



SUMMER/FALL

2014



ISSUE # 3

## Winter Drought Affects Spawning Salmon in the Mattole

By Michelle Dow, Mattole Salmon Group

Over eighty massive salmon swam in circles below me, lazily circling around in a methodical, compact unit. There's a palpable stillness when you're snorkeling, where all time stops and you are completely present and enthralled. I had to shake my awe and start counting and differentiating species. I'd never seen that many adult Chinook in one pool before and I knew that it would take me at least two more laps before I could have a confident count of all the salmon present. Last winter's low flows provided incredible visibility and an opportunity to witness and document the Mattole Chinook salmon run in a sub-normal water year.

The Mattole Salmon Group's (MSG) spawner survey efforts follow the Department of Fish and Wildlife's (DFW) general random tessellation stratified (GRTS) method, whereby a random draw of spatially balanced mainstem and tributary reaches is made at the beginning of the season, and those selected reaches are surveyed every 7-10 days. In addition to being the standard method used in watersheds across the North Coast and thus allowing for comparison of various watersheds' data, this method enables DFW to take our data from any given year's selected reaches and extrapolate it to the entire watershed. The end result\* is a watershed-wide redd population estimate (which is not the same as a salmon population estimate; a redd is a nest made by a female salmon). For example, the redd population estimate made by DFW for Mattole River Chinook salmon in the winter of 2012-13 was 373. Redd population estimates from this most recent winter season, 2013-14, are not yet available from DFW.

Because low flows inhibited salmon from migrating upriver past the Honeydew Slide for the majority of the 2013-14 Chinook spawner season (thus making it pointless to survey the GRTS-selected reaches in the headwaters), the MSG decided to implement a full Chinook census of the lower river. Crews surveyed reaches from the confluence of Honeydew Creek to Stansberry Creek, just above the estuary.

The upshot of the census is that, from what we could tell, there appear to have been more than 353 Chinook that returned to the Mattole River to spawn last winter. We know this because during the single week that we saw the most live Chinook (January 3-9, 2014), 353 is the number of live Chinook seen that week plus



*Chinook holding in the Blue Slide hole, lower Mattole River. Photo by Thomas Dunklin*

the number of Chinook carcasses that had already been counted previously. There were certainly more Chinook, total, in the Mattole throughout the entire season, but this is a minimum that avoids double-counting the same fish across multiple weeks.

The highest concentration of redds observed were between the Petrolia bridge and Mill Creek and from the Lindley bridge to Conklin Creek (see Table 1, page 10.) The peak of Chinook spawning occurred from mid-December to mid-January – a slightly later peak compared to previous years, because the fish held out waiting for rains. There were only a handful of Chinook left to make the journey upriver when the February rains arrived, and the furthest upriver observations of live Chinook were between Big Finley Creek and the Ettersburg bridge.

This winter's low flows posed challenges for Chinook and survey crews alike. The majority of Chinook were stuck below the Honeydew Slide and were forced to spawn in lower-river riffles where much superimposition occurred. (Superimposition is the term used to describe what happens when fish spawn on top of one another: a redd dug partially or completely on top of a pre-existing redd; it is believed to reduce viability among the eggs in the initial redd.) Whole riffles in the lower river were worked over and stocked full of redds and live fish.

*See "Drought Affects Salmon" - continued on page 10*

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### MATTOLE RESTORATION COUNCIL MISSION

The mission of the Mattole Restoration Council is the restoration of natural systems in the Mattole River watershed and their maintenance at sustainable levels of health and productivity, especially in regards to forests, fisheries, soil, and other plant and animal communities.

### MATTOLE RESTORATION COUNCIL VISION

"We look forward to a Mattole that has healthy, self-sustaining, productive forests, meadows, and streams, with abundant native fish and wildlife populations. We envision a community that draws its sustenance from and lives in harmony with the environment. We seek to understand processes of natural healing and enhance them using best land practices in harmony with the local environment. We seek to enhance the exchange of knowledge among all community members toward that goal. We look forward to a time in the Mattole watershed when "restoration" will no longer be needed."

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and MRC Members and Friends of the Mattole.

# From the Executive Directors

By Cassie Pinnell and Sungnome Madrone



Hello everyone in the Mattole and friends of the Mattole,

Since our last newsletter six months ago, we've watched California pass through one of the worst winter droughts in modern record. We are again reminded that we are strongly reliant on a finite water supply. However, unlike most of California, our water usage in the Mattole River watershed is not regulated by a water district via reservoirs, pipes, and centralized pumping facilities. Our water availability here is regulated by our valley's ability to absorb rainwater into the ground, store it as groundwater, and slowly release it via springs and creeks. As rural residents on private water systems, we have a much more direct look at the impacts of heavy water use during a dry year than our fellow Californians in urban areas. If we use too much, our tanks run low, our wells dry down, and our creeks diminish to a slow trickle.

Our direct reliance on the local water supply will be what we make of it. We have the opportunity to improve our efficiency, minimize our use, and plan with our tributary neighbors. We can store water when we have extra, and plan for times of low supply. We ask that you please identify any and all ways to conserve water this summer/fall, and make plans for increasing your water storage next winter so that we can all leave a little more for the river and the fish. As always, we here at the Mattole Salmon Group and the Mattole Restoration Council are dedicated to helping the fish and the folks that live in the valley. At the MRC we will be shifting some focus to try to support our community with drought preparedness for future years. We will be working on increasing community storage capacity, providing information for improving water use efficiency, and ramping up our fuels reduction programs in case of wildfires. At the Mattole Salmon Group, we have been busy doing fish surveys throughout the watershed and conducting habitat restoration in the Mattole estuary. By the time this newsletter is out, a brand new habitat area in the estuary will be opened (see page 8) and surveys will be well underway to locate juvenile coho throughout the watershed. We are prepared for rescue and relocation of juvenile coho if needed. At the same time, we hope that we can all work together to use the watershed's precious water more wisely, so that the pools with fish stay deep and cold all summer long, and the young salmon can be safely left to forage and grow in locations of their own choosing.

We are pleased to welcome Sanctuary Forest as a partner in this issue of the *Mattole Watershed News*. Sanctuary Forest is a forerunner in community water storage/drought preparedness and has been working with our two groups for years to ensure that the Mattole headwaters have ample water and healthy juvenile salmonid habitat. We hope you will enjoy their articles and information (see pages 4-7). If you want to help us achieve our missions, please consider a donation to one of the three groups working to restore the Mattole watershed, river, and fish. And let us know what ideas you have for how we can support you, our community, as we look towards a future of unpredictable water availability.

Sincerely,

Cassie Pinnell and Sungnome Madrone

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The Mattole Salmon Group works to restore salmon populations to self-sustaining levels in the Mattole watershed.

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# Where Has the Water Gone?

By John Williams, Mattole Restoration Council

Ever get tired of hearing people claim that things aren't what they used to be? Often, such claims result from the tendency of human memory to confuse memorable events with the way things usually were. If people tell you that dry-season flows in the Mattole are lower than they used to be, however, they are right. The US Geological Survey has measured flow in the river near Petrolia since 1951, so we can compare current flows with flows in the past, and also use the flow record to test ideas about the reasons for the decline.

There are wet years and dry years, and flow in the river varies correspondingly, but the gage record shows a declining trend in minimum flows since about 1960, with a faster decline since about 1990. Minimum flows have decreased by roughly ten cubic feet per second (cfs), or about 40%, over the last 25 years. Ten cfs is a lot of water, enough to fill a 2,500 gallon tank in about half a minute, or cover almost 20 acres a foot deep in a day. However, there is no trend in average flows, or in the late spring and early summer flows; flows on July 1 vary a lot, depending especially on the spring rains, but show no downward trend, and the August 1 flows show only a small downward trend. But, flows now decrease more rapidly for the rest of the dry season, so the minimum flows tend to be lower. There are several reasons for this.

If the fall rains arrive late, there is more time for the flow to drop. August and September rains have been less frequent in recent decades, so the minimum flows also tend to occur somewhat later in recent decades, but analysis of the gage data shows that this effect is minor.

Diversions by marijuana growers got lots of press last year, and probably will again this year. With the "Green Rush," there are more people and irrigated plants in the basin, and more water is diverted from springs or streams to supply their needs, but the decline in late-summer flows at Petrolia seems too big for diversions to be the main cause. Reliable numbers on water use by marijuana cultivation are not at hand, but based on data for Scott Valley in Siskiyou County from UC Davis, one cfs will irrigate about 95 acres of alfalfa in July, or about 160 acres in September. That seems equivalent to a lot of greenhouses. And, irrigation is not new; until the 1970s, ranchers grew irrigated alfalfa on some of the terraces along the river for hay. Diversions do have locally severe effects in tributaries and the upper river, however; when people turn on pumps they can dry up small streams.

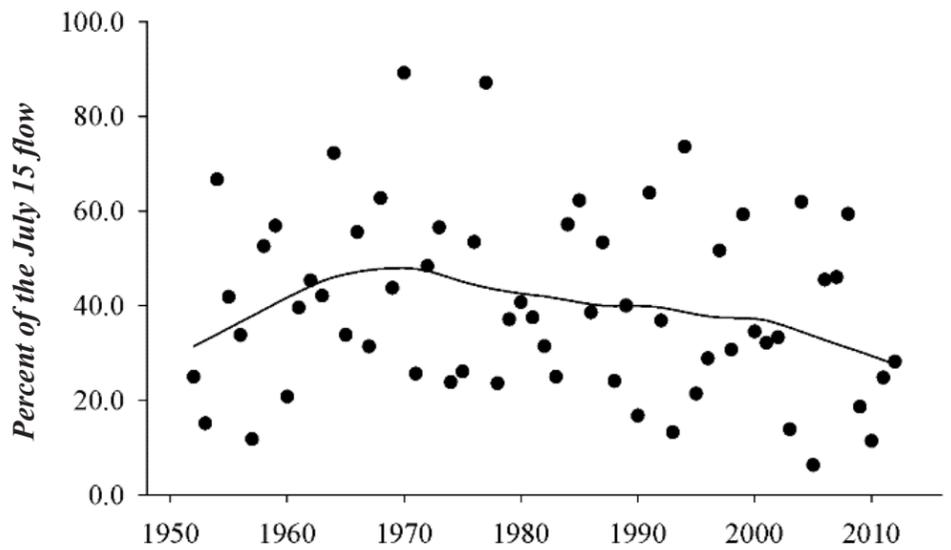
Increased water use by trees, mainly Douglas-fir and grand fir, rather than by people, seems to be the main cause for the decline in minimum flows. The forest in the Mattole basin is rapidly recovering from the logging boom of the 1950s and 60s, and the forest has expanded. Mapping by the MRC shows that about 55% of grasslands have been lost between 1950 and 2005. Douglas-fir are also expanding into oak woodlands in interior parts of the

*"Diversions do have locally severe effects in tributaries and the upper river..."*

Mattole basin, as has been documented in many areas, from the North Fork Eel River to as far north as Vancouver Island. (The MRC is developing an oak woodlands project to quantify and hopefully reverse the process here.) Closer to the coast in the Mattole basin, old, open-grown fir, whose lower branches have been shaded out but have not yet fallen, show that dense young forest has replaced scattered trees in many areas.

Increases in summer flows after forest clearing have been documented in many kinds of forests, but this effect is masked in the Petrolia gage data by variation in the weather. However, when minimum flows are adjusted by the July 15 flows, in order to account for wet or dry springs, the response to the logging shows up clearly (Figure 1).

With our annual summer drought, summer streamflow comes from water that percolates deep into hills, and trees affect deep percolation in several ways. First, tree roots penetrate deeply



**Figure 1. The minimum flow at the Near Petrolia USGS gage, as a percentage of the July 15 flow. Notice the beginning of the decline in minimum flows corresponds to the timing of the re-growth of Mattole forests after large-scale logging that was mostly concluded by 1970. The trend line was fit with a smoothing algorithm called Lowess. Figure by John Williams**

into the ground, drying soil at depth.

Second, trees intercept rain or snow before it hits the ground, and some of this evaporates directly from the surface of the canopy during and after rains, so that less reaches the ground. This "interception loss" varies, being greater as a percentage in light rains, but the scientific literature suggests 15-20% overall is a reasonable estimate. Interception by grass is much less, so trees reduce the effective rainfall. (Where there is much fog, as on the road to Ferndale, trees can increase effective rainfall through fog drip, but fog is not a major factor in the Mattole basin.) As the forest expands, interception increases as well.

Finally, the young fir forest that developed after the logging boom may be reaching peak water use. As a stand matures, water use by individual trees increases because they are bigger, but at some point use by the stand decreases because the trees are fewer and less effective at moving water to their needles. Taller trees need to suck harder to lift water into their canopies, which takes water-transporting cells with thicker walls and smaller passages in the sapwood, twigs, and needles.

Will aggressively thinning the forest help? In the very short and long run, probably yes, but in the medium term, the remaining

*"Increased water use by trees, rather than by people, seems to be the main cause for the decline in minimum flows in the lower river."*

trees probably will expand their root systems to capture the newly available water. How much thinning may help, and the time scales involved, are uncertain. We are helping two members of the Forestry Department at Humboldt State, Andy Stubblefield and Aaron Hohl, set up some experimental plots near the top of Mill Creek Road to get data on the response of water use to thinning. 🐟

## Mattole Watershed News

*Published twice yearly by:*

The Mattole Restoration Council  
and  
The Mattole Salmon Group

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### Mission Statement

Sanctuary Forest is a land trust whose mission is to conserve the Mattole River watershed and surrounding areas for wildlife habitat and aesthetic, spiritual and intrinsic values, in cooperation with our diverse community.

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## From Sanctuary Forest's Executive Director

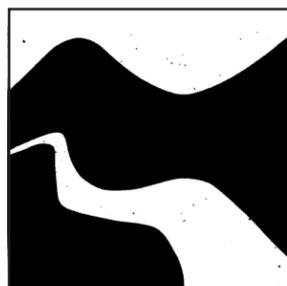
By Tasha McKee

My family has lived in the Whitethorn Valley for four generations, and the Mattole River is my home. I joined Sanctuary Forest in 1997 when our work was focused on conserving the last remaining old-growth redwood forests in the Mattole watershed. At this time Sanctuary Forest had succeeded in protecting 4,000 acres of old growth and second-growth forest, in collaboration with many partners and the local community. We were also instrumental in protecting the ecological values of another 6,000 acres of private property through conservation easements. Sanctuary Forest had just begun to learn about land stewardship and restoration when I joined the board to help with sediment reduction and riparian planting projects.

Then in 2002 a new issue arose when increasing water scarcity led to an ecological crisis in the upper Mattole. Streamflows in the headwaters dropped to a trickle causing thousands of juvenile fish to perish and leaving households without water for basic needs. Sanctuary Forest responded to the call of the river just as we had responded to the call of the trees. We developed a plan to restore streamflow that consisted of two strategies, both of which addressed the impact of human use. One was based on changing human water use, and the other on restoring ground and surface water hydrologic functions that had been impaired by land-use practices. These ideas gave rise to the Mattole Flow Program, consisting of water storage and forbearance (see article this issue), restoring ground and surface water hydrology (see groundwater recharge article), streamflow and groundwater monitoring and water stewardship education. The Mattole Flow Program is still very much in its learning and development phase. While we have made great progress with storage and forbearance in the Mattole headwaters, other approaches are needed to provide water security and reduce human-use impacts on a watershed scale. Implementation of projects to restore groundwater and surface water are just beginning with our Baker Creek pilot project and there is more planning and permitting work to be done before implementation can take place on private lands. Streamflow and groundwater monitoring is perhaps our most well developed program with 10 years of data collected, analyzed, and used for project development and flow alerts. Water stewardship education is ongoing and more important than ever with the current pattern of frequent droughts.

In the upcoming years we hope to work in closer collaboration with our downriver communities and partners and also with other watersheds. We have learned that sharing of knowledge both within and beyond our watershed is key to developing solutions and restoring this river that is our home. We envision a future with greater sharing of ideas and knowledge, of inspiration and ignited imaginations, of friendlier government programs that support good stewardship, and of realizing the dream of the early homesteaders: to live on and steward the land for the benefit of all living things.

Tasha McKee, Executive Director



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# Storing Water to Conserve Water

By Eric Shafer, Sanctuary Forest

A significant portion of the residents in the upper Mattole watershed are voluntarily banding together in an attempt to keep the Mattole River and its tributaries flowing during periods of drought. This year's drought poses an opportunity for more responsible citizens to join the effort when water is scarce. The practice of storing water during periods of heavy rainfall and high flows, which can then be rationed wisely during extended drought, is one of the most important contributions households



can make and will help keep the river and creeks flowing, supporting the health of our fragile ecosystem. Some households in the upper Mattole are displaying blue painted fish cut-outs on posts and fences to identify their willingness to comply with the “no pump” period—taking no water from springs, creeks, or the Mattole when the flow of the river slows to a critical level. These free blue fish are available at the Sanctuary Forest office in Whitethorn. Those who partner with Sanctuary Forest's Storage & Forbearance Program are formally informed when the no pumping period is predicted to begin so they can fill their tanks and make other preparations. Sanctuary Forest also posts the cut-off date on a large sign near the Whitethorn junction so non-participants can voluntarily comply if they wish. Current projections show that July 22 will be the cut-off this year: the date when river flows recede to a critical level. If these projections prove true, 2014 will be the lowest-flow year since 2008, which was the lowest year on record.

*Whitethorn Elementary students, holding the painted blue fish cut-outs, stand in front of 80,000 gallons of water storage installed at the school as part of the Storage & Forbearance Program. Photo by Joe Whitney*

## Storage & Forbearance

Sanctuary Forest, guided by community concerns, has identified water conservation and restoration of streams as priorities. As part of the Storage & Forbearance Program, eligible landowners can become partners with Sanctuary Forest and get the water storage capacity they need to survive the dry season without pumping. These partners enter into legally binding, 15-year “forbearance agreements” in which they give up their right to pump from the river during the low flow season. There are currently 18 participants in the program, with 3 systems scheduled to be installed this summer. Another 20 households (that we are aware of) comply voluntarily with the no-pump period. With the current state-wide drought, Sanctuary Forest hopes to receive funding to expand the forbearance program, and encourages people living in the identified critical reach (upstream of Bridge Creek, including tributaries) to contact Sanctuary Forest for more information.

## Stories from Participants

“Signing the legal document giving up my right to water made me worried about what would happen if we ran completely out of water, what would we do?” recalled Theresa Vallotton, one of the first participants to join the program. “The assurance that water will be delivered to us in such an emergency put me at ease, so I signed. I have no regrets whatsoever. Water is wealth, and I feel wealthy. We had given up our vegetable garden for years due to lack of water. Now we can grow as much as we need and I hope to plant a small lawn here by the house to help keep down the dust. We are careful and have never come close to running out of water since we got the storage tank installed.”

Ken Forden, the first participant in the tank program, explained how “signing the legal contract was a risk worth taking. Being the first ones to sign, my wife Michelle and I had no one to talk to or share stories with. Standing on our [access] bridge looking both upstream and downstream at a dry river bed made me anxious about the future. I had no options.” Ken calculated that he and his wife use about 900 gallons of water per week for their basic household needs. “With no garden or livestock, our water use is low,” Ken acknowledges, “but we have never come close to running out of water while depending on our storage tanks.” He does not take credit for influencing his neighbors, but all the residents on Ken's road are now partners in the tank program. “The first few years there were quite a few scheduled visits to our home as a demonstration site. It has tapered off in recent years, but I am always willing to share information and encourage people to help conserve water.”

## We are in this together!

There is a sense of importance among members of the community of the need to forbear from taking water when the supply decreases to a critical level. Driving from the Whitethorn junction to Four Corners, impressive green and silver tank systems dot the landscape, giving a message to visitors and residents alike: the river knows no property lines, and we are all in this together. The Mattole River Flow sign at the Whitethorn junction reports up-to-date streamflow measurements and encourages conservation. Community participation is essential to solve the low flow problem. A community forum in 2002 developed the idea of combining greater storage of water with a no-pumping period. Sanctuary Forest developed the idea, beginning with research into the impact forbearance would have. The research demonstrated that a cessation of pumping could triple the flows during the dry season. This research supported the successful pursuit of funding for this pioneering program. Coupled with voluntary water conservation efforts by a growing number of community members, this program is producing an important model that can be used by other rural communities facing similar seasonal water shortages. Sanctuary Forest is committed to help further this critical component of preserving and protecting our world for future generations. Becoming stewards of our homesteads, learning from nature, and promoting sustainable living is the path to a healthy life for all. Please do what you can and join your neighbors in this communal effort to cooperate and support each other. 🐟

# Groundwater Recharge: the Answer

By Marisa Formosa, Sanctuary Forest

In California, we are facing one of the most severe periods of drought on record. Call it a dry streak, call it climate change—the bottom line is that compounded by human use, the destruction of natural watershed processes and land-use practices, the State of California is running out of water. Here in Northern California we have a little more room to breathe, thanks to higher annual rainfall and active communities dedicated to restoration and water conservation efforts. But even in the emerald triangle—known for its clean, green rivers and lush redwood forests—water shortages are becoming a part of everyday life, causing conflict among humans and putting native salmon populations in danger. But this is not a hopeless situation. Here in the Mattole River watershed, and in watersheds around the world, people are finding new ways, and reviving old ways, to answer the water question.

These grassroots, community-based solutions are premised on the idea that to achieve success, people must work with nature and imitate natural functions and processes. Unlike mainstream, contemporary focus on large-scale projects and centralized authority, the emerging thinking focuses more on numerous, small-scale projects and community involvement. This article will discuss ways the Mattole River community is working towards restoring flows, coho habitat and groundwater capacity and storage. It will also discuss Rajasthan, India, where villages have been working to restore groundwater for over 25 years. The work being done in Rajasthan is a prime example of what a committed community can accomplish. Their success is an opportunity to learn further how humans can live lightly on this earth and give back to nature.

The semi-arid region of Rajasthan in India is known for drought, with an average rainfall of just 24 inches, all occurring during the short monsoon months. Before colonization, villages in Rajasthan had a symbiotic relationship with their natural resources, which were considered common property. Independence in the 1950s solidified the change from communal control over forests and rivers to control by centralized authorities—leading to excessive mining, large-scale deforestation, flash floods, severe land degradation and unnatural drought. Life in the villages became extremely difficult, causing a mass migration to cities as families looked for work. A severe drought in 1985 was the catalyst for the beginning of a movement, spearheaded by the



*Baker Creek in February 2014. Photograph by Marisa Formosa*

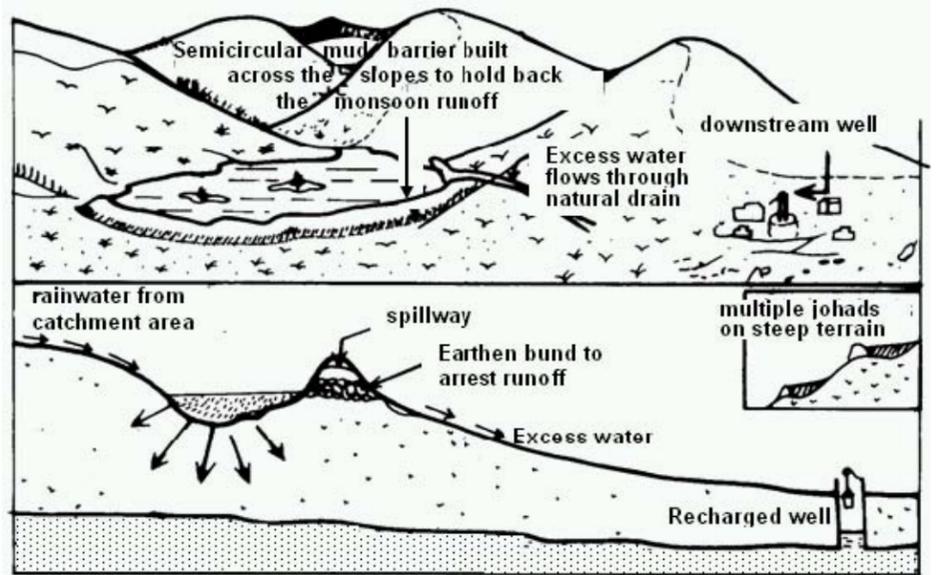
non-profit Tarun Bharat Sangh (TBS). Elders in the village of Gopalpura spoke to TBS leaders (who had been trying unsuccessfully for years to improve literacy rates) and told them that what the people needed was water, not books. “You need to build a johad so that the water does not run away, but is held back,” the Gopalpura elders explained, adding that rainwater harvesting systems (called johads) were not a new concept in India. The villages needed to return to traditional methods of collecting and storing water.

A johad is a traditional water structure that traps the monsoon rains and recharges the groundwater that supplies the village wells. They are either crescent-shaped earthen embankments built across seasonally flooded gullies, or low, concrete “check-dams” built across streams. The monsoon rains turn the area behind the structures into ponds. Most ponds are dry after six months, but their main purpose is not to hold surface water, but to recharge groundwater. Groundwater doesn’t evaporate or breed mosquitoes, it is protected from contamination, replenishes wells and improves the ecosystem.

The first pilot project was implemented in 1986, and the success was immediately apparent, which sparked interest in neighboring towns. Today there are over 10,000 structures in the region. The impact of these johads has been miraculous. They have increased ground and surface water, vegetation and pasture land. Seasonal streams have been reborn and drinking water is available year-round. There has been a significant increase in school enrollment and literacy levels and a decrease in forced migration to cities. The Arvari River, which had been totally dry for over 50 years, has been reborn. Three hundred seventy-five structures have been built in the river’s catchment area, and it now flows year-round, with a thriving fish population and a “river parliament” representing 72 villages along its banks. The johads are built and managed by the people in the villages. With the help of TBS, they have returned to the old ways of water management, and have brought their communities back to life.

In the Mattole watershed, success has also been found by increasing groundwater, and by working together. During the early 2000s, as community alarm began to grow at the site of bone-dry streambeds

# to Drought?



Above: Diagram of a johad. Courtesy of gwadi.org

Left: A johad in India, photographed by Tasha McKee when she went to India in February 2013 to visit Vandana Shiva's water school and learn more about johads. Photograph by Tasha McKee

and thousands of stranded salmonids in the headwaters, Sanctuary Forest began to ask some important questions: where is all the water going? How can we help keep it in the river during the summer months? How much of an impact are humans having? How can the community work together to find a solution and save our river? Although human pumps are a huge factor during the late summer when river flows in the headwaters drop down to below 100 gallons per minute, the heart of the problem is more complicated. Many historically healthy tributaries that have zero human use are still drying up. A myriad of factors—including past land-use practices and the removal of wood from the creeks—have caused many streams to lose their natural resilience, leaving them unable to withstand the new pattern of prolonged dry seasons.

The Baker Creek Groundwater Recharge & Coho Habitat Recovery Project was developed as a collaborative effort over the course of 3 years and implemented in 2012 and 2013. The pilot project included 12 channel-spanning log structures, placement of wood debris, and connection to historic side channels. The goals were to slow down and back up streamflows, elevate groundwater levels, reconnect the stream to its floodplain and create winter and summer habitat for coho. The

*“Sanctuary Forest is planning another groundwater project on a seasonal watercourse in the Mattole headwaters that will be very similar to the Indian johads.”*

project has been a huge success. The narrow, entrenched section of stream where the structures were implemented is now a complex system of pools, wood and off-channel habitat. Before the project, it had been three years since any coho juveniles were seen in Baker, and five years without any observations of spawning adults. In the winter of 2012, two coho redds were found. In the summer of 2013, 1,300 juvenile coho were

counted in Baker, out of 2,500 total observed in the Mattole watershed. As flows throughout the watershed diminished and neared crisis levels, pools began to disconnect. But unlike the past, the pools in the project reach remained big and deep, with ample habitat and cover for juvenile salmon. The habitat was persistent, and as hoped, provided resilience against drought.

Sanctuary Forest and partners are currently in the planning process for a similar project on Lost River, which has been identified as the next most viable and needed location. Like Baker, the Lost River Project will focus on recovering healthy stream functions, complexity and critical stream and wetland habitat. Sanctuary Forest hypothesizes that ten groundwater recharge projects could be enough to restore summer flows to the Mattole River and bring back the coho population.

Buck Creek, also a Mattole tributary, is another example of using small dams or structures to improve stream health. Even during the longest summers, when all other headwaters tributaries have stopped flowing, two ponds built near the headwaters of Buck Creek keep it flowing year-round, at times with a higher streamflow than the river itself. Near Whitethorn Construction there is a series of three ponds built down a swale, from small to large. Functioning like a johad, the ponds catch rainwater runoff. When the top pond is full it overflows into the next pond and so forth. By early to mid-summer, the upper two ponds are often dry, but the third and largest is fed by groundwater from the two above and retains water year-round. Sanctuary Forest is planning another groundwater project on a seasonal watercourse in the Mattole headwaters that will be very similar to the Indian johads. The Lost Coast Forestlands Johad will be constructed in a low-gradient valley that naturally collects water during the winter months, but dries up in summer. This project is planned as a series of four recharge ponds, with the goal of increasing groundwater elevations and streamflow and restoring a historic wetland.

Like the johads of India, these water projects aim to increase the capacity of the watershed by building small-scale structures that restore groundwater levels. The Mattole watershed has great potential to adapt to climate change. Over the next five years, Sanctuary Forest will be working with all of these groundwater recharge concepts—developing, implementing and monitoring projects to learn and share knowledge throughout the Mattole and other watersheds. Sanctuary Forest would like to express gratitude to the Bureau of Land Management and the Mattole Salmon Group for their role in the Baker Creek Project, which would not have happened without them, and to all our funders and supporters. Like the johad movement in Rajasthan, the water conservation happening in the Mattole is fueled and backed by the community, and is dependent on community participation. Whether a trickling stream on private property or a gushing river on public land, the water flowing from sinks and hoses belongs to us all, and is precious to every living thing in the watershed. Together, we can see the coho return and the river heal. 

# Slough Restoration

By Sungnome Madrone and Drew Barber, Mattole Salmon Group

Last winter's drought impacted many things, including the 3 salmonid species in the Mattole. A significant portion of the returning adult Chinook this past fall and winter were limited to the lower river downstream of Honeydew due to low flows. The result was a concentration of spawning in the lower river that may lead to carrying capacity issues in the estuary/lagoon this summer. So what can we do about this situation? What will the young fish do? And what did they used to do when there was a healthy estuary/lagoon with deep pools and extensive riparian and slough habitat?

These are questions that local residents and watershed groups are asking. To get the answers, we have been engaged in extensive monitoring for over three decades. Learning about the fish and their preferred habitats has helped us develop plans and execute actions to help the fish. Using a triage approach, some actions are immediate to help save the "patient," but then there are farsighted actions that are more like long-term health care. We describe here some recent actions to restore off-channel slough habitat in the estuary/lagoon of the Mattole. We hope that this project may have near-term benefits for fish in the lagoon this summer, as well as longer-term benefits spanning future decades, such as increased refuge from winter high flows and an overall expansion of off-channel habitat in the estuary/lagoon.

In 2012, the Bureau of Land Management (BLM), working with local landowners, watershed groups, and numerous other state and federal agencies, developed a 5-Year Restoration Plan for the estuary/lower river on BLM lands. Last year's helicopter wood placement was one of the actions identified in the Plan; this year's slough restoration project is also described in the Plan.

There is a complex of elevated slough channels along the south bank of the Mattole River estuary that were disconnected from the river after the 1992 Triple Junction earthquakes uplifted the area by 3-5 feet, and subsequent deposition from over-bank flows filled in the old river channels. The current slough restoration project is excavating 250 feet of one of these historic channels to create off-channel habitat for juvenile salmonids. This slack-water habitat will have cooler water temperatures than the main river and an abundance of insects (food for juvenile salmonids) from the extensive over-hanging riparian vegetation. It will serve as a refuge from high water velocities in the winter and be a veritable paradise



*View of the slough excavation site during project work.  
Photograph by Nathan Queener*

of cool water temperatures and abundant food in the summer. Hoping it may be an alluring refuge for coho, we like to think of it as a "Cohotel."

This project is being coordinated by staff of the Mattole Salmon Group, in cooperation with Mattole Restoration Council staff who are completing all of the associated willow planting work, and Patrick Queen, a local heavy equipment operator and problem solver. Funding comes from the California Department of Fish and Wildlife, The Nature Conservancy, and the National Oceanic Atmospheric Administration, with funding and staff support from the Bureau of Land Management, and tree donations from Ellen Taylor and Michael Evenson.

The work dredging the old, filled-in and uplifted slough channel was finished in early July. We have also completed extensive terrace margin treatments with willows, whole trees, wooden posts and logs, and thousands of willow cuttings. Fish presence will be monitored after the slough is opened to the river. When we deployed minnow traps in this area in May prior to the start of work, there were no salmonids present. Monitoring results from this project will help inform a soon-to-be-funded study to determine if additional slough channel areas should be reopened.

The Cohotel opens soon. 🐟



*Work plan for slough excavation project. Yellow marks represent whole trees positioned at the mouth of the slough. Upstream (right) of the main slough excavation site, blue lines represent the first 50 feet of the trenches where whole trees with root wads were placed. Black lines represent the remainder of the trenches, where logs and willow cuttings were placed. The willow and wood trenches are designed to lengthen the life of the slough excavation area by providing hardness (vegetation and logs) upstream. When the terrace gets inundated with water, the willow will also help to settle fine sediment upstream of the slough channel. Map by Mattole Salmon Group*

This page is dedicated to stuff for, about, and by kids only!

## Introducing the Mattole Youth Environmental Stewards!

By Monica Scholey, Mattole Restoration Council

April 2014 marked the launch of a new collaborative environmental education effort that brings together groups working throughout the watershed, place-based curriculum developed over the past decade, and hands-on exploration of the Mattole. Our goal is to inspire stewardship through fostering a connection to place and encouraging students to take responsibility for their part in the ecological processes of the Mattole. Over the 15 months of the program, students, student interns, and Lost Coast Campers will go on field trips with staff from Mattole Restoration Council, Sanctuary Forest, Mattole Salmon Group, and Bureau of Land Management to experience working examples of land stewardship. Students who complete the program will be recognized by the community at a Stewardship Celebration in June 2015. Thanks to the Whale Tail license plates and the California Coastal Commission for helping us launch this new program! 🐟

**Right: Triple Junction High School students Sequoia Madrone and Kate Fatseas testing dissolved oxygen levels at Mill Creek in May 2014.**

**Below: Triple Junction High School students learning about forest ecology and stream monitoring of the Sudden Oak Death pathogen in April 2014.**  
Photographs by Unity Minton and Monica Scholey



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### BECOME A MEMBER OF THE MATTOLE RESTORATION COUNCIL!

Please consider becoming a member of the MRC. Becoming a member is one of the easiest ways to become a part of the Mattole restoration movement. Your membership dues are extremely important to us, allowing us to pursue important work that may otherwise fall through the cracks between our grants and contracts.

#### Additional Benefits of Membership:

- \* Subscription to our twice-yearly newsletter.
- \* 20% discount on custom mapping services (applies to labor costs only).
- \* Members who are also residents or landowners in the Mattole watershed are eligible to vote in our board elections.

If you'd like to become a member, please visit our website: [www.mattole.org/content/join-us](http://www.mattole.org/content/join-us)

### DONATE TO THE MATTOLE SALMON GROUP!

The Mattole Salmon Group is a non-profit organization dedicated to long-term restoration of salmon populations in the Mattole watershed. Your donation to the Mattole Salmon Group is tax deductible, goes directly to our organization alone, and is used to fund restoration or monitoring projects benefiting salmon in the Mattole River.

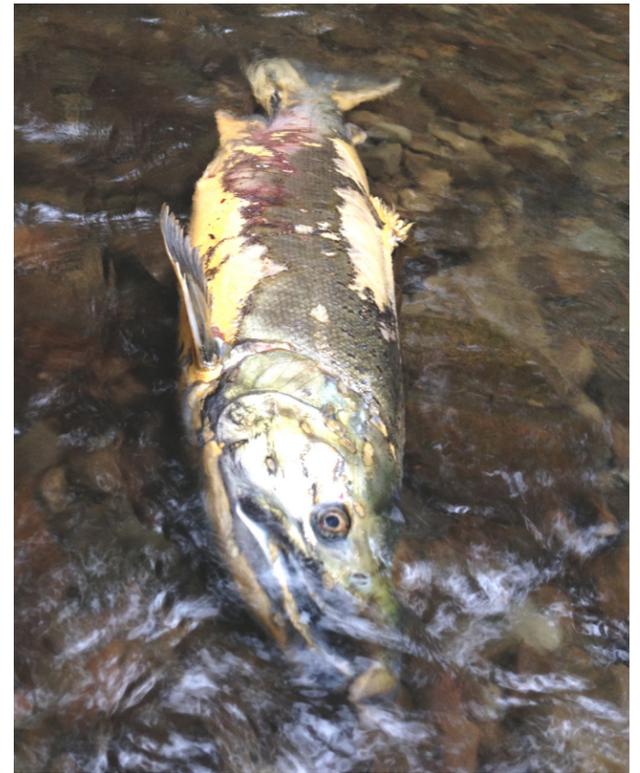
Supporters may donate any amount at any time, and may choose one of the following ways to donate. All donors can receive our newsletter by mail and may elect to receive email updates about our activities.

\* Donate online! [www.mattolesalmon.org](http://www.mattolesalmon.org)

\* Donate by mail! You can send a check made out to the Mattole Salmon Group to our headquarters on the Mattole: PO Box 188, Petrolia, CA 95558.

# Drought Affects Salmon - continued from page 1

Reach Boundaries	unidentified	coho	Chinook	steelhead	Total
Lower Mill Cr-Stansberry Cr			15	7	22
Petrolia Bridge-Lower Mill Cr	3		52	16	71
Conklin Cr-Petrolia Bridge	1		18	7	26
Lindley Bridge- Conklin Cr	1		51	19	71
Squaw Cr- Lindley Bridge			19	3	22
Hadley Bridge-Squaw Cr			38	9	47
Honeydew Cr-Hadley Bridge			26	6	32
Bear Cr-Sholes Cr			4		4
Big Finley Cr-Bear Cr	8		6	15	29
Stanley Cr-VanArken Cr	2		1	10	13
Lost River-Stanley Cr	10			8	18
Big Jackson Cr-Lost River			2	6	8
SF Bear Cr, Horse Mtn-Tolkan	4			4	8
NF Bear Cr, mouth-Rd bridge				1	1
Big Finley Cr				1	1
Baker Cr		3		3	6
Thompson Cr	2			9	11
<b>Total</b>	<b>31</b>	<b>3</b>	<b>232</b>	<b>124</b>	<b>390</b>



**Table 1: 2013-14 Salmonid Redd Observations by Reach.**

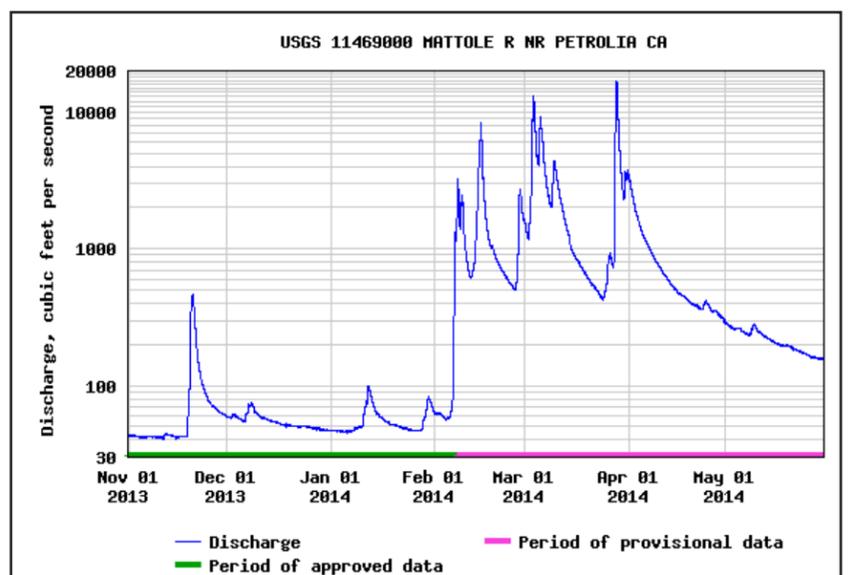
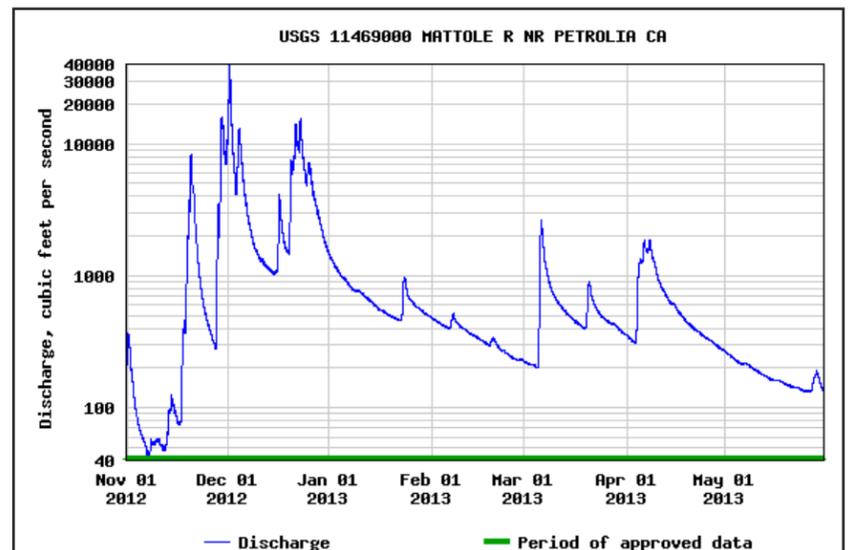
*Note that among the surveyed reaches in winter 2013-14, the majority of redds occurred in lower river reaches, as opposed to the middle-upper river and headwaters tributaries. This was due to low flows restricting fish access to the lower river until additional rains fell in February (see hydrograph at bottom right), at which point fish could enter the upper Mattole River. These late rains provided some upriver access for steelhead and coho, however the Chinook run was largely completed by that time. Surveys – which target coho and Chinook – concluded in late March and thus did not capture the entire Mattole steelhead run, much of which takes place later.*

*Top right: Male coho carcass in Baker Creek, March 2014. Photograph by Sophie Price*

You may be thinking, “Oh dear, with all those Chinook spawning in the lower river, all their eggs are doomed!” While spawning in the lower river – where redds are more vulnerable to high flows and turbidity – certainly isn’t ideal, we observed that some redds were dug in larger cobbles and boulders, which should offer more protection during high flows. The broadness of the lower river valley and lack of subsequent large flow events over 20,000 cfs could have been favorable for the success of redds and juveniles. This past spring, the lower river was most likely considerably crowded with juvenile Chinook (indeed snorkelers occasionally noted high concentrations of juvenile Chinook in the lower river in May.) Whether many of these fish perished due to fierce competition for limited resources or opted to outmigrate to the sea remains unknown. This summer, surveys for juveniles will give the MSG a better idea of the survival rate of the lower-river juveniles. With the fate of global warming upon us, bringing more erratic weather patterns, habitat enhancement of the lower river is critical to ensure survival of large numbers of juveniles.

Mattole coho salmon – with their tendency to arrive and spawn slightly later in the season – seem to have weathered the winter drought a little luckier than Chinook. (Although given their recent numbers, it’s hard to be very optimistic about Mattole coho.) A handful of coho were observed holding in lower-river pools this past winter, waiting for more rains to advance to the headwaters. Once the early February rains came and re-opened the river mouth, coho salmon were observed spawning in Baker Creek, and one live coho male was seen in Thompson Creek (both Baker and Thompson Creek being upstream of Whitethorn, in the Mattole headwaters). Three coho redds with spawning females were confirmed this winter in Baker Creek. This is more coho on redds than have been seen in the Mattole in any year since the winter of 2007-08. It’s unclear if these spawning coho were fresh from the ocean or had held out in the lower river since before the river mouth closed on December 1st. One positive note is that coho juveniles spend a year in fresh water, and this winter’s low flows provided favorable habitat conditions for last year’s coho juveniles, with ample refuge from high flows and turbidity.

The winter of 2013-14 was an odd one. When comparing the hydrographs from this year to last year (which was more typical), it is evident that the storms this winter occurred much later than they typically do, with the largest storms in February through April compared to November through February. It’s uncertain if this year was just a blip or a herald of more strangeness to come. Certainly within their 6 million years of evolution, salmon have encountered many landscape and climatic changes, but with later rains and less annual precipitation changing spawning behavior and selection, lower-river habitat may become paramount to the success and vitality of the Mattole salmon runs. 🐟



*Above: Hydrographs of Mattole River flows from winter 2012-13 (at top) and winter 2013-14. Comparing the timing of the two years’ high flow events – shown as peaks in the blue line – conveys just how dry last winter’s usually-wet winter months of December through February were. Hydrographs from [waterdata.usgs.gov](http://waterdata.usgs.gov).*

\* The end result for watersheds lacking DFW salmonid life-cycle monitoring stations (such as the Mattole) is a redd population estimate. In watersheds that contain salmonid life-cycle monitoring stations, such as Prairie Creek (tributary to Redwood Creek) and Humboldt Bay’s Freshwater Creek, DFW crews are able to obtain data leading to salmon population estimates, in addition to the redd population estimates that are generated by surveys identical to those done here in the Mattole. When those salmon population estimates from watersheds such as Prairie Creek and Freshwater Creek are considered alongside their redd population estimates, a mathematical relationship between the two may become evident. Such a mathematical relationship – once derived – could prove useful in DFW’s ability to one day make salmon population estimates for the Mattole.

# Trim Those Trees (and Brush!)

By Ali Freedlund, Mattole Restoration Council

As our watershed heats up and dries out, the threat of wildfire and the potential for devastating impacts intensifies. It is increasingly important to reduce the fuels around our homes, roads, and landscapes. By taking initiative on your own land, landowners will also be helping their neighbors and the watershed become more resilient to fire. The good news is that there are now several funding mechanisms to help landowners reduce volatile fuels.

Money from California's Cap and Trade program will be available for fuels reduction projects this year, along with State Responsibility Area (SRA/fire fee) funding. Some of these funds have been allocated to CAL FIRE and California Conservation Corps (CCC) to implement state-sanctioned fuels reduction projects. Some projects are free and others require a landowner match. Below are four ways to implement a project.

1) Talk directly to CAL FIRE about the development of a Vegetation Management Plan or VMP. This is primarily for larger ownerships as it involves an investment in the development of a plan. But once developed, CAL FIRE will help implement the plan and only require a 25% match from the landowner. Most VMPs involve both vegetation removal and prescribed burning. For more information, contact Len Nielson at 599-6442.

2) Help organize a free SRA-funded county road project. Whether you or your neighbor adjoin the county road, you can help organize a segment to be treated. Treatments include thinning dense stands, removing roadside brush, and limbing up older trees to within 50 feet (or less) of the road surface. Removed material would then be chipped, lopped and scattered, or pile-burned in designated locations. Crews would be either CAL FIRE inmates or the CCCs or both. These projects require a sponsor. Though the MRC

receives no compensation for this, we believe in its importance and are willing to sponsor road segments in the Mattole if there is landowner involvement.

*"There are now several funding mechanisms to help landowners reduce fuels."*

3) Find out about CA's Fire Safe Council Grants Clearinghouse projects. These projects require a fiscal sponsor. If you are an eligible landowner, there are two categories in this path. The first is through MRC's Fire-adapted Landscapes and Safe Homes (FLASH) program that is administered through the County. FLASH is landowner driven but requires treatment of fuels in the defensible space zone, i.e., around a structure or along your driveway. You can do the work yourself, hire a crew of your choice or hire an MRC crew. Your project will be PARTIALLY compensated dependent on the amount of acres treated and the intensity of fuels reduced.

The other option is to join with neighboring landowners to develop a landscape-level project. This requires a 50/50 match; a CAL FIRE crew can be counted as part of the match. Two recent projects MRC has sponsored involve treatment of fir and brush-encroached prairies. For either category, contact Ali (ali@mattole.org) for more information.

4) Continue your stewardship on your own and thin those trees (and brush!) for the safety of your home and neighbors. Safer yet, cooperate and treat another's property one week and yours the next! 🐟

## A Bright Side to the Drought?

### Sudden Oak Death and Lower-than-usual Spore Production

By Unity Minton and Flora Brain, Mattole Restoration Council

Scientists studying *Phytophthora ramorum* (the pathogen that causes Sudden Oak Death, or SOD) have long observed that its spread seems to be aided by wet weather, since the pathogen spreads via spores that are transmitted from tree to tree when conditions are warm, wet, and windy.

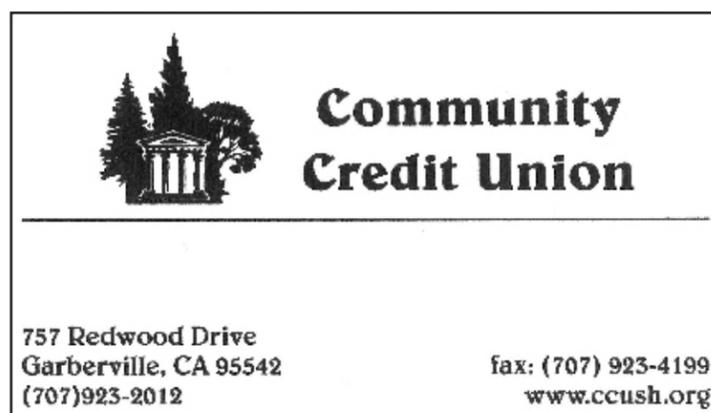
Then what happens when there's less rain falling on ecosystems where SOD is taking hold? While scientists are hesitant to say it's due solely to last winter's drought, across the entire area monitored by the California *P. ramorum* Watershed Monitoring Program, there has been a marked decrease in positive detections of the pathogen as of the May 2014 sampling. Of the 24 sites that were *P. ramorum* positive in past years (including sites in Humboldt, Mendocino, and Monterey Counties) only 13 have been positive so far in 2014. Considering sites in Humboldt County alone, of the 12 sites that were *P. ramorum* positive in past years, only 6 have been positive in 2014, as of the May sampling.

The April sample from Grindstone Creek in the Mattole watershed was *P. ramorum* positive. The Grindstone Creek sample

from May was negative. Grindstone Creek was not sampled in June, and samples taken from the other Mattole watershed monitoring sites in June have not yet been processed. As of this time, unless one of the samples from the other Mattole sites turns up positive, Grindstone Creek will be the only *P. ramorum* positive stream monitoring sample collected from the Mattole area in 2014.

While reduced pathogen recovery from known positive sites likely indicates low spore production by *P. ramorum* this spring, this pathogen is still present in these watersheds. And, despite pathogen detection being lower than usual this year, *P. ramorum* was still detected for the first time in 5 watersheds in Humboldt and Mendocino Counties. None of these detections were in the vicinity of the Mattole. The new Humboldt detections were in Cooper Creek, tributary to the Van Duzen, and Beaver Creek, tributary to Redwood Creek. The new Mendocino detections were all in the Jackson Demonstration State Forest.

Thanks to Heather Mehl at the UC Davis Department of Plant Pathology for sharing information for this article. 🐟



# Students Reflect on Mattole Field Institute's Spring 2014 Field Course

By Flora Brain, Mattole Restoration Council

In May, the MRC's Mattole Field Institute offered a 5-day course in Estuarine Dynamics and Habitat Restoration. Eight students – undergrad and graduate – from Humboldt State University attended, and made the Mattole Beach Campground their temporary home as they submerged themselves in many aspects of watershed ecology. With staff from the MRC and the Salmon Group as their field instructors, they studied riparian restoration, native plant nursery operations, and instream large wood placement. They got in the river to learn about juvenile salmonid behavior and invertebrate sampling techniques, and got their hands dirty in a riparian invasive plant control project.

Why do we offer these field courses, and what do students learn? We've excerpted some of their comments so you can hear them, in their own words, describe the significance of their field experience.

## **Why did you sign up for this field course?**

"For hands-on field experience, and for insight into watershed techniques being implemented on a professional level."

"I wanted to learn about the ecology of the stream-ocean ecotone. And I wanted to learn about restoration practices in the estuary. I also wanted to meet people in Humboldt who are involved with biology and restoration as a vocation (networking)."

"I plan to work in ecological restoration as my career and love the area so it seemed like the perfect opportunity to experience restoration efforts and bulk up my resume."

## **Did the course meet your expectations?**

"It exceeded my expectations. Instructors were extremely knowledgeable and approachable."

"My expectations were met in terms of learning restoration techniques and meeting people."

## **Would you recommend it to others?**

"I would because I felt I gained valuable knowledge of how the Restoration Council operates and how complex restoration can be."

"Yes. It is a good experience for everyone to get out of an urban jungle and spend an extended period of time existing in and learning about the natural world around them."

"Yes: it supports a well credible, local nonprofit that is highly active in restoration – lots of successes and failures to model after."

"Yes, I would because I think everyone could benefit from basic understandings of how to restore ecosystems."

"Yes. Excellent restoration field experience."

"Yes! It was fantastic and I believe anyone with an interest in nature should get hands-on experience."

## **How well did this course complement your on-campus, classroom-based education?**

***"It paralleled my on-campus learning perfectly. It put what I learned in the classroom into context by seeing restoration at the site level."***

"Good to get hands-on experience seeing the projects first hand."

"It perfectly corresponded to my classes and what I want to do."

## **Did this course inspire you to pursue further education and/or a career in ecological restoration or another environmental field?**

"Absolutely. It showed me the possibilities restoration has to offer."

"Yes, it encourages me to continue with restoration, but even possibly go into education."

"Yes, it made me want to move here and join the Council."

## **What was the most valuable aspect of the course, or the most valuable lesson you learned?**

"Experiencing processes – wind, flow, erosion – outside and not just by Powerpoint and book."

"Most valuable lesson: the importance of all-inclusive management."



***Mattole Field Institute students, with Nathan Queener of the Mattole Salmon Group and Sequoia Madrone, MRC mentor student, after studying juvenile salmonid behavior in the Mattole estuary. Photograph by Flora Brain***

"Most valuable lesson: watershed restoration is beyond physical change. Looking broadly at political and economic restrictions, historic precedents, etc., can effectively make restoration projects more effective."

## **Did the course change your understanding of ecology? If so, how?**

"Yes: Rivers as a function of watersheds."

## **What was one thing you learned during this field course that surprised you?**

"Baby fish aren't very shy."

"The estuary is often a lagoon."

"A caddisfly makes its own shell and isn't a crustacean."

"I was surprised to learn how much invertebrate diversity changes the ecology of the waterways."

"How easy willow is to establish."

"Learning about invertebrate diversity, ecotones, willow restoration and salmonid juveniles"

"The time spent communing with the local environment: seeing otters, watching whales frolic, etc."

"There are so many groups with different goals all working together. Yay!"

We had a positively great time getting to know the individuals in this past spring's field course, and eagerly look forward to welcoming more students to our watershed – as one student called it: "the Mecca of restoration."

We are deeply grateful to Professor Alison O'Dowd in the Environmental Science and Management Department at HSU, who collaborates with the MRC to offer this field course. Her solid grasp of the significance of field studies and her commitment to this course make it possible for us to continue to offer this unique hands-on experience to students. Thank you, Dr. O'Dowd!

The Mattole Field Institute hopes to soon work with additional partners at the college and university level to increase the curriculum areas in which we offer courses. If you are interested in future field courses, please contact Flora Brain at [flora@mattole.org](mailto:flora@mattole.org). 🐟

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