Final Report
Summer Steelhead Survey, 2006 Season
Mattole River Watershed

Submitted in fulfillment of
Task Order 003 (partial), Cooperative Agreement BAA020030
Bureau of Land Management, Arcata Field Office

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March 2007

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Acknowledgements

The Mattole Salmon Group acknowledges the following people as integral to the efforts of the 2006 Summer Steelhead Dive:

Keytra Meyer and Jill Grbavac, for their assistance coordinating the dives
Tom Campbell and Keytra Meyer, for supervision and editing
Mijanou Brown and Reid Bryson, for their efforts in compiling the 2005 State of the Salmon Report

We also appreciate the following partner organizations for providing volunteers:
Americorps Watershed Stewards Project
Mattole Restoration Council
US Fish and Wildlife Service
NOAA Fisheries
BLM
Nick's Interns

This project would not have been possible without MSG staff and volunteers who conducted the summer steelhead dives:

Natalie Arroyo	Jessica DeKelver	Heidi Klingel	Keytra Meyer	Nathan Scheinman
Amy Baier	Michael Evenson	Chris Larsen	Jay Ogawa	Pete Tans
Drew Barber	Dan Free	Micah Larsen	Jody Pennycook	Allen Taylor
Nick Blond	Tambra Fisher	Caryn Larsen	Shane Phillips	Campbell Thompson
Tabi Bolton	Jessi Graff	Pam Lauer	Kate Proctor	Daniel Tittman
Reid Bryson	Jill Grbavac	Matt Lee	Brooke Rahn	Bodie Yonts
Bill Buckeley	Dylan Harlan	Ken Lindke	Maureen Roche	Joe Yonts
Steph Cepellos	Sean James	Ray Lingel	Tom Rosen	Linda Yonts
Tom Campbell	Brian Jenke	Kali Lovett	Gabriel Salbego	
Sarah Campbell	Aaron Johnson	Sara Luring	Michael Salbego	
Andy Chitick	Brandon Jurrens	Edina Meiners	Lisa Schepman	

Introduction

The 11th annual Summer Steelhead Dive surveys were conducted in the Mattole Watershed (Figure 1) on July 14-15, 2006. One additional Summer Steelhead snorkel survey was conducted on July 19-20, 2006.

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.

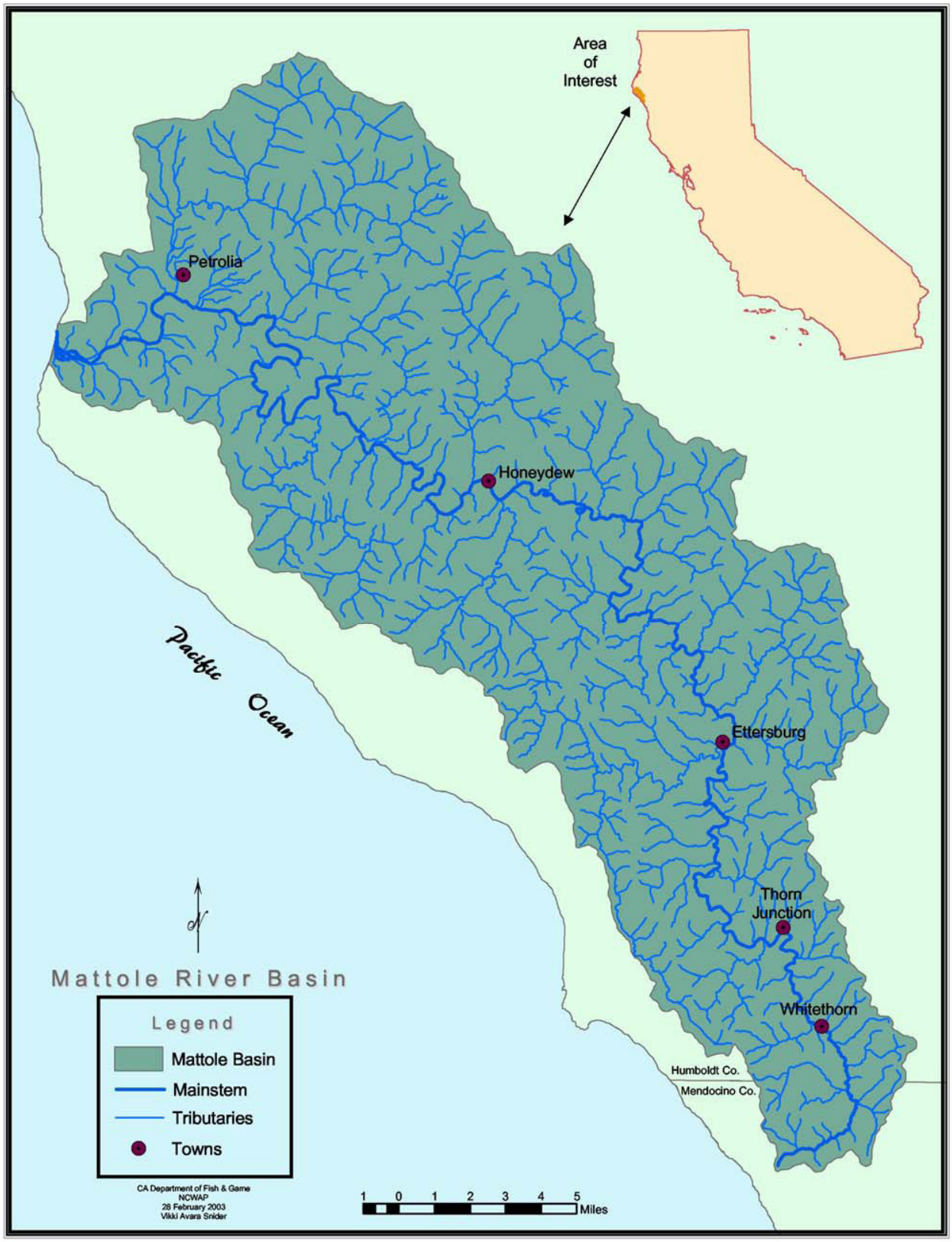
Forty-seven surveyors, working in teams of two or more, performed direct underwater observation counts in approximately 55.3 river miles of the Mattole (58.6 accumulated miles of the mainstem were surveyed due to slight overlapping of reaches in some cases) and 6.25 miles of tributaries. In total, 64.85 miles were surveyed in 2006. The survey comprised twenty-four reaches, varying in length from 1.3 to 6.5 miles (Table 1).

A total of nineteen (19) adult summer steelhead (>16 inches in length) and thirty-eight (38) half-pounders (12-16 inches in length) were counted during the 2006 surveys. The number of adult summer steelhead counted in 2006 was one less than those counted in 2005 (20); however, more "half-pounders" were observed in 2006 (38) than in 2005 (34). Adults observed per mile of survey effort was slightly lower in 2006 (0.29 adults per mile) in comparison with 2005 (0.33 adults per mile). "Half-pounders" observed per mile of survey effort in 2006 was slightly higher than "half-pounders" observed per mile in 2005 (0.59 in 2006 vs. 0.56 in 2005; Figure 4). The lowest number of adult sightings per stream mile ever recorded over the past ten years of summer steelhead surveys was in 2003 (0.19 adults per mile, 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 three reaches (Table 3). Juvenile coho were observed exclusively in the upper mainstem, in the uppermost three reaches surveyed. Juvenile Chinook salmon were observed in only two reaches in 2006, the uppermost reach and in reach 11, in the lower mainstem (Table 3). Cold areas were noted in all survey reaches (Appendix B, Table B-2). Temperatures recorded in 2006 were similar to those recorded in 2005 and comparable to typical temperatures documented since the 2000 Summer Steelhead Dive (Appendix C, Table C-3).

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 1996-2006 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 background information on steelhead in the Mattole River (Appendix A), 1996-2006 results by reach (Appendix B), and observations of other species and temperatures recorded in the 2006 summer steelhead surveys (Appendix C) 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

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 2006, MSG divers observed 19 adult summer steelhead and 38 "half-pounders" in 64.85 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, 3A, 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 9A, 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). Seventeen adult summer steelhead and 33 "half-pounders" were observed in the Mattole mainstem, while 2 adult summer steelhead and 5 "half-pounders" were observed in tributaries.

Adult summer steelhead were distributed throughout the mainstem in 2006 (Figure 2). Surveyors documented 3 adult summer steelhead in the upper Mattole [reaches 4(2) and 6(1)], and 6 adult summer steelhead in the lower Mattole [reaches 9A(3), 15(1), 15B(1), 16(1)]. The greatest number of adult summer steelhead observations (8) were in the middle Mattole [reaches 20(1), 7(1), and 21(6)]. Two adult summer steelhead and 4 "half-pounders" were observed in Bear Creek. Surveys in

Honeydew Creek documented no adult summer steelhead; however, one "half-pounder" was observed. No adults or "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 16 reaches, while adults were observed in 10).

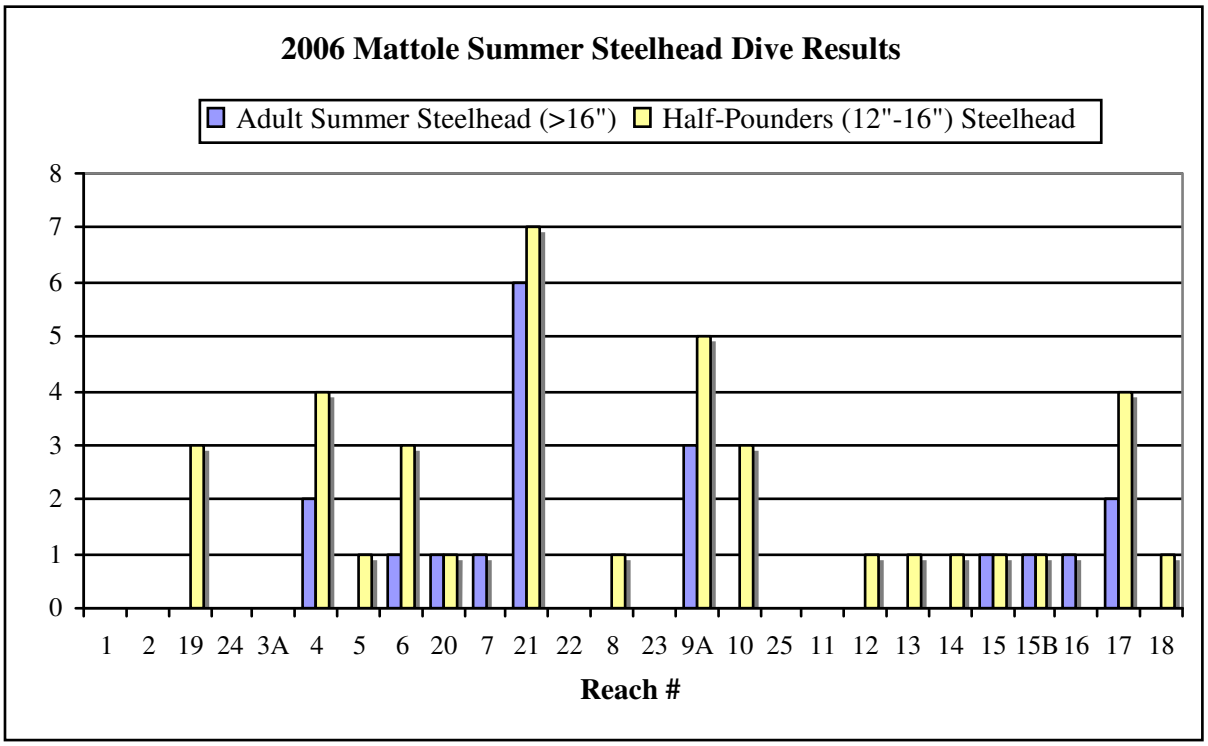
Table 1. 2006 Adult and "Half-pounder" Summer Steelhead Dive Results

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)	7/15	Maureen Roche*, Bill Buckley	1.7 (+0.15)	0	0
19	RM 57.1 - RM 55.6	Upper Mattole: Stanley Creek to Anderson Creek	7/15	Dan Free*, Ray Lingel	~1.5	0	3
24	RM 55.6 - RM 54.0	Upper Mattole: Anderson Creek to Van Arken Creek	7/14	Aaron Johnson, Shane Phillips	~1.6	0	0
3A	RM 52.8 - RM 52.1	Upper Mattole: McKee Creek to Bridge Creek	7/14	Jessica Dekelver*, Kate Proctor	0.7	0	0
4	RM ~51.3 - RM ~49.4	Upper Mattole: Crook's to Tom's Hole (Patty's)	7/14	Jody Pennycook*, Lisa Schepman*	~1.9	2	4
5	RM ~49.4 - RM 47.4	Upper Mattole: Tom's Hole to Big Finley Creek	7/14	Cam Thompson*, Nick Blond	~2.0	0	1
6	RM 47.4 - RM ~46.0	Upper Mattole: Big Finley Creek to Schepp's	7/14	Amy Baier*, Bill Buckley	~1.4	1	3
20	RM ~46.0 - RM 42.7	Middle Mattole: Schepp's to upstream of Bear Creek	7/15	Chris Larson*, Steph Cepellos, Aaron Johnson*	~3.3	1	1
7	RM 42.7 - RM ~ 39.9	Middle Mattole: Upstream of Bear Creek to Klossen's Hole (downstream of Mattole Canyon Cr eek)	7/15	Jay Ogawa*, Brooke Rahn, Tambra Fisher, Sarah Campbell	2.8	1	0
21	RM 41.1 - RM 34.6	Middle Mattole: Mattole Canyon Creek to Fourmile Creek	7/19-7/20	Amy Baier*, Jill Grbavac*, Sean James*	6.5	6	7
22	RM 34.6 - RM 32.8	Middle Mattole: Fourmile Creek to Gilham Creek	N/A	N/A	(N/A) 1.8	N/A	N/A
8	RM 32.8 - RM 30.4	Middle Mattole: Gilham Creek to Dry Creek	7/14	Jill Grbavac*, Kali Lovett, Andy Chitick	2.4	0	1
23	RM 30.4 - RM 27.0	Middle Mattole: Dry Creek to Honeydew Slide	7/14	Keytra Meyer*, Sara Luring, Jay Ogawa*	3.4	0	0
9A	RM 27.4 - RM 24.1	Lower Mattole: Honeydew Slide to Woods Creek	7/14	Maureen Roche*, Dylan Harlan, Brandon Jurrens, Tambra Fisher	3.3	3	5
10	RM 24.4 - RM 21.3	Lower Mattole: Bundle Prairie Creek to Triple Junction High School	7/14	Sean James*, Jessi Graff, Daniel Tittman Heidi Klingel	3.1	0	3

25	RM 21.3 - RM 19.7	Lower Mattole: Triple Junction High to Saunders Creek	7/15	Keytra Meyer*, Allen Taylor, Matt Lee	1.6	0	0
11	RM 19.7 - RM14.9	Lower Mattole: Saunders Creek to Squaw Creek	7/14	Natalie Arroyo*, Micah Larsen, Caryn Larsen, Ken Lindke	4.8	0	0
12	RM 14.9 - RM 12.6	Lower Mattole: Squaw Creek to Lindley Bridge	7/15	Drew Barber*, Edina Meiners, Pam Lauer, Tom Rosen, Ken Lindke	2.3	0	1
13	RM 12.6 – RM 7.8	Lower Mattole: Lindley Bridge to Conklin Creek	7/15	Lisa Schepman*, Tabi Bolton*, Sara Luring	4.8	0	1
14	RM 7.8 – RM 5.2	Lower Mattole: Conklin Creek to Hideaway Bridge	7/14	Reid Bryson*, Edina Meiners, Tom Rosen, Brian Jenke	2.6	0	1
15	RM 5.2 – RM 1.3	Lower Mattole: Hideaway Bridge to Stansberry Creek	7/15	Sean James*, Jessi Graff, Brian Jenke, Edina Meiners	3.9	1	1
15B	RM 3.0 – RM 1.3	Lower Mattole: Mattole Salmon Group office to Stansberry Creek	7/15	Michael Evenson*, Nathan Scheinman	1.7	1	1
16	RM 1.3 – RM 0.0	Lower Mattole: Stansberry Creek to Ocean	7/14	Tom Campbell*, Dan Free*, Allen Taylor, Pam Lauer, Sarah Campbell, Matt Lee, Brooke Rahn	1.3	1	0
17	RM 42.8 + 3.6	Bear Creek (Geppert/Spence's to mouth)	7/15	Amy Baier*, Pete Tans	(+~3.6)	2	4
18	RM 26.5 + 2.5	Honeydew Creek (Maureen Catalina's to 2.5 miles upstream of Bear Wallow Slide)	7/15	Reid Bryson*, Shane Phillips*	(+~2.5)	0	1
		Totals			64.85 total survey miles**	19	38

Key: *denotes prior survey experience, + denotes tributary mileage, N/A=not applicable, **64.85 total survey miles includes 6.25 miles of Mattole tributaries, 58.6 miles total mainstem survey miles, and 55.3 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 2006 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 B, Table B-1 and B-2, for reach locations surveyed in 1996-2006).

1996-2006

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 ten 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 eleven years of surveys. In 2006, MSG divers observed approximately 0.29 adults per mile (19 adults in 64.85 miles, Table 2), slightly less than the 0.33 adult summer steelhead per mile seen in 2005. MSG surveyors documented 0.19 and 0.34 adults per mile in 2003 and 2004, respectively (Table 2).

Steelhead counts by MSG divers during the Summer Steelhead Dive have shown a noticeable decline in recent years. Over the past four 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 0.29 adults per mile were seen during the 2003-2006 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 0.63 "half-pounder" sightings per mile occurred in 2003-2006.

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, 1996-2006.

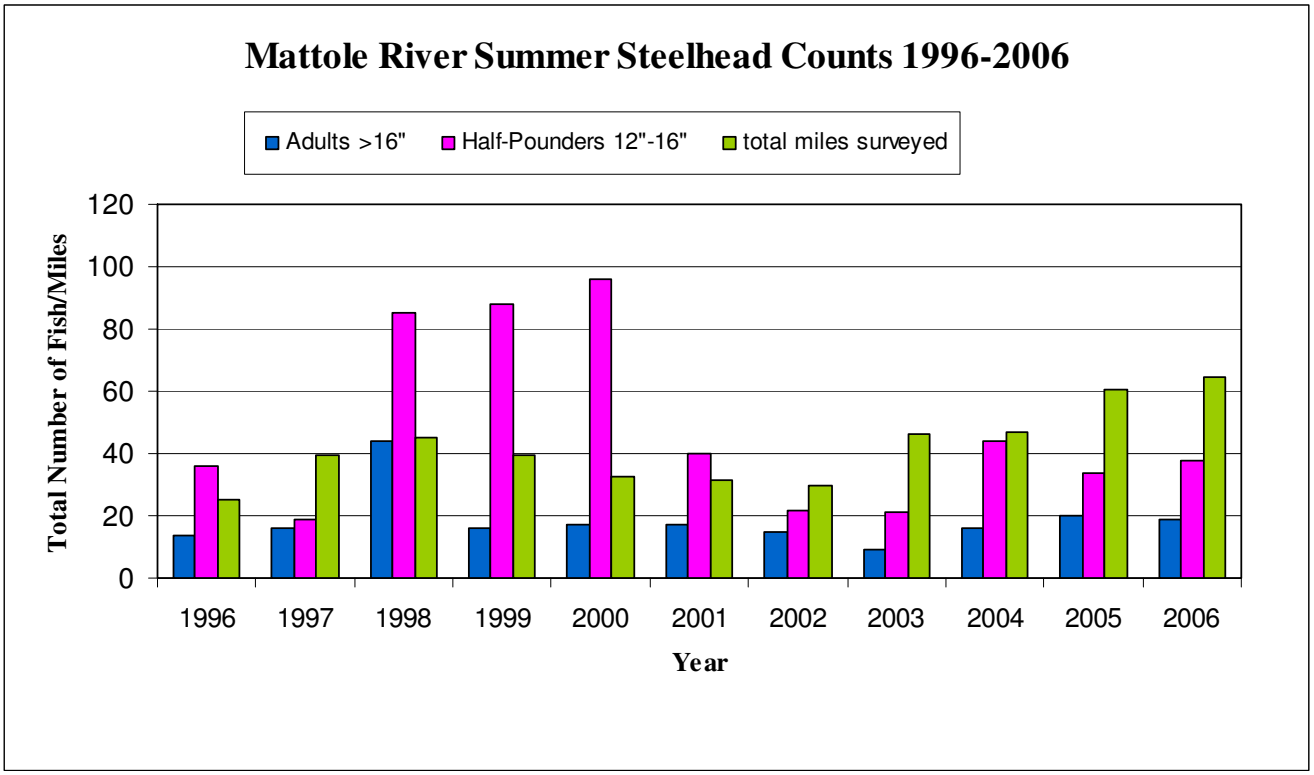
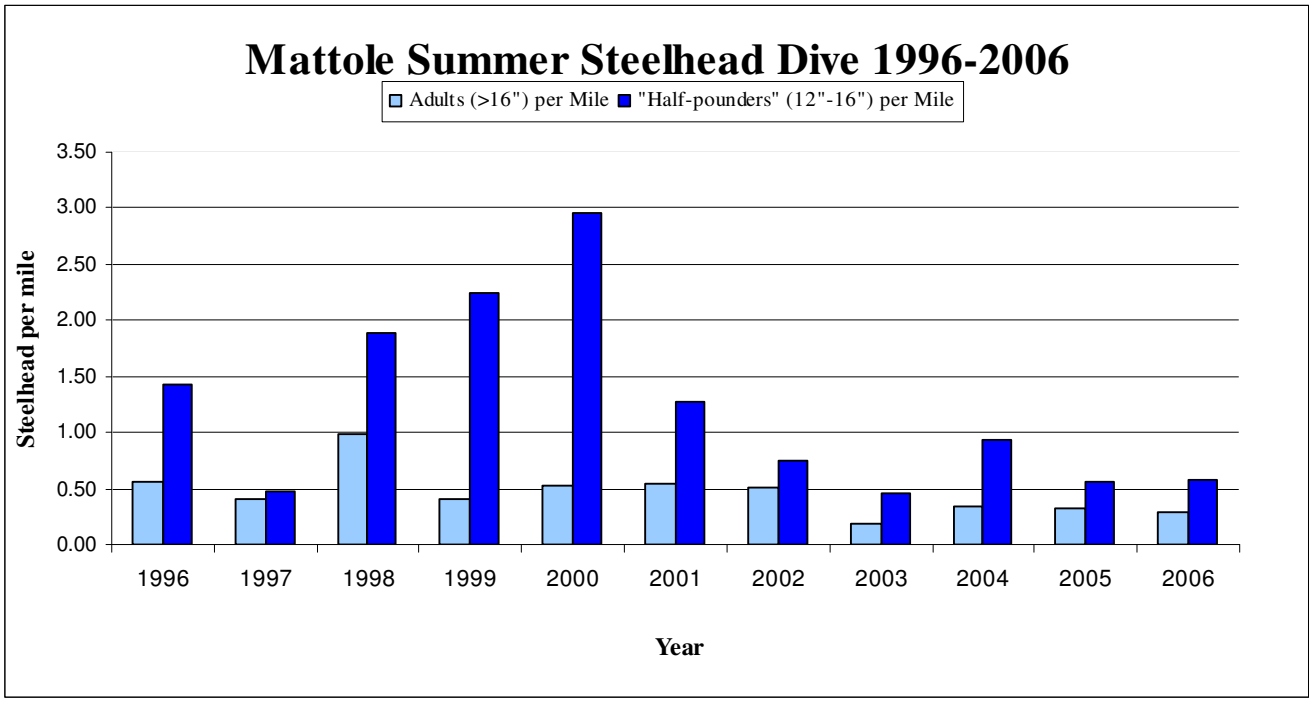


Table 2. Adult Summer Steelhead and "half-pounder" Counts in the Mattole River and tributaries, 1996-2006.

YEAR	ADULTS	HALF-POUNDERS	MS Miles	Tributary 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

Figure 4. Steelhead per mile observed during MSG Summer Steelhead Dives, 1996-2006.



Results by Reach, 1996-2006

See Table 1 and Appendix B, 1996-2005 Summer Steelhead Dive Tables and Figures, for data on results per reach from 1996 to 2006. Note that letter codes refer to variances between current and past reaches. Contact the MSG for a map of 2000-2006 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 eleven 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; in eleven years of surveys, a total of 41 "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) due to lack of landowner access. 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). During the survey on August 29, 2005, one adult steelhead (22") was sighted in a 6' deep pool at a creek mouth near

large woody debris. In 2006, there were no observations of adult summer steelhead in reach 19, although three "half-pounders" were observed. 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.

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 203 adult summer steelhead observed in the Mattole River over the past eleven years of surveys, 82 of those sightings occurred in reaches 3 through 6, representing ~40% of total summer steelhead sightings over eleven years. Three of the nineteen adult summer steelhead sightings and eight of thirty-eight "half-pounders" observed in 2006 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). 2006 dive counts followed this historical trend; summer steelhead observations per mile were noticeably higher downstream of McKee Creek. Throughout the upper Mattole, (reaches 2, 19, 24, and 3A through 6 (RM 58.8 – RM 46.0)), ~0.28 summer steelhead were observed per mile surveyed in 2006 (3 in 10.8 miles). In comparison, 0.5 summer steelhead were observed per mile of survey effort (3 in 6 miles) in reaches 3A through 6 (RM 52.8 – 46.0) during the 2006 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 1996-2006. A total of ten adult summer steelhead and 58 "half-pounders" were seen in the past eleven years of dives. The greatest number of adults seen in reach 7 was 4 in 1999. In the past four years of surveys, MSG divers observed one adult summer steelhead in reach 8 (2003). Three "half-pounders" have also been observed in reach 8 over the past four years. In 2006, divers observed one adult in reach 7 and one "half-pounder" 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.

In reach 20, surveyors saw one adult summer steelhead and one "half-pounder" in 2006. Both were seen in the bottom of deep pools. In 2005, one adult was seen in reach 20, also at the bottom of a deep pool. Reach 21 (6.5 miles) is the longest reach ever surveyed by MSG divers in the Summer Steelhead Dive. A crew of 3 divers with a canoe escort saw 6 summer steelhead and 7 half-pounders in reach 21 on a two-day survey from 7/19-20, 2006. Adult sightings occurred in deep pools as well as under rootwads and riparian vegetation. Four adults and one "half-pounder" were observed in reach 21 in 2005, all in deep pools present in the reach. Reach 22 was not surveyed in 2006, although MSG surveyors observed one adult summer steelhead in reach 22 in 2005. Continuing survey of reaches 20-22 is recommended in the future due to sightings over the past two 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. Despite two years of surveys, MSG divers have not observed a single fish in reach 23, although favorable habitat for summer steelhead does exist.

In comparison with the 0.29 adults observed per mile during the 2006 Summer Steelhead Dive, surveyors observed 0.71 adults/mile in reaches 20-21 in 2006. In the middle Mattole, reaches 7 and 8 and reaches 20-21 and 23, the middle 19 mile section of the Mattole, summer steelhead sightings were 0.47 fish/mile in 2006 (8 adults in 17.2 miles surveyed, reach 22 was not surveyed), 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.

In 2006, MSG divers spotted three adult summer steelhead and five half-pounders in reach 9A; interestingly, these fish were seen 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. Three "half-pounders" were observed by MSG surveyors in reach 10 in 2006. Three adult summer steelhead and two "half-pounders" were observed in reach 9 in 2005; MSG divers also saw three "half-pounders" in reach 10 in 2005. 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 1996-2006 (~19% of 203 sightings over the eleven 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 is not recommended as a priority reach in the future.

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 2006, there were three adult summer steelhead sightings in the lower 20 miles, which is unusual. Two of these sightings occurred in reach 15/15B (RM 5.2 – RM 1.3): One adult was located downstream of the Hideaway Bridge under riparian cover, and one adult was found in the Mill Creek pool, one of the coolest and deepest refugia pools in the lower river adjacent to Lower Mill Creek. One adult summer steelhead was also found in reach 16 (RM 1.3 – RM 0.0), a quarter mile downstream of Stanberry Creek, not far from the Mattole Estuary. A few "half-pounders" are usually spotted in the lower river each year; there were five "half-pounders" observed in reaches 11-16 in 2006.

In the lower Mattole (RM 27.0 – 0), ~0.20 summer steelhead were observed per mile in 2006 (6 in 29 miles surveyed). In comparison with the 0.5 summer steelhead observed per mile in reaches 3A-6 (RM 52.8 - 46.0) and the 0.47 summer steelhead observed per mile in the middle Mattole (RM 46.0 – 27.0), the lower Mattole had significantly less observations per mile. The low number of summer steelhead observed is typical of past survey years and not surprising considering the high water temperatures and lack of oversummering habitat in the lower river.

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.

Despite eleven 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 oversummering 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.

Figure 5. 1996-2006 Summer Steelhead Counts in Mattole Tributaries.

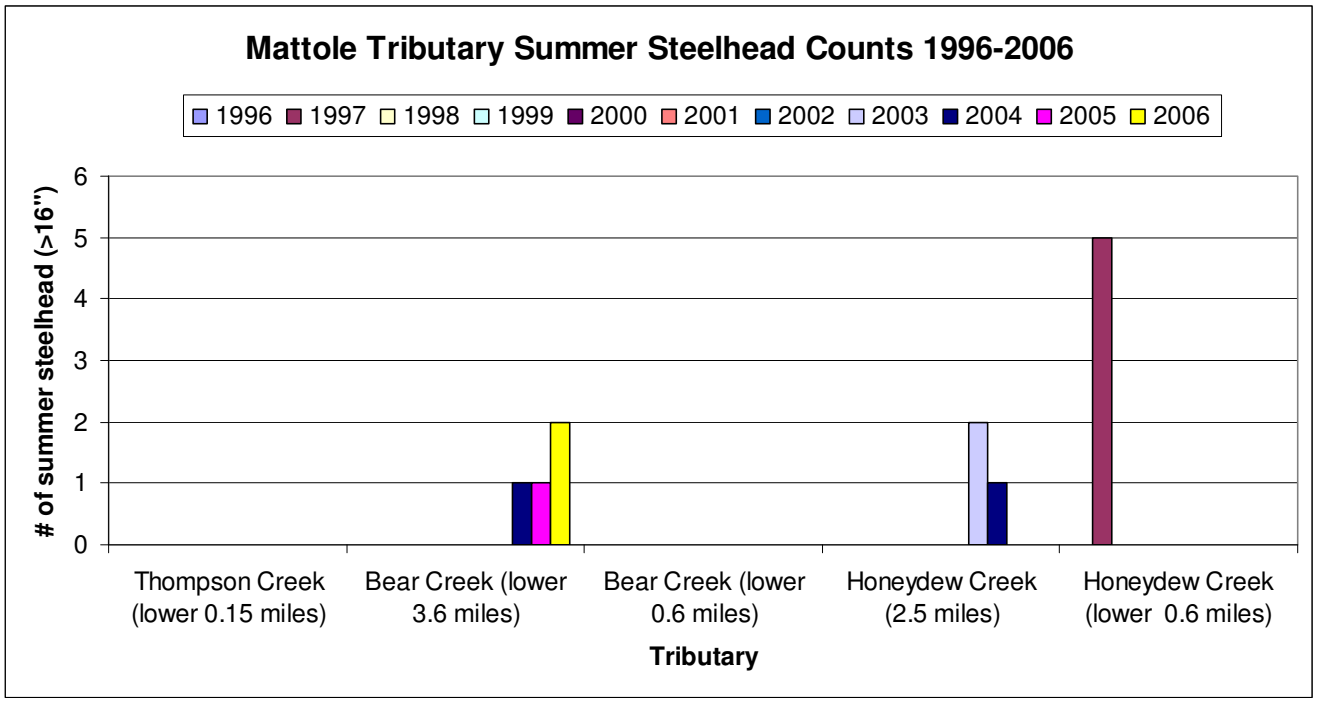
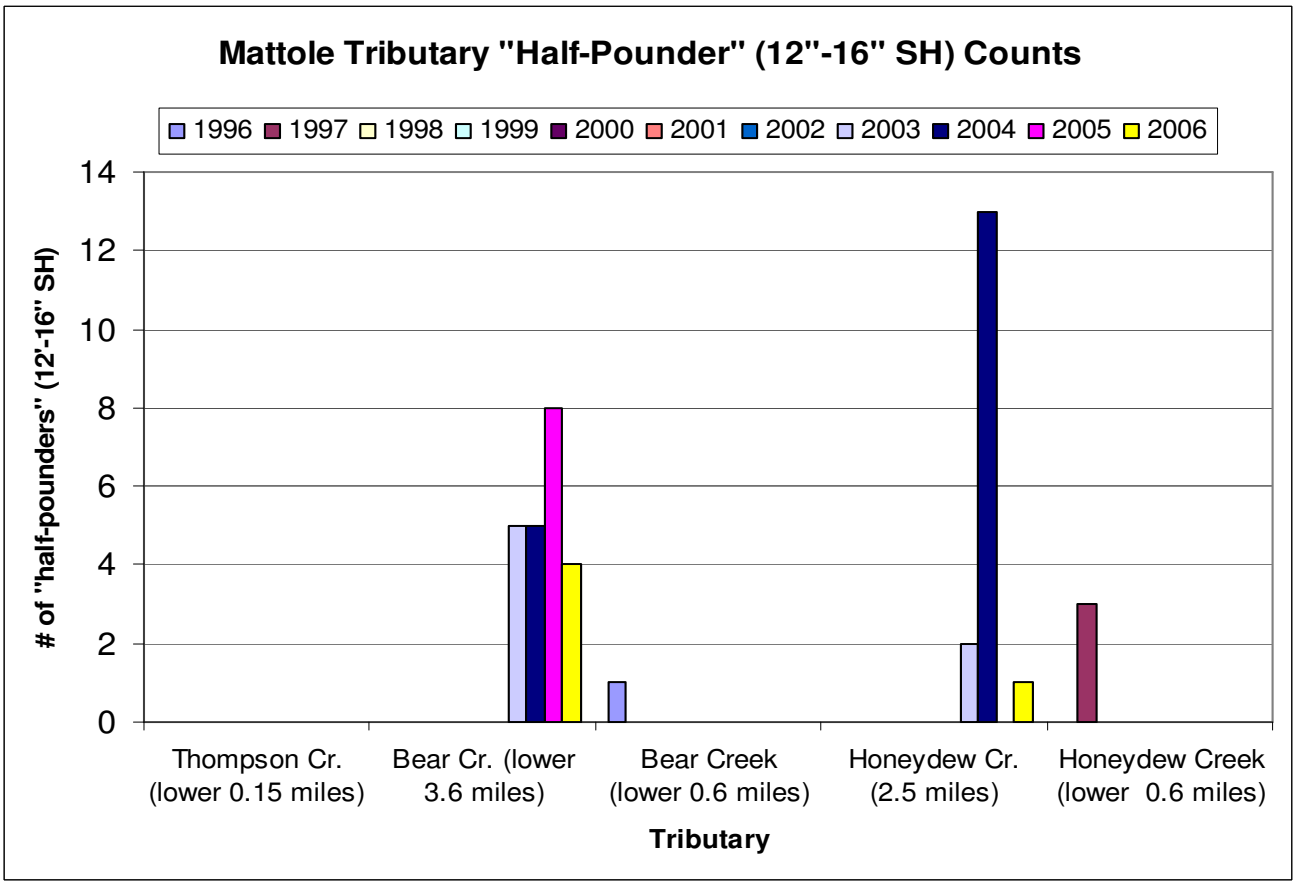


Figure 6. 1996-2006 "Half-pounder" Counts in Mattole Tributaries



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 2003-2006, MSG divers surveyed the lower 3.6 miles of Bear Creek; four adult summer steelhead have been observed in the past four years (See Figure 5). MSG surveyors located 2 adult summer steelhead and 4 "half-pounders" in the lower 3.6 miles of Bear Creek in 2006 (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 -2006. This year, MSG surveyors found no summer steelhead in Honeydew Creek, although one "half-pounder" was observed. Over the past four years of surveys, 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 oversummering 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 2006. In 2006, juvenile coho were observed in three reaches, while juvenile Chinook were found in two reaches (Table 3). Juvenile coho were observed in only the three uppermost reaches, all upstream of RM 54.0 (reaches 2, 19, and 24). In comparison with data collected during the Summer Steelhead Dive in 2005 and prior years, juvenile coho were seen in the least number of reaches and most upstream extent of the mainstem. In 2005, coho were observed in five reaches upstream of river mile 46.0. In 2006, juvenile Chinook were found in the upper mainstem (reach 2) and the lower mainstem (reach 11). While juvenile Chinook were observed in only two reaches in 2006, in 2005 Chinook were observed in four reaches.

In past years, the difference in distribution of coho and Chinook was noticeable. Coho have been observed oversummering exclusively in the upper mainstem. Chinook have been distributed in favorable micro-habitats throughout the river, although more are usually found in the upper mainstem. However, so few Chinook were observed this year, we were unable to determine specific patterns on their distribution.

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.

Table 3. Summary of adult summer steelhead, "half-pounders," and juvenile salmonid observations between the headwaters and the mouth of the Mattole River, July 14-15 and 19-20, 2006.

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	211, in pools	317, in larger volume pools	606, entire reach
19	RM 57.1 - RM 55.6	Upper Mattole: Stanley Creek to Anderson Creek	0	3	yes, entire reach but more in upper 1/2	No	Yes, entire reach
24	RM 55.6 - RM 54.0	Upper Mattole: Anderson Creek to Van Arken Creek	0	0	yes, upper portion of reach	No	Yes, entire reach
3A	RM 52.8 - RM 52.1	Upper Mattole: McKee Creek to Bridge Creek	0	0	No	No	Yes, entire reach
4	RM ~51.3 - RM ~49.4	Upper Mattole: Crook's to Tom's Hole (Patty's)	2	4	No	No	Yes
5	RM ~49.4 - RM 47.4	Upper Mattole: Tom's Hole to Big Finley Creek	0	1	No	No	Yes, entire reach
6	RM 47.4 - RM ~46.0	Upper Mattole: Big Finley Creek to Schepp's	1	3	No	No	Yes, entire reach
20	RM ~46.0 - RM 42.7	Middle Mattole: Schepps' to upstream of Bear Creek	1	1	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)	1	0	No	No	Yes, entire reach
21	RM 41.1 - RM 34.6	Middle Mattole: Mattole Canyon Creek to Fourmile Creek	6	7	No	No	Yes, entire reach
22	RM 34.6 - RM 32.8	Middle Mattole: Fourmile Creek to Gilham Creek	N/A	N/A	N/A	N/A	N/A
8	RM 32.8 - RM 30.4	Middle Mattole: Gilham Creek to Dry Creek	0	1	No	No	Yes, entire reach
23	RM 30.4 - RM 27.0	Middle Mattole: Dry Creek to Honeydew Slide	0	0	No	No	Yes
9A	RM 27.4 - RM 24.1	Lower Mattole: Honeydew Slide to Woods Creek	3	5	No	No	Yes
10	RM 24.4 - RM 21.3	Lower Mattole: Bundle Prairie Creek to Triple Junction High School	0	3	No	No	Yes, entire reach

25	RM 21.3 - RM 19.7	Lower Mattole: Triple Junction High to Saunders Creek	0	0	No	No	Yes
11	RM 19.7 - RM14.9	Lower Mattole: Saunders Creek to Squaw Creek	0	0	No	Yes, very few in upper 1/2	Yes, first half of reach
12	RM 14.9 - RM 12.6	Lower Mattole: Squaw Creek to Lindley Bridge	0	1	No	No	Yes, swift-moving, cold areas w/ live vegetative cover
13	RM 12.6 – RM 7.8	Lower Mattole: Lindley Bridge to Conklin Creek	0	1	No	No	Yes, cool areas with LWD
14	RM 7.8 – RM 5.2	Lower Mattole: Conklin Creek to Hideaway Bridge	0	1	No	No	Yes
15	RM 5.2 – RM 1.3	Lower Mattole: Hideaway Bridge to Stansberry Creek	1	1	No	No	Yes, entire reach
15B	RM 3.0 – RM 1.3	Lower Mattole: Mattole Salmon Group office to Stansberry Creek	1	1	No	No	Yes
16	RM 1.3 – RM 0.0	Lower Mattole: Stansberry Creek to Ocean	1	0	No	No	Yes, in willows
17	RM 42.8 +3.6	Bear Creek (Geppert/Spence's to mouth)	2	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)	0	1	No	No	Yes, entire reach
	Totals		10 reaches	16 reaches	3 reaches	2 reaches	All reaches

Non-salmonid Species

Observations of non-salmonid species, including western pond turtles, freshwater mussels, bull frog tadpoles, crayfish, and notes recorded by divers during the 2006 Summer Steelhead Dives are summarized in Appendix C, Table C-1.

Since 1999, MSG divers have noted western pond turtle sightings during the Summer Steelhead Dive. Over the past eight years, MSG divers have observed well over 200 turtles throughout the middle and lower river. For the first time, turtle sightings have been summarized by reach (Appendix C, Table C-2).

Temperatures

A summary of incidental stream and air temperature data gathered during the Summer Steelhead Dive are also provided in Appendix C, Table C-3. The temperatures recorded during this year's Summer Steelhead Dive were similar to those recorded in 2005 and comparable to prior years. The 2006 Summer Steelhead Dive occurred during the period where many of the maximum temperatures were reached at MSG Temperature Monitoring sites (See 2006 Temperature Monitoring Report for further information). Temperatures recorded during the 2006 Summer Steelhead Dive are likely to represent peak or near-peak temperatures during summer 2006.

Several late rain events in June resulted in a greater flow and lower water temperatures in the Mattole during the summers of 2005 and 2006 than in the past few years. These conditions were generally more favorable for both migration and oversummering salmonids. However, summer water temperatures in the Mattole remained much warmer than ideal for oversummering 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 oversummer 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 2006 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. Over the past eleven 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 eleven years of Summer Steelhead Dives, divers observed an average of 18.45 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 eleven survey years confirm that a small population of adult steelhead inhabit 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 four survey years, 2003 to 2006, that average has fallen to 0.29 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 0.63.

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.

- Update/revise datasheets to include mapping of "half-pounder" and turtle sightings, tributary and mainstem temperature recordings for each creek confluence, estimated flow, and description of change in habitat (i.e. large wood or sediment movement), if applicable.

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Appendix A: Summer steelhead in the Mattole River

Drainage

The Mattole River Watershed encompasses approximately 304 square miles in northern Mendocino and southern Humboldt counties (See Figure 1). The Mattole River originates as a small stream in the King Range National Conservation Area (on the eastern slope of Chemise Mountain), flows due east for a few miles, then turns northwesterly towards Petrolia, where it veers sharply to the west and discharges into the Pacific Ocean about 10 miles south of Cape Mendocino. Seventy-four perennial tributaries join the Mattole as it flows into the estuary, then the Pacific Ocean (Barnhardt and Young 1985). The mainstem Mattole is approximately 62 river miles long.

The Mattole Watershed lies in an area prone to geologic activity, including several active fault zones. Located near the Mendocino Triple Junction, where three tectonic plates converge, the area near the Mattole Estuary is rising at least 1.0 m/1000 years (McLaughlin et al. 1994).

The Mattole experiences high averages of annual precipitation, approximately 60-90 inches, with most occurring in the winter months (Busby et al. 1996). A broad discrepancy between winter and summer flow creates seasonal challenges for salmonids in the river. Winter storm events result in frequent natural disturbance to the Mattole River and its floodplain. Low late-summer flows represent a threat to rearing and oversummering salmonids, as well as other aquatic life. In recent dry years the rearing habitat in the headwaters has been reduced to a series of disconnected pools.

Past land uses in the Mattole Watershed have compounded the impacts of natural instabilities. Timber was harvested throughout the watershed; as of 1988 only 9% of old growth forest remained (MRC 1995). The removal of vegetation in the watershed in conjunction with high recurrences of natural disturbance have drastically changed the nature of the lower river. Subsequent to flood events in 1955 and 1964, the watershed experienced high rates of erosion, unknown prior to logging. Flooding swept away riparian vegetation, and deep pools filled with gravel and fine sediment (MRC 1995). Resultant high water temperatures and lack of adequate habitat have created conditions unfavorable to salmonid life.

Salmonids in the Mattole

The Mattole River is home to three species of salmonids, Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*Oncorhynchus kisutch*) and steelhead (*Oncorhynchus mykiss*). In 1960, USFWS estimated average annual runs in the Mattole were approximately 12,000 steelhead, 5,000 Chinook, and 2,000 coho (KRIS Mattole, Misc. References).

Steelhead in the Mattole

Mattole River steelhead are a part of the Northern California Evolutionary Significant unit (ESU). Steelhead in northern California are grouped into a single ESU based on genetic differences between steelhead in this region and those to the north and south (Busby et al. 1996). Steelhead within the northern California ESU include 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). This is especially true in the case of summer steelhead, which are particularly susceptible to freshwater habitat deterioration due to sedimentation and land use practices.

The observed Mattole population is believed to be the southernmost summer steelhead population to inhabit a watershed without significant snowmelt during spring and summer (Carlos Garza, pers comm.). 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.

Steelhead Life History

Anadromous steelhead are much more complex than salmon in terms of life history diversity. According to Busby et al. (1996), *"Oncorhynchus mykiss,* more commonly known as steelhead or rainbow trout, is considered by many to have the greatest diversity of life history patterns of any Pacific salmonid species (Shapovalov and Taft 1954, Barnhardt 1986), including varying degrees of anadromy, differences in reproductive biology, and plasticity of life history between generations."

Juvenile steelhead typically rear for 1-3 years in freshwater streams before smolting and migrating to the ocean (Moyle 2002). From there their life history diverges, including differing times of ocean residence, different run-timings, and different biological strategies. Steelhead are iteroparous; they may make several ocean migrations and spawn more than once.

Steelhead are divided into two runs/races "based on the state of sexual maturity at the time of river entry and duration of spawning migrations" (Busby et al. 1996). Winter steelhead (ocean-maturing) are sexually mature upon entering freshwater in fall or winter. They migrate upstream and spawn shortly thereafter in the winter and spring. Summer/stream maturing steelhead enter freshwater sexually immature and may reside in freshwater for up to several months before spawning.

"It appears that the summer, or stream maturing steelhead, occur where habitat is not is not fully utilized by winter steelhead; summer steelhead usually spawn farther upstream than winter steelhead" (Wilther 1966, Roelfs 1983, Behnke 1992 in Busby et al. 1996).

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). After maturing in the ocean for 1-2 years, they return to the river to spawn. 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.

Mattole River Summer Steelhead

In the Mattole, summer steelhead enter the river between March and June (Downie et al. 2002). Mattole summer steelhead oversummer in deep, cold pools before spawning during the following late winter and spring. Deposition of eggs in spawning gravel takes place in early spring; juveniles hatch within about 50 days (Downie et al. 2002). Juvenile steelhead typically 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.).

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. Infrequent observations of steelhead spawning in June have also been reported by MSG surveyors. Very small emergent SH fry have been observed by MSG divers in July and even Aug. However, overlaps in migration and spawning periods of winter and summer steelhead makes distinction difficult (Roelfs 1983).

Historical Summer Steelhead Populations in the Mattole

Historical records concerning summer steelhead populations in the Mattole are scarce (MSG 2005). Newspaper records, accounts by longtime watershed residents, and testimony by past surveyors support the existence of a historical summer steelhead population in the Mattole.

In a letter to the California Department of Fish and Game (CDFG) (1943), longtime Mattole resident Albert Etter described great numbers of steelhead migrating up the Mattole River in the months of January through April. He went on to detail observation of as many as 300 steelhead in a single pool. In October of 1942, Etter observed 100-200 large trout (16-24") near his farm in Ettersburg. Although these may have been early-run winter steelhead, it is unlikely that adult winter steelhead would be observed so early in the spawning season as Ettersburg is located 42 miles upstream of the mouth of the Mattole (Gerstung 2000). Etter described the large summer trout as full-bodied, not emaciated like spawned-out winter steelhead. According to Gerstung (2000), "resident rainbow trout of the size noted are generally not found, at least in the numbers observed, in northern California coastal streams." It follows that Etter may have observed summer steelhead holding in the Ettersburg area.

In 1980, a local game warden observed 44 summer steelhead near the confluence of Fourmile Creek and the mainstem Mattole (24 miles from the mouth) and in close proximity to Ettersburg.

Mattole Salmon Group Summer Steelhead Dives, 1996-2006

The Mattole Salmon Group (MSG) Summer Steelhead Dive is the primary source of information and monitoring of summer observations of adult steelhead in the Mattole River.

The first diving survey for summer steelhead on the Mattole, organized by CDFG, took place in l982; three sixteen inch steelhead were observed near Ettersburg (Gerstung 2000). In l991, Humboldt State University's Cooperative Fishery Research Unit organized a second dive, but it was unsuccessful in locating any adult summer steelhead.

Between 1996 and 2006, direct dive observation counts of steelhead were conducted in thirteen to twenty-five reaches of the mainstem Mattole and the lower reaches of three tributaries during the summer months. Thirteen index reaches were monitored throughout the ten years of surveys, although landowner access and volunteer personnel limited surveys in some cases. Divers were organized by the Mattole Salmon Group with volunteers from Cal Trout, Americorps Watershed Stewards Project, Humboldt Fish Action Council, NOAA Fisheries, and US Fish and Wildlife Service over the years.

The purpose of the Mattole Summer Steelhead Dive has been to enumerate adult steelhead and "half-pounders" holding in the Mattole over the summer months and identify their preferred holding habitat in the mainstem and lower sections of three tributaries. Other objectives included locating "cold-water" areas and identifying the distribution of three species of juvenile salmonids.

Appendix B, Mattole Salmon Group Summer Steelhead Dive Summary Tables, 1996-2006

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

Number	Reach Description	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	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+.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	1										**1**
24	Anderson Creek (RM 55.6) to Van Arken Creek (RM 54.0)	0											**0**
3	McKee Cr. (RM 52.8) to Crooks (RM 51.3)				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)	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)	0	0	4	0	1							**5**
6	Big Finley Cr. (RM 47.4) to Shepp's (RM~46.0)	1	6	0	0	2							**9**
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										**2**
7	Us. Bear Cr. (RM 42.7) to Klossen's Hole (ds Mattole Canyon Cr.)(RM~39.9)	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)	6	4										**10**
22	Fourmile Cr. (RM 34.6) to Gilham Cr. (RM 32.8)		1										**1**

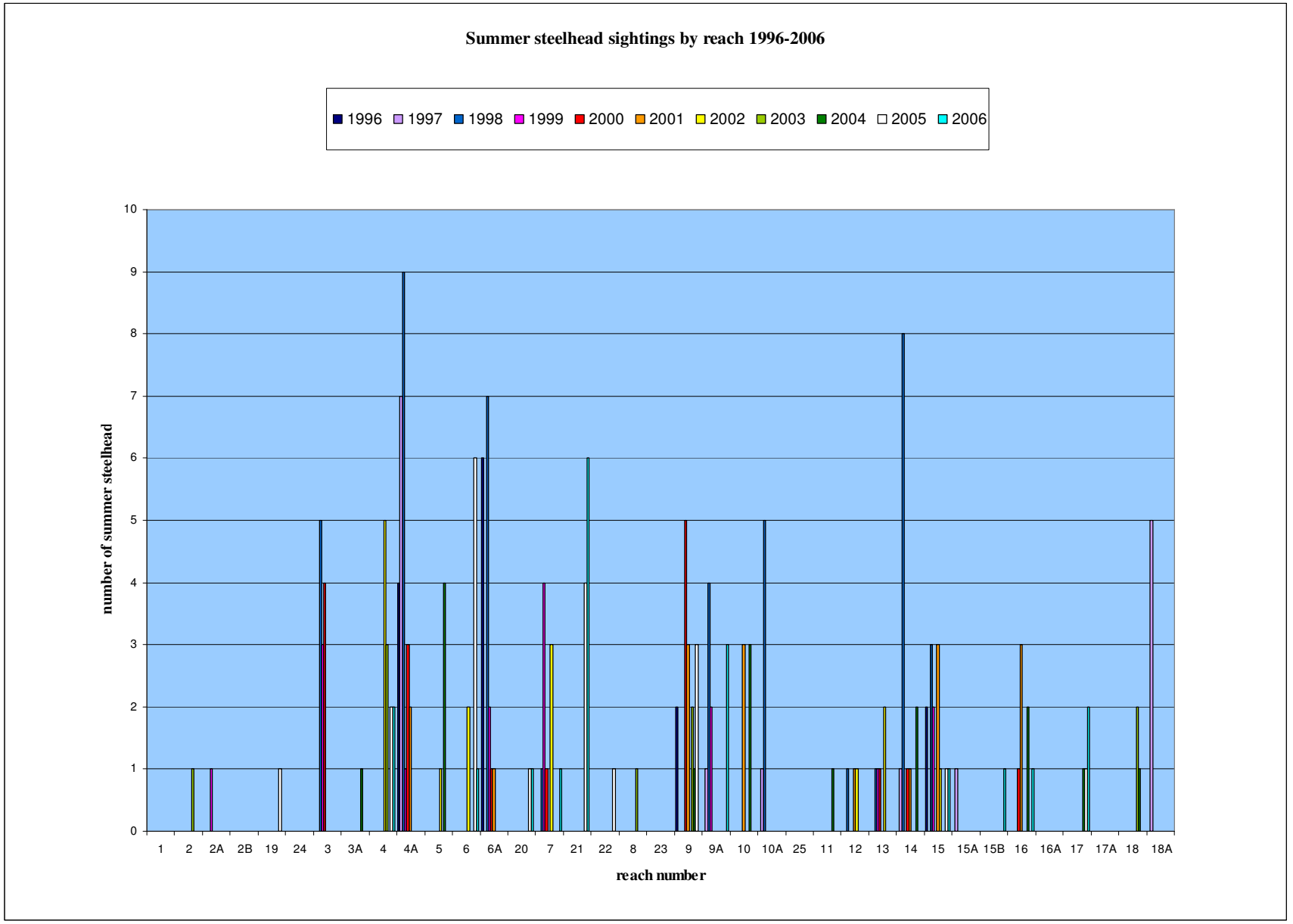
8	Gilham Cr. (RM 32.8) to Dry Cr. (RM 30.4)	0	0	0	1								**1**
23	Dry Creek (RM 30.4) to Honeydew Slide (RM 27.0)	0	0										**0**
9	Honeydew Slide (RM 27.0) to Bundle Prairie Cr. (RM 24.4)		3	1	2		3	5				2	**16**
9A	Honeydew Slide (27) to Woods Ck.(24.1)	3							2	4	1		**10**
10	Bundle Prairie Cr. (RM 24.4 to Triple Junction High School (RM 21.3)	0	0	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	1	0		0		0	0		0	**1**
12	Squaw Cr. (RM 14.9) to Lindley Bridge (RM 12.6)	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	2		1	1	1	0		**5**
14	Conklin Cr. (RM 7.8) to Hideaway Bridge (RM 5.2)	0	0	2	0	0	1	1	0	8	1		**13**
15	Hideaway Bridge (RM 5.2) to Stansberry Cr. (RM 1.3)	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)	1											**1**
16	Stansberry Cr. (RM 1. 3) to Ocean (RM 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)	2	1	1	0								**4**
17A	Bear Creek (lower 0.6 miles)											0	**0**
18	Honeydew Cr. Maureen Catalina's to 2.5 miles us Bear Wallow Slide	0		1	2								**3**
18A	Honeydew Creek (lower 0.6 miles)								0	0	5	0	**5**
	Totals	**19**	**20**	**16**	**9**	**15**	**17**	**17**	**16**	**44**	**16**	**14**	**203**

Table B-2. "Half-pounder" (12"-16" steelhead) Observations, MSG Summer Steelhead Dive

Number	Reach Description	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	2	3	2	1							8
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+.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	0										3
24	Anderson Creek (RM 55.6) to Van Arken Creek (RM 54.0)	0											0
3	McKee Cr. (RM 52.8) to Crooks (RM 51.3)				2	2	7	13	9	1	3		37
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)	4	0	3	2	5							14
4A	Crooks RM (51.1) 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)	1	5	3	1	2							12
6	Big Finley Cr. (RM 47.4) to Shepp's (RM~46.0)	3	2	4	0	0							9
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)	1	2										3
7	Us. Bear Cr. (RM 42.7) to Klossen's Hole (ds Mattole Canyon Cr.)(RM~39.9)	0	1	0	2	1	1	30	17	3	2	1	58
21	Mattole Canyon Cr. (RM 41.1) to Fourmile Cr. (RM 34.6)	7	1										8
22	Fourmile Cr. (RM 34.6) to Gilham Cr. (RM 32.8)		1										1
8	Gilham Cr. (RM 32.8) to Dry Cr. (RM 30.4)	1	1	0	1								3
23	Dry Creek (RM 30.4) to Honeydew Slide (RM 27.0)	0	0										0

9	Honeydew Slide (RM 27.0) to Bundle Prairie Cr. (RM 24.4)		2	4	0		2	15				14	37
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)	3	3	3	1	5	11						26
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	1		0		1	0		1	3
12	Squaw Cr. (RM 14.9) to Lindley Bridge (RM 12.6)	1	1	0	1	0	8	0	2	0	3	8	24
13	Lindley Bridge (RM 12.6) to Conklin Cr. (RM 7.8)	1	0	0	1	2		3	2	2	1		12
14	Conklin Cr. (RM 7.8) to Hideaway Bridge (RM 5.2)	1	2	4	0	0	1	1	7	12	0		28
15	Hideaway Bridge (RM 5.2) to Stansberry Cr. (RM 1.3)	1	0	2	0	4	0	4	6	12		2	31
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
16	Stansberry Cr. (RM 1. 3) to Ocean (RM 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)	4	8	5	5								22
17A	Bear Creek (lower 0.6 miles)											1	1
18	Honeydew Cr. Maureen Catalina's to 2.5 miles us Bear Wallow Slide	1		13	2								16
18A	Honeydew Creek (lower 0.6 miles)								0	0	3	0	3
	Totals	38	34	44	21	22	40	96	88	85	19	36	523

Figure B-1. 203 summer steelhead (>16") were observed in dive surveys in 1996-2006. Adult steelhead were observed throughout the watershed, but seemed to utilize pool habitat and thermal refugia in the mid-river to the greatest extent.



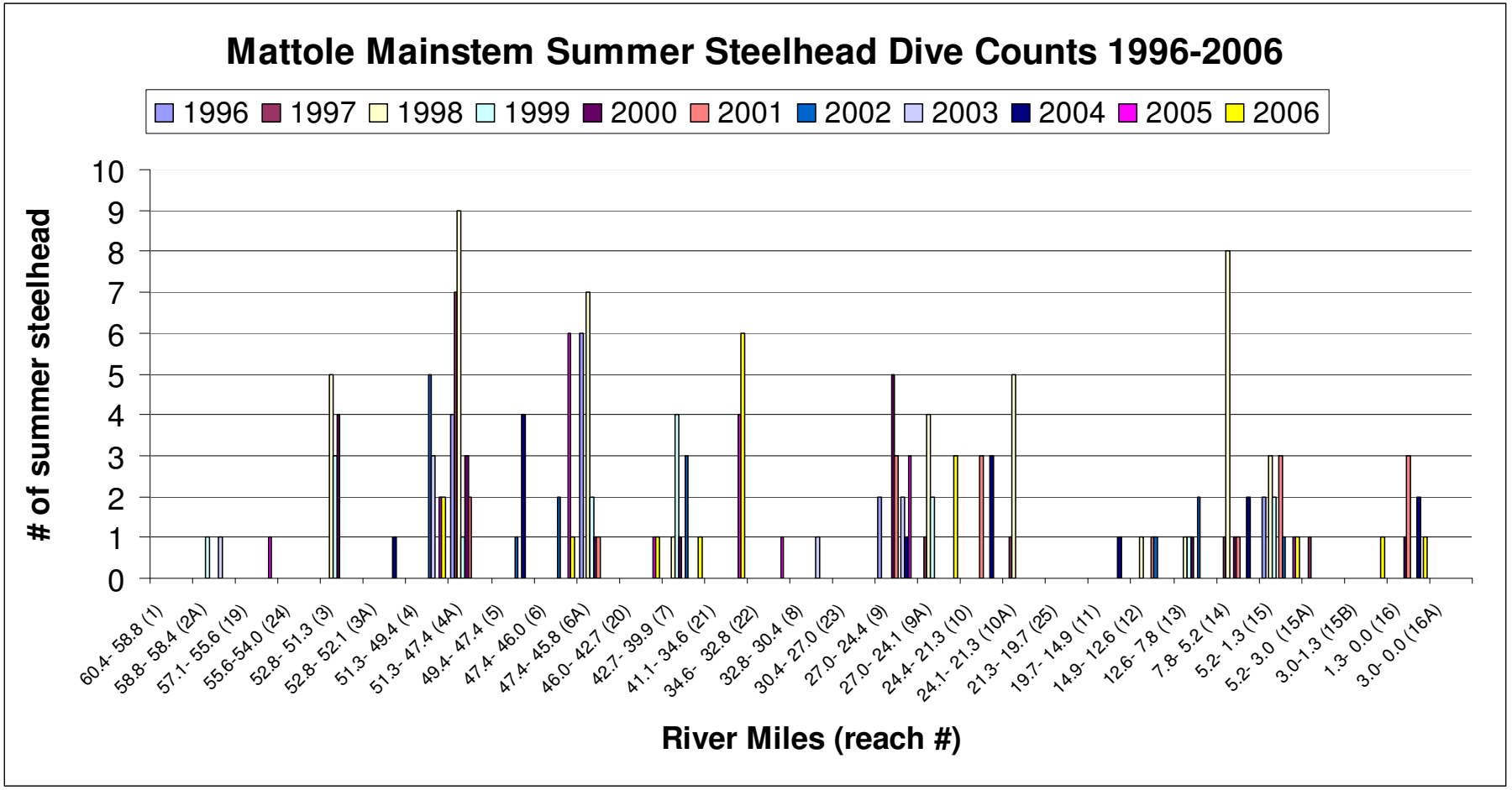


Figure B-2. Mattole mainstem adult summer steelhead observations by river mile, 1996-2006.

Appendix C.
Temperature recordings and other species observed during the MSG 2005 Summer Steelhead Dive

Table C-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 2006.

Reach #	Reach Name and Location	Freshwater Mussels	Bull Frog Tadpoles	Crayfish	Western Pond Turtles	Other	Notes
1	Phillips Cr. (RM 60.4) to Lost River Cr. (RM 58.8)	N/A	N/A	N/A	N/A	N/A	N/A
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 Cr.)	30, us Thompson Cr.	No	No	No	2 garter snakes, stickleback, 2 belted kingfishers	3 lamprey carcasses, more Lilium pardelinium than even last 1.4 miles
19	Stanley Cr. (RM 57.1) to ds Anderson Cr. (~55.6)	Yes, in habitat structure ds Stanley Cr	No	No	No	lamprey Redd, lamprey carcasses, garter snake	N/A
24	ds Anderson Creek (~55.6) to Van Arken Cr	No	No	No	No	salamanders	N/A
3A	McKee Cr. (RM 52.8) to Bridge Cr. (RM ~51.3)	Yes	No	No	No	N/A	N/A
4	Crook's (RM ~51.3) to Tom's Hole (Patty's) (RM ~49.4)	5	No	15 towards end of reach	No	3 garter snakes, blue-winged teal, ~20 rough-skinned newts, 6 blue heron	red colored frog (3' diameter) yellow legged frog, dippers
5	Tom's Hole (RM ~49.4) to Big Finley Cr. (RM 47.4)	No	60, all in deep pools	Yes	Yes	CA newts, Pacific Giant Salamander juveniles, one snake	tons of 0+ and 1+ SH, never seen so many in one dive
6	Big Finley Cr. (RM 47.4) to Schepp's (RM ~46.0)	Yes, numerous sites, more in second half of reach	No	Yes	5	numerous rough-skinned newts, many yellow legged frogs	N/A
20	Schepps' (RM ~46.0) to us Bear Cr. (RM 42.7)	1	No, but possible bullfrog	lots of crayfish	9	Many yellow-legged frogs, western toad, kingfishers, killdeer, many rough-skinned newts, aquatic garter snakes	at least 10 + SH that were 6-8", numerous macroinvertebrates, 10-12 deer
7	Us. Bear Cr. (RM 42.7) to Klossen's Hole (ds Mattole Canyon Cr)(RM ~39.9)	Yes, 1 ds Ettersburg Bridge	No	N/A	N/A	N/A	N/A
21	Mattole Canyon Cr. To 4 mile Cr.	No, saw empty mussel shell though	No	No	5	Newts, snakes, ducks	numerous turtles
22	4 Mile Cr. To Gilham Cr.	N/A	N/A	N/A	N/A	N/A	N/A
8	Gilham Cr. (RM 32.8) to Dry Cr. (RM 30.4)	No	No	No	1	ouzels, ducks, lots of newts	1/3 to 1/2 of SH were 4"-8"
23	Dry Cr. (RM 30.4) to Honeydew Slide (RM 27.0)	No	Yes, near Dry Creek in log jam	No	No	N/A	Numerous SH parr/smolts

9A	Honeydew Slide (RM 27.0) to Woods Creek (RM 24.1)	No	No	1 crayfish mort	1 male turtle (8")	2 aquatic garter snakes, 5 kingfisher, 2 prickly sculpin, 12 ducks	4 hooded merganzers, leeches, green heron, 3 killdeer
10	Bundle Prairie Cr. (RM 24.4 to Triple Junction High School (RM 21.3)	No	1 bullfrog	No	2	osprey	N/A
25	Triple Junction High School (RM 21.3) to Saunders Creek (RM 19.7)	No	No	No	1	2 western toads, newt, turtle, otter, deer	N/A
11	Saunders Cr. (RM 19.7) to Squaw Cr. (RM 14.9)	No	One, 1/4 mile ds Saunders Creek	No	No	Newts, snakes, mergansers	N/A
12	Squaw Cr. (RM 14.9) to Lindley Bridge (RM 12.6)	No	No	No	No	No	Wild Turkey disconnected from Mattole, isolated pool holding ~ 50 SH Juveniles
13	Lindley Bridge (RM 12.6) to Conklin Cr. (RM 7.8)	No	No	No	No	cows	Conklin Creek warmer than mainstem Mattole
14	Conklin Cr. (RM 7.8) to Hideaway Bridge (RM 5.2)	No	No	No	1 turtle under a cut bank	garter snakes	N/A
15	Hideaway Bridge (RM 5.2) to Stansberry Cr. (RM 1.3)	No	No	No	No	N/A	N/A
15B	MSG to Stansberry Creek	No	No	No	No	6" sculpins at Wingdam, 3 merganser ducks, 1 great blue heron	1+ SH and SH yoy in very good physical condition and deep-bodied
16	Stansberry Cr. (RM 1.3) To Ocean (RM 0.0)	No	No	No	No	N/A	N/A
17	Bear Cr. (Geppert/Spence's to mouth)	No	No	No	4	mergansers, wood ducks, numerous newts	lots of 1+ and larger (4"-8" and >8") SH and resident trout
18	Honeydew Cr. (Maureen Catalina's to 2.5 miles us Bear Wallow Slide	No	No	No	1	several racers and garter snakes, 1 newt	possibly revise reach to West Fork confluence
	Totals	7 reaches	4 reaches	5 reaches	30+ turtles	N/A	N/A

Table C-2. Western Pond Turtle Sightings, 1999-2006 Mattole Salmon Group Summer Steelhead Dives

Reach #	Reach Description	2006	2005	2004	2003	2002	2001	2000	1999	Total
1	Phillips Cr.(RM 60.4) to Lost River Cr.(RM 58.8)			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**
2A	Lost River Cr.(RM 58.8) to Stanley Cr. (RM 57.1)						0	0	0	**0**
2B	Thompson Cr. (RM 58.4+.15, mouth to confluence with Yew Cr.)						0	0	0	**0**
19	Stanley Cr. (RM 57.1) to Anderson Cr. (RM ~55.6)	0	0							**0**
24	Anderson Creek (RM 55.6) to Van Arken Creek (RM 54.0)	0								**0**
3	McKee Cr. (RM 52.8) to Crooks (RM 51.3)				2	5	0	2	1	**10**

3A	McKee Cr. (RM 52.8) to Bridge Cr. (RM 52.1)	0	Yes	0						**1+**
4	Crook's (RM ~51.3) to Tom's Hole (Patty's) (RM ~49.4)	0	0	1	1	1				**3**
4A	Crooks RM (51.3) to Big Finley Ck. (RM 47.4)						1	2	3	**6**
5	Tom's Hole (RM ~49.4) to Big Finley Cr. (RM 47.4)	Yes	1	4	3	Yes				**10+**
6	Big Finley Cr. (RM 47.4) to Shepp's (RM~46.0)	5	8	0	2	1				**16**
6A	Big Finley Cr. (RM 47.4) to Deer Lick Cr. (RM 45.8)						3	3	1	**7**
20	Schepps' (RM ~46.0) to us Bear Cr. (RM 42.7)	9	1							**10**
7	Us. Bear Cr. (RM 42.7) to Klossen's Hole (ds Mattole Canyon Cr.)(RM~39.9)	0	0	0	2	0	3	0	0	**5**
21	Mattole Canyon Cr. (RM 41.1) to Fourmile Cr. (RM 34.6)	5	Yes							**6+**
22	Fourmile Cr. (RM 34.6) to Gilham Cr. (RM 32.8)		5							**5**
8	Gilham Cr. (RM 32.8) to Dry Cr. (RM 30.4)	1	Yes	5	"numer ous"		0	0		**7+**
23	Dry Creek (RM 30.4) to Honeydew Slide (RM 27.0)	0	0							**0**
9	Honeydew Slide (RM 27.0) to Bundle Prairie Cr. (RM 24.4)		2+	0	3					**5+**
9A	Honeydew Slide (27) to Woods Ck.(24.1)	1							0	**1**
10	Bundle Prairie Cr. (RM 24.4 to Triple Junction High School (RM 21.3)	2	1	0	6	Yes	1			**11+**
10A	Woods Ck.(RM 24.1 to Triple Junction HS (RM 21..3)							3		**3**
25	Triple Junction High School (RM 21.3) to Saunders Creek (RM 19.7)	1								**1**
11	Saunders Cr. (RM 19.7) to Squaw Cr. (RM 14.9)	0	4	5	2	0	0		5	**16**
12	Squaw Cr. (RM 14.9) to Lindley Bridge (RM 12.6)	0	Yes	4	0	2	0	1	4	**12+**
13	Lindley Bridge (RM 12.6) to Conklin Cr. (RM 7.8)	0	2	3	3	Yes, lots		2	4	**15+**
14	Conklin Cr. (RM 7.8) to Hideaway Bridge (RM 5.2)	1	3	1	0	2	0	1	3	**11**
15	Hideaway Bridge (RM 5.2) to Stansberry Cr. (RM 1.3)	0	1	1	2	Yes	0	1	2	**8+**
15B	MSG Office (RM 3.0) to Stansberry Creek (RM 1.3)	0								**0**
16	Stansberry Cr. (RM 1. 3) to Ocean (RM 0.0)	0	0		0		1	2	2	**5**
17	Bear Cr. (Geppert/Spencer's to mouth) (lower 3.6 miles)	4	4	2	0					**10**
18	Honeydew Cr. Maureen Catalina's to 2.5 miles us Bear Wallow Slide	1	0	?	0					**1**
18A	Honeydew Creek (lower 0.6 miles)								0	**0**
	Totals	**30+**	**36+**	**26**	**26+**	**31+**	**9**	**17**	**25**	**200+**

Table C-3. Mattole stream and air temperatures were recorded by handheld thermometers during Summer Steelhead Survey dates, July 2006.

Date	Location	Reach #/Letter Code	Time	Tributary Temp (°F)	Mattole Temp (°F)	Air Temp (°F)
7/15	mouth- Lost River trickle	2/A	1130	60	62	72
7/15	mouth- Helen Barnum trickle	2/B	1130	62	62	
7/15	Thompson Creek (~1 cfs)	2/C	1300	64	64	72
7/15	Thompson us CAS (?)/ dam 1st dead moss	2/D	1330	66	--	74
7/15	Yew Creek (~20 gpm)	2/E	1330	62	--	74
7/15	Baker Creek trickle	2/F	1600	62	--	--
7/15	Stanley Creek trickle	2/G	1900	62	64	72
7/15	Stanley Creek Pool	19/A	1045	--	61 @ 1'	73
7/15	Stanley Creek @ mouth	19/B	1045	57 @ 6"	--	73
7/15	Gibson Creek @ mouth	19/C	1200	58 @ 6"	--	74
7/15	Harris Creek @ mouth	19/D	1300	59 @ 6"	--	75
7/15	Mattole @ Harris Creek	19/E	1300	--	62 @ 6"	75
7/15	Upper Mill Creek	19/F	1400	60 @ 6"	--	77
7/15	Mattole @ Upper Mill Creek	19/G	1400	--	64 @ 1'	77
7/15	Mattole @ end of reach #19 (ds Anderson Cr)	19/H	1530	--	67 @ 1'	77
7/14	Mattole @ Anderson Creek, survey start	24/A	--	--	61 @ 1'	70
7/14	Mattole, pool us Anderson Creek	24/B	--	--	60 @ 6'	70
7/14	Anderson Creek (tributary river left)	24/C	--	64 @ 2'	--	72
7/14	Deep pool (in Mattole mainstem)	24/D	--	--	67 @ 7'	72
7/14	Van Arken Creek	24/E	--	--	65 @ 1'	70
7/14	Mattole - put in @ Crook's	4/A	1050	--	62 @ 1'	76
7/14	Mattole - takeout @ Tom's Hole	4/B	1830	--	70.5 @ 2.5'	75
7/14	Mattole - put in @ Tom's Hole	5/A	1215	--	64 @ 6"	87
7/14	Mattole - pool with half-pounder	5/B	--	--	--	--
7/14	Mattole us of Big Finley Creek	5/C	1720	--	72 @ 6"	--
7/14	Mattole ds Big Finley Creek	5/D	1725	--	69 @ 6"	--
7/14	Mattole us Big Finley Creek (start)	6/A	1135	--	66 @ 6"	73
7/14	Big Finley Pool, deep	6/B	1150	--	64 @ 6'	73
7/14	Big Finley Creek	6/C	1155	58	--	73
7/14	Little Finley Creek	6/D	1545	64	--	--
7/14	Mattole ds Little Finley Creek	6/E	1550	--	70 @ 6"	--
7/14	Mattole - takeout @ Shepp's	6/F	1700	--	71 @ 6"	--
7/15	Mattole @ Shepp's	20/A	1200	--	66 @ 1'	67
7/15	Mattole, adult (case #1), LB Pool	20/B	1400	--	72 @ 7'	--
7/15	Mattole, reach 20, case #2 (1/2lber)	20/B	1700	--	69 @ 11'	--
7/15	Mattole, reach 20, case #2 (1/2lber)	20/C	1700	--	77 @ 1'	--
7/15	~1 mile us Bear Creek	7/A	1145	--	70	73
7/15	Just ds Bear Creek	7/B	1205	--	68	73
7/15	~ 100 yards us Ettersburg Bridge	7/C	1310	--	71.5	75
7/15	ds tributary (Blue Slide Creek)	7/D	1330	--	73	--
7/19	Mattole us Mattole Canyon Creek (put in)	21/A	1330	--	75	95

7/19	Right Bank tributary just us Grindstone Creek	21/B	1655	64	--	--
7/19	Mattole us RB tributary	21/C	1700	--	77	--
7/19	Grindstone Creek	21/D	1715	69	--	--
7/19	Mattole us Grindstone Creek	21/E	1716	--	78	--
7/19	Harrow Creek (LB tributary)	21/F	1807	63	--	--
7/19	Mattole us Harrow Creek (LB tributary)	21/G	1807	--	78 @ 3'	--
7/20	Reach 21 - Day 2 Start- Mattole ds Harrow Cr	21/H	1037	--	73	--
7/20	Mattole us Shoals Creek	21/I	1211	--	73	72
7/20	Shoals Creek	21/J	1211	63	--	--
7/14	Mattole @ Gilham Creek (start of survey)	8/A	1130	--	62 @ 1'	82
7/14	Cold seep in Mattole ds Gilham	8/B	1200	--	73 @ 3'	71
7/14	Mattole @ Westlund Creek	8/C	1245	--	75 @ 4'	78
7/14	Mattole @ Middle Creek	8/D	1300	--	74.5 @ 2'	73
7/14	Mattole @ Dry Creek (end of survey)	8/E	1530	--	78 @ 3'	75
7/14	River Mile 27.4 @ Boudoin's	9A/A	950	--	70 @ 1'	70
7/14	River Mile 26.6-Honeydew Creek split us	9A/B	1015	68 @ 1'	--	70
7/14	River Mile 26.6-Honeydew Creek split ds	9A/C	1015	--	68 @ 1'	70
7/14	River Mile 26.0-Honeydew Bridge us	9A/D	1215	--	62 @ 4"	78
7/14	River Mile 25.5-Upper North Fork	9A/E	1315	78 @ 1'	78 @ 1'	78
7/14	River Mile 25.1-us Bundle (Hunter's Overlook)	9A/F	1400	60 @ 2" (seep)	78 @ 2"	78
7/14	River Mile 24.3-Woods Creek	9A/G	1500	64 @ 1'	78 @ 1'	78
7/14	Mattole us Dry Creek	23/A	1130	--	73.4	82
7/14	Mattole ds Dry Creek	23/B	1130	--	72.5	82
7/14	Mattole @ seep/spring	23/C	1200	--	71.6	--
7/14	Mattole- pool with spring	23/D	1230	57.2	75.2	--
7/14	LB creek	23/E	1250	66.2	--	86
7/14	RB creek	23/F	1345	66.2	71.6	--
7/14	Bundle Prairie Creek (start of survey)	10/A	1053	69 @ 16"	--	81
7/14	Woods Creek	10/B	--	63 @ 4"	--	81
7/14	Kendall Gulch	10/C	--	62 @ 2"	--	81
7/14	Mattole @ Triple Junction H.S. (end survey)	10/D	1530	--	74	82
7/15	Mattole @ Triple Junction H.S. (start)	25/A	1030	--	73	87
7/15	LB tributary (Hadley Creek)	25/B	1100	60	--	--
7/15	Mattole us Saunders Creek	25/C	--	--	76	--
7/15	Saunders Creek	25/D	--	70	--	--
7/14	Saunders Creek	11/A	945	67 @ 4"	--	73
7/14	Mattole @ Saunders Creek confluence	11/B	--	--	71 @ 6"	73
7/14	Cook Gulch, (~200 yds ds, 5 gal. per min.)	11/C	--	60 @ 3"	--	76
7/14	Mattole ds Cook Gulch, cold pool w/ seep	11/D	--	--	60 @ 5"	75
7/14	Mattole @ cold, isolated seep	11/E	--	--	58	75
7/14	Mattole @ cold, isolated seep	11/F	--	--	58	74
7/14	Granny Creek (trickling tributary)	11/G	--	56 @ 2"	--	70
7/14	trickle w/ small pool-not connected to Mattole	11/H	--	57 @ 3'	--	70
7/14	trickle w/ small pool-not connected to Mattole	11/I	--	61 @ 6"	--	70
7/14	LB tributary past road	11/J	--	58 @ 3"	--	70

7/14	RB tributary	11/K	--	57 @ 2"	--	71
7/14	LB tributary before large bend in Mattole	11/L	--	60 @ 1"	--	73
7/14	Thornton Creek (large trib before peak)	11/M	--	60 @ 4"	--	67
7/14	Tributary ds Thornton w/ waterfall	11/N	--	60 @ 2'	--	69
7/14	Mattole @ Squaw Creek confluence	11/O	--	--	81	73
7/14	Squaw Creek	11/P	--	71	--	73
7/15	Mattole us Squaw Creek (put-in)	12/A	1020	--	66 @ 4"	72
7/15	Squaw Creek direct	12/B	1020	62	--	72
7/15	LB spring ds of AWAY	12/C	1050	--	55	--
7/15	Green Fir Creek direct	12/D	1313	56 @ 3'	--	74
7/15	Wild Turkey Creek	12/F	1353	55	--	73
7/15	Mattole @ Wild Turkey	12/G	1353	--	74	73
7/15	Mattole @ Lindley Bridge	13/A	1015	--	70 @ 1.5'	--
7/15	Indian Creek (LB tributary)	13/B	1200	73 @ 2'	--	--
7/15	McGinnis Creek	13/C	1517	74 @ 2'	--	--
7/15	Conklin Creek	13/D	1530	78 @ 3'	--	--
7/14	Conklin Creek (start)	14/A	930	60 @ 4"	--	72
7/14	Mattole mainstem @ Conklin Creek	14/B	930	--	68 @ 2'	72
7/14	Mattole mainstem (us Clear Creek)	14/C	1200	--	74 @ 2'	76
7/14	Clear Creek	14/D	1515	54 @ 6"	--	74
7/14	East Mill Creek	14/E	1530	63 @ 3"	--	74
7/15	Mattole @ Wingdam	15B/A	--	--	69	75
7/15	Lower Mill Creek	15B/B	--	65 @ 5'	--	70
7/15	Mattole ds L.Mill @ Groeling run	15B/C	--	--	70	70
7/15	Jim Goff Gulch	15B/D	--	70	--	70
7/15	Mattole @ Moore Hill cold seep	15B/E	--	--	68	68
7/14	Stansberry Creek	16/A	1500	69	76 @ 3'	83
7/14	mouth of Mattole @ high tide	16/B	1700	--	72 @ 6'	66
7/15	Bear Creek start (Geppert/Spence access)	17/A	1215	61	--	89
7/15	RB tributary to Bear Creek	17/B	1520	59	--	--
7/15	Bear Creek us RB tributary	17/C	1520	67	--	--
7/15	Jewett Creek	17/D	1700	64	--	--
7/15	Honeydew Creek start (2.5 miles us slide)	18/A	1030	62 @ 6"	--	70
7/15	East Fork Honeydew Creek confluence	18/B	1240	63 @ 5"	--	75
7/15	Honeydew Creek mainstem @ East Fork conf.	18/C	1245	62 @ 5"	--	75
7/15	West Fork Honeydew Creek confluence	18/D	1515	62 @ 8"	--	72
7/15	Honeydew Creek mainstem @ West Fork conf.	18/E	1520	63 @ 10"	--	72
7/15	Honeydew Creek end (Maureen Catalina's)	18/F	1650	68 @ 6"	--	75