Winter 2018

# the current

abundant wild fish · healthy waters · better California

CALIFORNIA TROUT
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## SOURCE Waters

### Why California's water security depends on it

### Modoc Meadow

Four meadows assessed and ready for restoration

### Scott River

South Fork restoration paves way for Coho Salmon's return

# A message to you

Our goal with each issue of *The Current* is to bring our stories and projects to life, with more images, videos and links... offering you a rich perspective on the work **your support makes possible**. We are thankful to you, our donors, who help us ensure that there will always be abundant populations of wild fish thriving in healthy waters for a better California.

## FEATURE



*Cover photo: Keith Brauneis*

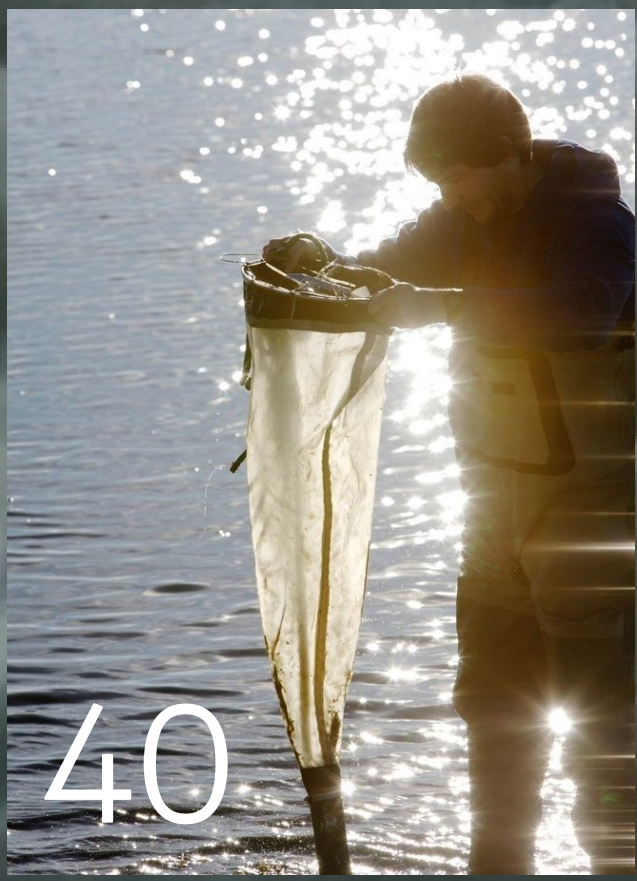
## SCIENCE

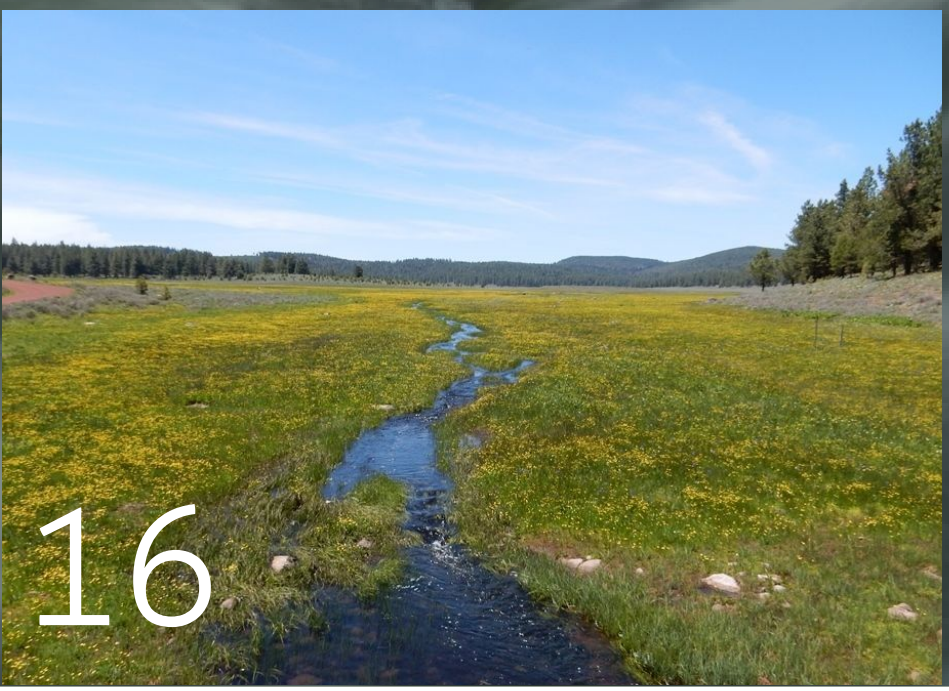


## PARTNER



## PROJECTS


# SOURCE waters

## Water is arguably the most valuable, sought after, and fough after resource in California. But do its 40 million residents re know where their water comes from?

WRITTEN BY

Curtis Knight

*Executive Director*

Tracey Diaz

*MarCom Director*

Water is the lifeblood of California. Most fundamentally it supplies drinking water for communities, fuels one of the most productive agricultural regions in the world, and of course sustains diverse rivers and streams and the species that depend on them.

However, despite its importance to our state's economy and livelihood, many Californians are unaware of where their water comes from and how it gets to them. Depending on where you live in the state you likely get your drinking water from local sources such as groundwater and local reservoirs or your water is imported from elsewhere in the state – often traveling long distances.

That water, so vital to the state, is variable. As California's climate changes, we can expect increasingly variable weather patterns, warmer temperatures, reduced snowpack, and likely longer and more severe droughts. This increases the concern about the availability, quality, and distribution of water for all its uses. With of the state experiencing the effects warming climate, those concerns are gro

At CalTrout, we believe that healthy fish healthy waters and healthy waters mean h Californians. Some of our native fish are healthy which should be viewed as the in the coal mine. Declining cold wate species indicates degraded water quality threatens California's long-term water security.

To protect against these threats we ne better understand our source water are intend to raise people's awareness of their water comes from, how it gets to the how they can protect these source wate for future generations. Because to p California's fish and its people, we're go need to protect the water - at its source

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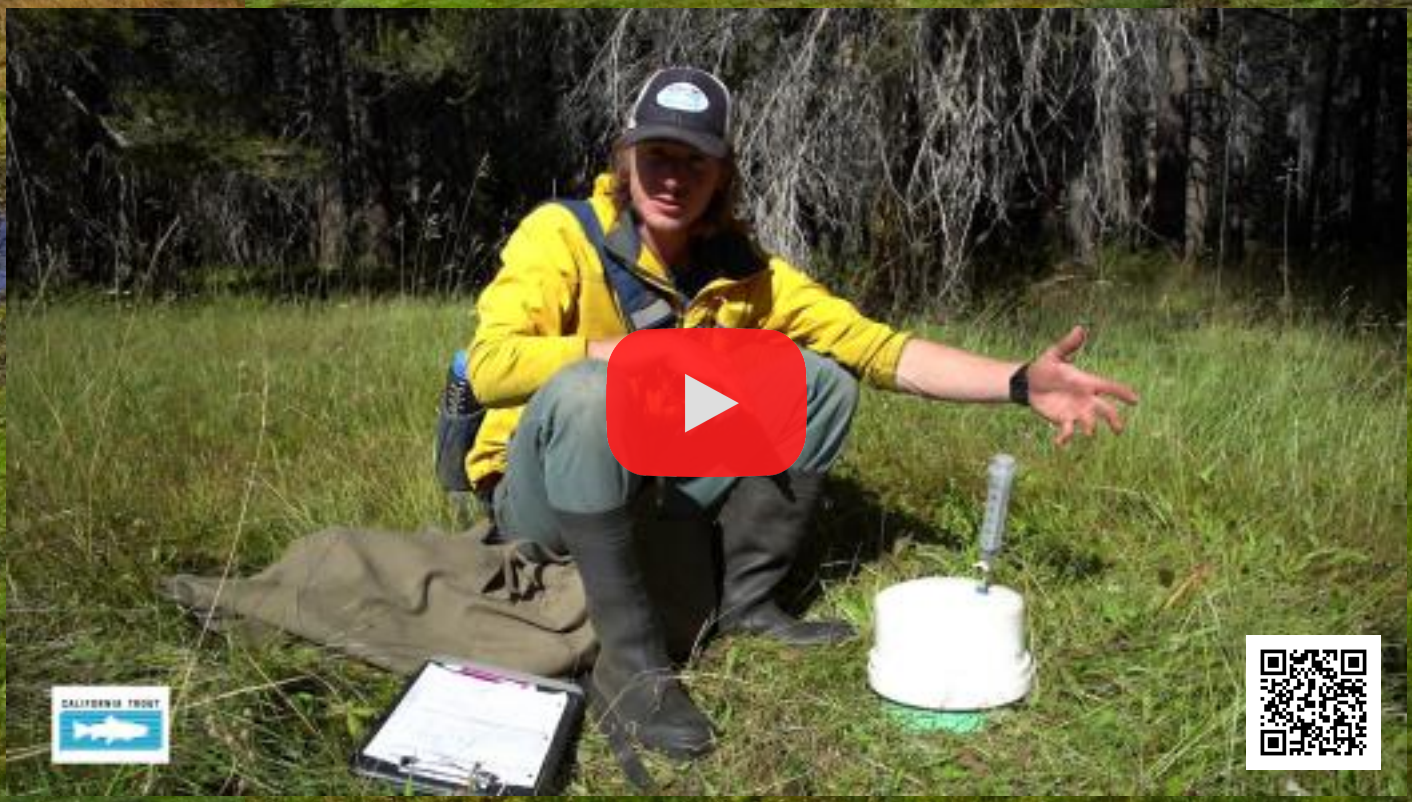
*Photo by Keith Brauneis*

FEATURE



# California's source waters

Within the state, the two most important source water areas are the Sierra Nevada mountains and the greater Mt. Shasta area springs. These two source areas provide the majority of water for urban drinking supplies as far away as Los Angeles and for agricultural uses across the Central Valley.

## SOURCE #1 - THE SIERRA NEVADA

California's vast Sierra Nevada range, spanning 400 miles, rises to capture rain and snow from the clouds drifting eastward from the Pacific Ocean providing the source for approximately 60% of California's developed water supply.

The Sierra's hydrologic system is a snowpack driven system. Snowpack in the Sierra provides a natural form of water storage, but the effects of climate change are expected to decrease snowpack by up to 40% by 2050. Warmer temperatures will cause what snow we do get to melt faster and earlier, making it more difficult to store and use. This poses a real problem for our water supply. But recent research has shown how restoring Sierra meadows can help counteract the effects of climate

Help restore our source water meadows **CLICK HERE**

change.

## The role of Sierra meadows

Sierra meadows cover less than 2 percent of the overall Sierra-Cascade landscape, but they are biological hotspots that sustain the headwaters of several major California water sources. Like the mountain snow pack that Californians depend on for year-round water, healthy meadows store water like a sponge and release it gradually. They also filter out pollutants in the process. As the climate warms and scientists project more rain and less snowfall in these mountain ranges, Sierra meadows will become an increasingly important resource for water storage. Of the roughly 190,000 acres of meadows throughout the greater Sierra Nevada, an estimated 40-60 percent (~90,000 acres) have been degraded due primarily to human activity.

The degradation of these meadows is due to a number of factors, mostly livestock and agriculture related. Meandering streams were straightened, streambanks destroyed, and the "sponge function" dried up and withered. Our efforts to protect and enhance habitat for native trout populations, has led us to scientifically quantify

*Photo by Mike Wier*

# The Sierra Meadows Partnership

## Collaborative meadow restoration and protection

To elevate and coordinate meadow restoration, CalTrout and its partners have created the Sierra Meadows Partnership, a broad coalition of government agencies, scientists, non-profit conservation organizations and other stakeholders. The Partnership plans for an ambitious course of action. To achieve its overarching goal will require restoring 30,000 of the estimated 90,000 acres of degraded meadows in the strategy area over the next 15 years. This work will require a multi-pronged approach that includes improving the science and implementation of meadow restoration,

helping to improve the efficiency of planning and permitting, and building funding, resources and partnership capacity.

Restoring meadows increase ecological resilience in the face of a changing climate including helping counteract changes in precipitation and increases in large scale forest fires. Restored meadows also improve water supply security by keeping more water in the system acting as a natural reservoir to carry water through into the dry season when it is needed most by fish and people.

In addition to increasing the ecological resilience, restored meadows also sequester more carbon. A core part of our meadows work is developing the science and protocols for quantifying carbon sequestration and greenhouse gas retention in restored meadows. Our goal is to enter into carbon trading or payment for ecosystem services, generating a steady and new stream of funding for meadow restoration. This would then increase the pace and scale of meadow restoration across California.

Dic

## SOURCE #2 - SHASTA AREA SPRINGS

The other important source water region is the Mt. Shasta area springs. Storing and releasing large amounts of groundwater, these springs sustain some of the most iconic trout streams in the world - such as the Upper Sacramento, McCloud, Pit, Fall Rivers and Hat Creek. These spring rivers flow even when there is little rain or snow to generate runoff. This steady supply of cold, clean water could potentially be even more important as climate change diminishes snowpack in the Sierra.

For fish and people, these abundant spring waters are like the fountain of youth – eternal and life giving. The area's landscape and geology is shaped by volcanic eruptions over the last several million years. Those volcanic eruptions formed vast expanses of contiguous permeable rock that filters water into the earth forming these ancient aquifers.

# d you know...

there are:

**90,000 acres**
of degraded Sierra meadows

**30,000 acres**
that CalTrout and Sierra Meadows Partnership will restore by 2030

**700 miles**
of State Water Project pipes and canals

**2,882 feet**
water pumped over the Tehachapi Mountains

**700 billion gallons**
of water from Shasta area springs contributed to Shasta Reservoir

**3000 cubic foot per second (cfs)**
total discharge water from Shasta area springs

**$1 billion**
value of water deliveries from Shasta Reservoir

**14 – 75 days**
it takes water to travel the CA aqueduct to LA metro area
(depending on how many pumps are operating)

**100,000 number of cars**
effectively taken off the road per year
with carbon sequestered in
30,000 acres of restored meadows

**40%**
of the state's hydroelectric power comes
from Shasta aquifers spring fed water

Some estimates suggest that there are 20 – 40 million acre feet of water stored in these aquifers. That's more than California's top 100 reservoirs combined. That water is essential for agriculture, for hydropower, water for people and of course water for fish and wildlife.

However, we don't fully understand these important source waters. We don't understand the recharge zones, we don't understand the total storage capacity and we really don't understand the human impact. It's impossible to manage what you don't understand so California Trout is forming partnerships and developing a foundation of science to inform management and policy for long-term protection.

*Photo by Keith Brauneis*

FEATURE

# From the source to you

All the water emerging from Mt Shasta's springs is captured in Shasta Reservoir, the state's largest. Likewise, water from the Sierra is captured in reservoirs up and down its flanks. This source water then enters a system of reservoirs, canals, pumps and pipes that is one of the most extensive water delivery systems in the world.

There is no simple way to tell the story of this elaborate system. But, by way of example, we highlight four important delivery projects that share one important attribute – they deliver water hundreds of miles from Mt. Shasta springs area and the Sierra to where the majority of Californians live in Southern California and the Bay Area.

These are some of the most important, but certainly not the only, water delivery systems for California's urban water supply. These projects collect water from rivers flowing from the Sierra and the greater Mt. Shasta springs area. This water travels hundreds of miles from the source to the end user and, because of that, there is often a disconnect, a lack of awareness, and often a disinterest in protecting these areas vital to all Californians.

California's climate is changing and we must better understand where our water comes from. CalTrout is working to promote source water areas and raise awareness about their importance to drinking water supplies, water for agriculture and downstream river health. Our mantra – know the source, protect the source, restore the source. California's water security depends on it.





First, the **LA Aqueduct** delivers water over 400 miles from the East side of the Sierra – the Mono Lake area and Owens River – to the greater Los Angeles area. Built in 1905, this was the first major water project built in California and is still today one of three primary sources of water for the greater Los Angeles area – the other two being the Colorado River and the State Water Project (see below).


Further north and from the west side of the Sierra, **Hetch Hetchy Reservoir** captures water from the Tuolumne River where it is piped 167 miles as the primary water supply for over 3 million people in San Francisco and the Peninsula.


In the northern Sierra, the **State Water Project** starts with Oroville dam, the tallest dam in the country, which captures water from the massive Feather River watershed. Water is distributed through a network of 21 dams and over 700 miles of pipes and canals delivering water to 23 million people in Southern California and the Bay Area. To reach Southern California, the water must be pumped 2,882 feet over the Tehachapi Mountains, the highest single water lift in the world. It's the largest public works water system in the world.


Finally, the **Central Valley Project** is a federally funded project primarily developed for agriculture but also important for municipal water supplies delivering water to over 1 million people. The centerpiece of the project is Shasta Reservoir built in 1945, capturing all the water coming from the springs around the greater Mt. Shasta area for storage and delivery downstream.

COMING SOON

**Know. Protect. Restore.**

# THE SOURCE

California's water security depends on it.

## Do you know where your w

What do the iconic trout waters of Mt. Shasta and the
They are a major SOURCE of California's water supply.
waters are productive and healthy, for people and fish


Watch for our SOURCE film to be released next month.

# ater comes from?

meadows of the High Sierra have in common? CalTrout is working to ensure these vital source n.

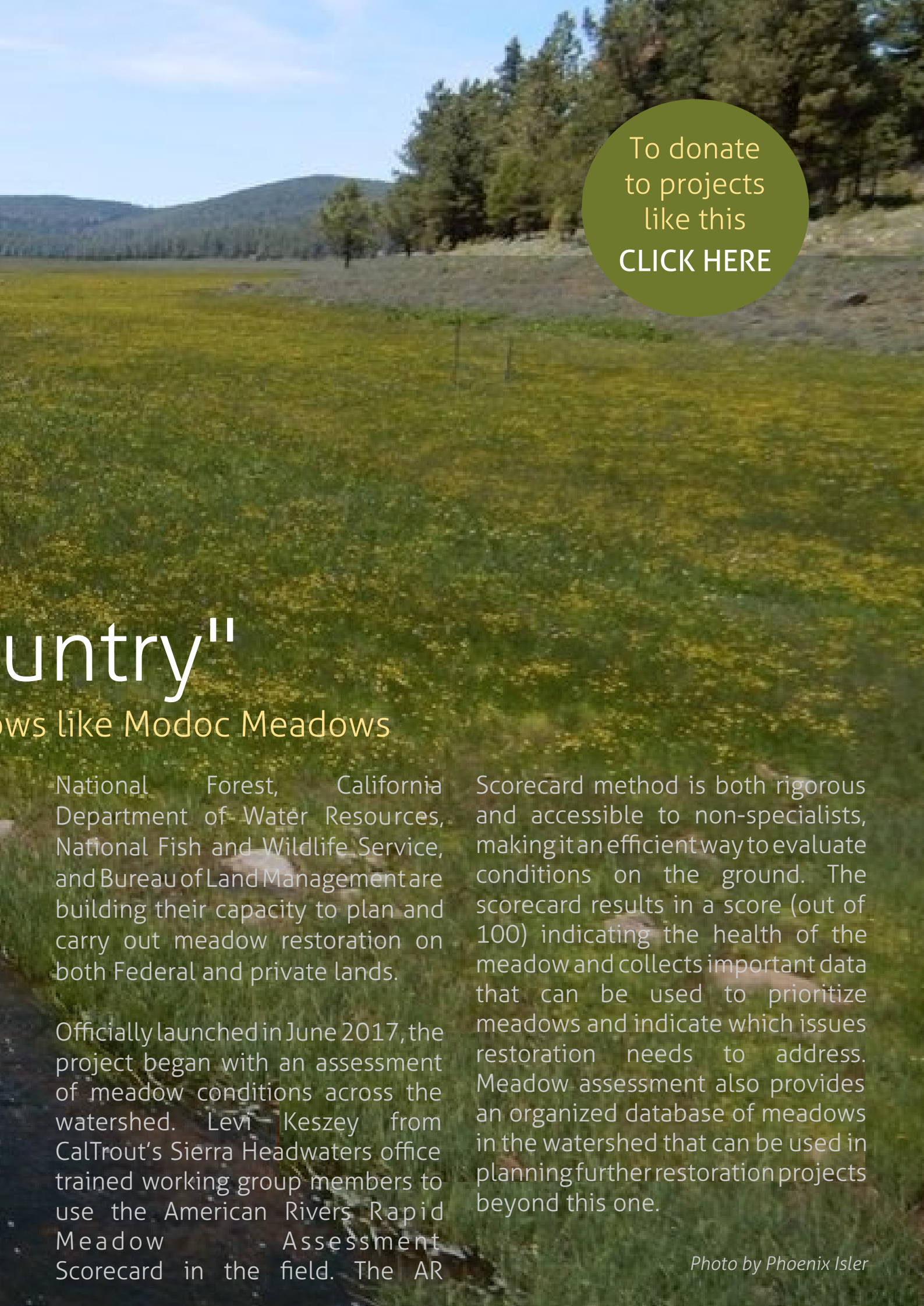
WRITTEN BY
Phoenix Isler
*Mt. Shasta Project Manager*
*Phoenix istarted working with CalTrout in 2016 as a hydrologist contractor and then became a staff member in July of 2017*

# Restoring "Cowboy Co

## Assessing conditions of important source water meado

Located in the northeast corner of California, Modoc County is one of the last places in the state that deserves the title "cowboy country." This high desert is home to sagebrush steppes, juniper and pine forests, and wide expanses of rangeland where cattle roam the lava-shaped landscape. The Pit River originates here, on the slopes of the Warner Mountains and surrounding volcanic hills, before flowing south to contribute source waters to Lake Shasta and the State Water Project. This is the site of CalTrout's first meadows project outside of the Sierra Nevada – the Modoc Plateau Meadows Assessment and Restoration Design Project.

The project applies the model developed by CalTrout in the Sierra Nevada which streamlines the meadow restoration cycle by first identifying, assessing, and prioritizing meadows for restoration, then completing restoration design and environmental compliance for the priority meadows. By project's end in early 2019, four meadows will be brought to "shovel ready" status. As part of the project's working group, agency staff from the Modoc



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# untry"

## ows like Modoc Meadows

National Forest, California Department of Water Resources, National Fish and Wildlife Service, and Bureau of Land Management are building their capacity to plan and carry out meadow restoration on both Federal and private lands.

Officially launched in June 2017, the project began with an assessment of meadow conditions across the watershed. Levi Keszey from CalTrout's Sierra Headwaters office trained working group members to use the American Rivers Rapid Meadow Assessment Scorecard in the field. The AR Scorecard method is both rigorous and accessible to non-specialists, making it an efficient way to evaluate conditions on the ground. The scorecard results in a score (out of 100) indicating the health of the meadow and collects important data that can be used to prioritize meadows and indicate which issues restoration needs to address. Meadow assessment also provides an organized database of meadows in the watershed that can be used in planning further restoration projects beyond this one.

*Photo by Phoenix Isler*

# Restoring over a century of degradation

"It's exciting to extend CalTrout's meadows work beyond the Sierra Nevada and be part of inter-regional cooperation between the Shasta-Klamath and Sierra Headwaters offices."

- Phoenix Isler

Meadows in this area have become degraded by more than a century of land use impacts including overgrazing, water diversion, and forestry practices. Healthy meadows provide important hydrologic functions by spreading and slowing flows during the wet season and storing groundwater that is slowly released as cool flows in late summer. An eroded stream in a degraded meadow drains winter rains and snowmelt quickly downstream as the channel is no longer connected to the floodplain. This can lead to a drop in the water table as the "sponge" of the meadow is dried out. Invasive species and upland conifers and shrubs can encroach on the meadow and take over.

Restoration goals include returning hydrologic function, and enhancing habitat for terrestrial and aquatic species including migratory birds and native fish (Rainbow Trout and the Modoc Sucker). Restoring meadows in the Upper Pit Watershed can improve groundwater recharge and late-season base flows and benefit water quality in the Pit River by moderating flood events and reducing sediment loads.

Over the summer, multi-stakeholder teams assessed a total of 35 meadows with an area totaling over 5,000 acres. Assessment scores ranged from 47 to 98, showing some healthy meadows and others in bad shape.

Nearly all the assessed meadows had evidence of grazing, although some meadows in the Modoc National Forest scored highly despite being grazed for some part of the year, demonstrating that when appropriately managed, grazing can take place in meadows without causing erosion and degradation.

The next step was prioritization, ranking meadows based on the scorecard results and other criteria including habitat diversity and complexity, importance to the Pit River, feasibility for successful restoration, and "bang for the buck." The process identified four priority meadows to be restored - two in the Modoc National Forest, one on private land, and one meadow split between Bureau of Land Management and California Department of Fish and Wildlife ownership.

AR Scorecard Training at Parsnip Springs Meadow in the South Warner Mountains. *Photo by Phoenix Isler*

# Modoc Meadows Project Target Meadows For Restoration

Assessed Meadows

- Patterson Meadow
- Willow Creek Van Thein
- Fitzhugh Cabin Meadow
- Parman Meadow
- Hunsinger Draw
- Higgens Flat Meadow

This map shows the meadows which have been identified through the assessment and prioritization process as the targeted meadows for restoration implementation.

# Priority meadows for restoration

**Fitzhugh Creek Meadow** lies partially on BLM land and partially in the CDFW Fitzhugh Creek Wildlife Area, and contains a stream with good fish habitat and moderate channel incision. This meadow could be restored using beaver dam analogues (BDAs), low-cost structures that mimic what beavers build to slow down flows and create pools in deeper parts of the channel. BDAs can be easily built by hand crews using natural materials, and the most exciting part is that if there are beaver present in the area, they are likely to move in to the newly created habitat and maintain it with their own constructions.

The 120-acre **Patterson Meadow** sits in the foothills of the South Warner Mountains in the Modoc National Forest and has multiple head cuts (newly eroding channels) threatening to open up in the middle of the meadow. It is not yet severely degraded but is at risk due to the head cuts, so is high-priority for restoration.

**Willow Creek Meadow** is located on private land in an area with high habitat diversity and complexity including healthy stands of willows and aspens. The channel has been seriously eroded, with bank heights of over 6 feet. The "pond and plug" technique is likely to be applied in this meadow, requiring a relocation of the main channel and replacing the eroded channel with a series of earth plugs and dug out ponds.

**Parman Meadow** in the Warner Mountains northeast of Alturas is a special site because it contains fens – an uncommon habitat type comprised of peat wetlands, home to rare moss and plant species. This meadow has been trampled by cattle, cutting channels in the delicate peat. It presents an opportunity to learn more about how to restore fens by trialing new techniques to determine what is most effective.

While this project focuses on only four meadows, it is part of a larger vision for increasing the pace and scale of meadows work in this region. The data gathered during assessment will be useful to other groups looking to pursue similar projects. Now that target meadows have been identified, work is proceeding on restoration design, and in 2018 we will go through the state or Federal environmental compliance processes and apply for funding for the implementation phase of the project.

Fitzhugh Creek Meadow. *Photo by Todd Sloat*

Channel incision in Turner Creek Meadow – an example of a degraded meadow. *Photo by Phoenix Isler*

In this column we highlight important scientific publications, by CalTrout staff and others, that expand upon our understanding of the management or science regarding trout, steelhead and salmon in California.

By DR. ROB LUSARDI
CalTrout/UC Davis Wild & Coldwater Fish Research Lead

# Spring-Fed Rivers and their importa

Not all streams are created equal, at least in their ability to produce salmonids. For example, the Shasta River, a spring-fed river, historically accounted for greater than half the lower Klamath Chinook Salmon run, despite contributing approximately one percent of mean annual flow to the Klamath River. While it's impossible to go back in time and understand all of the potential mechanisms contributing to such prolific production, current research in the Shasta River basin and elsewhere in the greater Mt. Shasta area has produced some intriguing results related to the value of spring-fed rivers and their importance for trout and salmon.

A recent paper by Jeffres et al. (in review) found that juvenile steelhead trout on the Shasta River exhibited growth rates six-fold greater (mass) than the same age class of steelhead on the Scott River, another tributary to the Lower Klamath River but one that is dominated by snowmelt runoff. Analysis suggested that

# ance for trout and salmon

steelhead in the spring-fed Shasta River emerged as fry from gravel, on average, 60 days earlier than those in the Scott River (a function of water temperature), which, in turn, provided a significant head start on growth. The analysis also showed that Shasta River juvenile steelhead exhibited daily growth rates that were approximately 14% greater than those in the Scott River. Daily growth rate differences were attributed to warmer water temperature and enhanced food resources associated with the Shasta. Growth and size of juvenile fish is important because research has shown that fish entering the ocean at larger sizes generally have a better chance for survival and eventual adult return. So, it appears that both stable environmental conditions (water temperature, but also flow) and improved food resources likely played an important role in producing large numbers of Chinook Salmon in the Shasta River, among other factors.

*Shasta River. Photo by Mike Weir*

# Resilient in a changing climate

Spring-fed rivers may also represent important coldwater refuges for coldwater fishes in the face of climate change. Lusardi et al. (2016) recently examined differences between spring-fed and runoff rivers in northern California. The authors studied Hat Creek, Rising River, Fall River (spring-fed rivers) and compared environmental conditions (production of stream invertebrates, water temperature, flow) to adjacent runoff rivers (Castle Creek, the McCloud River above spring sources, and the south fork Sacramento River) over a period of four seasons. Although the study did not examine how salmonids grow in these different systems (this is the subject of current research), they did find large differences in several of the habitat variables examined, with important implications for how trout (and salmon, historically) used these ecosystems. Specifically, spring-fed rivers supported stream invertebrate densities (i.e., fish food) that were 7 to 16 times greater than those associated with runoff rivers, indicating that food was plentiful for foraging fishes in spring-fed rivers. Spring-fed systems in this study also exhibited less water temperature and flow variability than runoff rivers. In short, spring-fed rivers were generally warmer during winter and cooler during summer, lacked high flow events during winter, but exhibited higher low flows during summer.

Current climate predictions indicate the onset of earlier snowmelt runoff, higher magnitude winter flood events, prolonged periods of low flow particularly during summer and fall, and strong declines in thermal habitat for coldwater fishes in California and throughout the greater western United States.

The results of Lusardi et al. (2016) and Jeffres et al. (in review), suggest that spring-fed rivers may be uniquely resilient to such changes in climate because they are less dependent (at least in the short-term) on snowmelt runoff and more dependent on springs. The dependency on springs means that these ecosystems are better able to moderate temperature and flow fluctuations. In addition, coldwater fishes would likely be able to metabolically compensate for slight increases in water temperature with the abundant food resources associated with spring-fed rivers.

Despite spring-fed rivers being somewhat rare in the larger network of stream types in California, they are incredibly important from an ecological perspective. They are productive ecosystems, are likely resilient to climate change, and, due to their inherent environmental differences compared with other stream types, are strong contributors to trout and salmon diversity. Improving trout and salmon diversity is key to enabling these emblematic fishes to adapt to a changing landscape in order to promote long-term species persistence.

*Dr. Robert Lusardi is the California Trout-UC Davis Wild and Coldwater Fish Scientist.*

Jeffres, C. A., Nichols, A. L., Lusardi, R. A., Deas, M. L., Mount, J. F., Moyle, P. B., and R. A. Dahlgren. *Geologic subsidies drive high productivity in a volcanic spring-fed stream.* Submitted to Frontiers in Ecology and the Environment.

Lusardi, R. A., M. T. Bogan, P. B. Moyle, and R. A. Dahlgren. 2016. *Environment shapes invertebrate assemblage structure differences between volcanic spring-fed and runoff rivers in northern California.* Freshwater Science 35:1010-1022.

*Fall River. Photo by Val Atkinson*

CalTrout is delighted to present these iF4 screenings:

Sacramento
Thursday, February 1
Tower Theater
7pm

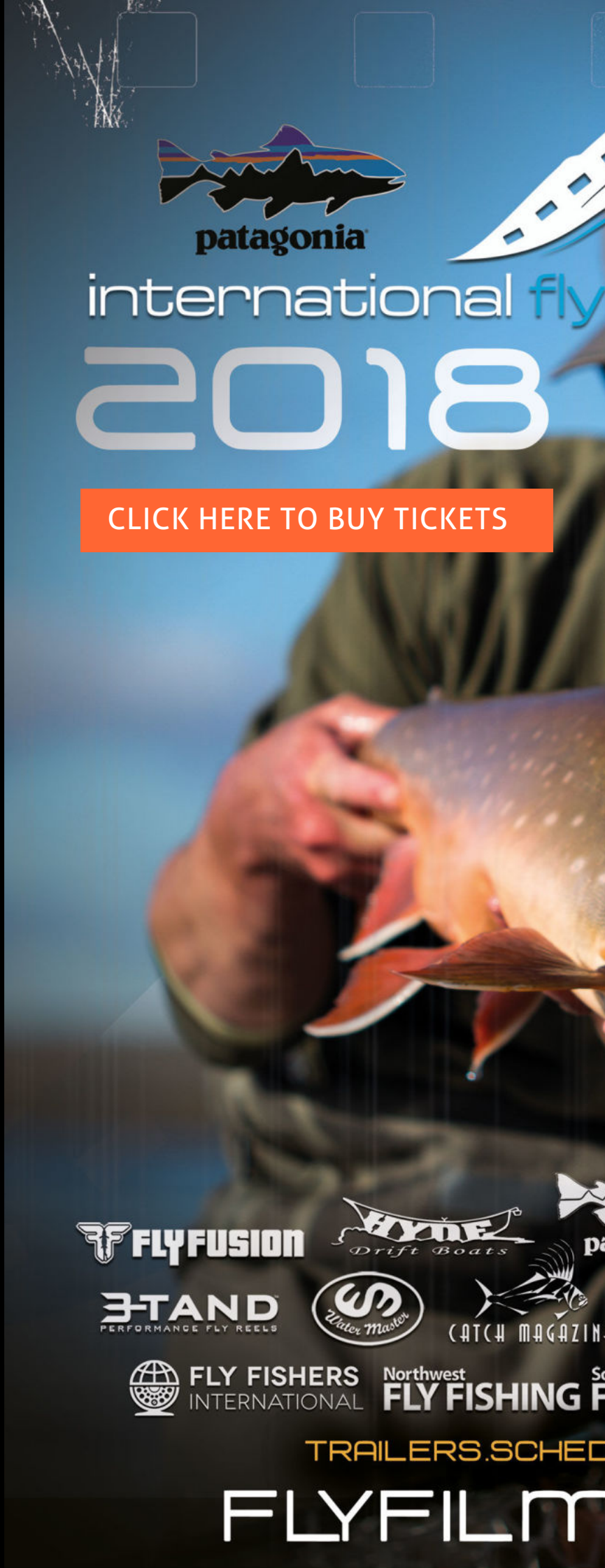
Marin - Larkspur
Wednesday, March 7
Lark Theater
7pm

East Bay - Orinda
Wednesday, March 14
Orinda Theater
7pm

Peninsula - Menlo Park
Thursday, March 15
Guild Theater
7pm

North Coast - Arcata
Thursday, March 22
Minor Theater
7pm

Southern CA dates and locations coming soon!

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This article is reprinted from the Spring 2017 issue.

# Scott River Water Trust

Preston Harris, Executive Director

Preston Harris lives in Scott Valley, California, with his wife and three daughters. He is a natural resource consultant specializing in flow improvement and in-stream enhancement.

The Scott River Water Trust is the first active water trust in California and is a community-supported organization that operates with the cooperation of local farmers, ranchers, agencies, and businesses. Their purpose is to improve stream flow in priority fish habitat reaches of the Scott River and its tributaries through voluntary water leases with agricultural producers.

To help improve the survival and growth of young Coho Salmon and steelhead, they focus on leasing water during the irrigation season in the late summer months, primarily in the cooler, west-side tributaries. In the fall, when surface diversion is used to water livestock, the Trust focuses on obtaining leases to increase mainstem Scott River flows, which assists with passage for spawning Chinook Salmon, Coho Salmon, and steelhead trout.

THE MUDDY WATERS of the Scott River enter the Klamath River. The Scott River has one of the last best runs of wild Coho Salmon, and is one of the primary producers of Coho in both California and Oregon. The Scott River is thus critical to the long-term survival of this threatened species

*Photo: Daniel Nylen*

PARTNER PROFILE

It's no secret that the Klamath River Watershed is a basin riddled with conflict. From fish population protection to irrigation water delivery, the decades-old battles that span two states, multiple indigenous territories and thousands of agricultural acres continue to simmer, and at times boil over. I don't think any natural resource professional working in the basin can say with a straight face that these cultural, economic and philosophical issues have an end in site. If you ask someone what the key to restoring the Klamath is, chances are you would hear about irrigation reduction, or increased fishing regulations, or dam removal. Every pro could be followed by a con, and the seemingly endless struggle to restore one of the West's most important watersheds slowly moves forward, like a slug of sediment creeping down the river. It's a difficult thing to witness and be involved in, but though the Klamath seems to be perpetually shrouded in conflict, there are a lot of positive efforts taking place throughout this diverse watershed that tend to get absorbed by the basin's more polarizing topics.

One such area is the Scott River Basin, which is a 58-mile long tributary that rests in between the Shasta River to the east and the Salmon River to the west. Like other watersheds in Siskiyou County, the Scott Basin's economy primarily consists of logging and agricultural production, with the former being largely suppressed. However, farming and ranching is another story. This industry is economically stable, if not thriving from time to time, but that doesn't mean this local industry is free of conflict. The Scott is a bubble within a bubble, meaning it's a microcosm of the greater Klamath River. If you're

*Photo: Preston Harris*

searching for an area where natural resource issues are as hot as a branding iron, well, you've come to the right place.

Surrounded by the Marble Mountains, Russian Mountains, and Trinity Alps to the west, and the Mineral Range and low lying hills to the east, the Scott is truly a majestic landscape. As the river travels south from it's southern headwaters, it runs through the 33,000-acre Scott River Valley, which is home to dozens of family-based alfalfa farms and cattle ranches. High mountain tributaries almost systematically feed the river as it flows through the countryside. Upon clearing the valley, the Scott enters an approximate 20-mile long canyon before flowing into the Klamath River.

So, where does the conflict lay? As mentioned there's plenty to choose from, but perhaps the most pressing issue facing the watershed revolves around Coho Salmon. This species is state and federally listed as threatened in California, and the Scott is home to the largest population of Coho Salmon in the Klamath Basin and state. Coho Salmon's life history strategy includes juvenile summer rearing before migrating to the ocean the following spring. Often times, as summer moves into fall, water availability diminishes which reduces rearing habitat for Coho. And therein lies much of the problem, limited water for fish versus the need for irrigation delivery—a widespread theme across the West.

Despite this, the Scott Basin has some good things going for it (like improving Coho Salmon runs and a viable farming economy) but what it could use is support from outside groups to help highlight and advance all the good work coming from the natural resource and farming communities.

Enter, California Trout.

One day in February of 2015, I received a call from CalTrout's Shasta/Klamath Regional Director, Andrew Braugh. He said that his organization was interested in working in the Scott and that he would like to schedule time to discuss the possibility of our respective organizations collaborating on projects. In all honesty, my first reaction was one of caution. CalTrout was on the other side of some politicized topics in the Klamath, and partnering with them could prompt backlash. However, instead o to hear him out. My limited u that they were not nefarious o they took; it was more t organizational mission, which others working and living in

Likewise, Andrew heard me o the sensitivities surrounding CalTrout's motto is Fish, Wate was to advance restoration a related issues for the betterm stream systems. After nu comfortable collaborating o sites on a quarter mile restor Fork Scott River. The process o

*Photo: Patrick Jarrett*

f telling Andrew no I decided
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the Scott River. He said that
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n a project, and we set our
ation project along the South
f conceptualizing the project

and obtaining funds went pretty smooth, so we tried something similar for an off-channel rearing pond at a different location. That went smooth, too, so we upped the stakes and dove into the more complicated task of working with water users to enhance in-stream flow in high priority rearing locations. Though we don't have a finished product, we're getting close to finalizing deals that will be a win-win for farmers and fish.

And we haven't stopped there.

*(continued on page 68)*

PROJECT UPDATE

WRITTEN BY

Alisan Amrhein

*CalTrout Communications Associate*

*Alisan has a masters in Environmental Science and Management from the Bren School, UCSB and has been an invaluable member of the team since she joined CalTrout in 2016 .*

# Scott River

## Restoring habitat for Coho Salmon on the South Fork

The Scott River, a key mid-Klamath River tributary, is the largest producer of wild Coho Salmon in California; more than half of our state's Coho population returned to the Scott River in recent years. CalTrout and partners recently completed an instream habitat restoration project on a degraded section of the South Fork Scott River; the project area was a historic tailings location where large-scale mining took place over 100 years ago. Historical, high-quality Coho Salmon habitat was greatly reduced or eliminated.

The specific stream reach we targeted for restoration had been identified as critically important spawning and rearing habitat for Southern Oregon/Northern California Coast (SONCC) Coho Salmon, a federally-listed threatened fish, in the 2014 SONCC Recovery Plan by NOAA Fisheries. The juvenile life stage is currently the limiting freshwater life stage for continued viability and success of the Scott River Coho Salmon population.

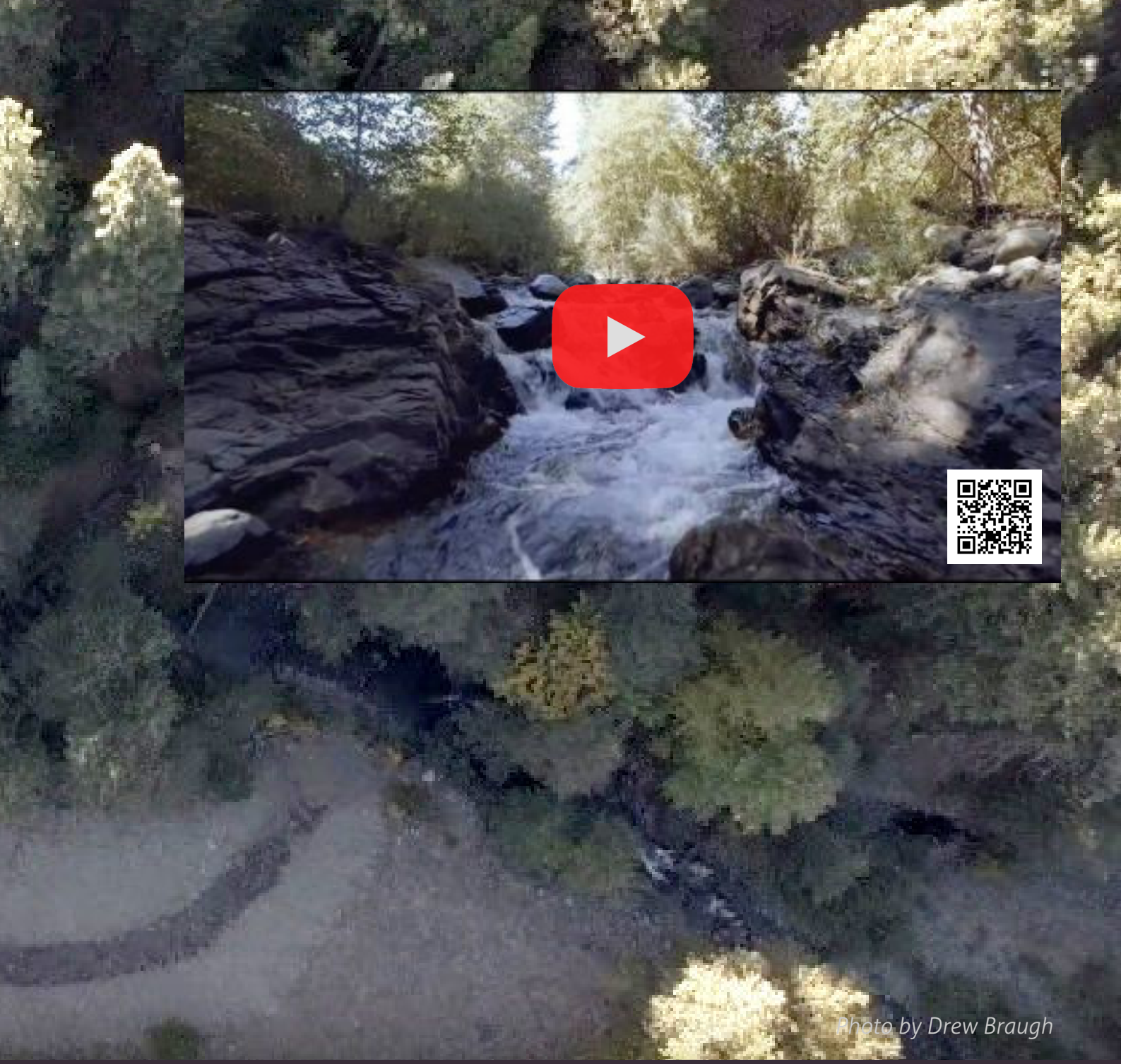

*Photo by Drew Braugh*

Restoration activities kicked off with excavating an inset floodplain to reconnect the river to off-stream habitat that juvenile salmon use for rearing. Intact floodplains also provide recharge to groundwater basins, supporting cooler base flows in the summer, and reduce ru-off. This results in an overall increase in stream flow during the dry season when it is needed. Coho Salmon are particularly adapted to the physical habitat elements that are generated from healthy channel and floodplain interactions.

Restoration also involved creating a more complex, diversified instream habitat with deep pools for adults to rest and for juveniles to rear. Trees were felled to install woody debris instream; the logs create sanctuary spaces for fish. Additionally, our team planted native vegetation, including trees such as willows, alders, and cottonwoods, to restore the natural riparian ecosystem.

# Rescue effort leads to restoration

A few years prior to restoration in 2014, we were involved in a rescue operation on the south fork of the Scott River which was the target site for relocating nearly 30,000 juvenile Coho Salmon that had become trapped. Coinciding with the largest run of wild Coho Salmon ever recorded, drought conditions – record low surface flows and lack of connectivity between streams – had forced more than 2,700 adult Coho Salmon to spawn in the mainstem Scott River, unable to reach their customary spawning grounds in the Scott River tributaries.

Concerns quickly grew that the unusually large number and concentration of Coho Salmon juveniles emerging from the redds would not be able to get to and rear in streams that would stay flowing through the spring and summer. These conditions posed a real risk that an entire brood year of Scott River Coho Salmon, and as much as fifty percent of the natural run of adult Coho Salmon produced in the California that year, might be lost. The Siskiyou Resource Conservation District (RCD) and the Scott River Water Trust (SRWT) voiced concerns of the juvenile stranding and initiated coordination for rescue with the California Department of Fish and Wildlife (CDFW). In summer of 2014, teams worked quickly to rescue and relocate juvenile salmonids to holding tanks at Iron Gate Hatchery, and were later returned to the Scott River and its tributaries in late October when river conditions had improved. CalTrout and UC Davis have been monitoring conditions in the creek since then.

The successful Scott River Instream Habitat Restoration Project was an important opportunity to build strong, strategic partnerships between landowners, agencies, and conservation organizations. We are eager to see how the site evolves back to its natural condition.

Thank you to our partners, Siskiyou Resource Conservation District, Scott River Water Trust, California Department of Fish and Wildlife, US Fish and Wildlife Service, and Western Rivers. Special thanks to our generous funders, California State Coastal Conservancy and California Department of Fish and Wildlife.

*Photos by Preston Scott*

DONOR PROFILE

# Bob and Donna Oliver

Richard May Legacy Circle Members

"These leg
We nee

**"Cleaning up Hat Creek just seemed like a fun thing to do with the kids."**

And so, in 1971, Bob and Donna packed up two of their three boys Mark, age 8, and John, 10, and drove north to Burney at the suggestion of Richard May. In reminiscing about that weekend in the early 70's: "They gave us a boat and told us to just go along the banks and pull out any squaw fish we saw or could feel in the banks. he trout had already been removed. he water was low so it was easy – although a slimy, muddy and slippery job that the kids eventually loved. ome of the squaw fish were so large they initially scared the kids. ut we all had a great time and we were dead tired after a full day of 'no-fly fishing'."

It was the first of many trips to Northern California. Bob and Donna eventually bought a cabin in McCloud and over the next several decades they, their boys and their friends fished Hat Creek, Fall River, Pit River and the Sac with the wild McCloud and its perfumed springtime azaleas being a favorite memory. During his college years, Mark was an intern at the Nature Conservancy under the mentorship of Tom Hesseldenz; although no longer in California the boys continue to fish and protect the waters they fish in.

Bob and Donna have been supporters ever since that first trip they learned about CalTrout. Bob notes: "These legacy waters are close to our heart. They are the source of water for all downstream uses, irrespective of whether you do or do not

Photos: Left: Mark Oliver, sitting in the boat, holding the first turtle he ever saw; Right: Bob and Donna O

gacy waters are close to our heart.
ed to keep these waters clean and
protect them at the source."

fish. e need to keep these waters clean and protect them at the source. Restoration and downstream clean up projects are pointless f the water is compromised at the source, not to mention the enormous use of energy and cost of restoring contaminated water to anything close to its original condition and quality. CalTrout does a magnificent job of keeping this larger picture in mind and deserves everyone's attention."

Click to
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in supporting
CalTrout

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CALIFORNIA TROUT
FISH · WATER · PEOPLE

# The Richard May Legacy Circle

Whether it's because of our restoration work on Hat Creek or other rivers in California, basing our work on solid science, or being the voice for fish in Sacramento, some of our supporters have included CalTrout in their wills.

Why? They appreciate our work ensuring wild fish will thrive in healthy waters now and in the future. Will you consider joining these supporters by making a legacy gift? All sizes are welcome. You'll ensure your legacy and the future of CalTrout!

We'll thank you by enrolling you in the Richard May Legacy Circle. We have special events for members and listing in publications. You can remain anonymous if you wish.

*To find out more, contact Julie Seelen, CFRE, Advancement Director* (415)392-8887 ext.102

# The Food is on the Floodplain

In the Central Valley of California, approximately 3360 km of state and federal levees, along with local flood protection projects, have cut off approximately 95% of historical floodplain wetlands from their river channels. We've effectively conquered the landscape. And the fish have suffered. Sacramento River winter-run Chinook Salmon, for one, are on the verge of extinction. Floodplains and other off-channel habitat are important refuge for salmon and provide food resources. The warm, shallow flood waters elevate phytoplankton growth; the algae turns the sunlight into sugars that nourish zooplankton, which in turn feed salmon fry. The once ample food the fish feasted on hundreds of years ago has now been taken away from them.

When rivers are connected to their floodplains, channels are able to migrate more naturally. The 'bug buffet' created on the floodplains would historically feed into the rivers, providing essential fish food. The food is still there today, but fish are unable to access it. The rivers have become pretty much a food desert.

The issue is that levees and other flood control infrastructure are vital for human safety. Our state capitol, Sacramento, is on a floodplain – the Yolo Bypass. Levees protect us. Equally, there's no question that agriculture is vitally important for humans. Fueled to end the water war between fish, farms, and flood control, CalTrout and UC Davis put science into action in 2011, partnering with Sacramento Valley rice farmers to grow fish on their inundated fields, deployed in floating cages. Current farm practices involve intentionally flooding rice fields in fall and early winter to aid in rice stubble decomposition. Over the course of six weeks assessing fish growth, we proved that rearing fish in managed floodplain fields results in rapid growth for juvenile Chinook Salmon; juveniles on average tripled in weight during the six-week experiment. This earned them the nickname "floodplain fatties."

NEW PROJECT

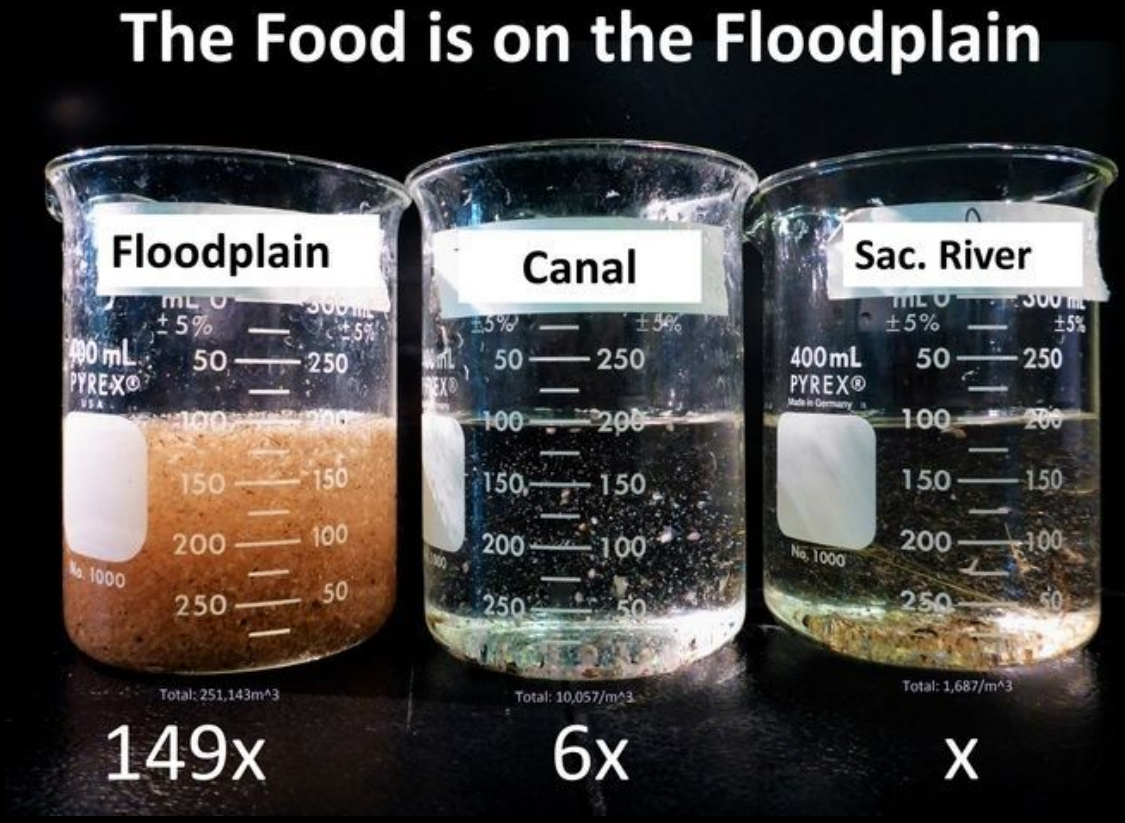
# Re-stocking the river food shelves

Under current practices, the decomposition water percolates into the fields and very little of the "fish food" produced on these managed agricultural floodplains drains back to the river. However, with altered management practices, there is potential to pass on these critically important floodplain resources to the river where they may boost the aquatic ecosystem's depleted food resources and help recover endangered fish populations.

In 2017, CalTrout launched the Fish Food on Floodplain Farm Fields (Fish Food) project with goals to better understand aquatic food web productivity on managed floodplains, and to work with farmers and water suppliers to pioneer new practices aimed at reintegrating floodplain food sources back into the greater Sacramento Valley ecosystem in the hopes that it will recover fish and wildlife populations. In simple terms, getting the food from the floodplain to the river.

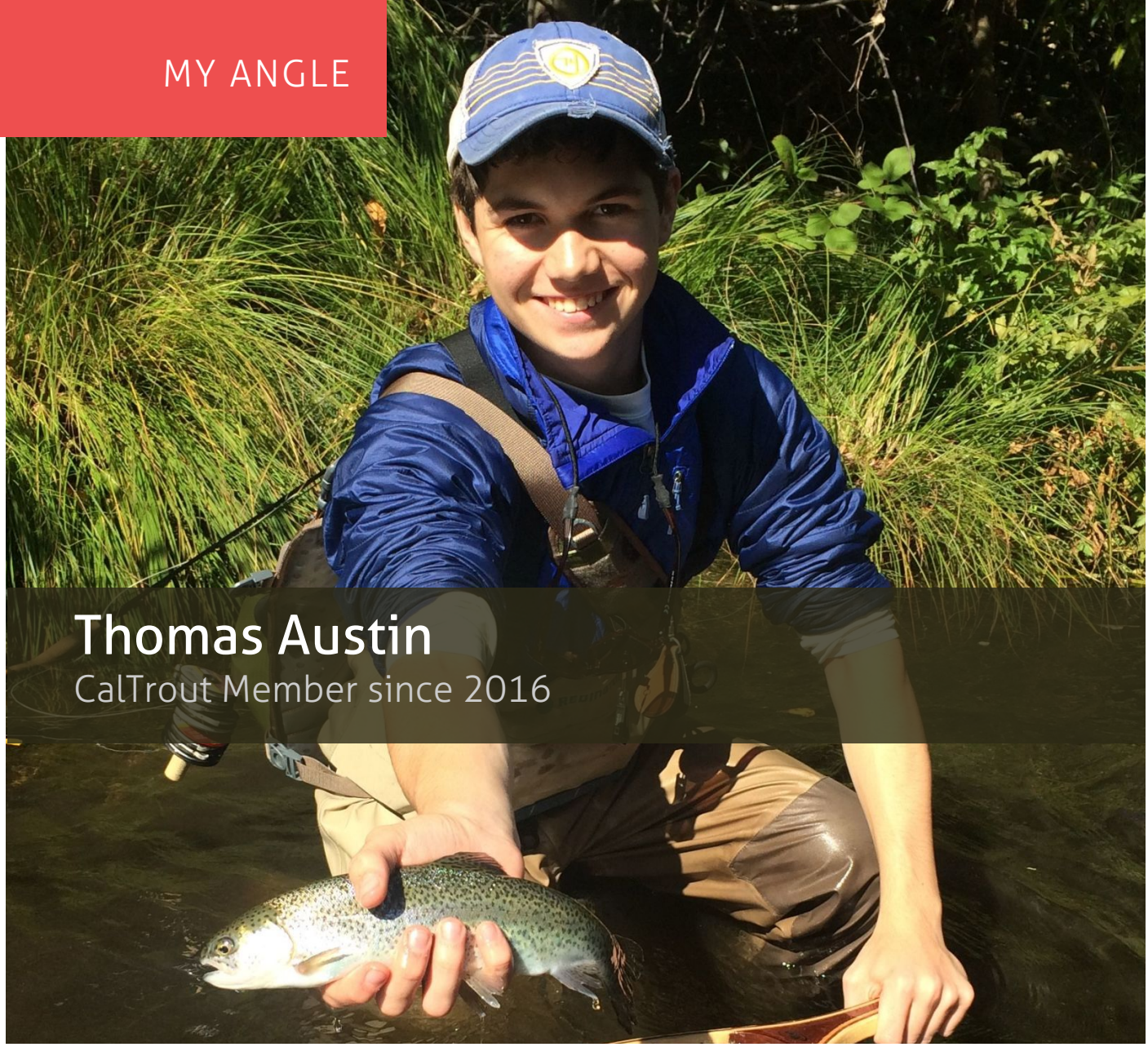
*"California can get far more 'pop per drop' from water used by putting it to work, creating multiple benefits for both fish and people on its way downstream."*

- Dr. Jacob Katz




We know the food is there, but it remains unclear if the "standing stock" of bugs can be exported to the river for fish to feed on. This year we will be researching the reintegration of floodplain food, studying how zooplankton responds to draining, re-flooding, and moving through drainage canal systems, and whether there are observable, localized effects from boosting the Sacramento River with the drain water rich in floodplain-derived food and nutrients.

Even during times of drought, California can get far more "pop per drop" from water used by putting it to work, creating multiple benefits for both fish and people on its way downstream. The innovative water management pioneered in our projects demonstrated that California can have its fish and its farm, and they can work together in harmony.



# Thomas Austin

CalTrout Member since 2016

I am 16 years old and I love fly fishing, but I have realized that I rarely encounter anyone my age on the water. I wonder why this is the case, and I have some thoughts on what we as anglers and conservationists can do to fix it.

Sometimes when fishing on the McCloud River, I try to imagine what it would have looked like before humans exploited it for power. We can all agree that the McCloud is a beautiful, pristine river and an outstanding fishery, but I think we can also agree that it would be that much more amazing if it still held steelhead, salmon, and bull trout.

Sometimes these thoughts make me angry at earlier generations for ruining what was once so perfect, but usually they make me excited, for I realize that it is up to my generation to make this daydream a reality. It is up to my generation to continue the work of the many good people in the generations before us who dedicated their life's work to protecting and restoring California's native anadromous

Yes, the political and environmental climate right now seems like it is working against us and yes, many of our native fish species are in severe danger of going extinct, but I believe the only productive attitude to have is a positive one. We still have all but one native species swimming in our beautiful state's rivers, streams, and the Pacific ocean. I have met amazing people working day in and day out to protect these fish and I think there are just too many good people out there for us to be stopped; but we need help.

In order to continue the outstanding work that CalTrout and other organizations do, it is critical that young people take an interest in protecting coldwater fisheries. It is important now more than ever that we have smart, passionate people fighting for the California's fish. The fly fishing community would be doing itself an enormous favor by introducing more young anglers to the sport, as these young anglers may be the ones that save our fish from extinction. California is lucky to have the diversity of fish species that it has, and it is up to us to keep those species alive and well. So here is my suggestion: Take a kid fishing.

Take your niece or nephew or grandson or granddaughter. If they decide it's not for them, well at least you got out on the water. If they love it, it just might change their life, and yours too.

# Spot Check

By MIKE WIER

## Cottonwood Creek

### Golden Trout heaven

Have you ever taken the time to just sit and watch fish be fish? It's a whole different dynamic when you're not trying to catch them. It often takes more stealth and patience to approach a piece of water with the intent of just observing fish. Most of the time you end up spooking them upon first approach. Trout in particular have adapted to be very wary of overhead predation from predators like birds and raccoons. As soon as they see something come into their peripheral vision that is out of ordinary, they dart to safety under a rock or log. Often, but not always, they will eventually come out of hiding and get back to a normal routine if you wait long enough. But you have to be totally still and not make any sudden movements or give away your position. Then add in the element of trying to film or photograph a trout in it's natural habitat and the equation gets even harder. You need crystal clear and semi shallow water to get good shots but fish are also the most easily spooked in those conditions.

Well that's how I spend most of my time on the water these days. I'd say I spend more time now trying to find and film fish then I do trying to catch them. And frankly I quite enjoy that. I get a lot of satisfaction getting a great photo or video of a fish. As much so as hooking and playing one.

Photo: Mike Wier

# Spot Check continued


Of all the places I visited last summer searching for native trout, Cottonwood Creek was one of my favorites. If you drive east out of the town of Lone Pine off Highway 395 toward Whitney Portal you will see a road to the left called Horseshoe Meadows Road. It cuts off Whitney Portal right in the middle of the Alabama hills. The drive out there alone is pretty spectacular. I'm a big fan of the Alabama hills so driving through that area is always cool. After a couple short miles you start up the grade. It's one of the fastest assents you can do from the valley floor to elevation in the Sierra. Within a few miles you're up over 10,000 feet! The views are incredible! It's hard not to stop along the way and check out the scenery. But don't let it distract you as you're driving. The hairpin curves are bad enough but there are also large trucks with horse trailers coming up and down every day of the summer.

Once you reach the crest of the steep switch backs you'll get your first look up into the Cottonwood Creek drainage. Cottonwood Creek drains out of the Golden Trout Wilderness and heads east. It's a vast and wind-swept landscape

nestled high in the Southern Sierra. Cottonwood forms out of the Cottonwood Lakes area and heads almost directly east. When you first see Cottonwood Creek from the road it's cutting a path down a steep canyon section and into a rapid decent down towards the valley floor. The further up the road you go, the more the gradient softens out and you get into some great cascading pools and even some riffles eventually ending up in a nice long horseshoe shaped meadow where the Horseshoe Meadows trail head starts at the end of the road. There's a section where the creek flows close to the road for a bit and that can be a great place to jump out and fish. It's easy to locate this section as the forest was burned a few a few years back and many of the larger trees are still blackened. There's also a sign at that point that gives the fishing regulations. It's all catch and release and single, barbless hooks to maintain a healthy fishery. Cottonwood Creek is one of the only places I know where you can drive right up, jump out and catch California Golden Trout. Most fish are going to be in the 6-8" range with maybe the occasional 10 or 12 incher.

# Spot Check continued


A little-known fact is that the streams flowing easterly off the crest of the southern Sierra Nevada contained no native trout. In 1876, 13 golden trout were taken by a man named Colonel Stevens and his crew from a small tributary to the South Fork Kern River (Mulkey Creek) and transported in a coffee pot over the Hockett trail to Cottonwood Creek, a distance of about four miles. Stevens' desire to have fish in Cottonwood Creek near his sawmill resulted in what may have been the first transplant of golden trout into waters other than their native habitat, the full significance of which he would never realize.

Regardless of their origins, these fish are still one of the most beautiful wild animals in our region and have earned the title of California State fish. They are truly something to behold in nature and it's a treat to get a close look at one. On this particular trip I decided to try something a little different. I didn't get my rod out of the van once. Instead I spent two days capturing underwater images of fish. Using a few different GoPro's and anchoring systems I rotated around cameras underwater set on photo ti mode. Over the course of two days I s 30,000 underwater images and a few re videos. Using time-lapse, I was able to fi for long durations and turn those clips i seconds of footage. It's a unique persp see how the fish feed and interact. Mo time I'd set the cameras then walk awa fish would go back to their normal hab only get the real story much later aft through the photos and stitching t together. I hope you enjoy this shor California Golden Trout in the wild.

Cheers,

*Michael E. Wier*

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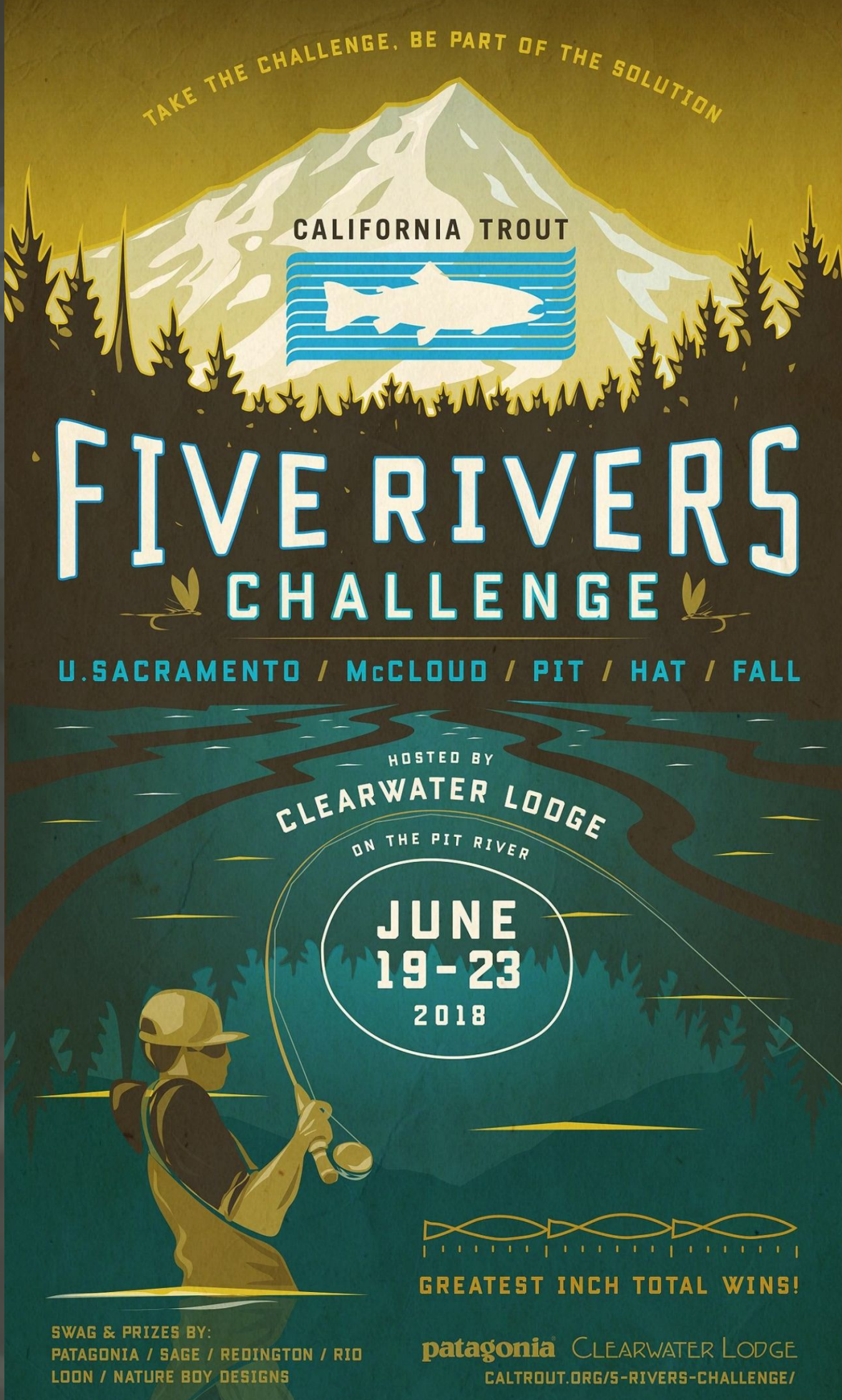

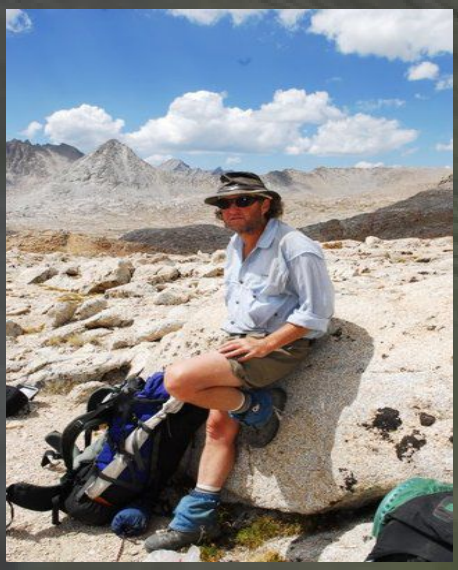

# Craig's Corner

by Craig Ballenger, CalTrout Ambassador

## The iconic tale of the holy Trinity River and the three threats th

During July of 2017, a Bill (HR23), authored by California Congressman David Valadao, passed 230-190 in the House of Representatives. Among other potentially dangerous results, the Bill specifically targeted the beleaguered Trinity. The Bill's aim was to eliminate fish disease preventative flows and redirect more river to water contractors and irrigation districts in California's Central Valley.

According to Congressman Jared Huffman, the Bill underlines "...a newer development resulting from the Department of Interior's 2015 ruling on the recognition of Humboldt County's contract rights to 50,000 acre feet of Trinity water."

The Center for Investigative Reporting found that Deputy Director of the Department of Interior, David Bernhardt, was frequently consulted while the bill was being drafted by Valadao. According to the Center, Bernhardt, a former Westlands Water District lobbyist, was involved for "months after he had told the US Senate he had cut ties with the District." Not a great sign for transparency of interest.

While the Bill ultimately died in the Senate, the threat remains. In fact, earlier versions of H.R. 23 have been championed by Valadao over the past few legislative sessions. At a future date, it could be "...resurrected as a rider on an Appropriations Bill," observed salmon and water policy analyst Tom Stokely.


at loom beyond the horizon of its canyon walls.

Second, and more recently, The Sites Project Authority, composed of State and Federal water contractors, alongside State irrigation districts, has proposed for the Trinity, "similar long-term average flows," except, "...during normal and below average years." It concludes that during these times, "flows could be reduced 31.2 and 33.6 percent during February and March, respectively."

Just when would Trinity water not fall into one of these categories?

In a subsequent piece of curious logic, the proponents claim in their media campaign that such flows would aid troubled Sacramento River salmon populations by storing water for releases into the Bay Delta.

Lastly, the Department of Interior has 'unilaterally' deactivated the Trinity Adaptive Management Working Group, which was created in 2000 and charged with the mission of restoring the river's fisheries. Essentially this disallows stakeholders a right to be heard. (For more on this development see Caltrout's Trout Clout update.)

As Caltrout co-founder Richard May has continually reminded me, vigilance is as much a component of Caltrout's mission as activism.

JOHN DURFEE, "*Lower falls of the Upper McCloud River*

REFLECTIONS

bers and Followers

GAYLE SOSKOLNE, *"Before the storm - Upper Owens Ri*

nbers and Followers

*ver"*

DAN RHODES, *"Hat Creek summer"*

SIMON BELL, *"Mammoth Lakes - Enticing"*

nbers and Followers

# CALTROUT VIDEO VAULT


## DIYAK

CalTrout's Mike Wier and a couple buddies venture out on a 100 mile wilderness float in a remote corner of Alaska. It's pure Do It Yourself Alaska.


## CALTROUT 2017

Take a tour through our six regions across the state for an overview of projects to restore our native fish and their habitats for a better California.

## A RIVER'S LAST CHANCE

By Pacific Rivers Council and North Fork Studios, this film explores the legacy of California's Eel River and searches for an economic and ecologic balance for its future.

## FLY FISHING MCCLOUD RIVER PART I - FALL

The Lost Coast Outfitters Crew followed around a few different anglers on the McCloud this Fall. Their experience ranging from beginner to expert, but enhanced by the sheer beauty of the McCloud River in the Fall..

# Who We Are

## IN THE SPOTLIGHT

### JANET HATFIELD

*Sierra Headwaters Project Manager*

Janet serves as the Sierra Headwaters Project Manager where she is involved on several meadow restoration and upper watershed protection projects to improve the functionality and health of Sierra watersheds. When not working feverishly to restore and preserve her beloved Sierra backyard, you can find her paddling remote rivers throughout the West or in her garden with her chickens.

*Photos: Mike Wier*

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Scott River Water Trust *con't from page 33*

For the past year we have been collaborating with a working group that consists of the area's most qualified individuals to bring habitat restoration and enhancement efforts to nearly three contiguous miles of the mainstem Scott River. It's a project that has enormous fisheries potential, and is a great opportunity for restorationists working in the Scott Basin to take our efforts and partnerships to the next level. It's also something that would not be possible without the cooperative effort started by Andrew and myself.

CalTrout has displayed fairness and honesty and the opportunities originating from our willingness to work together will only benefit the watershed. If people sit down and talk about their positions and why they take the stances they do, chances are some common ground will be found. I know that sounds rudimentary but communication doesn't always happen. Andrew and I took the time to listen and be open-minded, and I think fish, water and people in the Scott will be better for it.

Click here to read about the South Fork Scott Restoration Project.



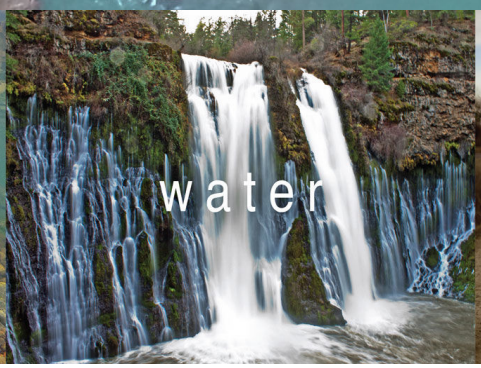
CALIFORNIA TROUT

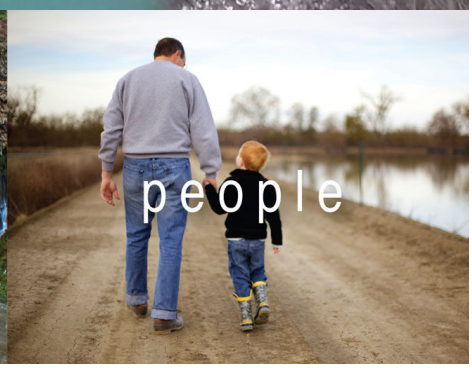
FISH · WATER · PEOPLE

Join CalTrout today!

# Your Support

Being a CalTrout member brings you into a community of Californians who believe that clean, cold water and wild rivers benefit fish *and* people. Our work relies on the support of our members and donors. Please renew your membership or donate today.

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*The Current*

Please send us your emails, photos
and comments to current@caltrout.org
We want to hear from you!

Lower Owens Evening. Photo: Bo Adams