# SANTA MONICA BAY
# ANADROMOUS ADULT AND JUVENILE
# STEELHEAD MONITORING

## 2013-2018

RESOURCE
CONSERVATION DISTRICT
OF THE
SANTA MONICA MOUNTAINS

www.rcdsmm.org

*Prepared for:*
**CDFW contracts No P1250013 and No P1450013**

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# INTRODUCTION

This report summarizes data collected between 2013 -2018 documenting the lagoon conditions and monitoring of anadromous and juvenile steelhead (*Oncorhynchus mykiss*) within the Santa Monica Bay. The purpose of this study was to address numerous questions posed by the California Coastal Salmonid Population Monitoring Strategy, Design and Methods (Adams et al. 2011) and information requested by the Southern California Steelhead DPS Recovery Action Tables for Big Sycamore Creek, Las Flores Creek, and Topanga Creek (NMFS 2012).

This study included three complimentary, but somewhat different tasks: 1) Presence/Absence surveys, water temperature, stream flow, and lagoon monitoring of Santa Monica Mountains Creeks; 2) Anadromous Adult and Smolt Monitoring with DIDSON camera in Topanga Creek; and, 3) Mainstem Nursery Habitat Evaluation. Each chapter in this report provides the methods, results, and summaries from each individual task. Appendixes providing detailed data follows each chapter.

Unfortunately, the duration of this study effort coincided with a significant period of extreme drought, leading to below average precipitation throughout the Santa Monica Bay region. This limited the ability to collect data, as periods of flow were extremely rare, but it did provide important documentation of drought level conditions.

## ACKNOWLEDGEMENTS

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We greatly appreciated the assistance of many CDFW and Pacific States Marine Fisheries Commission staff with the training and deployment of the DIDSON camera and subsequent data analysis. Many thanks to Mary Larson, Dana McCanne, Kate McLaughlin, Chris Lima, Sam Bankston, Jamie Hoffman, Gaytha Morningstar, Ester Bell, Paul Lopez, Stan Allen, and Patrick Riparatti. Heidi Block also helped train us with analysis.

All of these efforts have benefitted from the enthusiastic and creative input from the RCDSMM Stream Team staff, Watershed Steward Project members, and volunteers including: Krista Adamek, Sandra Albers, Danielle Alverez, Alex Balcerzack, Ben Chuback, Salvador Contreras, Brianna Demerci, Crystal Garcia, Dylan Hofflander, Jenna Krug, Suzy Kwon, Delmar Lathers, Jennifer Mongolo, Elizabeth Montgomery, Garrett Nichols, Amanda Rosenblum, Jayni Shuman, Andy Spryka, Grifin Srednick, Nina Trusso, Ken Wheeland, and Steve Williams. Thanks to all!!!!

Finally, a big thanks to the CDPR Angeles District staff and rangers for their continued assistance and facilitation of our monitoring work in Topanga Creek State Park.

# BACKGROUND

Historically, most of the small coastal creeks within the Santa Monica Bay supported populations of both anadromous and resident *O. mykiss* (Dagit et al. 2005). Starting with the installation of culverts under Pacific Coast Highway in the 1920's, and continuing with additional fish passage impediments associated with development installed subsequently, access to these creeks has become an increasingly key limiting factor for *O. mykiss* (Caltrout 2006). There has been a concerted effort to acquire and restore critical coastal access to the creeks, as well as preserve and protect watershed integrity since the 1970's when the Santa Monica Mountains National Recreation Area was founded. To date, significant progress has been made, incorporating thousands of acres into local, state, and federal parklands. Each of the focal watersheds identified in the Santa Monica Mountains Biogeographical Population Group (BPG) (NMFS 2012), as well as Trancas and Solstice Creeks, have extensive park holdings, and in some cases (Big Sycamore, Solstice, Topanga, Trancas, and Zuma) much of the creek, riparian zones, and upper watersheds are protected. Restoration of coastal lagoons is either proposed (Topanga, Trancas), completed (Arroyo Sequit, Zuma) or in progress (Solstice). Restoration addressing other fish passage constraints has also progressed significantly in these creeks.

Since 2000, anadromous adults and juveniles have been observed in only Arroyo Sequit, Malibu, and Topanga Creeks, where monitoring has been on-going since 2001. A single presence/absence survey was conducted in the other creeks (Big Sycamore, Las Flores, Solstice, Trancas, Zuma) in 2004, with no *O. mykiss* observed (Caltrout 2006). The RCDSMM has conducted periodic seines or visual surveys at Trancas and Zuma associated with other projects and not documented presence of *O. mykiss* between 2008 and present.

Access to these small coastal creeks for anadromous *O. mykiss* is directly related to rainfall, as well as barriers. In 2005, the Santa Monica Mountains experienced an exceptionally wet year, with over 65 inches of rain recorded in Topanga Creek. During that year, and again in the above average rain year of 2008, many of the smaller coastal lagoons remained connected to the ocean for more than 50 days. Populations of *O. mykiss* in Malibu and Topanga experienced pulses of young of the year recruitment in the following summers. In March 2011, a single large storm (>7" in 24 hrs) occurred and subsequent snorkel surveys documented a strong pulse of outmigration of *O. mykiss* in the 6-10 inch size class (Dagit et al. 2018).

Establishing a structured long-term monitoring of steelhead abundance, distribution, and migration opportunities is essential for developing a well-documented and prioritized planning effort for steelhead recovery in the Santa Monica Mountains BPG. In accordance with the federal Endangered Species Act, the National Marine Fisheries Service developed a Recovery Plan for the Southern California Coast Distinct Population Segment (DPS) (NMFS 2012). At present, the RCDSMM has collected the only data available on steelhead/native trout abundance and distribution in the Santa Monica Mountains region (since 2001 in Topanga Creek, and since 2005 in Arroyo Sequit and Malibu Creeks). Good planning requires the most complete information possible. At minimum, a long-term (i.e. 15-20 year), data set is required to provide reliable information upon which to base recovery and management decisions.

NMFS (2012) and CDFG Fisheries Bulletin 180 (Adams et al. 2011) identify the need for Status Monitoring designed to document annual anadromous run size in each creek within the Santa Monica Mountains BPG to characterize the status of the entire population. By augmenting current monitoring (in Arroyo Sequit, Malibu, and Topanga creeks), with snorkel surveys, water temperature, and summer-fall stream flow conditions in other creeks that had historical presence of *O. mykiss* (**Task 1**), such as Big Sycamore, Solstice, Trancas, and Zuma, and Las Flores Creek (which is identified as a potential steelhead creek (NMFS 2012), we attempted to directly address the following Recovery Plan questions:

- Do intermittent creeks serve as steelhead nursery habitat?
- Does mainstem habitat support high juvenile survival and growth?
- How common is dispersal and how does it relate to population structure, especially in small coastal basins?

This project proposed a systematic approach to documenting not only presence and absence patterns in these historic creeks, but also provides essential information on numbers of individuals, size class distribution and density related to hydrological and other physical factors.

Deployment of a DIDSON camera in Topanga Creek (**Task 2**) tried to capture the number of anadromous adults and smolts migrating during high flow events when traps cannot be deployed, expanding the ability to effectively monitor the full extent of the migration period. Although the instream antenna array was functional part of the time, it only documents passage of tagged individuals. The DIDSON information directly documented how many anadromous adults were able to access Topanga while the camera was deployed, and how many smolts leave, even if they are not tagged. Tagging was initiated in fall 2008 (940 individuals marked to date), and we were disappointed that no returning adults were observed.

Adding DIDSON capability to the on-going Lifecycle Monitoring in Topanga Creek tried to address the following research questions posed by NMFS (2012):

- What is the relationship between reliability of migration corridors and anadromous faction?
- What spawner density (at what spatial and temporal scale) is sufficient to indicate a viable population of steelhead?
- What is the mechanism for, and frequency of, life-history crossovers in the southern CA region and how does this affect persistence of the anadromous form?

The relationship between smolt size and probability of return from the ocean suggests that larger smolts have a higher survival rate. Identifying the suite of environmental factors within the mainstem of small coastal creeks that foster rapid juvenile growth has been identified as a high research priority (NMFS 2012). Another priority is to ascertain what encourages successful anadromy.

- Does fast growth and good conditions in freshwater encourage a more resident population, or does this set the stage for successful marine survival when out-migration is possible?

**Task 3** provided a cost effective strategy to develop a better understanding of seasonal patterns of food availability sufficient to support juvenile growth, especially during the more stressful periods of elevated water temperature. Data collected in Topanga through non-lethal stomach sampling, age and growth analysis, augmented with habitat data and water temperature monitoring suggest that despite thermal stress in the summer months, *O. mykiss* are able to continue growing (Krug et al. 2014).

A greater understanding of potential factors limiting growth, including food availability and elevated water temperatures would help clarify the nursery potential of small creeks without functional coastal lagoons, where mainstream habitat is all that is available. Measuring growth of marked juvenile steelhead during low flow periods (summer-fall), during storm event migration trapping in the cooler winter months, as well as during cooler flows associated with spring conditions has been on-going since 2008 in Topanga Creek. Details associated with abundance differences of terrestrial drop resulting from the functional riparian vegetation compared to aquatic drift and benthic production tried to address questions associated with the suitability of small, interrupted coastal creek habitat, restoration effectiveness, as well as pre-fire responses. Since most of these creeks have little if any lagoon habitat remaining, this data, along with the temperature data and flow characterization proposed in **Task 1**, provides insight into the potential nursery role of mainstem habitat, and further identify habitat characteristics that promote rapid growth of juveniles.

Additionally, a 1000 meter restoration of the lower Topanga Creek reach between 0.4 and 1.3 river kilometers (rkm) was completed in fall 2008. The on-going Lifecycle Monitoring effort including the instream antenna, mark-recapture efforts, snorkel, and redd surveys provide Effectiveness Monitoring data documenting both positive (restored connectivity extending passage opportunities, restored sediment transport, additional spawning and rearing habitat) and negative impacts (invasive weed problem, subsurface flow). However, due to the extreme drought conditions experienced during the study period it was not possible to accurately assess the restoration of this reach.

Other restoration actions within the Santa Monica Mountains are either proposed (restoring Big Sycamore, Trancas, and Topanga lagoons, and removing fish passage barriers in Arroyo Sequit and Zuma Creeks), in progress (Solstice Creeks) or completed (Zuma Lagoon restoration). Expanded presence/absence surveys coupled with water temperature and flow monitoring will provide additional Effectiveness Monitoring for these projects.

This kind of information is essential to the development of objective, measurable, population level recovery goals that accurately reflect both the complexity of the southern steelhead life cycle and opportunities to recover the population to the fullest extent possible. Having a long-term database in the Santa Monica Mountains will provide greater confidence levels in extrapolating potential population opportunities in other small coastal creek systems particular to Southern California.

## Study Area

Based on the priority watersheds identified in the Southern California Steelhead Recovery Plan (NOAA 2012), the following areas within the Santa Monica Bay were the focus of this study: Big Sycamore, Las Flores, Solstice, Topanga, Trancas, and Zuma Creeks. Malibu Creek is the second largest watershed draining into the Santa Monica Bay and was monitored in a complementary study effort. Figures 1 and 2 illustrate the regional context and provide a sense of public land ownership protecting these watersheds within the Santa Monica Mountains National Recreation Area.

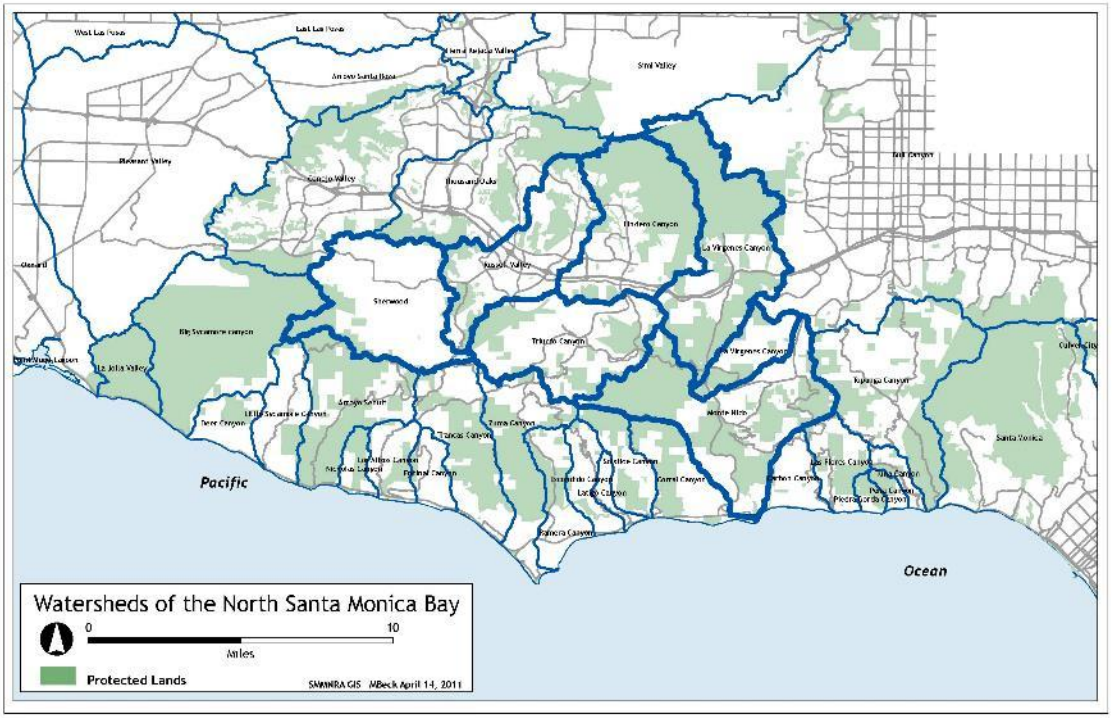


**Figure 1. Overview of the Santa Monica Bay watersheds in the anadromous adults and juvenile steelhead monitoring study area.** (Map prepared by Melanie Beck and Luis Aguilar, Santa Monica Mts. National Recreation Area, NPS)

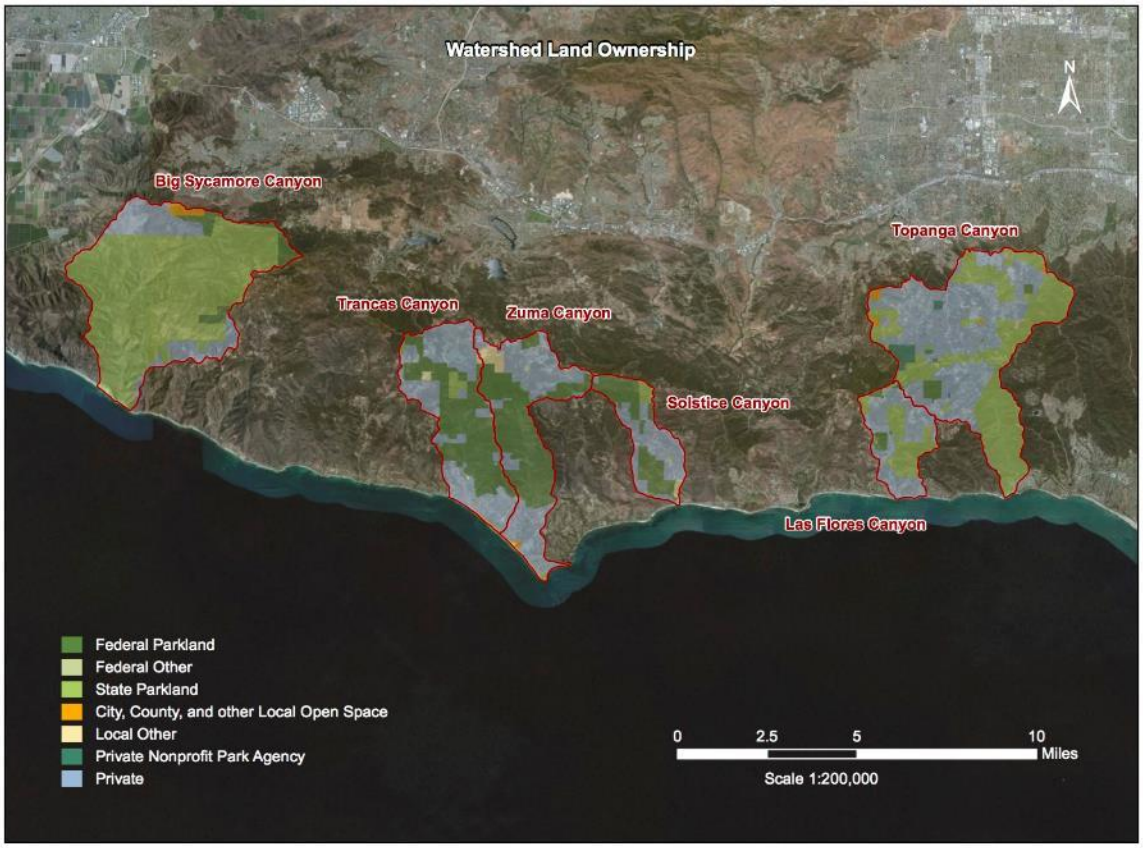


**Figure 2. Public land ownership protecting the watersheds within the Santa Monica Mountains National Recreation Area.**

# APPENDIX 4

## QA/QC DEVELOPMENT AND IMPLEMENTATION

SANTA MONICA BAY
ANADROMOUS ADULT AND JUVENILE
STEELHEAD MONITORING
2013-2018

Prepared for
CDFW contract No P1250013

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May 2018

# I. TITLE AND APPROVAL PAGE

Santa Monica Bay Steelhead Monitoring
Lagoon Monitoring
DIDSON Camera Deployment
Mainstem Nursery Habitat Evaluation

Resource Conservation District of the Santa Monica Mountains
**Responsible Agency**

10 August 2015

***Project Manager***
**Print Name & Date:** Rosi Dagit, 8.10.15_____

## QA/QC Development and Implementation

The goal of this living document is to develop strategies designed to ensure that standards of data collection reliability and correct use of monitoring protocols takes place. These strategies will utilize the existing CDFG acceptable protocols from the *Salmonid Stream Habitat Restoration Manual* and the *Interim Protocol for Effectiveness and Validation Monitoring of Salmonid Habitat Restoration Projects*, as well as other applicable monitoring protocols, and incorporate new standards and methodologies as they become available from CDFW ***CA Coastal Salmonid Monitoring Program.***

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# V. PROBLEM DEFINITION AND BACKGROUND

Historically, southern steelhead trout utilized many of the small coastal creeks within the Santa Monica Bay, but due to passage restrictions and upstream development, access has been restricted for over 50 years. At present, Arroyo Sequit, Malibu and Topanga Creeks are the last remaining creeks used by steelhead since the 1970's. The southern steelhead population was federally listed as far south as Malibu Creek in 1997. The Topanga Creek population was included in the southern range expansion of the Southern California Coast Evolutionarily Significant Unit in July 2002.

Monitoring the distribution and abundance of the fish in these creeks has been identified as an important way to provide critical management information for the NOAA (2012) Recovery Plan. Topanga Creek is listed as a Core 1 population by the Recovery Plan and currently is the most stable actively recruiting population of steelhead in the Santa Monica Bay. Malibu Creek has also been listed as a Core 1 population by the Recovery Plan but has experienced several extensive declines in 2006 and in 2009, despite an impressive rebound in 2008. Big sycamore, Las Flores, Solstice, Trancas and Zuma Creeks have also been identified as important coastal watersheds that historically supported O. mykiss. The Coastal Monitoring Program calls for consistent monitoring of these potential as well as currently used creeks to provide better documentation of the role played by these small but important systems.

The data collected will be used to document abundance and distribution trends in all of these critical streams. Lagoon storm interface and lagoon condition monitoring, combined with more focused DIDSON camera monitoring in Topanga Creek, as well as mainstem habitat evaluation in Topanga were identified by the NOAA (2011) Recovery Plan as a way of identifying pulses of recruitment associated with adult dispersal from these small coastal biogeographic population groups.

# VI. PROJECT/TASK DESCRIPTION

In order to document and monitor the distribution, abundance, and reproduction of *O. mykiss* within the Santa Monica Bay, snorkel surveys and lagoon monitoring surveys are conducted monthly in Topanga, Malibu and Arroyo Sequit Creeks. Redd (spawner) surveys are conducted monthly in Malibu and Arroyo Sequit, and bi-monthly in Topanga Creek during the spawning season (January to June) to document spawning and reproduction patterns. Onset HOBO tidbits are used to document warm, dry weather instream water temperatures (typically October to April), and water quality parameters and flow measurements are taken when necessary.

Beginning in fall 2013, snorkel surveys and lagoon monitoring was expanded to include five other creeks that drain into Santa Monica Bay: Big Sycamore, Las Flores, Solstice, Trancas, and Zuma. In fall 2013, a protocol for lagoon monitoring using photopoints was established, and each lagoon was measured, mapped, and seined. Photopoint monitoring is completed for each lagoon during any storm event and potential breach. If the lagoon is fully connected to the ocean and upper creek such that fish passage is possible, snorkel and redd surveys (including an initial measurement of potential spawning gravel) will be conducted in the lagoon and upwards to the northernmost migration boundary. HOBO tidbits will be placed into each lagoon annually during the dry season

(April to October) to monitor summer temperatures in each lagoon and investigate their suitability for over-summering of *O. mykiss*.

During snorkel surveys, the estimated sizes and number of fish are recorded, and in any pool with fish, habitat data is taken as well. Habitat data includes the following: habitat type (pool, step pool, riffle, run, etc.), maximum and average depths (cm), percent canopy cover, percent algae cover, dominant substrate (gravel, cobble, boulder, bedrock, etc.), percent instream cover, and shelter value (0.5-3). Presence and abundance of invasive species (e.g., crayfish, carp, largemouth bass) and local aquatic species (e.g., Arroyo chub, tidewater gobies) are recorded as well, along with presence and abundance of native and invasive amphibians (newts, tree frogs, bull frogs) and turtles (southwestern pond turtle, red-eared sliders). Lagoon condition, habitat quality and fish presence is monitored as well during snorkel surveys and during and following storm events. Sizes and numbers of fish are important to document spatiotemporal patterns of distribution of fish of various sizes, and habitat data is important in order to compare with spatiotemporal patters of fish distribution. Habitat data can also give us information on what types of habitat appear to be of greater importance to the survival and growth of *O. mykiss* populations. We will be comparing our snorkel data over time to look for pattern and trends within each watershed. See Appendix A for a detailed protocol for RCDSMM snorkel surveys, which is a modified Hankin-Mohr method.

Redd survey data is collected per National Marine Fisheries Service (NMFS) protocol (Gallagher et al. 2007). See Appendix B for NMFS field manual and data sheet. Data is compiled and transferred into an EXCEL file that is CDFW CMP (Coastal Monitoring Program) ACCESS compatible. Once in the ACCESS database, it can be compared to other watersheds.

A Troll 9500 data sonde continuously records pH, conductivity, water temperature, salinity, and dissolved oxygen in Malibu Creek (Start Pool). It is solar powered alleviating the need to change out batteries. Two data sondes are switched out and calibrated every other month. Data is uploaded and checked monthly during the Malibu snorkel survey.

**Table 1. Project Timetable**

| Activity | Projected Start Date | Anticipated Date of Completion | Frequency |
|---|---|---|---|
| **ARROYO SEQUIT CREEK** | | | |
| Snorkel Surveys | 2004 | June 2019 | Monthly; on-going |
| Lagoon Monitoring | 2001 | June 2018 | Monthly & during and following storm events |
| HOBO Deployment | 2009 | November 2017 | Annually; dry-season |
| **BIG SYCAMORE CREEK** | | | |
| Snorkel Surveys | 2013 | June 2018 | At the start of the dry season and as needed, when lagoon is fully connected and passable |
| Lagoon Monitoring Photo Document | 2013 | June 2018 | As needed, during storm events |
| Lagoon Seining/Snorkeling | 2013 | June 2018 | As needed, when connected to ocean and during summer and fall |
| HOBO Deployment | 2013 | November 2017 | Annually; dry-season |

| | | | |
|---|---|---|---|
| **LAS FLORES CREEK** | | | |
| Snorkel Surveys | 2013 | June 2018 | At the start of the dry season and as needed, when lagoon is fully connected and passable |
| Lagoon Monitoring Photo Document | 2013 | June 2018 | As needed, during storm events |
| Lagoon Seining/Snorkeling | 2013 | June 2018 | As needed, when connected to ocean and during summer and fall |
| HOBO Deployment | 2013 | November 2017 | Annually; dry-season |
| **MALIBU** | | | |
| Snorkel Surveys | 2004 | June 2019 | Monthly; on-going |
| Lagoon Monitoring | 2001 | On-going | Monthly & during and following storm events |
| HOBO Deployment | 2009 | November 2017 | Annually; dry-season |
| **SOLSTICE CREEK** | | | |
| Snorkel Surveys | 2013 | June 2019 | At the start of the dry season and as needed, when lagoon is fully connected and passable |
| Lagoon Monitoring Photo Document | 2013 | June 2018 | As needed, during storm events |
| Lagoon Seining/Snorkeling | 2013 | June 2018 | As needed, when connected to ocean and during summer and fall |
| HOBO Deployment | 2013 | November 2017 | Annually; dry-season |
| **TOPANGA CREEK** | | | |
| Snorkel Surveys | 2001 | June 2019 | Monthly; on-going |
| Lagoon Monitoring | 2001 | June 2019 | Monthly & during and following storm events |
| Redd Surveys | 2010 | June 2019 | Annually; twice per month during spawning season (January to June) |
| HOBO Deployment | 2004 | June 2019 | Annually; dry-season |
| DIDSON Camera | 2012 | June 2018 | November - May as possible |
| Mainstem Habitat Evaluation | 2013 | June 2018 | Drift nets set in March, July and November each year |
| **TRANCAS CREEK** | | | |
| Snorkel Surveys | 2013 | June 2018 | At the start of the dry season and as needed, when lagoon is fully connected and passable |
| Lagoon Monitoring Photo Document | 2013 | June 2018 | As needed, during storm events |
| Lagoon Seining/Snorkeling | 2013 | June 2018 | As needed, when connected to ocean and during summer and fall |
| HOBO Deployment | 2013 | November 2017 | Annually; dry-season |

| | | | |
|---|---|---|---|
| **ZUMA CREEK** | | | |
| Snorkel Surveys | 2013 | June 2018 | At the start of the dry season and as needed, when lagoon is fully connected and passable |
| Lagoon Monitoring Photo Document | 2013 | June 2018 | As needed, during storm events |
| Lagoon Seining/Snorkeling | 2013 | June 2018 | As needed, when connected to ocean and during summer and fall |
| HOBO Deployment | 2013 | November 2017 | Annually; dry-season |
| **PROTOCOLS** | | | |
| PROJECT PROTOCOLS | 2013 | June 2018 | Living documents established at the beginning of each project |
| **REPORTS** | | | |
| MONTHLY | 2013 | June 2018 | End of each month |
| FINAL | 2015 | June 2018 | End of grant cycle |

- Rain dependent.

# VII. DATA QUALITY OBJECTIVES FOR MEASUREMENT DATA

In this type of monitoring, the data quality indicators cannot be expressed quantitatively (such as reporting the accuracy and precision of water quality test probes), however, it can be expressed in narrative form as representativeness, comparability, and completeness.

**Representativeness**
Lagoon monitoring is focused on potential for fish passage in creeks chosen for this study based on the historical and present distribution of *O. mykiss* as well as their potential suitability for future *O. mykiss* inhabitance. Monitoring lagoon temperature in the current conditions was also identified as an important way to understand any thermal barriers. Snorkel and redd surveys are completed in the entire reach of each creek where *O. mykiss* have been documented or are possible; therefore representativeness should not be an issue. Due to funding limitations, evaluation of mainstem habitat is limited to annual surveys and drift net sampling in Topanga Creek.

**Comparability**
In order to ensure comparability, we follow protocols for field surveys, data collection, and data management established by NOAA NMFS and CDFW (e.g., Flosi et al. 2010, Gallagher et al. 2007, O'Neil 2007). Data is organized and provided to CDFW Coastal Monitoring Program annually. Standardized taxonomic keys are used to identify macroinvertebrates found in stomach samples as well as in benthic macroinvertebrates samples to the lowest taxonomic level necessary for analyses. Analytical methods and units of reporting are such that results can be comparable with the majority of other similar studies. BMI samples are processed to the best of our abilities following protocols from Southern California Coastal Water Research Project (SCCWRP) for the California Stream Condition Index (CSCI).

**Completeness**
We do not anticipate any legal or compliance uses for data collected during this study. Samples are

expected to be collected in the most complete way possible. Exceptions include weather or stream conditions that prevent conducting a sampling event.

# VIII. SPECIAL TRAINING REQUIREMENTS

### *A. Training Logistical Arrangements*

Table 2 outlines the types and frequency of training that will occur to ensure quality data is consistently being collected for the Santa Monica Bay Anadromous Adult and juvenile monitoring project.

**Table 2. Training Logistical Arrangements.**

| Type of Training | Trainees | Frequency of Training/Certification |
|---|---|---|
| Snorkel Surveys, Lagoon Monitoring, HOBO tidbit installation/upload | Stream team | Semi-annually, and as needed |
| Redd Surveys | Stream team | Semi-annually, and as needed |
| DIDSON Camera | Stream Team | Fall |
| Mainstem Habitat Evaluation | Stream team | Annually |
| Data Entry/Management | New staff (biologists) | As needed |
| Safety Training | Stream team | Semi-annually, and as needed |
| CPR/First Aid/AED | RCDSMM Biologists, Stream team leaders | Bi-annually |

### *B. Description of Training and Trainer Qualifications*

Training for Field Crew

*Snorkel surveys/Lagoon monitoring/HOBO management*

Experienced RCDSMM biologists will provide semi-annual snorkel survey trainings for stream team field assistants and volunteers. Trainings will cover the snorkel survey protocol (Hankin and Reeves 1998, Hankin and Mohr 2001, O'Neal ), including how to avoid double counting, how to best estimate fish size, and how to assess habitat quality parameters (habitat type, depths, instream cover, etc.). See Appendix A for the RCDSMM Snorkel Survey Protocol. Snorkel survey trainings will include a reminder to everyone to collect lagoon data during all snorkel and redd surveys as well. Lagoon monitoring includes photographs as well as condition (open vs. closed), habitat data, and any fish observations. Trainings will also be held at the beginning of each deployment season for management and data upload of Onset HOBO tidbits (continuously collecting temperature data loggers). Snorkel survey, lagoon monitoring and tidbit management are also reviewed for all team members prior to each survey.

*Redd surveys*

Redd survey trainings are conducted at the beginning of each redd survey season by experienced RCDSMM biologists for less experienced returning and new personnel. Trainings review the NMFS protocol and data collection (see Appendix B) in detail. Data collection and protocol are also reviewed for less experienced personnel prior to each survey.

*Lagoon Monitoring*
Trainings are provided each spring with the deployment of temperature loggers, and in the fall prior to the rainy season. Training includes review of photopoints, data to record, when to check, follow up if connection established and passage possible.

*DIDSON Camera Deployment*
Experienced CDFW Biologists and Environmental Scientists initially led the training on the deployment and use of the DIDSON camera. Training is provided each Fall when the DIDSON office is set up prior to the rainy season in early November. All biologists and stream team volunteers who might be involved during a deployment spend a day practicing setting up the camera, managing and analyzing video data, and record keeping. Manuals for software and hardware management and care are kept accessible at all times.

*Mainstem Habitat Evaluation*
Habitat mapping is done using the California Salmonid Stream Habitat Assessment protocols (Flosi and Reynolds 2002). Review of the drift net protocol is completed at each deployment. Annual training is done on the identification and analysis of benthic macroinvertebrates in accordance with CDFW protocols.

*Data entry/management*
When necessary, experienced RCDSMM biologists will train technical staff (new staff biologists) in data review, entry, management, analysis, and archiving procedures. Data is reviewed at the time of input, and again with a more formal QA/QC protocol. Data is organized to be compatible with CDFW Coastal Monitoring Program formats and submitted annually and at the end of each grant cycle. BIOS metadata is updated as needed.

*Safety Training*
Annual safety training is completed for all RCDSMM Biologists, stream team members and volunteers. RCDSMM lead biologists are certified in CPR/First Aid/AED on a biannual basis by American Red Cross, American Heart Association or similar organization (e.g., Joffe Emergency Services).

Trainer Qualifications
*RESOURCE CONSERVATION DISTRICT OF THE SMM:*
**Rosi Dagit, Senior Conservation Biologist**
Since 1988, Rosi Dagit has coordinated current research within the Topanga Creek Watershed, as well as other areas of the Santa Monica Mountains. As Principle Investigator for the steelhead monitoring project, she has conducted training of staff, coordinated all fieldwork, conducted QA/QC for all data, and managed the grants supporting all fieldwork. In addition to monitoring steelhead trout, she has a variety of projects in process including: monitoring tidewater gobies in Santa Monica Bay creeks; developing long-term vegetation management strategies for increased fire safety that incorporate ecological parameters for preserving upslope integrity and reducing sedimentation and stormwater run-off; coordinating volunteer water quality monitoring throughout the watershed; conducting surveys of vegetation and sensitive; studying southwestern pond turtles in Topanga Creek; developing design alternatives suitable for Caltrans restoration planning; annual

monitoring of amphibian population density and diversity; and numerous projects related to the physiology of Coast Live Oaks and their role in streambank stabilization, ecosystem integrity, and watershed management. Ms. Dagit has a B. S. in Marine Science from Kutztown University. She holds scientific collecting permits for monitoring southern steelhead trout (*Oncorhynchus mykiss*) in the Santa Monica Bay (CDFG SC-000604 and NMFS Section 10 Permit # 15390), as well as for capture, tag and release of southwestern pond turtles (*Clemmys marmorata*). USFWS Permit # TE811188-1 covers the research on tidewater gobies (within the Santa Monica Bay). Ms. Dagit also maintains a current Wilderness First Responder certification from Wilderness Medical Associates.

**Jennifer Mongolo, Conservation Biologist**
Jennifer L. Mongolo is a bilingual environmental consultant with extensive experience in integrated resource management, including conservation and restoration planning, environmental analysis, and geographic information systems (GIS). For more than 15 years she has worked with and studied natural resources in the United States and Mexico. Through her studies and professional experience, she has developed an intimate understanding of the complexities related to resource management and the great need for cooperative planning, sustainable development, and biodiversity conservation. Ms. Mongolo's professional and academic interests have long center on watershed management and stream ecology, especially in relation to the impact of built environments on fresh water resources. She has a strong interest in utilizing GIS to develop sound management practices and restoration plans and to educate and inform stakeholders about key issues. Ms. Mongolo has diverse experience conducting wildlife, vegetation, habitat, wetland, water quality, and even social surveys and monitoring in a variety of habitats throughout the continental US and Mexico. In her time as a Conservation Biologist with the RCDSMM, Ms. Mongolo, has assisted with lifecycle monitoring of southern steelhead trout, as well as monthly snorkel surveys. She is working with DIDSON camera monitoring and instream antenna monitoring, as well as maintaining the data sondes and temperature loggers. She has also assisted with southwestern pond turtle monitoring and care. She has prepared mulitple biological assessement and inventory reports, restoration/slope stabilization proposals, and seed recommendations based on site specific conditions. Ms. Mongolo is also currently working with a privately owned golf course to develop sustainable management practices for controlling mosquito populations and protecting 35 acres of emergent wetland habitat.

**Krista Adamek, Biologist**
Krista Adamek has many years of experience in conducting wildlife and vegetation surveys in a variety of habitats throughout the world, and most recently in Southern California. As a Conservation Biologist for the RCDSMM, she has conducted monitoring of southern steelhead trout, water quality sampling, collecting and identifying macroinvertebrates, assisted with maintaining and calibrating field equipment, installation of data sondes, DIDSON camera, fish antennae, and data loggers. Ms. Adamek has also been responsible for data entry and management, assisted with report writing, and attended public meetings and events. She has also participated in invasive plant removal, amphibian monitoring, and southwestern pond turtle monitoring. Ms. Adameks' diverse background combines all aspects of the research process, from data collection, management, and analysis to real-world application. Prior to her work with RCDSMM, she spent several years analyzing long-term data from field work with the World Wildlife Fund in the Peruvian Amazon which focused on space use and movements of area-sensitive species. Similarly, in Costa Rica her work with an endangered species of Macaw ultimately resulted in a protected area 10 years later. She also spent a year on an upland aquaculture farm on the desert coast of the Red

Sea, where she monitored water quality, surveyed aquatic and avian species in the channels and created wetlands, and initiated a woman's cooperative to protect and manage wetland plant communities for the Carbon Credit program. She has worked with Parks Canada, where she surveyed, mapped, and made recommendations for their newest National Park, and collaborated with the Nature Conservancy, and Missouri Department of Conservation while studying the dispersal of grassland birds.

*CA DEPT. OF FISH AND WILDLIFE:*
**Dana McCanne, Environmental Scientist**
Dana McCanne is an Environmental Scientist for the California Department of Fish and Game Steelhead Assessment Program in Santa Barbara. Working as a Senior Research Analyst, Biologist, and project Principle Investigator at the Forest Science Project, Institute for Watershed Management and the Institute for River Ecosystems at Humboldt State University, he has over a decade of experience designing and implementing region wide salmonid surveys. He is a member of the California Coastal Salmonid Monitoring Plan Technical Team tasked with developing the statewide salmonid monitoring program.

## IX. DOCUMENTATION AND RECORDS

All computer files including data from snorkel surveys, lagoon monitoring, DIDSON camera, redd surveys, Malibu solar sonde, and HOBOs are stored on desktop computer that is continuously backed up to an external hard drive at the RCDSMM office, as well as in an RCDSMM dropbox account. Hard copies of original data are stored at the RCDSMM office indefinitely.

Snorkel surveys are typically broken down into two teams for Topanga Creek, one team completing the lower reach (0-3600m) and the other completing the upper reach (3600- 6000m). Due to finding NZMS in August 2016, we broke the reaches into three sections to avoid any chance of spreading snails. Reaches were 0-2000m, 2000-4000m, 4000-5300m until February 2017 when the flushing flows removed any evidence of snails in the creek. In Arroyo Sequit, Big Sycamore, Las Flores, Solstice, Trancas and Zuma Creeks, a single team of three observers/divers completes the entire survey in one day. In Malibu Creek, a team of 3-4 observers surveys the lower reach (Start Pool – Tufa Pool) on one day, followed by a team of 3-4 observers surveying the upper reach (Tufa Pool – Rindge Dam, upstream reach from Rindge Dam + 500 m) on the second day. One team member is the designated data recorder/observer, and carries the gear for the team in a backpack. The data recorder enters all data into a Rite in the Rain bound notebook as the survey proceeds, and checks the field notebook at the end of the day to make sure all notes have been recorded.

The lead biologist (i.e., Project Manager) checks each team's data book for completeness and accuracy as soon as possible following a survey. If any inconsistencies are found, or data is missing, they consult the data recorder and/or other team members and complete the notes. The field data books are then taken to the RCD office where they are copied and stored in a three-ring binder at the RCD indefinitely. The data is then entered into an EXCEL file by the lead biologist and a field assistant. One person reads the data and the other enters it, and then reads it back to ensure correct entry. The data is graphed to look for further inconsistencies, and saved onto the main RCD computer as well as dropbox.

Redd surveys are also completed by two teams in Topanga Creek, one in the lower (0-3600m), one in the upper reach (3600-6000m). Data is collected on Rite in the Rain bound field notebooks, as well as on loose waterproof paper data sheets. Data is reviewed and completed by the field team at the end of each survey. The lead biologist checks each team's data for accuracy and completeness at the end of each field day. The data gets entered into an EXCEL spreadsheet as per the standard two-person data entry protocol, and eventually into the CDFW CMP ACCESS database, and original copies get stored at the RCD indefinitely.

Deployed HOBO tidbits are uploaded during each snorkel survey or monthly during the summer at the lagoon monitoring sites. Uploads are recorded in the notes as successful or not. If unsuccessful, the tidbit will be replaced immediately with a spare tidbit. Data from successful uploads is transferred onto the RCD computer using the most up-to-date version of HOBOware and archived in a HOBO temperature data folder with the appropriate site and date. HOBOware files are converted into EXCEL files that are updated after every upload. Temperature graphs are made and updated after each upload in order to quickly check for outliers and potential issues with the HOBO. At the end of each season, data for that season is imported into a master file for each location, which contains data from all years for that location. Graphs are made showing temperature data over time for each year (to look for trends and differences among years), proportion of time at temperatures during the dry season (to look for trends and differences among years during the dry season specifically), and, when applicable, time over 23°C and time over 25°C. Metadata (sites, dates and length of deployment, upload success record) is recorded into an EXCEL spreadsheet as well and stored at the RCD and on dropbox.

When the DIDSON camera is deployed, data is recorded throughout the deployment on the data log, and includes dates, times, personnel, and conditions, among other notes. Video is monitored while recording throughout the event. Anytime something of note appears on the screen, it is recorded in the log along with a timestamp so that it can be reviewed later. Previously collected video is analyzed on a second computer by a trained biologist, while the assistant monitors the current video imagery. Data is checked regularly for completeness and accuracy. Data is entered into a database at the end of each event. After entry, entered data is checked against data sheets. See Appendix D for a copy of the data log used during DIDSON deployments. DIDSON Camera files are stored on dedicated external hard drives due to large file sizes. These are backed up during processing and any files with fish detected are stored on the main RCDSMM computer back up system indefinitely. Hard copies of deployment notes and other information is also archived at the RCD office indefinitely. Summary files are copied and shared with CDFW Santa Barbara office at the end of each field season.

Two Troll 9500 data sondes are calibrated and switched out monthly at the Malibu solar sonde station. Sonde management and data upload takes place during the monthly Malibu snorkel survey. Sondes are calibrated every other month prior to deployment using QuickCal solution, and every few months using individual calibration reagants (pH, conductivity, DO). Win-Situ software is used to calibrate and maintain data sondes. Data is uploaded from the micrologger 3000 monthly using LoggerNet software. Immediately following upload, data is archived in an appropriate folder on the RCD field laptop and imported into a master EXCEL file, containing all data. Temperature and DO are graphed immediately to look for outliers and any potential issues. The EXCEL file is stored on

dropbox and on the main RCD computer. As of 2017, California State Parks and Recreation took over responsibility of data sonde management with continued assistance from the RCDSMM.

# X. SAMPLING PROCESS DESIGN

See Table 1 for a schedule and frequency of all activities. Sample locations (i.e., Topanga, Malibu, Arroyo Sequit, Big Sycamore, Las Flores, Solstice, Trancas and Zuma Creeks) were originally selected based on historical and current presence of anadromous *O. mykiss*, as well as their listing as focal watersheds (specifically Topanga Creek) for southern steelhead monitoring. Surveying and sampling design was constructed following CDFW and NMFS protocols. Snorkel and redd surveys are conducted in entirety (in the entire known *O. mykiss* reach in each creek) to avoid missing important data. HOBO deployment locations were chosen based on presence of *O. mykiss*, and which represented a diversity of canopy cover conditions, proximity to known seeps or springs, and depth conditions. The loggers are set to record data at 30 minute intervals to get a full evaluation of diurnal temperature variations.

The instream antenna and DIDSON camera are deployed at the beginning of each wet season and kept in until the end of the wet season. The units are turned on when flows are high enough to allow for fish passage opportunities. Trapping occurs during the wet season on the falling limb of the hydrograph, when flows are high enough to allow for migratory opportunities and trapping efficiency.

Weather, seasonal variations, stream flow, water conditions (quality or visibility) and site access/safety are all issues that may affect whether sampling/surveying is completed. In the case of weather, stream flow, water conditions, access or safety issues, surveys are typically rescheduled to the next possible date. See Appendix F for the complete RCDSMM Safety Protocol. Seasonal variations affect redd surveys (conducted during spawning season only, January to June), and HOBO deployment (typically conducted during dry, warm season only, April to October).

# XI. SAMPLING METHODS REQUIREMENTS

See Section VI. of this document for a summary and Appendix A (snorkel surveys; see also O'Neil 2007), B (redd surveys), C (sonde management), D (DIDSON camera) and E (Mainstem habitat) for protocols on sampling methods used for this project. HOBO methods are described in detail in Dagit et al. (2009). Redd surveys follow NMFS protocol directly, whereas snorkel surveys are slightly modified to fit our program. Snorkel surveys are conducted with a team of two divers and one data recorder. The data recorder hikes on the side of the creek, being careful to stay out of the water prior to an area being snorkeled. In step pool habitats, and when possible, the two divers leap frog one another being careful not to disturb the other. In pool habitats, two divers begin the pool together and snorkel around the same speed, each taking a side. LED dive lights are used to check under boulders and in darker areas. When initially entering a habitat unit, the diver will first scan the unit without moving much, then proceed to swim or crawl forward. In pool habitats, the data recorder will walk to the top of the pool and watch as the divers enter the water, for any fish potentially leaving the unit or swimming under boulders so that the divers might miss them. In long run habitats, divers swim one in front of the other, so that the second diver can catch any that the first diver scares downstream. At the end of a large pool surveyed by multiple divers, there is a

discussion about sizes and numbers of fish observed. Same sized fish observed in a similar area are assumed to be the same fish, and different sized fish or same sized fish observed in very different areas are assumed to be different fish. At the end of a unit, each diver will report to the data recorder the total fish count, habitat data, and other notes.

Malibu, Solstice, Trancas, and Zuma Creeks contain invasive New Zealand Mud Snails (NZMS) whereas Arroyo Sequit, Big Sycamore and Las Flores are currently NZMS free. Decontamination of equipment exposed to NZMS can be accomplished by either drying in excessive heat, or freezing for 72 hours. We choose to clean and freeze for 72+ hours any equipment that is used where exposed to NZMS and might be subsequently used in areas without NZMS to avoid spread of this invasive species. Appendix G contains a full description of the HACCP protocol used by RCDSMM to decontaminate field equipment to avoid spread or introduction of invasive species.

In 2013 Quagga mussels were documented in Ventura County creeks. We will expand our efforts to carefully clean and decontaminate all equipment used in all our study creeks to include examination for these invasives. If found, a HACCP will be prepared and implemented.

## XII. SAMPLE HANDLING AND CUSTODY PROCEDURES

During lagoon monitoring, snorkel and redd surveys, dead fish have been encountered. When possible, *O. mykiss* carcasses are collected in a Ziploc bag, measured, and processed (fin clips, scales, otoliths collected). The date, location, condition, size, collectors name, and other notes are written in permanent ink on the outside of the Ziploc, and also written in pencil on rite in the rain paper inserted into the bag. Fin clips are collected from the caudal fin, dried in rite in the rain paper, placed in a labeled envelope and sent to the NMFS Genetic Tissue Lab, Santa Cruz, CA for genetic analysis. Scales and otoliths are collected in labeled envelopes and used to age the individual. Remaining tissue and bones are discarded unless otherwise specified. If carcass is kept it is then stored frozen in a Ziploc bag at the RCDSMM for transfer to CDFW or NMFS. Carcasses are collected only when they are complete enough to process. If they are highly degraded, the size is estimated, the carcass is photographed, and the observation is recorded in the field notebook. When carcasses are collected, team member names, collection location, site conditions, and condition and estimated size of carcass are recorded in the field notebook. Carcass inventory is entered into an EXCEL file which is stored on the main RCD computer, and updated as needed. The protocol for dealing with carcasses is found in the RCDSMM Snorkel Survey Protocol (Appendix A).

## XIII. METHODS REQUIREMENTS

The only analytical method used in the field is determining size of observed fish. In order to standardize this effort, divers use their dive lights (6-8 inches) and length of arm from hand to elbow (varies with individual) to use as reference points. All other data compilation and analysis is completed in EXCEL or ACCESS using an RCD computer. Certain software is required for the upload of some parameters (see Section IX), however none of the parameters in this project require additional equipment for analysis.

# XIV. QUALITY CONTROL REQUIREMENTS

Quality control checks for snorkel surveys are conducted occasionally as cross checks. Two teams separately snorkel the same habitat unit and the sizes and number of fish are compared. To be as consistent as possible for habitat data (habitat type, maximum and average depth, canopy cover, dominate substrate, percent algae, shelter value, instream cover percent), it is usually discussed among team members and decided upon together, and checked with the lead biologist for accuracy. The lead biologist has final decision on habitat quality data. The data recorder is typically consistent between teams and over time. The lead biologist will also switch from one team to the other every other month or so to ensure consistency and quality control.

For redd surveys, quality control checks are implemented by the lead biologist switching between teams to check that all old redds were recorded accurately and any new redds get recorded accurately.

HOBO and sonde data is checked after every upload event to ensure quality data is being collected.

DIDSON camera video is independently reviewed by at least 2 trained observers. Any potential fish are additionally reviewed by CDFW staff. During deployment, measures are taken to ensure that complete field notes, water temperature, turbidity, depth, flow, rainfall and other data is collected according to the protocols.

If a problem is encountered at any point, a training session will be held for all regular team members, protocols will be reviewed, and the problem will be addressed. Increased cross checks and checks by lead biologists will occur until the problem has been reconciled.

# XV. INSTRUMENT AND EQUIPMENT REQUIREMENTS

*Snorkel and redd surveys*
Equipment necessary for quality data collection during snorkel surveys includes wetsuits, hoods, neoprene socks and gloves that are in good to excellent condition, especially during the colder, winter months. Wetsuits are inspected monthly to assess condition and replaced as needed. Canyoneering and hiking shoes used during snorkel and redd surveys and masks and snorkels are inspected monthly as well and replaced as needed to ensure quality supplies. Flashlights are checked prior to each event to ensure that they are properly functioning and batteries are replaced when lights become dim and/or as needed otherwise. Separate equipment is used in waters infested with New Zealand Mud Snails (NZMS) and in waters clear of (NZMS). Even so, gear used in NZMS infested waters is thoroughly cleaned and frozen for 72 hrs post-use.

*Lagoon monitoring* (*storm events*)
Storm event monitoring includes reviewing the precipitation intensity on the LA County real time website (www.ladpw.org/wrd/precip/), NOAA satellite radar of cloud cover and tide charts. If it appears that a storm could potentially cause the lagoons to breach and connect to the ocean, a team

is deployed with a camera and field materials to visit each site. Lagoon size and depth is measured yearly or more often if needed to respond to changes in the configuration due to storm events.

*Lagoon monitoring (seining)*
Seine nets and dip nets are used to survey lagoons during times of connectedness. All nets are checked thoroughly prior to use to check for holes or any other repairs they may need. Repairs are made as needed prior to use. Separate equipment is used in waters infested with New Zealand Mud Snails (NZMS) and in waters clear of (NZMS). Even so, gear used in NZMS infested waters is thoroughly cleaned and frozen for 72 hrs post-use.

*HOBO tidbits*
HOBO tidbits are checked for proper functioning prior to each deployment, and checked monthly upon upload. If a tidbit malfunctions, it is replaced immediately with a spare hobo. Spare hobos are given to each snorkel survey team to use if needed.

*DIDSON Camera*
The DIDSON Office is set up each November and stocked with all the equipment needed to deploy the camera. This information is detailed in Appendix D. The DIDSON camera is stored in the DIDSON shed until needed. The camera is visually inspected at the beginning of the sampling season and prior to each use. It is carefully handled in order to prevent breakage, as there is not a spare camera. Spare tools and other smaller parts are kept in the DIDSON shed throughout the season if needed. All associated cables, connectors, stand, security devices and other equipment needed for safe and secure deployment are kept in the DIDSON shed. At the end of every deployment, all equipment is inspected for any problems and fixed so that the camera is ready to go for the next event. Once base flow is restored and Topanga Creek is connected to the ocean, deployment is initiated. The camera remains deployed for as long as conditions permit.

*Drift Net Deployment*
Drift nets are used to collect macroinvertebrates during a 24 hour period in March, July and November. Water quality probes are calibrated prior to use. Flow meter batteries are checked prior to use. Nets are cleaned and repaired following each deployment so that they are ready for the next event.

*In-situ Troll data sonde management*
Two Troll data sondes are used to collect continuous water quality data in Malibu Creek. They are switched out with one another every other month and calibrated prior to each deployment. Calibration reagents are suggested and/or purchased through In-situ and thus are compatible with the sondes. Instructions for calibrating data sondes are included in Appendix C. A toothbrush is used to clean parts of the sonde submerged in water following removal after each deployment. Data sondes will be sent back to In-situ for inspection and maintenance on an as needed basis. California Department of Parks and Recreation has taken responsibility of the data sondes including any necessary maintenance as of June 2017 with on-going assistance from RCDSMM.

# XVI. DATA ACQUISITION REQUIREMENTS

Precipitation data is obtained through the LA County Department of Public Works Water Resources Division website (http://ladpw.org/wrd/Precip/alert_rain/index.cfm), as well as from local residents that track rainfall. Las Virgenes Municipal Water District, which releases treated effluence into Malibu Creek, measures flow at their outfall and at the USGS gage located just downstream of the outfall and that is used to determine flow in Malibu. There are no stream gages on any of the other study creeks. Heal the Bay shares their water quality monitoring data, including nutrients, bacteria and in-situ measurements (pH, conductivity, dissolved oxygen, water temperature) from Malibu and Arroyo Sequit Creeks. Surfrider Foundation has two cameras installed at Malibu Lagoon in order to monitor lagoon breaches and movement of the thalweg. Their images are shared with us as well.

# XVII. DATA MANAGEMENT

See Section IX for a description of data checks, what happens to data after it is collected and computer software programs that are needed to collect and analyze data and check for outliers, and data storage. All of the data in this project is eventually archived in EXCEL files. EXCEL is also used for minimal data analyses and graphing. Redd data, and eventually snorkel data, will be uploaded to the CMP ACCESS Database as well.

An experienced biologist enters the data within one week of data collection, although preferably within one day, and summarizes it on a monthly basis. The monthly summaries get reported to the Program Manager and the granting agency. To ensure accuracy of data entry into the computer, two levels of review are used. First, when entering initial data, the lead biologist compares the entries to the field data sheet to ensure completeness and accuracy. The second level of review is performed by the Program Manager randomly selects every 5-10 entries for comparison with copies of the field sheets provided. Finally, the data gets organized for analysis and summarized, and is reviewed again by the Program Manager prior to inclusion in the reports. A record of all QA/QC activities and training materials is compiled and included as an appendix to the final grant report.

*DIDSON Camera*
Data sheets (see Appendix A) are used to record notes along with timestamps during DIDSON deployment. A Rite-in-the-rain field book is also used to record any additional notes and water quality and flow measurements. Video footage, collected by the DIDSON software, is analyzed in six hour segments. Once six hours of video footage has been collected, the external hard drive storing all data, is switched out and while one team member monitors the current video footage, the previous footage is analyzed by a second trained biologist. Data is checked for completeness and accuracy and is entered into an EXCEL file at the end of each field day. Fish sizes of known individuals also detected by the antenna estimated on DIDSON software are compared to sizes at last capture. All original data sheets and copies of field notes are stored in a binder at the RCDSMM office indefinitely.

## XVIII. ASSESSMENTS AND RESPONSE ACTIONS

Training for field staff, especially data observers/recorders is held annually. Reminders of specific focus needs are reviewed at the start of each field day. Field notes are evaluated at the end of each surveying day or event, and discrepancies in data are reviewed with data recorders before the next field event. When notes are consistently subpar, semiannual, or as needed, trainings are held. Data input, management and analysis checklists are posted in a visible location and consulted regularly. When possible, observers and data recorders are kept consistent and are, therefore, knowledgeable about the locations within their survey reach. When data is missing, the lead biologist will consult the entire field team to pull together missing data as best as possible. Data QC audits occur at the end of each sampling event and at the end of each year. If problems are noted, then appropriate steps are taken to prevent them from reoccurring.

## XIX. REPORTS, PRESENTATIONS AND OTHER DELIVERABLES

Monthly reports detailing all work accomplished in that time period are sent out with monthly invoices to the grant manager (i.e., Program Manager, CDFW). Final reports are produced at the end of each grant cycle and include a description of methods used, data collected, and all data analyses and interpretation as well as a discussion of how the data collected compares and contributes to the broader field. The final report contains results of QC audits and internal review of methodology and analysis, and is distributed to the granting agency, CDFW, as well as other appropriate and collaborative agencies.

Peer reviewed journal articles are submitted when appropriate throughout the study. Professional presentations in the form of oral talks and posters are given when applicable as well. Typically, at minimum, a poster presenting results from this study is given at the Salmonid Restoration Federation annual conference.

## XX. DATA REVIEW, VALIDATION AND VERIFICATION REQUIREMENTS

All field and laboratory data is reviewed initially by a Conservation Biologist (Project Manager) and/or by the Senior Conservation Biologist (Program Manager, RCD). In addition, Stillwater Sciences Biologists review data when preparing results for the final report. Decisions concerning whether data should be accepted, rejected, or qualified are made by the Senior Conservation Biologist.

## XXI. VALIDATION AND VERIFICATION METHODS

Errors in the dataset are checked for in several ways and throughout the data processing. First, when entering the data into a computer file, the data is verified by comparing computer entries with field data sheets and field books. Once entered into the computer file, the person entering the data reads

the data back to the person with the data sheets or field book. If there are discrepancies in any dataset, the original datasheets, copies of data, and/or chain of custody forms are checked to try to correct the error. Reviewing data graphs, charts and tables can make checking for outliers and errors in a dataset simpler, and thus is used to validate and verify data. If errors or outliers are found, field notes and original datasheets are checked as well as calculations used to formulate the graphs, charts or tables in order to determine the cause of the error. Depending on the type of data and the situation, outliers may be removed for analysis when appropriate. Section IX and XVII further discuss data management and quality control.

## XXII. RECONCILIATION WITH DATA QUALITY OBJECTIVES

The first review is at the conclusion of each event, be it lagoon monitoring, temperature monitoring, DIDSON or drift net deployment. The intent is to identify any problems immediately so they can be addressed and corrected. This is particularly true for the temperature data, DIDSON results and drift net data, and any associated information provided to the CDFW CA Coastal Monitoring ACCESS database. At the midterm of the grant cycle, the data quality objectives set forth are assessed for the entire dataset compiled during that grant period. If any of the objectives are not met at the midterm review, the project and data collection and management plan is reassessed and actions are taken so that the DQO's will be met. At the midpoint, actions might include adjusting the training schedule or data management plan to make sure DQO's are met, or revising the DQO's. At the end of the project, it may be decided that errors in the dataset should be rejected and discarded, or the project's DQO's may be revised. Issues with the data quality objectives and actions taken to reconciliation of those issues will be discussed in the final report.

## XXIII. REFERENCES

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## XXIV. APPENDICES

APPENDIX A – RCDSMM Snorkel Survey Protocol and training log
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# APPENDIX A
# RCDSMM Snorkel Survey Protocol

## SNORKEL SURVEY TRAINING

August 2015 updated in 2017

**1. Preparedness**

You are expected to arrive at the meeting place **on time** and ready to go.
You are expected to come with all necessary equipment, or come a few minutes early to get equipment from the shed, such as;

- Mask, snorkel and water shoes (different for Malibu)
- Wetsuit, gloves and hood (from the shed)
- Polaroid sunglasses for observer/data recorder
- Lunch and water (1 liter max)

If you need a wetsuit from Malibu Divers, arrange with Rosi.
You may be asked to drive your car to the put in or pull out sites.

You are expected to be able to accurately identify ALL fish species potentially found in the survey reach. All divers must be able to accurately describe the difference between Arroyo chub and steelhead for work in Topanga Creek. If you are working in Malibu Creek, you also need to be able to differentiate between young steelhead and largemouth bass, green and bluegill sunfish.

You are expected to return all equipment in working order. If there is equipment failure or loss, you may be held accountable for it, depending on the circumstances. We are living on a very tight budget, so please try and use all gear carefully! It is really expensive to replace lost or damaged equipment.

**2. Safety**

You are expected to use caution moving through the creek. Jumping from rocks, etc. can result in bad falls, especially when the algal mats are doing rock imitations!

You are expected to be capable of an 8 hour day in the field, where you will be wet, cold/hot, doing snorkel yoga to find fish, hiking through uneven terrain, etc.

If you have any poison oak or bee sting allergies, please come prepared to handle them and let the Team Leader know in advance!

**3. Team Leaders**

Team Leaders are expected to have the backpack prepared for the day with all necessary equipment. Refer to checklist posted on shed wall.

You will be responsible for all data entry correctness. If you wish to share data entry with other divers, make sure they fully understand and complete the entries for each location.

You are responsible for knowing the locations of all HOBOS and downloading them at each visit.

At the end of the day, you are responsible for making sure field notes are complete and accurate.

At the end of the day, you are responsible for getting all gear back to the office to be cleaned, dried, and put away.

**4. Snorkel Procedure**

Observer/data recorder will move to a place where s/he can clearly see the habitat unit fully.

1-2 divers will quietly slither into the habitat from the downstream end, slowly swimming upstream to the end of the unit. Depending on width and undercuts, divers will split the area, one to a side. Divers should stay abreast of each other and confirm fish sightings, unless it is too narrow. IF the pool is too wide or deep, then additional divers should be used, or multiple passes required to cover all areas.

Divers will fully explore all undercut boulders. This sometimes means contorting into and under the spaces in order to see far enough back to where fish hide.

Divers will fully explore all bubble curtains under cascades as fish are often found lurking in the undercuts behind these curtains.

Young of the year are frequently found in very shallow areas. If it is possible to put a mask into the water, do it!

We are also searching for redds during winter and spring, so please keep eyes open!

Divers will provide fish numbers and sizes to the data recorder. If there is a question about number or size of fish, then the team will pause for 10 minutes and then dive the area again.

The observer/data recorder will add any additional fish noted from their vantage point and make sure that if fish move into an upstream habitat unit they are not counted again.

Estimating fish size:

Fish appear about 1-2x larger underwater due to magnification.
Use your hand, arm or dive light as a reference tool to gage size.
Provide size to data recorder in inches
If you are not sure, ask for help!!!!!

Estimating number of fish observed:

It is really important to try not to double count, especially in small areas!
Also, our fish are really good at hiding, so scanning the whole pool when you first enter is a good way to not miss fish that see you and hide!

If visibility is compromised due to angle of light, turbidity or algae, ask the data recorder to make that note.

**5. Data Recording**

The following information needs to be recorded at the start of the survey:

Team member names, start location, weather conditions, visibility
Start time
Hobo shuttle Id number

Date needs to be on the top of each page!
Number pages sequentially in top right corner
Write headings across the top line:

DISTANCE (meters)

Please check flags in Topanga and replace if needed

Habitat Unit Name (if it has one)

If it does not have a name, then GPS and note approximate meters

Habitat Unit type ( pool, riffle, run, step pool, etc.)

Maximum depth of unit in cm (estimated)

Average depth of unit in cm (estimated)

% canopy cover over the wetted width of the channel (this does not include shade from rock walls!)

substrate(dominate only (bedrock, boulder, cobble, gravel, sand, silt)

When noting substrate, use the bottom of the creek channel, not the sides or what is visible above water as your guide.
There are only a few bedrock bottom pools (barrier falls, for example). most pools even those with bedrock sides have sand, gravel, etc. as dominant.

% algal cover – this can be more than 100% if there is floating as well as attached species. Also note condition (dead, intermediate, green), if you know the species, add that as well!

Shelter Value- think like a fish!

0 = horrible place to be, dry!
0.5 = shallow, exposed, but can be used to get from place to place
1 = Fair conditions: shallow, but steady flow, can support yoy
1.5 = depth varies, might have undercuts, ok for yoy – big fish transient
2 = Good conditions of depth, canopy, substrate, flow, undercuts
2.5 = could support all sizes of fish

3 = Excellent conditions – has everything a trout of any size could want!

Instream Cover – % of hiding space good for fish
This is a percent cover of the wetted habitat unit and looks at the amount of boulder undercuts, bubble curtains, hiding places and feeding stations.

Number and Size of Trout
Circle the number for each size observed
Example 4 4", 2 6"

Suitable Spawning Gravel – in fall we will designate one survey to get visual estimates of the location (meters) where spawning gravel beds are observed, the approximate area of the gravel, percent embeddedness, and if located at a pool tail.

Pit tag numbers: record any tag numbers in the notes section then compare to the list and note location fish observed on the tag list data sheet. Be sure to repeat the number back to the diver to make sure you heard and record it correctly. Each number has 10 digits.

Arroyo Chub: Please note presence and estimate number and size if observed

Crayfish: Please note presence and estimate number when observed

Muck: Note color and estimate area covered, example black 1mx1m

NOTES; anything of interest!
Please note places with good spawning gravel and estimate size of gravel patch, example 5m x 5 m

Please note if the substrate is really embedded, covered with bacteria or diatoms, etc.

HOBOS- note location and download info for each unit Please record GPS when installed along with HOBO id number and give good description of location so someone else could find it!

If visibility changes, or other factors such as algal cover or leaf litter impede ability to see fish, make notes!

**For all locations:**
Please make note of any pools that are dry, overall status of algae and anything you see of note (including naked sleeping men!)

Need to be sure we are clear about snake and frog id - garter snakes are different than 2 stripe garter

snakes, which are aquatic and what we usually see. Please be clear which it is! noting 2 stripe is sufficient, but garter snake is not (unless it is of course really a garter snake!)

**For Topanga specifically**:
Really important to note BOTH the pool location (xxx meters) AND pool name if it has one

Also really important to provide estimated distance if you find fish in un-named pools, don't just say next step! We need next step (+5 m) or estimate distance! Please use the RCD cameras for pool photos so we can update the files. I am keeping track of changes at specific pools over time (Ken2 comes to mind) so use the photo guide and try and get a shot from the same perspective. This provides a really interesting record of changes!

We are also monitoring the chub and crayfish, so it is really critical to note number and size in each location with trout. Counts for chub and crayfish are recorded for all data pools even if trout are not observed at that point in time. Large chub are noted with size if present. Lots of crayfish parts (legs/claws, or parts of shells) in data pools are noted, but only full crayfish are included in official counts.

**For Malibu specifically:**
The pool guide is used as reference for all pools name's and location's. Photos taken of each pool match the photo guide perspective to get a record of changes over time.

When taking notes on the above dam section, please provide overview of all data categories,( type, sub, canopy, max./vg depth, algae)

**6. Daily Data Management**

At the end of each field day, the data books will be reviewed by the Team Leader and any missing data added or noted why missing.
Photocopies will be made of field notebook pages.
Data will be entered into the excel workbooks for QA/QC.

**HOBOS**

We need to anchor the hobos securely and hide them from potential vandals.
Hobos also need to be placed where they will stay submerged as water levels drop.

Need to take photos of the sites where HOBOs are deployed.

Hobos need to be downloaded each time we snorkel.
Please note the HOBO id number and location and any problems.

**PHOTOS OF HABITAT**

At each location where trout are found, please take a photo standing at the downstream end of the habitat unit looking upstream. Try to frame the photo so that it includes the whole wetted width of the channel, as well as any unique identifying features. We are trying to keep track of changes to each pool over time and these photos are critical to that effort.

Use the pool photo sheet as a reference and try and get the same orientation so that we can see changes. If it is a new location, be sure and add info to notes so that we can id the photo properly.

Please use the RCD cameras for pool photos so we can update the files. We are keeping track of changes at specific pools over time (Ken2 comes to mind) so use the photo guide and try and get a shot from the same perspective. This provides a really interesting record of changes!

**LAGOON/OCEAN CONDITION PHOTOS**

At the end of each creek survey, photos will be taken from the designated locations (3rd stanchion in from the east on PCH bridge, Topanga, W end of PCH bridge for Arroyo, variable locations in Malibu to illustrate connectivity) Please try to frame the photos consistently so that we can identify changes over time.

**DATA SONDE MAINTENANCE - Monthly**

Team leader will work with CDPR staff to calibrate the sonde. All data will be uploaded to the Research laptop for QA/QC.

# APPENDIX B
# RCDSMM Redd Survey Protocol & Data Sheet

**California Department of Fish & Wildlife**
**Coastal Monitoring Plan:**
**SOUTHERN CALIFORNIA STEELHEAD REDD SURVEY PROTOCOL**
***DRAFT – 12.13.17****

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## Introduction

The California Department of Fish and Wildlife (CDFW) developed the Coastal Monitoring Plan (CMP; Adams et al. 2011) to serve as a framework for monitoring threatened and endangered salmonids throughout the state. Data collected under this framework will generate information on the viability of salmonid populations by tracking four parameters—abundance, productivity, spatial structure, and diversity; plans to monitor freshwater and marine survival are also outlined.

Sampling methods associated with this statewide monitoring effort should be standardized, statistically robust, and allow for analysis at multiple geographic scales. Approaches between the Northern Area (Aptos Creek in Santa Cruz County and north) and the Southern Area (Pajaro River in Monterey County and south) will differ "due to differences in species composition, abundances, and habitat conditions." (Adams et al. 2011).

Monitoring in the Southern Area focuses on steelhead (*Oncorhynchus mykiss*). The Southern Area is comprised of two Distinct Population Segments (DPS) for steelhead—South Central and Southern California. Steelhead in South Central California are listed as threatened, while Southern California steelhead are listed as endangered under the federal Endangered Species Act. This protocol will focus on methods used to monitor Southern California steelhead whose range extends from the Santa Maria River to the border with Mexico.

In order to effectively and consistently monitor endangered Southern California steelhead, methods are currently being tested to collect robust data, while minimizing impacts to populations and being widely applicable throughout the DPS. During redd surveys, surveyors walk a designated study reach and collect data on redds and fish observed. Fish are not handled, and efforts are made to minimize disturbance to fish behavior and habitat, resulting in a sampling method with the potential for minimal impact to populations and habitat. Counts of redds observed can be combined with

estimates of the number of redds per adult *O. mykiss* (Gallagher et al. 2007) to estimate population abundance[1].
Data will be collected by conducting a census of spawning grounds within the sampling frame. These datasets will contribute to CDFW studies exploring stratification strategies for southern California creeks that effectively remove non-suitable spawning habitat from the sampling universe, thus allowing for detection of spawning activity of *O. mykiss*, while minimizing zero counts. Where possible, redd surveys should be paired with fixed counting stations. Data generated from these redundant sampling techniques will allow for calibration of both methods in addition to the development of adult per redd estimates.

In addition to low numbers, patchy distributions and fragmented habitat conditions, sampling efforts for Southern California steelhead are further complicated by the diverse life histories exhibited by *O. mykiss* (Adams et al. 2011). While the anadromous form of the species is listed as endangered, they can occupy the same space in freshwater systems as the resident form (commonly referred to as rainbow trout). In order to develop predictive models relating the size, distribution and abundance of redds to *O. mykiss* life history, data for both anadromous and resident redds will be collected under this protocol. CDFW staff will review data at the end of each field season to determine differences between anadromous and resident redds (initially based on redd size; Zimmerman and Reeves 2000). Such models could contribute to future protocols for relating productivity of resident *O. mykiss* to anadromous populations, or improve efficiencies in sampling protocols for anadromous populations.

We have developed this Southern California Steelhead Redd Survey Protocol to standardize survey efforts in southern California. This protocol largely draws from the California Department of Fish & Game's Salmonid Spawning Survey Personal Digital Assistant Data Entry Protocol (2011) and the National Marine Fisheries Service's Southern California Steelhead DPS Redd Survey Protocols (2012 and 2015). Methods for recording data using electronic handheld devices are described to allow for synchronizing with the state's CMP database. Data collected from various entities using this protocol will be presented to the Department's CMP Technical Team for consideration in ongoing monitoring and protocol development.

## Objectives

The main objectives of southern California *O. mykiss* redd surveys are to estimate the total number of redds constructed; determine *O. mykiss* distribution within the individual watersheds, and to distinguish between steelhead and resident rainbow trout redds, abundance, and distribution. The tasks necessary to achieve these objectives include accurately counting redds, recording GPS coordinates of the redd locations, measuring redd dimensions and noting observations of adult *O. mykiss*.

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* Note: This protocol is being shared with select CDFW partners in southern California for review and testing during the 2017-2018 redd survey season. Please do not distribute beyond your organization's field crew. Data collection using this protocol will inform continued development of Southern California steelhead monitoring efforts.

[1] Past studies (Gallagher et al. 2007; Gallagher et al. 2010; ODFW 2016) indicate it may be necessary to develop regional adult-to-redd rates annually. CDFW will generate regional anadromous adult per redd values by pairing southern California redd surveys with fixed counting stations (sonar cameras).

## Redd Identification

A redd is a contiguous series of spawning nests built by female salmonids. The female builds the nest by using her tail and lateral body movements to excavate a pot and displace substrate. The disturbed and lifted substrate is moved downstream by the flowing water and forms the tailspill (see Figure 1). Once the redd is created, the female *O. mykiss* deposits her eggs. The eggs are then externally fertilized by one or more males and then quickly covered with gravel (Kugligowski et al. 2005).

A newly formed redd is visible because the excavation of the substrate will create a pot, a subsequent downstream crest, and a tailspill. The disturbance of the substrate during redd construction often removes surface algae and detritus causing the redd to appear lighter in coloration and be less uniform than the surrounding substrate (Bjornn and Reiser 1991). The pot can vary in shape but is typically circular or crescent shaped while the downstream tailspill is cone-shaped (NMFS 2012).

Steelhead redds are usually located in swift water habitats typical to pool tails and tops of riffles. The suitable habitat for steelhead are listed as "1) large uniform gravels, (2) a gradient of water depth and velocity, allowing options for redd construction over varying streamflow, (3) good inter-gravel flow through down-welling of stream flow, and (4) protection from scour during freshets" (ODFW 2004).

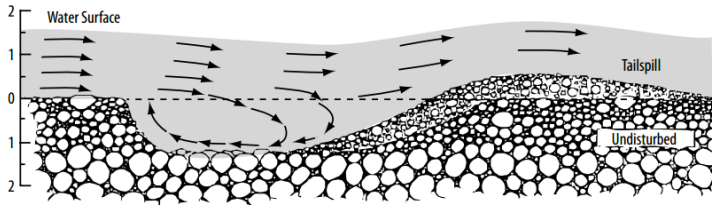


**Figure 1.** Illustration by Andrew Fuller (Burner 1951, 98).

**Figure 2.** Redd observed in North Fork Matilija Creek , Ventura River watershed, Ventura County. (CDFW)

## Field Methods

### Sampling Area and Frequency

Redd reaches should have consistent start and end points for every survey conducted during the spawning season. These points should be recorded both as GPS points and with landmark descriptions so all surveyors may readily identify where to enter and exit the stream. Having reaches that align with obvious physical features within the watershed (e.g., tributary entering the system, significant barrier to passage) facilitates start and end point identification and groups data by potential changes in physical characteristics of the stream (e.g., flow, anadromous passage). Reach lengths should be chosen such that surveys can be realistically completed in a single day, regardless of redd abundance or flow conditions. If any portion of the designated survey reach cannot be conducted (due to dangerously high flows, barriers to passage, etc.), the exit and re-entry points should be noted in the data. Reaches should have a standardized location code to use in redd ID numbers (see Appendix 1 for an example of study reaches used by CDFW in the Ventura River basin).

Spawning surveys are generally conducted from December through May (Gallagher et al. 2007). The first survey of the season should be conducted prior to the first major rain event and no later than February 1st. If new redds are observed in May, surveys will continue for one month after the final redd is observed for the first time.

The frequency of redd surveys is based on how long redds remain visible (i.e., redd life; Gallagher et al. 2007). Redd life was estimated at 10-14 days in two southern California streams (R. Bush, National Marine Fisheries Service, unpublished data). Therefore, in the southern California steelhead range, primary reaches are surveyed every 14 days after the initial survey date.

### Personnel and Guidelines

Surveys should be conducted by trained field staff in teams of two. During the survey, staff will look for redds, live *O. mykiss*, carcasses, and other species of interest. The teams will walk upstream, taking care not to disturb the stream bed by boulder hopping or by walking along the bank when possible. Surveyors should move upstream in tandem, unless the channel splits, in which case the surveyors should each take a branch. Surveyors should approach pools and gravel runs (habitats more likely to have spawning activity) quietly and cautiously to minimize any disturbance to fish and to maximize the probability of observing a fish on its redd.

### Methodology

For data collection, a Palm PDA[2] handheld data recorder will be used with custom Pendragon® forms and sub-forms in accordance with state database requirements (CDFG 2011). Paper datasheets are also included in the back of this protocol for use if the Palm PDA is unavailable or malfunctions during a survey. All GPS units should record points using the NAD 83 datum. Brief descriptions for the sequence of data collection and specific scenarios are outlined below. More detailed explanations of data fields begin on page 6.

[2] Palm PDA units are antiquated and in the near future, CDFW will be moving toward a different brand of handheld device (e.g., iPad, iPhone, Android). For simplicity, we will use the term "Palm PDA" in this protocol, but any handheld data recorder using the relevant forms can be used.

*Header:* At the beginning of the survey, the team should record the following: watershed, stream, reach, method, weather, air temperature, water temperature, water visibility, and names of surveyors. (See page 6 and 7 for further details.)

*Individual and Batch Count Subform*: For observations of individual fish, multiple fish in the same habitat unit, or other species of interest, the information should be entered into either the individual or batch count form, as appropriate given the number of animals observed. For each observation, the GPS coordinates, species, size, and sex of the animals observed should be recorded whenever possible. (See pages 8,9 and 10 for further details.)

*Newly Observed Redds*: When a redd is observed, it should be measured and flagged (see Figures 3 and 4 for the measurements to be taken for each redd; see page 9 for details on flagging). A waypoint for the redd should be marked in the GPS, a photo should be taken, and the photo number recorded in the PDA (under notes). For the photo, the measuring stick or stadia rod should be placed adjacent to the pot for scale. It is helpful to take both a close up photo of the redd and a wider angle shot that shows where the redd was built. (See page 11 for further details.)

*Fish on Redd:* When a fish is present and the redd is under construction, it is critical that you do not disturb the fish. In this case, redd measurements should be visually estimated. The redd should be flagged with total redd length left blank; observers on the next survey can take redd measurements and fill total length on the flagging at that time. If you are unable to get close enough to the redd to get an accurate GPS reading, **GPS** should be written on the flagging and will be crossed out when a reading can be obtained.

*Previously Marked Redds:* When you come across flagging in the channel, it should always be read. If it is part of your agency's survey, the redd number should be entered into the redd subform using the ID # listed on the flagging. The age code is the only other important piece of information that should be observed and recorded unless the redd has changed significantly in size (always fill in missing information such as measurements or GPS). Age should be changed on the flagging using tally marks. When a redd has reached an age code 4, the flagging should be tied in a knot. (See page 13 for more on age codes.)

*Superimposed Redds:* In the event that a new redd is built on top of a previously-existing redd, the previous redd should be marked as age 4 in the data and the flag should be knotted. The new redd should be flagged (with new flagging) and recorded with a note as superimposed or SU.

*Redds Under Construction or with Missing Information:* If flagging is missing any information, the data should be collected and added to the blank space on the flagging. The redd should be recorded in the PDA using the redd record number on the flagging with the addition of the new information.

*Dry Redds:* If a redd is no longer wetted, classify it with age code 4, knot the flag, and choose the drop down of dry for redd condition in the PDA. (Page 13 has a full list of age codes for redds.)

*Test Redds:* A "test", or false, redd is only partially constructed and the female does not desposit eggs in it (Shapovalov and Taft 1954; Gallagher 2007). If you cannot positively identify an area as a completed redd, this may be a test redd. Do not record test redds in the PDA. If you are questioning

whether a redd is a test or a completed redd, take measurements and inform your supervisor upon returning from the field; the biologist will make the final determination (usually after a follow-up visit) whether or not to count the observation as a completed redd. If it is determine to be a completed redd, record the data in the PDA. Never submit data to be uploaded with questionable or test redds. (See pages 9 and 10.)

*Carcass Collection*: Carcass collection is only permitted with National Marine Fisheries Service (NMFS) approval—an Endangered Species Act Section 10 permit is required in order to collect any steelhead carcasses. If a permit is already approved for the project, a GPS waypoint should be recorded and the whole carcass should be collected in a plastic bag and frozen with a card listing stream, date, fork length, and latitude and longitude where the carcass was collected. Carcasses should be transferred to NMFS (Rick.Bush@noaa.gov) no later than June 15 of each year (NMFS 2015). If the project does not have the correct permitting, NMFS should be notified of the carcass with GPS information, but the carcass cannot be collected.

## Handheld Data Recorder- Data Collection and Entry

**Survey Header**

*A survey header is completed for all new days on a reach. Subsequent data (redds, individuals and batch counts) are linked back to this header information.*

From the PDA Home page, Click the icon **Forms 5.1**

Choose **Header**, select **New.**

Date: This value will be automatically generated.

Geographic Area: Select regional area (ex: Ventura River).

Geographic Unit: Select basin unit (ex: Matilija Creek, San Antonio Creek, or Ventura River).

Location code: Select reach (ex: San Antionio 1). This reach corresponds to a location code that will be displayed as the entered value for the field.

Method: Select survey method. For southern California surveys, the method is most often walking. For other parts of the state, other methods are listed (e.g., seine, minnow trap).
[1] Walking
[2]Floating
[3] Adult Migrant (weir)
[4] Juvenile Migrant
[5] Seine
[6] Minnow Trap

Weather: Select weather (cloudy refers to some breaks where sky is visible, whereas overcast is blanketed in clouds without breaks).

[1] Sunny
[2] Cloudy
[3] Overcast
[4] Rain
[5] Snow

Air Temp: Attach thermometer to vegetation ***0.3 meters above the creek in the shade*** and get air temperature after the thermometer has acclimated.

Water Temp: Place thermometer in water ***0.5 meters from the edge of the bank in the shade*** and get water temperature after the thermometer has acclimated.

Temp Units: Fahrenheit (F) or Celsius (C)**.**

Water visibility: The distance a surveyor can see into the water column**.** This value is obtained by placing a measuring stick (e.g., stadia rod) vertically into an undisturbed water column to a depth where the bottom of the rod begins to disappear from sight. This measurement is taken at the beginning of the survey. If there is 100% visibility (the measuring stick remains fully visible to the bottom of the stream bed), enter 999 (Gallagher et al. 2007) and include the water depth in the notes. This value provides a gross measure of the ability of surveyors to observe redds that are present (i.e., if visibility is minimal, confidence in the accuracy of the survey is decreased).

Water visibility units: Choose appropriate units, most often **cm.**

Water Flow: Flow measurements should be recorded in the same area every time a reach is surveyed. ***Measure flow using a flow meter or estimate flow using the following steps*:**

1) Measure the wetted width of the channel perpendicular to the flow in a run that lacks surface turbulence, undercut banks, and overhanging vegetation;
2) Measure the depth of the water across the channel at 3 – 4 points and average these t calculate average depth;
3) Multiply the width by the average depth;
4) Hold the measuring stick parallel to the stream flow just above the surface of the water so that you have 1 m in view. Drop a buoyant object (stick, leaf, orange, etc.) at the top end of the 1 m mark on the measuring stick and count the number of seconds it takes the object to float 1 m;
5) Divide (wetted width * average depth) by the number of seconds it took the object to float 1 m by to get the amount of flow in cubic meters per second.

Water Flow Units: If using the method above, choose $m^3$/sec.
[cfs] cubic feet per second
[cu ft/hr] cubic feet per hour
[gal/day] gallons per day
[gpm] gallons per minute
[m3/sec] cubic meters per second

***Note: If water visibility is so poor that it is not possible to clearly observe the substrate for the majority of the study reach, cancel the survey and attempt at a later date when visibility has improved. The same applies if flow results in turbulence prevents successful observation of the substrate, thereby limiting the surveyors' ability to detect redds or fish.***

Surveyors: Select: **Click here to add names**, select **Contributor Lookup.** Choose surveyors from the list of options and select **Next.** To add the second contributor's name, repeat the process. If a surveyor is not on list, then choose **Anonymous** and enter initials into the notes section at the end of the header. Choose **Next at the bottom** when all the surveyors have been selected or identified in the notes.

***Past the Subform Selection screen are 3 remaining questions:***

Comments: This is used for recording general notes about the survey that are not specific to an individual fish or redd record. For example, ending survey early due to an injury or if flow was recorded in a different section of the reach (include Lat/Long and why this happened).

Camera: Select the camera taken into the field from the popup list.

GPS: Select the GPS unit taken into the field from the popup list.
***After entering Camera and GPS, select "*Previous*" to return to the Subform Selection screen.***

*Lat/Long vs. Waypoints*

**For every record you create (Individual, Count or Redd), you will record the GPS location in the PDA (in the provided Lat and Long fields).**

**Only create a waypoint in the GPS unit for:**

1. **A newly identified redd;**
2. **O. mykiss over 16" in total length (in the Individual or Count Subforms); or**
3. **An observation of a novel invasive (consult your project leader to determine which invasives are known to be present in which reach).**

**Waypoints should be named using the format: XReachID.DateIDNumber**

## Individual Subform

*The Individual Subform is used to record observations of individual fish within a habitat unit. Other species of interest (i.e., outside the CMP focus-species) may also be recorded in the Individual Subform.*

Fish Record Number: This field will auto-populate with a running count of the number of fish observed for the survey reach for the survey day.

Waypoint: Label your waypoint as IReachID.DateIndividualID
***Only take a waypoint for an individual O. mykiss over 16" or a novel invasive.***
Example: Ventura 1, March 9, third *O. mykiss* over 16" observed (each observed in difference habitat units) would be **IVEN1.0309003**.
The ID number listed at the end of the waypoint name will be a running tally of individuals for that day on the survey reach.

***Record Lat/Long on the PDA for every record, even if no waypoint is taken in the GPS.***

Latitude (Y Coordinate): Location of the fish observation; e.g., 34.42495°.

Longitude (X Coordinate): Location of the fish observation; e.g., -119.26440°.

Coordinate System: Select GCS_North_American_1983.

GPS Error: E.g., if +/- 18 feet, enter 18.

Condition: Choose the condition that best describes the individual observed.
[-1] – No data
[1] – Carcass fresh clear eye
[2] – Carcass cloudy eye low fungus
[3] – Carcass no eye heavy fungus
[4] – Carcass skin and bones with head
[5] – Carcass skin and bones no head
[6] – Loose tag no fish
[D] – Dead (no other information)
[L] – Live (no other information)
[L1] – Live fresh not yet spawned
[L2] – Live spent spawned out
[L3] – Live Fresh Dark

Species: Choose the appropriate species. Specific protocols can be modified for regionally-relevant species of special interest for non-CMP research needs.

Migrant Stage: If your species is *O. mykiss,* choose the migrant stage. If migrant stage is unknown, leave this field blank.
**anad-adult**- Anadromous adult, 50 cm or greater.
**parr**- A juvenile salmonid with noticeable parr marks.
**resident adult**- Non-anadromous trout, 13 cm (K. McLaughlin, CDFW, unpublished data) to 38 cm (NMFS, 2012).
**YOY**- Young of the year, the most recently hatched salmonids.
**Uncertain**- Select this migrant stage if the fish does not definitively fit into one of the above categories.

Fish Length: Fish length is a visual estimate unless measuring a carcass.

Length Units: Choose the appropriate units for the length measurement.

Sex: Unknown (U), male (M), or female (F).

Sex Certainty: Sure, Maybe, or Unknown.

Fish on Redd?: Yes or No. A fish is considered to be associated with a redd if it is within three stream widths of the redd in question (NMFS 2015).

**Fish On Redd Subform:**

Redd Record Number: The record number of the Redd the fish is on.

Notes: Any additional notes about the fish or redd at this time.

Length Type: Fork Length (FL) or Total Length (TL). ***Note***: Fork Length will only be measured from a carcass, and only if your organization has a Section 10 permit authorizing carcass handling.

Notes: This section is for any additional information that is relevant and not otherwise covered in any of the drop down options. Noteworthy information includes invasive species observations, drought or water quality concerns and photo numbers. If the individual fish was on a redd, the redd record number should be recorded here.

**Count Subform**

*Used when multiple fish are observed within a single habitat unit. Counts will be made when multiple trout of the same size class (2 inch groups) are seen together. Example: A pool with 5 trout all between 2-4 inches in length would be a single count record. A pool with 3 trout 2-4 inches in size and 3 trout 6-8 inches in size would be* ***2 separate count records****. Note: you can use the same waypoint for 2 count records in the same habitat unit.*

Waypoint: Label your waypoint as CReachID.DateCountID
***Note: Only record a count waypoint for O. mykiss over 16" or a novel invasive sighting.***
Example: Ventura 1, March 9, second novel invasive observed on the reach would be
**CVEN1.0309002**
The ID number listed at the end of the waypoint name will be a running tally of Counts for that day on the survey reach.

***Record Lat/Long on the PDA for every record, even if no waypoint is taken in the GPS.***

Latitude (Y Coordinate): Location of the fish observation; e.g., 34.42495°.

Longitude (X Coordinate): Location of the fish observation; e.g., -119.26440°.

Coordinate System: Select GCS_North_American_1983.

GPS Error: E.g., if +/- 18 feet, enter 18.

Species: Choose the appropriate species. Specific protocols can be modified for regionally-relevant species of special interest for non-CMP research needs.

Migrant Stage: If your species is *O. mykiss* choose the migrant stage. (See page 8 for migrant stage list and descriptions.)

Count: Number of individuals or egg masses. If egg mass, indicate in the notes section.

Batch Size Class: Select the corresponding 2 inch size class for the batch of fish from the drop down menu.

Notes: Include any other pertinent information, including photo numbers.

**Redd sub form:**

Redd Record Number: Enter the date followed by the count of redds (a three digit value, include leading zeroes as needed) for that survey. Example: date-March 9, 2014, third redd observed that survey, redd number = **0309003**

Waypoint: Label your way point as the RReachID.DateReddID. Record a waypoint for every new redd. Example: Ventura 1, March 9, third redd observed would be **RVEN1.0309003**

Latitude (Y Coordinate): Location of the redd (e.g., 34.42495°).

Longitude (X Coordinate): Location of the redd (e.g., -119.26440°). If a GPS reading cannot be obtained (e.g., a fish is on the redd or insufficient satellite coverage), write "GPS" on the flagging.

Coordinate System: Select GCS_North_American_1983.

GPS Error: E.g., if +/- 18 feet, enter 18.

GPS Error Units: Select the appropriate units from the dropdown menu; e.g., if +/- 18 feet, enter ft.

Bearing: Measure the compass angle from the location of the flag to the middle of the tailspill: Standing at the flag, point the compass at the redd. Adjust the degree until the compass's red outlined arrow is in line with the red colored side of the magnetic needle (pointed north). The number marked at top of the compass, pointed in the direction of the redd, is the compass bearing. Remember to keep all electronics away from the compass when taking a reading, as they will interfere with the needle and give you an incorrect bearing. The bearing is out of 360°. ***Write on flag.***

Distance: Measure the distance from the flag to the middle of the tailspill. ***Write on flag.***

Distance Units: Choose the appropriate units for the distance measurement.

***Flagging redds***

All newly observed redds should be flagged. The flagging should be attached downstream of the redd to a substantial and solid living object that is visible at eye level (i.e., a sturdy, living tree branch is a good place for flagging, a cluster of cattails or a downed branch is not appropriate). Flagging should include:

- *Agency Name,*
- *Year,*
- *Redd record number,*
- *Bearing from the flag to the center of the tailspill,*
- *Distance from the flag to the center of the tailspill,*
- *Total length of the redd, and*
- *Redd age.*

*Ex: 0309003 50° 1.5m TL 1.2 m RA=1, 2014*

Species: Since the only salmonid recorded as typically residing in southern California are steelhead, *O. mykiss* is the default.

Redd Measurement Units: Select the unit of measurement from the dropdown menu. Centimeters are standard. If using meters, measure to 2 decimal places (1 meter = 1.00).

(See Figure 3 and 4 for diagrams of physical redd measurements.)

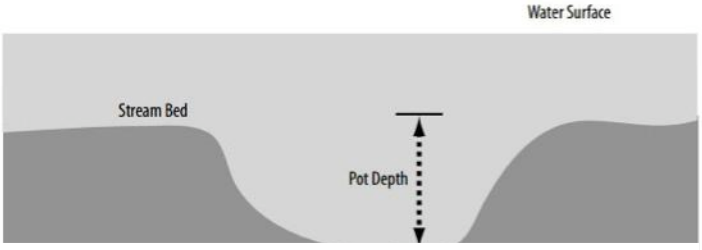


**Figure 3.** Cross-section view of redd. Illustration by Andrew Fuller.

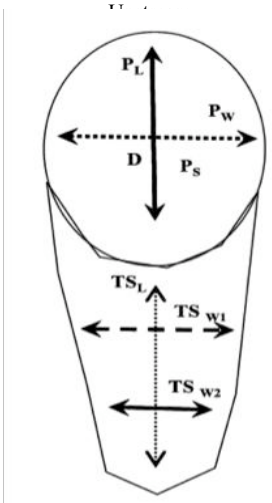


**Figure 4**. Redd diagram showing physical measurements. P is pot; TS is tail spill, L is length, W is width, $P_S$ is pot substrate. (CDFG, 2011)

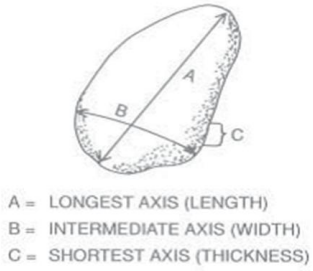


**Figure 5.** The A, B and C axes of a typical stream bed particle. Particle size measurements are estimated along the B-axis (Doll et al. 2003).

Pot Length (**$P_L$**): Total length of the pot parallel to the stream flow.

Pot Width (**$P_W$**): The maximum width of the pot perpendicular to stream flow.

Pot Depth (**$P_D$**): The maximum depth of the excavated portion related to the undisturbed streambed—measure the depth from water surface to deepest part of pot and the water surface to bottom of stream bed, the pot depth is the difference between the two.

Pot Substrate (**$P_S$**): The size of dominant substrate in the pot. This is estimated by choosing a representative piece of gravel for the dominate substrate and measuring the diameter across the smallest axis that will pass through a sieve. This corresponds to the intermediate axis (labeled B in the diagram below).

Tailspill Length (**$TS_L$**): total length of the tailspill parallel to the stream flow. Measurement is taken from the bottom edge of the pot to the bottom edge of the tailspill. The measurement should follow the center line of the redd when possible. If the tailspill is irregularly shaped, do your best to estimate.

Tailspill Width 1 (**$TS_{W1}$**): maximum width of the tailspill perpendicular to the stream flow or pot length. Measure from one edge to the other 1/3 of the distance from the upstream end of the tailspill.

Tailspill Width 2 (**$TS_{W2}$**): maximum width of the tailspill perpendicular to the flow or pot length. Measure from one edge to the other 2/3 of the distance from the upstream end of the tailspill.

Tailspill Substrate (**$TS_S$**): size of dominant substrate in the tailspill. This is estimated by choosing a representative piece of gravel for the dominate substrate and measuring the diameter across the smallest axis that will pass through a sieve (Figure 5).

Age Code: Age code or Redd Age is used to determine how long the redd is visible. The redd age should be reviewed every time a redd is surveyed and changed when appropriate.

***Write on flag*:**
**I=New since last survey**: All new redds observed and flagged for the first time.
**II=Previously identified and still measureable**: A redd flagged from a previous survey. If total length has changed significantly, remeasure the entire redd.
**III=No longer measureable but still visible**: Previously-identified redd still visible but has become less discernable.
**IV=No redd apparent, only flag**: Previously identified redd which is no longer visible. If you cannot see the redd then tie a loose knot in the flagging.
**V=Poor conditions cannot see substrate**: When you identify where a redd flag is from a previous survey and the flag is unknotted, but you cannot see the substrate to confirm if a redd is visible.

Re-measured?: Yes/No

Notes: Noteworthy items include: redd shape differs from a circular pot and triangular tail spill, superimposed (SU) and old record number, any *O. mykiss* behavior, fish on redd, etc.

**PDA tips and tricks**:

A. When using the stylus:
   1. The left side of the lower pad is for letters.
   2. The right side of the lower pad is for numbers.
   3. Writing on the line between the left and right side of the lower pad (between the arrows) will give you capitalized letters.
   4. Writing a dash forward will add a space.
   5. Writing a dash backwards will delete the previous character.

B. If you need to edit a record after it has been created (the header or a subform):
   1. Return to the FORMS 5.1 screen:

a) Select next to scroll through all the pages; or
b) Select "End" located at the bottom of the form.

2. Highlight the form you want to edit (i.e., the subform or header).
3. Select "Review".
4. Click on the record you want to edit to open the record; make your edits.
5. When you are done editing, select "Next" until you are back at the screen with the list of forms or subforms.
6. Select "Done" to return to FORMS 5.1 page.
7. Select "Header" and choose "Review". Select the header record you're currently working on to continue entering new data.

C. Some data fields have restrictions on what kind of data can be entered. Some will only accept answers from a drop down list or will only except numbers. If you attempt to enter something else, you will receive an error message.

D. Some data fields are required. They will generate an error message if you leave the field blank.

## Equipment Checklist

- ☐ Boots, waders and gear bags or totes
- ☐ Polarized sunglasses
- ☐ Hat
- ☐ Handheld data recorder
- ☐ Blank data forms (included as attachment to protocol) and clipboard
- ☐ Pencils, pens and permanent markers
- ☐ Spawning survey protocol
- ☐ GPS unit and extra batteries
- ☐ Camera and extra batteries
- ☐ Flagging
- ☐ Metric measuring stick (e.g., stadia rod)
- ☐ 2 thermometers
- ☐ Compass
- ☐ Flow meter, meter tape and flow datasheet
- ☐ First aid kit
- ☐ Ziploc bags large enough for anadromous adult carcasses (if you are permitted to handle, see page 5 for more information)

## Safety

Be sure to plan your route and know your entry and exit point ahead of time. Let office or on call staff know where you are going and when you intend to be out of the creek; text or call when you are safely back at a vehicle. Work in pairs and bring extra food and water, in addition to a first aid kit and sunscreen. Know the location of the nearest hospital or medical center.

Decontamination is mandatory to prevent the spread of invasive species among and within watersheds. The following protocol is used (modified from CDFW 2013; Tsai/PSMFC 2016):

1. Ensure any gear that was in contact with the creek is isolated during transport at the conclusion of the day in the field. Gear can be put in heavy duty trash bags or totes to keep.
2. Scrub gear with a stiff-bristled brush to remove all organisms. Thoroughly brush small crevices such as boot laces, seams, net corners, etc.
3. Soak gear in 10% saline solution for ten minutes; then rinse with fresh water.
   If gear cannot be soaked in salt water (e.g., electronics), wipe down with a 2% Virkon solution.
   For gear that should not be soaked in solution (e.g., backpacks), freeze (step 4, below) and then allow to dry fully for a minimum of 48 hours.
4. Place in a freezer 32°F or colder for a minimum of eight hours.

Other appropriately rigorous and CDFW-approved decontamination methods can be used.

## Data

At the conclusion of the sampling season, after data has undergone quality control methods, data should be transferred electronically to Dana McCanne, Environmental Scientist for the California Department of Fish and Wildlife's South Coast Region (Dana.McCanne@wildlife.ca.gov). He will coordinate the transfer of data to the statewide database and other regional coordination.

## Acknowledgements

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**Appendix 1.** Reach names and reference codes used in the Ventura River watershed.

| Reach Name | Code |
|---|---|
| Matilija Creek Reach 1 | UPM1 |
| Matilija Creek Reach 2 | UPM2 |
| Matilija Creek Reach 3 | UPM3 |
| Matilija Creek Reach 4 (UNF) | UNF1 |
| North Fork Matilija Reach 1 | NFM1 |
| North Fork Matilija Reach 2 | NFM2 |
| North Fork Matilija Reach 3 | NFM3 |
| North Fork Matilija Reach 4 (Bear) | BER1 |
| San Antonio Creek Reach 1 | SNT1 |
| San Antonio Creek Reach 2 | SNT2 |
| San Antonio Creek Reach 3 | SNT3 |
| San Antonio Creek Reach 4 (Lion) | LSA1 |
| Ventura River Reach 1 | VEN1 |
| Ventura River Reach 2 | VEN2 |
| Ventura River Reach 3 | VEN3 |
| Ventura River Reach 4 | VEN4 |
| Ventura River Reach 5 | VEN5 |
| Ventura River Reach 5.1 | VEN5.1 |

| Date: | Type (Foot/Snorkel): | Surveyors: | REDD SURVEY FORM (2017.03.02) | Form # ____ of ____ |
|---|---|---|---|---|
| Time: | Weather: | Start GPS: | End GPS: | Water Flow: At redd only |
| Creek Name/Reach: | Air Temp (°C): | Water Temp (°C): | Water Vis (0-3) (Feet): | (cfs) (cm/s) |
| | Camera: | GPS Unit: | Age Code: 1= new; 2 = Previsouly ID'd & measurable; 3= Can't measure but visible; 4= No redd only flag; 5= Poor conditions can't see substrate | |

| Redd Record Number | RKM | GPS Coordinates | GPS Error (ft) | Bear-ing | Dis-tance (m) | Pot L (cm) | Pot W (cm) | Pot D (cm) | Pot Sub-strate (cm) | TS L (cm) | TS W1 (cm) | TS W2 (cm) | TS Sub-strate (cm) | Age Code | Re-measured? | Comments (Picture File #, fish on?, etc) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | |
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Notes:

Survey Type: 1=foot, 2=snorkel

Reach Codes: 2 =Malibu Lower, 3=Malibu Upper, 4= Topanga 0-1700m, 5=Topanga 1700-3600m, 6=Topanga 3600-5300m

CMP Codes: Weather 1=sunny, 2=cloudy, 3=overcast, 4=rain, 5=snow

| Gear | Camera | GPS | GoPro | Stadia Rod | Compass | Thermo-meters |
|---|---|---|---|---|---|---|

Supplemental: Flow float method: Using a meter stick, measure depth at equal intervals along the width of the stream. Multiply each depth by the interval it was taken in and add all the amounts together. This calculation is the area of a cross section of the stream. Decide on a length of the stream to send a floating object down. Measure the time it takes the float to travel down that length. Repeat 3 times to determine average.
In the office: http://www.appropedia.org/How_to_measure_stream_flow_rate.

# APPENDIX C
# RCDSMM Malibu Solar Sonde Management Protocol

## Malibu Creek Solar Water Quality Data Sonde Data Upload and Calibration Protocol

What to bring when you are going into Malibu Creek to upload data from the CR3000 Micrologger or calibrate or switch out the In-situ 9500 data sonde:

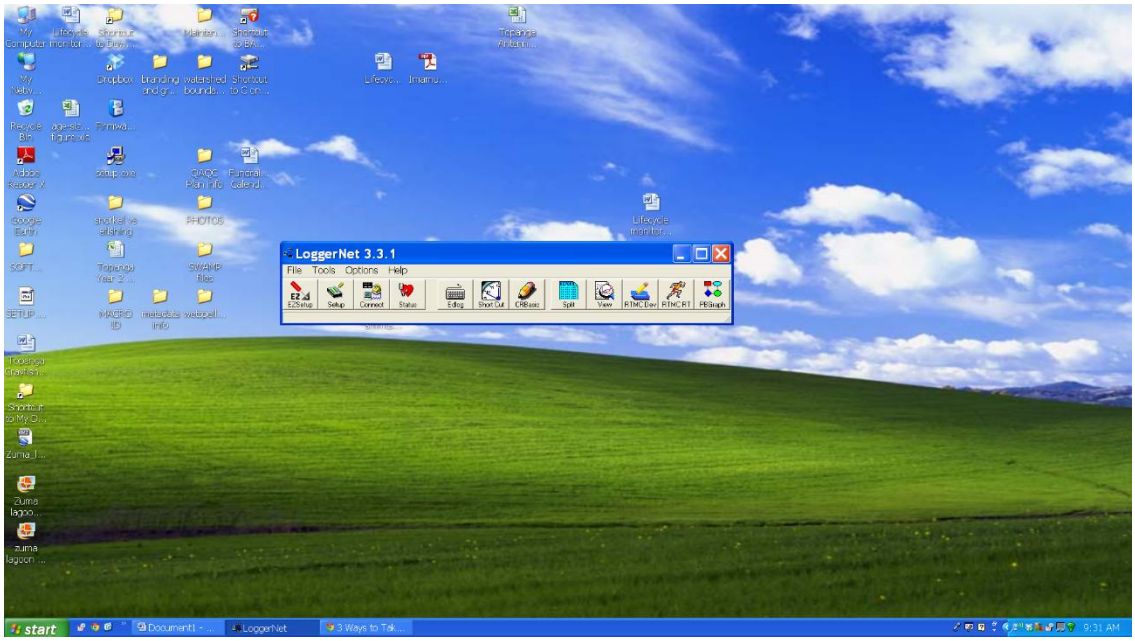
- Solar box key
- Sonde lock key
- Flathead screwdriver (for solar box)
- In-situ Quick-cal solution (or other appropriate calibration solutions)
- In-situ cable (connect sonde to computer)
- Tools for removing probes
- Calibration cup
- Laptop, Camera & Data book

### Instructions for uploading new data and updating the master data file:

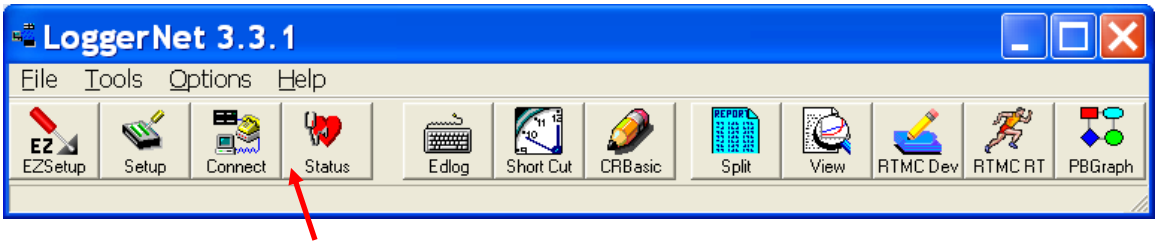
***Uploading new data file:***

**1)** Use solar box key and flathead screwdriver to open the solar box that holds the CR3000 micrologger. Hook up the silver cord that is attached to the micrologger to the USB port on the right side of the laptop (port closest to the charger port [DC IN 15.6V]).

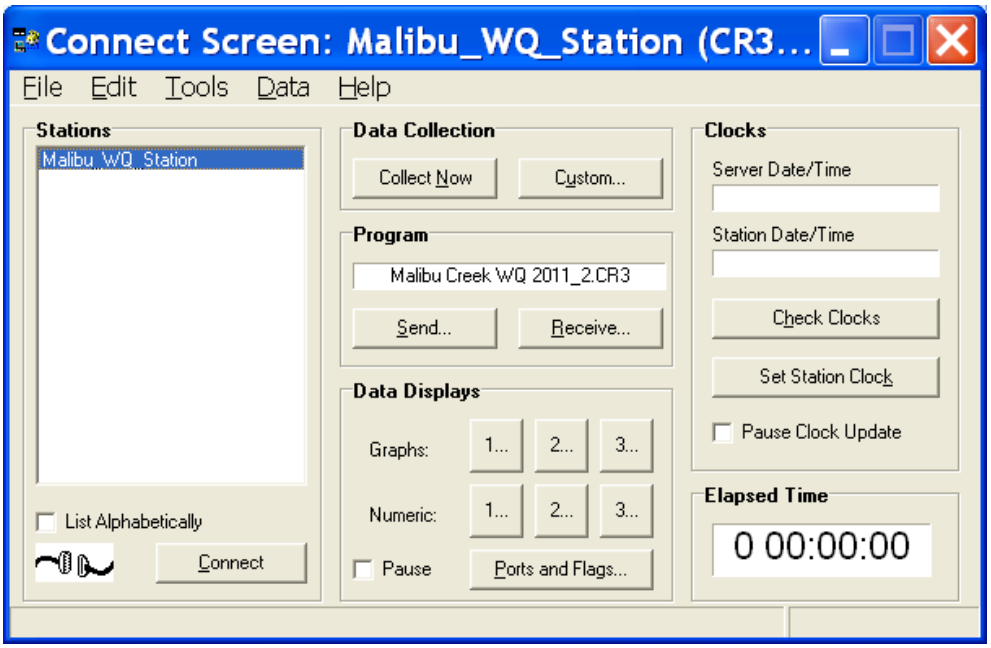
**2)** Open LoggerNet (in Software folder on desktop of Panasonic CF-52 laptop).



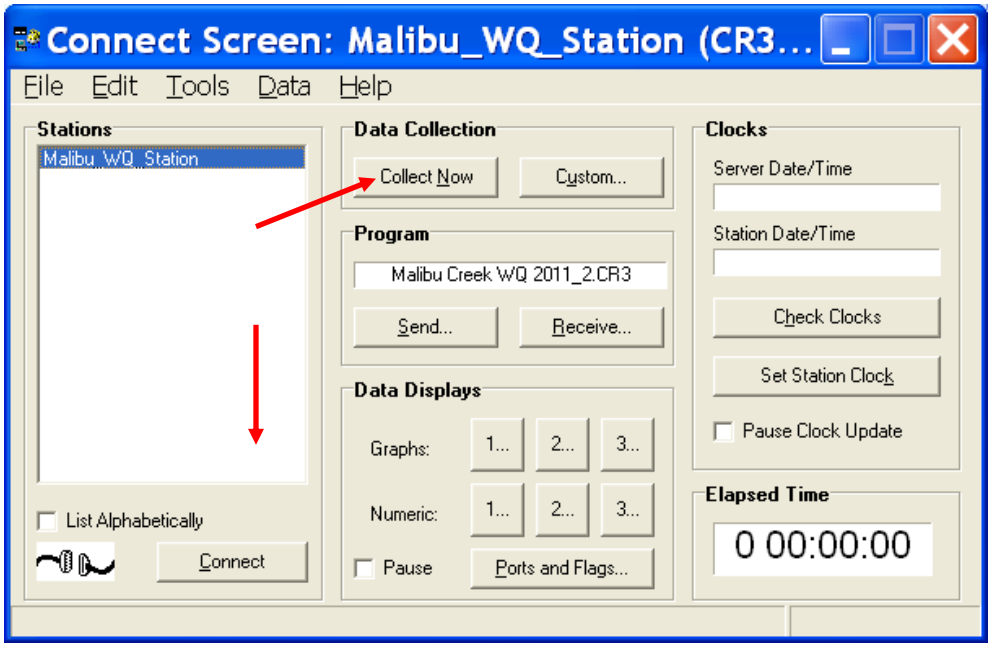

**3)** Click on Connect.




**4)** The Connect Screen will open. Click on Connect. Once connected it will read Disconnect



**5)** Once you are connected to the micrologger, click on Collect Now.




**6)** The file will begin to upload to the laptop. When complete, it will show you the file location. Click Disconnect (it will be where the Connect button is in the image above).

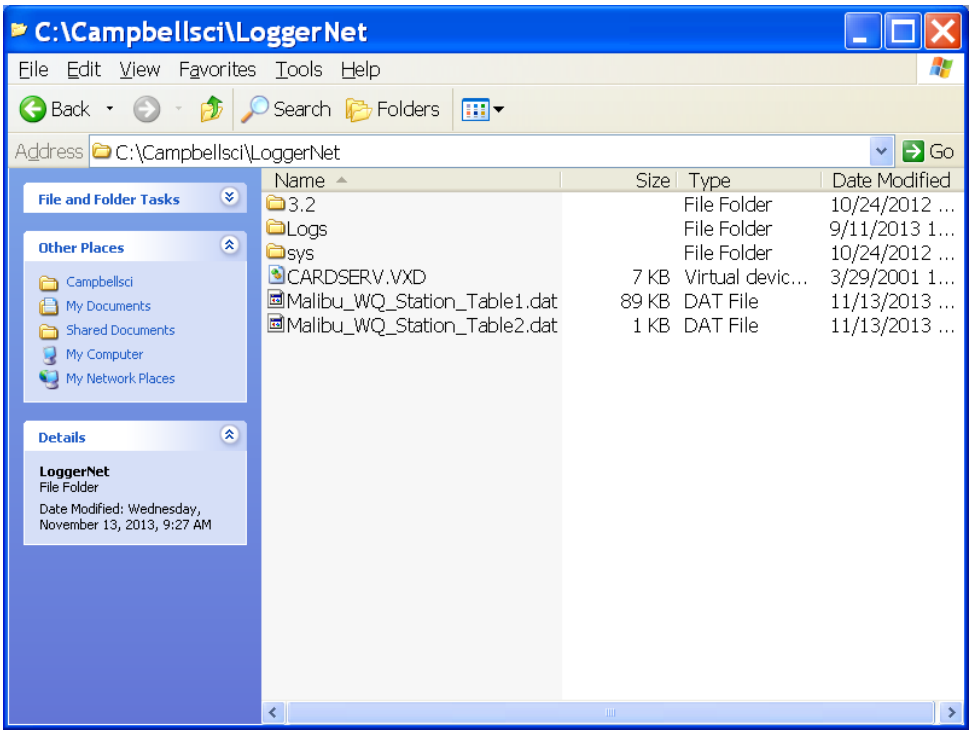
**7)** Close out of LoggerNet, disconnect silver cable from laptop and put back in the solar box.

**8)** Open the file to check that the data sonde has been working and the data uploaded okay (see *Updating existing master data file* below for further instructions).

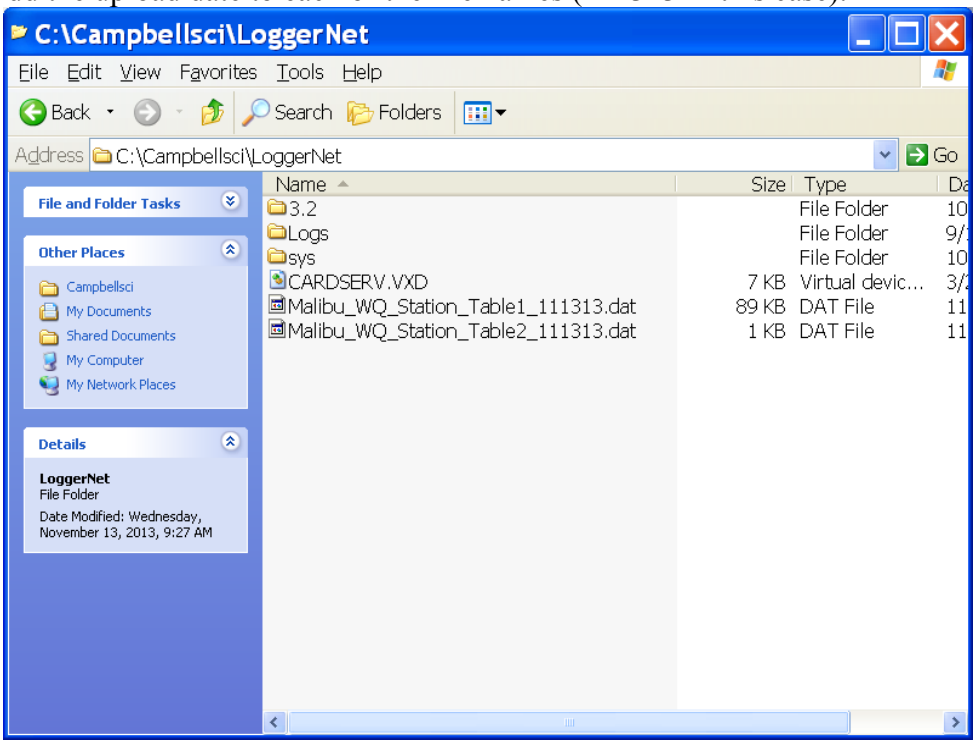
***Updating existing master data file:***

**1)** Go to Start Menu → Open My Computer → Local Disk (C:) → Campbellsci → LoggerNet

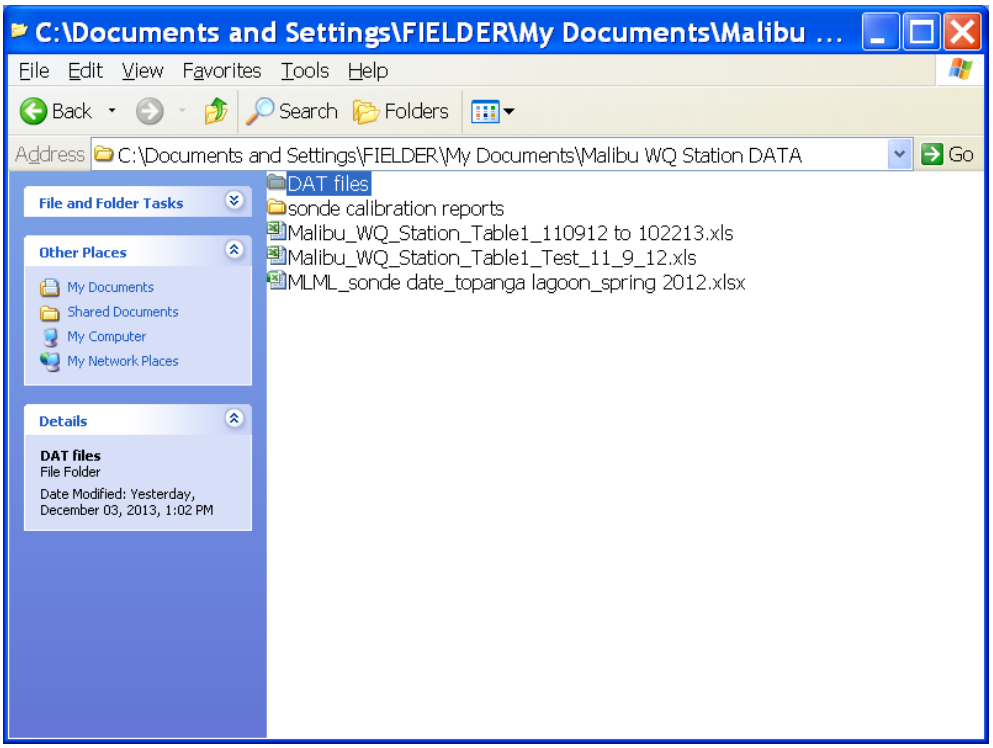
**2)** There should be two new files in the LoggerNet folder (Table 1 and Table 2). Table 1 is larger and contains the water quality data, table 2 contains micrologger data.



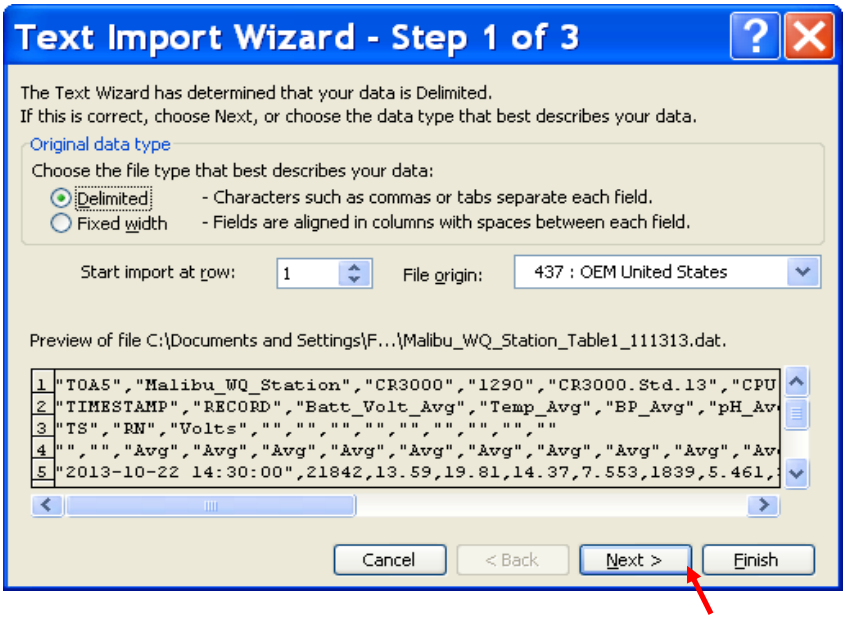

**3)** Add the upload date to each of the file names (111313 in this case).



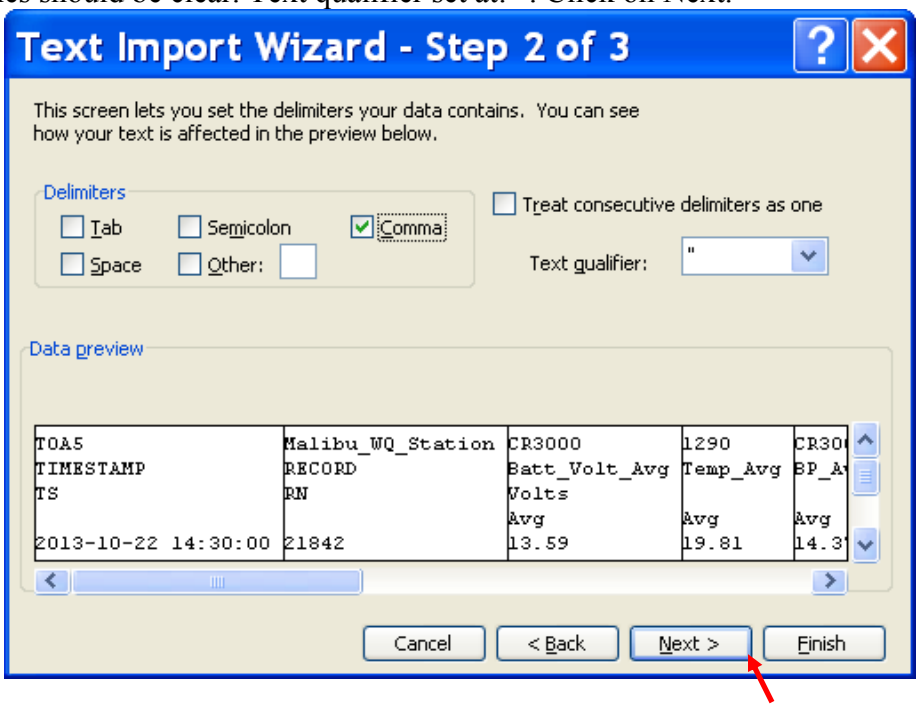

**4)** Go back to Start Menu → Open My Documents → Malibu WQ Station DATA → DAT files.



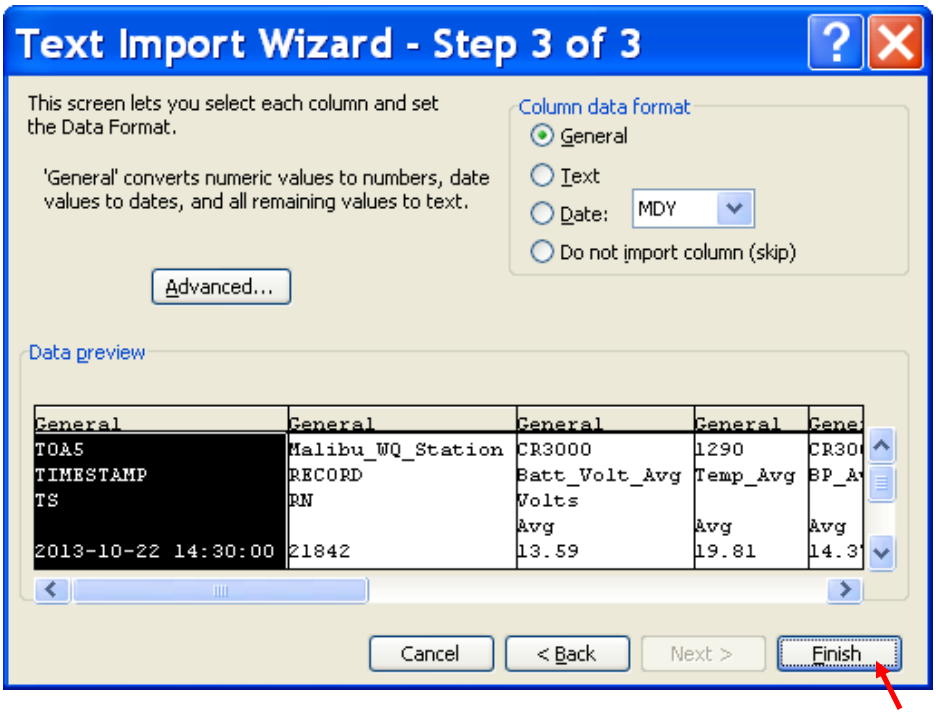

5) Cut and paste the two new data files from the LoggerNet folder into the DAT files folder.
6) Open the most recent master data file (in the Malibu WQ Station DATA folder) – in the example above it is: **Malibu_WQ_Station_Table1_110912 to 102213.xls**
7) In Excel, Go to File → Open → Malibu WQ Station DATA → DAT files (at this point, use the dropdown menu for "Files of Type" and select "All Files (*.*)") → select the new file – in this example it is: **Malibu WQ_Station_Table1_111313.dat**
8) The Test Import Wizard screen will appear. In step 1 of 3, Delimited should be selected. Start import set at row:1, File origin set at: 437 : OEM United States. Click on Next.



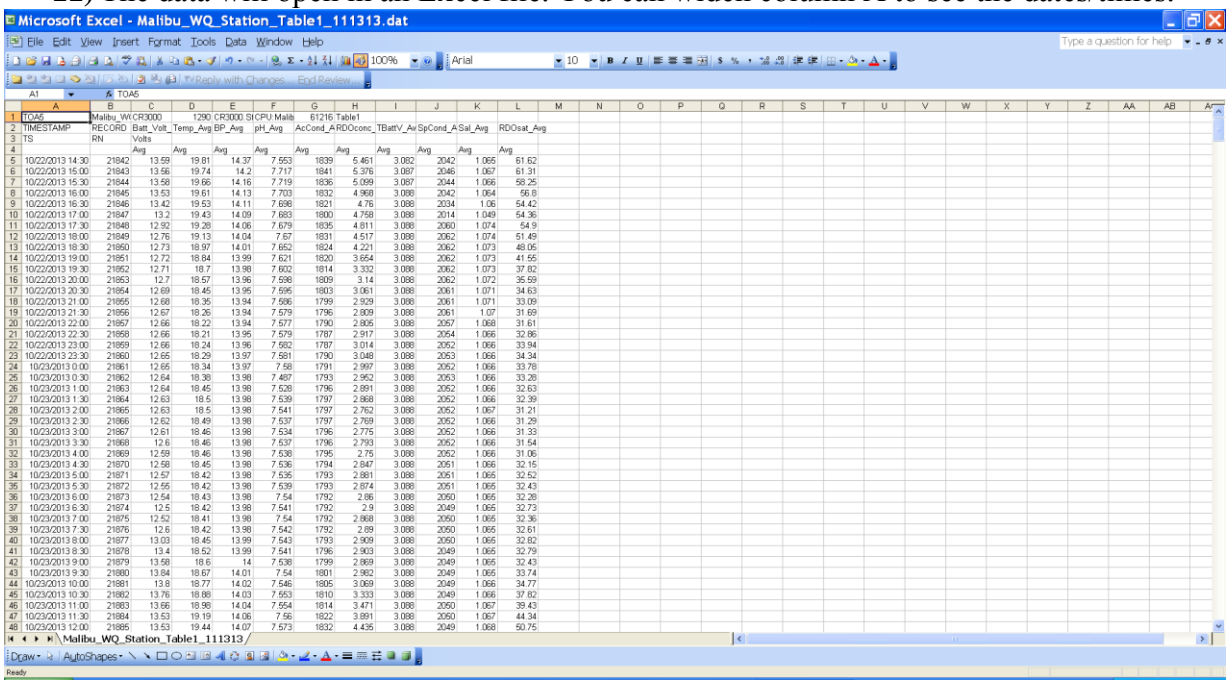
**9)** In Step 2 of 3, under Delimiters, Tab will be selected, you'll need to click on the box next to Tab to deselect it and click on the box next to Comma to select it. All other boxes should be clear. Text qualifier set at: ". Click on Next.



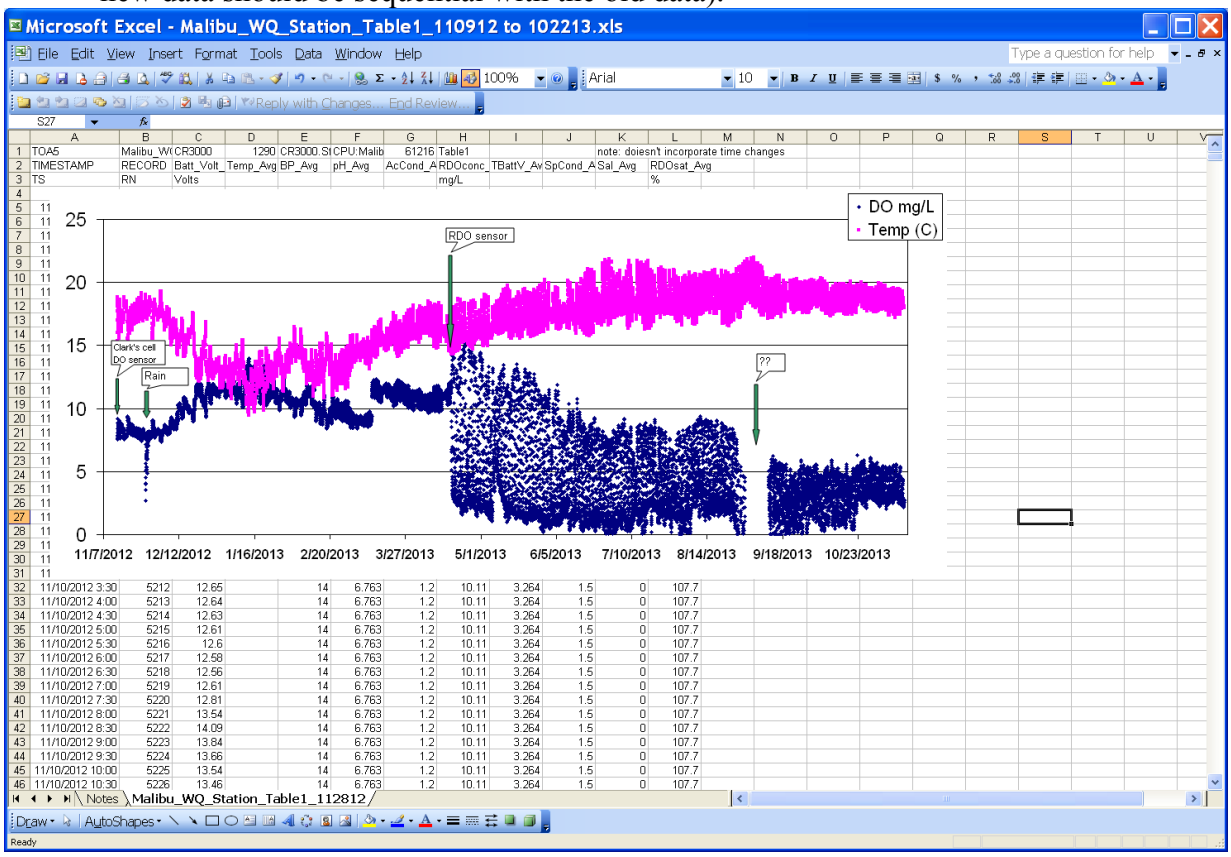

**10)** In Step 3 of 3, under Column data format, General should be selected. Click on Finish.



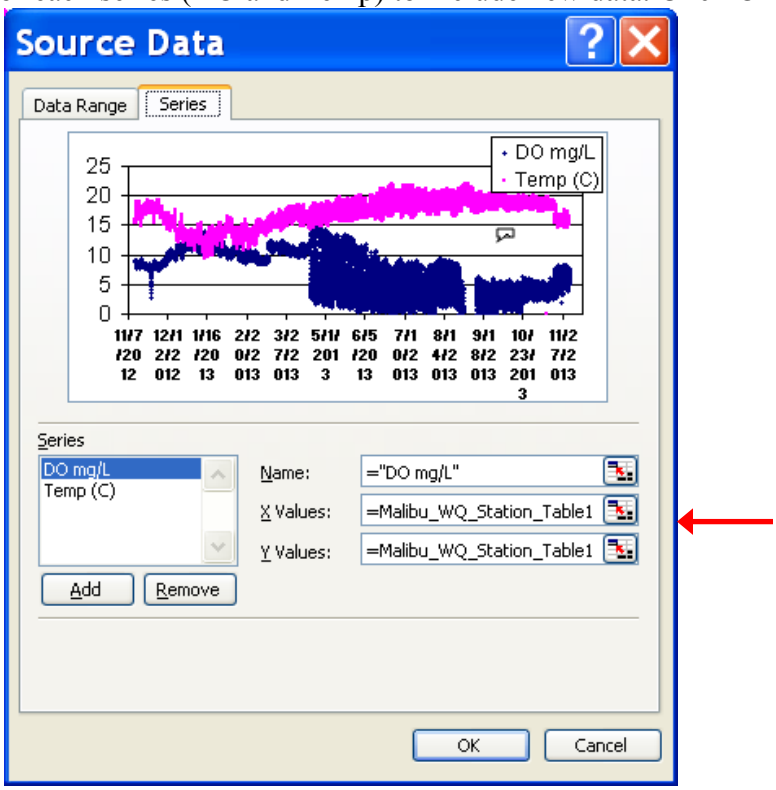
**11)** The data will open in an Excel file. You can widen column A to see the dates/times.



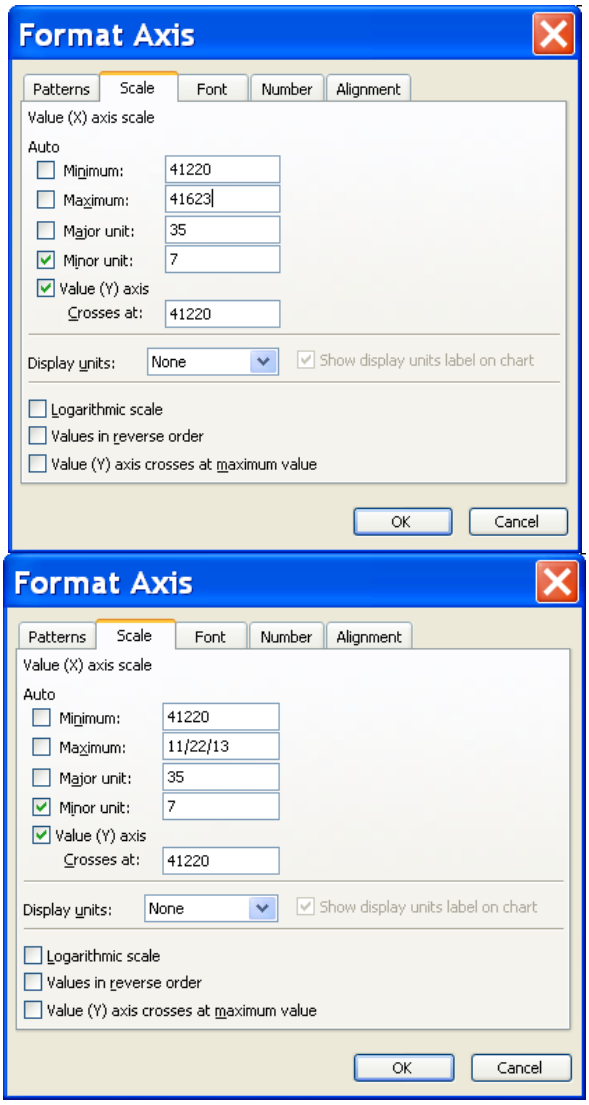

**12)** Copy and paste this data into the original Master Data file (into the row below the last current data point). Check that the new data lines up okay (the dates and times of the new data should be sequential with the old data).



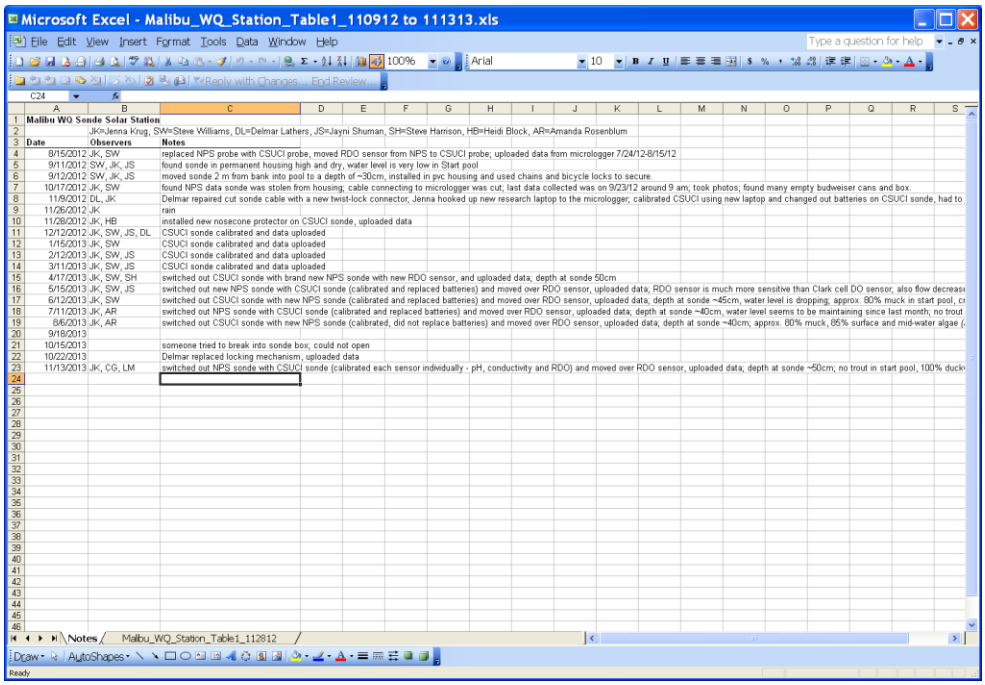
**13)** Update the temp/do graph to include new data by Right-clicking on the graph and selecting Source Data… In the Source Data screen, select the Series tab. Update the X and Y values for each series (DO and Temp) to include new data. Click OK.




**14)** Double click on the x-axis values (dates) on the graph to update the x-axis scale. In Format Axis, select the Scale tab. Enter the current date in the Maximum value box. (It will likely read a value like 41623 (see image below on left), you can still enter the date as mm/dd/yy in the maximum value box (see image below on right). Click OK.

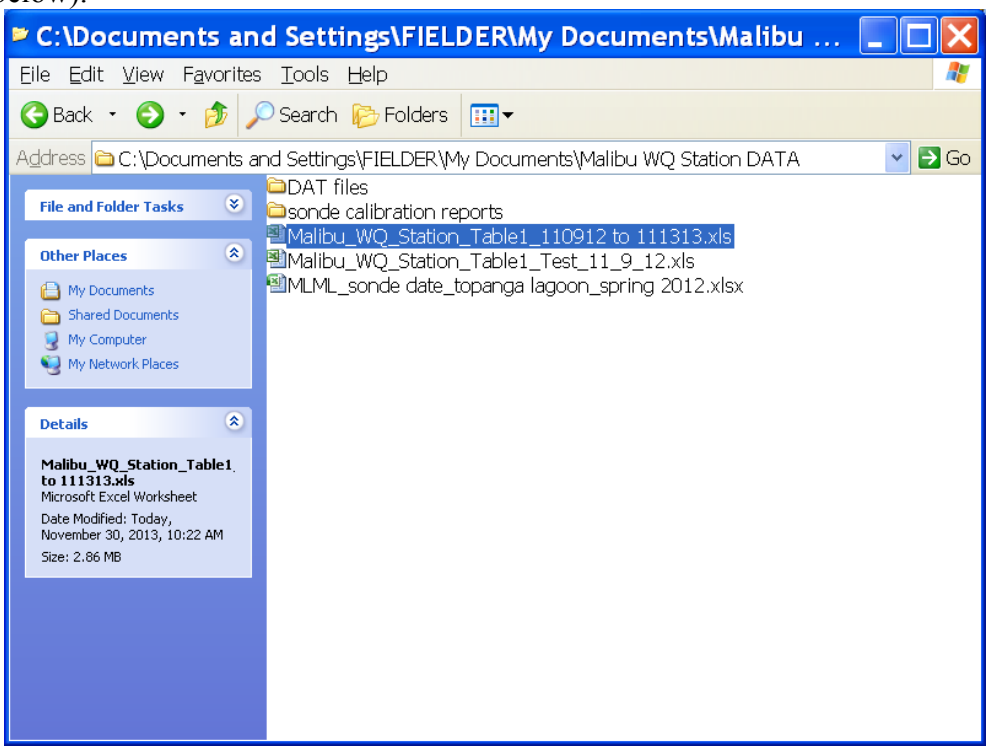



**15)** Check that the data looks reasonable, and that the sonde appears to be working okay.
**16)** Update the Notes worksheet.




**17)** Save and Close out of excel. You do not need to save the new data as its own excel file.

**18)** Last step is to update the master data file name to include the latest date (111313 below).

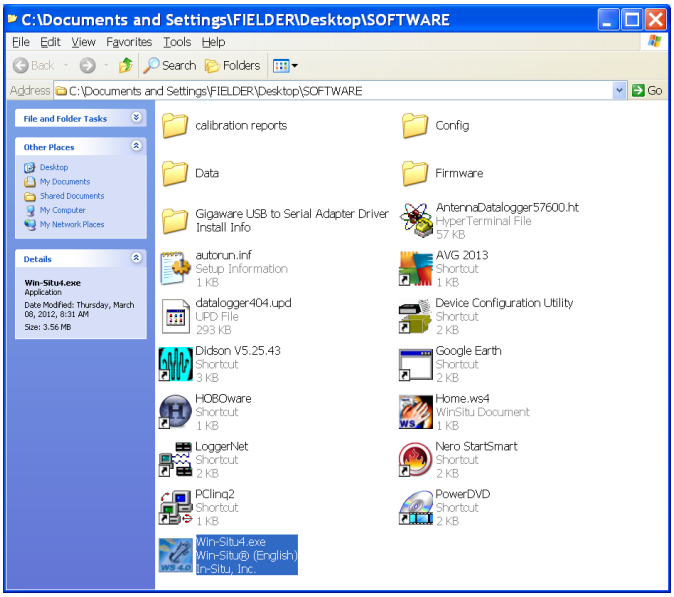



**19)** You have now completed the file upload and data update!

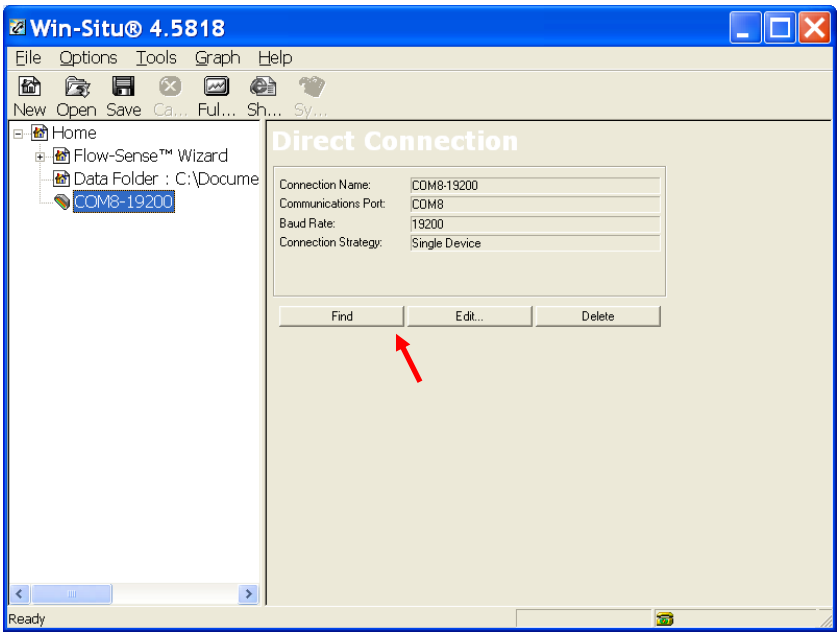
****NOTE - While you are uploading and updating the file, your partner should be getting the data sonde from the creek and preparing for calibration and/or switching out the sonde. See page 8 for calibration instructions.**

## Instructions for calibrating and switching out data sondes:

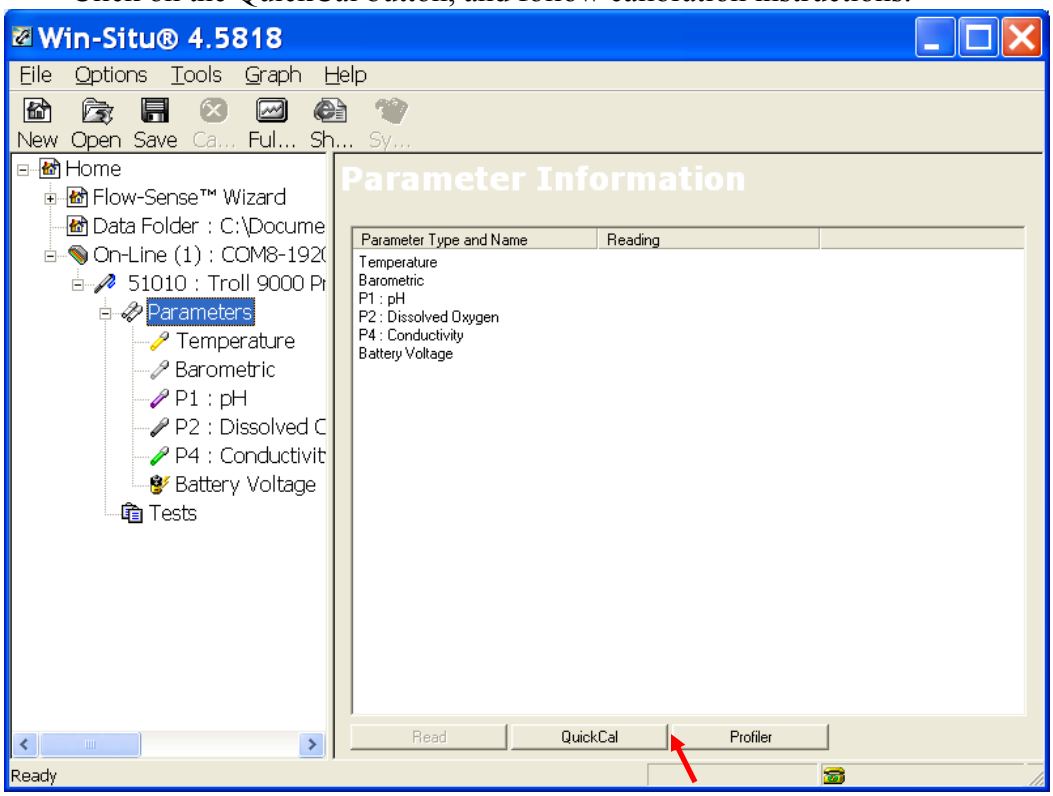
1) Use the sonde lock key to unlock the sonde housing. Remove the sonde from the housing and bring up to computer box for switching out and calibrating. Make sure the twist-lock end of the cable (the end that connects to the sonde) does not get wet.
2) Once up by the computer, remove the RDO sensor from the sonde and place it on the replacement sonde.
3) For Quick-Cal calibration:
   - Fill the calibration cup to fill line with Quick-Cal solution and place onto sonde.
   - Using In-situ USB cable, connect the sonde to the laptop.
   - Open Win-Situ4.exe (in the Software folder on the desktop of the Panasonic CF-52).




   - Once open, select COM8-19200, then click on Find.

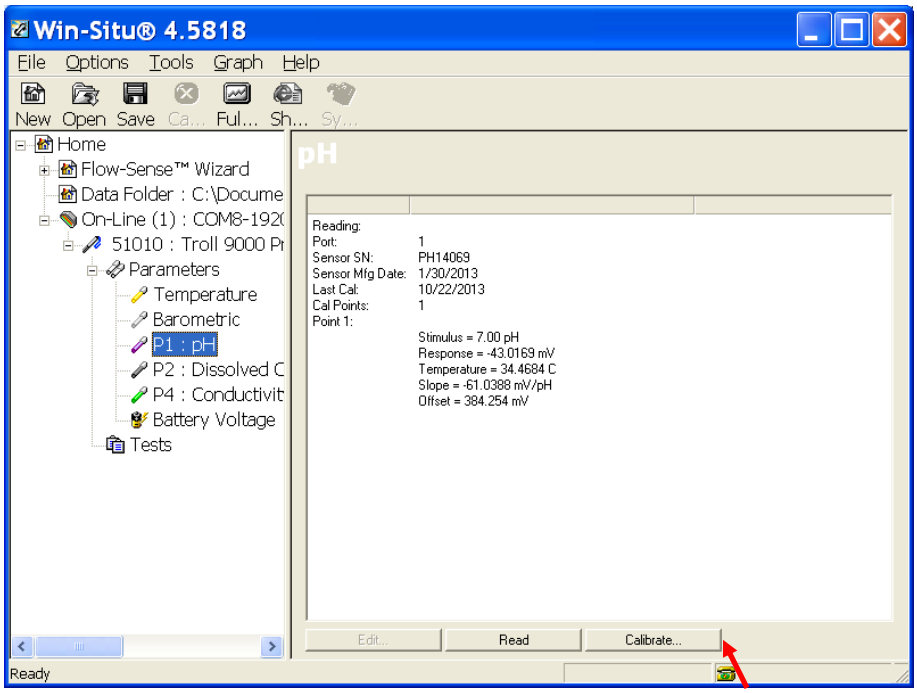



- It might take a minute to find the Troll sonde. Once found, you'll see the unit appear On-Line. Each of the parameters (sensors) detected will be listed.
- Click on the QuickCal button, and follow calibration instructions.

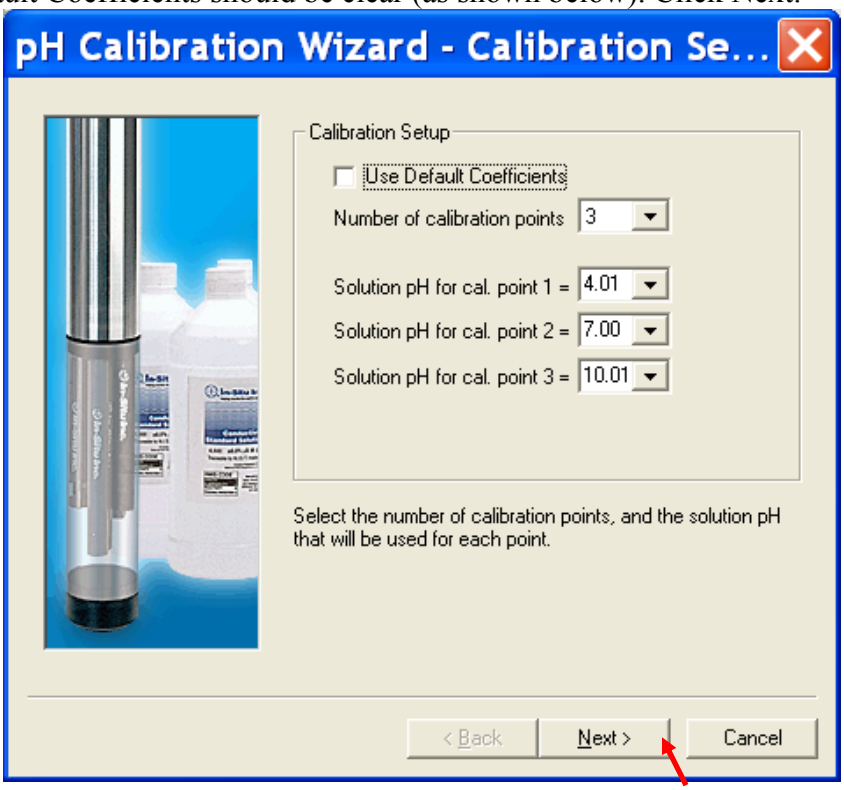


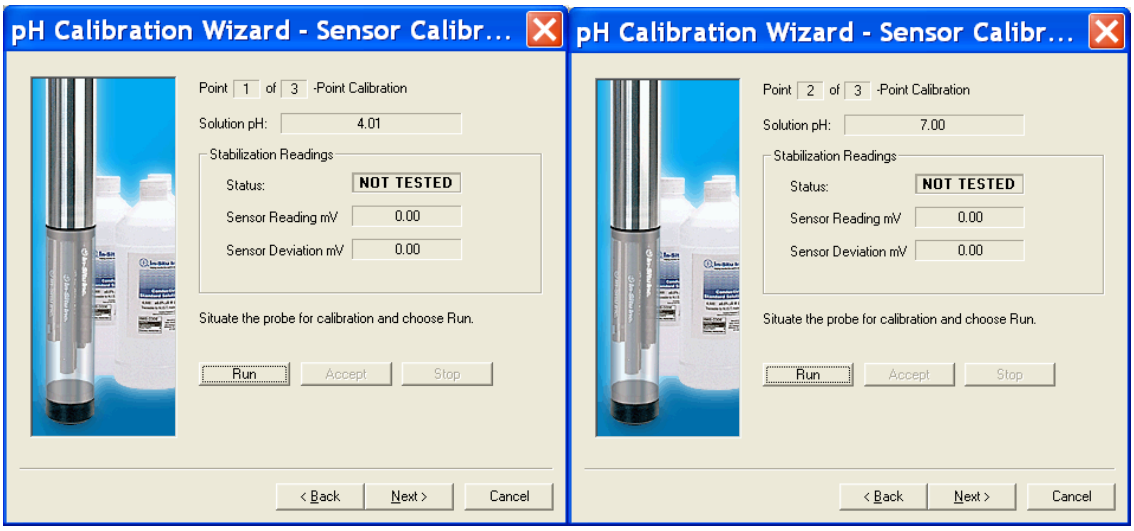

**4)** For individual parameter calibration:

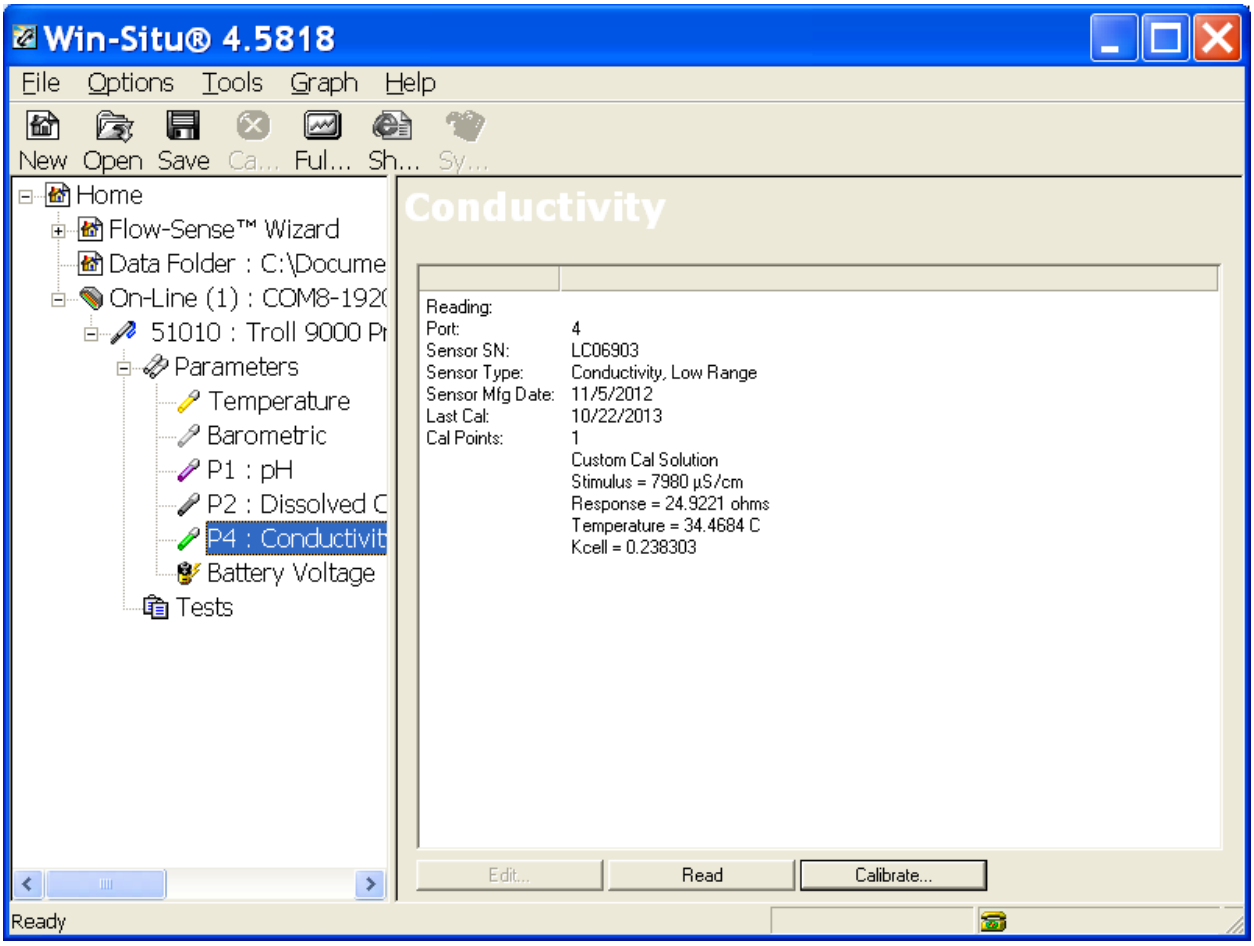
- Click once on the parameter you want to calibrate (**pH**). Then select Calibrate

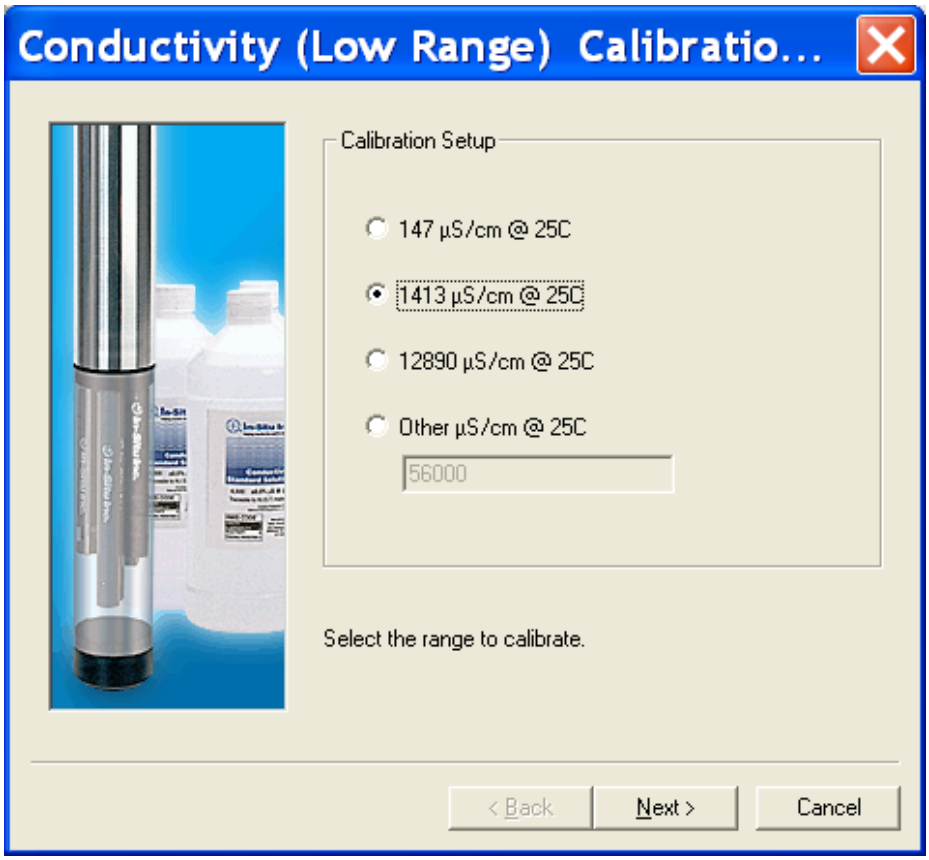


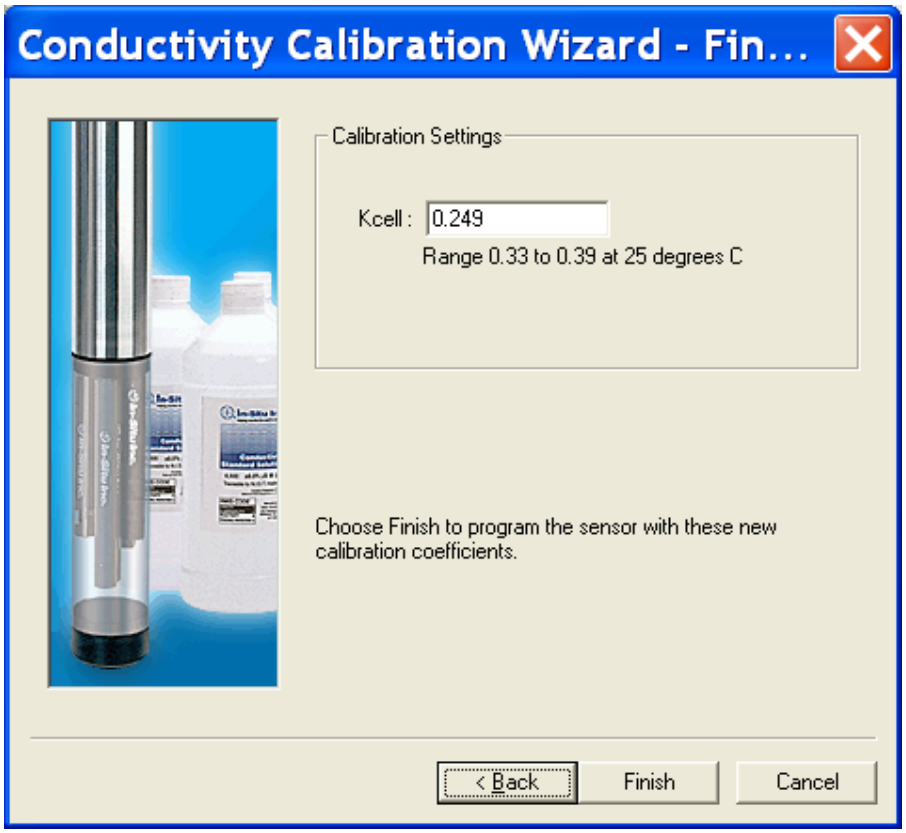

- pH Calibration Wizard screen will appear. Under Calibration Setup, select Number of calibration points as 3, with 4.01, 7.00, and 10.01 solutions. Use Default Coefficients should be clear (as shown below). Click Next.




pH Calibration Wizard - Sensor Calibr...
Point 1 of 3 -Point Calibration
Solution pH: 4.01
Stabilization Readings
Status: NOT TESTED
Sensor Reading mV 0.00
Sensor Deviation mV 0.00
Situate the probe for calibration and choose Run.
Run
Accept
Stop
< Back
Next >
Cancel
pH Calibration Wizard - Sensor Calibr...
Point 2 of 3 -Point Calibration
Solution pH: 7.00
Stabilization Readings
Status: NOT TESTED
Sensor Reading mV 0.00
Sensor Deviation mV 0.00
Situate the probe for calibration and choose Run.
Run
Accept
Stop
< Back
Next >
Cancel


Win-Situ® 4.5818
File Options Tools Graph Help
New Open Save Ca... Ful... Sh... Sy...
Home
Flow-Sense™ Wizard
Data Folder : C:\Docume
On-Line (1) : COM8-192(
51010 : Troll 9000 Pr
Parameters
Temperature
Barometric
P1 : pH
P2 : Dissolved C
P4 : Conductivit
Battery Voltage
Tests
Conductivity
Reading:
Port: 4
Sensor SN: LC06903
Sensor Type: Conductivity, Low Range
Sensor Mfg Date: 11/5/2012
Last Cal: 10/22/2013
Cal Points: 1
Custom Cal Solution
Stimulus = 7980 µS/cm
Response = 24.9221 ohms
Temperature = 34.4684 C
Kcell = 0.238303
Edit...
Read
Calibrate...
Ready


Conductivity (Low Range) Calibratio...
Calibration Setup
147 µS/cm @ 25C
1413 µS/cm @ 25C
12890 µS/cm @ 25C
Other µS/cm @ 25C
56000
Select the range to calibrate.
< Back
Next >
Cancel


Conductivity Calibration Wizard - Fin...
Calibration Settings
Kcell :
0.249
Range 0.33 to 0.39 at 25 degrees C
Choose Finish to program the sensor with these new calibration coefficients.
< Back
Finish
Cancel

# APPENDIX D
# DIDSON Camera Protocols

The purpose of this protocol is to guide the installation and deployment of a DIDSON camera in Topanga Creek. Some of the steps will vary depending on flow regime and rainfall rates, and can be adjusted accordingly.

**Project Contacts and Phone Numbers:**
Contact one of the following people if there are questions or concerns:
Rosi Dagit, RCD Project Manager (Cell) – 310-488-6381
Rosi Dagit (Home Office) – 310-455-7528
Kate McLaughlin, CDFW – 805-962-4473
Sam Bankston, CDFW – 805-423-5477
RCD Office (Topanga) – 818-597-8627 ext. 102 (John Hendra)
Marcel (electrician) – 310-488-5361

**I. Prior to deployment – when to deploy**
When a storm is approaching, the current depth and flow of the creek should be noted and the storm should be tracked using NOAA and other weather tracking sites.

*Suggested websites for storm tracking:*

- NOAA Weather (also see Forecast Discussion for details) - http://forecast.weather.gov/MapClick.php?site=lox&textField1=34.09361&textField2=-118.60056
- The Weather Channel Satellite Video – http://www.weather.com/maps/geography/westus/westcoastussatellite_large.html
- LA County DPW WRD (for approximate rainfall totals) - http://www.ladpw.org/wrd/precip/

When it appears like the storm will produce enough rainfall and flow to allow for proper use of DIDSON, preparation for deployment should begin.

Water levels in the creek should be monitored closely as well when expecting a storm – check Topanga Bridge (mm 2.02), Fish Camp, DIDSON site, and Lagoon for connectedness.

**II.A. Prior to deployment – check equipment**
When a storm is approaching, all equipment should be checked for proper functioning and water quality equipment should be calibrated as needed. All necessary equipment should be staged in the Mobile Mini Unit so that it is ready to go when needed. *Power* should be connected to make sure it is working properly (see Section III. below for complete instructions on connecting power to the Mobile Mini). The *rain gauge* should be attached to a pole outside of Mobile Mini to be able to track rainfall nearest to the DIDSON.

**II.B. Prior to deployment – staging equipment**
The following is a list of equipment that should be staged:

- DIDSON camera

- DIDSON camera housing
- A-frame
- Black cable connecting camera to topside
- 2 laptops – one for recording, one for processing
- Headlamps
- Flashlights
- Life vests
- Waders
- Sand bags
- Towels
- Rain gear
- Water quality test probes – pH, conductivity, dissolved oxygen, water and air temperature (see notes above re: calibrating)
- Keys to power boxes and locks for camera housing and tether
- Tether cord
- Data sheets for processing and in-situ data collection
- Pencils
- Cameras and chargers
- Shovels, rebar, loppers, other tools

**III. Connecting Power to the Mobile Mini Unit (Reverse these steps to SHUT DOWN)**

Follow these steps exactly:

1) Unlock and open the Right side grey breaker box on pole (key in mobile mini)
2) Make sure both breakers (125, 50) are OFF
3) Unlock and open grey breaker box on mobile mini (MM) and make sure everything is in the OFF position
4) Plug in extension cord into MM FIRST – roll it like a wheel towards the pole – then plug in to the pole
    a. To insert, line up arrow on bottom and twist
    b. Make sure the cable is laid out flat and there are no coils!
5) Once both ends are connected
    a. FIRST turn ON 125, 50 at POLE
    b. SECOND turn on all breakers at MM
6) Check that Power is on in MM and lock up both breaker boxes

**IV. Deployment**

Once it has been decided that the DIDSON should be deployed, first step is to connect power to the shed (see Section III. above). The rain gauge should already be set up in anticipation of rain. Then, the following should be completed (can be simultaneous if staffing allows):

**A. Setting up the DIDSON**

1) CDFW instructions on how to attach the DIDSON camera to the connector cable and install into housing. Be careful not to place the viewfinder side of the housing on gravel or rocks to avoid scratching or scraping it. Use the Master lock in the MM allocated for the didson housing to lock the housing.
2) Carefully carry A-frame down to creek.

3) One person should carefully carry camera in housing down to creek while the other person carefully unrolls the black cable, making sure to unroll the long side towards the creek and keep the short side near the MM (it is okay if this cable doubles back on itself or coils, but try to keep it straight and neat so to avoid tripping over it at any point).
4) Once down at the creek, connect the camera to the A-frame and wrap the black cord around the A-frame to reduce any tension on the camera connection.
5) Place the A-frame in the creek at an appropriate spot (depending on flow and safety)
6) Before tethering and adding sandbags – check topside connection
7) Topside box should be attached to the recording computer and to the DIDSON (black cable connector) per CDFW instructions.
8) Follow CDFW instructions to check topside connection, basically open DIDSON software (DIDSON should be OFF), turn off DEMO mode and turn the DIDSON ON.
9) It will take a few minutes to establish a connection as the cable is very long. Can take up to ten minutes. Be patient.
10) Once a connection has been established, then secure the DIDSON camera in the creek.
11) Use the tether cord to lock the DIDSON housing (can attach it through the lock) to a tree on the East bank. Use another lock to lock the tether to the tree.
12) Place sand bags filled with sand around the back of the DIDSON in a manner that will encourage fish to swim about a meter in front of the camera (see photo below for an example).

13) Once the camera is secure, set save directory
    a. Set up a folder on one of the external hard drives named with the deployment date and location (e.g., Topanga_28 Feb 2014)
    b. Save (should be set to save as the date and time in HHMMSS). Do not add anything to the Save As file name. Ex.: 2014-02-28_134000_HF.ddf
    c. Make sure Auto Rate, Auto Frequency and HF are all selected and adjust window length as needed (see CDFW instructions for details)
    d. Start Recording!

**B. Data collection and note taking**

At the start of each deployment, a WORD document for notes and personnel tracking, and an EXCEL spreadsheet for data entry, should be set up on the processing computer.

A lead from each shift (likely the same person processing videos) should record shift time and personnel and any notes taken during the shift. Lead biologist will review all previous data and notes at the start of their shift.

At a minimum, the following notes should be taken during each shift:

- Hourly, and as needed, field checks on DIDSON camera position
- Any time the DIDSON is adjusted or moved and how/where it was adjusted or moved
- Hourly measurements of turbidity, water and air temperatures, total rainfall (rain gauge and LACDPW WRD)
- Flow (cfs) measurements, when possible. Do not take flow if you feel unsafe or if you see many fish swimming by.

**C. Video processing**

In order to avoid any missing images, at least every six hours all new DIDSON files should be backed up from the recording external hard drive onto the second processing external hard drive. When ejecting the processing hard drive, make sure you are ejecting the correct one! The hard drives are labeled, the USB ports are labeled, and you can see real-time images being saved on the recording drive, so make sure you have the correct drive.

Process data from each six hour time period, recording onto the appropriate data sheets. Once a six hour time period is complete or at the end of your shift, you should enter all processing data into the appropriate EXCEL spreadsheet.

**V. End of deployment**

The purpose of this protocol is to guide the installation and deployment of a DIDSON camera in Topanga Creek. Some of the steps will vary depending on flow regime and rainfall rates, and can be adjusted accordingly.

## DIDSON HARDWARE PROCEDURES

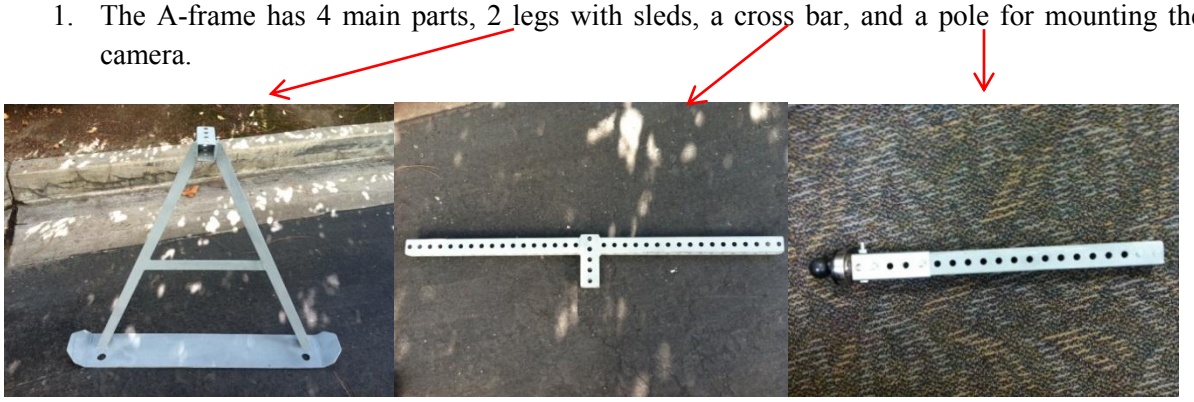
**Equipment List:**

1. Tools
    a. 7/16 wrench
    b. Flat head screw driver
2. DIDSON Pelican Case
    a. DIDSON
    b. Topside box
    c. Topside box power cable
    d. Ethernet cable
    e. Bolts
3. DIDSON Cable

   a. 500ft cable on spool
4. Silt Box and Metal Debris Box
   a. Attached with metal plate
   b. Has attached ball mount
   c. Lock (keeps debris box closed and prevents easy access to the DIDSON)
5. Mount
   a. A frame
   b. 3 locking pins
   c. Ball joint
6. Laptop Computer
   a. Power cord
7. External hard drive
   a. All necessary cords
8. A "can-do" attitude ☺

**Assemble A-Frame:**

1. The A-frame has 4 main parts, 2 legs with sleds, a cross bar, and a pole for mounting the camera.



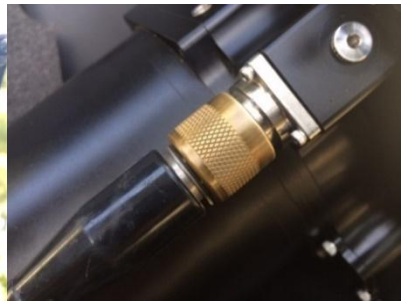
2. Attach the cross bar to the two legs, using locking pins
3. Attach the center pole mount to the cross bar using a locking pin

**Assemble DIDSON in Silt/Debris Box:**

1. Attach silt box lid to the DIDSON

2. Attach one end of the DIDSON cable to the DIDSON
    a. Make sure to align the pin in the cable with the slot on the DIDSON





3. Wrap DIDSON cable around the front of the DIDSON, so that it does not get in the way of the lens.

4. Place DIDSON in the silt/debris box with the lens lined up with the window on the siltbox.
    a. The cable should come out of the notch at the top of the silt/debris box

**Set up Computer and topside equipment:**

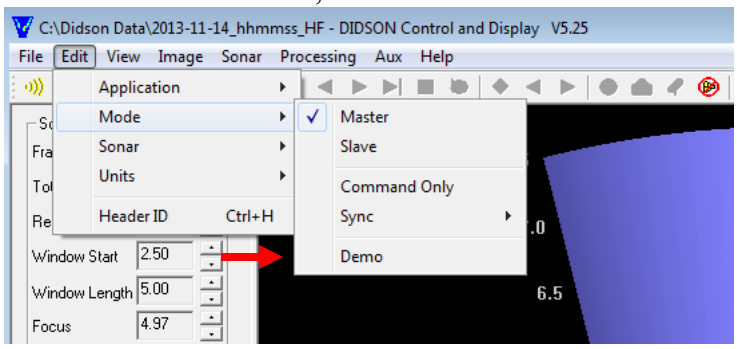
1. Turn on the computer and open the DIDSON software
2. Plug in the hard drive
3. Plug in the DIDSON topside box
    a. Make sure the topside box is off
4. Plug the blue DIDSON Ethernet cable into the topside box (where it says PC) and then into the computer
5. See DIDSON Software procedures for DIDSON software setup and recording

# DIDSON SOFTWARE PROCEDURES

## Powering up the DIDSON

- Open the DIDSON topside software with the "**Didson V5.25.35**" shortcut on the desktop.

- Make sure the software is **NOT** operating in "**Demo mode**" by looking under "**Edit**" → "**Mode**". If "**Demo**" is checked, uncheck it.

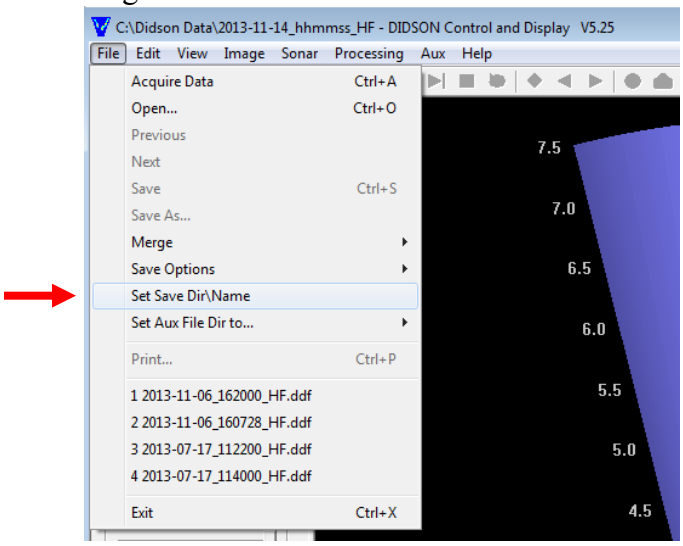



- Turn on the DIDSON topside box

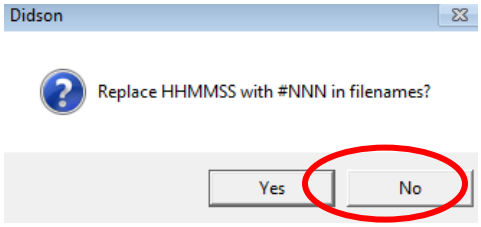

- It takes approximately one minute for the sonar to cycle the lens and focusing motor, at which point the screen will switch to a live feed.

**Recording with the DIDSON**

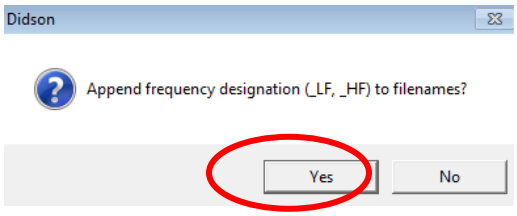
- Prior to hitting the record button, check that files will be saved to the proper directory. Under "**File**" → "**Set Save Dir/Name**", the external hard drive should be selected as the designated save location.



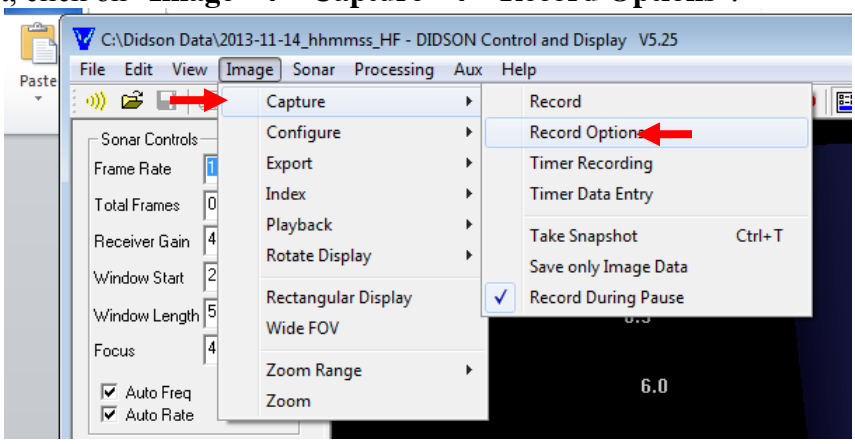

- When prompted to change file name from HHMMSS format to #NNN format, decline.



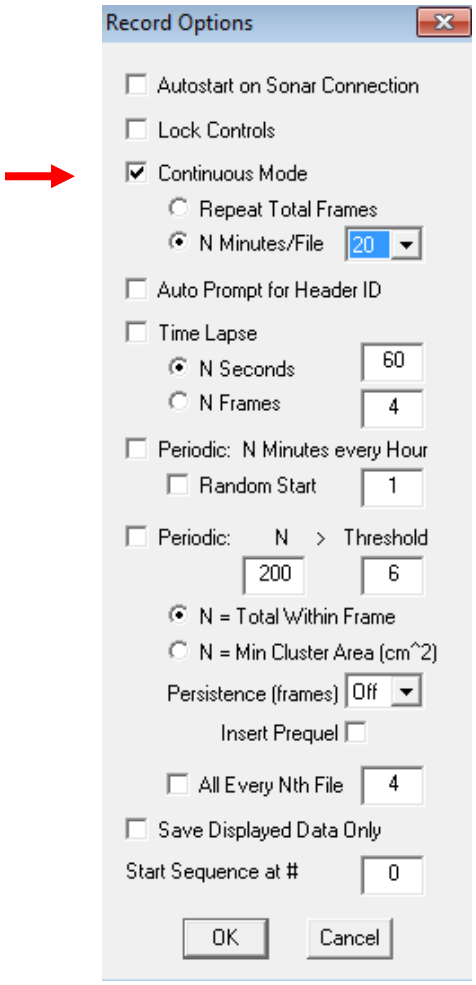
- Accept the "Append frequency designation (_LF, _HF) to file names" message that appears next.



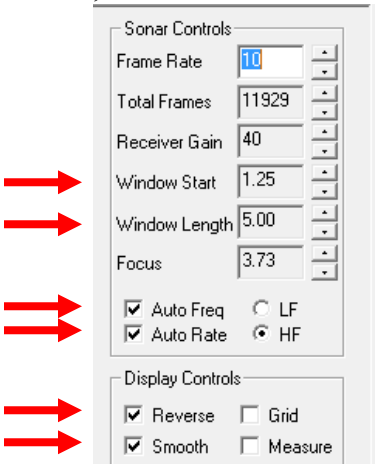

- Files are saved in 20 minute increments. To confirm that files will be recorded in this format, click on "**Image**" → "**Capture**" → "**Record Options**".



- The square box next to "**Continuous Mode**" should be checked. Below that, "**N Minutes/File**" should be checked with the number 20 displayed in the box.

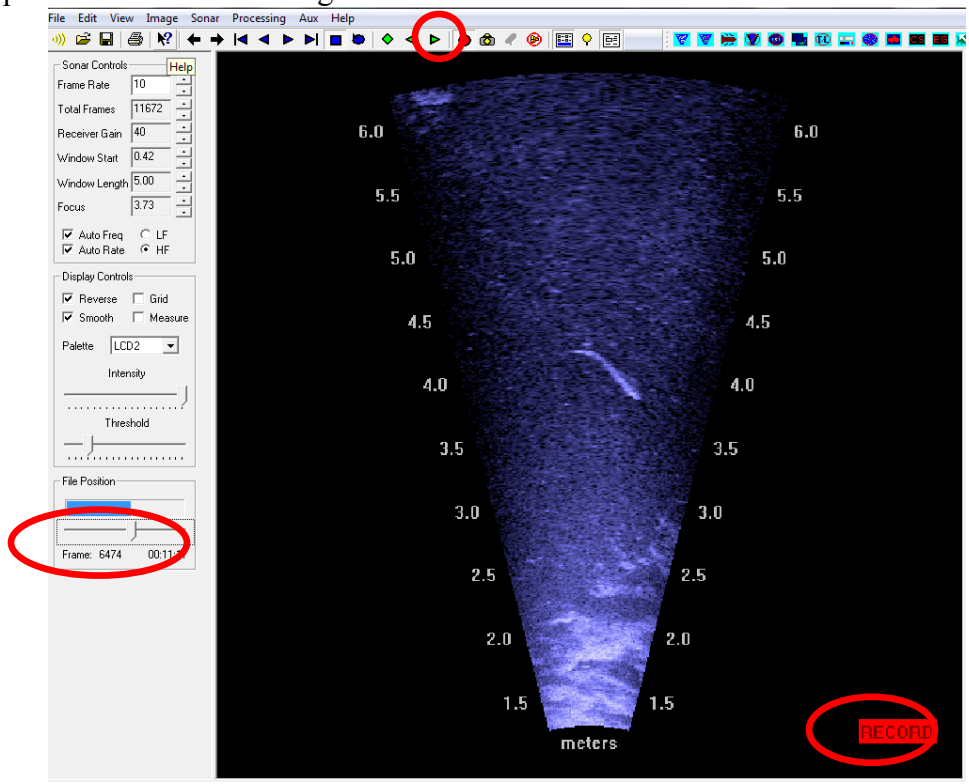



- Set DIDSON Record Options: Window Start, Window Length. Make sure that Auto Freq and Auto Rate are checked, and that Reverse and smooth are checked



- If the above settings are as specified, press the red record button on the taskbar.


- A red box with "Record" will appear in the lower right hand corner of the display. You will see the file numbers going up in the bottom left corner. To stop recording, press the record button again.




**Removing the DIDSON**

1. Press the **"Record"** icon to stop recording
2. Close the DIDSON software on the laptop- a window will appear that says **"please wait while the lens is being retracted"**, a second window will notify you when the retraction is complete
3. Turn off the Top Side Box, you can now remove the DIDSON from the stream
4. Disconnect the Top Side Box by disconnecting the Ethernet cable, sonar cable and power cables
5. Eject the external hard drive, and power down the computer
6. Disassemble the DIDSON, making sure to put all hardware in the appropriate locations

**When you check on the DIDSON:**

**Check the unit is recording**

- "**RECORD**" should be in red at the bottom right of the DIDSON screen
- the file numbers on the left bottom of the screen should be going up
- make sure the image looks right!

**If the unit is NOT recording**

- Check that the set/save directory is correct, saving on the external hard drive NOT the computer
- Check that the power is on, power strip does not need to be reset

**If the power is OFF**

- turn off the topside box
- stop recording and shut down the DIDSON software
    - if you get an error message not letting you shut down the software because the unit is still recording. Put in "DEMO" mode and stop recording and then shut down.
- reset the power strip
- restart the DIDSON software
    - make sure "DEMO" is no longer selected
    - check set/save directory to ensure the hard drive is selected
- turn on the topside box
- re-start recording

**Other**

If you are unsure about how to do something or there is a different problem **CALL RCDSMM Contact**

## Switching External Hard drives

7. Press the **"Record"** icon to stop recording
8. Eject the external hard drive by clicking the **"Safely Remove Hardware and Eject Media"** icon located in the bottom right corner on the windows taskbar. Make sure you receive a **"Safe to Remove Hardware"** notification before unplugging the drive.
9. Unplug the drive and plug in the replacement drive.
10. You will need to set the save directory on the new drive under **File -> Set Save Dir\Name** and confirm that your **"Record Options"** are set appropriately. (see **"DIDSON Software Procedures"** for instructions)
11. Once you have checked that all of the record options are correct, hit **"Record"**.

## File Naming

1. Be sure that save folders are located on an appropriate external hard drive. Files are large and will quickly fill a laptops storage capacity.
2. DIDSON file folder names should be named using the following format
    i. SITENAME_DEPLOYMENT DATE(MMDDYYYY)
    ii. **Ex.** Topanga_12192013
3. Individual DIDSON files written to this folder will automatically be assigned filenames based settings chosen in the software (see **"DIDSON Software Procedures"**) and should follow the format (YYYY-MM-DD_HHMMSS_operating frequency). **Ex.** 2013-07-15_124000_HF.ddf

## Processing Data

When processing the data you want to make sure that you do not overwrite or otherwise corrupt the original data files.

1. Connect the hard drive with data to the processing computer
2. Select files to be analyzed and copy them to a folder on the processing computer
    a. Name this folder something like: Copied DIDSON files for analysis
3. Safely remove the hard drive with the original data by clicking **"Safely Remove Hardware and Eject Media"** icon located in the bottom right corner on the windows taskbar. Make sure you receive a **"Safe to Remove Hardware"** notification before unplugging the drive.

## Creating Avi Video Clips

1. Open the DIDSON file you want to convert to an avi file in the DIDSON software.

2. Determine the range of frames you wish to save as a video clip. Then click **Image -> Playback -> Set Endpoints** to set the start and end frames.

3. Click **File** -> **Save Options** -> **Prompt for Avi Compressor** to bring up a listing of compression options when you save your file.

4. Select **File**, then **Save As** to choose your file name and save directory.

5. Change "**Save as type:**", located at the bottom of window, to "**Avi Files (*.avi)**" and click **save**.

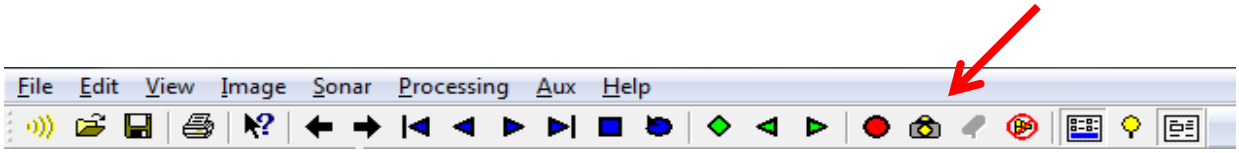
6. A "**Video Compression**" dialogue box will pop-up. At this time you can choose to apply video compression by selecting one of the options listed under "**Compressor**" or to leave the file at full size by selecting **Frames (uncompressed)**. Click **OK** to create the file.

## Taking a Snapshot

Taking a snapshot can be accomplished in three ways.

1. Click **Image -> Capture -> Take Snapshot**

2. Click the "Take Snapshot" icon located on the toolbar shown below




3. Hold Ctrl + T

Snapshots will be saved to the same directory as the file they are taken from.

# APPENDIX E
# Mainstem Habitat Evaluation

We propose to assess relative levels of food availability among seasons, and in particular during drought enhanced low flow and thermal stress conditions (summer-fall). A primary objective of this assessment is to better understand the relationship between seasonal growth patterns of juvenile *O. mykiss*, and mainstem habitat suitability characteristics associated with promoting rapid growth needed for increased rates of marine survival. The data will also help discern the relative importance of aquatic-origin vs. terrestrial origin prey in supporting growth of juvenile *O. mykiss*, and determine whether seasonal shifts in prey type may be important for growth. Data from our on-going mark-recapture project and analysis of stomach samples (non-lethal lavage methods used to obtain samples), as well as water temperature, nutrient and crayfish monitoring will be combined with the following information. Since many of these parameters are already being collected as part of other ongoing efforts and analysis will be conducted by summer interns and volunteers, adding these tasks will cost relatively little and potentially provide a great deal of important information identified by the CA Coastal Salmonid Population Monitoring Strategy, Design and Methods (CDFG 2011).

a) Select one pool-riffle-pool complex study site in two locations between the ocean and the natural low flow barrier at 4.4 RK in Topanga Creek that meet the following criteria: 1) retain sufficient flow throughout the summer to maintain pool habitat (may have little or no flow over riffles), 2) are downstream of locations where juvenile *O. mykiss* are observed during snorkel surveys, 3) sites are sufficient distance from fish to avoid possible effects due to interception and removal of drift, and 4) sites that are accessible during all sampling periods.
b) Sampling will be conducted three times each year: spring (the day before the start of the March mark-recapture, stomach sampling event); summer (July-August); and fall (the day before start of the November mark-recapture, stomach sampling event). If the low flow drought conditions persist, no summer sampling will be done to avoid potential loss of food resources to fish in the reach.
c) Record GPS coordinates and river kilometer location of each site.
d) Record habitat characteristic of each site including, but not limited to: average wetted width and length of the habitat unit, substrate composition, maximum depth, average depth, instream fish percent cover and type (boulders, bedrock ledges, vegetation, woody debris), percent canopy cover and type of vegetation and/or percent shading by canyon walls, percent and type of algae cover.
e) Measure discharge using a Marsh-McBirney Model 2000 flow meter at the cross section where the drift nets will be deployed. If flow is too low to measure, then flow volume per unit time will be calculated by recording the amount of time required to fill a graduated cylinder, repeated three times and averaged.
f) Calculate a "Flow index" if needed to correct for different channel geometry and allow for unbiased comparison of flow related parameters between sites. Flow index is determined by dividing the discharge at each site by the wetted channel width. The flow index is correlated with velocity and depth, and used to correct for potential differences in "drift" (delivery and production of invertebrates).

g) Collect salinity, pH, conductivity, dissolved oxygen at each site at the start and end of the 24 hour sampling period.
h) Drift nets (30cm x 50 cm with 363 micron nylon mesh) will be deployed at the upstream top of the site, to capture drift entering the pool-riffle complex and the downstream end of the site, to capture any drift originating within the site. Nets will be set side-by-side if necessary to cover the entire wetted channel width.
i) Nets will be set by 1200, and samples collected every six hours (1600, 2400, 0600, 1200) for a 24-hour period.
j) Water depth at the mouth of the net will be measured with a meter stick, and velocity will be measured with a Marsh-McBirney 2000 flow meter set at 0.6 total depth at two equally spaced locations in the mouth of each net to estimate volume of water sampled.
k) Contents of the nets will be collected by removing the cod ends of the net and emptying them directly into labeled sample bags. Contents will then be frozen until processed.
l) Processing by summer interns and volunteers will include sorting each sample to remove debris and identifying all invertebrates (both whole and parts) to the lowest practical taxonomic level, and life stage. Each sample will be processed in full (no subsampling) using a dissecting microscope at 12x magnification.
m) Each invertebrate will be measured to the nearest millimeter to permit use of the taxon specific length-mass regression equations to calculate invertebrate biomass. Analytical scales will be used to collect blotted dry weights of entire samples, as well as for individual whole invertebrates (consistent with protocol for lavage samples).
n) Terrestrial and aquatic invertebrates will be sorted separately to better assess food availability.
o) Analysis of invertebrate drift will include, but not be limited to:
    - Total biomass
    - Biomass of larval, pupal and adult life stages
    - Mean number of invertebrates per sample that are suitable prey items for *O. mykiss*,
    - Number and percent occurrence of invertebrates by taxonomic group
    - Number and percent occurrence of invertebrates by origin (aquatic or terrestrial)
    - Flow will be related to drift based on biomass and frequency of most common taxa available to fish
    - Box and/or whisker plots will be used to graph comparisons of drift composition among sites
    - Invertebrates greater than 10mm may be removed from the dataset to reduce stochastic bias. Occurrence of large individuals in drift is not related to flow.
    - Rare taxa may also be excluded for the purposes of prey availability analysis, if the taxon has fewer than 6 individuals represented in all samples.
    - Statistical analyses will be used to compare the drift composition among sites, sampling periods, habitat types, and other parameters.
p) Mainstem nursery suitability will be described based on the analysis of possible food availability restrictions, thermal stress limitations, habitat characteristics, flow, and observed juvenile growth patterns.

# APPENDIX F
# RCDSMM Safety Protocol

# RCDSMM
# FIELD SAFETY MANUAL
# March 2018

## SAFETY INSTRUCTIONS

### PROTECT YOURSELF – PAY ATTENTION TO SAFETY!

**1. REVIEW ALL POTENTIAL SITE RISKS WITH RCDSMM LEADER.**

**2. WASH YOUR HANDS WITH SOAP BEFORE EATING.**

**3. WEAR APPROPRIATE SHOES AT ALL TIMES.**

**4. REPORT ANY PROBLEMS OR ACCIDENTS PROMPTLY TO THE RCDSMM LEADER.**

**5. PLEASE KNOW HOW TO GET TO THE FOLLOWING CARE CENTERS**

**Local Hospitals and Urgent Care Centers**
**Malibu Urgent Care 310-456-7551**
23656 PCH At corner with Webb Way on east side of PCH near shopping center

**Urgent Care Calabasas 818-880-2225 9am – 9pm**
26777 Agoura Rd. Suite 4 In Summit shopping center between Lost Hills and Las Virgenes Rds.

**Santa Monica Hospital**
15th and Arizona Emergency Room entrance

**Los Robles Hospital**
215 W. Janss Rd, Thousand Oaks
Take 101N exit at Lynn Rd Go north to W. Janss and turn right (east)

**West Hills Hospital**
7300 Medical Center Dr, West Hills Go north on Fallbrook Rd past Sherman Way

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# 1.0 INTRODUCTION

This document presents the health and safety procedures that are intended to guide all field activities conducted by RCDSMM staff, field assistants and volunteers.

It is important to recognize that although serious hazards are present, fieldwork may be safely conducted if care is taken, intelligence is used, hazards are given respect, and people are observant.

# 2.0 POLICY STATEMENT

Safety of all its personnel is RCDSMM' highest priority.

It is the policy of RCDSMM to provide a safe work environment for all of its employees. Fieldwork can be dangerous; however, all accidents are preventable, and with proper training and execution field workers can conduct their work free from health and safety incidents. To accomplish this, RCDSMM will 1) maintain a code of safe practices for its work activities, 2) support a positive accident prevention program to reduce the risk of injuries occurring on the job and 3) provide all applicable safety equipment for its employees. This program is to be used in conjunction with applicable federal, state, and local safety codes and regulations, as well as the safety plans of the client and other consultants in the field.

## *The goals of the Health and Safety Plan are to:*

- Conduct all fieldwork free from accidents.
- Prevent accidents from occurring by communicating the importance of safe practices to all RCDSMM staff, field assistants and volunteers.
- Outline and assign the duties and responsibilities of all individuals who will establish and maintain an active safety program

Accident prevention is beneficial to all and is the responsibility of RCDSMM to its personnel on site. The RCDSMM expects the full cooperation of everyone in complying with safety procedures. Compliance with all federal, state, county, and local safety codes and regulations is mandatory.

Safety is a mutual endeavor. Each individual is responsible for their own health and safety and that of their immediate co-workers. Everyone is expected to exercise personal judgment, and have an explicit right to refuse hazardous assignments if they have safety concerns.

Unsafe conditions requiring work suspension or modification may arise from weather, wildfire, presence of dangerous animals or other unforeseen conditions.

The RCDSMM may request anyone whose on-site conduct is judged not to comply with the provisions of this plan and/or endangers the health and/or safety of others to leave the work site immediately.

It is everyone's responsibility to inform all co-workers and their supervisor of any pre-existing conditions that may affect their health and safety in the field and that may require

special awareness by other workers (i.e. diabetes, allergies, vision or hearing impairments or other health concerns). Field teams should discuss health and safety issues when beginning a new work task and decide on appropriate responses to potential situations.

Everyone is expected to be familiar with basic first aid before conducting fieldwork and team leaders are required to have current CPR certification.

# 3.0 POTENTIAL HAZARDS

Fieldwork has inherent hazards especially in remote locations with difficult terrain and variable weather conditions. These hazards may include but are not limited to:

- Poisonous plants
- Dangerous animals
- Inclement weather
- Wild fires
- Flashfloods
- Hiking over rugged terrain
- Criminal activity

RCDSMM field activities fall into two categories with specific safety concerns. All RCDSMM staff, field workers and volunteers are expected to know and implement all safety procedures.

**WATER QUALITY TESTING:**

- Read all instructions to familiarize yourself with the procedures before you begin. Note any precautions in the instructions.
- Keep all equipment and reagent chemicals out of the reach of young children.
- In the event of an accident or suspected poisoning immediately call 911, the Poison 800-777-6476, or your physician. Be prepared to give the name of the reagent in question. The MSDS are in water quality testing kit.
- Avoid contact between reagent chemicals and skin, eyes, nose, and mouth.
- Wear safety goggles or glasses when handling reagent chemicals.
- Use test tube caps or stoppers, to cover test tubes during shaking or mixing. Use gloves for hand protection when handling reagent chemicals.
- Do not eat or drink at the same time as using the reagents. Wash hands thoroughly after using the chemicals before contact with eyes, food, or mouth.
- When dispensing a reagent from a plastic squeeze bottle, hold the bottle vertically upside down (not at an Angle) and gently squeeze it. If a gentle squeeze does not suffice, the dispensing cap or plug may be clogged.
- Wipe up any reagent chemical spills, liquid or powder, as soon as they occur. Rinse area with wet sponge.
- Thoroughly rinse test tubes before and after each test. Dry your hands and the outside of the tube.
- Tightly close all reagent containers immediately after use. Do not interchange caps from different containers. Put all reagents and equipment back in their proper locations in the test kit to ensure safe transport.
- Avoid prolonged exposure of equipment/reagents to sunlight.

**FIELD RESEARCH AND RESTORATION:**

- Be careful not to fall. You may be traversing slippery rocks, hillsides, and steep erodible streambanks. Wear tennis shoes or boots that provide good support, and that you don't mind getting wet.
- Be prepared! Dress and Pack for all types of weather, including a hat! If needed bring a cellular phone, a change of clothes, footwear, a walking stick.
- Bring plenty of water! Heat exhaustion can be a real problem and is easily avoided by remaining well hydrated at all times.
- Use sunscreen at all times. Apply at least 1/2 hour before going into the field and re-apply as needed during the day.
- Never take it upon yourself to conduct monitoring or fieldwork on your own. Inform the program coordinator of any unscheduled monitoring event you wish to conduct and let someone at home know where you plan to go so that your location is known if anything happens. Two heads are better than one, particularly for monitoring. Always work with a partner!
- When crossing or wading through a stream be aware of fast moving current. Use your walking stick for balance and to judge the depth. If possible look for areas shallower than knee depth to wade across.
- Be aware of flood conditions. Do not enter low-lying areas if you have reason to believe flooding is possible. When in doubt consult your Field Team leader.
- Don't drink the water!
- If you suspect high levels of pollution protect yourself. Wear rubber gloves and avoid exposure.
- Bring a map and compass (that you know how to use!), particularly in areas that do not have established trails.

# 4.0 POISONOUS PLANTS

## 4.1 POISON OAK

Be aware of Poison Oak. Avoid direct contact by wearing long sleeved shirts and long pants. Get to know this plant's characteristics. Leaves of three, let it be! It changes through the seasons and the physical characteristics can vary from plant to plant. Contact with this plant, even just the bare twigs in winter can cause severe blistering and itching. Even secondary contact such as petting a dog, handling equipment that has been in contact, or washing someone else's laundry that had direct contact with poison oak can cause adverse reactions.

***PREVENTION***

Each field worker should learn to recognize poison oak. Avoid contact with poison oak if possible. Wear protective clothing to prevent exposure to skin.

***TREATMENT***

Wash affected area thoroughly with cold water (for at least 3-5 minutes) immediately following exposure to try and rinse off the oils. The reaction can take place within 15 minutes, so prompt response is important. This may help avert a reaction. After an hour or so, however, the urushiol has usually penetrated the skin and washing won't necessarily prevent a reaction, but it may help reduce its severity.

If you must wait, then use of soaps like Technu and Fels-naptha can help remove the oils and reduce reaction areas.

If you get a rash, itching and blisters, hot showers followed by soaking in oatmeal or aveeno solutions can help reduce the itching. Topical applications of calamine lotion, benedryl creams or other topical products can also be helpful. Rubbing the area with ice cubes can also provide relief.

Call your supervisor and Company Nurse (877-518-6711) if any of the following occur:

- The reaction is severe or widespread.
- The rash affects sensitive areas of the body, such as eyes, mouth or genitals.
- Blisters are oozing pus.
- A fever greater than 100 F develops.
- The rash doesn't get better within a few weeks

There are numerous over the counter products designed to protect the skin from poison oak. Each product has proponents and some have detractors. Field workers are encouraged to investigate these products to determine whether they are suitable for their use.

After exposure to poison oak workers should remove any exposed clothing before entering project vehicles or cover the seats with covers that can be removed and cleaned to wash away toxic poison oak residue. Exposed clothing and fabrics should be washed as poison oak oils persist on fabrics for lengthy periods.

Often, the rash has a linear appearance because of the way the plant brushes against the skin. But if skin comes into contact with a piece of clothing or pet fur that has urushiol on it, the rash may be more diffuse.

The reaction usually develops a day or two after exposure and can last several weeks, even with treatment. In severe cases, new areas of rash may break out several days or more after initial exposure.

Spreading blister fluid through scratching doesn't spread the rash, but germs under fingernails may cause a secondary infection.

## 4.2 STINGING NETTLES

Stinging nettles are often encountered in moist areas in chaparral or wetland areas. There are two common species, Stinging Nettle (Urtica doica), which has opposite leaves 2-4 inches long and is a densely hairy perennial herb standing up to 8 feet high; and the Annual Stinging Nettle (Hesperocnide tenella), which is smaller overall and blooms earlier in April- June.

***PREVENTION***

Each field worker should learn to recognize stinging nettles. To avoid the intense pain associated with brushing your skin against the hairs of this plant, wear long pants and long sleeve shirt.

***TREATMENT***

If you grab one by mistake, treating the affected area with vinegar can help, as can rinsing the area with cool water.

# 5.0 DANGEROUS ANIMALS

Wild animals cause injury through bites, kicks, or blunt trauma, or by the use of horns or claws. Wild animals in general tend to avoid human beings, but they can attack if they perceive threat, are protecting their young or territory, or are injured or ill. Although attacks by wild animals can be dramatic, attacks by domestic animals are far more common.

## 5.1 MOUNTAIN LIONS

Mountain lions are generally shy and nocturnal, but as the urban world encroaches further into the wildlands, some have become more habituated to humans and less fearful. If you see a mountain lion, keep your distance. Most will give you a wide berth and you will have had an outstanding wilderness experience. Mountain lions should always be considered potentially dangerous. Mountain lions are powerful predators capable of seriously injuring and killing humans.

Make noise as you walk. The noise you make will generally scare the lion away and halt any confrontation.

If however they begin to stalk you or refuse to give way, stand tall and make yourself as large as possible. Yell, scream and throw things, as long as you don't need to bend over to pick them up! Slowly back away, keeping your eye on the lion and making yourself as big and scary as possible. Children and dogs are particularly vulnerable. Keep children between 2 adults when hiking. Dogs should not be off leash.

Never run away from a mountain lion. Running stimulates a mountain lion's natural instinct to chase.

Make yourself look larger, stand up as tall as possible, it intimidates the lion and often makes them turn and run

Never turn your back on a lion.

Do not squat down or bend over.

If you have a jacket on, open it and flap it about, yell, throw stones, make sure you react so that the lion senses you are in control.

If you are attacked, fight back. Never succumb or roll into a ball. Hit as hard as possible especially to the head area. If you can retrieve a stick or large rock, use it as a weapon. If face to face with the cat, go for the eyes by clawing or throwing sand in the face of the cat.

If attacked from behind, try to reposition yourself to meet the lion face to face.

Attempt to drive an attacking lion away in order to prevent further injury and to allow treatment of injury. If serious bleeding occurs attempt to stop bleeding with standard first aid techniques.

Once the injured party is stabilized, seek help. Attempt to call 911 for help with a cell phone, seek a high point to use a cell phone. If no contact can be made, and the injured person is unable to hike out, make the injured person as comfortable as possible, explain to the injured person that you are going to get help, hike or drive to the nearest location to obtain help or call for help. If it is possible to keep a second person with the injured person, do so.

## 5.2 RATTLESNAKES

Rattlesnakes really don't want to bother you, especially if you don't bother them. Keep a respectable distance from them and they will probably leave you alone. Be careful where you step, wear high hiking boots, and be careful where you put your hands if you are climbing over rocks. Adult rattlesnakes don't like to waste their venom on humans, and the majority of bites are "dry". They are still subject to infection and should be treated by a physician. Baby rattlers are not as much in control, and can inject sufficient venom to cause problems. Be particularly careful with these little guys!

Rattlesnake bites are a potentially serious accident. They can lead to severe pain or other problems, and in the rare instance even death. Rattlesnake bites seldom result in death, but they cause very serious injury, which requires medical attention.

Rattlesnakes inject venom when they bite, usually containing two types of poison: hemolytic toxins that attack the walls of blood vessels; and neurotoxins that attack the nerves. Rattlesnakes have a very efficient venom injection mechanism. They have long hollow fangs and a system to inject venom through those fangs. They can inject large volumes of venom quickly.

***PREVENTION***
Be very careful in rattlesnake areas about moving rocks, logs, and brush where snakes may hide, or reaching into any potential hiding spot. Be aware of your surroundings and avoid stepping into areas or putting your hands into places that have not first been inspected for rattlesnakes. Wear boots and long pants, which both provide protection if a rattlesnake strikes.

***TREATMENT***
If bitten, try to remain calm and move away from the snake to avoid more bites.
If possible, photograph the snake to confirm identification.

Do not attempt to cut or suction the wound.
Remove all potentially constricting jewelry, rings, watches, etc. that could be problematic with swelling.

Wash puncture with clean water and soap if available.
Apply a loose bandage to protect the bite.

Keep bitten area below heart level if possible.

Call ahead to the hospital or inform 911 personnel of bite location and species. The most important priority is getting the bitten person to medical help. Do not delay.

## 5.3 TICKS

Ticks are frequently encountered, usually in grassy or bushy places. They wait (sometimes for up to 15 years) for some warm blooded creature like you to come walking by. They can attach to you, burying their heads under the skin for a nice drink of blood. Ticks occur throughout our study area and can be difficult to avoid. Ticks may carry diseases such as Lyme disease or Rocky Mountain spotted fever.

***PREVENTION***
Wear light colored clothing where possible and regularly inspect for ticks that could be removed prior to biting. Insect repellants and wrapping pant-leg-bottoms with duct tape or stuffing your pants inside your socks may also help avoid tick bites. When you get back from a field excursion, make sure you check your body carefully for any ticks you may have brought home. They especially like the hairline, under arms and in the crotch.

***TREATMENT***

Ticks are best removed as soon as possible, because the risk of disease transmission increases significantly after 24 hours of attachment. If you do find a tick, carefully remove the tick with forceps, making sure to remove any buried parts. Lyme Disease is not common, but a definite possibility. It usually is not transmitted unless an infected host tick is embedded in you for more than 18 hours. Pay attention to development of a characteristic "bull's eye" rash, spreading out from the tick bite. Only 50% of bites get the rash, although localized tenderness and infection is more common.

If you have had a tick for more than 18 hours, then it is best to carefully remove the tick, wrap in moist paper towel, place in a Ziploc baggie and take with you to the doctor for identification. If it is a western black-legged tick, then you may need to start antibiotic treatment. To see if the tick is carrying the disease, send to IgeneX, Inc. 797 San Antonia Rd, Palo Alto, CA 94303. Their web site (www.igenex.com) also has a lot of good information, including the forms and prices for sending in a tick. This testing is not usually covered by workers compensation or regular health insurance.

Blunt, medium-tipped, angled forceps/tweezers offer the best results. It is important to remove the tick completely, including the mouthpart and the cement the tick has secreted to secure attachment. The most commonly recommended and successful tick-removal method is manual extraction of the tick.

Do not use petroleum jelly or a hot match to kill and remove a tick.

**Tick removal method:**

(1) Grasp the tick's mouthparts against the skin, using forceps.

(2) Pull back slowly and steadily with firm force.

(a) Pull in the reverse of the direction in which the mouthparts are inserted, as removing a splinter.

(b) BE PATIENT – The long, central mouthpart (called the hypostome) is inserted in the skin. It is covered with sharp barbs, sometimes making removal difficult and time-consuming

(c) Most ticks secrete a cement-like substance during feeding. This material helps secure their mouthparts firmly in the flesh, further adding to the difficulty of removal.

(d) It is important to continue to pull steadily until the tick can be eased out of the skin

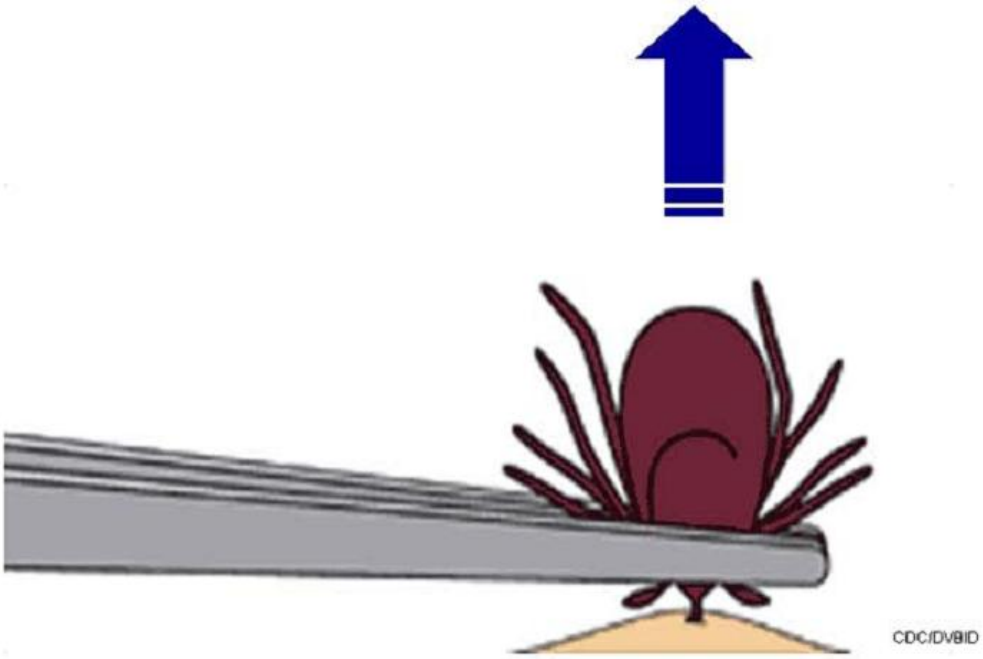
(e) DO NOT pull back sharply, as this may tear the mouthparts from the body of the tick, leaving them embedded in the skin. If this happens, do not panic. Embedded mouthparts are comparable to having a splinter in the skin.

Mouthparts alone cannot transmit disease because the infective body of the tick is no longer attached.

(f) DO NOT squeeze or crush the body of the tick because this may force infective body fluids through the mouthparts and into the wound site.

(3) Save the tick for future identification should disease symptoms develop later. Preserve it by placing it in a clean, dry jar, vial, small Ziploc plastic bag, or other sealed container and keeping it in the freezer. Identification of the tick will help the physician's diagnosis and treatment, since many tick-borne diseases are transmitted only by certain species.

**Figure Tick Removal**




From the Center for Disease Control (CDC)

Inspect the bite area carefully for any retained mouthparts. The area should be cleaned with antiseptic solution. Signs of local or systemic illness should be monitored.

## 5.4 BEES, WASPS AND HORNETS

Bee, hornet and wasp stings inject venom or other substances into the skin that triggers an allergic reaction. The severity of the reaction depends on the individual's sensitivity to the insect venom or substance.

Most reactions to bee stings are mild, causing little more than an annoying itching or stinging sensation and mild swelling that disappear within a day or so. A delayed reaction may cause fever, hives, painful joints and swollen glands. Sometimes both the immediate and the delayed reactions occur from the same sting. Some individuals are highly allergic to bee stings.

Africanized honey bees have made their way into southern California. If you observe a bee hive, leave the area and do not encroach on their territory. If bees attack you, run until they stop chasing you. Agitated bees may pursue for up to a quarter of a mile. Do not hide in a bush or under water. They will just wait until you are exposed.

***PREVENTION***
If bees, hornets or wasps are encountered, remain calm, be still and move away slowly. Do not wildly flail arms: this is likely to excite them and probably causing them to sting. Avoid wearing any strong-smelling scents in the field (perfumes, after shave, heavily-scented shampoos, etc.).

***TREATMENT***
If stung repeatedly, seek prompt medical attention at first sign of any symptoms like shortness of breath, rapid heart rate or dizziness. If you have a bee allergy, carry your epi-pen and medical alert information with you at all times. Notify your Team Leader of this allergy and review use of the epi-pen or other medications with the Team Leader before heading into the field.

**Mild reaction treatment**
Scrape or brush off the stinger with a straight-edged object, such as a credit card or the back of a knife. Wash the affected area with soap and water. Don't try to pull out the stinger. Doing so may release more venom.

Apply a cold pack or cloth filled with ice to reduce pain and swelling. Apply hydrocortisone cream (0.5 percent or 1 percent), calamine lotion or a baking soda paste (with a ratio of 3 teaspoons baking soda to 1 teaspoon water) to the sting several times a day until the symptoms subside. Take an antihistamine containing diphenhydramine or chlorpheniramine maleate.

**Severe reaction treatment**
Severe reactions may progress rapidly. Dial 911 immediately if any of the following signs or symptoms occur:

- Difficulty breathing
- Swelling of the lips or throat
- Faintness
- Dizziness
- Confusion
- Rapid heartbeat
- Hives
- Nausea, cramps and vomiting

Take these actions immediately while waiting with a severely affected person for medical help:

- Check for special medications that the person might be carrying to treat an allergic attack, such as an auto-injector of epinephrine (for example, EpiPen). Administer the drug as directed, usually by pressing the auto-injector against the person's thigh and holding it in place for several seconds. Massage the injection site for 10 seconds to enhance absorption.

- Have the person take an antihistamine pill if he or she is able to do so without choking, after administering epinephrine.

- Have the person lie still on his or her back with feet higher than the head.

- Loosen tight clothing and cover the person with a blanket. Don't give anything to drink.

- Turn the person on his or her side to prevent choking, if there's vomiting or bleeding from the mouth.

- Begin CPR, if there are no signs of circulation (breathing, coughing or movement).

## *5.5 Pressure Immobilization Technique FOR STINGS*

The pressure immobilization method can be used for various bites and stings. The technique is designed to slow the blood flow to the area of envenomation by applying pressure to the skin over the bite or sting. Use this technique especially if medical attention is not available to the person within at least 2 hours.

- Apply pressure to the bite or sting by placing a 1-inch-thick gauze pad or cloth directly over the wound. The pressure bandage may be held in place with a hand or elastic bandage. When wrapping an elastic bandage around the pad, check for adequate circulation in the fingers or toes. Fingers or toes with adequate circulation have normal color and feeling.
- The pressure should be firm enough to press the pad into the skin but not so tight that blood circulation is stopped. For example, do not wrap tape completely around the limb because this may hamper circulation.
- The pressure pack should be released within 8 hours or as soon as medical care is reached.
- Another technique involves wrapping the arm or leg, not tightly, with an elastic bandage. This slows the absorption of the venom. Then splint the limb so the person is not able to move it. Use a sling if the bite is on the arm or hand.

# 6.0 HOT WEATHER

Hot weather, typical of the region, poses safety risks from: sunburn, dehydration, heat exhaustion, and heatstroke,

## 6.1 SUNBURN

Sunburn is a potential health hazard. Sunburn occurs when the sun's energy penetrates deeply into the skin and damages DNA of skin cells. Sunburn increases the risk of certain complications and related skin diseases including: dry, wrinkled skin; liver spots; actinic keratoses; and skin cancer.

***PREVENTION***

Each field worker should wear protective clothing and use adequate amounts of sunscreen to avoid over exposure to the sun. Wear tightly woven clothing that covers your arms and legs and a broad-brimmed hat.

Apply sunscreen liberally 30 minutes before going outdoors and reapply about every two hours, sooner if it's washed away by perspiration or water. Use it even on cloudy or hazy days.

Wear sunglasses when outdoors. Look for a manufacturer's label that says the sunglasses block 99 percent or 100 percent of all UV light. To be even more effective, choose sunglasses that fit close to your face or have wraparound frames that block sunlight from all angles.

***TREATMENT***

The following treatments may reduce sunburn pain and discomfort in the hours and days following sunburn:

- Cool the sunburned area with a cold compress such as a towel dampened with cool tap water, or take a cool bath or shower.

- Apply a moisturizing cream, aloe vera lotion or hydrocortisone cream to sunburned skin. A low-dose (0.5 percent to 1 percent) hydrocortisone cream may decrease pain and swelling, and speed up healing.

- If blisters develop, don't break them. Blisters contain natural body fluid (serum) and are a protective layer. Additionally, breaking blisters slows healing and increases infection risk. If needed, blisters should be covered lightly with gauze. If blisters break on their own, apply an antibacterial cream.

- Drink plenty of fluids. Sun exposure and heat can cause fluid loss that needs to be replenished to prevent dehydration.

# 6.2 DEHYDRATION

Dehydration occurs when more fluid is lost than taken in by the body and the body doesn't have enough water and other fluids to carry out its normal functions. If lost fluid is not replenished, serious consequences may result. Mild dehydration can cause symptoms such as weakness, dizziness and fatigue. Severe dehydration can lead to heat exhaustion, heat stroke or death.

***PREVENTION***

Drink liquids regularly during work in warm or hot weather. Fieldworkers should carry sufficient liquids, preferably water, and drink regularly to prevent dehydration. It is a misconception that one should only drink when thirsty; in fact, if you're thirsty, it's a sign your body is already low on water. Another misconception is that it is only necessary to drink water in hot weather. It's actually very easy to become dehydrated at any time of the year, even in the winter.

Mild to moderate dehydration is likely to cause:

- Dry, sticky mouth
- Sleepiness or tiredness — children are likely to be less active than usual
- Thirst
- Decreased urine output
- Few or no tears when crying
- Muscle weakness
- Headache
- Dizziness or lightheadedness

***TREATMENT***

The only effective treatment for dehydration is to replace lost fluids. Drinking cool water and resting in a cool place is recommended. Getting into an air-conditioned building is best, but at the least, one should find a shady area.

# 6.3 HEAT EXHAUSTION

Heat exhaustion is a heat related syndrome usually caused by exposure to high temperatures, particularly when combined with high humidity and strenuous physical activity. Strenuous exercise or overexertion in hot, humid weather can lead to heat exhaustion. Without prompt treatment, heat exhaustion can progress to heatstroke, a life-threatening condition. Fortunately, heat exhaustion is preventable.

***PREVENTION***

When working or exercising in hot weather, take breaks, rest frequently in a cool spot and replenish fluids regularly. Wear a lightweight, wide-brimmed hat to protect from the sun, and apply sunscreen to any exposed skin. A sunburn reduces the body's ability to rid itself of heat.

Seek a cooler place such as shade, an air conditioned vehicle or air conditioned building. Drink plenty of fluids. Staying hydrated will help the body sweat and maintain a normal body temperature. Soaking clothes in water can help cool the body.

Pay attention to the frequency and color of urine. You should be drinking enough to urinate several times during a work day, and urine should be clear. If the urine starts to darken and become more yellow, drink more water right away.

***TREATMENT***

- Rest in a cool place. Getting into an air-conditioned building is best, but at the least, find a shady area. Rest on your back with your legs elevated higher than your heart level.
- Drink cool fluids.
- Apply cool water to the skin. If possible, take a cool shower or soak in a cool bath.
- Don't apply alcohol to the skin.
- Keep clothing loose. Remove any unnecessary clothing and make sure clothes aren't binding.

**If no improvement occurs within a half-hour using these treatment measures, seek prompt medical attention.**

## 6.4 HEAT STROKE

Heatstroke is the most severe of the heat-related problems, often resulting from exercise or heavy work in hot environments combined with inadequate fluid intake. Heatstroke is a life-threatening condition that occurs when the body temperature reaches 104ºF (40ºC) or higher.

***PREVENTION***

Measures to prevent heatstroke are basically the same as those to prevent dehydration and heat exhaustion. When working or exercising in hot weather, take breaks, rest frequently in a cool area and replenish fluids regularly. Wear a lightweight, wide-brimmed hat to protect from the sun, and apply sunscreen to any exposed skin. A sunburn reduces the body's ability to rid itself of heat.

Seek a cooler place such as shade, an air conditioned vehicle or air conditioned building. Drink plenty of fluids. Staying hydrated will help one sweat and maintain a normal body temperature.

The main sign of heatstroke is a markedly elevated body temperature, generally greater than 104ºF (40ºC), with changes in mental status ranging from personality changes to confusion and coma. Skin may be hot and dry, although if heatstroke is caused by exertion, the skin may be moist.

Other signs and symptoms may include:

- Rapid heartbeat

- Rapid and shallow breathing
- Elevated or lowered blood pressure
- Cessation of sweating
- Irritability, confusion or unconsciousness
- Feeling dizzy or lightheaded
- Headache
- Nausea
- Fainting, which may be the first sign in older adults

***TREATMENT***
If heatstroke is suspected:

- Move the person out of the sun and into a shady or air-conditioned space.

- Dial 911 or call for emergency medical assistance.

- Cool the person by covering him or her with damp sheets or by spraying with cool water. Direct air onto the person with a fan or newspaper.

- Have the person drink cool water, if he or she is able.

# 7.0 COLD WEATHER

Exposure to low temperatures presents a risk to safety and health both through the direct effect of the low temperature on the body and collateral effects such as slipping, falling and decreased dexterity. The effects of cold exposure include frostbite and hypothermia. Even in southern California, working in the creek during rain events could potentially cause these problems. By paying attention, wearing appropriate protective waders, raincoats, wetsuits, etc. this should not be a problem.

# 7.1 HYPOTHERMIA

Hypothermia is the rapid, progressive mental and physical collapse accompanying the chilling of the inner core of the human body. Hypothermia is caused by exposure to cold, aggravated by wet, wind, and exhaustion. Hypothermia is defined as a decrease in a person's core temperature below 96°F. The person remains conscious and responsive with normal blood pressure and a core temperature of 93.2°F. As hypothermia advances beyond this point, the person has a glassy stare, slow pulse, slow respiratory rate, and may lose consciousness. Severe hypothermia starts when the core body temperature reaches 91.4°F.

Hypothermia affects the brain, potentially impairing judgment and motivation. Thus hypothermia is particularly dangerous because a person may not know it is occurring and won't be able to properly respond.

***PREVENTION***
Exercise increased care when working in cold environments to prevent accidents that may result from the cold.

Wear a hat or other protective covering to prevent body heat from escaping from the head, face and neck. Wear gloves or mittens to minimize heat loss from hands. Wear loose fitting, layered, lightweight clothing. Outer clothing made of tightly woven, water-repellent material is best for wind protection. Wool, silk or polypropylene inner layers hold more body heat than cotton does. Stay as dry as possible.

Common signs to look for are shivering, which is the body's attempt to generate heat through muscle activity, and the "-umbles":

- Stumbles
- Mumbles
- Fumbles
- Grumbles

***TREATMENT***
Preventing additional heat loss is crucial. Get to a warm and dry place as soon as possible. Put on dry closes, especially hat, socks and shoes. If the affected person is alert and is able to swallow, have the person drink a warm, nonalcoholic beverage to help warm the body. Apply warm compresses to the neck, chest wall and groin. Don't attempt to warm the arms and legs. Heat applied to the arms and legs forces cold blood back toward the heart, lungs and brain, causing the core body temperature to drop. This can be fatal.

Treat mild hypothermia by getting into a warm and dry environment. Seek shelter from wind and weather

# 8.0 WILDFIRES

All of our study sites are located within HIGH FIRE DANGER AREAS.

The RCDSMM has a NO SMOKING POLICY. Smoking is not allowed at any time, or at any RCDSMM work location.

Field work in areas that have difficult access are not permitted on RED FLAG DAYS.

Team Leaders and office staff will check for fire alert or warnings immediately prior to field work, and monitor conditions while the team is in the field. If there is a higher than normal potential for wildfire (fires are possible almost every day in southern California), Team Leaders will review an exit strategy with the office contact person to make sure that they are notified immediately if there is a wildfire start that could affect the team in the field.

If a wildfire is detected or suspected, evacuate immediately. If evacuation is not possible, seek shelter in the lower reaches of canyons, preferably within the wetted creek channel. Soak your clothes or immerse yourself in the water in the center of the largest pool available.

Wildfire can cause immediate death and serious injury. Burns can vary from mild (first degree) to serious (third degree). Additionally smoke from wildfires can hurt the eyes, irritate the respiratory system, and worsen chronic heart and lung diseases.

# 9.0 BURNS

## 9.1 First Degree Burns

First-degree burns involve the top layer of skin. Sunburn is a first-degree burn. Signs of first degree burns:

- Red skin
- Painful to touch
- Skin will show mild swelling

**First degree burn treatment:**

- Apply cool, wet compresses, or immerse in cool, fresh water. Continue until pain subsides.
- Cover the burn with a sterile, non-adhesive bandage or clean cloth.
- Do not apply ointments or butter to burn; these may cause infection.
- Over-the-counter pain medications may be used to help relieve pain and reduce inflammation.
- First degree burns usually heal without further treatment. However, if a first-degree burn covers a large area of the body, seek emergency medical attention.

## 9.2 Second Degree Burns

Second-degree burns involve the first two layers of skin. Signs of second degree burns:

- Deep reddening of the skin

- Pain
- Blisters
- Glossy appearance from leaking fluid
- Possible loss of some skin

**Second degree burn treatment:**

- Immerse in fresh, cool water, or apply cool compresses. Continue for 10 to 15 minutes.
- Dry with clean cloth and cover with sterile gauze.
- Do not break blisters.
- Do not apply ointments or butter to burns; these may cause infection
- Elevate burned arms or legs.
- Take steps to prevent shock: lay the victim flat, elevate the feet about 12 inches, and cover the victim with a coat or blanket. Do not place the victim in the shock position if a head, neck, back, or leg injury is suspected, or if it makes the victim uncomfortable.
- Further medical treatment is required.

## 9.3 Third Degree Burns

A third-degree burn penetrates the entire thickness of the skin and permanently destroys tissue. Signs of third degree burns:

- Loss of skin layers
- Often painless. (Pain may be caused by patches of first- and second-degree burns that often surround third-degree burns).
- Skin is dry and leathery
- Skin may appear charred or have patches which appear white, brown or black

**Third degree burn treatment:**

- Cover burn lightly with sterile gauze or clean cloth. Do not use material that can leave lint on the burn.
- Do not apply ointments or butter to burns; these may cause infection
- Take steps to prevent shock: lay the victim flat, elevate the feet about 12 inches.
- Have person sit up if face is burned. Watch closely for possible breathing problems.
- Elevate burned area higher than the victim's head when possible. Keep person warm and comfortable, and watch for signs of shock.
- Do not place a pillow under the victim's head if the person is lying down and there is an airway burn. This can close the airway.
- Immediate medical attention is required. Do not attempt to treat serious burns unless you are a trained health professional.

# 10. FLASH FLOODS

A flash flood is a sudden local flood of great volume and short duration. Flash floods can take only a few minutes to a few hours to develop. Rain events in southern California are very flashy, and the peak flows can be very powerful and can cause serious injury or death.

Being observant when working on the traps, DIDSON camera or any other creek based activity, and knowing possible exits to higher areas are key factors in preventing injury.

During storm event trapping or DIDSON camera deployment, check weather reports or internet weather sites for flash flood warnings or flash flood watches.

- A flash flood WARNING means a flash flood is occurring or will occur very soon.

- A flash flood WATCH means flash flooding is possible in the area.

**Some internet weather sites:**
NOAA Los Angeles http://www.wrh.noaa.gov/lox/
CNN Weather http://weather.cnn.com/weather/forecast.jsp
Weather Underground http://www.wunderground.com/

If flash flood warning or watch is in effect, field work in canyons and near streams will not be conducted.

If heavy rains are forecast, fieldwork in canyons and along streams will not be conducted until rains have decreased within the watershed where fieldwork will be conducted.

If you are already conducting field work in the creek, listen for rumbling sounds that might indicate an approaching flash flood. Immediately move to higher ground away from the creek channel. Do not attempt to carry heavy items that will slow your movement.

# 11. HIKING

Fieldwork in the Santa Monica Mountains requires hiking off of established trails, often in rugged terrain. Slips, trips, and falls can easily occur. Field work within stream channels and adjacent areas has the additional risk of falls due to wet, slippery rocks, and algal mats that hide holes. Rigorous hiking can also lead to fatigue and exhaustion. Fatigue is well established as a contributing factor to occupational injury.

All field workers are required to wear proper footwear for field conditions and pay attention to where they are stepping when hiking. Flip-flops, Tevas or any other open sandal is not permitted in stream work.

Team leaders and field staff should always inform the RCDSMM office contact of when and where field work will be conducted. Team leaders are expected to call the RCDSMM office contact at the end of each field day. A charged cellular telephone and GPS unit will be accessible to each field team.

If a field worker becomes lost, they should call for help or simply find a safe place to sit and wait for searchers to arrive.

Rest breaks should be taken so that fatigue does not occur.

When using ropes to assist climbs, always:

- Check to determine that rope is firmly attached to its anchor point by pulling firmly on rope;
- Visually check rope for frayed spots, wear or other deterioration;
- Climb carefully, making sure grip is tight and feet are placed securely;
- Do not allow rope to run over a sharp edge when climbing,

# 12. CRIMINAL ACTIVITY

Field personnel could be harassed, threatened or attacked by individuals engaged in illegal activities. Field equipment and vehicles may be stolen or vandalized. Several of our field locations are known areas for transient encampments.

Evidence of suspected criminal activity such as marijuana plants or stripped vehicles should be avoided and immediately reported to the state park rangers, police or other authorities. The location of suspected illegal activity should be noted by GPS coordinates if possible.

Stay together as a team. Do not leave any team member alone.
DO NOT linger at locations of suspected illegal activity.
DO NOT confront individuals in the vicinity of suspected illegal activity.

Lock all equipment securely in vehicles, trailer or the RCD shed.

# 13.0 GENERAL HEALTH AND SAFETY REQUIREMENTS

All fieldwork will be conducted by a minimum of two persons. The buddy system is a basic component of field safety. In the event of injury, the uninjured person will remain with the injured party unless absolutely necessary to leave in order to obtain emergency assistance.

## *Code For Safe Practices*

### ***The following is a list of safety procedures that will be adhered to while working at any field location:***

- All OSHA requirements will be observed
- Eye, ear, hand protection devices and weather protective gear must be worn when the type of work being done requires this type of protection.
- Protective clothing will be worn
- Personnel will carry water

Safety is a mutual endeavor. Each individual is responsible for their own health and safety and that of their immediate co-workers. All personnel are to exercise personal judgment and have an explicit right to refuse hazardous assignments if they have safety concerns.

## *Protective Equipment and Clothing*

Equipment required for Field Personnel while working in the field:

- Boots or closed toe shoes for water work
- Waders for electrofishing
- Cell Phone
- Long Pants

Equipment required to be available onsite and/or in field vehicle:

- First–aid kit
- Flashlight with fully charged batteries
- Cell phone car charger

Equipment recommended for Field Personnel while working in the field:

- Hat
- Gloves
- sunscreeen

A vehicle must be kept on site while personnel are working, for the transport of slightly injured personnel to a hospital or emergency medical facility. Severely injured personnel MUST ONLY be transported by paramedics. A copy of hospital and urgent care center addresses must remain in the field backpack.

# APPENDIX G
# RCDSMM HACCP Equipment Decontamination Protocol

# ANS-HACCP Plan –
# SNORKEL SURVEYS

Resource Conservation District of the Santa Monica Mountains

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**1) Product Description**
**2) Flow Diagram**
**3) Potential Hazards**
**4) Hazard Analysis Worksheet**
**5) HACCP Plan Form**

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## 1) Product Description

| | |
|---|---|
| **Firm Name:** | *RCDSMM* |
| **Firm Address:** | *540 S. Topanga Canyon Blvd. Topanga, CA 90290* |
| **Species of fish:** | *Rainbow Trout (Onchorhynchus mykiss)* |
| **Cultured, wild harvested, or both:** | *Wild* |
| **Harvest method:** | *Not applicable* |
| **Method of distribution and storage:** | *Not applicable* |
| **Intended use and consumer:** | *Monitoring population abundance and distribution* |

## 2) Flow Diagram

| | |
|---|---|
| **Step 1** | *Malibu Creek specific gear collected at the RCDSMM research storage shed. Gear includes wetsuits, gloves, hoods, shoes, dive lights, masks and snorkels.* |
| ⇓ | |
| **Step 2** | *Gear transported in Malibu specific tubs to the input site.* |
| ⇓ | |
| **Step 3** | *Sort gear for each diver. Each diver carries their own gear approximately 1/2 –1 mile hike in to the start point for the snorkel surveys. Change into dive gear.* |
| ⇓ | |
| *Step 4* | *One recorder carries a backpack, while all divers snorkel in Malibu Creek counting all steelhead trout observed.* |
| ⇓ | |
| **Step 5** | *Return to start site and change into regular clothes and shoes. Re-pack all dive gear to carry back to the vehicles.* |
| ⇓ | |
| **Step 6** | *All gear that has been in touch with the water is placed into the storage tubs in the vehicles.* |
| ⇓ | |
| **Step 7** | *Return to the decontamination site. Remove gear from tubs and scrub everything with a brush used only for Malibu gear. Rinse in specific Malibu only tubs.* |
| ⇓ | |
| **Step 8** | *All gear other than wetsuits is then placed into a 50/50 solution of 409 (old formula) and water. Soak for at least 30 minutes. Rinse all gear in specific Malibu only tubs.* |
| ⇓ | |
| **Step 9** | *Wetsuits are sprayed with a 10% bleach solution, rinsed, and hung out to dry. When inside is dry, then the outside is sprayed, rinsed, and dried as well.* |
| ⇓ | |
| **Step 10** | *Tubs are inspected and washed, then sprayed with a 10% bleach solution and allowed to dry completely.* |
| ⇓ | |
| **Step 11** | *When the tubs and gear have completely dried, everything is neatly stored for future use.* |

## 3) Potential Hazards (List relevant species)

1. **ANS Fish and Other Vertebrates.** Examples: Eurasian ruffe, round goby, Asian carps, non-native amphibians, etc.

*Bullfrog eggs or tadpoles, carp, catfish, bluegill, green sunfish, striped bass, mosquitofish and fathead minnow eggs or fry.*

2. **ANS Invertebrates.** Examples: zebra mussels, Asiatic clams, spiny waterfleas, rusty crayfish, etc.

*New Zealand Mudsnails, red swamp crayfish*

3. **ANS Plants.** Examples: Eurasian watermilfoil, hydrilla, giant salvinia, water chestnut, etc.

*Terrestrial precautions*

***4. Diseases (Pathogens and Parasites)***

*None known at this time*

## 4) Hazard Analysis Worksheet

| (1) Harvest or Aquaculture Step (from flow diagram) | (2) Identify potential ANS hazards introduced or controlled at this step (1) | (3) Are any potential ANS hazards significant? (Yes/No) | (4) Justify your decisions for column 3. | (5) What control measures can be applied to prevent the significant hazards? | (6) Is this step a critical control point? (Yes/No) |
|---|---|---|---|---|---|
| *1. Malibu Creek specific gear collected at the RCDSMM research storage shed. Gear includes wetsuits, gloves, hoods, shoes, dive lights, masks and snorkels.* | Fish/Other Vert. | No | *Gear is put away clean and disinfected.* | *NA* | *No* |
| | Invertebrate NZMS | No | *Gear is put away clean and disinfected* | *NA* | *No* |
| | Plant | No | *Gear is put away clean and disinfected* | *NA* | *No* |
| *2. Gear transported in Malibu specific tubs to the input site.* | Fish/Other Vert. | No | No chance of infection during transport. | NA | No |
| | Invertebrate | No | No chance of infection during transport. | NA | No |
| | Plant | No | No chance of infection during transport. | NA | No |
| *3 Sort gear for each diver. Each diver carries their own gear approximately 1/2 –1 mile hike in to the start point for the snorkel surveys. Change into dive gear.* | Fish/Other Vert. | No | No chance of infection during transport. | NA | No |
| | Invertebrate | No | No chance of infection during transport. | NA | No |
| | Plant | No | No chance of infection during transport. | NA | No |
| *4. One recorder carries a backpack, while all divers snorkel in Malibu* | Fish/Other Vert. exotic fish eggs and larvae | Yes | Contact with water and bank vegetation may cause inadvertent tramsport | Visually inspect shoes, clothes, and snorkel gear and the backpack. | Yes |

| | | | | | |
|---|---|---|---|---|---|
| *Creek counting all steelhead trout observed.* | | | | | |
| | Invertebrate NZMS | Yes. | Contact with water and bank vegetation may cause inadvertent tramsport | Visually inspect shoes clothes, and snorkel gear and the backpack. | Yes |
| | Plant Invasive Euphorbia | Yes | Contact with water and bank vegetation may cause inadvertent tramsport | Visually inspect shoes, clothes, and snorkel gear and the backpack. | Yes |
| *5. Return to start site and change into regular clothes and shoes. Re-pack all dive gear to carry back to the vehicles.* | Fish/Other Vert. exotic fish eggs and larrvae | Yes | Contact with water and bank vegetation may cause inadvertent tramsport | Visually inspect shoes, clothes, and snorkel gear and the backpack. | Yes |
| | Invertebrate NZMS | Yes. | Contact with water and bank vegetation may cause inadvertent transport | Visually inspect shoes clothes, and snorkel gear and the backpack. | Yes |
| | Plant Invasive Euphorbia | Yes | Contact with water and bank vegetation may cause inadvertent tramsport | Visually inspect shoes, clothes, and snorkel gear and the backpack. | Yes |
| *6. All gear that has been in touch with the water is placed into the storage tubs in the vehicles.* | Fish/Other Vert. exotic fish eggs and larvae | NO | All gear is contained to avoid contaminating the vehicle. | Make sure that everything gets put inside the tubs completely. | Yes |
| | Invertebrate NZMS | NO | All gear is contained to avoid contaminating the vehicle. | Make sure that everything gets put inside the tubs completely. | Yes |
| | Plant Invasive Euphorbia | NO | All gear is contained to avoid contaminating the vehicle. | Make sure that everything gets put inside the tubs completely. | Yes |
| *7. Return to the decontamination site. Remove gear from tubs and scrub everything with a brush used only for Malibu gear. Rinse in specific Malibu only tubs.* | Fish/Other Vert. exotic fish eggs and larvae | No | The decontamination site is away from any other natural drainage, and any runoff from the site is contained and filtered to remove invasives. | Decontamination is confined to areas with access to water and adequate filtration. Gear is cleaned in one set of marked tubs only. Rinse water is disposed of away from any waterways that | Yes |

| | | | | | |
|---|---|---|---|---|---|
| | | | | could convey invasives. | |
| | Invertebrate<br>NZMS | No | The decontamination site is away from any other natural drainage, and any runoff from the site is contained and filtered to remove invasives. | Decontamination is confined to areas with access to water and adequate filtration. Gear is cleaned in one set of marked tubs only. Rinse water is disposed of away from any waterways that could convey invasives. | Yes |
| | Plant<br>Invasive Euphorbia | No | The decontamination site is away from any other natural drainage, and any runoff from the site is contained and filtered to remove invasives. | Decontamination is confined to areas with access to water and adequate filtration. Gear is cleaned in one set of marked tubs only. Rinse water is disposed of away from any waterways that could convey invasives. | Yes |
| *8. All gear other than wetsuits is then placed into a 50/50 solution of 409 (old formula) and water. Soak for at least 30 minutes. Rinse all gear in specific Malibu only tubs.* | Fish/Other Vert.<br><br>exotic fish eggs and larvae | No | Fish eggs and larvae cannot survive soak in 409. | Using the 409 soak kills all fish eggs and larvae. Rinsing in a contained area ensures that if any eggs survived, they would be prevented from reaching a drainage. | Yes |
| | Invertebrate<br>NZMS | No | Crayfish eggs and larvae cannot survive soak in 409. NZMS are also killed by this solution. | Using the 409 soak kills all eggs and larvae. Rinsing in a contained area ensures that if any eggs or snails survived, they would be prevented from reaching a drainage. | Yes |
| | Plant<br>Invasive Euphorbia | No | Most seeds cannot survive soak in 409. | Using the 409 soak kills all seeds. Rinsing in a contained area ensures that if any eggs survived, they | Yes |

| | | | | | |
|---|---|---|---|---|---|
| | | | | would be prevented from reaching a drainage. | |
| *9. Wetsuits are sprayed with a 10% bleach solution, rinsed, and hung out to dry. When inside is dry, then the outside is sprayed, rinsed, and dried as well.* | Fish/Other Vert.<br>exotic fish eggs and larvae | No | While fish eggs might attach to the wetsuits, they would not survive the bleach treatment and drying. | Spray with a 10% bleach solution and allow to dry completely, inside and out. | Yes |
| | Invertebrate<br>NZMS | No | While crayfish eggs and NZMS might attach to the wetsuits, they would not survive the bleach treatment and drying. | Spray with a 10% bleach solution and allow to dry completely, inside and out. | Yes |
| | Plant<br>Invasive Euphorbia | No | While seeds might attach to the wetsuits, they would not survive the bleach treatment and drying. | Spray with a 10% bleach solution and allow to dry completely, inside and out. | Yes |
| *10. Tubs are inspected and washed, then sprayed with a 10% bleach solution and allowed to dry completely.* | Fish/Other Vert.<br>exotic fish eggs and larvae | No | Any organisms left in the tubs would be killed by the bleach solution and drying. | Bleach and drying are effective controls. | Yes |
| | Invertebrate<br>NZMS | No | Any organisms left in the tubs would be killed by the bleach solution and drying. | Bleach and drying are effective controls. | Yes |
| | Plant<br>Invasive Euphorbia | No | Any organisms left in the tubs would be killed by the bleach solution and drying. | Bleach and drying are effective controls. | Yes |
| *11. When the tubs and gear have completely dried, everything is neatly stored for future use.* | Fish/Other Vert.<br>exotic fish eggs and larvae | No | Equipment is stored in a metal shipping container that gets pretty hot and is not used for a month. | Drying and heat effectively kill these organisms. Gear is stored for a month before next use. | Yes |
| | Invertebrate<br>NZMS | No | Equipment is stored in a metal shipping container that gets pretty hot and is not used for a month. | Drying and heat effectively kill these organisms. Gear is stored for a month before next | Yes |

| | | | | |
|---|---|---|---|---|
| | | | use. | |
| Plant<br>Invasive Euphorbia | No | Equipment is stored in a metal shipping container that gets pretty hot and is not used for a month. | Drying and heat effectively kill these organisms. Gear is stored for a month before next use. | Yes |

**5) ANS-HACCP Plan Form**

**1) Critical Control Point** – Water contact while snorkeling and when transporting gear.

**2) Hazard –** Transport of aquatic invasive NZMS or terrestrial seeds to other drainages

**3) Limits for each Control Measure** - Zero tolerance

**4) Monitoring – What? –** Visual Inspection, scrubbing and decontamination of gear

**5) Monitoring – How?** – Decontamination using various solvents and drying, as well as keeping all gear from infected watershed separately

**6) Monitoring – Frequency? –** Before and following each use.

**7) Monitoring – Who? –** Field Supervisor

**8) Corrective Action(s)** – Quarantine and clean equipment; nix the program

**9) Verification Process** – "Certify" decontamination after each use

**10) Records to be Kept**- Checklist of decontamination steps kept with the storage tubs and initialed following each step at each event.

**APPENDIX 5**

**BIOS METADATA**

SANTA MONICA BAY
ANADROMOUS ADULT AND JUVENILE
STEELHEAD MONITORING
2015-2018

Prepared for
CDFW Contract No. P1250013 and P1450013

Prepared by:

RCD of the Santa Monica Mountains
540 S. Topanga Canyon Blvd.
Topanga, CA 90290

May 2018

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# SANTA MONICA BAY ANADROMOUS ADULT AND JUVENILE STEELHEAD MONITORING

## SMB Lagoon Monitoring and Presence/Absence Data

**Abstract:** Establishing a structured long-term monitoring of steelhead abundance, distribution, and migration opportunities is essential for developing a well-documented and prioritized planning effort for steelhead recovery in the Santa Monica Mountains BPG. In accordance with the federal Endangered Species Act, the National Marine Fisheries Service developed a Recovery Plan for the Southern California Coast Distinct Population Segment (DPS) (NMFS 2011). At minimum, a long-term (i.e., 15+ year), data set is required to provide reliable information upon which to base recovery and management decisions. NMFS (2011) and CDFG Fisheries Bulletin 180 (CDFG 2011) identify the need for Status Monitoring designed to document annual anadromous run size in each creek within the Santa Monica Mountains BPG to characterize the status of the entire population. By augmenting current monitoring (in Arroyo Sequit, Malibu and Topanga creeks), with snorkel surveys, water temperature and summer-fall stream flow conditions in other creeks that had historical presence of *O. mykiss*, such as Big Sycamore, Solstice, Trancas and Zuma, and Las Flores Creek (which is identified as a potential steelhead creek [NMFS 2011]), we should be able to directly address the following Recovery Plan questions: 1) Do intermittent creeks serve as steelhead nursery habitat? 2) Does mainstem habitat support high juvenile survival and growth? 3) How common is dispersal and how does it relate to population structure, especially in small coastal basins?

**Purpose:** Presence/absence surveys in Big Sycamore, Las Flores, Solstice, Trancas and Zuma Creeks will augment on-going surveys being conducted in Arroyo Sequit, Malibu and Topanga Creeks to provide a comprehensive monitoring of the Santa Monica Mountains Biogeographic Population Group.

**Dates:** September 2013 – May 2018.

**Point of Contact:**

**Person's Name:** Rosi Dagit
**Organization's Name:** Resource Conservation District of the Santa Monica Mountains
**Telephone Number:** 818-597-8627 ext. 107
**E-Mail address:** rdagit@rcdsmm.org

**Data Type:** EXCEL Spreadsheets, WORD Documents

**Field Definitions:**
Lagoon condition = breach status, connectivity
Thalweg status = depth, width and whether passable for steelhead or not
Length (m), Width (m) = length and width of habitat unit in meters
Max depth (cm), Avg depth (cm) = maximum and average depths of habitat unit in centimeters
Tidal stage = high and low tide time and height
Presence/Absence = visual observations of *O. mykiss* and other fish species

**Access Constraints:** CDFW and NMFS staff
**Use Constraints:** Please cite as RCDSMM Lifecycle Monitoring – DIDSON Data
**Data Distribution:** Limited to CDFW and NMFS staff and projects.

**Progress:** Completed 10 May, 2018.

**Update Frequency:** As needed.

---

**File Name and Location (26 April, 2018 ):**
**Location - (Research Computer RCD)** C:\Users\Any Contractor\My Documents\DFG Reports\DIDSON Final Grant Report 2018\Raw Data File Copies
**Name –** Lagoon Monitoring Data 2013-2018

---

**Keywords (optional):** Words or short phrases summarizing an aspect of the data set, used to allow people to find your dataset with quick keyword searches.

**Theme:** Lagoon condition, presence/absence, southern steelhead, *Oncorhynchus mykiss*

**Place:** Arroyo Sequit, Big Sycamore, Las Flores, Malibu, Solstice, Topanga, Trancas, Zuma Creeks, Southern California, Los Angeles County, Santa Monica Bay

# SANTA MONICA BAY STEELHEAD MONITORING

## Water Temperature (HOBO) Data

**Abstract:** Recording temperature data loggers (ONSET HOBO Tidbits v2 temperature loggers) were installed seasonally in seven pools in Topanga Creek (2005–2017), two – four pools in Malibu Creek (2005-2017), and one pool in Arroyo Sequit Creek (2005-2017). Loggers were deployed in pools known to be refugia for *O. mykiss* and which represented a diversity of canopy cover conditions, proximity to known seeps or springs, and depth conditions. The loggers were set to record data at 30 minute intervals. Data were downloaded monthly when possible during snorkel surveys using Boxcar Pro or HOBOware software and analyzed using Microsoft Excel. Methods are described in further detail in Dagit et al. (2015). Loggers will also be deployed in potential refugia pools in Big Sycamore, Las Flores, Solstice, Trancas and Zuma Creeks, as well as in any remnant lagoons beginning in 2014. Loggers were deployed in pools where anadromous fish were known to be in Arroyo Sequit and Topanga in 2017.

Water and air temperatures were graphed over time for all years and annual mean, maximum and minimum temperatures were assessed and compared. Proportion graphs were made to show the proportion of time a pool was at a certain temperature. We focused the proportion graphs on years that have overlapping data from on the hottest time of year (July-October in most cases) since we are most interested in the amount of time *O. mykiss* are exposed to extreme temperatures. If a pools temperature was above 25°C for any amount of time, the total amount of time (hours) above 25°C was calculated as well.

**Purpose:** Monitor instream water temperatures during times of potential thermal stress (i.e., warm, dry months) in creeks throughout the Santa Monica Bay that have previous or current records of steelhead residents.

**Dates:** 2005 to 2017

**Point of Contact:**

**Person's Name:** Rosi Dagit
**Organization's Name:** Resource Conservation District of the Santa Monica Mountains
**Telephone Number:** 818-597-8627 ext. 107
**E-Mail address:** rdagit@rcdsmm.org

**Data Type:** EXCEL Spreadsheets.

**Field Definitions:**
Date = date data collected
Time = hourly
Water temperature = in degrees Celsius

**Access Constraints:** LA County, CDPR, HTB, USFWS, SCCWRP, CDFW and NMFS staff
**Use Constraints:** Please cite as RCDSMM Water Temperature (HOBO) Data
**Data Distribution:** Limited to those listed above.

**Progress:** In Progress.

**Update Frequency:** Monthly during deployment and then As Needed.

**File Name and Location (26 April, 2018):**
***All files are stored on the RCD (Research computer at the following location:***
C:\Users\Any Contractor\My Documents\DFG Reports\DIDSON Final Grant Report 2018\Raw Data File Copies\HOBO Tempurature Data 2005-2017
***File names:* – list date period included in file**
HOBO Data for All Pools_2016-2018.xls
Topanga hobo data (EXCEL)
Arroyo Sequit hobo data (EXCEL)
All Pools_ hobo data, Topanga and Malibu (EXCEL)
Big Sycamore hobo data (EXCEL)
Las Flores hobo data (EXCEL)
Solstice hobo data (EXCEL)
Trancas hobo data (EXCEL)
Zuma hobo data (EXCEL)

**Keywords (optional):** Words or short phrases summarizing an aspect of the data set, used to allow people to find your dataset with quick keyword searches.

**Theme:** Instream water temperature, air temperature, thermal refugia, thermal limits, steelhead, *Oncorhynchus mykiss*

**Place:** Santa Monica Mountains, Santa Monica Bay, Los Angeles County, Topanga Creek, Malibu Creek, Arroyo Sequit Creek, Big Sycamore Creek, Las Flores Creek, Solstice Creek, Trancas Creek, Zuma Creek.

# SANTA MONICA BAY STEELHEAD MONITORING

## Hydrologic Data

**Abstract:** The amount of water available is subject to extreme natural variability in the small coastal creeks within the Santa Monica Bay. Monitoring flow conditions is possible in Malibu Creek, where USGS/Los Angeles County Department of Public Works maintains a stream gage (F130-9-R) located below the outfall of the Tapia Wastewater Treatment Plant and captures approximately 104 of the 109 square mile watershed. Data from this gage can be obtained by contacting LACDPW. Following the 2007 wildfire in Malibu Creek, USGS installed a second flow gage at the Cross Creek Bridge, located just upstream of Malibu Lagoon. This data was available online in real time until September 2012. LACDPW also maintains a stream gage in Topanga Creek (F54C-R), located at the mile marker 2.02 bridge on Topanga Canyon Blvd. Data from this gage can be obtained by contacting LACDPW.

Precipitation data is also important to monitor, as the duration and peak flows associated with storm events are responsible for connecting the creeks to the ocean. All of the coastal creeks in the Santa Monica Bay form sand berms at the creek mouths during the dry season, and are only directly accessible from the ocean when flows are sufficient to breach the berms. Real time rain data is available from LACDPW online.

**Purpose:** Monitor and record precipitation and streamflow data in the Santa Monica Bay.

**Date:** 2000 to 2018

**Point of Contact:**

**Person's Name:** Rosi Dagit
**Organization's Name:** Resource Conservation District of the Santa Monica Mountains
**Telephone Number:** 818-597-8627 ext. 107
**E-Mail address:** rdagit@rcdsmm.org

**Data Type:** EXCEL Spreadsheet.

**Field Definitions:**

**Description: Precipitation**

Topanga Creek - Daily
Water Years 2001-2018 (18 water years)
Gage Name: Topanga Patrol Station (LACDPW 318)
Source: Los Angeles County Department of Public Works

Malibu Creek - Daily
Water Years 2005-2018 (13 water years)
Gage Name: Monte Nido Fire Station (LACDPW 319)
Source: Los Angeles County Department of Public Works

Arroyo Sequit, Big Sycamore, Trancas, Zuma Creeks - Daily
Water Years 2001-2018 (18 water years)
Gage Name: Lechuza Patrol Station (LACDPW 454)
Source: Los Angeles County Department of Public Works

Las Flores Creek - Daily
Water Years 2005-2018 (13 water years)
Gage Name: Big Rock Mesa (LACDPW 320)
Source: Los Angeles County Department of Public Works

**Description: Streamflow**
Topanga - Daily
Mean Daily Discharge
Water Years 2001-2006 6 years
Gage Name: Topanga Creek (F54C-R)
Source: Los Angeles County Department of Public Works

Malibu- Daily
Mean Daily Discharge
Water Years 2001-2006 6 years
Gage Name: Topanga Creek (F130-9-R)
Source: Los Angeles County Department of Public Works

**Access Constraints:** CDPR, LA County, USFWS, HTB, CDFW and NMFS staff
**Use Constraints:** Please cite as RCDSMM Hydrological Data
**Data Distribution:** Limited to those listed above.

**Progress:** On-going

**Update Frequency:** As Needed.

---

**File Name and Location (26 April, 2018):**
***All files are stored on the RCD (Research computer at the following location:***
C:\Users\Any Contractor\My Documents\DFG Reports\DIDSON Final Grant Report 2018 Raw Data File Copies\Rain Data
***File names:* – list date period included in file**
Topanga flow data (EXCEL) 2001-2017
Malibu flow data (EXCEL) 2005-2016
Topanga Rain data (EXCEL) 2000-2018
Topanga Water Years (EXCEL) 1928- 2018
Monte Nido Rain data (EXCEL) 2005-2018
Lechuza Patrol Rain data (EXCEL) 2005- 2018
Big Rock Mesa Rain data (EXCEL) 2013- 2018

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**Keywords (optional):** Words or short phrases summarizing an aspect of the data set, used to allow people to find your dataset with quick keyword searches.

**Theme:** precipitation, stream flow
**Place:** Santa Monica Mountains, Santa Monica Bay, Los Angeles County, Topanga Creek, Malibu Creek, Arroyo Sequit Creek, Big Sycamore Creek, Las Flores Creek, Solstice Creek, Trancas Creek, Zuma Creek.

# SANTA MONICA BAY ANADROMOUS ADULT AND JUVENILE STEELHEAD MONITORING

## DIDSON Camera Data

**Abstract:** Steelhead (*Oncorhynchus mykiss*) in Topanga Creek was included in the Southern California Coast Distinct Population Segment in July 2002. Until 1980, a population of steelhead of unknown size was present in Topanga Creek (Moyle et al. 1989, Swift et al. 1993, Dagit et al. 2005). It is not clear if this was primarily a resident population, or mixed, supporting anadromy when conditions were suitable. Occasional surveys by CDFG between 1980 and 1997 failed to find steelhead. In 1998, four adults were observed. Since June 2001, monthly snorkel surveys, biannual mark-recapture efforts and storm event migrant trapping, have documented the abundance and distribution trends of the reproducing population of *O. mykiss* in Topanga Creek. Continued long-term research and monitoring is essential to fully optimize steelhead recovery in Topanga Creek. As of 2012, a DIDSON camera has been deployed in Topanga Creek when flows were high enough and the creek was deep enough to cover the camera and allow for proper functioning (approx. 15 cm depth). Low flows in 2012 and 2013 allowed for only 2 opportunities to deploy the DIDSON. One rain event in 2014 allowed for a 2 night deployment as well. No deployments were possible in 2015. One rain event in 2016 allowed for a 17 hour deployment. Above average rainfall in 2017 allowed for four separate DIDSON deployments in January and February. No deployments were possible in 2018 The DIDSON camera allows for potential to document incoming anadromous adults or outgoing smolts during times when flows are too high to allow for trapping. The DIDSON camera is deployed about 30 meters above the antenna system, allowing for comparison between antenna detections (of tagged fish) and image detections (of tagged and untagged fish). When trapping is possible, trapping will also be conducted simultaneously.

**Purpose:** A DIDSON unit will quantify the number of anadromous adults/smolts migrating in/out of Topanga Creek, a designated lifecycle monitoring site.

**Dates:** 12-14 April 2012, 25-27 January 2013, 28 Feb-2 Mar 2014, 6-7 March 2016, 19-20 January 2017, 6-7 February 2017, 10-11 February 2017, 19-20 February 2017

**Point of Contact:**

**Person's Name:** Rosi Dagit
**Organization's Name:** Resource Conservation District of the Santa Monica Mountains
**Telephone Number:** 818-597-8627 ext. 107
**E-Mail address:** rdagit@rcdsmm.org

**Data Type:** EXCEL Spreadsheets.

**Field Definitions:**

Field notes describing deployment conditions is a word document prepared for each deployment. Data sheets used to collect data during deployment include Excel worksheets with:

- date, time, lagoon condition, tide status, observers, wetted width (m) of channel, Avg depth (in), flow (cfs), Dissolved oxygen (% saturation, mg/l), pH, conductivity, water temperature, air temperature, visibility, bank condition, total rain, weather conditions, notes
- flow calculations

Image processing data include Excel worksheets with:

- file name, file date, Reviewer 1, Reviewer 2, Fish, Ecogram, Comments

**Access Constraints:** CDFW and NMFS staff
**Use Constraints:** Please cite as RCDSMM Lifecycle Monitoring – DIDSON Data
**Data Distribution:** Limited to CDFW and NMFS staff and projects.

**Progress:** Complete

**Update Frequency:** As needed.

---

**File Name and Location (26 April, 2018):**
**DIDSON Data and Photos**
**Location - (Research Computer RCD)** C:\Users\Any Contractor\My Documents\DFG Reports\DIDSON Final Grant Report 2018\Raw Data File Copies\DIDSON Deployments

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**Keywords (optional):** Words or short phrases summarizing an aspect of the data set, used to allow people to find your dataset with quick keyword searches.

**Theme:** DIDSON, lifecycle monitoring, southern steelhead, *Oncorhynchus mykiss*
**Place:** Topanga Creek, Southern California, Los Angeles County, Santa Monica Bay

# TOPANGA CREEK STEELHEAD LIFECYCLE MONITORING

## Instream Antenna Data

**Abstract:** As part of the lifecycle monitoring efforts, an instream antenna system has been set up in Topanga Creek in order to monitor instream migration of *Oncorhynchus mykiss*. The system includes an upstream and downstream antenna, allowing for detection of movement direction. The antenna was initially set up at the trapping location, a site known as Fish Camp, located approximately 1300m upstream of the lagoon. The criteria for selecting the location included accessibility, appropriate flow characteristics and sandy substrate to facilitate antenna installation. In Spring 2010, the antenna got blown out during a high flow event, and only one antenna could be replaced for the remainder of the season. As of fall 2011, the antenna system was set up further downstream at a location only about 580m upstream of the ocean, to allow for better estimation of outmigration, rather than just instream movement. The location is also narrower and requires less cable, reducing chances of destruction during high flow events. From 2012 to 2018 the antenna was set up in this same location. The antenna data logger had to be sent to the manufacturer for repair in 2013, 2017, and 2018. In 2017, the antenna got blown out again during a flash flood surge in January so coupled with the reader repairs, it was out of service for all of the 2017 and 2018wet season. This data set includes all detections recorded on the instream antenna while functional in Topanga Creek. Detection data includes the pit tag number of the individual, the date and time the individual passed an antenna, the position of the antenna (upstream or downstream), and information from previous captures such as size, age and distance.

**Purpose:** Monitor migration of tagged individuals, either outmigrant smolts or anadromous adults returning to Topanga Creek. The instream antenna can work in higher flows which can make it difficult to set traps, and therefore allows us to gain information on fish movement during times of high flows and low flows when traps are not set. When both upstream and downstream antenna are set and functional, it records movement direction as well as pit tag number, which we can then refer to in order to figure out size and age at last capture and estimate size and age when passing the antenna.

**Dates:** 2008 – 2018

**Point of Contact:** Contact information for an individual or organization that is knowledgeable about the data set.

**Person's Name:** Rosi Dagit
**Organization's Name:** Resource Conservation District of the Santa Monica Mountains
**Telephone Number:** 818-597-8627 ext. 107
**E-Mail address:** rdagit@rcdsmm.org

**Data Type:** EXCEL Spreadsheet.

**Field Definitions:**
This worksheet contains worksheets for each season of trapping (e.g., 2008-2009, 2009-2010, 2010-2011, 2011-2012, 2012-2013, etc). Each worksheet contains the following information:

- Dates deployed
- # days one or both antenna were operational
- Date, time, antenna hit (upstream or downstream or both), pit tag number, date last caught, capture status, location, size (mm), age at capture, estimated age at detection, RCD ID, notes, and lavage data, if applicable.

**Access Constraints:** CDFW and NMFS staff
**Use Constraints:** Please cite as RCDSMM Lifecycle Monitoring – Instream Antenna Data
**Data Distribution:** Limited to CDFW and NMFS staff and projects.

**Progress:** Completed

**Update Frequency:** As needed.

---

**File Location & Name (26 April, 2018):**
**Location - (Research Computer RCD)** C:\Users\Any Contractor\My Documents\DFG Reports\DIDSON Final Grant Reports 2018\Raw Data Files Copies\Antenna
**Name -** Topanga Antenna Data_2008-2017

---

**Keywords (optional):** Words or short phrases summarizing an aspect of the data set, used to allow people to find your dataset with quick keyword searches.

**Theme:** PIT tagging, instream antenna, lifecycle monitoring, southern steelhead, *Oncorhynchus mykiss*

**Place:** Topanga Creek, Southern California, Los Angeles County, Santa Monica Bay

# TOPANGA CREEK STEELHEAD LIFECYCLE MONITORING

## Mark-Recapture (PIT) Data

**Abstract:** The Resource Conservation District of the Santa Monica Mountains has been conducting a lifecycle monitoring project in Topanga Creek since 2008. Mark-recapture events are held every November (2008-2017) and March (2011-2013) in order to monitor the abundance and distribution of *Oncorhynchus mykiss* in Topanga Creek. Individual movement, age, growth, diet, and genetics are assessed as well. There are individual spreadsheets for each mark-recapture event held since 2008. Each spreadsheet includes the following worksheets: Pit tag data MASTER, Hab data, Scales, Fins, Lavage, Summary, Recaptures. Details of each worksheet are described below. There is also a spreadsheet that contains all mark-recapture data from all years (master PIT data), as well as recapture data from all years (master recapture data).

**Purpose:** Long-term lifecycle monitoring (age and growth, genetics, diet, movement) of southern steelhead (*Oncorhynchus mykiss*) in Topanga Creek.

**Dates:** November 2008, November 2009, November 2010, November 2011, November 2012, November 2013, November 2014, November 2015, November 2016, November 2017, March 2011, March 2012, March 2013, March 2014

**Point of Contact:** Contact information for an individual or organization that is knowledgeable about the data set.

**Person's Name:** Rosi Dagit
**Organization's Name:** Resource Conservation District of the Santa Monica Mountains
**Telephone Number:** 818-597-8627 ext. 107
**E-Mail address:** rdagit@rcdsmm.org

**Data Type:** EXCEL Spreadsheets & CMP ACCESS Database compatible EXCEL spreadsheet.

**Field Definitions (& worksheet description):**
***Pit tagging data for individual events:***
*Pit tag data MASTER:* includes all pit tag data and notes.
Pit tag number = number on pit tag implanted into individual
RCD ID number = ID given to individual based on creek, year, and sample number (T=Topanga; e.g., T11-100)
Date captured = date trout captured
Distance = distance (RKM) of capture location, upstream from Topanga lagoon
FL mm = fork length in millimeters
Condition code = condition of fish at capture (1=healthy, 2=injured, 3= dead)
Capture method = T (trap), E (electrofishing), A (angling)
N/R = new or recapture
Scales, Fin clip, lavage, branded = yes if taken, no if not taken (stable isotope samples were also taken during several sampling events)
Notes = any notes about individual taken during event

*Hab* data: includes all habitat data from units where fish were captured.
Date = survey date
Distance = distance (RKM) of capture location, upstream from lagoon
Pool name = name of known habitat unit
Hab type = type of habitat unit (pool, riffle, step pool, run, etc.)

Max depth = maximum depth of habitat unit (cm)
Avg depth = average depth of habitat unit (cm)
Canopy (% cover) = percent of total habitat unit shaded by canopy (trees, arundo, etc.)
Substrate = predominant substrate type in habitat unit (sand, gravel, cobble, boulders, bedrock, etc.)
Algae (% cover) = percent of total habitat unit with algae (could be up to 100% bottom, 100% mid-water, 100% surface for a total of 300% cover)
Shelter value = the value of the habitat unit for steelhead, ranges from 0.5 to 3 and recorded in 0.5 increments (0.5,1,1.5,2,2.5,3)
Instream % cover = percent of pool providing instream cover or shelter (typically undercut boulders or banks but could include deep areas or foliage like arundo, cattails or willow roots), typically recorded in 5% increments and typically ranges from about 0-25%, but could be higher depending on size of habitat unit and amount of cover
#trout = number of trout located in each habitat unit
Notes = any notes taken during survey

*Scales*: includes a list of all scale samples taken as well as age determinations based on scales. Fields are same as in Pit tag data MASTER, but only includes individuals that had scales sampled.
Notes = notes on scale samples

*Fins*: includes a list of all fin tissue samples taken.
Fields are same as in Pit tag data MASTER, but only includes individuals that had fin samples taken.

*Lavage*: includes a list of all lavage samples taken.
Fields are same as in Pit tag data MASTER, but only includes individuals that had lavage samples taken.

*Summary*: includes summary data from mark-recapture event, including total fish captured electrofishing, small and large tags inserted, young of year (yoy) under 110 mm FL, scales, fin clips, lavage samples, recaptures, and other information, as well as water quality data (depth, conductivity, water and air temperature, salinity, dissolved oxygen, and pH, and sometimes flow), taken at the beginning of each sampling date.

*Recaptures*: includes a list of all recaptured individuals.

***PIT tag master data file:***
*Data log:* includes notes on any edits to the data set.
Date = date of update
Name = name of person editing data
Updates = notes on what has been edited

*MASTER TAG LIST:* includes a list of captures of all tagged individuals.
PIT TAG # = number of pit tag inserted into individual
RCD ID number = ID given to individual based on creek, year, and sample number (T=Topanga; e.g., T11-100)
Date = date trout captured
Dist (m) = distance (RKM) of capture location, upstream from lagoon
Annular Rings = age determination based on scale sample analysis or estimated from other samples based on size
FL mm = fork length in millimeters

N/R = new or recapture
Lavage? = date individual was lavaged
Branded? = date individual was branded
NOTES = notes from events

*MASTER Recaptures*: includes a list of all individuals recaptured at least once.
Includes same data as master tag list except just for recaptured individuals and has it arranged across columns rather than rows. Also includes growth data as change in fork length over number of days between captures and movement as distance moved up or downstream.

*No Tag List:* includes a list of any individuals captured during mark-recapture events that were not tagged.

**Access Constraints:** CDFW and NMFS staff
**Use Constraints:** Please cite as RCDSMM Lifecycle Monitoring – Mark-Recapture Data
**Data Distribution:** Limited to CDFW and NMFS staff and projects.

**Progress:** Completed

**Update Frequency:** As needed.

---

**File Location & Name:**
**Location - (Research Computer RCD)** C:\Users\Any Contractor\My Documents\DFG Reports\DIDSON Final Grant Report 2018\Raw Data File Copies\Mark Recapture
**Names (date last updated) -**

***Pit tagging data for individual events:***
1) PIT data Nov 2008 R.1 (2/14/13)
2) Pit data Nov 09-SA (2/14/13)
3) Pit tagging data_Nov 2010 (12/30/13)
4) Pit tagging data_Mar 2011 (12/30/13)
5) Pit tagging data_Nov 2011 (12/30/13)
6) Pit tagging data_Mar 2012 (12/30/13)
7) Pit tagging data_Nov 2012 (12/17/13)
8) Pit tagging data_Mar 2013 (12/17/13)
9) Pit tagging data_Nov 2013 (12/17/13)
10) Pit tagging data_Nov 2014 (11/21/14)
11) Pit tagging data_Nov 2015 (11/16/15)
12) Pit tagging data_Nov 2016 (1/5/2017)
13) Pit tagging data_Nov 2017 (1/23/2018)

***Pit tag master data file:***
1) PIT MASTER DATA.xlsx (3/14/18)

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**Keywords (optional):** Words or short phrases summarizing an aspect of the data set, used to allow people to find your dataset with quick keyword searches.

**Theme:** Lifecycle monitoring, age and growth, diet, genetics, southern steelhead, *Oncorhynchus mykiss*
**Place:** Topanga Creek, Southern California, Los Angeles County, Santa Monica Bay

# TOPANGA CREEK STEELHEAD LIFECYCLE MONITORING

## Migration Trapping Data

**Abstract:** As part of the lifecycle monitoring efforts, migrant trapping began opportunistically in 2002 when flows were sufficient to be able to set traps at a site known as Fish Camp, located approximately 1.3 RKM upstream of the lagoon. The criteria for selecting the location included accessibility, appropriate flow characteristics and sandy substrate to facilitate net installation. From 2002 to spring 2010, a downstream fyke net, composed of a 9.1m x 1.8 m seine with a 1.8m x1.8 m bag, (12 mm mesh) with a 60cm diameter hoop (fyke) net 1.4 meter long with 6 mm mesh sewn into the end of the bag seine, was used. This was placed across the creek (according to specifications of CDFW). No upstream debris barriers were installed, although they were kept available if needed. Leaf litter was removed from the net as needed during the course of the trapping. A Weir Trap built to meet CDFW specifications was installed approximately 5 meters downstream of the fyke net, to capture any upstream migrating fish. Beginning in fall 2010, a weir trap was used for capturing downstream migrants as well. It allows for efficient trapping in lower flows, and reduces the chance of fish getting caught up in a net. Traps are typically set after peak flow and kept in overnight. When fish are captured in either downstream or upstream migrant traps, they are removed from the traps and placed into a bucket with MS222 so that they can be processed. Processing includes assessing condition, measuring fork length, checking for a tag, tagging if new, and taking scale and fin clip samples. Fish are then returned to the creek in the direction of movement.

**Purpose:** Conduct fish trap surveys following major storm events just above the mouth of the creek to identify movements of adults and juvenile steelhead.

**Dates:** 2002 – May 2018 (during wet season)

**Point of Contact:** Contact information for an individual or organization that is knowledgeable about the data set.

**Person's Name:** Rosi Dagit
**Organization's Name:** Resource Conservation District of the Santa Monica Mountains
**Telephone Number:** 818-597-8627 ext. 107
**E-Mail address:** rdagit@rcdsmm.org

**Data Type:** EXCEL Spreadsheet.

**Field Definitions:**
Date captured = date trout captured
Pit tag number = number on pit tag implanted into individual
RCD ID number = ID given to individual based on creek, year, and sample number (T=Topanga; e.g., T11-100)
Distance = distance (RKM) of capture location, for this dataset, it will typically be 1300 (Fish Camp)
FL mm = fork length in millimeters
Condition code = condition of fish at capture (1=healthy, 2=injured)
Capture method = T (trap)
Trap type = type of trap capture in (fyke or weir)
US or DS = caught in an upstream trap or a downstream trap
Capture time = time of capture

N/R = new or recapture
Scales, Fin clip, and lavage = yes if taken, no if not taken
Notes = any notes taken during trapping event

**Access Constraints:** CDFW and NMFS staff
**Use Constraints:** Please cite as RCDSMM Lifecycle Monitoring – Mark-Recapture Data
**Data Distribution:** Limited to CDFW and NMFS staff and projects.

**Progress:** Completed

**Update Frequency:** As needed.

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**File Location & Name (26 April, 2018):**
**Location - (Research Computer RCD)** C:\Users\Any Contractor\My Documents\DFG Reports\DIDSON Final Grant Report 2018\Raw Data File Copies\Mark Recapture
**Name -** Topanga Trapping Data_2002-2013 (01-28-14)

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**Keywords (optional):** Words or short phrases summarizing an aspect of the data set, used to allow people to find your dataset with quick keyword searches.

**Theme:** Migrant trapping, lifecycle monitoring, southern steelhead, *Oncorhynchus mykiss*

**Place:** Topanga Creek, Southern California, Los Angeles County, Santa Monica Bay

# TOPANGA CREEK WATER QUALITY MONITORING

## Benthic Macroinvertebrate - Index of Biological Integrity Data

**Abstract:** Food availability is a crucial element of overall habitat quality for fish and an important consideration in freshwater conservation and management. Invertebrate drift is one measurement of the quality and quantity of food available for maturing *O. mykiss*. Density of invertebrate drift has been correlated with benthic productivity (Pearson and Kramer 1972, Benke et al. 1991), as well as trout short-term growth rate (Wilzbach et al. 1986), and spatial distribution of fish (Ensign et al 1990, Shannon et al. 1996). In Topanga Creek, drift nets were deployed for 24 hour periods in March, July, and November 2014-2017 to measure invertebrate drift abundance at the upstream and downstream ends of a representative pool habitat.

Additionally, annual spring sampling of benthic macroinvertebrates at four locations in the Topanga Creek Watershed began in 2000. Initially we used the California Rapid Bioassessment Protocol (Ode 2009), but in 2012 we initiated use of the Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California (SWAMP 2007).

**Purpose:** To examine the abundance, diversity and distribution of benthic macroinvertebrates in Topanga Creek.

**Dates:** 2000- 2017

**Point of Contact:**

**Person's Name:** Rosi Dagit
**Organization's Name:** Resource Conservation District of the Santa Monica Mountains
**Telephone Number:** 818-597-8627 ext. 107
**E-Mail address:** rdagit@rcdsmm.org

**Data Type: EXCEL spreadsheet**

**Field Definitions:**
**Access Constraints:** RCDSMM, UCLA, HTB, CDPR, CDFW and NMFS staff
**Use Constraints:** Please cite as RCDSMM BMI Data
**Data Distribution:** Limited to those listed above.

**Progress:** Complete.

**Update Frequency:** N/A – Project dataset is complete.

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**File Name and Location (26 April 2018): )** C:\Users\Any Contractor\My Documents\DFG Reports\DIDSON Final Grant Report 2018\Raw Data File Copies\BMI-IBI Data
Topanga Drift Net 2014-2017 BMI MASTER_3.22.18 (3/22/2018)

Drift net DATA only
Topanga Drift Net BMI 201317 DIDSON analysis EM2817 (8/2/2017)
Topanga Drift Net BMI Inventory and Taxalist updated 7.28.17 EAM(080217 SC) (8/3/2017)

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**Keywords (optional):** Words or short phrases summarizing an aspect of the data set, used to allow people to find your dataset with quick keyword searches.

**Theme:** DIDSON, lifecycle monitoring, southern steelhead, *Oncorhynchus mykiss*

**Place:** Topanga Creek, Southern California, Los Angeles County, Santa Monica Bay