*Final Report*

# 2009-2010 Temperature, Water Quality and Juvenile Salmonid Presence/Absence Monitoring, Mattole River Watershed

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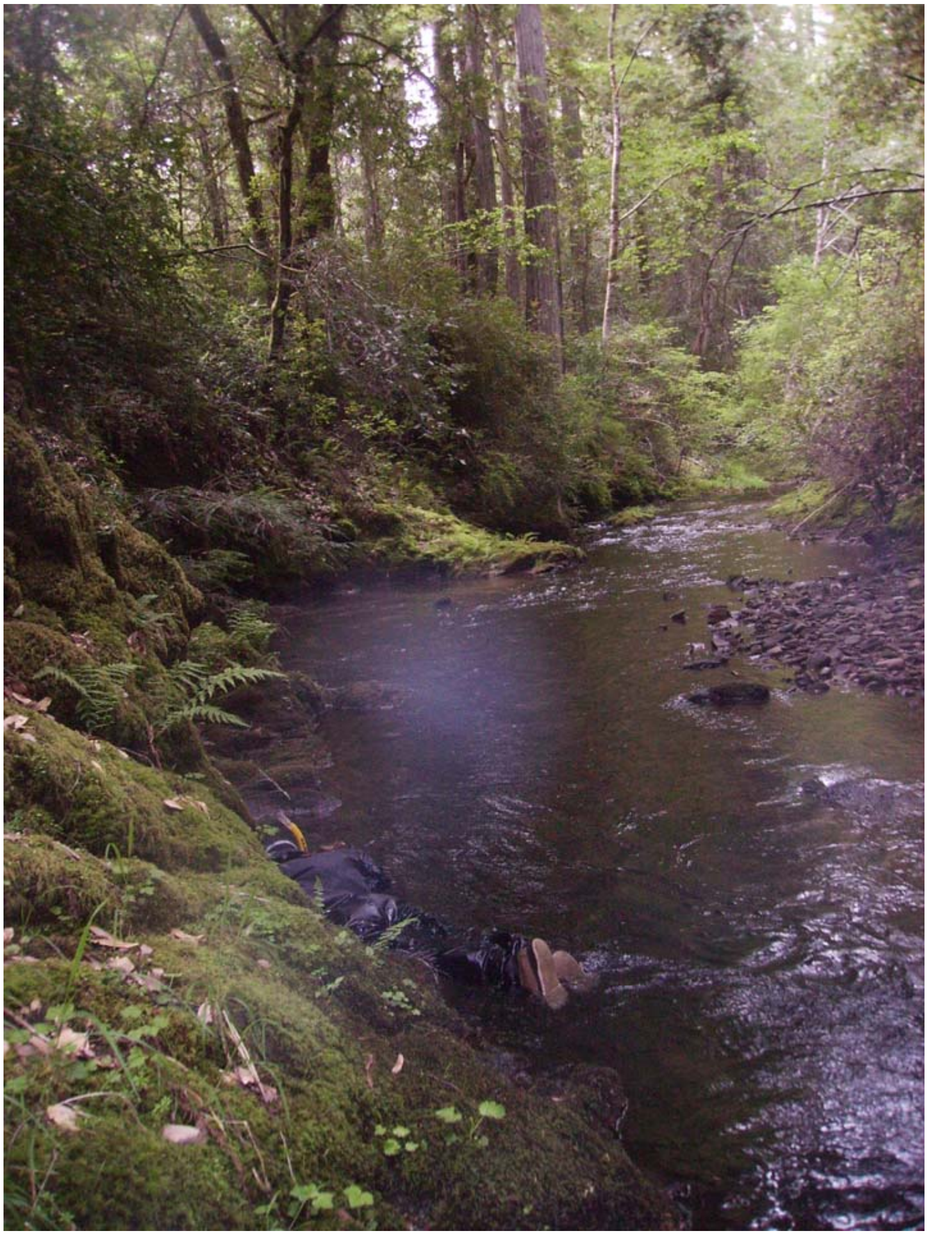
# Table of Contents



# Table of Figures

## Tables





*Thompson Creek (lower reach) Juvenile Dive Survey (6/9/10), Mattole Salmon Group. Photo courtesy MSG Staff.*

## Acknowledgements

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*Matt Hanington, MSG Dive Staff, takes a water quality measurement in the lower Mattole mainstem. Photo courtesy MSG staff.*

## Abstract

Past salmonid habitat and population monitoring has indicated rearing habitat is a major limiting factor to salmonid survival and abundance in the Mattole River Watershed. Water quality, particularly temperature and dissolved oxygen, limits suitable habitat during the summer months and compromises salmonid growth and survival. The decrease in quality and extent of freshwater habitat has inevitably resulted in reduced run strength, particularly for native Mattole Coho Salmon.

In 2009 and 2010, the Mattole Salmon Group conducted extensive water quality and juvenile salmonid monitoring to quantify habitat and population status of Coho Salmon (*Oncorhynchus kisutch)*, Chinook Salmon (*Oncorhynchus tshawytscha*), and Steelhead Trout (*Oncorhynchus mykiss*). Water quality investigations included placement and retrieval of temperature monitoring devices and spot checks of dissolved oxygen in the mainstem Mattole River and selected tributaries.

Direct underwater observation counts of juvenile salmonids were conducted in all tributaries monitored to determine the distribution and relative abundance of the three species of juvenile salmonids. Surveys occurred concurrent with temperature logger deployment in May and retrieval in late September through October to document oversummer survival. Dive surveys in 2009 occurred in all tributaries with Chinook and Coho Salmon presence previously documented by the Mattole Salmon Group (MSG). Dive surveys in 2010 were conducted in upper and lower sections of all tributaries with Coho presence determined by MSG monitoring since 2000.

Water quality monitoring results indicate favorable thermal habitat for summer rearing of juvenile Coho is restricted to the headwaters of the mainstem Mattole (upstream of River Mile (RM) 54.0 and a limited number of tributaries in the upper Mattole. In the headwaters, substandard dissolved oxygen levels due to low flows further limit suitable habitat for salmonids rearing over summer.

Dive survey results indicate Mattole Coho are at risk of extinction, with current observed distribution limited to a small geographical area near the headwaters and abundance at critically low densities. In 2010, Coho were identified in only two tributaries (four reaches) out of 21 tributaries (42 reaches) surveyed (10% of tributary reaches monitored). Three of the reaches were within a single tributary.


## Introduction

The Mattole River is home to three independent populations of threatened salmonids: Coho Salmon, Chinook Salmon and Steelhead Trout.

The Mattole Coho Salmon (*Oncorhynchus kisutch)* population is part of the Southern Oregon/Northern California Coast (SONCC) Coho Salmon Evolutionarily Significant Unit (ESU), composed of populations inhabiting coastal streams between Punta Gorda, California to Cape Blanco, Oregon (70 FR 37160).

The Chinook Salmon population of the Mattole is part of the California Coastal Chinook Salmon ESU, composed of populations inhabiting coastal streams from Redwood Creek in Humboldt County south through the Russian River (70 FR 52488).

Mattole Steelhead Trout are part of the Northern California Steelhead Distinct Population Segment (DPS), composed of populations inhabiting coastal streams from Redwood Creek in Humboldt County south through the Gualala River (70 FR 52488)

National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS) listed the SONCC Coho Salmon ESU, CC Chinook Salmon ESU, and NC Steelhead Trout DPS as Threatened under the Federal Endangered Species Act (ESA) in 1997, 1999, and 2000, respectively (70 FR 37160, 64 FR 50394, 65 FR 36074). Coho Salmon are also listed as Endangered under the California Endangered Species Act (CESA).

NMFS has completed more recent status reviews (Good et al. 2005, 71 FR 834 862) and concluded that all 3 ESUs are likely to become endangered in the near future. The most recent status review of SONCC Coho and CC Chinook (76 FR 50447), released on August 15, 2011, concluded both populations should remain listed threatened as previously determined at this time.

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). Temperature is one of the most important environmental influences on salmonid biology. Salmon and Steelhead, like most aquatic organisms, are poikilotherms, meaning their temperature and metabolism is determined by the ambient temperature of the water in which they reside. Temperature therefore affects growth and feeding rates, metabolism, development of embryos and alevins, timing of life history events such as upstream migration, spawning, freshwater rearing, and emigration to the ocean, and the availability of food. In addition, changes in temperature can cause stress, and even death in extreme cases (Ligon et al. 1999).

Juvenile Coho Salmon and Steelhead are vulnerable to increased instream temperatures as they rear in freshwater over the summer and fall months. Of the three Mattole salmonid species, Coho Salmon are acknowledged to be the most imperiled, in part due to their extended freshwater rearing strategy and greater sensitivity to high instream temperatures. Steelhead can tolerate warmer water temperatures than Coho (Frissell 1992), however, some Steelhead remain in freshwater for up to three years, resulting in a longer duration exposed to thermal stressors.

Figure 1 lists threshold temperature criteria used by the Mattole Salmon Group in this report to evaluate suitable thermal habitat at monitoring locations throughout the watershed. Criteria used to evaluate thermal habitat suitability for salmonids must consider both lethal exposure to high temperatures as well as the effects of stress and reduced growth capacity during prolonged exposure to sub-lethal temperatures (Armour 1991).

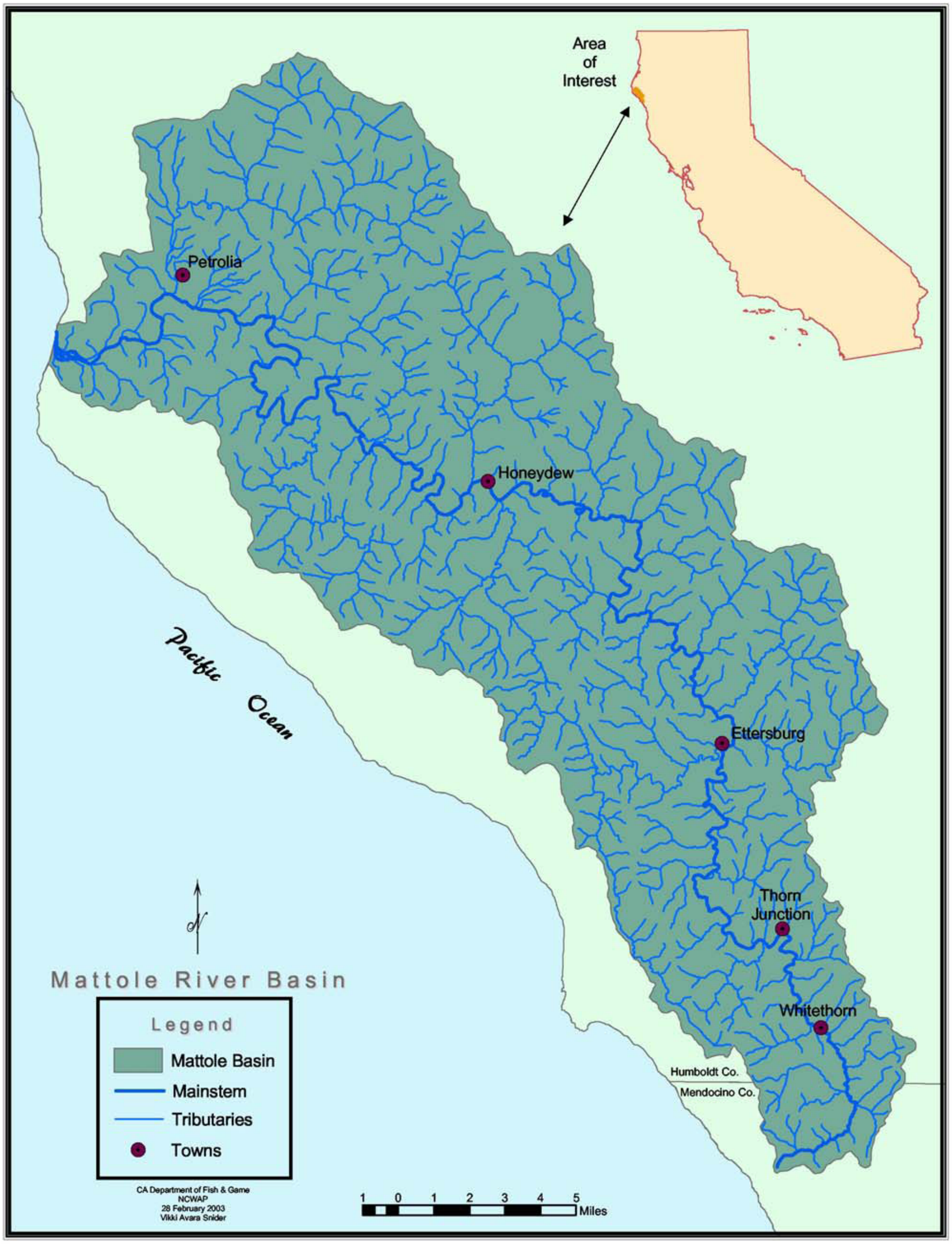
| Criteria | Temperature | Reference |
|---|---|---|
| Prolonged Temperature Stress | Days >20°C | Brett 1952 |
| Growth Stops | 19.1°C | Armour 1991 |
| Growth Occurs | 5-17°C | Brungs and Jones 1977 |
| Optimum Growth | 12-14°C | Brett 1952 |
| | 10-15.6°C | Armour 1991 |
| Maximum Weekly Maximum Temperature (MWMT) | >18.1°C MWMT (Coho) | Welsh et al. 2001 |
| Maximum Weekly Average Temperature (MWAT) | >16.8°C MWAT(Coho) | Welsh et al. 2001 |
| UILT* | 26°C (Coho) | Brett 1952 |
| Short-term Maximum Temperature (50% survival) | 23.7°C(Coho) 23.9°C(Steelhead) | Brungs and Jones 1977 |

*upper incipient lethal temperature

**Figure 1.** Criteria used to evaluate thermal habitat for salmonids in the Mattole River Watershed.

The Mattole Salmon Group has conducted temperature monitoring throughout the Mattole River Watershed (Figure 2) annually since 1995 and dissolved oxygen monitoring since 2003, with concurrent dive surveys. Dive surveys have documented juvenile presence and distribution since 1991. Dive surveys have generally occurred in late spring/early summer (May-June) and early fall (September-October) using a modified “10 pool” protocol (Preston et al. 2002).

The goal of our long-term juvenile salmonid population and habitat monitoring program is to quantify distribution and relative abundance of juvenile salmonids in relation to summertime water quality factors. Here we analyze water quality and dive data collected in 2009 and 2010 in relation to threshold values for salmonids as well as data collected over prior survey years.




Downie et al. 2003

**Figure 2.** Mattole River Watershed.

We use maximum weekly average temperature (MWAT) to evaluate chronic thermal stress.  MWAT is the maximum value of the running 7-day average of the daily average temperatures over a defined period of time.  In other words, MWAT is the single highest mean of daily average temperatures over any 7-day period during the study (Brungs and Jones 1977).

Daily maximum temperatures are used to evaluate acute thermal stress and duration of temperature stress (days >20°C).  Laboratory studies found an upper incipient lethal temperature (UILT) of 26°C for juvenile Coho and Chinook Salmon, although they showed indications of thermal stress at much lower temperatures (>20°C) (Brett 1952). Brungs and Jones 1977 found survival was reduced by 50% at temperatures above 23.7-23.9°C.

Low flows in the headwaters have been determined to be the primary factor limiting oversummer survival of juvenile Coho at their current distribution (MRRP 2011). Seven of the last 11 years have had the lowest flows of the past 61 years on record at the USGS Petrolia gauge.  In the recent seven dry years, extreme low flows have caused the upper 9.4 miles of the mainstem Mattole as well as several tributaries to become disconnected, with some pools drying completely.  Substandard water quality, mainly low dissolved oxygen, in remaining pools further limits survival and fitness of salmonids rearing in the headwaters.

Dissolved oxygen (DO) is an important requirement of water quality for salmonid habitat because it is a key factor affecting the growth and survival of aquatic organisms (Bjornn and Reiser 1991). Low DO levels cause metabolic stress for juvenile salmonids and increase their susceptibility to disease.

Minimum daily DO levels below 6 mg/L can result in slight production impairment to rearing salmonids (US EPA 1986, SWRCB 2002).  Oxygen distress causes severe production impairment at DO levels below 4 mg/L (USEPA 1986), acutely impacting growth.  Bjornn and Reiser (1991) recognized 3.3 mg/L as the minimum threshold for survival for salmonids.  While some salmonids have been known to survive in waters with DO below 3 mg/L (SWRCB 2002), diminished fitness reduces chances for long-term survival.

Existing information on impacts of other water quality factors upon salmonid populations in the Mattole are largely unknown.  To ameliorate this, spot-checks using a multi-parameter water quality instrument were conducted during 2009 and 2010 temperature monitoring.  Specific conductance, pH, and DO were the parameters measured, which are known to affect salmonid life.

PH is the measure of the acidity or alkalinity of a solution, and is determined by the molar concentration of hydrogen ions.  Instream pH is important for development of adult and juvenile salmonids.  Low pH can affect reproductive success for adults and reduce survival during early life stages (Jordahl and Benson 1987).  High pH levels can negatively impact feeding and create stress (Wagner et al. 1997).  High instream temperature can exacerbate the effects of high pH on salmonid life (Wagner et al.

1997). Extremes in pH can cause mortality (Wagner et al. 1997). The MSG uses the pH range of 6.5 to 8.5 to evaluate acceptable salmonid habitat (Kier & Associates and NMFS 2008, Spence et al 1996, NCRWQCB 2001).

Specific conductance is a measure of electrical conductivity of an aqueous solution, corrected to the resistance of the solution at 25°C. Specific conductance is related to the concentration of dissolved solids. The breakdown of compounds results in an increased amount of unbound ions, which are positively or negatively charged when dissolved in water. Conductivity increases with increasing amount of unbound ions, so it is an indirect measure of the presence of dissolved solids such as chloride, nitrate, sulfate, phosphate, sodium, magnesium, calcium, and iron. Conductivity can be used as an indirect indicator of water pollution, as an increase in dissolved solids will elevate conductivity levels. Here we use NCRWQCB specific conductance objectives for the Mattole, which are 300 μs/cm (0.30 mS/cm) for a 90% upper limit and 170 μS/cm (0.17 mS/cm) for a 50% upper limit, for evaluation purposes (NCRWQCB 2001).

**Project Goals**

Each water quality monitoring site in the Mattole watershed was chosen according to its ability to meet one or more of the following goals identified by Mattole Salmon Group staff:

1. Monitor air and water temperature at reference locations to evaluate changes in thermal regime from year to year and over longer time frames.
2. Document geographic distribution of suitable thermal habitat.
3. Document temperatures prior to and/or subsequent to road improvement work and/or timber harvest in specific locations.
4. Help determine where instream restoration and revegetation projects are best directed, and assess the effects of restoration activities.
5. Monitor temperature, dissolved oxygen, and other water quality parameters at low-flow monitoring locations in the headwaters.
6. Monitor temperatures in conjunction with downstream migrant trapping in the lower Mattole River and water quality monitoring in the Mattole Estuary.
7. Monitor Chinook and Coho-bearing tributaries to determine current salmonid distribution in relation to temperature and other water quality parameters.

# Procedures

In 2009, the MSG monitored lower reaches in all Chinook and Coho-bearing tributaries in the Mattole Watershed to determine current distribution in relation to temperature and other water quality parameters. Monitoring consisted of a placing temperature monitoring device for the duration of the summer, along with water-quality spot-checks and dives to determine salmonid presence/absence at placement and retrieval. In 2009, temperature loggers were also placed in the Mattole mainstem upstream of each monitored tributary (Table 2009-1).

Due to warning signs from 2009 juvenile monitoring and 2009-2010 adult surveys, and the compilation of the Coho Recovery Strategy, 2010 monitoring was focused on Coho.

In 2010, upper and lower locations were chosen in all Coho-bearing streams in the Mattole River Watershed to better establish Coho presence/absence throughout the watershed (Figure 3). Temperature monitoring devices were deployed and water quality spot-checks conducted in both upper and lower reaches to evaluate habitat in multiple locations within each monitored tributary (Table 2010-1).

## Temperature Data Collection

Temperature monitoring devices (Hobo Water Temp Pro and Hobo Tidbit data loggers, herein referred to as "loggers") were deployed to provide a continuous record of temperature at monitoring locations throughout the season.

All temperature data is subject to a verification process. Prior and subsequent to placement in the field, the MSG verified the accuracy of all loggers with a two-point calibration method using an NIST-traceable thermometer. Methods follow the USFWS Water Temperature Data Collection Methods (Zedonis and Scheiff 2009). Loggers that deviated from the acceptable range (+/- 0.2°C) during pre-calibration were not placed in the field.

The temperature loggers were launched to record hourly temperature for the duration of the field season. Surveyors placed water temperature loggers in or near the thalweg, where water turbulence and mixing was greatest, and at sufficient depth (greater than one foot if possible) to prevent exposure at low flows. Typically, suitable sites were located in runs or heads of pools. Loggers were also placed out of direct sunlight. A description of general and precise placement location of logger, placement depth of logger, depth of logger upon retrieval, and maximum pool depth at placement location were recorded at placement. In 2010, GPS coordinates were also taken at temperature monitoring locations.

Surveyors took air temperature at the beginning of the survey using a calibrated hand-held thermometer and noted current and recent weather. Using the float method, surveyors estimated instream flow at each site in spring and fall. In 2010, surveyors also completed a brief habitat assessment to evaluate instream conditions at each monitoring location. Habitat assessment was based on US EPA Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish (Barbour et al. 1999).

Following retrieval, data was downloaded from the devices and analyzed. Data that deviated from the acceptable accuracy range were discarded. Erroneous data, such as data recorded while loggers were in transit, were deleted. Maximum and average daily statistics were calculated from the trimmed files for data analysis.

## Water Quality Data Collection

Using a YSI Multi Parameter Instrument (556 MPS or Pro-Plus), surveyors recorded water quality at temperature monitoring locations. The multi-parameter instrument measures temperature (˚C), dissolved oxygen (mg/L), dissolved oxygen (% saturation), pH, specific conductivity (mS/cm), and barometric pressure (mmHg).

Instruments were calibrated according to the manufacturers specification prior to the field season. Calibration occurred monthly during the monitoring season, or more often, if the probe exhibited signs of inaccuracy, such as difficulty stabilizing, or obviously inaccurate values.

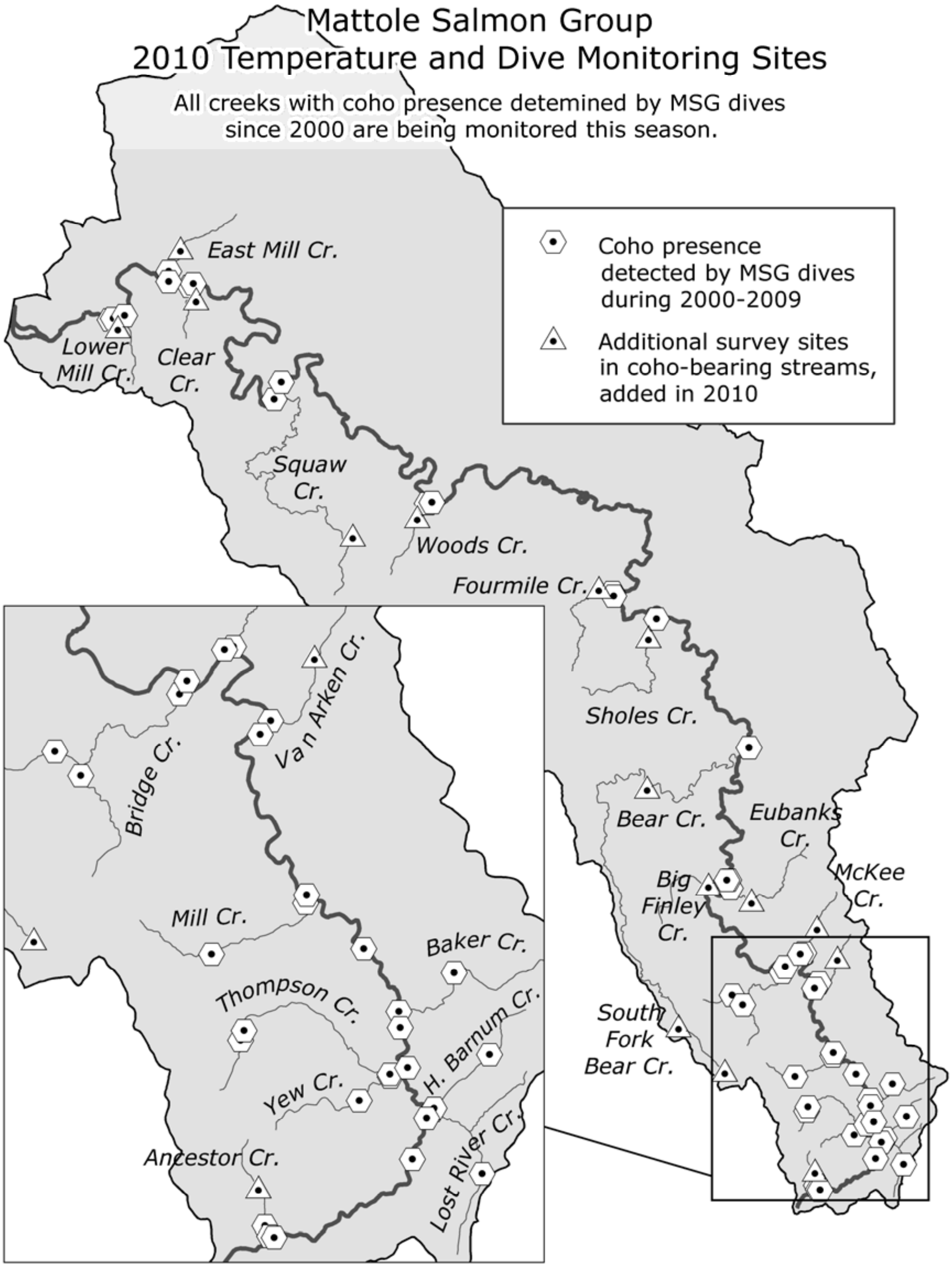



**Figure 3.** 2010 Mattole Salmon Group temperature, water quality, and dive monitoring locations.

### Snorkel Survey Methods

A snorkel survey was conducted at each monitoring location at the time of temperature logger placement and retrieval to identify salmonid species present and determine relative abundance. Salmonid observations were recorded in the following size classes based on estimated fork length, >4" (young-of-the-year), 4"-8" (1+, greater than one year old), and >8."

Surveyors dove in teams of two people. As the flows dropped and the pool size decreased, in some cases only a single diver performed the survey. Surveyors used underwater flashlights to increase visibility below undercut banks, bedrock, and into thick aquatic vegetation.

Our snorkel surveys followed a "modified 10-pool protocol" for determining presence/absence of juvenile Coho Salmon, as employed by the California Department of Fish and Game (Preston et al. 2002).

The scope of the MSG's snorkel surveys was limited by project funding and, in some streams, by lack of access points. It was unfeasible to survey reaches in the lower, middle and upper areas of a stream given project resources and, in some cases, stream access. In 2009, only lower reaches were surveyed in each tributary. In 2010, in an effort to better determine actual Coho presence, surveys included upper and lower reaches. Given that in actuality fewer reaches were sampled per stream than designated in the modified ten-pool protocol cited above, determination of species absence in a stream would be less certain.

Another way the Mattole Salmon Group's snorkel surveys differed from a standard modified 10-pool protocol, is that when a Coho Salmon was sighted, the survey continued until 10 pools (or the maximum number of pools possible if less than 10) were surveyed. This allowed for a broader sampling of relative abundance.

## Results

Frequent, late spring rains in 2010 extended into early June, resulting in higher flows throughout the summer than in 2009 (Figure 4). The onset of fall rains began earlier (9/18) in 2010 than in 2009 (10/13).

The results of 2009 and 2010 water quality monitoring in show flow has an important influence on suitable habitat conditions for rearing salmonids. Some locations were monitored repeatedly in 2009 and 2009, and data from these locations are used to draw comparisons between the two years. Both temperatures and dissolved oxygen remained favorable in a greater extent of rearing habitat in 2010 when oversummer flows were higher than in 2009 (for the range of like monitoring locations). The headwaters (upstream of RM 52.1) were the primary area demonstrating the impact of flow on suitable habitat conditions. The extent of thermally favorable habitat in the upper mainstem extended father downstream and fewer tributary locations showed substandard DO levels in 2010.

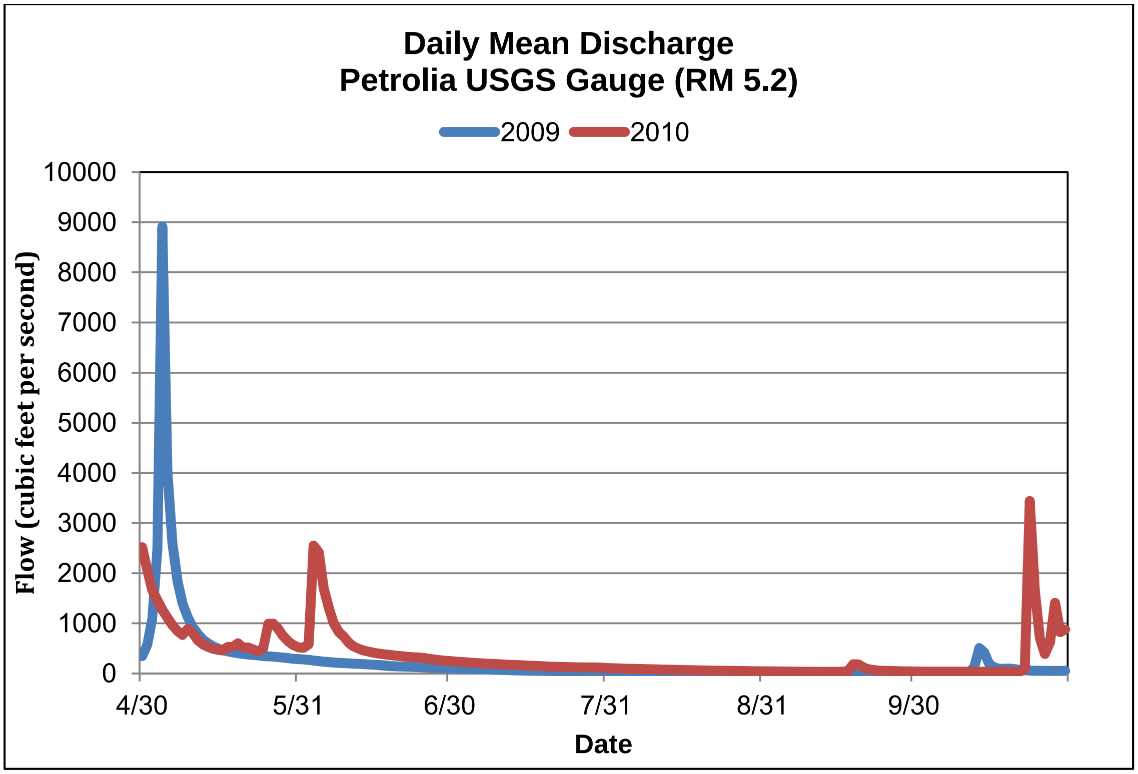



**Figure 4.** 2009-2010 average daily flow in the Mattole River at the Petrolia USGS gauge (RM 5.2).

## Temperature

Temperature monitoring indicates thermally suitable rearing habitat is concentrated in the upper mainstem and headwaters tributaries, with a limited number of lower river tributaries also indicating favorable temperatures for juvenile salmonid rearing.

Daily maximum temperatures in 2009, daily maximum temperatures ranged from 14.31°C to 28.79°C (Table 1). The low was recorded in McNasty Creek (RM 60.8+0.15) and the high recorded in the mainstem Mattole upstream of Sholes Creek (RM 36.6).

In 2009, all *tributaries* upstream of RM 47.4 exhibited thermally suitable Coho habitat (<16.8°C MWAT, Welsh et al. 2001) with the exception of McKee Creek (RM 42.8). Relatively few (8) salmonid-bearing tributaries in the lower river and only the upper forks of Bear Creek in the middle river showed favorable temperatures for Coho rearing (i.e. produced MWATs below the thermal threshold for Coho presence). These 8 tributaries included the South and North Forks of Bear Creek (RM 42.8), Woods Creek (RM 24.1), Clear Creek (RM 6.1), East Mill Creek (RM 5.4), Lower Mill Creek (RM 2.8), Stansberry Creek (RM 1.3), and Lower Bear Creek (RM 1.0, discontinuous with the mainstem).

Monitoring locations in tributaries located in the lower watershed where temperatures were not favorable for Coho (i.e. exceeded the 16.8°C MWAT threshold) included: Lower North Fork Mattole (RM 4.7), Squaw Creek (RM 14.9), Upper North Fork Mattole (RM 25.5), Honeydew Creek (RM 26.4, all 3 sites), Fourmile Creek (RM 34.6), Sholes Creek (RM 36.6), Grindstone Creek (RM 39.0), Mattole Canyon Creek (RM 41.1), Bear Creek (RM 42.8), and McKee Creek (RM 52.8).

In 2009, daily maximum temperatures in all *mainstem* Mattole sites downstream of RM 47.4 exceeded 20°C for *at least some time* during the monitoring period, indicating exposure to thermal stress (Brett 1952). Furthermore, the mainstem temperature monitoring locations from RM 34.6 (Fourmile Creek confluence) downstream exceeded 20°C for the *majority* of the time period monitored, with many locations also exceeding 26°C, the upper incipient lethal temperature for salmonids (Brett 1952). In regard to MWATs, in 2009, all sites in the mainstem downstream of the Thompson Creek confluence with the Mattole (RM 58.4) exceeded the 16.8°C MWAT threshold for Coho presence (Welsh et al. 2001).

In 2010, daily maximum water temperatures recorded ranged from 13.98°C to 26.72°C (Table 2). The maximum water temperature recorded occurred on July 16 in the mainstem Mattole upstream of Squaw Creek (RM 15.0). The site with the lowest seasonal maximum was in lower Helen Barnum Creek (RM 58.7). Two of 8 lower and middle mainstem locations exceeded 26°C, the upper incipient lethal temperature for salmonids (Brett 1952); however temperatures near that limit (between 25-26°C) were recorded at many of the remaining 6 locations.

Of 42 reaches in 21 tributaries monitored in 2010, MWATs greater than the 16.8°C threshold for Coho occurred in only two locations, the lower reaches of Squaw Creek (RM 14.9) and Fourmile Creek (RM 34.6), thus all monitored tributaries in the headwaters showed thermally suitable temperatures for Coho rearing. Outside of the headwaters, the tributaries with the coolest summer temperatures were Lower Mill Creek (RM 2.8), Clear Creek (RM 6.1), and Woods Creek (RM 14.1).

Temperatures recorded at sites monitored during both years show maximum temperatures and MWATs were ~1°C cooler in 2010 than in 2009, thus showing an expansion in extent of thermally suitable habitat for Coho rearing between 2009 and 2010. This is most likely due to the presence of late spring rains in 2010 and not 2009, and does not seem to be attributable to ambient air temperatures. The only comparable air temperature site for both years is the Mattole mainstem at the Wingdam location. In 2009 the maximum temperature was 27.58˚C on August 10, while in 2010 the maximum temperature was 33.26˚C on July 5. This data suggest that it was actually warmer and earlier in the season in 2010 than in 2009, however water temperatures at this site show the opposite – a maximum of 25.56˚C on July 17 in 2009 and 25.21˚C on August 24 in 2010 (Tables 1 and 2). Unfortunately comparable air temperature loggers further upstream (Ettersburg and headwaters areas) were either not installed in both years or lost to unforeseen factors during the course of the season.

Results from both years indicate that thermally favorable Coho habitat was restricted to sites in the headwaters (upstream of RM 52.1), however in 2010 this range extended further downstream in the mainstem Mattole (yet still above RM 52.1). In 2009 suitable thermal habitat in the mainstem ended at RM 58.4 (Thompson Creek confluence), yet in 2010, thermally suitable habitat extended an additional 1.5 miles downstream to RM 56.9 (Metz Bridge). Of the tributary sites monitored in both years, one additional tributary – McKee Creek at RM 52.8 – showed temperatures were favorable for Coho in 2010 but not in 2009.

**Table 1. 2009 Temperature Monitoring Summary**
(The blue color indicates sites that were monitored in both 2009 and 2010.)

| Logger Serial Number | Location | River Mile | Date in | Spring Species Present | Spring Staff | Date Out | Fall Species Present | Fall Staff | Max | Date | >68 | Days | MWAT | Week of | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 575787 | Mattole Estuary @ MSG Structure | ~0.5 | 6/3/09 | SH | K.C., W.K., WSP | 10/12 | N/A | S.B., C.R. | 24.00 | 6/18 | 90 | 130 | 21.06 | 8/8 | |
| 618860 | Mattole Estuary @ MSG Structure (air) | ~0.5 | 6/3/09 | " | K.C., W.K., WSP | 10/12 | " | S.B., C.R. | 26.13 | 8/28 | 44 | 130 | 20.99 | 7/8 | |
| 989871 | Mattole Estuary, Area 6 (shallow) | ~0.5 | 6/11/09 | KS, SH | K.C., S.B. | 10/12 | SH | K.C., S.B., C.R. | 24.41 | 6/18 | 104 | 122 | 20.79 | 8/9 | spring dive data from 6/11/09 estuary dive, all of section 6 |
| 575782 | Mattole Estuary, Area 6 (deep) | ~0.5 | 6/11/09 | KS, SH | K.C., S.B. | 10/12 | SH | K.C., S.B., C.R. | 24.44 | 6/18 | 104 | 122 | 20.73 | 8/9 | " |
| 1163382 | Lower Bear Creek | 1+0.3 | 5/30/09 | None | M.R, S.B. | 10/5 | None | M.R., C.R. | 17.03 | 8/4 | 0 | 68 | 14.29 | 8/1 | creek dry in fall; logger out of water after 8/7/09 |
| 2334529 | Stansberry Creek | 1.3+ 0.1 | 5/11/09 | SH | M.R., J.H. | 10/5 | SH | M.R., C.R. | 16.01 | 8/12 | 0 | 145 | 14.61 | 8/9 | |
| 891582 | Mattole us Stansberry Creek | 1.3 | 5/26/09 | SH, KS, SS | M.R., C.R. | 10/5 | SH | M.R., C.R. | N/A | N/A | N/A | N/A | N/A | N/A | logger malfunction |
| 2334525 | Lower Mill Creek (lower) | 2.8+ 0.1 | 5/11/09 | SH, UN | M.R., J.H. | 10/5 | SH | M.R., C.R. | 15.89 | 8/12 | 0 | 146 | 14.66 | 8/9 | |
| 266344 | Mattole @ Wingdam (shallow) | 2.9 | 6/18/09 | KS, SH | S.B., C.R. | 10/12 | SH | S.B., C.R. | 25.56 | 7/17 | 99 | 115 | 21.34 | 8/9 | |
| 688889 | Mattole @ Wingdam, AIR | 2.9 | 6/18/09 | " | S.B., C.R. | 10/12 | " | S.B., C.R. | 27.58 | 8/10 | 47 | 114 | 18.89 | 8/8 | |
| 1157756 | Mattole @ DSMT | 3.9 | 5/20/09 | SH | S.J., W.K. | 7/9 | N/A | S.J. | 25.62 | 6/28 | 48 | 75 | 21.16 | 6/26 | SH, KS, SS observed in trap, no fall dive |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1157769 | Lower North Fork (LNF) | 4.7+ ~1.0 | 4/6/09 | KS, SH | S.J., C.R., S.B., W.K. | 10/10 | SH | S.B., W.K. | 25.33 | 7/17 | 118 | 186 | 19.98 | 7/14 | western pond turtle observed in pool 4 in fall |
| N/A | Sulfur Creek (trib of LNF) | 4.7+ ~2.0 | 6/9/09 | None | W.K., C.R. | 10/9 | SH | W.K., S.B. | N/A | N/A | N/A | N/A | N/A | N/A | |
| 1163383 | Mattole us LNF | 4.8 | 5/20/09 | KS, SH | S.J., W.K. | 10/10 | SH | S.B., W.K. | 25.62 | 7/17 | 122 | 142 | 21.83 | 7/13 | LNF & Mattole confluence was obstructed by gravel due to road work, no culvert |
| 2334523 | East Mill Creek (lower) | 5.4+ ~0.2 | 5/11/09 | SH | M.R., J.H. | 10/5 | SH | M.R., C.R. | 20.08 | 8/11 | 1 | 146 | 16.48 | 8/9 | |
| 895563 | Mattole us East Mill Creek | 5.5 | 5/30/09 | SH, KS | M.R., S.B. | 10/5 | SH | M.R., C.R. | 26.70 | 7/17 | 115 | 127 | 22.10 | 7/13 | |
| 1163384 | Clear Creek (lower) | 6.1+0.2 | 5/21/09 | SH | S.J., W.K. | 10/10 | SH | S.J. | 15.99 | 8/12 | 0 | 141 | 14.95 | 8/9 | |
| 1157777 | Mattole us Clear Creek | 6.1 | 5/21/09 | SH | S.J., W.K. | 10/12 | SH | S.J. | 26.79 | 7/17 | 126 | 143 | 22.15 | 7/13 | very few fish in spring |
| 2334532 | Squaw Creek (lower) | 14.9+0.1 | 5/1/09 | SH, KS | M.R., C.R. | 10/5 | SH | M.R., C.R. | 22.13 | 7/19 | 38 | 156 | 19.29 | 7/17 | 5/12/09 & 5/14/09 WSP Dive w/K.C. found SH, KS; rough-skinned newt in spring, pileated woodpeckers in fall; 12" Steelhead in fall |
| 2334527 | Mattole us Squaw Creek | 15.0 | 5/1/09 | None | M.R., C.R. | 10/5 | SH | M.R., C.R. | 27.26 | 7/18 | 130 | 156 | 22.85 | 7/14 | 2 mallards observed in spring |
| 2334524 | Woods Creek (lower) | 24.1+ 0.1 | 5/11/09 | SH | M.R., J.H. | 10/2 | SH | M.R., C.R. | 17.68 | 7/19 | 0 | 143 | 15.39 | 7/26 | 150' of Woods Cr. dry by fall |
| 575777 | Mattole us Woods Creek | 24.2 | 5/30/09 | SH | M.R., S.B. | 10/2 | SH | M.R., C.R. | 25.94 | 7/19 | 92 | 124 | 22.49 | 7/25 | |
| 1157760 | Upper North Fork (UNF) | 25.5+ ~1.0 | 5/18/09 | SH | K.C., N.Q. | 10/12 | SH | K.C., C.P. | 23.76 | 7/27 | 80 | 146 | 20.33 | 7/26 | yellow-legged frog throughout |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N/A | Rattlesnake Creek (trib to UNF) | 25.5 +2.0+ 0.1 | 6/10/09 | SH | K.C., S.B. | 10/9 | SH | W.K., S.B. | N/A | N/A | N/A | N/A | N/A | N/A | |
| 575792 | Mattole us UNF | 25.5 | 5/18/09 | SH | K.C., N.Q. | 10/6 | SH | K.C., C.R. | 26.89 | 7/27 | 118 | 140 | 22.06 | 7/25 | |
| 881989 | Honeydew Creek (lower) | 26.5+ ~1.0 | 5/30/09 | SH, KS | M.R., S.B. | 9/29 | SH | M.R., S.B. | 22.99 | 7/27 | 65 | 121 | 18.73 | 7/25 | |
| 1157762 | Honeydew Creek (east fork) | 26.5+ ~2.5 +0.1 | 6/10/09 | SH | W.K., M.S. | 10/12 | SH | W.K., M.S. | 19.44 | 7/27 | 0 | 123 | 17.19 | 7/26 | |
| 1163380 | Honeydew Creek (upper) | 26.5 + ~2.5 | 6/10/09 | SH | W.K., M.S. | 10/12 | SH | W.K., M.S. | 19.29 | 7/27 | 0 | 123 | 16.92 | 7/26 | |
| 989872 | Mattole us Honeydew Creek | 26.5 | 5/30/09 | SH, KS | M.R., S.B. | 9/29 | None | M.R., S.B. | 26.52 | 7/19 | 113 | 121 | 22.65 | 7/25 | |
| 893658 | Mattole us Honeydew Creek (air) | 26.5 | 5/30/09 | " | M.R., S.B. | 9/29 | " | M.R., S.B. | 38.78 | 9/26 | 112 | 121 | 20.89 | 7/13 | |
| 1157768 | Fourmile Creek (lower) | 34.6+ ~0.1 | 5/21/09 | KS, SH | K.C., K.M. | 10/16 | SH | K.C., S.B. | 19.87 | 7/14 | 0 | 147 | 17.18 | 7/27 | stickleback (spring and fall), newts in spring |
| 1163389 | Mattole us Fourmile Creek | 34.6 | 5/21/09 | SH | K.C., K.M. | 10/16 | None | K.C., S.B. | 27.11 | 7/27 | 111 | 147 | 24.34 | 7/26 | |
| 1163388 | Sholes Creek (lower) | 36.6+ ~0.1 | 5/21/09 | SH | K.C., K.M. | 10/16 | SH | K.C., S.B. | 18.91 | 7/27 | 0 | 147 | 17.01 | 7/26 | |
| 1157757 | Mattole us Sholes Creek | 36.7 | 5/21/09 | SH | K.C., K.M. | 10/16 | None | K.C., S.B. | 28.79 | 7/27 | 115 | 147 | 24.28 | 7/26 | |
| 1157765 | Grindstone Creek (lower) | 39.0+ ~0.1 | 5/19/09 | SH | K.C., D.G. | 10/6 | SH | K.C., C.R. | 22.01 | 7/28, 7/29 | 30 | 139 | 18.56 | 7/26 | |
| 309426 | Mattole us Grindstone Creek | 38.9 | 5/19/09 | SH | K.C., D.G. | 10/6 | None | K.C., C.R. | 27.73 | 7/27 | 106 | 139 | 23.94 | 7/26 | |
| 1157766 | Mattole Canyon Creek (upper) | 41.1 +3.1 | 6/1/09 | SH | S.J., C.C. | 10/20 | SH | S.J. | 28.57 | 7/27 | 83 | 140 | 21.13 | 7/26 | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1157770 | Mattole ds Ettersburg Bridge | ~42.0 | 5/19/09 | SH | K.C., D.G. | 10/6 | SH | K.C., C.R. | 26.57 | 7/27 | 95 | 139 | 22.83 | 7/26 | 8/26/09 w/K.C. spot check found SH and 9.52 mg/L DO @ surface, 9.05 mg/L @ 6-7', stickleback in fall |
| 1157774 | Mattole ds Ettersburg Bridge (air) | ~42.0 | 5/19/09 | " | K.C., D.G. | 10/6 | " | K.C., C.R. | 34.60 | 7/27 | 119 | 139 | 22.10 | 7/23 | |
| 1163386 | Bear Creek (lower) | 42.8+ ~0.2 | 6/1/09 | SH, KS | S.J., C.C. | 10/10 | SH | S.J., C.R. | 23.79 | 7/28 | 43 | 130 | 21.10 | 7/26 | |
| 1157767 | Mattole us Bear Creek | 42.9 | 6/1/09 | SH | S.J., C.C. | 10/10 | SH | S.J., C.R. | 27.16 | 7/27 | 102 | 130 | 23.58 | 7/26 | 1 mussel, 1 crayfish, lots of green and brown algae |
| 1157775 | South Fork Bear Creek @ Lingel Property | 42.8+ ~5.0+ ~1.0 | 5/25/09 | SH | S.J., S.B. | 10/9 | SH | S.J., C.R. | 18.22 | 7/19 | 0 | 136 | 15.90 | 7/14 | |
| 893659 | North Fork Bear Creek | 42.8+ ~5.0 +~2.0 | 5/19/09 | SH | K.C., D.G. | 10/6 | SH | K.C., C.R. | 18.41 | 7/27 | 0 | 139 | 16.52 | 7/26 | |
| 1163385 | Big Finley Creek (lower) | 47.4+ ~0.1 | 5/27/09 | SH | S.J, S.B. | 10/9 | SH | S.J., C.R. | 17.15 | 7/28 | 0 | 134 | 15.90 | 7/26 | lots of water still in fall, crayfish observed in fall |
| 1157758 | Mattole at Big Finley Creek | 47.4 | 5/27/09 | KS, SH | S.J, S.B. | 10/9 | SH, KS | S.J., C.R. | 20.15 | 7/28 | 2 | 134 | 18.72 | 7/25 | |
| 1163387 | Eubanks Creek (lower) | 47.7 + ~0.1 | 5/27/09 | SH | S.J, S.B. | 10/9 | SH | S.B., C.R. | 18.87 | 7/28 | 0 | 134 | 13.80 | 6/27 | very little water in fall, 2 pools dry, most pools very shallow |
| 1157772 | Mattole us Eubanks Creek | 47.8 | 5/27/09 | SH | S.J, S.B. | 10/9 | SH | S.J., C.R. | 23.86 | 7/28 | 50 | 134 | 21.27 | 7/26 | |
| 1157773 | Bridge Creek (lower) | 52.1+ ~0.2 | 5/25/09 | SH | S.J, S.B. | 10/9 | SH | S.B., C.R. | 19.46 | 7/27 | 0 | 136 | 16.42 | 7/24 | in fall, water very black (tannins) |
| 1163381 | MS-6, Mattole us Bridge Creek | 52.2 | 5/25/09 | KS, SH | S.J, S.B. | 9/28 | SH | M.R., S.B., C.R. | 21.32 | 7/27 | 10 | 125 | 19.45 | 7/24 | |
| 1157776 | McKee Creek (lower) | 52.8+ ~0.1 | 5/25/09 | SH | S.J, S.B. | 10/9 | SH | S.J., C.R. | 19.03 | 7/27 | 0 | 136 | 16.92 | 7/24 | 8 pools dry in fall, remaining 2 pools were very black with low DO |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 882012 | Mattole @ Junction Hole/ds McKee Creek | 52.7 | 5/25/09 | SH | S.J, S.B. | 10/9 | SH | S.J., C.R. | 20.41 | 7/27 | 2 | 136 | 18.42 | 7/24 | |
| 575793 | Van Arken Creek (lower) | 54+ ~0.1 | 5/22/09 | SH | M.R., D.G. | 10/2 | None | M.R., C.R. | 17.11 | 7/28 | 0 | 132 | 15.83 | 7/24 | in fall, pool was murky, smelled like decomposition, eutrophic |
| 891612 | MS-5/Mattole us Van Arken Creek | 53.8 | 5/22/09 | SH | M.R., D.G. | 9/28 | SH | M.R., S.B., C.R. | 22.15 | 7/27 | 16 | 128 | 19.05 | 7/23 | stickleback, rough-skinned newt, yellow-legged frog, 107 gpm on 9/23/09 |
| 895562 | Upper Mill Creek (lower) | 56.2+ ~0.1 | 5/22/09 | SH, SS | M.R., D.G. | 9/29 | SH, UN | M.R., S.B. | 17.06 | 7/28 | 0 | 129 | 15.51 | 7/18 | |
| 575780 | Mattole us Upper Mill Creek | 56.3 | 5/22/09 | SH, SS | M.R., D.G. | 9/29 | SH, SS | M.R., S.B. | 18.82 | 7/28 | 0 | 129 | 16.96 | 7/18 | algae in fall |
| 1157764 | Mattole ds Metz Bridge | 56.9 | 6/14/09 | SH | C.T. | 10/12 | N/A | C.T. | 18.77 | 7/19 | 0 | 119 | 17.30 | 7/18 | |
| 1157761 | Mattole ds Metz Bridge (air) | 56.9 | 6/14/09 | " | C.T. | 10/12 | N/A | C.T. | 25.77 | 7/18 | 68 | 119 | 18.31 | 7/17 | |
| 891552 | Baker Creek (lower) | 57.6+ ~0.1 | 5/20/09 | SH, SS | M.R., D.G. | 9/29 | SH | M.R., S.B. | 16.82 | 7/19 | 0 | 131 | 15.48 | 7/23 | In fall, 3 pools dry, 7 isolated, pool 4 was the deepest remaining pool |
| 882000 | Mattole us Baker Creek | 57.8 | 5/20/09 | SH, KS, SS | M.R., D.G. | 9/28 | SH, KS, SS | M.R., S.B., C.R. | 19.22 | 7/19 | 0 | 130 | 17.10 | 7/18 | |
| 2334526 | Thompson Creek (lower) | 58.4+ ~0.1 | 5/18/09 | SH, SS, UN | M.R., F.B. | 10/2 | SH, SS | M.R., C.R. | 18.60 | 7/19 | 0 | 136 | 16.23 | 7/18 | only 1 UN fish in Yew Creek confluence pool (unusual), Coho small in spring (30-40 mm), 1 SS smolt observed in spring (125 mm), 1 SS smolt in fall (5") |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2334531 | Yew Creek (lower) | 58.4 +0.15 +0.1 | 5/18/09 | SH, SS, UN | M.R., F.B. | 10/2 | SH, SS | M.R., C.R. | 17.56 | 7/19 | 0 | 136 | 14.97 | 7/17 | stickleback in fall |
| 2334528 | MS-3/Mattole us Thompson Creek | 58.4 | 5/18/09 | UN | M.R., F.B. | 9/28 | SH | M.R., S.B., C.R. | 17.84 | 7/27 | 0 | 132 | 16.04 | 7/18 | |
| 2334530 | Lost River (lower) | 58.8+ ~0.1 | 5/18/09 | SH | M.R., F.B. | 9/29 | SH | M.R., S.B. | 15.20 | 7/28, 7/29 | 0 | 133 | 14.69 | 7/24 | 4 pools dry in fall, 6 isolated |
| 884733 | MS-2/Mattole us Lost River | 58.9 | 5/18/09 | SH, KS | M.R., F.B. | 9/28 | SH, KS, SS | M.R., S.B., C.R. | 17.72 | 7/19 | 0 | 132 | 15.87 | 7/18 | Spring: 2 pregnant stickleback, ~50 mm KS, 1 merganser. Fall: stickleback, KS <90mm & slim |
| 891576 | MS-1, Mattole ds Big Alder Creek | 59.4 | 5/20/09 | None | M.R., D.G. | 9/28 | SH | M.R., S.B., C.R. | 17.56 | 7/19 | 0 | 130 | 15.40 | 7/17, 7/18 | |
| 895564 | McNasty Creek (lower) | 60.8+0 .15 +0.02 | 5/20/09 | None | M.R., D.G. | 10/2 | SH | M.R., C.R. | 14.31 | 7/19 | 0 | 134 | 13.28 | 8/9 | |
| 884753 | Ancestor Creek (lower) | 60.8+ ~0.1 | 5/20/09 | SH | M.R., D.G. | 10/2 | SH, SS | M.R., C.R. | 14.91 | 7/19 | 0 | 134 | 13.50 | 7/17 | |
| 893657 | Mattole ds Ancestor Creek | 60.8 | 5/20/09 | None | M.R., D.G. | 10/2 | SH | M.R., C.R. | 15.13 | 7/19 | 0 | 134 | 13.59 | 7/14 | |

Sites arranged from downstream (Mattole Estuary) to upstream (Mattole headwaters).
Key: **= Approximate River Mile, ds=downstream, us=upstream, trib=tributary, DSMT= MSG Downstream Migrant Trap site MS=Sanctuary Forest mainstem flow monitoring stations,+=tributary stream miles, SH=Steelhead, KS=Chinook Salmon, SS=Coho Salmon, WSP=Watershed Stewards Project Dive

**Table 2. 2010 Temperature Monitoring Summary**
(The blue color indicates sites that were monitored in both 2009 and 2010.)

| Logger Serial Number | Location | River Mile** | GPS Point | Date In | Spring species Present | Spring Staff | Date Out | Fall species Present | Fall Staff | Max | Date | >20 | Days | MWAT | Week of | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1000292 | Mattole Estuary @ MSG Structure | ~0.5 | N 40□17'39.5" W 124□21'01.9' | 7/8/10 | SH, KS | KC | 10/7 | SH, KS | KC | 23.76 | 7/16 | 51 | 90 | 19.57 | 7/29 | |
| 1000293 | Mattole Estuary @ MSG Structure (air) | ~0.5 | N 40□17'39.5" W 124□21'01.9' | 7/8/10 | " | KC | 10/7 | " | KC | 34.68 | 9/21 | 71 | 90 | 20.30 | 7/11 | |
| 1163381 | Lower Mill Creek (lower) | 2.8+ 0.1 | N 40°17'52.1" W 124°18'28.3" | 5/23/10 | SH | A.B., K.C. | 10/12 | SH | K.C., C.P. | 14.91 | 6/28 | 0 | 141 | 13.67 | 9/26 | |
| 1157777 | Lower Mill Creek (upper) | 2.8+ ~0.75 | N 40°17'42.3" W 124°18'08.9" | 5/23/10 | SH | A.B., K.C. | 10/10 | SH | A.B., K.C. | 14.65 | 6/28 | 0 | 139 | 13.68 | 9/26 | |
| 9748563 | Mattole @ Wingdam (deep) | 2.9 | N/A | 6/24/10 | SH | S.B., M.H. | 9/30 | SH | S.B., M.H. | 25.21 | 8/24 | 93 | 97 | 21.09 | 7/15 | |
| 9663025 | Mattole @ Wingdam, AIR | 2.9 | N/A | 6/24/10 | " | S.B., M.H. | 9/30 | " | S.B., M.H. | 33.26 | 7/5 | 57 | 97 | 17.79 | 6/25 | |
| 9663029 | Mattole @ DSMT | 3.9 | N 40°18'24.1" W 124°17'51.2" | 5/19/10 | SH, KS, SS (from DSMT) | A.P. | 7/9 | N/A | A.P. | 24.39 | 6/28 | 19 | 50 | 19.91 | 7/2 | No dive |
| N/A | Mattole @ Hideaway Bridge | 5.3 | N40°18'48" W124°16'56" | 10/30/ 2009 | N/A | A.B., W.K. | 10/12 | N/A | M.H., S.B. | N/A | N/A | N/A | N/A | N/A | N/A | Logger Lost |
| 2334524 | Mattole @ Hideaway Bridge (air) | 5.3 | N40°18'48" W124°16'56" | 10/30 20/09 | " | A.B., W.K. | 10/12 | " | M.H., S.B. | 43.89 | 8/24 | 184 | 346 | 18.90 | 8/31 | No dive |
| 2334530 | East Mill Creek (lower) | 5.4+ ~0.2 | N 43°18'57.8" W 124°16'42.3" | 5/24/10 | SH, KS | S.B., M.H. | 9/30 | SH | S.B., M.H. | 17.32 | 9/2 | 0 | 128 | 14.67 | 9/1 | |
| 1157770 | East Mill Creek (upper) | 5.4+ ~0.8 | N 40°19'30.2" W 124°16'20.6" | 5/26/10 | SH | A.B., K.M. | 10/15 | SH | A.B. | 17.51 | 9/2 | 0 | 141 | 14.71 | 9/26 | |
| 9748571 | Mattole us East Mill Creek | 5.5 | N 40°18'44.5" W124°16'45.4" | 6/18/10 | None | M.R., M.H. | 9/30 | SH | S.B., M.H. | 25.99 | 8/25 | 89 | 103 | 21.69 | 7/15 | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1157767 | Clear Creek (lower) | 6.1+ 0.2 | N 40°18'36.7" W 124°16'04.0" | 5/6/10 | SH | J.G., S.B. | 9/24 | SH | S.B., M.H. | 15.25 | 9/2 | 0 | 140 | 13.79 | 9/1 | |
| 881989 | Clear Creek (upper) | 6.1+ ~0.8 | N 40°18'21.6" W 124°15'51.5" | 5/6/10 | SH | J.G., S.B. | 9/24 | SH | S.B., M.H. | 15.18 | 8/25 | 0 | 140 | 13.61 | 9/2 | |
| 9748569 | Mattole us Clear Creek | 6.2 | N40°18'40.4" W124°16'02.8" | 6/18/10 | SH | M.R., S.B. | 9/24 | None | S.B., M.H. | 25.77 | 8/8 | 86 | 97 | 21.24 | 8/6 | |
| 9663021 | Squaw Creek (lower) | 14.9+ 0.1 | N 40°16'6.8" W 124°13'31" | 5/12/10 | SH | J.G., S.C. | 9/30 | SH | S.B., M.H. | 20.96 | 7/16 | 6 | 140 | 18.07 | 8/6 | |
| 9748556 | Squaw Creek (upper) | 14.9+ ~6.0 | N 40°13'04.8" W 124°11'06.0" | 6/7/10 | SH | J.G., K.C. | 10/6 | SH | J.G., K.C. | 16.46 | 7/16 | 0 | 120 | 14.69 | 7/15, 7/16/2 010 | |
| 2334529 | Mattole us Squaw Creek | 15.0 | N40°16'07.2" W124°13'36.3" | 6/18/10 | SH | M.R., S.B. | 9/30 | None | S.B., M.H. | 26.72 | 7/16 | 97 | 103 | 22.31 | 7/15 | |
| 9663023 | Woods Creek (lower) | 24.1+ 0.1 | N 40°13'49.6" W124°08'59.5" | 5/12/10 | SH, KS | J.G., S.C. | 10/11 | SH | S.B., M.H. | 16.73 | 8/25 | 0 | 151 | 14.60 | 8/6 | |
| 9748560 | Woods Creek (upper) | 24.1+ 0.7 | N 40°13'30.9" W124°09'16.7" | 5/28/10 | SH | K.C., S.B. | 10/11 | SH | S.B., M.H. | 15.92 | 8/25 | 0 | 135 | 14.17 | 8/6 | |
| 9748561 | Mattole us Woods Creek | 24.2 | N 40°13'51.2" W124°08'56.2" | 6/18/10 | SH, KS | M.R., M.H. | 10/11 | SH | S.B., M.H. | 26.18 | 7/16 | 87 | 114 | 21.80 | 7/15 | |
| 9748564 | Fourmile Creek (lower) | 34.6+ ~0.1 | N 40°11'51.3" W 124°03'33.7" | 6/28/10 | SH | K.M., K.C. | 9/27 | SH | K.C., S.B. | 19.46 | 8/8 | 0 | 90 | 16.44 | 8/3 | |
| 1157760 | Fourmile Creek (upper) | 34.6+ ~0.75 | N 40°11'54.7" W 124°04'01.9" | 6/28/10 | SH | K.M., K.C. | 9/27 | SH | K.C., S.B. | 18.13 | 7/17 | 0 | 90 | 15.87 | 8/6 | |
| 9748565 | Mattole us Fourmile Creek | 34.6 | N 40°11'23.7" W 124°03'13.0" | 6/28/10 | SH | K.M., K.C. | 9/27 | SH | K.C., S.B. | 25.57 | 7/17 | 78 | 90 | 22.13 | 8/3 | moved on 7/16 |
| N/A | Mattole ds Ettersburg Bridge | ~42.0 | N 40°'02'00.6" W 124°01'27.2" | 10/30/ 2009 | SH | A.B., W.K. | 10/10 | SH | W.K., D.H., S.A. | N/A | N/A | N/A | N/A | N/A | N/A | Logger Lost |
| N/A | Mattole ds Ettersburg Bridge (air) | ~42.0 | N 40°'02'00.6" W 124°01'27.2" | 10/30/ 2009 | " | A.B., W.K. | 10/10 | " | W.K., D.H., S.A. | N/A | N/A | N/A | N/A | N/A | N/A | Logger Lost |
| 9748562 | Bear Creek (upper) | 42.8+ ~3.6 | N 40°'07'27.3" W 124°02'21.4" | 7/16/10 | SH | F.B., A.V. | 10/5 | SH | S.B., M.H. | 18.75 | 7/17 | 0 | 80 | 16.13 | 8/4 | |
| 1157768 | South Fork Bear Creek- | 42.8+ ~5.0+ ~2.0 | N 40°02'01.0" W 124°01'27.1" | 6/10/10 | SH | K.C., F.B., K.M. | 10/9 | SH | K.C., C.P. | 15.61 | 8/8 | 0 | 120 | 14.23 | 8/3 | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hidden Valley (lower) | | | | | | | | | | | | | | | |
| 1157769 | South Fork Bear Creek - Wailaki Camp-ground (upper) | 42.8+ ~5.0+ ~2.5 | N 40°01'05.08" W 124°00'09.3" | 6/10/10 | SH | K.C., F.B., K.M. | 10/9 | SH | K.C., C.P. | 14.46 | 8/25 | 0 | 120 | 12.68 | 9/1 | |
| 1163380 | Big Finley Creek (lower) | 47.4+ ~0.1 | N 40°05'23.9" W124°00'05.2" | 5/18/10 | SH | J.G., W.K. | 10/10 | SH | W.K., D.H., S.A. | 15.89 | 7/17 | 0 | 144 | 14.64 | 7/12 | |
| 1157758 | Big Finley Creek (upper) | 47.4+ ~0.75 | N 40°05'17.8" W 124°00'36.0" | 5/18/10 | SH | J.G., W.K. | Logg er Lost | SH | W.K., D.H., S.A. | N/A | N/A | N/A | N/A | N/A | N/A | Logger Lost |
| 9663031 | Mattole at Big Finley Creek | 47.4 | N 40°05'23.0" W 124°00'01.7" | 5/18/10 | SH | J.G., W.K. | 10/10 | SH | W.K., D.H., S.A. | 20.01 | 7/17 | 1 | 144 | 17.73 | 7/20 | |
| 1157771 | Eubanks Creek (lower) | 47.7 +0.1 | N 40°05'11.5" W 123°59'56.6" | 5/31/10 | SH | S.B., M.H. | 10/5 | SH | S.B., M.H. | 17.08 | 7/16 | 0 | 126 | 15.19 | 7/12 | |
| 1163389 | Eubanks Creek (upper) | 47.7+ ~0.6 | N 40°04'57.2" W 123°59'19.9" | 5/31/10 | SH | S.B., M.H. | 10/5 | SH | S.B., M.H. | 17.51 | 7/17 | 0 | 126 | 15.24 | 7/12 | |
| 1163384 | Bridge Creek (lower) | 52.1+ ~0.2 | N 40°03'20.7" W 123°58'26.4" | 5/4/10 | SH | K.C., S.B. | 10/14 | SH | M.H., D.H. | 16.89 | 7/17 | 0 | 162 | 14.83 | 7/16 | |
| 1157773 | Bridge Creek (upper) | 52.1+ 2.1 | N 40°02'3.5" W 123°59'35.7" | 5/27/10 | SH, KS | K.C., M.H. | 10/14 | SH | M.H., D.H. | 16.30 | 7/17 | 0 | 139 | 14.06 | 7/16 | |
| 1163388 | West Fork Bridge Creek | 52.1+ 2.15 | N 40°02'41.7" W 123°59'37.8" | 5/27/10 | SH | K.C., M.H. | 10/14 | SH | M.H., D.H. | 17.70 | 9/1 | 0 | 139 | 14.10 | 8/6 | |
| 1157766 | MS-6, Mattole us Bridge | 52.2 | N 40°03'47.1 W 123°58'39.4" | 5/4/10 | SH | K.C., S.B. | 10/14 | SH | M.H., D.H. | 19.51 | 7/17 | 0 | 162 | 17.29 | 8/4 | |
| 1157776 | McKee Creek (lower) | 52.8+ ~0.1 | N 40°03'45.8" W 123°57'50.5" | 5/4/10 | SH | J.G., M.H. | 10/14 | SH | M.H., D.H. | 18.01 | 7/17 | 0 | 162 | 15.40 | 7/16 | |
| 1157765 | McKee Creek (upper) | 52.8+ ~0.6 | N 40°04'22.0" W 123°57'24.4" | 5/4/10 | SH | J.G., M.H. | 10/14 | SH | M.H., D.H. | 16.01 | 7/17 | 0 | 162 | 14.30 | 8/5, 8/6/10 | |
| 9663028 | Van Arken Creek (lower) | 54.0+ 0.1 | N 40°03'05.7" W 123°57'22.1" | 5/20/10 | SH | J.G., S.B. | 10/14 | SH | S.B., S.A. | 15.96 | 7/17 | 0 | 146 | 14.78 | 8/5 | |
| 1157757 | Van Arken Creek (upper) | 54.0+ 0.75 | N 40°03'41.0" W 123°56'48.0" | 5/20/10 | SH | J.G., S.B. | 10/14 | SH | S.B., S.A. | 15.18 | 8/8 | 0 | 145 | 13.60 | 8/5, 8/6/10 | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9748557 | MS-5/Mattole us Van Arken | 53.8 | N 40°03'43.8" W 123°57'35.9" | 5/27/10 | SH | S.B., A.B. | 10/14 | SH | S.B., S.A. | 19.41 | 8/8 | 0 | 139 | 17.03 | 8/4 | |
| 1163382 | Upper Mill Creek (lower) | 56.2+ 0.1 | N 40°01'30.9" W 123°56'53.4" | 5/5/10 | SH | M.R., S.B. | 10/13 | SH | S.B., S.A. | 12.80 * | 6/10/ 10* | 0* | 36* | 10.92* | 6/3/10 * | *out of water after 6/10 |
| 1157772 | Upper Mill Creek (upper) | 56.2+ 1.4 | N 40°01'02.9" W 123°57'50.8 | 5/20/10 | SH | M.R., S.B. | 10/13 | SH | S.B., S.A. | 15.32 | 8/8 | 0 | 145 | 13.67 | 8/3 | |
| 1163387 | Mattole ds Metz Bridge | 56.9 | N 40°01'02.5" W 123°56'13.2" | 5/24/10 | SH | J.G., A.B. | 10/13 | SH | J.G., A.B. | 17.08 | 7/17 | 0 | 141 | 15.83 | 8/4 | |
| 1163383 | Mattole ds Metz Bridge (air) | 56.9 | N 40°01'02.5" W 123°56'13.2" | 5/24/10 | " | J.G., A.B. | 10/13 | " | J.G., A.B. | 24.20 | 8/25 | 48 | 141 | 16.65 | 7/15 | |
| 9663024 | Baker Creek (lower) | 57.6+ ~0.1 | N 40°00'32.4" W 123°55'49.3" | 5/20/10 | SH | A.B., M.H. | 10/13 | SH | M.H., D.H. | 15.99 | 8/8 | 0 | 145 | 14.57 | 8/3 | |
| 2334525 | Baker Creek (upper) | 57.6+ 0.95 | N 40°00'50.8" W 123°55'10.7" | 5/20/10 | SH | A.B., M.H. | 10/13 | SH | M.H., D.H. | 15.18 | 8/8 | 0 | 145 | 13.96 | 8/3 | |
| 2334526 | Mattole us Baker | 57.8 | N/A | 5/27/10 | SH | AB., S.B. | 10/13 | SH | M.H., D.H. | 17.46 | 8/8 | 0 | 138 | 15.57 | 8/3 | |
| 1163385 | Thompson Creek (lower) | 58.4+ ~0.1 | N 39°59'53.6" W123°55'54.5" | 5/24/10 | SH | J.G., A.B. | 10/13 | SH, SS | J.G., A.B. | 17.06 | 8/8 | 0 | 141 | 15.22 | 8/3 | |
| 9748559 | Thompson Creek (upper) | 58.4+ 2.3 | N 40°00'15.3" W123°57'37.6" | 6/8/10 | SH, SS | J.G., C.T. | 10/12 | SH, SS | J.G., A.B. | 15.10 | 8/8 | 0 | 125 | 13.78 | 8/3 | |
| 1157764 | North Fork Thompson (Danny's) Creek | 58.4+ 2.2 | N 40°00'16.0" W123°57'39.3" | 6/8/10 | SH, SS | J.G., C.T. | 10/12 | SH, SS | J.G., A.B. | 14.94 | 8/8 | 0 | 125 | 13.51 | 8/3 | |
| 9663022 | Yew Creek (lower) | 58.4+ 0.15+ 0.1 | N 39°59'52.6" W123°55'53.7" | 5/24/10 | SH | J.G., A.B. | 10/13 | SH | J.G., A.B. | 16.13 | 8/8 | 0 | 141 | 14.52 | 8/3 | |
| 9748567 | Yew Creek (upper) | 58.4+ 0.15+ 0.4 | N 39°59'36.9" W123°56'18.0" | 6/8/10 | SH | J.G., C.T. | 10/12 | None | J.G., A.B. | 15.53 | 7/17 | 0 | 125 | 14.16 | 7/16 | |
| 1157756 | Mattole us Thompson Cr (MS-3) | 58.4 | N/A | 5/24/10 | None | J.G., A.B. | 10/13 | SH | J.G., A.B. | 16.39 | 8/8 | 0 | 141 | 14.85 | 8/4 | |
| 9663027 | Helen Barnum (lower) | 58.7+ 0.01 | N 39°59'34.5" W 123°55'24.9" | 5/27/10 | None | K.C., M.H. | 10/8 | None | S.B., M.H. | 13.98 | 7/17 | 0 | 133 | 13.57 | 8/6 | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9748566 | Helen Barnum (upper) | 58.7+ 0.9 | N 39°59'47.7" W 123°55'08.3" | 6/3/10 | None | J.G., S.B. | 10/13 | None | J.G., S.B. | 15.03 | 8/8 | 0 | 131 | 13.52 | 8/3 | |
| 1157775 | Lost River (lower) | 58.8+ ~0.1 | N 39°59'34.8" W 123°55'25.4" | 5/18/10 | SH | K.C., S.B. | 10/13 | SH | S.B., S.A. | 15.20 | 8/8 | 0 | 147 | 14.11 | 8/4 | |
| 1157774 | Lost River (upper) | 58.8+ 1.0 | N 39°58'45.0" W123°54'59.2" | 5/18/10 | None | K.C., S.B. | 10/13 | None | S.B., S.A. | 14.00 | 8/8 | 0 | 147 | 12.76 | 8/5 | |
| 989872 | MS-2/Mattole us Lost River | 58.9 | N 39°59'30.2" W123°55'26.1" | 5/18/10 | SH | K.C., S.B. | 10/13 | SH | S.B., S.A. | 15.53 | 8/8 | 0 | 147 | 14.50 | 8/4 | |
| 9663026 | MS-1, Mattole ds Big Alder Creek | 59.4 | N 39°59'00.7" W123°55'42.2" | 5/24/10 | None | J.G., A.B. | 10/13 | SH | J.G., A.B. | 16.06 | 8/8 | 0 | 141 | 14.37 | 8/3 | |
| 1157762 | McNasty Creek (lower) | 60.8+ 0.15+ 0.02 | N 39°58'41.2" W123°57'47.1" | 5/5/10 | SH | K.C., M.H. | 10/8 | SH | S.B, M.H. | 14.12 | 7/20 | 0 | 155 | 12.98 | 8/3 | |
| 1163386 | Ancestor Creek (lower) | 60.8+ 0.15 | N 39°58'25.3" W 123°57'18.6" | 5/19/10 | SH, SS | K.C., S.B. | 10/8 | SH, SS | S.B., M.H. | 14.19 | 8/8 | 0 | 141 | 13.07 | 8/3 | |
| 2334532 | Ancestor Creek (upper) | 60.8+ ~0.6 | N 39°38'51.6" W123°57'27.2" | 5/4/10 | SH | K.C., M.H. | 10/8 | None | S.B., M.H. | 14.34 | 8/8 | 0 | 155 | 13.40 | 8/4 | |
| 575777 | Mattole ds Ancestor Creek | 60.8 | N 39°58'23.9" W123°57'18.9" | 5/19/10 | SS | K.C., S.B. | 10/8 | SH | S.B., M.H. | 14.29 | 8/8 | 0 | 141 | 13.10 | 8/3 | |

Sites arranged from downstream (Mattole Estuary) to upstream (Mattole headwaters).
Key: **= Approximate River Mile, ds=downstream, us=upstream, trib=tributary, DSMT= MSG Downstream Migrant Trap site, MS=Sanctuary Forest mainstem flow monitoring stations, +=tributary stream miles, SH=Steelhead, KS=Chinook Salmon, SS=Coho Salmon

### Water Quality Spot-Checks

#### Dissolved Oxygen

All DO levels downstream of the headwaters (RM 52.1) in both 2009 and 2010 indicated suitable dissolved oxygen for rearing salmonids (Tables 3 and 4) during the spring and fall spot-checks of water quality. Some of the tributaries were monitored both years, and some just one year, but all results indicate suitable DO levels.

In the headwaters, more locations were monitored in 2010 than in 2009, however the same tributaries were monitored in 2009 and 2010, with an additional tributary (Helen Barnum) monitored in 2010 – i.e. two locations were monitored on each tributary in 2010 but only one per tributary in 2009. Figures 5 and 6 show only data collected from repeat monitoring locations (downstream monitoring sites) in 2009 and 2010, with additional 2010 data in Figure 6 from Helen Barnum Creek.

The higher summer flow and earlier onset of fall rains in 2010 corresponded to more favorable DO levels in the headwaters than in 2009. In 2009, substandard DO levels were found in a greater number of headwaters monitoring locations (Figures 5 and 6). It should be noted, however, that all fall surveys in 2010 occurred after the first fall rain event, while most fall surveys in 2009 were completed prior to the first fall rain that year.

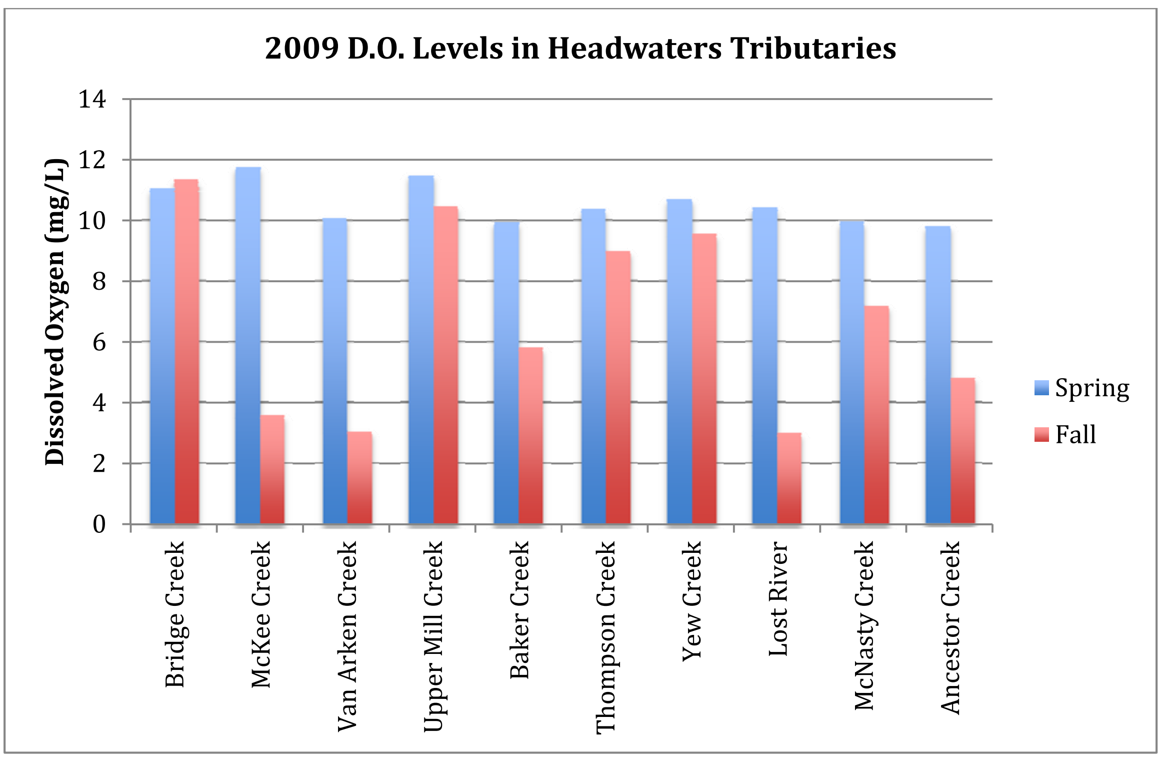


**Figure 5.** 2009 DO levels in Mattole headwaters tributaries (upstream of RM 52.1), recorded during spot-checks in spring and fall.

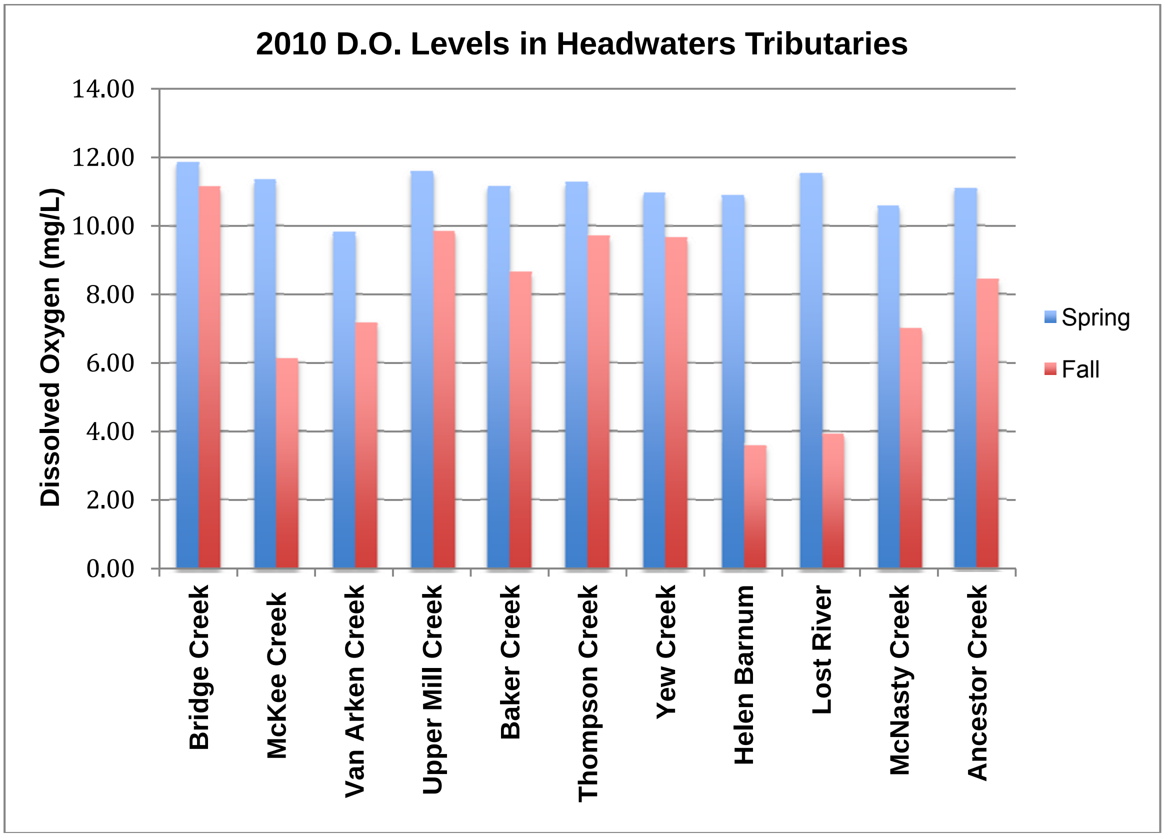


**Figure 6.** 2010 DO levels in Mattole headwaters tributaries (upstream of RM 52.1), recorded during spot-checks in spring and fall.

2009 DO levels ranged from 13.96 to 8.58 mg/L in spring and 11.34 to 2.99 mg/L in the fall. The lowest DO level measured in 2009 was 2.99 mg/L, recorded in Lost River (RM 58.7) on 9/29/09. In 2009, minimum DO levels in 3 of 10 tributaries monitored in the headwaters (McKee Creek (RM 52.8), Van Arken Creek (RM 54.0), and Lost River (RM 58.7)) were below 4 mg/L, the threshold for severe production impairment (Figure 5). DO levels in two additional tributaries – Baker Creek (RM 57.6) and Ancestor Creek (RM 60.8) – were below 6 mg/L, demonstrating marginal production impairment. In the mainstem above RM 52.1, DO levels at one location, Mattole at Junction Hole (RM 52.7), indicated slight production impairment (<6 mg/L).

In 2010, DO levels varied from a maximum of 12.52mg/L to a minimum of 9.40 mg/L in spring, and 11.60 to 3.60 mg/L in fall. The minimum DO level was recorded in the fall at the lower reach of Helen Barnum Creek (RM 58.8). Fall DO levels below 4 mg/L occurred in 2 of 23 reach locations (2 of 11 tributaries) monitored in the headwaters – the lower reaches of Helen Barnum (RM 58.7) and Lost River (RM 58.8) Creeks – indicating severe production impairment. In addition, a single DO reading below 6 mg/L was recorded in upper Lost River Creek during the fall spot-check (5.38 mg/L on 10/13/10), indicating slight production impairment.

## pH

In 2009, pH levels remained within 6.5 to 8.5, the acceptable range for salmonids (Kier and Associates and NMFS 2008, Spence et al 1996, NCRWQCB 2001) at all monitoring locations, with one exception (Table 3). A pH level of 6.41 was recorded in lower Lost River (RM 58.8) in fall (09/29/09). The maximum pH measured was 8.27, recorded on 10/05/09 in the mainstem Mattole upstream of Squaw Creek (RM 15.0).

In 2010, the pH probe on the Professional-Plus instrument began to become faulty, despite numerous rounds of calibration and being less than one year old. PH readings in the summary table (2010-2) have been marked with an "*" if they were questionable. The number of faulty readings made analysis difficult. pH readings above the 8.5 threshold for salmonids were recorded throughout the season in many locations, although the pH probe appeared to be malfunctioning. Comparison to favorable pH levels recorded in 2009 in the same locations makes these readings suspect. Further investigation into pH levels in the Mattole, especially in the headwaters, should be pursued during future water quality monitoring.

## Specific Conductivity

In 2009, specific conductance values ranged from 0.066 to 0.514 mS/cm, the latter of which was recorded in the Mattole estuary indicating a more saline environment. 2010 specific conductance measurements varied from 0.055 to 0.291 mS/cm. The NCRWQCB conductivity objectives for the Mattole are 300 µs/cm (0.30 ms/cm) for a 90% upper limit and 170 µs/cm (ms/cm) for a 50% upper limit (NCRWQCB 2001). The 50% upper limit means 50% or more of the monthly means must not exceed the upper limit in a calendar year. The 90% upper limit means 90% or more of the values in a calendar year must be less than the objective. Water quality monitoring spot-checks are insufficient to determine if the objective was met throughout the year. Specific conductance values recorded in all mainstem and tributary locations upstream of RM 47.4 and in South Fork Bear Creek were well below target specific conductance values. Higher specific conductance measurements corresponded to downriver monitoring locations, which is consistent with higher instream sediment downstream of the headwaters.

**Table 3. 2009 Water Quality Spot-Check Data Summary**
(The blue color indicates sites that were monitored in both 2009 and 2010.)

| Location | River Mile* | Spring Date | Water Temp © | DO (mg/L) | pH | Sp. Cond . | mm Hg | Instrument | Fall Date | Water Temp © | DO (mg/L) | pH | Sp. Cond (mS/ cm) | mmHg | Instrument |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mattole Estuary @ MSG Structure | ~0.5 | 6/3 | 18.53 | 9.13 | 8.18 | 0.206 | N/A | 556 MPS | 10/12 | 14.62 | 10.04 | 8.25 | 0.514 | 752.40 | 556 MPS |
| Mattole Estuary, Area 6 (shallow) | ~0.5 | 6/11 | 19.72 | 9.52 | 8.12 | 0.210 | 104.1 | 556 MPS | 10/12 | 15.20 | 8.59 | 7.88 | 0.278 | 751.6 | 556 MPS |
| Mattole Estuary, Area 6 (deep) | ~0.5 | 6/11 | 19.84 | 9.33 | 8.12 | 0.210 | 102.4 | 556 MPS | 10/12 | 15.24 | 8.59 | 7.88 | 0.278 | 751.6 | 556 MPS |
| Lower Bear Creek | 1+0.3 | 5/30 | 12.68 | 10.57 | 7.89 | 0.200 | 761.6 | 556 MPS | 10/5 | N/A | N/A | N/A | N/A | N/A | No spot-check in fall |
| Stansberry Creek | 1.3+0.1 | 5/11 | 12.75 | 10.37 | 7.80 | 0.179 | 762.4 | 556 MPS | 10/5 | 11.07 | 9.35 | 7.98 | 0.231 | 762.6 | 556 MPS |
| Mattole us Stansberry Creek | 1.3 | 5/26 | 20.95 | 8.58 | 8.03 | 0.195 | 762.8 | 556 MPS | 10/5 | 16.27 | 8.68 | 8.14 | 0.279 | 763.2 | 556 MPS |
| Lower Mill Creek | 2.8+0.1 | 5/11 | 12.87 | 10.56 | 7.90 | 0.137 | 761.0 | 556 MPS | 10/5 | 10.87 | 9.90 | 7.84 | 0.161 | 761.6 | 556 MPS |
| Mattole @ Wingdam (shallow) | 2.9 | 6/18 | 23.56 | 9.01 | 8.23 | 0.215 | 761.5 | 556 MPS | 10/12 | 14.5 | 7.80 | 8.00 | 0.284 | 753.9 | Pro-Plus |
| Lower North Fork (LNF) | 4.7+~1.0 | 4/6 | N/A | N/A | N/A | N/A | N/A | no spot-check in spring | 10/10 | 17.0 | 8.58 | 8.16 | 0.335 | 757.6 | Pro-Plus |
| Sulfur Creek (trib of LNF) | 4.7+ ~2.0 | 6/9 | N/A | N/A | N/A | N/A | N/A | no spot-check in spring | 10/9 | 10.1 | 9.50 | 7.73 | 0.309 | 734.8 | ? |
| Mattole us LNF | 4.8 | 5/20 | N/A | N/A | N/A | N/A | N/A | no spot-check in spring | 10/10 | 18.0 | 8.18 | 8.12 | 0.308 | 758.1 | Pro-Plus |
| East Mill Creek | 5.4+~0.2 | 5/11 | 14.00 | 9.62 | 7.96 | 0.194 | 761.1 | 556 MPS | 10/5 | 10.53 | 9.32 | 7.74 | 0.155 | 761.5 | 556 MPS |
| Mattole us East Mill Creek | 5.5 | 5/30 | 21.12 | 8.77 | 8.02 | 0.190 | 761.5 | 556 MPS | 10/5 | 13.47 | 8.86 | 8.08 | 0.273 | 761.2 | 556 MPS |
| Clear Creek | 6.1+0.2 | 5/21 | N/A | N/A | N/A | N/A | N/A | no spot-check in spring | 10/10 | 10.74 | 10.69 | 7.82 | 0.190 | 753.2 | 556 MPS |
| Mattole us Clear Creek | 6.1 | 5/21 | N/A | N/A | N/A | N/A | N/A | no spot-check in spring | 10/12 | 13.66 | 9.30 | 7.66 | 0.260 | 753.5 | 556 MPS |
| Squaw Creek | 14.9+0.1 | 5/1 | 10.22 | 16.44* | 7.78 | 0.209 | 755.0 | 556 MPS | 10/5 | 10.92 | 8.72 | 8.06 | 0.286 | 759.2 | 556 MPS |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mattole us Squaw Creek | 15 | 5/1 | 12.92 | 13.96 | 7.92 | 0.179 | 755.1 | 556 MPS | 10/5 | 12.73 | 9.60 | 8.27 | 0.268 | 759.4 | 556 MPS |
| Woods Creek | 24.1+0.1 | 5/11 | 13.62 | 10.59 | 7.93 | 0.156 | 754.3 | 556 MPS | 10/2 | 13.68 | 9.03 | 8.06 | 0.199 | 756.5 | 556 MPS |
| Mattole us Woods Creek | 24.2 | 5/30 | 19.11 | 8.85 | 7.92 | 0.165 | 754.0 | 556 MPS | 10/2 | 17.68 | 7.49 | 7.62 | 0.241 | 755.0 | 556 MPS |
| Upper North Fork (UNF) | 25.5+~1.0 | 5/18 | 19.38 | 10.50 | 8.01 | 0.208 | 747.7 | 556 MPS | 10/12 | 12.3 | 9.58 | 8.16 | 0.281 | 742.4 | Pro-Plus |
| Rattlesnake Creek (trib to UNF) | 25.5+~2.0 +0.1 | 6/10 | 13.11 | 10.75 | 7.99 | 0.196 | 745.2 | 556 MPS | 10/9 | 9.8 | 10.27 | 8.25 | 0.242 | 748.4 | ? |
| Mattole us UNF | 25.5 | 5/18 | 19.05 | N/A* | 7.68 | 0.143 | 752.3 | 556 MPS | 10/6 | 18.32 | 8.00 | 8.21 | 0.235 | 751.5 | 556 MPS |
| Honeydew Creek (lower) | 26.5+~1.0 | 5/30 | 14.15 | 9.93 | 7.80 | 0.175 | 752.3 | 556 MPS | 9/29 | 15.47 | 9.40 | 8.18 | 0.226 | 753.7 | 556 MPS |
| Honeydew Creek (east fork) | 26.5+~2.5+ 0.1 | 6/10 | N/A | N/A | N/A | N/A | N/A | no spot-check in spring | 10/12 | 10.68 | 10.08 | 7.66 | 0.215 | 740.5 | 556 MPS |
| Honeydew Creek (upper) | 26.5 + ~2.5 | 6/10 | N/A | N/A | N/A | N/A | N/A | no spot-check in spring | 10/12 | 11.45 | 10.45 | 7.78 | 0.214 | 740.7 | 556 MPS |
| Mattole us Honeydew Creek | 26.5 | 5/30 | 18.98 | 8.87 | 7.91 | 0.150 | 753.3 | 556 MPS | 9/29 | 19.19 | 7.66 | 7.89 | 0.238 | 755.3 | 556 MPS |
| Fourmile Creek | 34.6+~0.1 | 5/21 | 14.66 | 10.2 | 7.63 | 0.169 | N/A | 556 MPS | 10/16 | 13.57 | 9.68 | 7.51 | 0.260 | 746.2 | 556 MPS |
| Mattole us Fourmile Creek | 34.6 | 5/21 | 17.41 | 10.10 | 7.71 | 0.123 | 747.3 | 556 MPS | 10/16 | 16.09 | 10.18 | 7.73 | 0.169 | 751.4 | 556 MPS |
| Sholes Creek | 36.6+~0.1 | 5/21 | 12.40 | 11.09 | 7.61 | 0.129 | 746.3 | 556 MPS | 10/16 | 12.08 | 10.68 | 7.50 | 0.190 * | 751.5 | 556 MPS |
| Mattole us Sholes Creek | 36.7 | 5/21 | 15.09 | 11.05 | 7.29 | 0.121 | 747.4 | 556 MPS | 10/16 | 14.77 | 10.06 | 7.62 | 0.160 | 752.2 | 556 MPS |
| Grindstone Creek | 39+~0.1 | 5/19 | N/A | N/A | N/A | N/A | N/A | instrument malfunction | 10/6 | 12.99 | 8.80 | 7.92 | 0.255 | 742.9 | 556 MPS |
| Mattole us Grindstone Creek | 38.9 | 5/19 | N/A* | N/A* | N/A* | N/A* | N/A* | instrument malfunction | 10/6 | 16.68 | 8.91 | 8.21 | 0.176 | 745.6 | 556 MPS |
| Mattole Canyon Creek | 41.1+ 3.1 | 6/1 | 15.77 | 9.51 | 8.04 | 0.233 | 741.0 | 556 MPS | 10/20 | 13.61 | 8.93 | 7.11 | 0.342 | 746.3 | 556 MPS |
| Mattole ds Ettersburg Bridge | ~42 | 5/19 | N/A* | N/A* | N/A* | N/A* | N/A* | instrument malfunction | 10/6 | 11.62 | 9.61 | 7.67 | 0.162 | 746.1 | 556 MPS |
| Bear Creek | 42.8+~0.2 | 6/1 | 13.59 | 10.50 | 8.25 | 0.134 | 744.3 | 556 MPS | 10/10 | 10.26 | 9.88 | 7.83 | 0.178 | 743.8 | 556 MPS |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mattole us Bear Creek | 42.9 | 6/1 | 15.48 | 10.95 | 8.00 | 0.091 | 744.3 | 556 MPS | 10/10 | 13.41 | 9.44 | 7.61 | 0.133 | 743.0 | 556 MPS |
| South Fork Bear Creek | 42.8+~5.0+ ~1.0 | 5/25 | 12.39 | 10.91 | 7.22 | 0.081 | 719.1 | 556 MPS | 10/9 | 9.62 | 10.50 | 7.15 | 0.094 | 720.9 | 556 MPS |
| North Fork Bear Creek | 42.8+~5.0+ ~2.0 | 5/19 | 12.28 | N/A* | N/A* | 0.127 | 732.1 | 556 MPS | 10/6 | 9.93 | 10.11 | 7.77 | 0.180 | 730.0 | 556 MPS |
| Big Finley Creek | 47.4+~0.1 | 5/27 | 12.46 | 10.94 | 7.39 | 0.117 | 741.3 | 556 MPS | 10/9 | 9.06 | 10.96 | 7.42 | 0.138 | 745.8 | 556 MPS |
| Mattole at Big Finley Creek | 47.4 | 5/27 | 13.69 | 10.92 | 7.28 | 0.079 | 740.9 | 556 MPS | 10/9 | 9.27 | 9.37 | 7,42 | 0.129 | 746.5 | 556 MPS |
| Eubanks Creek | 47.7 | 5/27 | 13.40 | 10.66 | 7.37 | 0.090 | 740.3 | 556 MPS | 10/9 | 7.97 | 8.60 | 7.22 | 0.191 | 745.4 | 556 MPS |
| Mattole us Eubanks Creek | 47.8 | 5/27 | 14.55 | 10.34 | 7.43 | 0.080 | 740.8 | 556 MPS | 10/9 | 8.92 | 10.63 | 7.47 | 0.123 | 745.7 | 556 MPS |
| Bridge Creek | 52.1+~0.1 | 5/25 | 11.89 | 11.04 | 7.33 | 0.087 | 737.3 | 556 MPS | 10/9 | 7.68 | 11.34 | 7.61 | 0.109 | 745.4 | 556 MPS |
| MS-6/Mattole us Bridge Creek | 52.2 | 5/25 | 13.01 | 11.08 | 7.26 | 0.065 | 737.3 | 556 MPS | 9/28 | 13.70 | 6.85 | 6.73 | 0.087 | N/A | 556 MPS |
| McKee Creek | 52.8+~0.1 | 5/25 | 11.41 | 11.78 | 7.17 | 0.078 | 737.1 | 556 MPS | 10/9 | 7.96 | 3.57 | 6.8 | 0.163 | 739.8 | 556 MPS |
| Mattole @ Junction Hole | 52.7 | 5/25 | 11.69 | 10.70 | 7.28 | 0.065 | 737.4 | 556 MPS | 10/9 | 9.44 | 5.73 | 6.70 | 0.087 | 737.6 | 556 MPS |
| Van Arken Creek | 54+~0.1 | 5/22 | 11.37 | 10.09 | 7.13 | 0.074 | 735.6 | 556 MPS | 10/2 | 10.47 | 3.05 | 6.80 | 0.161 | 736.2 | 556 MPS |
| MS-5/Mattole us Van Arken Creek | 53.8 | 5/22 | 12.96 | 10.51 | 7.13 | 0.064 | 736.0 | 556 MPS | 9/28 | 12.18 | 7.86 | 6.85 | 0.085 | N/A | 556 MPS |
| Upper Mill Creek | 56.2+~0.1 | 5/22 | 10.41 | 11.49 | 7.10 | 0.067 | 734.9 | 556 MPS | 9/29 | 11.04 | 10.46 | 7.15 | 0.076 | 736.9 | 556 MPS |
| Mattole us Upper Mill Creek | 56.3 | 5/22 | 11.57 | 10.23 | 7.18 | 0.064 | 753.4 | 556 MPS | 9/29 | 11.47 | 8.41 | 6.88 | 0.079 | 737.1 | 556 MPS |
| Baker Creek | 57.6+~0.1 | 5/20 | 11.78 | 9.96 | 6.9 | 0.073 | 733.9 | 556 MPS | 9/29 | 10.95 | 5.81 | 6.64 | 0.126 | 736.1 | 556 MPS |
| Mattole us Baker | 57.8 | 5/20 | 12.03 | 10.46 | 6.87 | 0.063 | 734.1 | 556 MPS | 9/28 | 12.67 | 8.20 | 6.75 | 0.075 | N/A | 556 MPS |
| Thompson Creek | 58.4+~0.1 | 5/18 | 12.14 | 10.37 | 6.78 | 0.062 | 734.0 | 556 MPS | 10/2 | 10.48 | 9.00 | 6.63 | 0.081 | 734.2 | 556 MPS |
| Yew Creek | 58.4+0.15+ 0.1 | 5/18 | 11.51 | 10.72 | 6.85 | 0.065 | 734.0 | 556 MPS | 10/2 | 10.62 | 9.56 | 6.78 | 0.066 | 733.0 | 556 MPS |
| MS-3/Mattole us Thompson Creek | 58.4 | 5/18 | 11.77 | 10.76 | 6.97 | 0.065 | N/A | 556 MPS | 9/28 | 12.43 | 8.41 | 6.89 | 0.078 | N/A | 556 MPS |
| Lost River | 58.8+~0.1 | 5/18 | 11.73 | 10.41 | 6.76 | 0.057 | 733.8 | 556 MPS | 9/29 | 10.87 | 2.99 | 6.41 | 0.097 | 735.2 | 556 MPS |
| MS-2/Mattole us Lost River | 58.9 | 5/18 | 12.20 | 10.53 | 6.97 | 0.067 | 733.0 | 556 MPS | 9/28 | 12.36 | 7.41 | 6.81 | 0.081 | N/A | 556 MPS |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MS-1, Mattole ds Big Alder Creek | 59.4 | 5/20 | 11.28 | 10.79 | 6.92 | 0.069 | 732.2 | 556 MPS | 9/28 | 11.93 | 8.25 | 6.90 | 0.085 | N/A | 556 MPS |
| McNasty Creek | 60.8+0.15+ 0.02 | 5/20 | 10.91 | 9.94 | 6.76 | 0.068 | 729.4 | 556 MPS | 10/2 | 11.23 | 7.18 | 7.22 | 0.084 | 730,8 | 556 MPS |
| Ancestor Creek | 60.8+0.15 | 5/20 | 10.56 | 9.83 | 6.92 | 0.070 | 729.9 | 556 MPS | 10/2 | 11.80 | 4.83 | 6.58 | 0.078 | 730.8 | 556 MPS |
| Mattole ds Ancestor Creek | 60.8 | 5/20 | 10.50 | 10.35 | 6.98 | 0.071 | 730.1 | 556 MPS | 10/2 | 11.49 | 7.87 | 7.34 | 0.077 | 731.1 | 556 MPS |

Sites arranged from downstream (Mattole Estuary) to upstream (Mattole headwaters).
Key: **= Approximate River Mile, ds=downstream, us=upstream, trib=tributary, MS=Sanctuary Forest mainstem flow monitoring stations, +=tributary stream miles, *probe malfunctioning or suspect possible malfunction.

**Table 4. 2010 Water Quality Spot-Check Data Summary**
(The blue color indicates sites that were monitored in both 2009 and 2010.)

| Location | River Mile** | Spring Date | Water Temp © | DO (mg/L) | pH | Sp. Cond (mS/cm) | mm Hg | Instrument | Fall Date | Water Temp © | DO (mg/L) | pH | Sp. Cond (mS/cm) | mmHg | Instrument |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lower Mill Creek (lower) | 2.8+0.1 | 5/23 | 10.04 | 12.52 | N/A* | 0.129 | 764.1 | 556 MPS | 10/16 | 11.2 | 10.79 | 7.72 | 0.159 | 763.5 | Pro-Plus |
| Lower Mill Creek (upper) | 2.8+~0.75 | 5/23 | 10.49 | 12.42 | N/A* | 0.122 | 760.3 | 556 MPS | 10/10 | 13.3 | 10.31 | 7.54 | 0.148 | 762.6 | Pro-Plus |
| Mattole @ Wingdam (deep) | 2.9 | 6/24 | 18.80 | 9.40 | 8.3 | 0.182 | 761.8 | Pro-Plus | 9/30 | 20.5 | 10.67 | 8.25 | 0.266 | 755.8 | Pro-Plus |
| Mattole @ Hideaway Bridge | 5.3 | 10/30/ 2009 | 13.8 | 5.10 | 8.07 | 0.293 | 765.2 | Pro-Plus | 10/12 | N/A | N/A | N/A | N/A | N/A | N/A |
| Sulphur Creek (trib to Lower North Fork) | 4.7+ ~2.0 | 6/22 | 11.1 | 10.98 | 8.02 | 0.156 | 733.9 | Pro-Plus | N/A | N/A | N/A | N/A | N/A | N/A | No fall survey |
| East Mill Creek (lower) | 5.4+~0.2 | 5/24 | 11.72 | 11.53 | N/A* | 0.183 | 761.5 | 556 MPS | 9/30 | 15.4 | 10.21 | 7.15 | 0.185 | 754.3 | Pro-Plus |
| East Mill Creek (upper) | 5.4+~0.8 | 5/26 | 11.8 | 11.13 | 8.16 | 0.212 | 756.4 | Pro-Plus | 10/15 | N/A | N/A | N/A | N/A | N/A | None |
| Mattole us East Mill Creek | 5.5 | 6/18 | 18.3 | 10.10 | 8.24 | 0.163 | 761.7 | Pro-Plus | 9/30 | 20.5 | 11.14 | 8.77* | 0.289 | 754.5 | Pro-Plus |
| Clear Creek (lower) | 6.1+0.2 | 5/6 | 10.0 | 11.80 | 8.05 | 0.120 | 765.1 | Pro-Plus | 9/24 | 12.6 | 10.62 | 7.76 | 0.179 | 762.4 | Pro-Plus |
| Clear Creek (upper) | 6.1+~0.8 | 5/6 | 10.9 | 11.35 | 8.03 | 0.121 | 759.4 | Pro-Plus | 9/24 | 12.6 | 10.20 | 7.7 | 0.170 | 757.8 | Pro-Plus |
| Mattole us Clear Creek | 6.2 | 6/18 | 17.8 | 10.20 | 8.21 | 0.161 | 761.3 | Pro-Plus | 9/24 | 20.5 | 11.28 | 8.58 | 0.291 | 762.7 | Pro-Plus |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Squaw Creek (lower) | 14.9+0.1 | 5/12 | 13.5 | 10.73 | 8.08 | 0.167 | 761.7 | Pro-Plus | 9/30 | 15.2 | 9.99 | N/A* | 0.283 | 752.1 | Pro-Plus |
| Squaw Creek (upper) | 14.9+~6.0 | 6/7 | 12.4 | 10.99 | 8.23* | 0.138 | 742.6 | Pro-Plus | 10/6 | 12.6 | 10.27 | 7.92 | 0.233 | 740.0 | Pro-Plus |
| Mattole us Squaw Creek | 15.0 | 6/18 | 16.9 | 10.20 | 8.26 | 0.153 | 758.5 | Pro-Plus | 9/30 | 18 | 8.91 | 8.37 | 0.238 | 752.4 | Pro-Plus |
| Woods Creek (lower) | 24.1+0.1 | 5/12 | 11.6 | 11.25 | 8.1 | 0.134 | 758.1 | Pro-Plus | 10/11 | 12.3 | 10.50 | 7.39 | 0.189 | 758.3 | Pro-Plus |
| Woods Creek (upper) | 24.1+0.7 | 5/28 | 11.1 | 11.46 | N/A* | 0.136 | 757.9 | Pro-Plus | 10/11 | 12.9 | 10.21 | 7.77 | 0.189 | 755.4 | Pro-Plus |
| Mattole us Woods Creek | 24.2 | 6/18 | 15.90 | 10.39 | 8.31 | 0.144 | 755.2 | Pro-Plus | 10/11 | 15.9 | 9.07 | 7.70 | 0.216 | 758.8 | Pro-Plus |
| Rattlesnake Creek (trib to Upper North Fork) | 25.5+ ~2.0 +0.1 | 6/23 | 12.1 | 11.12 | 8.27 | 0.179 | 746.9 | Pro-Plus | N/A | N/A | N/A | N/A | N/A | N/A | No fall survey |
| Fourmile Creek (lower) | 34.6+~0.1 | 6/28 | 16.85 | 10.72 | N/A* | 0.170 | 747.0 | 556 MPS | 9/27 | 14.9 | 9.74 | 7.97 | 0.233 | 747.6 | Pro-Plus |
| Fourmile Creek (upper) | 34.6+~0.75 | 6/28 | 15.36 | 10.86 | N/A* | 0.181 | 747.2 | 556 MPS | 9/27 | 14.3 | 9.75 | 11.12* | 0.280 | 746.1 | Pro-Plus |
| Mattole us Fourmile Creek | 34.6 | 6/28 | 21.13 | 10.26 | N/A* | 0.122 | 747.8 | 556 MPS | 9/27 | 19.2 | 10.01 | 11.18 | 0.178 | 746.4 | Pro-Plus |
| Mattole ds Ettersburg Bridge | ~42.0 | 10/30/ 2009 | 11.50 | 9.58 | 7.85 | 0.160 | 750.9 | Pro-Plus | 10/12 | 13.02 | 11.02 | 6.55 | 0.138 | N/A | 556 MPS |
| Bear Creek (upper) | 42.8+ ~3.6 | N/A | N/A | N/A | N/A | N/A | N/A | No spring survey | 10/5 | 11.2 | 10.92 | 8.27* | 0.163 | 741.6 | Pro-Plus |
| S. Fork Bear Creek-Hidden Valley (lower) | 42.8+ ~5.0+ ~2.0 | 6/10 | 10.50 | 10.50 | N/A* | 0.078 | 721.7 | Pro-Plus | 10/9 | 11.9 | 8.47 | 6.72 | 0.096 | 724.0 | Pro-Plus |
| S.F Bear - Wailaki (upper) | 42.8+ ~5.0+ ~2.5 | 6/10 | 10.00 | 10.53 | N/A* | 0.068 | 718.3 | Pro-Plus | 10/9 | 11.89 | 9.97 | N/A* | 0.055 | 720.9 | Pro-Plus |
| Big Finley Creek (lower) | 47.4+ ~0.1 | 5/18 | 10.8 | 11.13 | 7.97 | 0.104 | 745.9 | Pro-Plus | 10/10 | N/A | N/A | N/A | N/A | N/A | No fall spot-check |
| Big Finley Creek (upper) | 47.4+ ~0.75 | 5/18 | 10.5 | 10.97 | 11.37* | 0.102 | 743.3 | Pro-Plus | 10/10 | N/A | N/A | N/A | N/A | N/A | No fall spot-check |
| Mattole at Big Finley Creek | 47.4 | 5/18 | 10.8 | 11.20 | 7.92 | 0.072 | 746.6 | Pro-Plus | 10/10 | N/A | N/A | N/A | N/A | N/A | No fall spot-check |
| Eubanks Creek (lower) | 47.7 +0.1 | 5/31 | 11.3 | 11.20 | 8.35 | 0.088 | 742.9 | Pro-Plus | 10/5 | 11.9 | 9.72 | N/A* | 0.149 | 741.4 | Pro-Plus |
| Eubanks Creek (upper) | 47.7+ ~0.6 | 5/31 | 12.2 | 10.64 | 7.67 | 0.079 | 740.2 | Pro-Plus | 10/5 | 11.1 | 8.85 | N/A* | 0.122 | 738.3 | Pro-Plus |
| Bridge Creek (lower) | 52.1+ ~0.2 | 5/4 | 9.81 | 11.88 | N/A* | 0.077 | 744.3 | 556 MPS | 10/14 | 10.25 | 11.16 | 10.86 | 0.104 | 740.9 | 556 MPS |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bridge Creek (upper) | 52.1+2.1 | 5/27 | 9.90 | 11.59 | N/A* | N/A* | 732.8 | 556 MPS | 10/14 | 10.10 | 11.58 | 7.70 | 0.107 | 737.7 | 556 MPS |
| Bridge Creek (WF) | 52.1+ 2.15 | 5/27 | 9.83 | 11.29 | N/A* | N/A* | 733.0 | 556 MPS | 10/14 | 10.40 | 10.01 | 9.18 | 0.105 | 738.0 | 556 MPS |
| MS-6, Mattole us Bridge | 52.2 | 5/4 | 9.11 | 11.06 | N/A* | 0.062 | 745.8 | 556 MPS | 10/14 | 11.29 | 7.32 | 9.30 | 0.075 | 740.7 | 556 MPS |
| McKee Creek (lower) | 52.8+ ~0.1 | 5/4 | 9.2 | 11.34 | 7.52 | 0.070 | N/A | Pro-Plus | 10/14 | 10.58 | 6.12 | 10.23* | 0.095 | 739.4 | 556 MPS |
| McKee Creek (upper) | 52.8+ ~0.6 | 5/4 | 10.3 | 10.87 | 7.38 | 0.068 | N/A | Pro-Plus | 10/14 | 10.74 | 9.21 | 9.90* | 0.080 | 737.5 | 556 MPS |
| Van Arken Creek (lower) | 54.0+0.1 | 5/20 | 10.2 | 9.81 | 7.53 | 0.074 | 742.0 | Pro-Plus | 10/14 | 10.1 | 7.19 | 8.17 | 0.097 | 740.1 | Pro-Plus |
| Van Arken Creek (upper) | 54.0 +0.75 | 5/20 | 9.3 | 11.35 | 7.43 | 0.075 | 740.5 | Pro-Plus | 10/14 | 9.3 | 10.16 | 8.49 | 0.080 | 737.4 | Pro-Plus |
| MS-5/Mattole us Van Arken | 53.8 | 5/27 | 10.1 | 11.49 | 5.51* | 0.062 | 736.1 | Pro-Plus | 10/14 | 10.2 | 9.73 | 8.29 | 0.077 | 740.6 | Pro-Plus |
| Upper Mill Creek (lower) | 56.2+0.1 | 5/5 | 8.7 | 11.62 | 7.35 | 0.062 | 741.3 | Pro-Plus | 10/13 | 11.1 | 9.87 | 8.21 | 0.076 | 737.6 | Pro-Plus |
| Upper Mill Creek (upper) | 56.2+1.4 | 5/20 | 8.92 | 11.63 | N/A* | 0.068 | 741.1 | 556 MPS | 10/13 | 11.0 | 9.44 | 8.85 | 0.086 | 735.6 | Pro-Plus |
| Mattole ds Metz Bridge | 56.9 | 5/24 | 10.1 | 11.26 | 7.47 | 0.063 | 736.1 | Pro-Plus | 10/15 | 10.6 | 8.97 | 7.93 | 0.071 | 738.1 | Pro-Plus |
| Baker Creek (lower) | 57.6+ ~0.1 | 5/20 | 10.34 | 11.17 | 7.41 | 0.074 | 739.8 | 556 MPS | 10/13 | 10.8 | 8.67 | 9.23 | 0.070 | 736.9 | 556 MPS |
| Baker Creek (upper) | 57.6 +0.95 | 5/20 | 10.12 | 11.46 | 7.52 | 0.079 | 738.9 | 556 MPS | 10/13 | 11.09 | 9.97 | 9.33 | 0.103 | 735.0 | 556 MPS |
| Mattole us Baker | 57.8 | 5/27 | 9.7 | 11.50 | 9.89 | 0.062 | 733.8 | Pro-Plus | 10/13 | 11.6 | 9.62 | 10.6* | 0.068 | 737.0 | 556 MPS |
| Thompson Creek (lower) | 58.4+ ~0.1 | 5/24 | 9.5 | 11.27 | 7.32 | 0.060 | 735.1 | Pro-Plus | 10/13 | 10.4 | 9.71 | 15.02 | 0.064 | 736.4 | Pro-Plus |
| Thompson Creek (upper) | 58.4+2.3 | 6/8 | 11.5 | 10.29 | 12.42 | 0.064 | 732.8 | Pro-Plus | 10/12 | 11.1 | 7.67 | 6.86 | 0.068 | 733.9 | Pro-Plus |
| North Fork Thompson (Danny's) Creek | 58.4+2.2 | 6/8 | 11.1 | 10.60 | 12.05 | 0.068 | 732.9 | Pro-Plus | 10/12 | 11.1 | 9.12 | 7.45 | 0.083 | 733.5 | Pro-Plus |
| Yew Creek (lower) | 58.4+ 0.15+ 0.1 | 5/24 | 9.8 | 10.98 | 7.46 | 0.061 | 735.3 | Pro-Plus | 10/13 | 10.3 | 9.66 | 15.43 | 0.067 | 736.7 | Pro-Plus |
| Yew Creek (upper) | 58.4 +0.15 +0.4 | 6/8 | 11.1 | 10.36 | 8.22 | 0.064 | 734.1 | Pro-Plus | 10/12 | 11.6 | 9.68 | 7.35 | 0.072 | 734.0 | Pro-Plus |
| Mattole us Thompson Cr (MS-3) | 58.4 | 5/24 | 9.6 | 11.60 | 7.5 | 0.063 | 735.7 | Pro-Plus | 10/13 | 9.6 | 11.60 | 7.5 | 0.063 | 735.7 | Pro-Plus |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Helen Barnum (lower) | 58.7 +0.01 | 5/27 | 9.5 | 10.91 | N/A* | N/A* | 733.4 | Pro-Plus | 10/8 | 12 | 3.60 | 6.6* | 0.066 | 739.4 | Pro-Plus |
| Helen Barnum (upper) | 58.7 +0.9 | 6/3 | 10.8 | 10.73 | 7.41 | 0.075 | 732.8 | Pro-Plus | 10/13 | 9.3 | 9.36 | 7.05 | 0.068 | 736.2 | Pro-Plus |
| Lost River (lower) | 58.8 +~0.1 | 5/18 | 9.90 | 11.56 | N/A* | 0.058 | 737.0 | 556 MPS | 10/13 | 11.1 | 3.92 | 6.6 | 0.063 | 736.9 | Pro-Plus |
| Lost River (upper) | 58.8 +1.0 | 5/18 | 9.95 | 10.11 | N/A* | 0.063 | 734.0 | 556 MPS | 10/13 | 10.4 | 5.38 | 12.36 | 0.087 | 733.2 | Pro-Plus |
| MS-2/Mattole us Lost River | 58.9 | 5/18 | 10.1 | 11.42 | N/A* | 0.067 | 737.6 | Pro-Plus | 10/13 | 10.1 | 9.62 | 8.13 | 0.078 | 736.6 | Pro-Plus |
| MS-1, Mattole ds Big Alder Creek | 59.4 | 5/24 | 9.6 | 11.36 | 7.56 | 0.067 | 733.8 | Pro-Plus | 10/14 | 10.8 | 9.77 | 8.62 | 0.080 | 735.2 | Pro-Plus |
| McNasty Creek | 60.8 +0.15 +0.02 | 5/5 | 9.47 | 10.61 | N/A* | 0.066 | N/A | 556 MPS | 10/8 | 11.0 | 7.02 | 8.55 | 0.071 | 734.5 | Pro-Plus |
| Ancestor Creek (lower) | 60.8 +0.15 | 5/19 | 9.31 | 11.11 | N/A* | 0.069 | 732.7 | 556 MPS | 10/8 | 11.3 | 8.45 | 6.63 | 0.073 | 735.7 | Pro-Plus |
| Ancestor Creek (upper) | 60.8 +~0.6 | 5/4 | 8.87 | 11.48 | N/A* | 0.073 | N/A | 556 MPS | 10/8 | 10.8 | 9.21 | 6.83 | 0.097 | 733.9 | Pro-Plus |
| Mattole ds Ancestor Creek | 60.8 | 5/19 | 9.42 | 11.20 | N/A* | 0.069 | 732.8 | 556 MPS | 10/8 | 11.1 | 9.09 | 6.8 | 0.076 | 735.5 | Pro-Plus |

Key: **= Approximate River Mile, ds=downstream, us=upstream, trib=tributary, MS=Sanctuary Forest mainstem flow monitoring stations, +=tributary stream miles, *probe malfunctioning or suspect possible malfunction.

## Dive Survey Observations

### Coho

In 2009, Coho were observed in both spring and fall in only two tributaries, Thompson Creek (RM 58.4) and Yew Creek (RM 58.4+0.15), a tributary to Thompson (Tables 5 and 6). Thompson Creek and Yew Creek, accounted for 49% of Coho observed in spring 2009. By the fall, the Thompson Creek drainage accounted for 65% of Coho observations. Overall, 58% of 2009 observations occurred in Thompson and Yew Creeks. Coho were also observed in Upper Mill Creek (RM 56.2) (spring only), Baker Creek (RM 57.6) (spring only), and Ancestor Creek (RM 60.8) (fall only).

In the mainstem, Coho were observed solely upstream of RM 56.2 in 2009, with one exception. One Coho was observed in the lower river, in the pool upstream of Stansberry Creek. Four Coho were observed in the upper mainstem in spring, and twenty-one were observed in fall. All locations with Coho in the upper mainstem occurred in large, deep pools. Surveyors found Coho at two mainstem locations in both spring and fall, including the pool us of the Upper Mill Creek confluence (RM 56.3) and the pool us the Baker Creek confluence (RM 57.8). One Coho was also sighted at MS-2 (RM 58.9) near the Lost River Bridge in the fall.

Despite an expanded survey effort concentrated in Coho streams, 2010 dive surveys found the lowest distribution of Coho observations on record. Of 41 locations in 21 tributaries surveyed throughout the watershed, juvenile Coho were found in only four locations – all in the headwaters, and three of which were in a single tributary (Thompson Creek). In addition to Thompson Creek, Coho were observed in Ancestor Creek (RM 60.8). In the mainstem Mattole, there was only one juvenile Coho sighting in the mainstem, at the uppermost temperature monitoring location just downstream of the Ancestor Creek confluence (RM 60.8) in spring. No Coho were found in the mainstem in the fall.

In addition to shrinking distribution, 2009 and 2010 dive surveys show the lowest relative abundance on record. In 2009, 123 Coho were observed, with 56 young-of-the-year (>4”) and 1 Coho smolt (4”-8”) found in spring and 63 young-of-the-year and 3 (4”-8”) Coho observed in fall. Despite upper and lower reaches surveyed in all tributaries with prior Coho presence, 2010 surveys found even fewer Coho. A total of 77 Coho were observed in 2010, 28 in spring of 2010 and 42 in fall. No larger size class Coho (4”-8”) were observed in 2010, in either spring or fall.

Comparing total spring and fall Coho observations in tributary reaches surveyed in both 2009 and 2010 gives a sense of relative abundance and distribution over the two survey years. Coho distribution in tributaries was limited to tributaries upstream of RM 56.2 in both years. Not only were a greater number of Coho observed in 2009, they were also observed in a greater number of tributaries (Figure 7). Comparing the total number of Coho observed in lower tributary reaches where Coho were observed in either 2009 or 2010 shows observed relative abundance was significantly greater in 2009 (97) than in

2010 (36). Coho were observed in five tributaries in 2009 and only two tributaries in 2010.

In the two tributaries where Coho were observed in both years, Thompson Creek (RM 58.4) and Ancestor Creek (RM 60.8), relative abundance did not show a distinct trend. A greater number of observations occurred in Ancestor Creek in 2010 than in 2009, while more Coho were observed in Thompson Creek in 2009 than in 2010. The importance of these two creeks as remaining Coho refuges becomes apparent upon further examination of Coho observations. In addition to consistent presence, Thompson Creek and Ancestor Creek account for all of the larger size class (4”-8”) Coho observed in 2009. No larger size class Coho were found in any location in 2010.

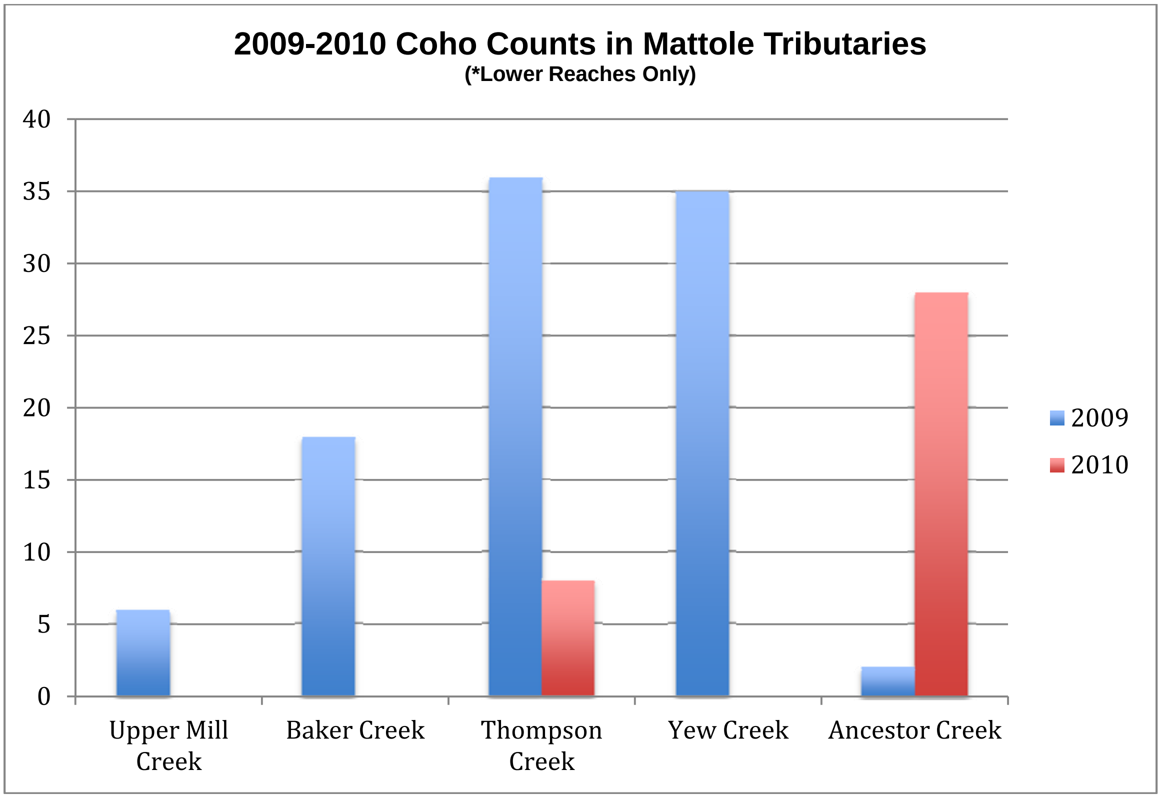


**Figure 7.** 2009 & 2010 total (spring and fall) juvenile Coho Salmon counts in Mattole River tributaries (*lower reaches only).

## Chinook

Survey timing does not allow for accurate determination of Chinook distribution and abundance, although there were some incidental Chinook observations in both 2009 and 2010. Early spring flows make dive surveys infeasible due to safety concerns, and rain can compromise visibility. Additionally, identifying and enumerating salmonids prior to May in the Mattole is difficult due to their small size and tendency to hide in refuges at higher flow during spring rain events.

Of the 5,803 Chinook observed in 2009, the great majority (5,764) were observed in spring. Of those spring observations, most were concentrated at the Stansberry Creek confluence pool (5,400) and the Estuary (~300), indicating out-migration of these fish. A small number of Chinook were observed in other monitoring locations in the lower river.

Tributaries with Chinook present in the spring of 2009 included the Lower North Fork (RM 4.7), Squaw Creek (RM 14.9), Fourmile Creek (RM 34.6), Honeydew Creek (RM 26.4), and Bear Creek (RM 42.8). No Chinook were observed during fall dives in any of the tributaries monitored.

In both spring and fall of 2009, a small number of Chinook were observed in the mainstem upstream of RM 47.4. In spring, the number of Chinook (6) observed upriver represented a very small percentage (0.1%) of the total Chinook observations. In fall, a greater number of Chinook were found in the upper mainstem (39); more notably, these represented 100% of fall Chinook observations.

Site selection and earlier surveys favored more observation of Chinook in 2009. While all Coho and Chinook-bearing tributaries were surveyed in 2009, 2010 juvenile dives were focused on Coho-bearing tributaries. In addition, fewer locations in the upper mainstem were monitored in 2010.

As site selection would predict, fewer Chinook were observed in 2010 (100) than in 2009. Most were observed in the Mattole estuary (59%). In spring of 2010, Chinook were found in one additional mainstem location, upstream of Woods Creek (Mattole @ RM 24.2). Regarding tributaries, Chinook were observed in the lower reach of East Mill Creek (RM 5.4), the lower reach of Woods Creek (RM 24.4), and the upper reach of Bridge Creek (RM 52.1).

### Steelhead

Steelhead were observed throughout the watershed during 2009 and 2010 dive surveys. Steelhead were more numerous and widespread than either Coho or Chinook in both survey years. In 2009, divers enumerated 6,316 Steelhead young-of-the-year, 2,273 (4”-8”) Steelhead, and 100 Steelhead with a fork length greater than 8”. Fewer Steelhead, especially of the larger size-classes, were observed in 2010. 2010 juvenile dive surveys found 4,562 Steelhead young-of-the-year, 765 (4”-8”) Steelhead, and 30 Steelhead (>8”). This may be a product of site selection in 2010.

**Table 5. 2009 Dive Survey Summary**

(The blue color indicates sites that were monitored in both 2009 and 2010.)

| SPRING DIVES | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | personnel | SH <4" | SH 4"- 8" | SH >8" | KS <4" | KS 4"- 8" | SS <4" | SS 4"- 8" | ND <4" | ND 4"- 8" | # Pools | Comments |
| Mattole Estuary @ MSG Structure | 6/3/09 | SB, KC,WK, CR | 40 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Mattole Estuary, Area 6 | 6/11/09 | KC, SB | 100-500 | 500-1000 | 1 | 100-500 | 0 | 0 | 0 | 0 | 0 | all of section 6 | dive data from estuary dive on 6/11/09, all of section 6 |
| Lower Bear Creek | 5/30/09 | MR, SB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Stansberry Creek | 5/11/09 | MR, JH | 1 | 12 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Stansberry Creek | 5/26/09 | MR, CR | 700 | 406 | 6 | 5400 | 0 | 1 | 0 | 0 | 0 | 2 | |
| Lower Mill Creek (lower) | 5/11/09 | MR, JH | 22 | 7 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 10 | |
| Mattole @ Wingdam | 6/18/09 | SB, CR | 10 | 45 | 2 | 30 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Mattole @ DSMT | 5/20/09 | SJ, WK | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Lower North Fork (LNF) | 4/6/09 | SJ, WK | 89 | 112 | 3 | 8 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Sulfur Creek (trib of LNF) | 6/9/09 | WK, CR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us LNF | 5/20/09 | SJ, WK | 5 | 20 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | |
| East Mill Creek (lower) | 5/11/09 | MR, JH | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us East Mill Creek | 5/30/09 | MR, SB | 16 | 9 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 2 | |
| Clear Creek (lower) | 5/21/09 | SJ, WK | 27 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Clear Creek | 5/21/09 | SJ, WK | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Squaw Creek (lower) | 5/1/09 | MR, CR | 2 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Squaw Creek | 5/1/09 | MR, CR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Woods Creek (lower) | 5/11/09 | MR, JH | 17 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Woods Creek | 5/30/09 | MR, SB | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Upper North Fork (UNF) | 5/18/09 | KC, NQ | 24 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Rattlesnake Creek (trib to UNF) | 6/10/09 | KC, SB | 85 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us UNF | 5/18/09 | KC, NQ | 70 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Honeydew Creek (lower) | 5/30/09 | MR, SB | 28 | 12 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Honeydew Creek (east fork) | 6/10/09 | WK, MS | 67 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Honeydew Creek (upper) | 6/10/09 | WK, MS | 22 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Honeydew Creek | 5/30/09 | MR, SB | 6 | 6 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Fourmile Creek (lower) | 5/21/09 | KC, KM | 175 | 6 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Fourmile Creek | 5/21/09 | KC, KM | 20 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Sholes Creek (lower) | 5/21/09 | KM, KC | 72 | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Sholes Creek | 5/21/09 | KC, KM | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Grindstone Creek (lower) | 5/19/09 | KC, DG | 100 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Grindstone Creek | 5/19/09 | KC, DG | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Mattole Canyon Creek (upper) | 6/1/09 | SJ, CC | 135 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole ds Ettersburg Bridge | 5/19/09 | KC, DG | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Bear Creek (lower) | 6/1/09 | SJ, CC | 57 | 11 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 10 | |
| North Fork Bear Creek | 5/19/09 | KC, DG | 22 | 17 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| South Fork Bear Creek @ Lingel Property | 5/25/09 | SJ, SB | 39 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mattole us Bear Creek | 6/1/09 | SJ, CC | 60 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Big Finley Creek (lower) | 5/27/09 | SS, SB | 21 | 23 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole at Big Finley Creek | 5/27/09 | SJ, SB | 12 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Eubanks Creek (lower) | 5/27/09 | SJ, SB | 70 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Eubanks Creek | 5/27/09 | SJ, SB | 14 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Bridge Creek (lower) | 5/25/09 | SJ, SB | 151 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| MS-6/ Mattole us Bridge Creek | 5/25/09 | SJ, SB | 100+ | 7 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | |
| McKee Creek (lower) | 5/25/09 | SJ, SB | 27 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole @ Junction Hole/ds McKee Creek | 5/25/09 | SJ, SB | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Van Arken Creek (lower) | 5/22/09 | MR, DG | 16 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| MS-5/Mattole us Van Arken Creek | 5/22/09 | MR, DG | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Upper Mill Creek (lower) | 5/22/09 | MR, DG | 11 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 10 | |
| Mattole us Upper Mill Creek | 5/22/09 | MR, DG | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | |
| Mattole ds Metz Bridge | 6/14/09 | CT | 26 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Baker Creek (lower) | 5/20/09 | MR, DG | 50 | 1 | 0 | 0 | 0 | 18 | 0 | 0 | 0 | 10 | |
| Mattole us Baker Creek | 5/20/09 | MR, DG | 4 | 1 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 1 | |
| Thompson Creek (lower) | 5/18/09 | MR, FB | 29 | 0 | 0 | 0 | 0 | 12 | 1 | 1 | 0 | 10 | |
| Yew Creek (lower) | 5/18/09 | MR, FB | 1 | 5 | 0 | 0 | 0 | 15 | 0 | 1 | 1 | 10 | |
| MS-3/Mattole us Thompson Creek | 5/18/09 | MR, FB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | |
| Lost River (lower) | 5/18/09 | MR, FB | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MS-2/Mattole us Lost River | 5/18/09 | MR, FB | 6 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | |
| MS-1, Mattole ds Big Alder Creek | 5/20/09 | MR, DG | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| McNasty Creek (lower) | 5/20/09 | MR, DG | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Ancestor Creek (lower) | 5/20/09 | MR, DG | 9 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole ds Ancestor Creek | 5/20/09 | MR, DG | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Spring Totals | | | 2692 | 887 | 20 | 5764 | 0 | 56 | 1 | 4 | 1 | | |
| FALL DIVES | | | | | | | | | | | | | |
| Location | Date | personnel | SH <4" | SH 4"- 8" | SH >8" | KS <4" | KS 4"- 8" | SS <4" | SS 4"- 8" | ND <4" | ND 4"- 8" | # Pools | Comments |
| Mattole Estuary @ MSG Structure | 10/12/09 | SB, CR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Mattole Estuary, Area 6 | 10/12/09 | SB, KC, CR | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | all of section 6 | |
| Lower Bear Creek | 10/5/09 | MR, CR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Stansberry Creek | 10/5/09 | MR, CR | 54 | 12 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Stansberry Creek | 10/5/09 | MR, CR | 60 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | |
| Lower Mill Creek (lower) | 10/5/09 | MR, CR | 23 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole @ Wingdam | 10/12/09 | SB, CR | 0 | 350 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Mattole @ DSMT | no fall dive | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | |
| Lower North Fork (LNF) | 10/10/09 | SB, WK | 605 | 380 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Sulfur Creek (trib of LNF) | 10/9/09 | WK, SB | 124 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us LNF | 10/10/09 | SB, WK | 0 | 18 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| East Mill Creek (lower) | 10/5/09 | MR, CR | 55 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us East Mill Creek | 10/5/09 | MR, CR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | |
| Clear Creek (lower) | 10/10/09 | SJ | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mattole us Clear Creek** | **10/12/09** | **SJ** | **15** | **9** | **1** | **0** | **0** | **0** | **0** | **0** | **0** | **1** | |
| **Squaw Creek (lower)** | **10/5/09** | **MR, CR** | **61** | **73** | **8** | **0** | **0** | **0** | **0** | **0** | **0** | **10** | |
| **Mattole us Squaw Creek** | **10/5/09** | **MR, CR** | **1** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **1** | |
| **Woods Creek (lower)** | **10/2/09** | **MR, CR** | **201** | **14** | **2** | **0** | **0** | **0** | **0** | **0** | **0** | **10** | |
| **Mattole us Woods Creek** | **10/2/09** | **MR, CR** | **1** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **1** | |
| **Upper North Fork (UNF)** | **10/12/09** | **KC, CP** | **5** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **10** | |
| **Rattlesnake Creek (trib to UNF)** | **10/9/09** | **WK, SB** | **291** | **62** | **8** | **0** | **0** | **0** | **0** | **0** | **0** | **10** | |
| **Mattole us UNF** | **10/6/09** | **KC, CR** | **0** | **20** | **1** | **0** | **0** | **0** | **0** | **0** | **0** | **1** | |
| **Honeydew Creek (lower)** | **9/29/09** | **MR, SB** | **94** | **11** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **10** | |
| **Honeydew Creek (east fork)** | **10/12/09** | **WK, MS** | **120** | **10** | **1** | **0** | **0** | **0** | **0** | **0** | **0** | **10** | |
| **Honeydew Creek (upper)** | **10/12/09** | **WK, MS** | **137** | **10** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **10** | |
| **Mattole us Honeydew Creek** | **9/29/09** | **MR, SB** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **1** | |
| **Fourmile Creek (lower)** | **10/16/09** | **KC, SB** | **156** | **25** | **2** | **0** | **0** | **0** | **0** | **0** | **0** | **10** | |
| **Mattole us Fourmile Creek** | **10/16/09** | **KC, SB** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **1** | |
| **Sholes Creek (lower)** | **10/16/09** | **KC, SB** | **36** | **12** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **10** | |
| **Mattole us Sholes Creek** | **10/16/09** | **KC, SB** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **1** | |
| **Grindstone Creek (lower)** | **10/6/09** | **KC, CR** | **112** | **39** | **1** | **0** | **0** | **0** | **0** | **0** | **0** | **10** | |
| **Mattole us Grindstone Creek** | **10/6/09** | **KC, CR** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **1** | |
| **Mattole Canyon Creek (upper)** | **10/20/09** | **SJ** | **109** | **42** | **8** | **0** | **0** | **0** | **0** | **0** | **0** | **10** | |
| **Mattole ds Ettersburg Bridge** | **10/6/09** | **KC, CR** | **1** | **2** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **1** | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bear Creek (lower) | 10/10/09 | SJ, CR | 368 | 106 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| North Fork Bear Creek | 10/6/09 | CR, KC | 148 | 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| South Fork Bear Creek @ Lingel Property | 10/9/09 | SJ, CR | 49 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Bear Creek | 10/10/09 | SJ, CR | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Big Finley Creek (lower) | 10/9/09 | SJ, CR | 43 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole at Big Finley Creek | 10/9/09 | SJ, CR | 50 | 40 | 3 | 0 | 5 | 0 | 0 | 0 | 0 | 1 | |
| Eubanks Creek (lower) | 10/9/09 | SJ, CR | 8 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Eubanks Creek | 10/9/09 | SJ, CR | 30 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Bridge Creek (lower) | 10/9/09 | SJ, CR | 56 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| MS-6/ Mattole us Bridge Creek | 9/28/09 | MR, SB, CR | 82 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| McKee Creek (lower) | 10/9/09 | SJ, CR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole @ Junction Hole/ds McKee Creek | 10/9/09 | SJ, CR | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Van Arken Creek (lower) | 10/2/09 | MR, CR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| MS-5/Mattole us Van Arken Creek | 9/28/09 | MR, SB, CR | 32 | 30 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Upper Mill Creek (lower) | 9/29/09 | MR, SB | 34 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 10 | |
| Mattole us Upper Mill Creek | 9/29/09 | MR, SB | 40 | 32 | 8 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | |
| Mattole ds Metz Bridge | no fall dive | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | |
| Baker Creek (lower) | 9/29/09 | MR, SB | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Baker Creek | 9/28/09 | MR, CR, SB | 70 | 0 | 0 | 2 | 0 | 18 | 0 | 0 | 0 | 1 | |
| Thompson Creek (lower) | 10/2/09 | MR, CR | 81 | 1 | 0 | 0 | 0 | 22 | 1 | 0 | 0 | 10 | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yew Creek (lower) | 10/2/09 | MR, CR | 32 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 10 | |
| MS-3/Mattole us Thompson Creek | 9/28/09 | MR, SB, CR | 27 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Lost River (lower) | 9/29/09 | MR, SB | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| MS-2/Mattole us Lost River | 9/28/09 | MR, SB, CR | 24 | 1 | 0 | 32 | 0 | 1 | 0 | 0 | 0 | 1 | |
| MS-1, Mattole ds Big Alder Creek | 9/28/09 | MR, SB, CR | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| McNasty Creek (lower) | 10/2/09 | MR, CR | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Ancestor Creek (lower) | 10/2/09 | MR, CR | 63 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 10 | |
| Mattole ds Ancestor Creek | 10/2/09 | MR, CR | 20 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Fall Totals | | | 3624 | 1386 | 80 | 34 | 5 | 63 | 3 | 1 | 0 | | |
| 2009 Totals | | | 6316 | 2273 | 100 | 5798 | 5 | 119 | 4 | 5 | 1 | | |

**Table 6. 2010 Dive Survey Summary**
(The blue color indicates sites that were monitored in both 2009 and 2010.)

| SPRING DIVES | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | personnel | SH <4" | SH 4"- 8" | SH >8" | KS <4" | KS 4"- 8" | SS <4" | SS 4"- 8" | ND <4" | ND 4"- 8" | # Pools | Comments |
| Mattole Estuary @ MSG Structure | 6/24/10 | KC, SB | 12 | 62 | 4 | 39 | 0 | 0 | 0 | 0 | 0 | All of Section #3 | |
| Lower Mill Creek (lower) | 5/23/10 | AB, KC | 13 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Lower Mill Creek (upper) | 5/23/10 | AB, KC | 9 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole @ Wingdam | 6/24/10 | SB, MH | 25 | 75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Sulphur Creek (trib to Lower North Fork) | 6/22/10 | SB, MH | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| East Mill Creek (lower) | 5/24/10 | SB, MH | 73 | 12 | 5 | 33 | 0 | 0 | 0 | 0 | 0 | 10 | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Mill Creek (upper) | 5/26/10 | AB, KM | 56 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us East Mill Creek | 6/18/10 | MR, SB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Poor visibility |
| Clear Creek (lower) | 5/6/10 | JG, SB | 6 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Clear Creek (upper) | 5/6/10 | JG, SB | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Clear Creek | 6/18/10 | MR, SB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Poor visibility |
| Squaw Creek (lower) | 5/12/10 | JG, SC | 44 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | Pools 3&4 may be isolated in the Fall |
| Squaw Creek (upper) | 6/7/10 | JG, KC | 53 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Squaw Creek | 6/18/10 | MR, SB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 fry observed while collecting data |
| Woods Creek (lower) | 5/12/10 | JG, SC | 39 | 8 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Woods Creek (upper) | 5/28/10 | KC, SB | 28 | 5 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Woods Creek | 6/18/10 | MR, MH | 5 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 3 divers |
| Rattlesnake Creek (trib to Upper North Fork) | 6/23/10 | SB, MH | 62 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Fourmile Creek (lower) | 6/28/10 | KM, KC | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Fourmile Creek (upper) | 6/28/10 | KM, KC | 127 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Fourmile Creek | 6/28/10 | KM, KC | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Mattole ds Ettersburg Bridge | 10/30/09 | AB, WK | 1 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | no adults |
| Bear Creek (upper) | no spring dive | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 0 | SH observed during SSD |
| South Fork Bear Creek-Hidden Valley (lower) | 6/10/10 | KC, FB, KM | 27 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Fork Bear Creek - Wailaki Campground (upper) | 6/10/10 | KC, FB, KM | 13 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Big Finley Creek (lower) | 5/18/10 | JG, WK | 18 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Big Finley Creek (upper) | 5/18/10 | JG, WK | 23 | 23 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Eubanks Creek (lower) | 10/5/10 | SB, MH | 63 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Eubanks Creek (upper) | 10/5/10 | SB, MH | 81 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Bridge Creek (lower) | 5/14/10 | KC,SB | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Bridge Creek (upper) | 5/27/10 | KC,MH | 65 | 5 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 10 | |
| West Fork Bridge Creek | 5/27/10 | KC,MH | 22 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| MS-6, Mattole us Bridge | 5/4/10 | KC,SB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| McKee Creek (lower) | 5/4/10 | JG,MH | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| McKee Creek (upper) | 5/4/10 | JG,MH | 24 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Van Arken Creek (lower) | 5/20/10 | JG, SB | 9 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Van Arken Creek (upper) | 5/20/10 | JG, SB | 22 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| MS-5/Mattole us Van Arken | 5/27/10 | SB, AB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Upper Mill Creek (lower) | 5/5/10 | MR, SB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Upper Mill Creek (upper) | 5/20/10 | JG, SB, MH | 21 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole ds Metz Bridge | 5/24/10 | AB, JG | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Baker Creek (lower) | 5/20/10 | AB,MH | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Baker Creek (upper) | 5/20/10 | AB,MH | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Baker | 5/27/10 | SB, AB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Raining, turbid water |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thompson Creek (lower) | 6/17/10 | SB, MH | 20 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 10 | Earlier dive (5/24/10 JG, AB) found no Coho |
| Thompson Creek (upper) | 6/8/10 | JG, CT | 5 | 9 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 10 | |
| North Fork Thompson (Danny's) Creek | 6/8/10 | JG, CT | 3 | 10 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 10 | |
| Yew Creek (lower) | 5/24/10 | AB, JG | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Yew Creek (upper) | 6/8/10 | JG, CT | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Thompson Cr (MS-3) | 5/24/10 | AB, JG | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Helen Barnum (lower) | 5/27/10 | KC, MH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Helen Barnum (upper) | 6/30/10 | JG, SB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Lost River (lower) | 5/18/10 | KC, SB | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Lost River (upper) | 5/18/10 | KC, SB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| MS-2/Mattole us Lost River | 5/18/10 | KC, SB | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| MS-1, Mattole ds Big Alder Creek | 5/24/10 | AB, JG | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| McNasty Creek (lower) | 5/5/10 | KC, MH | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Ancestor Creek (lower) | 5/19/10 | KC, SB | 2 | 2 | 0 | 0 | 0 | 12 | 0 | 0 | 0 | 10 | |
| Ancestor Creek (upper) | 5/4/10 | KC, MH | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole ds Ancestor Creek | 5/19/10 | KC, SB | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | |
| Spring Totals | | | 1086 | 318 | 16 | 80 | 0 | 29 | 0 | 0 | 0 | | |
| FALL DIVES | | | | | | | | | | | | | |
| Location | Date | personnel | SH <4" | SH 4"- 8" | SH >8" | KS <4" | KS 4"- 8" | SS <4" | SS 4"- 8" | ND <4" | ND 4"- 8" | # Pools | Comments |
| Mattole Estuary @ MSG Structure | 9/23/10 | FB, MH | 21 | 34 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | All of section #3 | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lower Mill Creek (lower) | 10/12/10 | CP, KC | 44 | 15 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Lower Mill Creek (upper) | 10/10/10 | AB, KC | 35 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole @ Wingdam | 9/30/10 | SB, MH | 10 | 80 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| East Mill Creek (lower) | 9/30/10 | SB, MH | 64 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| East Mill Creek (upper) | 10/15/10 | AB, KC | 84 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | Oil/bubbles in pools |
| Mattole us East Mill Creek | 9/30/10 | SB, MH | 30 | 20 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Clear Creek (lower) | 9/24/10 | SB, MH | 26 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Clear Creek (upper) | 9/24/10 | SB, MH | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Clear Creek | 9/24/10 | SB, MH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Squaw Creek (lower) | 9/30/10 | SB, MH | 418 | 34 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Squaw Creek (upper) | 10/6/10 | JG, KC | 89 | 18 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Squaw Creek | 9/30/10 | SB, MH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Woods Creek (lower) | 10/11/10 | SB, MH | 55 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Woods Creek (upper) | 10/11/10 | SB, MH | 125 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Woods Creek | 10/11/10 | SB, MH | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Fourmile Creek (lower) | 9/27/10 | KC, SB | 465 | 19 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Fourmile Creek (upper) | 9/27/10 | KC, SB | 370 | 42 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Fourmile Creek | 9/27/10 | KM, SB | 22 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Mattole ds Ettersburg Bridge | 10/12/10 | WK, SA, DH | 95 | 52 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | No adults |
| Bear Creek (upper) | 10/5/10 | SB, MH | 165 | 18 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Fork Bear Creek-Hidden Valley (lower) | 10/9/10 | KC, CP | 51 | 26 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | Shallow pools |
| South Fork Bear Creek - Wailaki Campground (upper) | 10/9/10 | KC, CP | 23 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Big Finley Creek (lower) | 10/12/10 | WK, SA, DH | 4 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Big Finley Creek (upper) | 10/12/10 | WK, SA, DH | 34 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Eubanks Creek (lower) | 5/31/10 | SB, MH | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Eubanks Creek (upper) | 5/31/10 | SB, MH | 85 | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Bridge Creek (lower) | 10/14/10 | MH,DH | 249 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Bridge Creek (upper) | 10/14/10 | MH,DH | 80 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| West Fork Bridge Creek | 10/14/10 | MH,DH | 43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| MS-6, Mattole us Bridge | 10/14/10 | MH,DH | 55 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| McKee Creek (lower) | 10/14/10 | MH,DH | 130 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| McKee Creek (upper) | 10/14/10 | MH,DH | 32 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Van Arken Creek (lower) | 10/14/10 | SB, SA | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Van Arken Creek (upper) | 10/14/10 | SB, SA | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| MS-5/Mattole us Van Arken | 10/14/10 | SB, SA | 69 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Upper Mill Creek (lower) | 10/13/10 | SB, SA | 54 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Upper Mill Creek (upper) | 10/13/10 | SB, SA | 42 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole ds Metz Bridge | 10/13/10 | AB, JG | 10 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Baker Creek (lower) | 10/13/10 | MH.DH | 27 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Baker Creek (upper) | 10/13/10 | MH.DH | 47 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Baker | 10/13/10 | MH,DH | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Thompson Creek (lower) | 10/13/10 | AB, JG | 106 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 10 | |
| Thompson Creek (upper) | 10/12/10 | AB, JG | 37 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 10 | |
| North Fork Thompson (Danny's) Creek | 10/12/10 | AB, JG | 30 | 2 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 10 | |
| Yew Creek (lower) | 10/13/10 | AB, JG | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Yew Creek (upper) | 10/12/10 | AB, JG | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole us Thompson Cr (MS-3) | 10/13/10 | AB, JG | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Helen Barnum (lower) | 10/8/10 | SB, MH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | |
| Helen Barnum (upper) | 10/13/10 | JG, SB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Lost River (lower) | 10/13/10 | SB | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Lost River (upper) | 10/13/10 | SB, SA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| MS-2/Mattole us Lost River | 10/13/10 | SB, SA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| MS-1, Mattole ds Big Alder Creek | 10/13/10 | AB, JG | 9 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| McNasty Creek (lower) | 10/8/10 | SB, MH | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | |
| Ancestor Creek (lower) | 10/13/10 | MH, SA, DH | 25 | 2 | 0 | 0 | 0 | 16 | 0 | 1 | 0 | 9 | 10/8/10 SB, MH dive found 11 Coho, re-surveyed due to late afternoon poor visibility |
| Ancestor Creek (upper) | 10/8/10 | SB, MH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| Mattole ds Ancestor Creek | 10/8/10 | SB, MH | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Fall Totals | | | 3476 | 447 | 14 | 20 | 0 | 48 | 0 | 1 | 0 | | |
| 2010 Totals | | | 4562 | 765 | 30 | 100 | 0 | 77 | 0 | 1 | 0 | | |

## Discussion

2009 and 2010 dive survey observations indicate current Coho distribution in the Mattole Watershed is restricted to a limited area of favorable headwaters habitat. No Coho were observed outside of the headwaters in 2009 or 2010. This is just the most recent step in a downward trend of abundance and distribution. Over the years surveyed, numbers throughout the watershed have declined significantly at all locations. The total number of Coho observed during 2010 spring and fall dives was 77 - the lowest on record. Total numbers of juveniles observed during 2009 dives (132) were 69% and 64% lower than in 2008 (432) and 2007 (368), respectively.

In recent years, Coho have been observed in fewer and fewer tributaries as a percentage of tributaries and tributary reaches surveyed (Figure 7). Since MSG dive surveys began in 1994, Coho Salmon have been observed in 40 tributary reaches, accounting for 63% of the total reaches surveyed. When considering only dives since 2000, Coho have been observed in 26 tributary reaches, representing 44% of the tributary reaches surveyed. The widespread dive monitoring effort during the 2007-09 survey years found Coho in only 13 tributary reaches, 30% of the reaches monitored. In 2010, observed Coho juvenile distribution was the most restricted observed since annual dive summaries were initiated, with Coho found in only two tributaries (four reaches) out of 21 tributaries (42 reaches) surveyed (10% of tributary reaches monitored). Additionally, in 2010, only a single juvenile Coho was observed in the upper mainstem Mattole during either spring or fall surveys.

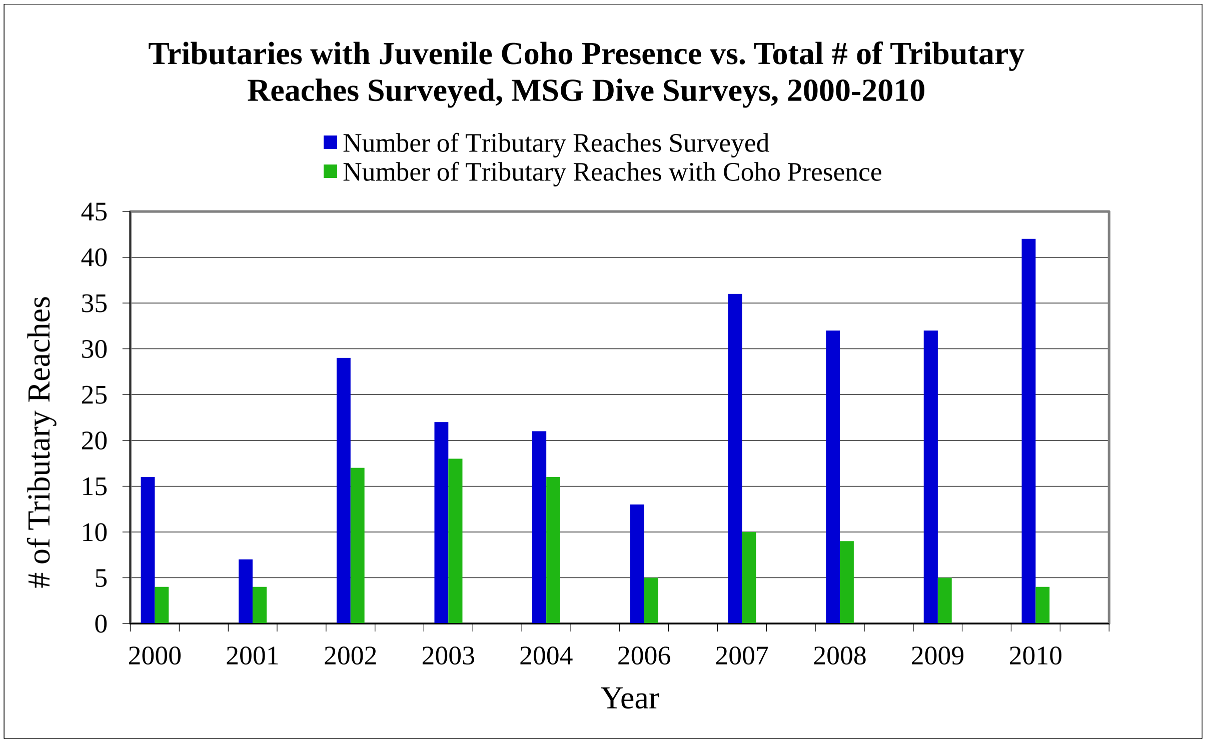


**Figure 8.** Tributaries with juvenile Coho presence vs. total number of tributary reaches surveyed in the Mattole River Watershed, based on Mattole Salmon Group snorkel surveys using the "modified 10-pool" protocol, 2000-2010.

While recent surveys document the trend of fewer and fewer tributaries with Coho presence, they also show geographical distribution throughout the watershed is shrinking (Figure 8). Surveys since 1994 have documented Coho in 17 tributaries total downstream of RM 52.1 (the Bridge Creek confluence). Since 2000, that number has declined to only seven tributaries. Despite expanded survey effort, more recent surveys have elucidated further decline in downriver distribution. Since 2007, Coho have been observed in only four tributaries downstream of RM 52.1, and no Coho were observed ds of RM 52.1 in either 2009 or 2010. Additionally, where Coho have been observed in downriver locations, they have been less abundant than Coho observations in the headwaters (Figure 9).

In the headwaters, Coho have become increasingly dependent on a small area of the Mattole mainstem and a few upper tributaries with both suitable temperatures and DO levels. Thompson Creek and its tributaries (North Fork Thompson and Yew Creeks) have shown an increasing percentage of Coho observed since 2007. Thompson Creek and the North Fork of Thompson Creek accounted for 62% (39 of 77 observations) of all Coho observed in 2010, although no Coho were found in Yew Creek, in contrast to past survey years. Of the total number of Coho observed annually (both spring and fall), 58% were observed in Thompson and Yew Creeks in 2009, 32% in 2008, and 50% in 2007.

Aside from Thompson and Yew Creeks, the tributary with the most consistent Coho observations in spring and fall is Ancestor Creek. Although Ancestor Creek counts have been lower than those of Thompson and Yew, juvenile Coho have been present in fall in each of the past four years. Juvenile Coho were observed in both the spring and fall of 2007, 2008, and 2010, but not the spring of 2009. Ancestor Creek was the only tributary in addition to Thompson Creek and the North Fork of Thompson Creek where Coho were observed in 2010.

Baker Creek and Upper Mill Creek are also two tributaries with consistent Coho presence over the years, but both are susceptible to significant reduction in summer rearing habitat due to low flows. Neither creek has had both spring and fall Coho presence in any of the past three years, although Coho have been observed in both creeks every year. Usually, Coho have been observed in the spring, except for in fall of 2008, when 17 Coho, (15 of which were 100-200 mm) were observed in Upper Mill Creek.

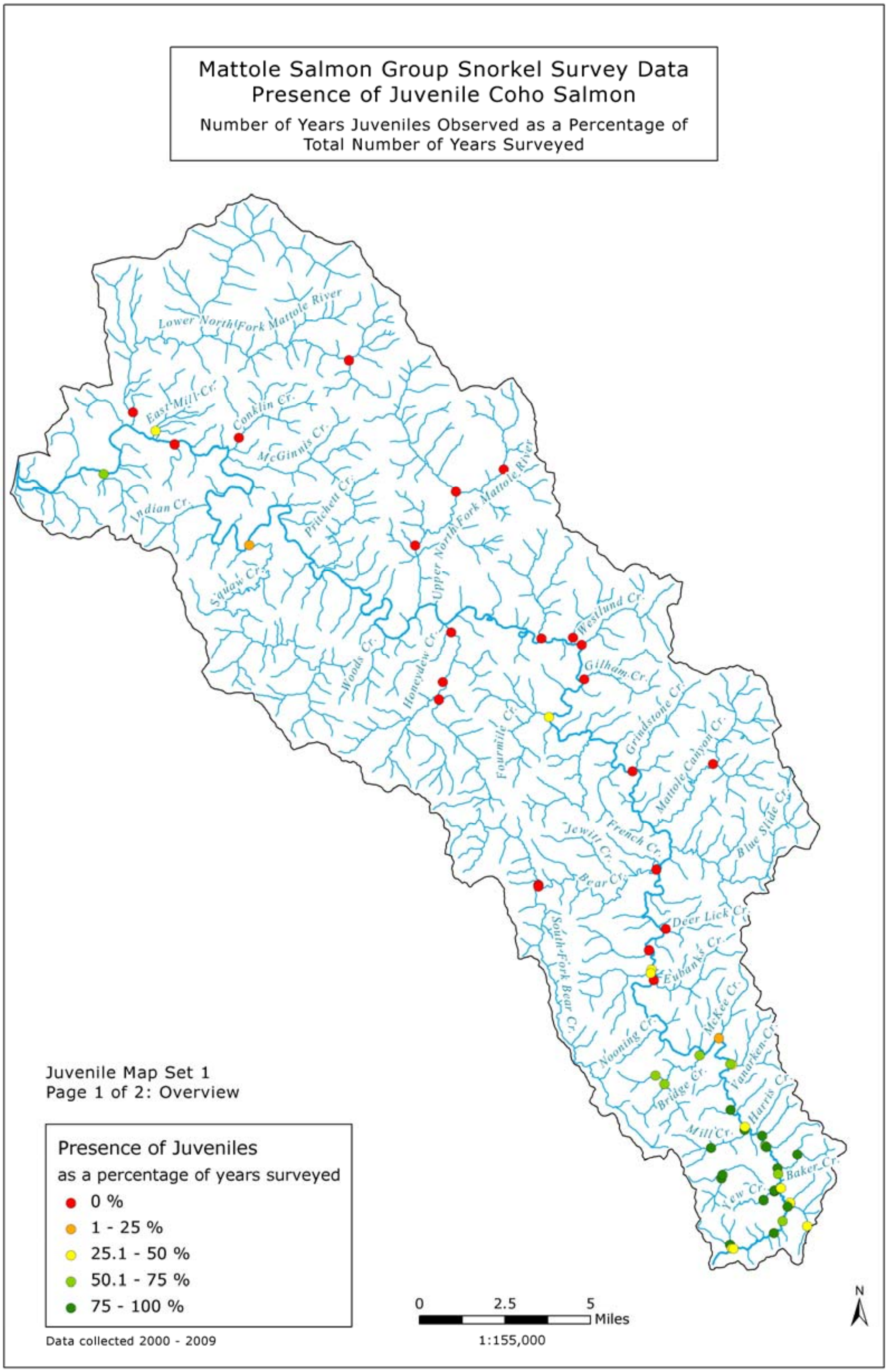


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**Figure 9.** Presence of Coho Salmon as a percentage of total number of years surveyed, based on Mattole Salmon Group snorkel surveys, 2000-2009.

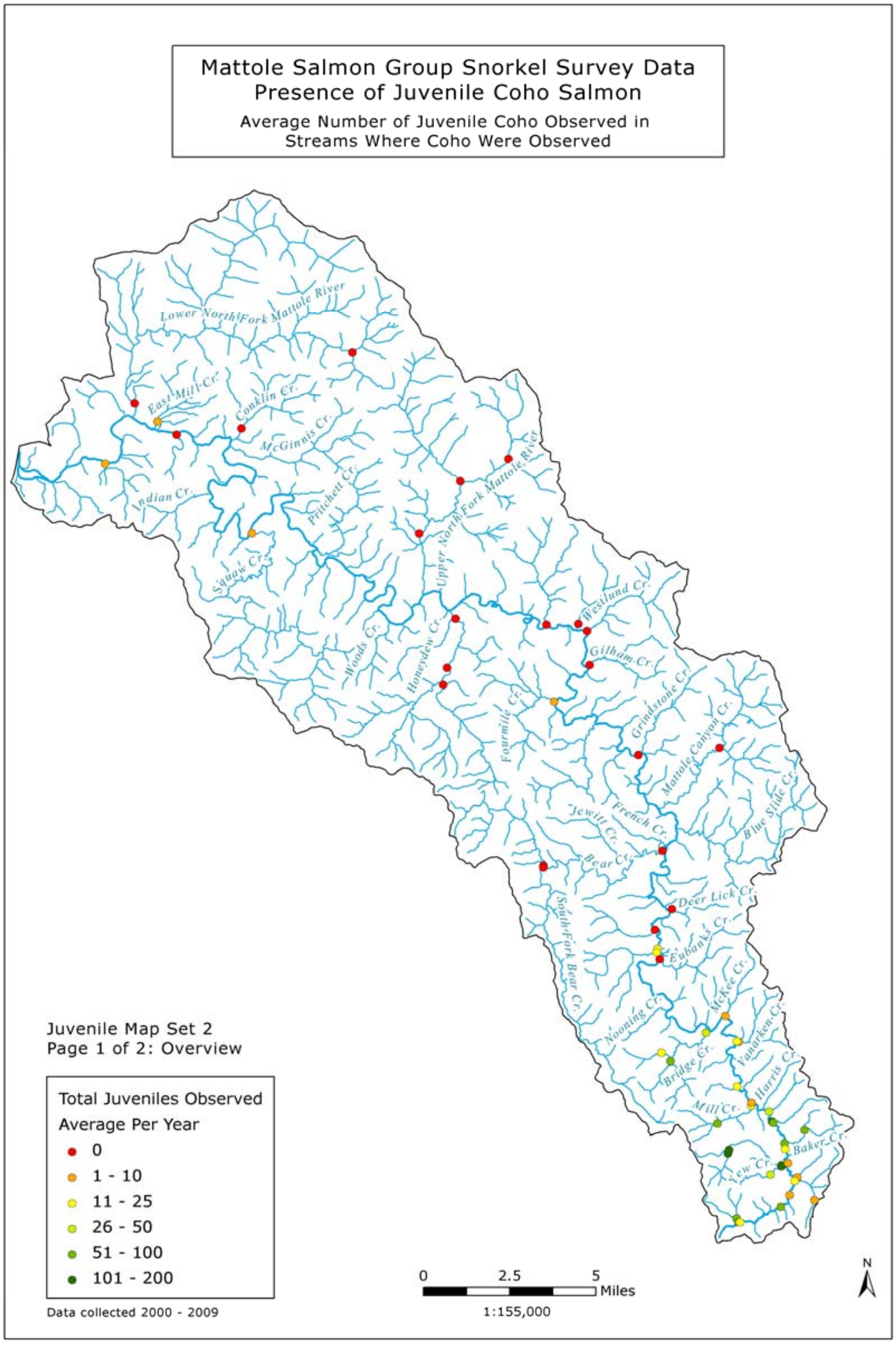


**Figure 10.** *Average* number of juvenile Coho Salmon observed in all streams where juvenile Coho were observed, based on Mattole Salmon Group snorkel surveys, 2000-2009.

The thermal characteristic of a given aquatic habitat is one environmental factor known to influence habitat utilization and occupancy by juvenile Coho Salmon. Based on established temperature thresholds, Mattole River temperature monitoring results indicate summer rearing habitat in the mainstem is severely restricted, with optimal temperatures for Coho rearing occurring only in monitoring locations in the upper extent of the headwaters (RM 58.4-RM 60.8). Coho rearing in the mainstem downstream of RM 58.4 are subject to thermal stress, which has a detrimental effect on growth and fitness, ultimately affecting survival in extreme cases.

This conclusion is supported by actual documentation of Coho Salmon through snorkel surveys. Coho observations in the mainstem most frequently occur in the restricted area of thermally favorable habitat, indicating temperature is an important factor limiting habitat selection in the Mattole River. In 2010, Coho were observed only upstream of RM 58.4, where temperatures remained below the established MWAT threshold for Coho presence (Welsh et al. 2001). In 2009, only 3 Coho were found downstream of RM 58.4 – they were observed in two locations between RM 58.4 and RM 56.3, where temperatures exceeded the Coho threshold (16.8°C MWAT) by less than 1°C.

Consistent favorable thermal habitat for Coho rearing in tributaries is also heavily concentrated in the headwaters, although the 2009 and 2010 seasons indicate that other areas of the watershed can provide suitable thermal habitat – of all the tributaries monitored both years, many remained within threshold temperatures for Coho rearing. However, site selection based on past Coho observation favored monitoring of the coolest tributaries in the watershed, which are in greatest concentration in the headwaters. Of the 42 tributary locations monitored in 2009 and 2010, 23 (55%) were located in the headwaters (Southern Sub-basin, upstream of RM 52.1).

In the 2009-20010 study, with selection of monitoring sites based on Coho presence since 1991, we sought to cover the greatest range of tributaries known to have provided suitable Coho habitat in recent history, thereby assessing to what extent this entire known range of habitat was occupied. This would give the most up-to-date picture of juvenile Coho distribution in the Mattole. However, it is likely even this recent record of Coho presence (since 1991) shows a more limited distribution than what was historically observed prior to landscape disturbance. We therefore are looking at a “prolonged-exposure snapshot” in the history of juvenile Mattole Coho distribution.

Our long-term monitoring results indicate that temperature plays a key role in determining juvenile Coho distribution in the Mattole over the long-term. Since 2002, the presence of Coho (and some consistent annual presence) in tributaries with consistently cool-water supports this conclusion, as well as the consistent absence of Coho in tributaries that are temperature limited, but otherwise seems to provide suitable habitat complexity and cover, such as Sholes Creek (RM 36.6).

The best-functioning habitat remaining in the Mattole – where favorable temperatures, greater habitat complexity, cover, and low sediment loads exist – is concentrated in the headwaters. Unfortunately, much of this favorable habitat is the same area most impacted by low summertime flows, another important factor that can directly limit salmonid survival and abundance. Not only may stream reach dry causing direct mortality, but results of water quality monitoring also indicate harmfully low DO is directly related to low instream flows. This means that already sparse suitable rearing habitat (based on temperature) is further depleted in abundance because of low DO levels due to low flows. Even outside of drought years, water quality is still an issue: flows in 2009 and 2010 were high relative to recent years and stream reaches did not become dry, however DO levels in three headwaters tributaries in 2009 and two in 2010 were below severe impairment levels by the time of fall spot-checks. Spring DO levels during both years were well above impairment levels for salmonids, suggesting DO dramatically declined over the season as a result of the decline in flow. Low flows also impair the ability of juveniles to move to better habitat, which in turn can increase competition for space, food, and predation, and increase the stress already associated with poor water quality conditions.

Given the influence of flow on quantity and quality of summer rearing habitat, we believe that instream flows are currently the primary limiting factor to juvenile Coho *oversummer* survival in the Mattole River Watershed. While temperature may not be the primary limiting factor of survival, it still heavily influences juvenile distribution within the Mattole over the long-term, although we found tributaries outside of the headwaters that exhibited thermally-suitable temperatures for juvenile Coho rearing.

Perhaps the most poignant of our discoveries in this study was that of the 19 monitored tributaries outside of the headwaters (total of 2009 and 2010), 13 had MWATs within the threshold for Coho presence, but no Coho were found. These 13 thermally-suitable tributaries are a representation of the best remaining habitat downstream of the headwaters, but by no means are representative of the majority of the lower and middle river tributaries. In these thermally-suitable best-available habitats no Coho were found. This indicates that other factors besides the availability of thermally-suitable summertime rearing habitat may be limiting overall Coho survival and distribution in the Mattole. Additionally, when comparing 2009 and 2010 results, a similar conclusion can be made. Temperatures were cooler in 2010 than in 2009 but fewer Coho were observed in 2010 than 2009.

The overall depressed state of the Mattole Coho population – both in terms of survival and distribution – is most likely due to a “perfect-storm” combination of temperatures, low flows, *and* other factors. These factors include habitat limitations in other seasons (winter, early spring) besides the ones being currently monitored (summer, fall), the difficulty of spawners finding a mate, and spawning only occurring in those tributaries with the highest persistent concentration of Coho.

Scarcity of winter rearing habitat, such as off-channel habitat and refuges from high flow, has been found an important factor limiting Coho survival and abundance elsewhere in Pacific Northwest streams. Due to the limited amount of such habitat existing in the Mattole, we hypothesize lack of winter rearing refuge is limiting *overall* juvenile Coho survival.

Lack of mating opportunities at the low population density observed in the Mattole is another factor likely limiting the Mattole Coho population (MRRP 2011). The adult Mattole Coho population is well below population numbers know to lead to depensation (Barrowman et al. 2003). Consistent spawning has only been observed in a few select tributaries (such as Thompson Creek) – the same tributaries where consistent juvenile presence is documented. This supports the theory that there are too few fish, both adult and juveniles to occupy the entire available suitable habitat.

With the severely depressed status of Coho in the Mattole in combination with extremely limited summertime habitat with both favorable temperatures and adequate flow, and limited wintertime habitat with adequate flow refuge, we conclude human intervention and direct stock enhancement are necessary to ensure species survival.

In regard to Chinook, due to the late spring rains in 2010, it is possible the Chinook observed in the lower reaches of East Mill Creek and Woods Creek were individuals seeking refuge from high flows in the mainstem during outmigration. This seems likely given the lack of prior Chinook observations in either creek in previous years, although it is entirely a possibility that these fish were outmigrating from those tributaries, as well.

The headwaters observations of Chinook, however, indicate something else entirely. Observations in 2009 Bridge Creek (and in other years in the mainstem) capture an expression of a stream-type life-history strategy: rearing in freshwater in the headwaters over the summer (and possibly through the winter) prior to outmigration. These data provide evidence of multiple life-history strategies employed by Chinook in the Mattole watershed. Given the limitations in juvenile Chinook migrating and oversummering habitat lower in the system – including the middle river and estuary – it seems upriver rearing is an important life history variant to preserve, and may contribute significantly to the genetic robustness and resiliency of the Mattole population. As headwaters habitats are susceptible to becoming compromised from low flows and the resulting poor water quality in the summer, it is important that this sub-population of Chinook is considered in addition to Coho in regards to management and restoration decisions.

## Recommendations

- Revise survey protocol in tributaries where juvenile Coho observations have been lacking to better assess distribution. The 10-pool survey method is not effective at detecting rare species (Webster and Pollock 2005), such as at the current observed density of Mattole Coho Salmon juveniles. We tested the Webster and Pollock (2005) protocol in spring of 2011, and, at this time, this is the protocol we recommend pending further research.
- Continue 10-pool surveys in tributaries where Coho have been consistently observed in 2009-2010 and prior years (Thompson and Ancestor Creeks) to evaluate relative abundance trends of juvenile Coho.
- Conduct mainstem headwaters snorkel surveys to determine relative abundance of Coho and Chinook upriver.
- Continue other salmonid population monitoring efforts, such as downstream migrant trapping and spawner surveys, to assess abundance of Coho and Chinook populations
- Conduct annual snorkel surveys in all Coho-bearing tributaries to determine juvenile Coho Salmon distribution, and ascertain whether distribution is remaining consistent, shrinking, or expanding.
- Continue temperature monitoring at a few geographically distributed reference locations throughout the Mattole Watershed to determine trends in temperature over a longer time frame, monitoring climate change, and determine how any changes in thermally suitable habitat corresponds to current salmonid distribution.
- Initiate a more comprehensive water quality monitoring program throughout the watershed that assesses DO, pH, and other nutrients and toxins that may be associated with agriculture and small-scale cultivation.
- Assess overwinter Coho survival in the Mattole and the extent to which winter rearing habitat limits salmonid survival relative to other factors.
- Future restoration should include efforts to increase winter flow refuges
- Initiate Mattole Recovery Rearing Program in cooperation with State and Federal Agencies.
- Consider upriver Chinook survival in current recovery and restoration plans.

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