14	Cold Pool us Stansberry Creek	15B/F	--	71	76	3'	--
7/14	Stansberry Creek (RM 1.3)	15B/G	16:30	71	--	3'	--
7/14	Top of Section 6 Estuary Unit (ds Stansberry Cr)	16/A	13:00	--	73	2'	--
7/13	Bear Creek put-in, Joelle's access	17/A	11:00	--	58	1'	68
7/13	1st trib on RB	17/B	12:30	57	62	1'	68
7/13	2nd trib on RB	17/C	14:00	57	64	<1'	66
7/13	Jewitt Creek	17/D	16:30	62	65	1'	67
7/13	Bear Creek confluence with Mattole	17/E	19:30	--	68	<1'	65
7/13	End of reach @ Maureen Catalina's	18/A	11:00	--	60	10"	64.5
7/13	Deep pool with 2 1/2 pounders	18/B	12:45	--	62	4'	82

7/13	confluence of creeks	18/C	14:05	64	62	3'	84
7/13	West Fork Honeydew Creek	18/D	15:12	--	60	1'	65
7/13	Honeydew Creek	18/E	15:19	--	62	1'	65
7/13	confluence of W.Fk.Honeydew+Honeydew Creek	18/F	15:27	--	61	3'	69