WATERMARKS

The California Newsletter for Citizen Water Quality Monitoring

The Stream Team

Heal the Bay

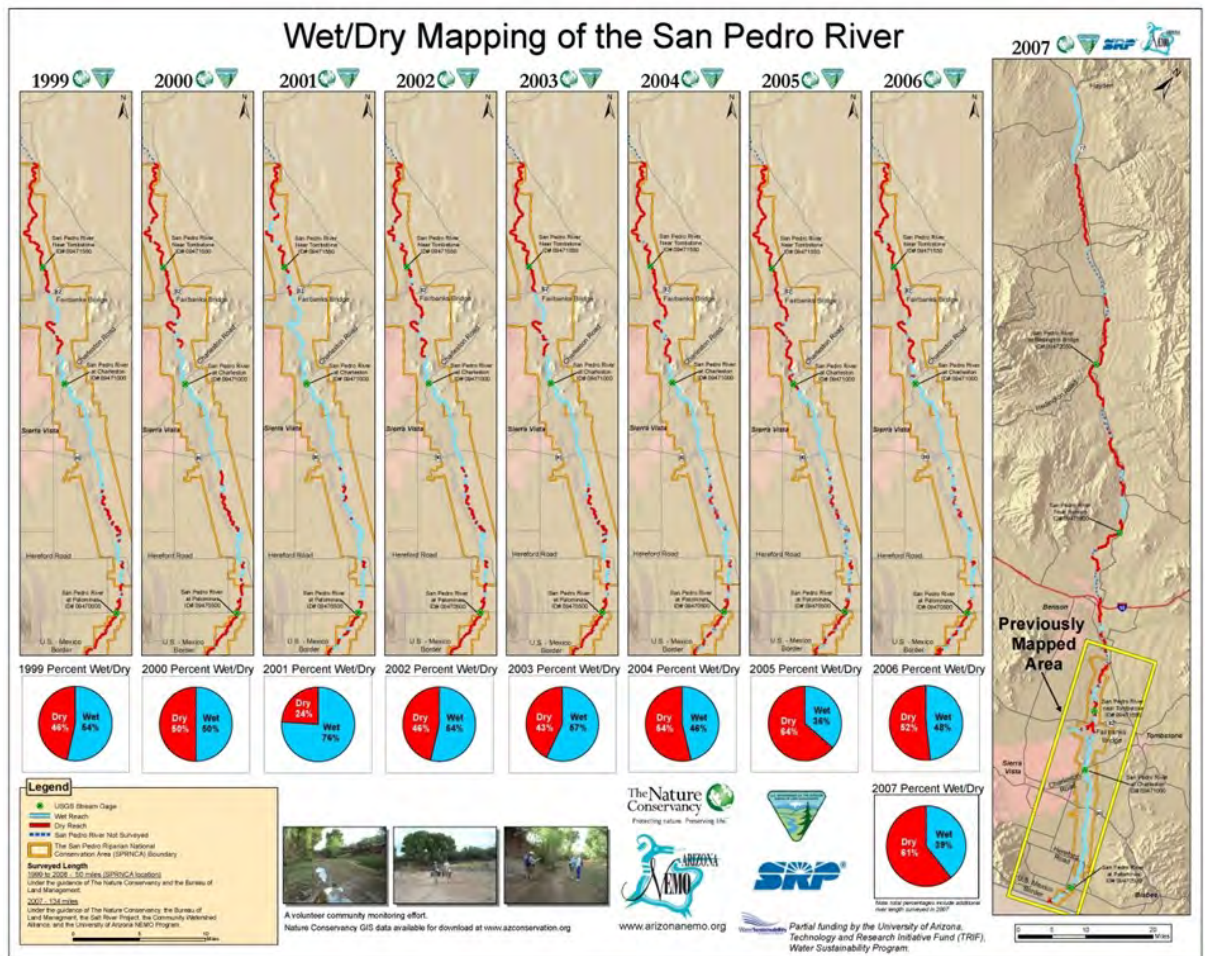Alpine Watershed Group

CONTENTS

Wet/Dry Mapping

Collecting Valuable Watershed Data During Dry Times

Statewide, California's citizen monitors have been busy collecting much needed and valued water quality data. During the dry times of summer, many of these watershed organizations struggle to maintain an active monitoring program that engages and retains their volunteer citizen scientists. Wet/dry mapping is an activity that can fill both the needs of keeping citizen scientists busy during the driest part of the year and collecting watershed data. It gives people a great opportunity to learn about the river or stream they love and the science is wonderfully empirical.

Wet/dry mapping provides a low-cost, river-wide comprehensive snapshot of hydrologic conditions for rivers with interrupted or perennial surface flows. When used in conjunction with more traditional point-specific stream flow or groundwater measurements wet/dry mapping provides a better understanding of hydrologic systems at the broad watershed scale. permits.

The mapping uses trained citizen scientists to map the extent of surface flow in a river or stream, where certain reaches can dry up during the summer. Conducted during the driest time of the year the citizen scientists travel the river on foot using GPS units to mark the locations where water is present. Maps are then created that show where water is present, and where it is not. Annual wet/dry mapping events will allow comparisons to determine the year-to-year variability.

"So what would otherwise be a normal walk through the riparian forest turns into meaningful science."

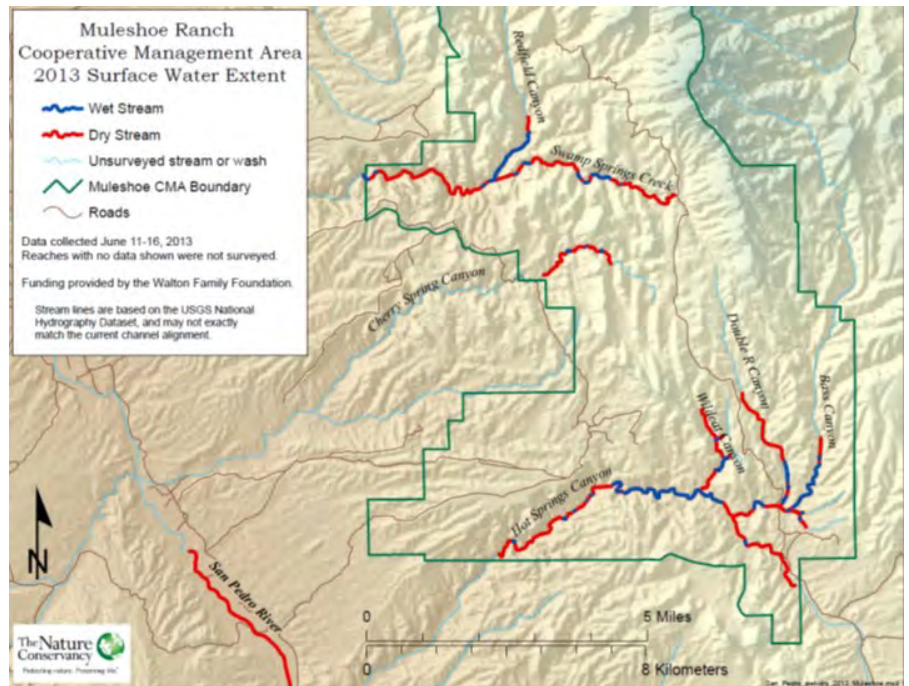Wet/Dry Mapping of the San Pedro River

Wet/dry mapping has many applications such as quantifying long-term trends in surface water patterns and providing a better understanding of groundwater/surface water interactions. Mapping over time can provide insight into what causes river flow reductions: climate change, drought, groundwater or surface water withdrawals. Determining where rivers and streams remain perennial helps to define the long-term cumulative effects of both water conservation efforts and water use.

The presence of perennial streamflow serves as an important indicator of ecosystem integrity. Wet/dry mapping can assist watershed management for ecological values by providing data used to manage fish and wildlife populations and riparian habitat, identifying study reaches to implement ecological research and monitoring. These maps can also help tell us where our efforts to restore river flows are making a significant difference. There is also a growing interest in the ecology of intermittent streams especially in anticipation of changing climates.

Some communities and watersheds are facing critical water management decisions concerning their water supply vulnerability to climate variability. Educational outreach and training is necessary to build capacity and sustain community partnerships. Empowering local communities to collect water resource data builds social capital in the identification and understanding of water resources and developing water management strategies. Wet/dry mapping gives people a chance to learn more about their rivers, get their feet wet in the ecosystem and contribute to environmental stewardship. Mapping provides opportunities for collaboration between interested citizens, landowners, decision makers, agencies and scientists and provide unbiased information to the public regarding the status and trends of surface flows. So what would otherwise be a normal walk through the riparian forest turns into meaningful science.

Wet/dry mapping has become an annual event for some watersheds in Arizona and Mexico. The San Pedro River, Agua Fria River, Cienega Creek and tributaries of the San Pedro River such as the Babocomari River, Ramsey, Miller, Hot Springs, and Redfield Canyons, and Los Fresnos in Mexico are being wet/dry mapped annually. By using the EPA VolMon listserve (an email listserve for volunteer water monitoring programs) the Clean Water Team asked if other programs were conducting wet/dry mapping. It was learned that probably no other wet/dry mapping efforts are taking place in the US. But many programs responded that they wanted to learn about wet/dry mapping and how it's conducted.

Muleshoe Ranch Cooperative Management Area 2013 Surface Water Extent

Wet/dry mapping is simple. By using handheld GPS units, people record the start- and endpoints of every wet portion along a stream or river. A protocol developed by the Nature Conservancy and the BLM to map the wet/dry reaches on the San Pedro River through the San Pedro Riparian National Conservation Area (SPRNCA) can be found on the internet (see weblink below). They have been mapping the river since 1999.

Mapping is done on the driest time of the year when river base flow is least likely to include recent precipitation (the third Saturday of June for the San Pedro River mapping). Surveyors are trained for consistency in data collection each year, during a social event that also incorporated sharing previous results, safety precautions, and logistics. Groups are assigned to predetermined portions of the river, ensuring continuous coverage along the river. During

the survey, teams record data in two forms, hand-written on data sheets and recorded in the GPS unit. Teams recorded the GPS readings using Universal Transverse Mercator (UTM), estimated position error (EPE), local time, and whether the water starts or stops, on the data sheets.

In The Nature Conservancy's protocol a 30 foot rule was employed. The 30 foot rule approach was taken due to the potential for cumulative location errors inherent in the GPS units and simplified data collection in areas with short gaps or small pools. Surveyors recorded the beginning and end points of all surface water reaches 30 ft or more in length, using paper data forms and consumer-grade global positioning system. Surveyors disregarded any dry gaps less than 30 ft long in otherwise wet reaches. Other observations such as wildlife sign or trash dumps were also recorded on data sheets. After mapping, the GPS units were collected and downloaded on the survey day and the data sheets were examined for obvious errors or omissions. Data were then entered into an EXCEL spreadsheet for additional data quality checks. Raw positions were plotted using ArcView. Using GIS software, these points are translated to lines on a map for display and analysis. The process is relatively easy for those that work with GIS.

The application of wet/dry mapping in California has tremendous value and our citizen scientists are capable of the task. The costs to implement wet/dry mapping with citizen scientists are very low. At a minimum project costs typically included the onetime expense for consumer grade GPS units, staff time (training citizen scientists and data analysis) and software licenses. Existing mapping methods and protocols are easy to use and can be adapted to suit your watershed of concern. Having graphics really enables your program to tell stories about your watershed and its condition in a way that data plots can't. The Clean Water Team hopes that many wet/dry mapping programs develop and keep's citizen scientists busy producing actionable data during the driest days of summer.

FREE WEBINAR

CA Water Quality Monitoring Collaboration Network
Join Dale Turner from The Nature Conservancy in Arizona presenting "Wet/dry mapping – Using citizen scientists to monitor perennial surface water."
Thursday - May 8, 2014
11:30 AM -12:30 PM
Please click here for instructions on how to join the webinar. A recording of this webinar will be made available online.

Wet/Dry Mapping Resource Page

Wet/Dry Mapping Instructions and Data Forms

Wet/Dry Mapping: Using Citizen Scientists to Monitor the Extent of Perennial Surface Flow
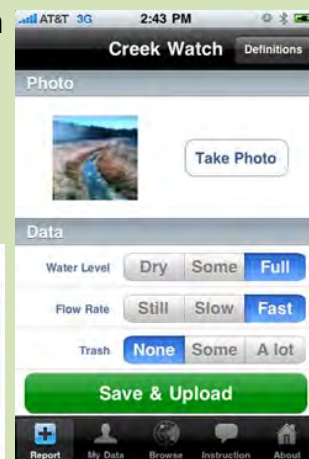
Community Monitoring Network 2004 Results

Video: Arizona Wet/Dry

How's It Flowing? — CreekWatch App

One of the reasons Creek Watch App was created for, was to help programs determine stream perenniality. The Creek Watch app allows the user to record a streams data flow (none, little, a lot), take a picture and geo-sync the GPS coordinates. All data is posted to the internet where it can be downloaded. It's an easy tool to use for your monitoring or STEM projects. Creek Watch is free and available for iPhone/iPad/iTouch.

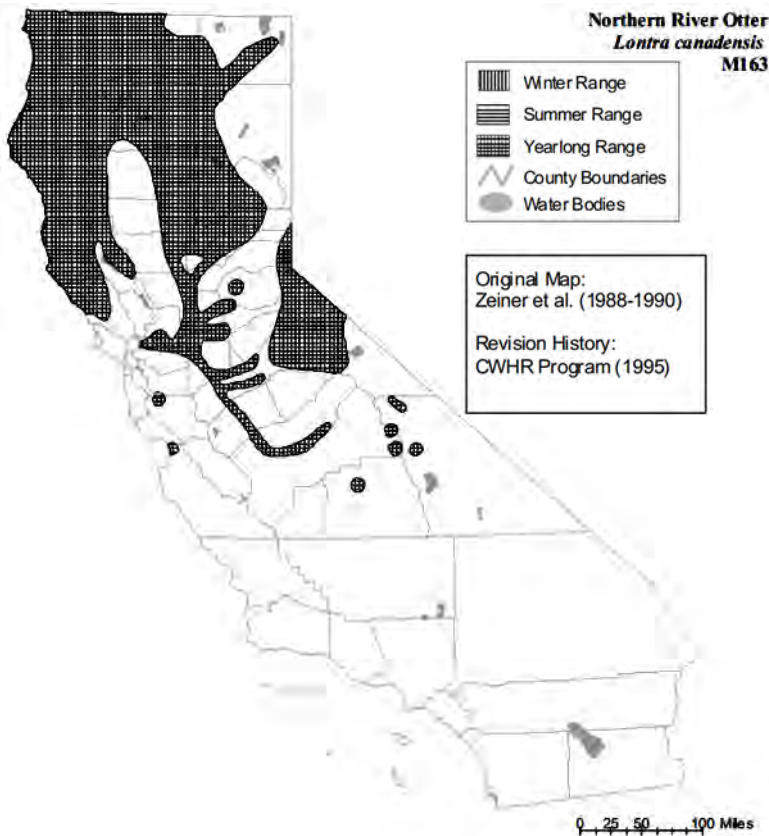| Date	Water Level	Flow Rate	Trash	State	Country	Latitude	Longitude	Location	Image
03-01-2014 17:37	Some	Fast	None	California	US	40.560584	-122.424974	view location	view
03-01-2014 17:39	Some	Slow	None	California	US	40.560171	-122.425333	view location	view
03-01-2014 17:35	Full	Slow	None	California	US	40.560964	-122.425006	view location	view
03-01-2014 17:29	Full	Fast	None	California	US	40.562003	-122.42433	view location	view

ON THE ROCKS

The North American River Otter

The North American river otters (*Lutra canadensis*) are playful aquatic mammals. Where there is land and water, river otters can establish burrows and dens at edges of the water bodies. They are found in rivers, lakes, swamps, estuaries, and various aquatic ecosystems.

River otters belong in the family *Mustelidae*, which also includes weasels, minks, badgers, and skunks. Two subspecies are found in California: the Sonora river otter (*L. c. sonora*) is established along the waters of Colorado River while the California river otter (*L. c. brevipilosus*) resides in the streams and marshes of northern California.

Historically, river otters used to be common throughout the continent. However, their populations began to decline in the 1720s due to unregulated harvest. River otters bear immense commercial and cultural values; During the 1800s California Fur Rush, they were greatly trapped and traded. The durable, high-quality pelt was deemed a valuable natural commodity that essentially opened up the West to world trade. The state of California banned river otter trapping in 1962. Today it's water pollution and habitat loss threatening their population.

Northern River Otter
Lontra canadensis
M163

⦀	Winter Range
☰	Summer Range
▦	Yearlong Range
⟋	County Boundaries
⬭	Water Bodies

Original Map:
Zeiner et al. (1988-1990)

Revision History:
CWHR Program (1995)

0 25 50   100 Miles

© California Department of Fish and Game

©NPS

To get around on land, river otters rely on their sense of smell, hearing, and touch. Their powerful tapered tail and webbed feet allows them to navigate and swim in water. They can hold their breath for as long as 8 minutes. Their nostrils and ears close underwater, and their eyes are adapted for underwater vision –leaving them nearsighted when out of water.

River otters are very sensitive to environmental pollution. When choosing their habitat, river otters are especially selective. They will only settle in locations with sufficient habitat coverage with access to high quality water and an abundant food supply. Hence their presence is a sign of clean and healthy watershed.

As the top predators of riverine food chains, river otters feed on fish, crustaceans, insects, amphibians, reptiles, mollusks, carrions, small mammals, birds, and occasionally fruits. This makes them good integrators of their aquatic environments and a useful species for determining exposure to environmental contaminants.

©NPS

As an indicator species, river otters can reveal certain environmental conditions. Their presence can indicate a healthy watershed and their decline in population can be used as an "early warning system" by biologists and conservation managers.

Since the passing of the Clean Water Act in 1972, there have been active management efforts to stop pollution and restore rivers. Recent sightings of river otters in the San Francisco Bay area are encouraging notes that California is moving in the right direction. However, such occurrence is still rare and the need for conservation and watershed stewardship continues.

Have you seen an otter?

The River Otter Ecology Project, a citizen scientist group, is taking count and recording behavioral observations. Report your findings here: www.riverotterecology.org/

For more information about the
North American river otter, visit:

https://nrm.dfg.ca.gov

https://www.nps.gov/sajh/naturescience/
north-american-river-otter.htm

Managing your water quality data and entering it into the California Environmental Data Exchange Network (CEDEN) is about to get easier.

TestTheWater.org (TTW) is a water data management solution, which allows water monitoring programs to leverage digital tools to simplify in-the-field sample/data collection, data analysis and data submission to CEDEN and the EPA. Quality Assurance and Data Validation are presented in a simplified user interface for the ease of metadata entry. Their MobileLabBook webApp is designed to support in-the-field activities, by digitally assisting water sample collection and measurement record keeping.

The MobileLabBook is operational on any mobile smart-phone, tablet, or computer running the Chrome web browser and maintains operations and data integrity, even in the absence of an internet connection. Samples and measurements can be precisely positioned with GPS coordinates and time-stamped offering highly accurate geospacial and time coordinate positioning of samples and data results. After review, digital records are synchronized with the TTW central database. The records can then be accessed by the data owner via the TTW DataCenter.
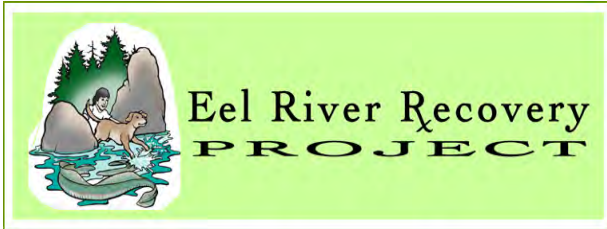

The DataCenter allows you to view, edit, and validate all of the parameters surrounding your data including comprehensive Quality Assurance fields for equipment and protocol metadata of the digital records. TTW data management system has been designed to integrate seamlessly with CEDEN, California's water monitoring database the California Environmental Data Exchange Network, and allows for an easy data submission process that maintains data compliance with the EPA.

In addition, the TTW Report Tool and website empowers community outreach messages by providing data analysis tools along with the TTW Forum for asking questions, sharing insights, and results. These tools will help you stay connected, making it easy to share your observations and experiences with other members. TTW is a project of 4Marbles Inc. a 501(c)3 scientific research and education non-profit. TTW is seeking members who, as early adopters, are interested in Beta-testing TTW products and providing feedback as we continue adapting these services to the needs of active members of our community.
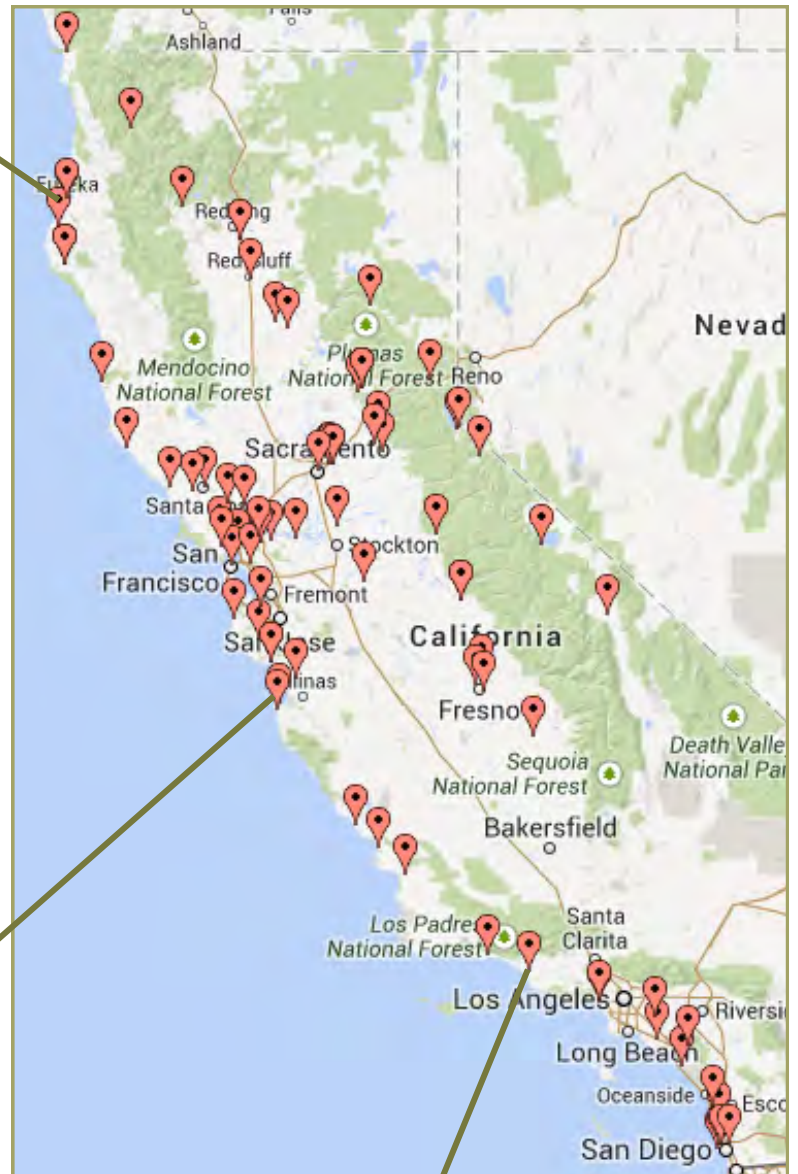
TTW has been collaborating with The Clean Water Team and CEDEN personal from the San Francisco Estuary Institute (SFEI) and the Southern California Coastal Water Research Project (SCCWRP). We hope that TTW app will assist citizen monitoring programs in making their data available to others and add additional value to their stewardship efforts. Visit http://testthewater.org/ to learn more.

Learn About Your Watershed!

The Eel River Recovery Project is a broad-based community initiative to address water conservation, nutrient pollution and ecosystem recovery. Their mission is to share information about the health of the watershed and work together to formulate and implement a restoration strategy. This is done through empowering communities to collaborate in monitoring the ecological conditions of the Eel River. They are currently monitoring water temperature, flow, blue-green algae, and fish. The collaborative effort to restore the Eel River is coordinated with communities, Tribes and government agencies.
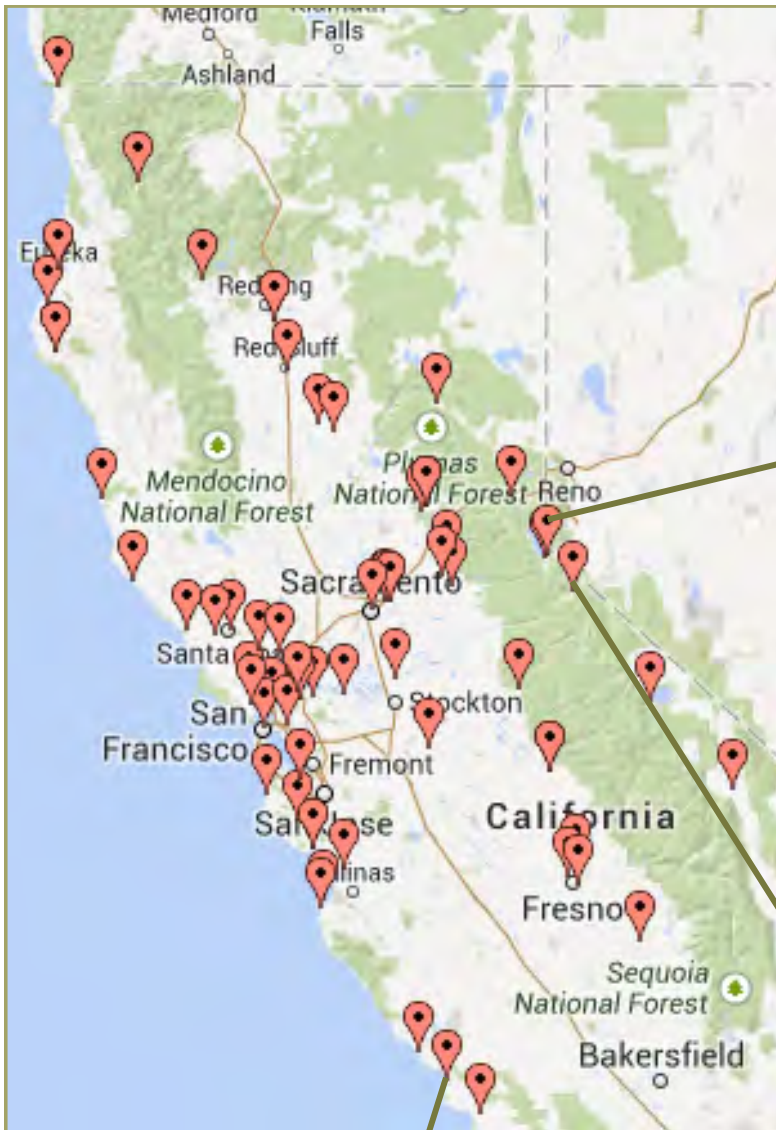

THE CARMEL RIVER WATERSHED CONSERVANCY

The primary mission of the Carmel River Watershed Conservancy (CRWC) is the protection of natural resources, including steelhead and California red-legged frogs, that form the Carmel River Watershed. They have adopted an Action Plan based on scientific studies, mission statement objectives and input from prospective partners and the public. Volunteers participate in fish rescues when the river flows begin to trap or isolate steelhead. Also, CRWC periodically works with other organizations in cleanup activities along the river and in tributary streams and creeks. Local residents and those who consider themselves stewards of the Carmel River are always welcomed.

VENTURA COASTKEEPER

The Ventura CoastKeeper strives to maintain a healthy environment for everyone through advocacy, education, enforcement and citizen action. They monitor Ventura County's waterbodies for pollution, and use the results of its monitoring efforts to protect the water quality and ecological integrity of the county's coastal and inland waterbodies.

Learn About Your Watershed!

The Western Shasta Resource Conservation District's (RCD) Citizen Monitoring Program consists of four components: aquatic bioassessment sampling of benthic macroinvertebrates, monitoring of precipitation, Bear Creek well monitoring project, and Nature's Notebook (documentation of emerging flora and fauna). These components provided opportunities for concerned citizens, who are interested in learning about the health of their local stream, to volunteer their time.

Alpine County encompasses the headwaters of 5 different watersheds that flow either towards California's Sacramento/San Joaquin Delta or into Nevada. The Alpine Watershed Group works to preserve and enhance these watersheds for future generations. The Group provides opportunities to collaborate, educate, and implement projects that benefit and steward the County's watersheds. Volunteers are invited to attend monthly meetings, assist with restoration, water quality monitoring, education and outreach.

The Morro Bay National Estuary Program brings citizens, local government, non-profit organizations, agencies, and landowners together through collaboration and partnership to protect and restore the Morro Bay Estuary. The organization conducts monitoring and research to track the health of the estuary, restores natural habitats to protect water quality and wildlife, and educates residents and visitors on how to be good stewards of the bay.

DIY Mapping
The Sky is the Limit

For centuries, maps have been telling stories and documenting the world we live in. Do It Yourself (DIY) Mapping projects empower people to map what's important to them, collect data and document their geography and events like sewage or oil spills, restoration projects, or development growth that official mapmakers might overlook. New technologies and online media vastly expanded the potential of citizen scientists and watershed stewardship organizations to create maps that weave narratives. These aerial pictures and maps tell stories and motivate people in ways regular images can't.

If you are interested in obtaining geospacial information from other than ground based GPS surveys and tracking. Try aerial photography. There are three ways to get a camera in the air: a balloon, a kite or an Unmanned Aerial Vehicle (UAV). Currently, civilian drone use in the U.S. in the public sector, is allowed for research or as a hobby, though the latter dictates they don't fly above 400 feet, near populated areas or outside of the operator's line of vision.

Kites and balloons can be very low cost DIY projects. A variety of websites offer great kite and balloon aerial photography solutions to help get your camera airborn. Publiclab.org, kite aerial photography, and Grassrootsmapping.org are great places to start. Instruction guides and material can also be found at some of these websites and others. Images and maps created with the use of kites have been creatively used in many projects such as the Automated Rapid Reef Assessment System (ARRAS) which is designed to survey large reef areas in a short amount of time, assessing change in wetland vegetation, and documenting biodiversity in the Lake Merritt BioBlitz.

Mapping resources.

- Turn aerial images into maps with Map Knitter. Map Knitter is a free and open source tool that can make maps from any image source and allows the user to combine and position images (often from MapMill.org) in geographic space into a composite image map. Its almost as easy as uploading an image and then rotate, distort and stretch it onto a reference map.

- Open Street Map is built by a community of mappers that contribute and maintain data about roads, trails, cafés, railway stations, and much more, all over the world. It powers map data on websitesm, mobile app and hardware devices. It is open data, if you alter or build upon the data in certain ways, you may distribute the result. Contributors use aerial imagery, GPS devices, and low-tech field maps to verify that OSM is accurate and up to date. Most importantly it emphasizes local knowledge. http://publiclab.org/

- Story maps are lightweight, open-source web applications. They combine web maps created using ArcGIS Online, Esri's cloud-based mapping system, with multimedia content - text, photos, video, and audio - to let you tell stories about the world. There are several applications that let you choose what type of story you want to tell (sequential place-based narratives, curated lists of points of interest, comparing two or more maps). You can see how they work by visiting Conservation and Sustainability Storymaps and find many examples.

- Robo-copter elevates watershed mapping

Interview with a
WATER WARRIOR
Ben Pitterle

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Growing up playing in riverbeds and visiting national parks with his family fostered Ben Pitterle's interest in conservation at a young age. It's a passion that led him to being an innovative citizen monitoring and environmental leader.

As a native Californian, Ben continued to stay engaged with local watersheds throughout his education and earned a Bachelor's degree in Environmental Science from University of California at Riverside. During his studies, Ben volunteered with Heal the Bay in Santa Monica. This was his first exposure to working with a citizen monitoring program and laid the foundation for his career.

After college, Ben traveled, worked part-time and really thought about what he wanted to do. Having always been drawn to the environmental science sector, he pursued a Master's degree in Environmental Science and Management at the University of California, Santa Barbara. Working as a field technician, environmental consultant, and environmental educator, Ben accrued extensive experience that led to his current title as Santa Barbara Channelkeeper's (SBCK) Watershed and Marine Program Director.

At SBCK, Ben's position deals heavily with community interaction, education, and outreach. He possessed both left- and right-brain skills to successfully direct the citizen monitoring program. Not only is he attentive to quality control and monitoring protocols, he also manages database, as well as understand the science to articulate concepts to various stakeholders. In addition to acquiring data for water resources management, there are many intangible benefits that accompany his organization's conservation efforts. He likes to say "…what's even more important than data is getting the community out there. [SBCK] provides this experience, people wouldn't
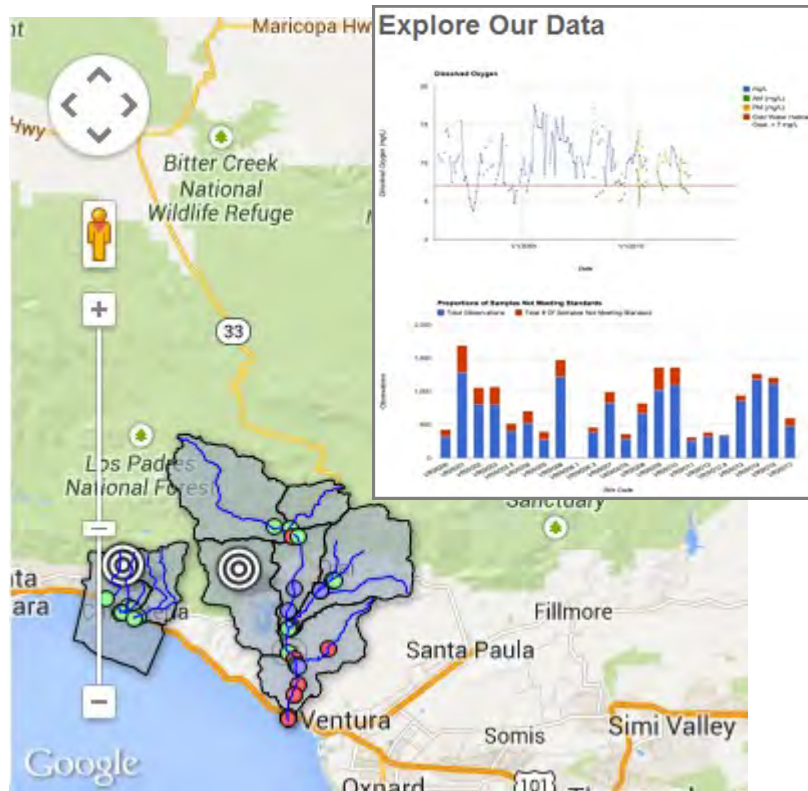
otherwise have. Most participants have never set foot in local rivers or streams. We facilitate a connection to nature and cultivate a sense of stewardship in our volunteers." Ben's direct involvement allows him to see great meaning and take pride in his work.

A common challenge that citizen monitoring programs and watershed stewardship organizations face is the scrutiny that data their quality encounters. According to Ben, SBCK takes great precautions at ensuring quality control.

"People question your data because you are working with volunteers, even though the numbers that consultants or lab technicians collect aren't any more valid than citizen work. You need to go above and beyond to convince. In addition to taking quality control seriously, we emphasize clear communication when training and supervising volunteers. Something we've done when people express skepticism: we make everything transparent and invite them to participate, see for themselves how the entire process goes. Our volunteers care about the watershed, and a lot of steps and measures are taken to ensure accuracy. This often diminishes skepticism."

One unique endeavor that Ben has partaken was the Pre-dawn Monitoring project launched in 2008. The time of day samples are collected often affects the properties of water, including dissolved oxygen (DO), pH, and temperature. Plants photosynthesize with daylight, so the water becomes more saturated with oxygen. When timing is not considered, the information collected could be deceiving due to daily diurnal fluctuations. In the summer, SBCK would mobilize volunteers and meet at 3:30 in the morning to collect samples before sunrise. The idea is to target minimum DO and pH measurement in order to shed more insight on how the watershed is being impacted by algal growth. This way, the data is more standardized as opposed to being collected sporadically throughout the day. The project contributed to over a decade of high quality nutrient data; it's been utilized by the state and incorporated into an algae TMDL regulatory program that was adopted by the LARWQCB last year.

Screenshot of the Stream Team Data Portal

Ben mentioned, "It's often not enough to simply collect the numbers. You need to help the public figure out what it all means, which takes a lot of time. The backend report writing and analysis consumes a lot of resources, many programs simply don't have the means to do it." SBCK was fortunate and had an endowment which made the Stream Team Data Portal 100% accessible to the public. The goal was to make something that could be updated relatively easily, and not heavily GIS extensive. Now anyone can download information for entire watersheds, and explore the data as they wish.

Over the years, SBCK has made significant contributions to conservation efforts in southern California. Ben said, "It's worthwhile just to have people,

eyes, and ears in the watershed. If something seems wrong or out of place, such as illegal dumping, it's often quickly observed and we'll look into getting it clean up. A couple years ago we're able to detect an illegal industrial discharge that was detected by our conductivity monitoring. We went upstream and to a pipe that was discharging high volume concentrated brine from a water purification company. Since then the discharge has been eliminated."

Stream monitoring work attracts people of all backgrounds, but those that come through all want to make a contribution. Ben said, "I wanted to do something to make my community a better place. Do something to preserve the environment for future generations, there's no question that this type of work is extremely rewarding. And the community interactions and people I've been able to meet −through our volunteer programs− those interactions and friendships I've built over the many years are invaluable."

To experience and share Ben's passion for watershed conservation, all you have to do is show up to one of the volunteering events. SBCK welcomes new participants, even those that just want to try it out once.

Photos courtesy of the Santa Barbara Channelkeeper

Emerging Technologies
Mobile Devices and Macro Lens Adapters

Taking a microscope and camera creekside has its challenges. Fortunately the abundance of smart phones and computer tablets is making this task a breeze. Many manufactures have been creating lens adapters for phone-photographers that allow citizen scientists the ability to magnify and photograph benthic macroinvertebrates on their phones and tablets.

The Clean Water Team tested some of the more popular smartphones and learned that about the best magnification to be expected is 4x. Not exactly great for looking at benthic macroinvertebrates. This is where the use of macro and microscope lens adapters for smartphones become advantageous. There is range of diversity among the adapters in price, whether it has a LED light and how they connect to the phone. Some of the adapters require the use of a dedicated phone sleeve while others were clipped on the phone or attached with a magnet. Ideally 10x and up is the desired range of magnification, unfortunately most adapters have a minimum magnification above 100x.

The Clean Water Team tested 4 lens adapters. We looked at clearance between the lens and the subject being looked at, ease of attaching to the phone, and magnification results. The best adapters and a selection of the images they produced can be seen below. We really liked the magnetic macro lens as seen in the middle. It's easy to attach the lens and its very small so carrying it around is not an issue. The clip type of lens adapter provided good magnification. It had a few draw backs such as getting the lens lay flat against the phone and its size. The adapter seen in the bottom right had a LED which seemed very useful. Unfortunately this adapter had very little clearance so it could not be used on all of the benthic macro invertebrates used in our test.

All of lens adapters tested cost less than $10.00 and our favorite was under $5.00. More expensive adapters exist as do some that attach your smartphone to a microscope.

For those organizations and education programs using a non-lethal benthic macroinvertebrate sampling procedures such as the California Streamside Biosurvey these tools could assist in documenting what organisms were seen. Likewise they could assist with Quality Assurance/Quality Control. These tools also make it easy to share your images via Facebook, Twitter or Instagram.

Tips:
- Use a tripod adapter and tabletop tripods as a camera grip.
- Use a shutter release cable (iPhone ear-buds can be used as a shutter release. Just squeeze the volume control. (You can also use the iPhone's volume control buttons to take a picture.)

Q&A

Professionals in watershed management and protection take your questions on Quality Assurance and Quality Control, sample handling procedures, SWAMP QAPrP lookup tables & scientific and technical advisory committees.

Q1: I'm new to operating a water quality monitoring program. What resources does the SWRCB have for me regarding Quality Assurance and Quality Control?

A1: The SWRCB has developed a new Quality Assurance/Quality Control Website (www.waterboards.ca.gov/water_issues/programs/quality_assurance/index.shtml). At this website you'll find answers to common questions such as "What Is A Quality Assurance Project Plan (QAPP)?", "QAPP Development Resources", and "What Is Swamp Comparability?".

Q2: My program is expanding and I need to update our sample handling procedures. Have there been any updates that I should be aware of?

A2: Updates were made to SWAMP's sample handling guidelines, which include crucial holding time requirements. These updates have been necessitated primarily by changes to environmental regulations and analytical methods. They've been compiled using the contributions and feedback of experts from the Environmental Protection Agency (EPA); state and local government entities; academia; and the private sector. The SWAMP QAPrP lookup tables have been updated and replace those previously appearing in the 2008. You can find these at www.waterboards.ca.gov/water_issues/programs/swamp/mqo.shtml.

Also available is the video SWAMP Quality Control and Sample Handling Guidelines produced by the CWQMCN and presented by the SWAMP QA Team (www.youtube.com/watch?v=iZdyJxCe73o&list=UU55pBe8pTmdRpKAv78O1oNw&feature=c4-overview).

Q3: What are scientific and technical advisory teams?

A3: Scientific and technical advisory committees assist programs by providing advice and guidance to research, SOPs, QAPPs, data management, modeling, sampling and monitoring efforts which affect the scientific adequacy of program activities and suggesting specific scientific activities necessary to meet program objectives.

These committees can oversee the assembly and analysis of historical and contemporary data bases. They can also review the development of any requests for proposals and draft proposals submitted for funding to ensure scientific rigor and quality.

Scientific and technical advisory committee member volunteers typically represent a balance of scientific disciplines with expertise in different areas such as water monitoring, chemistry, modeling, ecology, human health effects, statistics and local land use practices.

Take the time to establish contact with your state, local or EPA Quality Assurance Officer; citizen monitoring coordinators, water monitoring program managers and others to see how they have assembled their scientific and technical advisory committees. Having a scientific and technical advisory committee (aka TAC) can provide real benefits especially if they are formed prior to preparing your monitoring plans and QAPPs.

Meet Your CWQMC Citizen Monitoring Representative

Dear Fellow Monitors,

I would like to take this opportunity to introduce myself. My name is Beth Christman, and I was recently appointed to the California Water Quality Monitoring Council as the representative for Citizen Monitoring groups. While I have personal experience with Citizen Monitoring, in order to be a truly effective representative for groups throughout the state I would like to hear from others doing similar work.

I am pleased to have the opportunity here in Watermarks to introduce the Council and myself!

The California Water Quality Monitoring Council was established through a MOU between California EPA and the California Natural Resources agency in 2007. The MOU was mandated by a California Senate Bill (Kehoe, 2006). The Senate Bill required that Cal/EPA and CA Resources integrate and coordinate their water quality and related ecosystem monitoring, assessment, and reporting. The Monitoring Council saw a need for improved data presentation – monitoring data throughout the state are housed in many different locations of varying accessibility. Instead of focusing on new monitoring initiatives, the Monitoring Council decided to build on existing efforts as much as possible and to work to develop a platform for intuitive, streamlined access to water quality information. The Monitoring Council has developed theme-specific workgroups that evaluate existing monitoring, assessment, and reporting efforts. The work of the Monitoring Council to date has focused on developing a series of web portals to improve the delivery of water quality information.

The web portals are based around the basic (and important!) questions of: "Is our water safe to drink?", "Is it safe to swim in our waters?", "Is it safe to eat fish and shellfish from our waters?", and "Are our aquatic ecosystems healthy?". You can check them out at: www.mywaterquality.ca.gov.

The Monitoring Council is intended to represent a variety of water quality related interests. There are 11 designated seats, one of which is a representative for Citizen Monitoring Groups – which points to the importance of Citizen Monitoring in California!
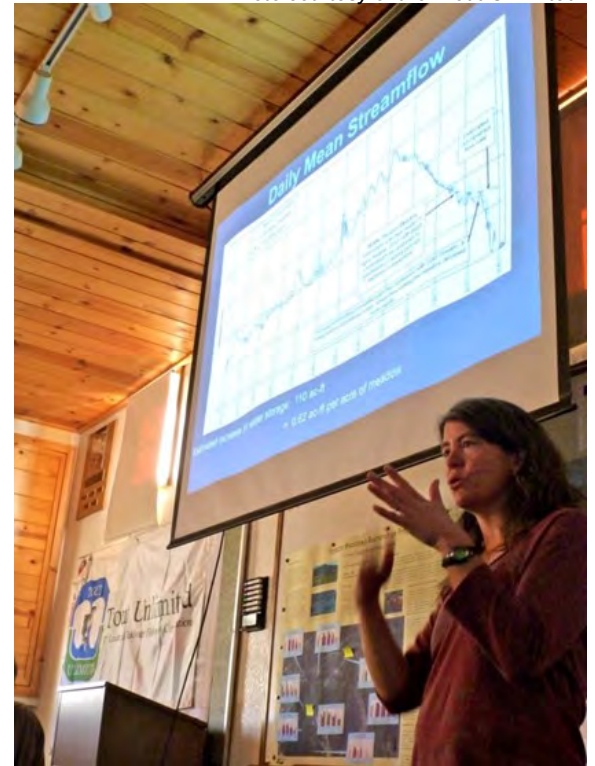
My role on the monitoring Council is to be a liaison for citizen monitoring groups throughout California. As such, I would love to hear about the successes and challenges that your group faces, and if there is a way that the Monitoring Council can help support your efforts.

I have worked to develop, implement, and maintain a Citizen Monitoring program at the Truckee River Watershed Council since 2002. We have a great group of volunteer monitors, approximately 75 people participate in our monitoring programs.

each year. We have a dedicated group of folks that collect and identify benthic macroinvertebrates from local streams. We have 15 "stream teams" that have adopted local streams and monitor those quarterly for basic water quality parameters. We also participate in a watershed-wide annual Snapshot Day that monitors all the streams in the Lake Tahoe – Truckee – Pyramid Lake watershed.

The other main focus of my job is to manage large and small scale restoration projects. We incorporate volunteers into most of our restoration projects through Truckee River Day – a watershed wide work day that was started in 1996.

Photo courtesy of Beth Christman

I encourage you to contact me with any questions or thoughts to share. I can be reached at bchristman@truckeeriverwc.org or 530-550-8760.

Sincerely,

Beth Christman

Director of Restoration Programs

Truckee River Watershed Council

Members of the California Water Quality Monitoring Council are selected by the Secretaries of the California Environmental Protection Agency (Cal/EPA) and the Natural Resources Agency. Follow the link to find out who else is working along Beth: www.mywaterquality.ca.gov/monitoring_council/

June 8th is World Oceans Day!

Thanks to a partnership between The Ocean Project, Dr. Seuss Enterprises, the Association of Zoos and Aquariums, and Random House Children's Books, we are pleased to offer great materials based on characters from the book One Fish, Two Fish, Red Fish, Blue Fish. For more information: http://worldoceansday.org/sign-up-for-dr-seuss-materials/

Viewing Watersheds Through Photo Spheres

Sharing images about your watershed, restoration projects, baseline photos, pollution issues has found a friend in Google's Photospheres. Photo spheres are technology featured in Google Maps, Google Earth often called Street Views, that create amazing interactive 360 degree panoramic views. But they don't have to feature just streets. Beaches, rivers, waterfalls, lakes and more can all be featured in Google Maps – Views (www.google.com/maps/views). By connecting your photo spheres you can create even more immersive, 360° views called constellations.

Examples of Environmental Photo Spheres

Santa Cruz Island, Channel Islands National Park

Hamilton Creek, Sequoia National Park

Bridalveil Fall, Yosemite National Park

Mono Lake

360 degree panoramas can be created with Android phones using the Photo Sphere mode (Nexus phones running Android 4.2 Jelly Bean.

You can also use your DSLR camera. This has many advantages like higher resolution, controlling exposure, ISO, other settings, and faster lenses. Use third party panorama software to create your panorama, add XMP metadata and then upload your photos to Google+.
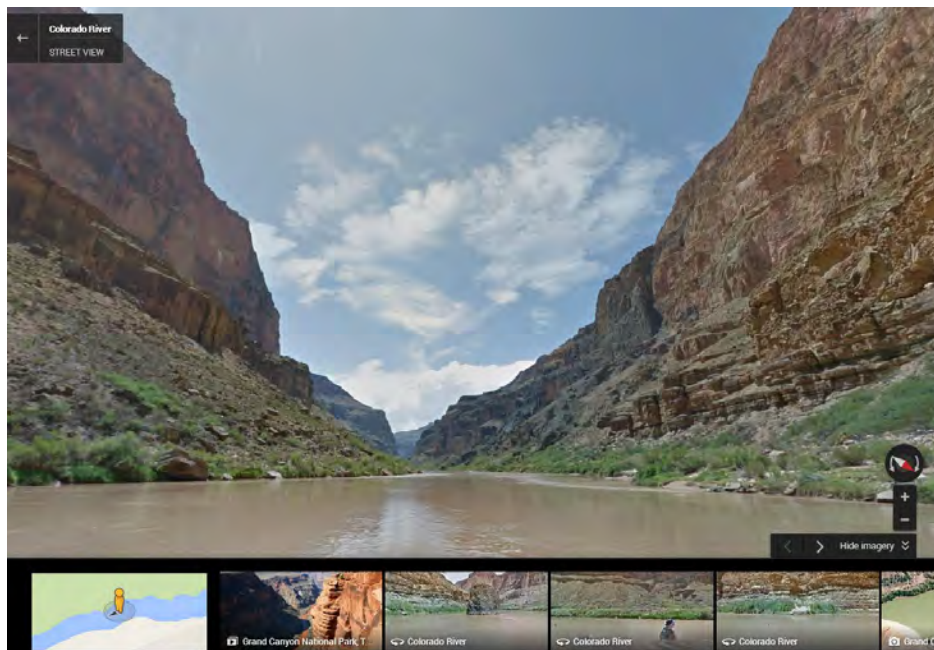
Creating photo spheres

Watch how to create photo spheres

Create your own Street View from photospheres

Contribute a photo sphere

Connect photo spheres (constellations)

Screenshot *Google's Street View* of the *Colorado River*

American Rivers and Google Maps launch Colorado River Street View!

For more information, visit: www.americanrivers.org/blog/american-rivers-and-google-maps-launch-colorado-river-street-view/

With just a bit of practice, you to can create amazing 360 degree photo spheres of your watershed projects and share them with all your social circles.

Photo spheres can also be embedded into your websites. For documentation, storytelling, fundraising or whatever you can think of, photo spheres are becoming a new way to look at your waters.

How to share Photo Sphere pics on Google Maps

Clean Water Team Videos

New Videos on the Clean Water Team's YouTube Channel:

◊ Shipping Benthic Macroinvertebrate Biological Samples - Special Provision A180
◊ A Guide for Field Identification of Bankfull Stage in the Western United States
◊ How to Select and Work with a Laboratory
◊ Measuring Slope with a Leveling Rod and an Inclinometer
◊ Managing Water Quality Equipment Inventories
◊ An Introduction to Crayfish

CA Citizen Monitoring Calendar 2014

The CWT calendar serves two purposes: it highlights the importance of California's surface waters, and celebrates the state's citizen monitors who volunteer to improve and protect water quality by using applied science to monitor the state's waters.

The calendar can be downloaded for free, either with or without the web link addresses being visible:

2014 California Citizen Monitoring Calendar
http://www.waterboards.ca.gov/water_issues/ programs/swamp/docs/cwt/volunteer/cal2014.pdf

2014 California Citizen Monitoring Calendar (with viewable URLs)
http://www.waterboards.ca.gov/water_issues/ programs/swamp/docs/cwt/volunteer/cal2014url.pdf

Get to know your Water Quality Control Plans

Water Quality Control Plans (Basin Plans) provide the basis for protecting water quality in California. Basin Plans are mandated by both the Federal Clean Water Act (CWA) and the State Porter-Cologne Water Quality Act (Porter-Cologne). Sections 13240-13247 of Porter-Cologne specify the required contents of a regional basin plan.

The Basin Plan is each Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. These enforceable water quality standards are designed to ensure that the beneficial uses of California's waters are protected. It also includes programs of implementation to achieve water quality objectives. Adoption of these plans follows a prescribed process that involves public review and approval by the State Water Resources Control Board (State Board), as well as by the United States Environmental Protection Agency (USEPA) and the Office of Administrative Law (OAL) when required.

Each plan must contain water quality objectives, which in the judgment of the Regional Water Board will ensure the reasonable protection of beneficial uses and the prevention of nuisance, and a program of implementation for achieving those objectives, including a description of the nature of actions that are necessary to achieve the objectives, time schedules for the actions to be taken, and a description of surveillance to be undertaken to determine compliance with objectives.

The Basin Plan is used as a regulatory tool by the Regional Water Board's technical staff. Regional Water Board orders cite the Basin Plan's water quality standards and prohibitions applicable to a particular discharge. The Basin Plan is also used by other agencies in their permitting and resource management activities. It also serves as an educational and reference document for dischargers and members of the public.

Regional Board Water Quality Control Plans (Basin Plans):
(1) North Coast Region Basin Plan
(2) San Francisco Bay Region Basin Plan
(3) Central Coast Region Basin Plan
(4) Los Angeles Region Basin Plan
(5) Central Valley Region Basin Plan
(6) Lahontan Region Basin Plan
(7) Colorado River Basin Region Basin Plan
(8) Santa Ana Region Basin Plan
(9) San Diego Region Basin Plan

Statewide Water Quality Control Plans:
- Water Quality Control Plan for Enclosed Bays and Estuaries of California – Part 1 Sediment Quality effective August 25, 2009
- Ocean Standards - California Ocean Plan
- Desalination Facilties and Brine Disposal
- Model Monitoring, Vessel Discharges and Non-Substantive Amendments
- State Water Quality Protection Areas & Marine Protected Areas Amendment
- Trash Control in California's Waters
- California Thermal Plan - Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California
- San Francisco Bay/Sacramento - San Joaquin Delta Estuary Water Quality Control Plan

The Clean Water Team is interested in acquiring orphaned data. Lots of effort has been spent acquiring data by monitoring programs. For one reason or another these programs are no longer active. The data produced by these citizen monitoring efforts still has value. Help our watersheds by helping the Clean Water Team acquire orphaned data sets, monitoring plans and QAPPs. For more information please contact the Clean Water Team's Citizen monitoring Coordinator (eburres@waterboards.ca.gov; 213-576-6788)

MISSING
- **DATA**
- **MONITORING PLANS**
- **QAPPs**

CLEAN WATER TEAM

CITIZEN MONITORING PROGRAM OF THE STATE WATER RESOURCES CONTROL BOARD

KEEP CALM
AND
MONITOR
WATER QUALITY