Final Report
Summer Steelhead Survey, 2009 Season
Mattole River Watershed

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Abstract

The 14th Annual Mattole Summer Steelhead Dive took place on July 16-22, 2009. The purpose of the summer steelhead survey was to enumerate summer-run adult steelhead and "half-pounders" in the Mattole River and identify their distribution in the mainstem Mattole River and the lower sections of two major tributaries, Bear Creek and Honeydew Creek. Additionally, the survey provided information on distribution of juvenile salmonids, other species of interest, cool-water habitat and potential restoration sites throughout the mainstem Mattole.

Mattole Salmon Group staff and volunteer divers surveyed 59.3 accumulated miles of the mainstem Mattole and 6.25 miles of tributaries. Divers observed a total of 33 adult summer steelhead (>16 inches in length) and 49 half-pounders (12-16 inches in length) during the 2009 survey.

The number of adults observed per mile of survey effort in 2009 (0.50) exceeded the average over the past fourteen years of surveys (0.46). Adult observations per mile were significantly higher this year and in 2008 (0.55) than average in the five years prior (0.28). The lowest number of adult sightings per survey mile was in 2003 (0.19). The number of "half-pounders" observed per mile of survey effort in 2009 (0.75) was less than the fourteen-year average of "half-pounders" per mile (1.19).

Juvenile steelhead were noted in all survey reaches. Juvenile coho were observed exclusively upstream of RM 54.0. Juvenile Chinook salmon were observed in three reaches, including the uppermost reach near the headwaters, upstream of Bear Creek (RM 42.8), and the Mattole Estuary. Temperatures recorded were comparable to mid-summer temperatures documented since the 2000 Summer Steelhead Dive.

The MSG has observed trends in habitat distribution of summer steelhead in the Mattole over the past fourteen years of surveys. Few summer steelhead are observed near the Mattole headwaters upstream of McKee Creek (RM 42.8), due to small channel size, resulting lack of deep pool habitat, and recent issues with summertime low flow. Consistently, the greatest number of summer steelhead per mile has been observed from McKee Creek (RM 52.8) to Dry Creek (RM 30.4). Deep pools in the upper and middle river represent the best oversummering habitat for adult steelhead in the Mattole. In the lower river, summer steelhead are observed less frequently, in limited habitat with cooler temperatures, deep pools and instream cover. A small number of summer steelhead have also been found oversummering in Honeydew Creek and Bear Creek, the two largest tributaries to the Mattole.

Introduction

The Mattole River steelhead population falls within the Northern California (NC) Evolutionary Significant Unit (ESU), which includes both winter and summer steelhead (Busby et al. 1996). Present data indicates population abundances of steelhead in northern California are very low relative to historical estimates (Busby et al. 1996). Summer steelhead are currently suffering the greatest declines, as they are particularly vulnerable to freshwater habitat deterioration (Clemento 2007). In California, significant wild summer steelhead trout populations exist solely in remote areas of the Eel and Klamath-Trinity systems, although evidence of the summer steelhead life history pattern has been found in over 25 tributaries of seven major river drainages (Roelofs 1983).

Genetic analysis of steelhead in the Middle Fork Eel River indicates the summer steelhead phenotype has a heritable component (Clemento 2007). Genetic divergence between summer and winter run steelhead has management implications for the Mattole and throughout the range where summer steelhead are observed, arising from the listing of NC Steelhead as threatened under the Endangered Species Act. Proven genetic differences would potentially result in more extensive protection status for summer run steelhead. As winter and summer run steelhead are currently listed under the same ESU, their protection status does not take into account the disproportionately depressed state of summer steelhead populations in comparison to the winter phenotype.

Spawner survey and dive observations of steelhead provide evidence of different life history patterns among Mattole steelhead. According to local restorationists, most steelhead in the Mattole spawn from late-December to May, with the peak of spawning activity believed to be in February and March. Infrequently, MSG surveyors have also reported observations of steelhead spawning in June. MSG divers have observed very small, emergent SH fry in July and even August. However, overlap in migration and spawning periods of winter and summer steelhead makes distinction difficult (Roelfs 1983).

The observed Mattole population is believed to be the southernmost summer steelhead population to inhabit a watershed without significant snowmelt during spring and summer (Garza 2005). As the Mattole is located at or near the southern extent of the species, warmer water temperatures in the Mattole as well as limited habitat due to watershed disturbance threaten summer steelhead.

The summer run of steelhead is perhaps the most unique of the diverse life history strategies exhibited by steelhead (Clemento 2007). In the Mattole, summer steelhead enter the river between March and June (Downie et al. 2002), before the river mouth closes for the summer. Summer steelhead are sexually immature (undeveloped gonads) upon river entry. They spend the summer instream before spawning during the ensuing rainy season, usually between January and March. Typically, juvenile steelhead spend two years in the Mattole before migrating to the ocean for one to three years. Ninety percent of returning steelhead spawners are three to four years old (Downie et al. 2002). Summer steelhead in the Mattole can be large; the average size is approximately 26” for males 24” for females (Downie et al. 2002.).

MSG surveyors designate 12 to 16 inch steelhead without parr marks as “half-pounders”. The “half-pounder” life strategy (terminology of Snyder 1925) in steelhead is found only in the Rogue, Mad, Klamath, and Eel Rivers of southern Oregon and northern California (Busby et al. 1996). After smolting, half-pounders reside in the ocean for 2-4 months before returning to freshwater. They overwinter in the river, then return to the ocean in the spring. This is sometimes called a “false migration;” half-pounders are usually sexually immature (Busby et al. 1996). 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).

Presence of “half-pounders” in the Mattole is anomalous; other watersheds with half-pounder migrations have significant snowmelt. However, life history similarities between steelhead of the Northern California ESU and those of the Klamath Mountains Province ESU do exist (Busby et al.1996), so it is possible there may be true half-pounders in the Mattole.

Materials and Methods

Summer steelhead surveys were conducted in as few consecutive days as possible to ensure similar hydrologic and thermal conditions on survey days. 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, surveyed each reach. 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 by the project coordinator.

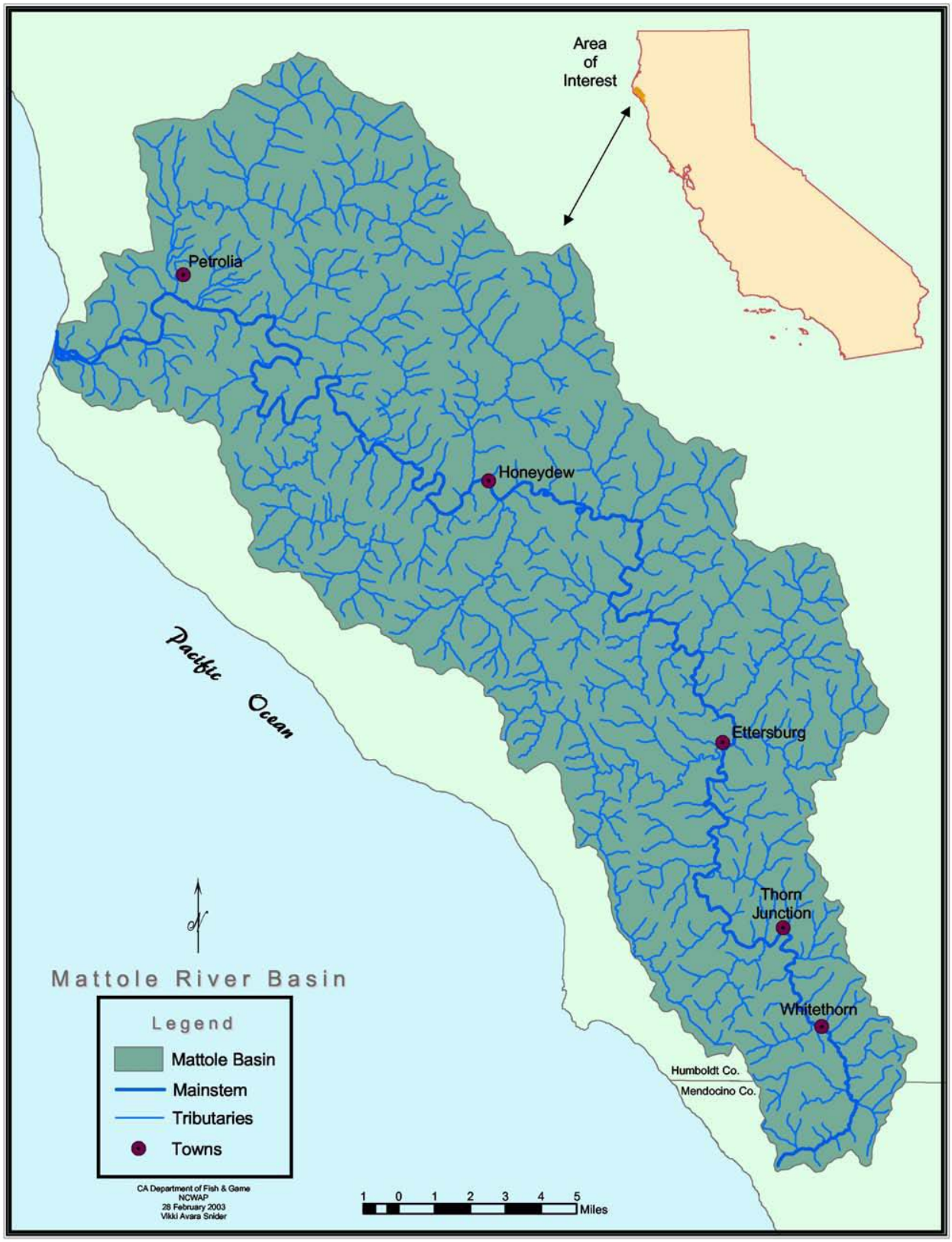
Surveyors snorkeled every area of the mainstem in their assigned reach that was deep enough to snorkel. Steelhead observations were recorded by size-class. Steelhead with an estimated fork length of greater than sixteen inches were designated adult summer steelhead, and those with a fork length between 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, 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, western pond turtle, crayfish, bullfrog tadpole, and freshwater mussel sightings were recorded and mapped (Appendix B, Table B-1).

Surveys occurred throughout the Mattole watershed (Figure 1). For the purposes of this report, the watershed is divided into the upper Mattole (river miles 58.8 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 lower Mattole (river miles 27.0 to the ocean; reaches 9, 10, 25, 11, 12, 13, 14, 15, 15B, and 16), based on observations of summer steelhead habitat utilization in the past. Three tributaries were also surveyed, including Thompson Creek [river mile (RM) 58.4 +0.15, part of reach 2], Bear Creek (RM 42.8 +3.6, reach 17) and Honeydew Creek (RM 26.5 +2.5, reach 18).

Figure 1. Mattole Watershed



Source: Downie et al. 2003

Results

Adult Summer Steelhead and "Half-Pounders"

In 2009, MSG divers observed 33 adult summer steelhead and 49 "half-pounders" in 65.55 miles surveyed (Table 1). Thirty-one adult summer steelhead and 43 "half-pounders" were observed in the Mattole mainstem, while 2 adult summer steelhead and 6 "half-pounders" were observed in tributaries. The survey comprised twenty-five reaches, varying in length from 1.3 to 4.8 miles. Approximately 59.3 accumulated survey miles of the mainstem Mattole (56 river miles due to slight overlapping of reaches in some cases) and 6.25 miles of tributaries were surveyed.

Adult summer steelhead observations occurred from RM 47.4 to RM 1.3 in 2009, with the greatest number (19) of observations occurring from RM 47.4 to RM 27.0. This distribution follows the general trend observed over the past 14 years, with one exception. In both 2008 and 2009, there were an unusually high number of observations in the lower Mattole. 2008 was a low water year in the Mattole, with an early mouth closure (5/15/08) and lack of spring rain. The low river conditions appeared to isolate adult summer steelhead to habitat lower in the river system than usual. In 2009, later mouth closure (6/28/09) and higher flows corresponded to a greater number of adult summer steelhead upriver. Despite this, adult observations in the lower river were numerous relative to other years. The discrepancy lies in their distribution within the lower river. In 2009, 50% of adults were found in the reach encompassing the Honeydew Slide reach, where adults are most commonly observed in the lower river. Comparatively, 15% of adults observed in 2008 were observed in the Honeydew Slide reach, while the remainder were distributed in the lower river in greater numbers than observed in any other year.

More "half-pounders" were observed than adults, and they were more widely distributed. "Half-pounder" observations occurred throughout the mainstem, occurring more frequently in the upper Mattole than adult observations. Smaller size allows "half-pounders" to better utilize habitat near the headwaters, where adult utilization is limited by lack of deep pools in conjunction with low flow.

Table 1. 2009 Adult and "Half-pounder" Observations

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)	7/17	Maureen Roche*, Karl Schneider	1.7 + 0.15	0	0
19	RM 57.1 - RM 55.6	Upper Mattole: Stanley Creek to Anderson Creek	7/17	Steve Gough*, Lisa Roberts, Dave Block	~1.5	0	3
24	RM 55.6 - RM 54.0	Upper Mattole: Anderson Creek to Van Arken Creek	7/17	Amanda Pisatelli*, Brian Jenke, Chris Root	~1.6	0	3
3	RM 52.8 - RM 51.3	Upper Mattole: McKee Creek to Crook's	7/17	Aaron Johnson*, Ray Lingel	~1.5	0	0
4	RM ~51.3 - RM ~49.4	Upper Mattole:	7/17	Sean James*, Becca	~1.9	0	2

		Crook's to Tom's Hole		Biggs, Jeff Hayes			
5	RM ~49.4 - RM 47.4	Upper Mattole: Tom's Hole to Big Finley Creek	7/17	Noah Stafslien*, Sierra Simpson, Ryan Brown	~2.0	0	2
6	RM 47.4 - RM ~46.0	Upper Mattole: Big Finley Creek to Schepp's	7/17	Keytra Meyer*, Nathan Queener, Natalie Arroyo*	~1.4	2	2
20	RM ~46.0 - RM 42.7	Middle Mattole: Schepp's to upstream of Bear Creek	7/17	Tony Heacock*, Phil Heacock, Josh Troyer	~3.3	3	0
7	RM 42.7 - RM ~ 39.9	Middle Mattole: Upstream of Bear Creek to Klossen's Hole (downstream of Mattole Canyon Cr eek)	7/17	Jen Hayes, Kate Rowe, Sarah Burstein, Lindsey Barris	2.8	0	0
21A	RM 41.1 - RM 39.0	Middle Mattole: Mattole Canyon Creek to Grindstone Creek	7/18	Tony Heacock*, Phil Heacock, Pete Tans	2.1	7	0
21B	RM 39.0 - RM 34.6	Middle Mattole: Grindstone Creek to Fourmile Creek	7/18	Aaron Johnson*, Dan Gebhardt, Sarah Burstein	4.4	1	2
22	RM 34.6 - RM 32.8	Middle Mattole: Fourmile Creek to Gilham Creek	7/18	Flora Brain*, Nathan Queener, Hugh McGee, Darlene Santner	1.8	1	3
8	RM 32.8 - RM 30.4	Middle Mattole: Gilham Creek to Dry Creek	7/18	Kate Cenci*, Jeff Hayes, Josh Troyer	2.4	0	3
23	RM 30.4 - RM 27.0	Middle Mattole: Dry Creek to Honeydew Slide	7/18	Natalie Arroyo*, Jacob Pounds, Steve Gough*	3.4	5	4
9	RM 27.4 - RM 24.4	Lower Mattole: Honeydew Slide to Bundle Prairie Creek	7/18	Maureen Roche*, Lindsey Barris, Ryan Brown	3	6	11
10	RM 24.4 - RM 21.3	Lower Mattole: Bundle Prairie Creek to Triple Junction High School	7/17	Will Kelly*, Monica Scholey, Julia Ralsten, Dylan Cook	3.1	1	4
11	RM 19.7 - RM 14.9	Lower Mattole: Saunders Creek to Squaw Creek	7/18	Amanda Pisatelli*, Karl Schneider, Brian Jenke	4.8	0	0
12	RM 14.9 - RM 12.6	Lower Mattole: Squaw Creek to Lindley Bridge	7/18	Amy Baier*, Monica Scholey	2.3	0	0
13	RM 12.6 – RM 7.8	Lower Mattole: Lindley Bridge to Conklin Creek	7/18	Will Kelly*, Dave Block, Chris Root	4.8	0	2
14	RM 7.8 – RM 5.2	Lower Mattole: Conklin Creek to Hideaway Bridge	7/18	Sean James*, Lisa Roberts, Kate Rowe	2.6	1	0
15	RM 5.2 – RM 3.9	Lower Mattole: Hideaway Bridge to MSG Downstream Migrant Trap	7/22	Flora Brain* Taylor Kelly, Shawnte Boldt	1.3	1	0
15	RM 3.9 - RM 1.3	Lower Mattole: MSG Downstream Migrant Trap to Stansberry Creek	7/22	Campbell Thompson*, Sage, Avery, Elena	2.6	3	1

15B	RM 3.0 – RM 1.3	Lower Mattole: Mattole Salmon Group office to Stansberry Creek	7/18	Michael Evenson*, Laird Leatherwood, Kobe Brunka	1.7	0	0
16	RM 1.3 – RM 0.0	Lower Mattole: Stansberry Creek to Ocean	7/16	Kate Cenci*, Maureen Roche*, Sarah Burstein, Steph Cepellos	1.3	0	1
17	RM 42.8 + 3.6	Bear Creek (Geppert/Spence's to mouth)	7/17	Kate Cenci*, Hugh McGee	(+~3.6)	1	4
18	RM 26.5 + 2.5	Honeydew Creek (Maureen Catalina's to 2.5 miles upstream of Bear Wallow Slide)	7/20	Will Kelly*, Monica Scholey	(+~2.5)	1	2
		Totals			65.55 total survey miles**	33	49

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 mainstem river miles surveyed (due to slight overlap of reaches in a few cases). Note that letter codes refer to variances between current and past reaches.

Juvenile Salmonid Distribution

Juvenile steelhead were found in all survey reaches in 2000 through 2009. Both juvenile coho and Chinook were observed in three reaches, although their distribution differed (Table 2). Juvenile coho were observed exclusively in mainstem upstream of river mile 47.4 (reaches 2, 19, and 24). Juvenile Chinook were found in the uppermost reach (2), in the middle river near Bear Creek (reach 7, RM 42.7 to RM 39.9), and in the estuary (reach 16).

Table 2. Summary of adult summer steelhead, "half-pounders," and juvenile salmonid observations between the headwaters and the mouth of the Mattole River, July 17-22, 2009.

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	0	1046, in most pools	143	2479, throughout
19	RM 57.1 - RM 55.6	Upper Mattole: Stanley Creek to Anderson Creek	0	3	Yes, near beginning of reach in shallow water	No	Yes, entire reach
24	RM 55.6 - RM 54.0	Upper Mattole: Anderson Creek to Van Arken Creek	0	3	Yes, in cold, shaded pools	No	Yes, entire reach
3	RM 52.8 - RM 51.3	Upper Mattole: McKee Creek to Crook's	0	0	No	No	Yes, entire reach
4	RM ~51.3 - RM ~49.4	Upper Mattole: Crook's to Tom's Hole (Patty's)	0	2	No	No	Yes, entire reach
5	RM ~49.4 - RM 47.4	Upper Mattole: Tom's Hole to Big Finley Creek	0	2	No	Possibly (one), second pool	Yes, entire reach
6	RM 47.4 - RM ~46.0	Upper Mattole:	2	2	No	No	Yes, entire reach

		Big Finley Creek to Schepp's					
20	RM ~46.0 - RM 42.7	Middle Mattole: Schepp's to upstream of Bear Creek	3	0	No	No	Yes, entire reach
7	RM 42.7 - RM ~ 39.9	Middle Mattole: Upstream of Bear Creek to Klossen's Hole (downstream of Mattole Canyon Cr eek)	0	0	No	Yes	Yes, entire reach
21A	RM 41.1 - RM 39.0	Middle Mattole: Mattole Canyon Creek to Grindstone Creek	7	0	No	No	Yes, entire reach
21B	RM 39.0 - RM 34.6	Middle Mattole: Grindstone Creek to Fourmile Creek	1	2	No	No	Yes, entire reach
22	RM 34.6 - RM 32.8	Middle Mattole: Fourmile Creek to Gilham Creek	1	3	No	No	Yes, entire reach
8	RM 32.8 - RM 30.4	Middle Mattole: Gilham Creek to Dry Creek	0	3	No	No	Yes, entire reach
23	RM 30.4 - RM 27.0	Middle Mattole: Dry Creek to Honeydew Slide	5	4	No	No	Yes, entire reach
9	RM 27.4 - RM 24.4	Lower Mattole: Honeydew Slide to Bundle Prairie Creek	6	11	No	No	Yes, entire reach (>12,720 over 4")
10	RM 24.4 - RM 21.3	Lower Mattole: Bundle Prairie Creek to Triple Junction High School	1	4	No	No	Yes, entire reach
11	RM 19.7 - RM14.9	Lower Mattole: Saunders Creek to Squaw Creek	0	0	No	No	Yes, throughout reach in pools and runs
12	RM 14.9 - RM 12.6	Lower Mattole: Squaw Creek to Lindley Bridge	0	0	No	No	Yes, entire reach
13	RM 12.6 – RM 7.8	Lower Mattole: Lindley Bridge to Conklin Creek	0	2	No	No	Yes, entire reach
14	RM 7.8 – RM 5.2	Lower Mattole: Conklin Creek to Hideaway Bridge	1	0	No	No	Yes, entire reach
15	RM 5.2 – RM 3.9	Lower Mattole: Hideaway Bridge to MSG Downstream Migrant Trap	1	0	No	No	Yes, entire reach
15	RM 3.9 - RM 1.3	Lower Mattole: MSG Downstream Migrant Trap to Stansberry Creek	3	1	No	No	Yes, entire reach
15B	RM 3.0 – RM 1.3	Lower Mattole: Mattole Salmon Group office to Stansberry Creek	0	0	No	No	Yes, throughout
16	RM 1.3 – RM 0.0	Lower Mattole: Stansberry Creek to Ocean	0	1	No	Yes, Stansberry, Area 6,5,4,3	Yes, entire reach
17	RM 42.8 + 3.6	Bear Creek (Geppert/Spence's to mouth)	1	4	No	No	Yes, entire reach

18	RM 26.5 + 2.5	Honeydew Creek (Maureen Catalina's to 2.5 miles upstream of Bear Wallow Slide)	1	2	No	No	Yes, entire reach
		Totals*	13 reaches	16 reaches	3 reaches	3 reaches	All reaches

*Reaches 15 and 15B are counted just once as they completely overlap.

Non-salmonid Species

Observations of non-salmonid species, including western pond turtles, freshwater mussels, bullfrog tadpoles, and crayfish, among others, recorded during the 2009 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 eleven years, MSG divers have observed well over 250 turtles throughout the Mattole. Turtle observations are most common from McKee Creek (RM 52.8) to the Estuary. In 2009, 33 turtles were observed, 32 in the mainstem downstream of RM 52.8 and one in Bear Creek.

As a watershed-wide dive survey, the Summer Steelhead Dive is a good opportunity to observe the distribution and abundance of aquatic indicator species and invasive species.

Freshwater mussels are an excellent indicator of the long-term health of aquatic ecosystems, as they are sensitive to changes in water quality and reflect cumulative effects of environmental conditions over time due to their long life span (Nedeau et al 2006). Mussels are sensitive to low dissolved oxygen, chemical contamination, and sedimentation, so their presence is a good indicator for favorable fish habitat. Freshwater mussels inhabit the entire upper Mattole and are also found in the middle river to a lesser extent. In 2009, divers observed mussels from RM 58.8 (Lost River Creek) to RM 42.7 (Bear Creek), with the greatest concentration from RM 52.8 (McKee Creek) to RM 42.7 (reaches 3, 4, 5, 6 and 20).

Bullfrog tadpoles are a widespread invasive aquatic species throughout much of the western United States and southwestern Canada. Bullfrog tadpoles are implicated in the decline of native species through competition and predation (Moyle 1973; Kupferburg 1997; Rosen and Schwalbe 2002; Pearl et al. 2004). Recent evidence of predation on juvenile coho salmon (Garwood et al. 2010) underscores the importance of monitoring their presence in the Mattole. In 2009, bullfrog tadpoles were observed in only two reaches, both in the lower river (reach 11, RM 19.7 to 14.9, and reach 14, RM 7.8 to 5.2). Significant care should be taken to prevent their spread upstream and into the headwaters, where the majority of coho rearing habitat exists, in order to prevent predation.

Crayfish are another aquatic invasive species found in the Mattole. Observations from the past two years of dives indicate crayfish are both expanding their range and increasing in number in the Mattole. In 2009, crayfish were distributed from RM 51.3 (ds of Bridge Creek) to RM 42.7 (Bear Creek). Surveyors reported seeing great numbers of crayfish throughout the river downstream of the Nooning Creek gorge to Bear Creek, although a few were observed upstream of the gorge.

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 within 2-3 degrees Fahrenheit of those recorded in past years. The 2009 Summer Steelhead Dive occurred close to the period where maximum temperatures were reached at many MSG Temperature Monitoring sites, indicating temperatures recorded are likely to represent peak or near-peak temperatures during summer 2009.

Habitat Utilization

During the MSG dives, most summer steelhead were observed in characteristic oversummering 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.

Discussion

Adult Summer Steelhead and "Half-Pounders"

Over the past 14 years, divers observed an average of 20.57 adult (>16") steelhead per year. The greatest number of summer steelhead observed was 44 in 1998. The greatest number of "half-pounders" documented was 96 in 2000. 2003 observations were collectively the lowest of any year on record; divers observed only 9 adult summer steelhead and 21 "half-pounders." The minimum number of "half-pounders" observed was 19 in 1997.

Despite more miles surveyed over the past five years, the MSG has not noted a corresponding increase in the number of adult summer steelhead observed (Figure 2). 2008 and 2009 were the exception to this trend, with 36 and 33 adults observed, respectively. 2008 was the second highest count of adult summer steelhead on record, and 2009 was the third highest.

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. Since the Summer Steelhead Dive began in 1996, the number of adults observed per mile has ranged from a minimum of 0.19 in 2003 to a maximum of 0.55 in 1996 and 2008. An average of 0.46 adults per mile have been observed over the 14 years surveyed. From 1996 through 2002 the average number of adult summer steelhead observed per mile was 0.56. From 2003 to 2007, the average fell to 0.28 adult summer steelhead per mile, and it seemed the observed population was declining. However, more adults per mile have been observed in the past two years. In 2009, MSG divers observed approximately 0.50 adults per mile (33 adults in 65.55 miles, Table 2). In 2008, 0.55 adults were observed per mile, tying 1996 for the highest number of adult observations per mile.

Divers observed fewer "half-pounders" in 2009 (49) than in the two years prior. "Half-pounder" observations were much higher in 2007 (79) and 2008 (73) than the 14-year average (51.71).

"Half-pounder" sightings per mile averaged 1.19 over the fourteen years of Mattole Summer Steelhead dive counts. By comparing "half-pounders" observed per mile since 1996, a trend of declining observations is clear. An average of 1.57 "half-pounders" per mile were seen from 1996-2002. Despite the high "half-pounder" counts in 2007-2008, the average of "half-pounder" observations per mile has fallen to 0.80 for the 2003-2009 survey years.

Figure 2. 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, 1996-2009.

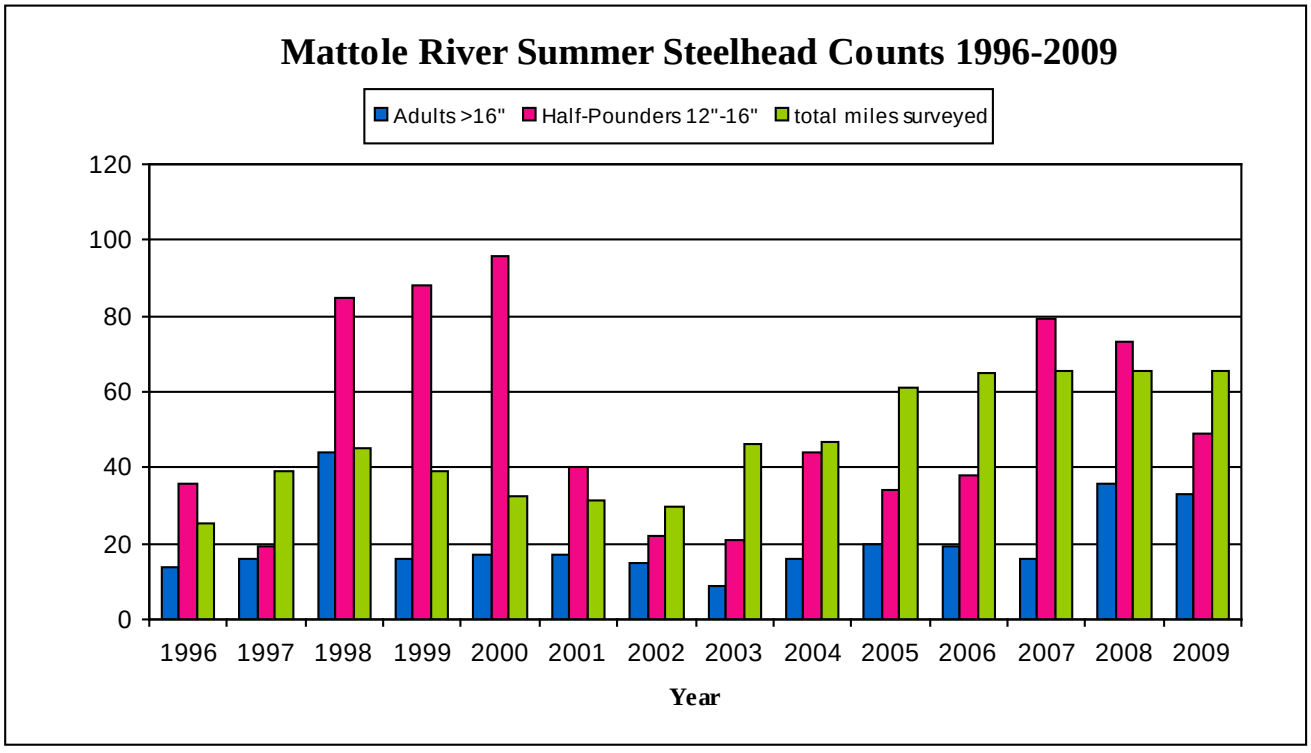
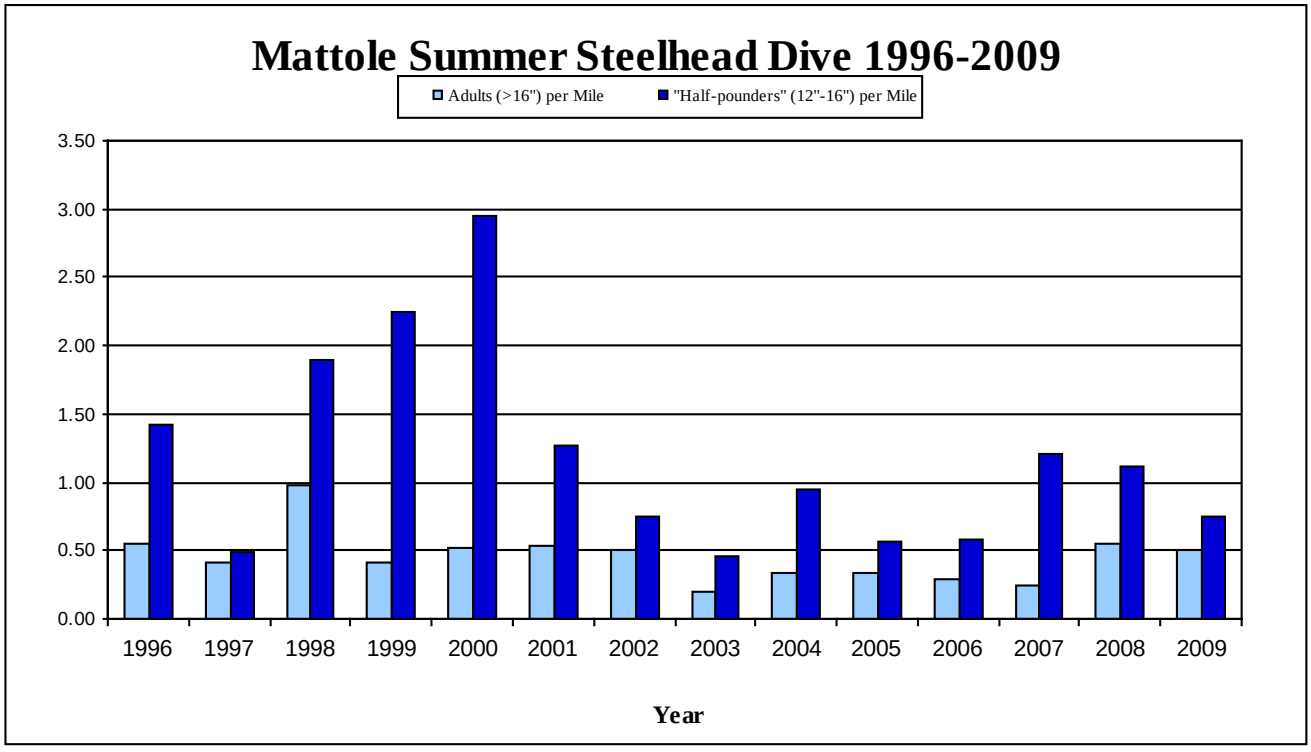


Table 3. Adult Summer Steelhead and "half-pounder" Counts in the Mattole River and tributaries, 1996-2009.

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
2008	36	73	59.3	6.25	65.55	0.55	1.11
2009	33	49	59.3	6.25	65.55	0.50	0.75

Figure 3. Steelhead per mile observed during MSG Summer Steelhead Dives, 1996-2009.



Genetic analysis offers the potential for determining if the adult steelhead observed in the Mattole during the summer months represent a genetically distinct run or a small number of fish exhibiting a divergent life history pattern. However, genetic analysis is not without risk. Clearly, any sample

collection of must be performed with the utmost respect and concern for the individual fish sampled, and the mortality rate for sample collection must be kept to a minimum. Researchers at NOAA – Santa Cruz have described successful attempts at collecting tissue samples from live summer steelhead in the wild (Garza 2006), potentially a viable option. Using an individual-based approach to genetic analysis, genetic material from a small number of summer steelhead can be compared to a larger number of winter steelhead samples. If genetic differences were significant, results would be evident despite the small number of summer steelhead samples available (Garza 2011). However, with sample sizes of either summer or winter steelhead likely to be below 50 individuals per year, statistically significant results of genetic analyses will take years to procure.

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. Based on the extensive survey effort and the long-term monitoring effort, the MSG believes the current adult summer steelhead population is below 50 individuals. Given the low number of observed individuals, the extent of habitat degradation within the watershed and the increased susceptibility of summer steelhead to threats ranging from elevated water temperatures to poachers, the MSG believes these individuals should be considered similar to an endangered population.

Continued monitoring of the population, restriction of fishing during the summer months and consideration of summer steelhead habitat as part of a basinwide restoration strategy is recommended. Instream habitat enhancement projects can provide nearly immediate benefits to their short tern survival by deepening pools, providing complex cover and adding organic debris to the river channel. Riparian re-vegetation projects keep water temperatures cool and provide bank stability once mature. Whether the adult steelhead observed in the Mattole during the summer months represent a genetically distinct run of summer steelhead or a life cycle variant, they contribute greatly to diversity of steelhead run in the Mattole, and are therefore important to study and preserve.

Juvenile Salmonid Distribution

Observations of juvenile coho distribution during the 2009 Summer Steelhead Dive further support the trend of diminishing geographical distribution observed during other MSG monitoring. During past Summer Steelhead Dives, coho were most common in the upper headwaters (upstream of RM 54.0), but smaller numbers were observed patchily distributed downstream in more favorable habitat locations. In 2009, juvenile coho observations occurred only upstream of RM 54.0.

Juvenile dive results parallel coho distribution observed during the Summer Steelhead Dive. 2009 juvenile dives also found no coho in the mainstem downstream of RM 56.0. In the past three years of juvenile dives, the MSG found coho in fewer tributaries as a percentage of those surveyed. Coho-bearing streams are becoming increasingly concentrated in the headwaters. Surveys since 1994 have documented coho in 17 tributaries downstream of RM 52. Since 2000, that number decreased to 6, and to 4 tributaries since 2007. No coho observations occurred in tributaries downstream of RM 56 in 2009 or 2010. Oversummer coho survival is suffering from increasing dependence on a limited amount of thermally suitable upriver habitat. Coho survival is further threatened by habitat losses due to low flow in the most thermally favorable coho-rearing habitat.

Numbers of both adult and juvenile coho observed via MSG monitoring have declined significantly. Total numbers of coho observed during 2009 juvenile dives (132) were 69% and 64% lower than in 2008 (432) and 2007 (368), respectively. As coho observations have become increasingly restricted to the headwaters upstream of RM 52, actual numbers of coho in tributaries upstream of RM 52 have declined by 85% from 2007-2009 (728) compared to 2002-2004 (4721). These years are used for comparison due to similar survey efforts.

Adult coho observations have declined as well. The past two seasons of spawner surveys were the worst consecutive seasons on record, showing multiple cohorts are barely viable. 2008-2009 spawner surveys found only 11 adults and 7 redds. During 2009-2010 spawner surveys, all coho observations (3 fish and 1 redd) were found in one tributary, Danny's Creek, a tributary of Thompson Creek (RM 58.4). In addition, no live adults were seen migrating in the lower river during 2009-2010 spawner surveys, which is in contrast to the last six years surveyed.

The MSG believes the adult Mattole coho population is a dozen to a couple of dozen individuals at best. We believe Mattole coho are well below the depensation level, and currently on the brink of extinction. We are making every effort to enact rescue operations and immediate strategies to increase coho survival, hoping we may avoid extirpation in the Mattole. For a more extensive discussion and compilation of Mattole coho data and trends, please refer to the recently released Mattole Coho Recovery Strategy, available at www.mattolesalmon.org.

Presence of juvenile Chinook observed during the 2009 Summer Steelhead Dive also indicated warning signs. Summer steelhead dive surveyors found Chinook only in the uppermost reach, the estuary, and directly upstream of Bear Creek (RM 42.8), which is well-documented Chinook-bearing tributary. The Chinook population in the Estuary oversummer represents a significant percentage of Chinook rearing in freshwater, although they are observed in the headwaters to a lesser extent. Warm temperatures in the estuary and low water in the headwaters result in a multi-faceted threat to Chinook by affecting both main rearing habitat areas.

In 2009, the river mouth remained open until June 28, allowing the majority of Chinook to emigrate to the Ocean. However, MSG DSMT data shows when Chinook emigrate from the river prior to mouth closure, it is at a substandard size for ocean survival (Reimers 1973). Extended freshwater rearing allows Chinook to emigrate to the Ocean at a larger size and have a better chance at returning as an adult spawner. The current state of the Mattole Estuary does not provide this boost to Chinook population due to poor habitat conditions, most notably high water temperature and resulting metabolic stress. MSG dives have documented the demise of thousands of Chinook oversummering in the estuary and lower mainstem following river mouth closure. In years with early mouth closure, greater numbers of Chinook perish before they are able to emigrate.

Detrimental effects of inadequate freshwater rearing habitat are becoming increasingly noticeable on Mattole Chinook populations. 2009-2010 adult surveys show low returns relative to the past 15 years of spawner surveys. Surveyors found the lowest number of redds (36) that MSG spawner surveys have observed since 1994, and the second lowest Escapement Index (redds per accumulated survey mile) for that period (0.27 in 09-10, 0.2 in 98-99).

More and more evidence indicates that returning Chinook, or lack thereof, are the survivors of those that reared in freshwater. Declines of returning adult fish have followed consecutive years of nearly

complete losses of Chinook rearing in the Estuary. This year's low adult numbers correspond to the return of 2007 juveniles, thousands of whom the MSG documented the disappearance of in the Estuary due to early mouth closure and subsequent poor habitat conditions.

The lack of suitable freshwater rearing habitat represents a major limiting factor to Chinook survival in the Mattole. Immediate action is necessary to mitigate for the lack of survival of the percentage of freshwater-reared Chinook. Diverting Chinook, who would otherwise face imminent death in the estuary following mouth closure, into rearing ponds offers the potential to vastly improve survival and foster growth. Releasing fish into more favorable conditions following fall rains and river mouth opening would allow a greater percentage of successful emigration at a more advantageous size for survival. Acting now before the population reaches the low numbers observed in the Mattole coho population gives a better chance for success in boosting the population and ultimately restoring a self-sustaining run.

Temperatures

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). While steelhead have a greater physiological tolerance to water temperature than other salmonids (Israel 2003), thermal habitat must meet minimum habitat requirements. Coates et al. (2002) found MWAT (Maximum Weekly Average Temperature) above 66°F unsuitable for steelhead. 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).

Over the past fourteen 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.

Habitat Utilization

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 are seen in cold pools, they are also observed in shallow water in areas with riparian cover. Nakamoto (1994) also reported that distribution of adult summer steelhead was more strongly correlated with physical stream characteristics than available thermal refugia. According to Nakamoto (1994), adult summer steelhead typically oversummer in the deepest pools where instream cover or riparian shading is available. 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 and Chapman 1972).

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). In 2009, there were no adult observations upstream of RM 47.4, and only two summer steelhead were observed in reach (6), the furthest downstream of the upper Mattole (RM 47.4 – RM 46.0).

Out of a total of 288 adult summer steelhead observed in the Mattole River over the past fourteen years of surveys, 89 of those sightings occurred in reaches 3 through 6 (RM 52.8 to RM 46.0), representing

~34% of total summer steelhead sightings over fourteen years. In 2009, only two of the 33 (6%) adult summer steelhead sightings occurred in these reaches, although 12 of 49 (24%) of "half-pounders" were found here.

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.

Deep, cool pools in the middle Mattole (RM 42.7 – RM 27.0) provide crucial oversummering habitat for summer steelhead. Due to its remote nature, few road access points and relatively large property ownerships, the middle Mattole relatively isolated from human impacts. Many large deep pools exist in this area, making this likely habitat for summer steelhead. Riparian cover is scare and summer water temperatures are warmer than ideal, but steep ridges on both sides and large boulders provide some shade. Survey observations support that Mattole summer steelhead utilize these favorable conditions for oversummering.

Since 1996, 22% of adults have been found in the middle Mattole. However, survey coverage in the middle Mattole was relatively sparse prior to 2005. In the years since survey coverage was expanded in the middle Mattole, the percentage of adult observations occurring in the middle Mattole has increased to 35%, better representing the proportion of the summer steelhead population utilizing middle river habitat.

Of the middle Mattole, Reach 21 (RM 41.1 to RM 34.6) contains arguably the best summer steelhead habitat and has provided the most numerous observations since surveys began here in 2005. This year, divers found a total of 8 adults, 24% of the 33 observed in 2009. In the past five years, 19% of all adult observations have occurred in reach 21.

In the lower Mattole (RM 27.4 - RM 0.0), the river emerges from the mid-river canyon into the broad valley of the lower Mattole and makes its journey to the Pacific. 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. 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.

Summer steelhead are infrequently observed in the lower Mattole River. Sightings of summer steelhead in the lower river tend to occur in isolated pools where local conditions have permitted coexistence of complex cover with a localized cold seep. Adults are often observed among the large boulders of the Honeydew Slide. Of the lower river reaches, Reach 9 (the Honeydew Slide to Bundle Prairie Creek, RM 27.4 to RM 24.1) and Reach 15 (Hideaway Bridge to Stansberry Creek, RM 5.2 to RM 1.3) have by far the most frequent summer steelhead observations. In 2009, six adults were observed in reach 9 and four in reach 15.

Since 1996, 38% of all adult observations have occurred in the lower river (downstream of RM 27.4). Approximately 12% of the adult observations since 1996 have occurred in reach 9 and 8% in reach 15, demonstrating the predominance of these two reaches among summer steelhead habitat in the lower

river. Since 2005, when additional survey coverage in the upper and middle Mattole was added, the percentage of observations downstream of RM 27.4 has dropped. 31% of observations since 2005 have occurred from the Honeydew Slide (RM 27.4) to the mouth of the Mattole.

The influence of low water on adult summer steelhead distribution was apparent in 2008. Adult observations were concentrated in the lower river, rather than characteristic deep pool oversummering habitat in the upper and middle Mattole (RM 52.8 to RM 27.4). 44% of adult observations occurred downstream of RM 27.4 in 2008. Isolated to marginal habitat downstream, individual fish are put under stress, undermining chances for survival, and putting stress on this sub-population as a whole. Because so few individuals exist, and they are subject to elevated threats from poachers as well as summer water temperatures downstream, low flow years increase risk to their ultimate survival. As climatic conditions change and human demand for water increases, the small population of summer steelhead that do exist will likely face increasing threats to their survival. Since the Mattole is the southern extent of summer steelhead, it is possible these fish are on a trajectory doomed by their life history strategy.

A combination of thermal stress, habitat preferences and migratory barriers are likely to guide habitat selection of summer steelhead in the Mattole. Results indicate thermal refugia and vegetative cover are vital habitat needs of the species. Mid-river pools in represent the best habitat in the Mattole, which are also the most utilized, as long as flow permits.

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 fourteen years (Figure 2). The tributaries include Thompson Creek (RM 58.4), Bear Creek (RM 42.8), and Honeydew Creek (RM 26.5).

Despite fourteen years of surveys, summer steelhead have never been observed in Thompson Creek. Relative to the Mattole's major tributaries it is small, lacking large, deep pools, which are usually prime summer steelhead habitat (Nakamoto 1994).

Observations of both adults and "half-pounders" during seven of eight survey years indicate adult summer steelhead and other larger size-class steelhead consistently utilize Bear Creek. In 2003-2009, MSG divers observed twelve adult summer steelhead and thirty-seven "half-pounders" in the lower 3.6 miles of Bear Creek. One adult and 4 "half-pounders" were observed in 2009. Bear Creek maintains significant summer flow and cool temperatures throughout the summer. Further upstream, Bear Creek contains prime summer steelhead habitat, consisting of numerous bedrock and boulder pools, which are shaded by a deep bedrock gorge. Much of the upper subshed is owned and protected by the BLM and is very remote. A fire road was built several years ago and has since made this area more accessible by road. Land use in the lower section is predominantly cattle-grazing and there is more impact from both inhabitants and sedimentation, but the habitat still contains pools and relatively cool water.

Honeydew Creek contains deep pools and significant cool summer flow, thus it is able to support at least a small number of oversummering steelhead greater than 12". Five adults have been observed in the middle 2.5 miles of Honeydew Creek since 2004, suggesting that summer steelhead utilize habitat

throughout this tributary. “Half-pounders” are observed more frequently. A total of thirty “half-pounders” have been observed in ten years of surveys.

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 Honeydew and Bear Creeks 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). Local residents have also reported summer steelhead in Squaw Creek (RM 14.9). Dependent on access, a survey in lower Squaw Creek would be a good addition to the Summer Steelhead Dive.

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.).

- Continue to implement the MSG Summer Steelhead Dive in future years as described in the Mattole Salmon Group Salmonid Population Monitoring Plan.

- Continue monitoring of the thirteen index reaches, tributary reaches in Honeydew and Bear Creeks, and new mainstem reaches added in 2005 and 2006.

- Count coho and Chinook salmon juveniles during future Summer Steelhead Dives to quantify their abundance throughout the mainstem and better inform rescue and recovery actions.

- Expand the MSG Summer Steelhead Dive to include creeks whose habitat and thermal conditions could support summer steelhead.

- Include consideration of summer steelhead populations and habitat needs in future restoration projects. Implement habitat restoration projects to enhance known summer steelhead habitat.

- Encourage water conservation throughout the Mattole Watershed, but especially in the upper Mattole, where favorable thermal habitat is most abundant and low flow most limiting.

- Educate the local community about this rare neighbor and encourage community stewardship of the small summer steelhead population.

- Update/revise datasheets to include mapping of “half-pounder” sightings. Train surveyors to take more accurate estimated flow measurements. Encourage surveyors to note describe any changes in habitat (i.e. large wood or sediment movement), if applicable.

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Appendix A, Mattole Salmon Group Summer Steelhead Dive Summary Tables, 1996-2009

Table A-1. Adult Summer Steelhead Observations, 1996-2009 MSG Summer Steelhead Dives

Reach #	Reach Description	2009	2008	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	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)	0	0	1	0	1										**2**
24	Anderson Creek (RM 55.6) to Van Arken Creek (RM 54.0)	0	0	0	0											**0**
3	McKee Cr. (RM 52.8) to Crooks (RM 51.3)	0	0	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	0	0	2	2	0	3	5							**12**
4A	Crook's (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)	0	2	1	0	0	4	0	1							**8**
6	Big Finley Cr. (RM 47.4) to Shepp's (RM~46.0)	2	1	1	1	6	0	0	2							**13**
6A	Big Finley Cr. (RM 47.4) to Deer Lick Cr. (RM 45.8)									1	1	2	7	0	6	**17**
20	Shepps' (RM ~46.0) to us Bear Cr. (RM 42.7)	3	4	1	1	1										**10**
7	Us. Bear Cr. (RM 42.7) to Klossen's Hole (ds Mattole Canyon Cr.)(RM~39.9)	0	1	0	1	0	0	0	3	0	1	4	1	0	0	**11**
21	Mattole Canyon Cr. (RM 41.1) to Fourmile Cr. (RM 34.6)			2	6	4										**12**
21A	Mattole Canyon Cr. (RM 41.1) to Grindstone Cr. (RM 39.0)	7	5													**12**
21B	Grindstone Cr. (RM 39.0) Fourmile Cr. (RM 34.6)	1	2													**3**

22	Fourmile Cr. (RM 34.6) to Gilham Cr. (RM 32.8)	1	1	4		1										**7**
8	Gilham Cr. (RM 32.8) to Dry Cr. (RM 30.4)	0	0		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)	5	1	1	0	0										**7**
9	Honeydew Slide (RM 27.0) to Bundle Prairie Cr. (RM 24.4)	6	2	0		3	1	2		3	5				2	**24**
9A	Honeydew Slide (RM 27.0) to Woods Cr. (RM 24.1)				3							2	4	1		**10**
10	Bundle Prairie Cr. (RM 24.4 to Triple Junction High School (RM 21.3)	1	6	0	0	0	3	0	0	3						**13**
10A	Woods Cr. (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	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	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	0	0	2		1	1	1	0		**5**
14	Conklin Cr. (RM 7.8) to Hideaway Bridge (RM 5.2)	1	0	0	0	0	2	0	0	1	1	0	8	1		**14**
15	Hideaway Bridge (RM 5.2) to Stansberry Cr. (RM 1.3)	4	6	0	1	1	0	0	1	3	0	2	3		2	**23**
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	2	0	1											**3**
16	Stansberry Cr. (RM 1. 3) to Ocean (RM 0.0)	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)	1	2	5	2	1	1	0								**12**
17A	Bear Creek (lower 0.6 miles)														0	**0**
18	Honeydew Cr. Maureen Catalina's to 2.5 miles us Bear Wallow Slide	1	1	0	0		1	2								**5**

18A	Honeydew Creek (lower 0.6 miles)											0	0	5	0	**5**
	Totals	**33**	**36**	**16**	**19**	**20**	**16**	**9**	**15**	**17**	**17**	**16**	**44**	**16**	**14**	**288**

Table A-2. "Half-pounder" (12"-16" steelhead) Observations, 1996-2009 MSG Summer Steelhead Dives

Reach #	Reach Description	2009	2008	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.)	0	1	3	0	2	3	2	1							**12**
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)	3	1	8	3	0										**15**
24	Anderson Creek (RM 55.6) to Van Arken Creek (RM 54.0)	3	0	0	0											**3**
3	McKee Cr. (RM 52.8) to Crooks (RM 51.3)	0	2	2				2	2	7	13	9	1	3		**41**
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)	2	3	0	4	0	3	2	5							**19**
4A	Crook's (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	2	1	5	3	1	2							**17**
6	Big Finley Cr. (RM 47.4) to Shepp's (RM~46.0)	2	1	6	3	2	4	0	0							**18**
6A	Big Finley Cr. (RM 47.4) to Deer Lick Cr. (RM 45.8)									5	1	1	9	0	6	**22**
20	Shepps' (RM ~46.0) to us Bear Cr. (RM 42.7)	0	0	4	1	2										**7**
7	Us. Bear Cr. (RM 42.7) to Klossen's Hole (ds Mattole Canyon Cr.)(RM~39.9)	0	5	4	0	1	0	2	1	1	30	17	3	2	1	**67**
21	Mattole Canyon Cr. (RM 41.1) to Fourmile Cr. (RM 34.6)			4	7	1										**12**
21A	Mattole Canyon Cr. (RM 41.1) to Grindstone Cr. (RM 39.0)	0	18													**18**

21B	Grindstone Cr. (RM 39.0) Fourmile Cr. (RM 34.6)	2	0													**2**
22	Fourmile Cr. (RM 34.6) to Gilham Cr. (RM 32.8)	3	6	6		1										**16**
8	Gilham Cr. (RM 32.8) to Dry Cr. (RM 30.4)	3	0		1	1	0	1								**6**
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)	4	6	15	0	0										**25**
9	Honeydew Slide (RM 27.0) to Bundle Prairie Cr. (RM 24.4)	11	5	2		2	4	0		2	15				14	**55**
9A	Honeydew Slide (RM 27.0) to Woods Cr. (RM 24.1)				5							3	2	4		**14**
10	Bundle Prairie Cr. (RM 24.4 to Triple Junction High School (RM 21.3)	4	3	2	3	3	3	1	5	11						**35**
10A	Woods Cr. (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	0	0	1		0		1	0		1	**3**
12	Squaw Cr. (RM 14.9) to Lindley Bridge (RM 12.6)	0	0	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)	2	1	1	1	0	0	1	2		3	2	2	1		**16**
14	Conklin Cr. (RM 7.8) to Hideaway Bridge (RM 5.2)	0	1	0	1	2	4	0	0	1	1	7	12	0		**29**
15	Hideaway Bridge (RM 5.2) to Stansberry Cr. (RM 1.3)	1	9	1	1	0	2	0	4	0	4	6	12		2	**42**
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	1											**3**
16	Stansberry Cr. (RM 1. 3) to Ocean (RM 0.0)	1	1	0	0	2	0	0		2	16	2	0		0	**24**
16A	Rex's (MSG Office)(RM 3.0) to Ocean													1		**1**
17	Bear Cr. (Geppert/Spencer's to mouth)	4	5	6	4	8	5	5								**37**
17A	Bear Creek (lower 0.6 miles)														1	**1**

18	Honeydew Cr. Maureen Catalina's to 2.5 miles us Bear Wallow Slide	2	3	7	1		13	2								**28**
18A	Honeydew Creek (lower 0.6 miles)											0	0	3	0	**3**
	Totals	**49**	**73**	**79**	**38**	**34**	**44**	**21**	**22**	**40**	**96**	**88**	**85**	**19**	**36**	**724**

Appendix B. Temperature recordings and other species observed during the MSG 2009 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 17-22, 2009.

Reach #	River Mile (RM) Location	Location and Reach Name	Freshwater Mussels	Bull Frog Tadpoles	Crayfish	Western Pond Turtles	Other	Notes
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	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)	Mattole @ confluence with Thompson	No	No	No	yellow-legged frog/eggs/juveniles, ouzel, swallow tails on leopard lilies	dream of trash removal effort from Baker to Stanley
19	RM 57.1 - RM 55.6	Upper Mattole: Stanley Creek to Anderson Creek	8 total in two sites, just past Anderson Creek	No	No	No	Trash, dead deer	N/A
24	RM 55.6 - RM 54.0	Upper Mattole: Anderson Creek to Van Arken Creek	Many throughout reach	No	No	1	rough-skinned newt, stickleback, ammocetes, garter snakes, red-legged frog	stickleback (some pregnant) with breeding colors & juveniles
3	RM 52.8 - RM 51.3	Upper Mattole: McKee Creek to Crook's	No	No	No	No	2 eel carcasses, numerous eel redds	where's the fish?
4	RM ~51.3 - RM ~49.4	Upper Mattole: Crook's to Tom's Hole (Patty's)	15	No	Yes	1	salamander	N/A
5	RM ~49.4 - RM 47.4	Upper Mattole: Tom's Hole to Big Finley Creek	50-60 in first two pools (25-30 in each)	No	Lots, throughout reach	4	4 newts throughout reach	N/A
6	RM 47.4 - RM ~46.0	Upper Mattole: Big Finley Creek to Schepp's	63 total in 3 sites, 60 @ site furthest ds	No	Throughout	2	salamanders, steelhead	salamanders with scoliosis
20	RM ~46.0 - RM	Middle Mattole:	1 on point	No	No	No	N/A	N/A

	42.7	Schepp's to upstream of Bear Creek	bar in gravel					
7	RM 42.7 - RM ~ 39.9	Middle Mattole: Upstream of Bear Creek to Klossen's Hole (downstream of Mattole Canyon Creek)	Lots, 4 sites	No	No	1	kingfisher, killdeer, snakes, lamprey, bullfrog tadpole, pacific giant salamander with gills	5 steelhead with spinal deformities, lamprey ammocetes, carcasses, and adults
21A	RM 41.1 - RM 39.0	Middle Mattole: Mattole Canyon Creek to Grindstone Creek	No	No	No	1	lots of newts in mouth of Grindstone Creek (~20)	N/A
21B	RM 39.0 - RM 34.6	Middle Mattole: Grindstone Creek to Fourmile Creek	~10, 2 sites in top 1/2 of reach	No	No	2, 1 near Harrow Creek, 1 near Sholes Creek	N/A	N/A
22	RM 34.6 - RM 32.8	Middle Mattole: Fourmile Creek to Gilham Creek	No	No	Live crayfish not far ds Fourmile Cr., dead crayfish @ start	4	snakes, yellow-legged frog, western toad, rough-skinned newts, kingfisher @ start	poor visibility, fewer juvenile steelhead ds end of reach, 1000s @ Gilham Creek confluence
8	RM 32.8 - RM 30.4	Middle Mattole: Gilham Creek to Dry Creek	No	3	No	2	cows near Gilham, dipper, sandpiper, water snakes, newts, stickleback	1000s of 4"-8" SH, <4" SH @ tribs and deeper pools, lots of >8" SH in pools and LWD
23	RM 30.4 - RM 27.0	Middle Mattole: Dry Creek to Honeydew Slide	No	No	No	No	1 newt in Dry Creek, 1 in mainstem @ confluence	N/A
9	RM 27.4 - RM 24.4	Lower Mattole:	No	No	No	No	12 lamprey	oyster

		Honeydew Slide to Bundle Prairie Creek					carcasses/parts, great blue heron, 4 juvenile merganser, osprey, red-shouldered hawk, 2 garter snakes, 6 RS newts, frogs TNTC	shells below Hunter's Overlook
10	RM 24.4 - RM 21.3	Lower Mattole: Bundle Prairie Creek to Triple Junction High School	No	No	No	3	Western toad, great blue heron, frog eggs, rough-skinned newts, sticklebacks	fishing lure and fishing pole found
11	RM 19.7 - RM 14.9	Lower Mattole: Saunders Creek to Squaw Creek	No	No	No	3	rough-skinned newts, western toad, frogs and lots of tadpoles, garter snakes, stickleback	more rough-skinned newts in lower part of reach
12	RM 14.9 - RM 12.6	Lower Mattole: Squaw Creek to Lindley Bridge	No	No	No	No	lots of newts, stickleback, otter	lots of swimmers at A.W.Way
13	RM 12.6 – RM 7.8	Lower Mattole: Lindley Bridge to Conklin Creek	No	No	No	3	bald eagle, newts, people, trash, tadpoles	N/A
14	RM 7.8 – RM 5.2	Lower Mattole: Conklin Creek to Hideaway Bridge	No	No	No	4	N/A	N/A
15	RM 5.2 – RM 3.9	Lower Mattole: Hideaway Bridge to MSG Downstream Migrant Trap	No	No	No	No	1 western toad	2 dead sculpin, 1 prickly (4"), and 1 unknown (7")
15	RM 3.9 - RM 1.3	Lower Mattole: MSG Downstream Migrant Trap to Stansberry Creek	No	No	No	1	garter snake in water at trap site	windy
15B	RM 3.0 – RM 1.3	Lower Mattole: Mattole Salmon Group office to Stansberry Creek	No	No	No	No	N/A	N/A
16	RM 1.3 – RM 0.0	Lower Mattole:	No	No	No	1, Area 4	Newt @ hole us	Fishing line

		Stansberry Creek to Ocean					Stansberry, heron, merganser family, stickleback	found us Stansberry
17	RM 42.8 + 3.6	Bear Creek (Geppert/Spence's to mouth)	No	No	Yes	1 in logger pool, 2nd large pool us bridge	Stickleback, newt, dead lamprey, scoliosis SH @ 6' hole below bridge	crayfish were from Jewitt downstream to confluence w/ Mattole
18	RM 26.5 + 2.5	Honeydew Creek (East Fork confluence to Maureen Catalina's)	No	No	No	2 in Honeydew Creek just ds of East Fork	N/A	N/A
		Totals	9 reaches	1 reach	5 reaches	33 turtles in 17 reaches	N/A	N/A

Table B-2. Mattole stream and air temperatures recorded by handheld thermometers during Summer Steelhead Survey dates, July 17-22, 2009.

Date	Location	Reach # / Letter Code	Time	Tributary Temp (°F)	Mattole Temp (°F)	Air Temp (°F)
7/18	Lost River (RM 58.8)	2/A	10:15	60 @ 4"	60	62
7/18	Helen Barnum Creek (RM 58.7)	2/B	10:20	58	60	62
7/18	Thompson Creek (RM 58.4)	2/C	12:00	60	60	70
7/18	Yew Creek (RM 58.4 +0.15)	2/D	13:00	60	--	70
7/18	Baker Creek (RM 57.6) - mouth dry, no trickle	2/E	15:00	60 @ 4"	60	76
7/18	Stanley Creek (RM 57.1) (End)	2/F	16:20	60 @ 4"	60	80
7/18	Stanley Creek (RM 57.1) (Start)	19/A	13:00	56	--	78
7/18	Metz Bridge (RM 56.9)	19/B	--	61 @ 4'	--	--
7/18	Mattole us Anderson Creek	19/C	--	--	64	--
7/18	Anderson Creek (RM 55.6)	19/D	15:30	57 @ 1'	--	--
7/18	Start - McKee Creek/Junction Hole	3/A	10:45	58 @ 4"	61 @ 4"	68
7/18	Bridge Creek (RM 52.1)	3/B	12:30	61 @ 3"	67 @ 3"	72
7/18	RB trib, ds bridge	3/C	12:45	59 @ 2"	66 @ 2"	72
7/18	RB trib	3/D	13:30	58 @ 2"	68 @ 2"	68
7/18	End - Crook's	3/E	14:30	--	68	68
7/18	Crook's (RM 51.3)	4/A	12:45	54	64	70
7/18	LB trickle @ Tom's Hole	4/B	19:00	--	--	--
7/18	Tom's Hole (RM ~49.4)	4/C	19:05	--	63	65
7/18	Tom's Hole	5/A	12:30	--	64	70
7/18	Case #1, pool with adult	5/B	--	--	70	--
7/18	spring	5/C	--	61	--	--
7/18	Eubanks Creek (RM 47.8), barely flowing	5/D	--	62	70	68
7/18	Big Finley Creek (RM 47.4)	5/E	--	61	65	65
7/18	Start - upstream of Big Finley Creek (RM 47.4)	6/A	12:00	--	65 @ 3.5'	70
7/18	Big Finley Creek (RM 47.4)	6/B	12:05	58 @ 11'	61	70
7/18	First big bend	6/C	14:00	--	67	70
7/18	Large pool	6/D	15:00	--	66	--
7/18	Little Finley Creek (RM 46.8)	6/E	15:30	62	--	--

7/18	Deer Lick Creek (RM 45.9)	6/F	16:00	58 @ 2'	71 @ 2'	--
7/18	End - Schepp's	6/G	16:45	--	72 @ 2'	82
7/18	Mattole @ Hart's Creek confluence	20/A	11:30	Dry	65 @ 1.5'	72
7/18	Pool below Hart's Creek	20/B	11:32	--	64 @ 6.5'	72
7/18	Trib on LB	20/C	12:30	59 @ 8"	66 @ 3'	--
7/18	Grasshopper Hill Creek (RM 45.0)	20/D	13:15	57 @ 2"	70 @ 2'	80
7/18	Bedrock pool on LB (SH #2, 16")	20/E	15:00	--	66 @ 9'	--
7/18	SH #3 (30")	20/F	--	--	67 @ 7'	--
7/18	SH #4 (18")	20/G	--	--	68 @ 11'	--
7/18	RB trib (Wolf Creek)	20/H	--	79 @ 6"	79 @ 6"	--
7/19	1 mile upstream of Bear Creek (Start)	7/A	13:24	--	76	83
7/19	confluence of Bear Creek and Mattole River	7/B	14:30	--	74	85
7/19	us Ettersburg Bridge	7/C	15:30	--	75	85
7/19	ds Blue Slide Creek	7/D	16:20	--	74	85
7/19	Mattole Canyon Creek (RM 41.1)	21A/A	13:00	dry for .25 mile	76	80
7/19	Grindstone Creek (RM 39.0)	21A/B	17:00	61 - 100' us	79	80
7/19	Mattole @ Grindstone Creek	21B/A	12:00	--	75	88
7/19	Start- us Fourmile Creek @ Hall's river road	22/A	11:50	--	73 @ 2'	74
7/19	Fourmile Creek confluence	22/B	12:30	68	75 @ 4'	78
7/19	End-Gilham Creek	22/C	16:30	64	80 @ 2'	77
7/19	Start- Gilham Creek	8/A	13:00	60 @ 1'	63 @ 1'	87
7/19	cold pool w/seep	8/B	--	--	66 @ 6'	94
7/19	End- Dry Creek	8/C	--	--	78 @ 2'	
7/19	Mattole us Dry Creek/Dry Creek	23/A	12:30	69 @ 4"	74 @ 1'	--
7/19	Mattole @ deep bedrock pool w/ half-pounders	23/B	13:45	--	73.5 @ 10'	--
7/19	Mattole us gulch/gulch	23/C	15:00	63 @ 4"	75 @ 1'	69
7/19	Mattole us drainage/drainage	23/D	16:00	61.5 @ 4"	76 @ 2'	--
7/19	Mattole us Honeydew Slide/ small drainage	23/E	17:00	63 @ 4"	76 @ 1'	--
7/18	Start-Honeydew Slide @ Boudoin's	9/A	10:45		72	82
7/18	Honeydew Creek	9/B	N/A	67	72	82
7/18	Upper North Fork	9/C	N/A	77	72	82
7/18	Case #1	9/D	N/A		67 @ 6'	82
7/18	Mattole @ Bundle Prairie Creek (RM 24.4)	10/A	11:00	--	71	73
7/18	Cold seep from LB	10/B	12:00	--	74 MS/ 68 seep	--
7/18	Kendall Gulch	10/C	14:15	60	78	--
7/18	Mattole @ Triple Junction High School	10/D	15:00	--	79	90
7/19	Saunders Creek (dry at confluence)	11/A	10:40	73 @ 6"	69 @ 6"	80
7/19	Below Saunders pool	11/B	--	--	71 @ 15"	--
7/19	pool ds Granny Creek	11/C	--	--	69 @ 4'	75
7/19	pool ds	11/D	--	--	66 @ 12'	82
7/19	Tributary- Thornton Creek (RM 17.2)	11/E	--	58 @ 4"	74 @ 4"	68
7/19	Tributary (pool) off Evert's Ridge	11/F	--	55	75.5 @ 10'	78
7/19	Squaw Creek	11/G	--	70 @ 4"	78 @ 4"	74
7/15	Start- Mattole @ Squaw Creek confluence	12/A	10:00	62	66	62
7/15	End- Lindley Bridge	12/B	12:30	--	70	67
7/19	Lindley Bridge	13/A	10:30	--	64	68
7/19	Indian Creek	13/B	11:00	--	53.5	--
7/19	McGinnis Creek	13/C	15:35	--	60	--
7/19	Conklin Creek (RM 7.8)	13/D	15:50	--	68	--
7/19	Mattole @ Conklin Creek (RM 7.8)	14/A	12:00	--	69	78

7/19	Conklin Creek (RM 7.8) - flowing subsurface	14/B	12:02	68	--	78
7/19	Mattole- 10' pool just ds Conklin @ bend	14/C	12:15	--	70	--
7/19	Mattole- 10' pool just ds Conklin @ bend- deep	14/D	12:15	--	70	--
7/19	Clear Creek confluence (RM 6.1)	14/E	14:30	65	75	--
7/19	Hideaway Bridge (RM 5.2)	14/F	15:00	--	75	--
7/16	Hideaway Bridge (RM 5.2)	15/A	10:45	--	66	61
7/16	Case #1 (cold pool), mouth of Jeffry Gulch	15/B	13:30	--	71 @ 6"	--
7/16	Case #1, mouth of Jeffry Gulch (deep)	15/C	13:30	--	61/64 @ 2'	--
7/16	DSMT (takeout) (RM 3.9)	15/D	15:00	--	73	--
7/16	Mattole @ DSMT, RM 3.5	15/E	10:15	--	68	62
7/16	Titus Creek (RM 3.2)	15/F	10:30	56	70	--
7/16	Tom Scott Creek (RM 3.1)	15/G	10:40	58	70	--
7/16	Mill Creek (RM 2.8)	15/H	12:00	58	72	--
7/16	Jim Goff Gulch (RM 1.8)	15/I	15:00	56	74	--
7/16	Mattole @ Stansberry Creek (RM 1.3)	15/J	14:40	Dry	74	70
7/19	Wingdam (RM 2.9)	15B/A	--	--	66	64
7/19	Mill Creek (RM 2.8)	15B/B	--	57	67	62.64
7/19	Groeling run willows	15B/C	--	--	70	60
7/19	Jim Goff Gulch run	15B/D	--	--	70	60
7/19	Spring Pond	15B/E	--	--	70	70
7/19	Stansberry Creek (RM 1.3)	15B/F	--	--	67-70	67
7/16	Stansberry Creek (RM 1.3)	16/A	11:35	58	--	68
7/16	Mattole us Stansberry Creek	16/B	11:40	--	64	68
7/16	section 6 in estuary, near log	16/C	13:00	--	65	--
7/16	section 4 in estuary, LB	16/D	14:20	--	65	--
7/16	section 5- estuary	16/E	15:00	--	65	--
7/16	section 3- estuary	16/F	11:00	--	67	--
7/16	section 2- estuary	16/G	13:00	--	68	--
7/16	section 1- estuary	16/H	14:30	--	67	60
8/7	Start- Bear Creek @ Geppert/Spence's	17/A	11:30	--	60 @ 0.5'	71.5
8/7	Large RB pool (bedrock)	17/B	--	--	63 @ 8'	--
8/7	RB trib	17/C	--	56	62.5 @ 0.25'	--
8/7	Case #1 (bottom)	17/D	--	--	63 @ 8.5'	--
8/7	Case #1 (top)	17/E	--	--	70 @ 1'	--
7/19	Honeydew Creek (Start-East Fork confluence)	18/A	11:00	--	62	68
7/19	East Fork of Honeydew Creek	18/B	12:00	59	--	78
7/19	Honeydew Creek/West Fork confluence	18/C	13:30	59	61	71
7/19	Upstream of West Fork confluence	18/D	13:30	--	61	71
7/19	Honeydew Creek- end	18/E	17:20	--	63	73