Collaborative Research to Balance Salmonid and Human Water Use in Intermittent Streams:

A Case Study from Salmon Creek, Sonoma County

Cleo Woelfle-Erskine, Ph.D.
California chapter meeting – Society for Freshwater Science UC Davis, 10/21/15
twitter: @technodowser

Why bring together science and local knowledge around water?

Understanding what residents are already measuring gives you insight into what matters to them → fish, springs, wells, rain

Looking at people's data and water apparatus reveals what they are doing to conserve water & cope with scarcity.

Joint research projects and analyses can create more robust results.

When watershed science encounters indigenous or local knowledge…

Scientists may use data collected by nonscientists to improve models. [Crain et al 2014, Turner and Richter 2011]

Non-scientists who share data may develop shared concepts of hydro-ecological processes. [Ostrom 1990, Sayre 2005, Woelfle-Erskine and Sarna in prep.]

Scientific and indigenous or local knowledges may harmonize. [Aldern and Goode 2014, Strengers and Maller 2012, Weir 2009, Nadasdy 2003]

Scientists may dismiss indigenous or local knowledge as unreliable.

Local knowledge holders withhold data because of concern about regulation.

"People are going to be less frank if they think there's any way the county or anyone else is going to monitor them.” — Salmon Creek resident

Scaling Down: Researching local water relations*

Many coastal watersheds lack Big Water [Sofoulis 2005]

Water sources are local and known:

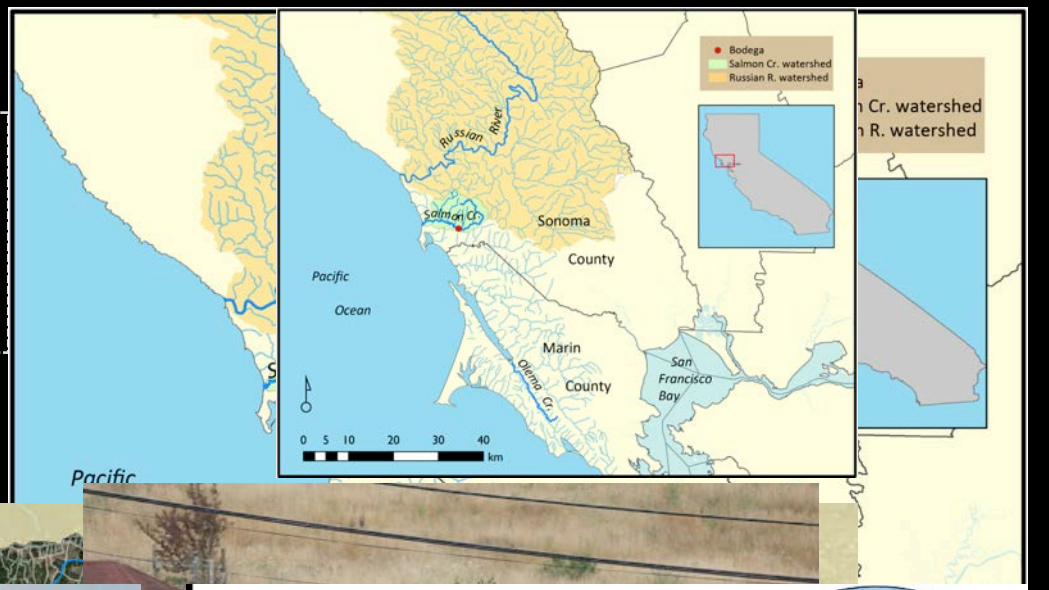
- municipal water with high tariffs, breakdowns
- own well / spring, may dry up

Salmon went extinct locally; reintroduced in 2008, future prospects depend on local action to restore flow & habitat

https://cdfgnews.wordpress.com/2012

[Woelfle-Erskine, C. 2015 ”Rain tanks, springs, and broken pipes as emerging commons along Salmon Creek, CA, USA. ACME: An E-journal of Critical Geographies. 14 (3)]

Salmon Creek
Sonoma County, CA



BODEGA LAND TRUST
2013 Walks and Talks Series

Join us for a very special walk this month during B50 event in Bodega.

The *REAL* Birds of Bodega


PHOTO CREDIT: Jackie Sone

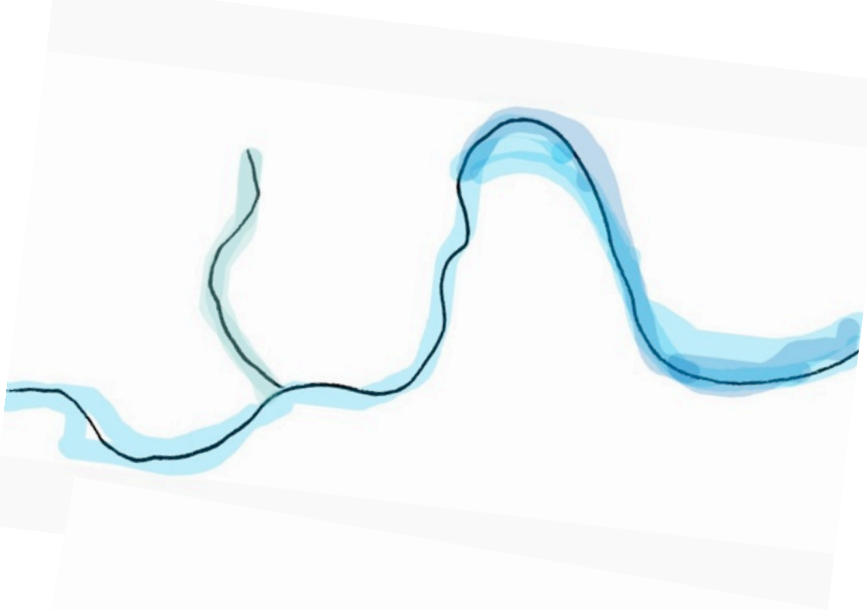
Monday, Sept. 2nd
8 -9 AM

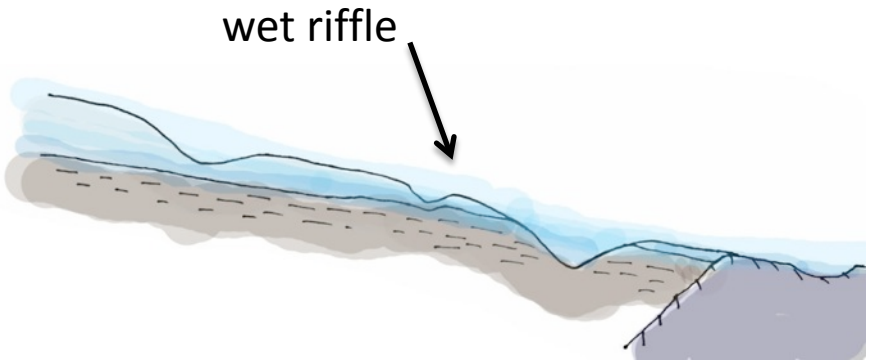
Enjoy an early morning walk down Salmon Creek Road to see the birds that truly call this beautiful watershed home.

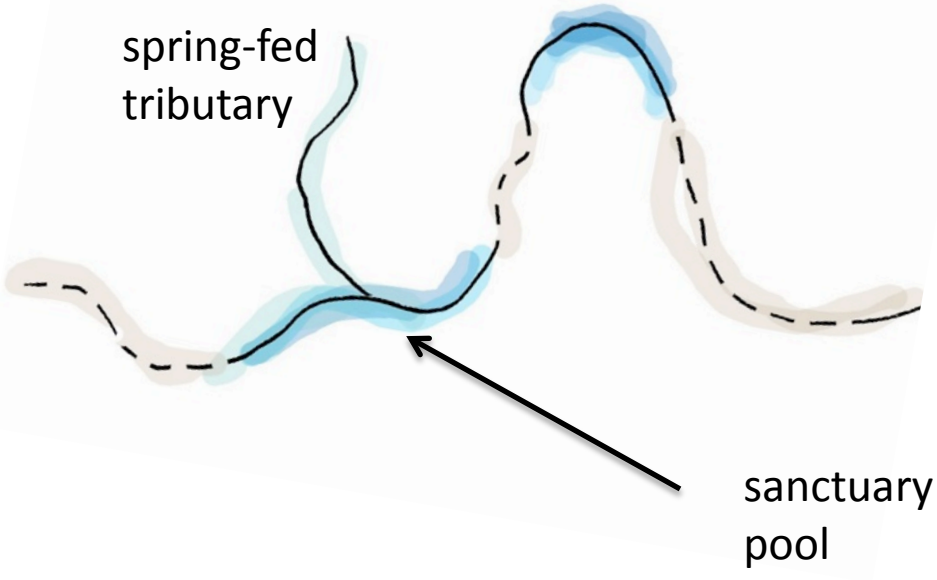
In settled landscapes, human water use is intensifying stream intermittency

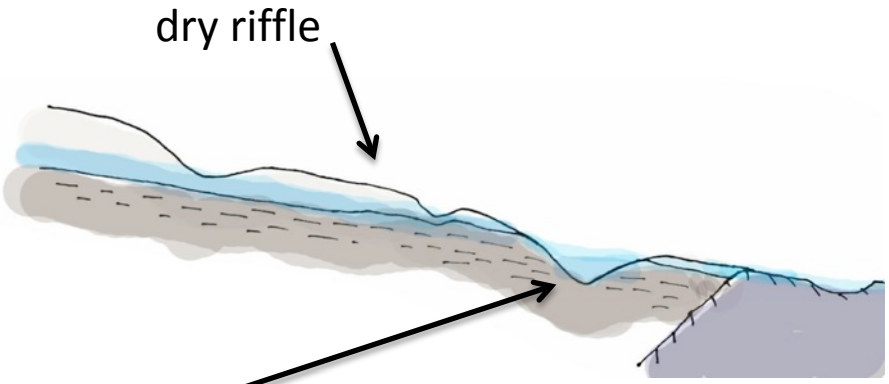
[Deitch et al. 2010]

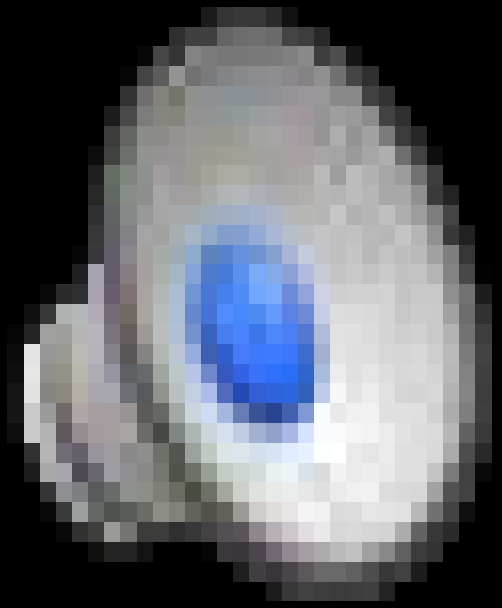
Intermittent streams: geomorphic context



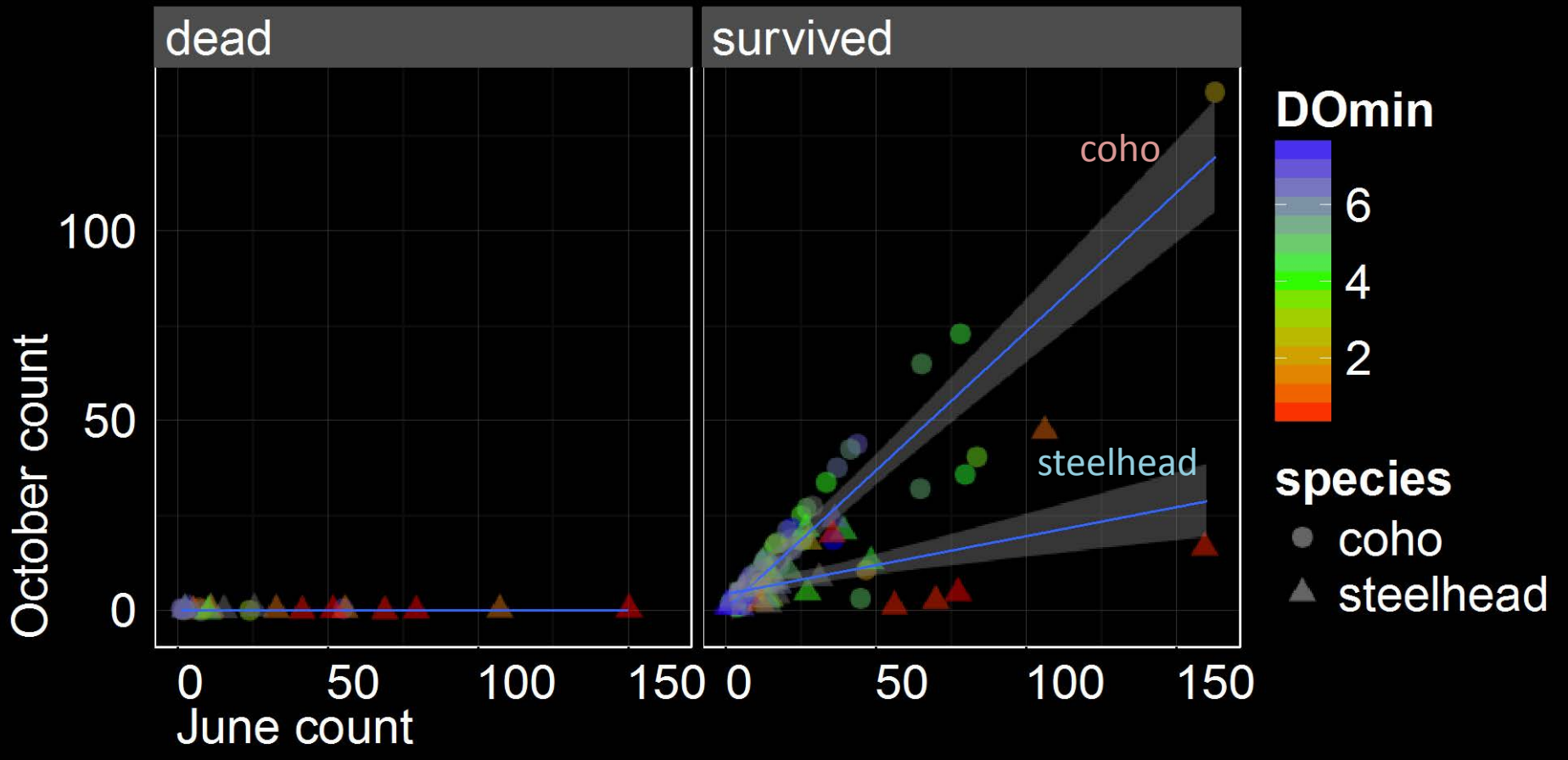








Academic ecology study designed collaboratively



Results: Flow mediates factors that drive salmonid over-summer survival

Salmon survive where:

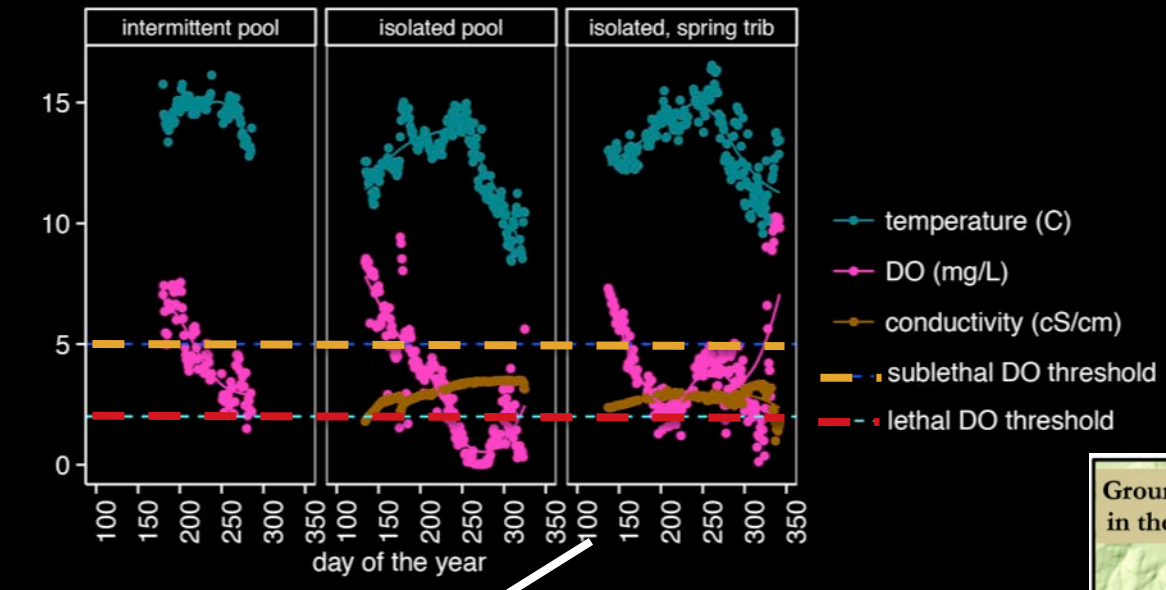
Dissolved oxygen > 2 ppm,

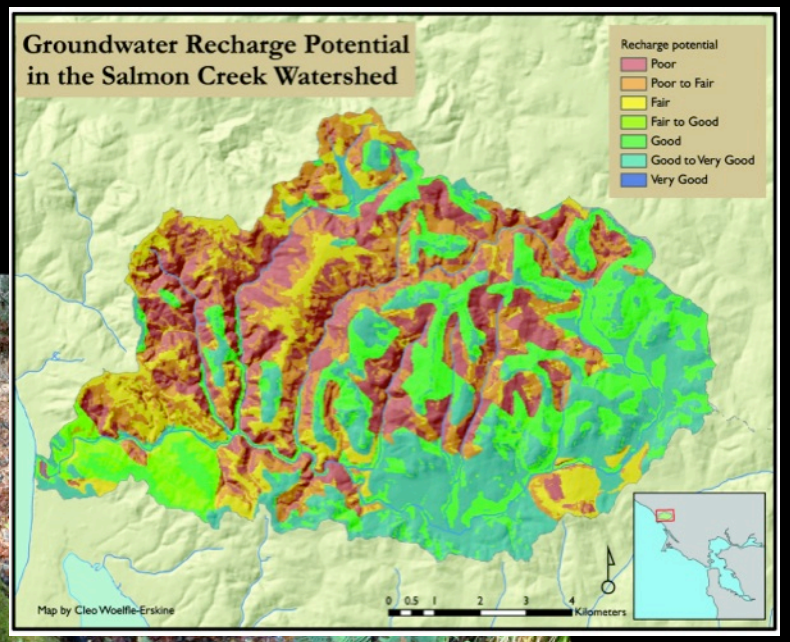
Water depth > 0.4 m,

Volume > 5 m^3

[Woelfle-Erskine, Larsen, Carlson, in review. “Abiotic habitat thresholds for salmonid over-summer survival in intermittent streams,” *Ecological Applications*]

Can rainwater harvesting or aquifer recharge decrease summer intermittency?

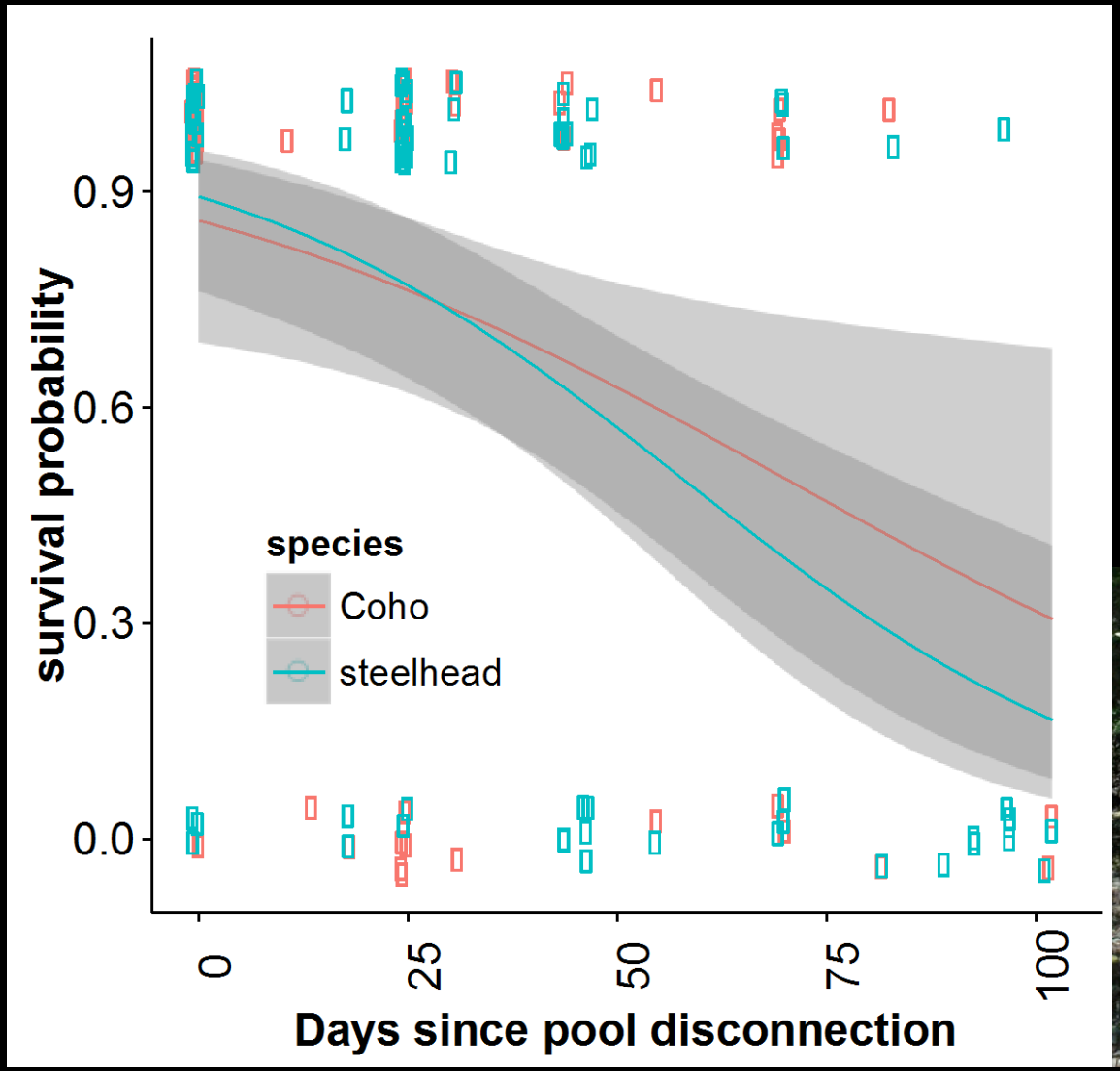




[Woelfle-Erskine, Larsen in prep.]

Collaborative field methods

1. Wet-dry surveys: diffuse sensing, citizen science



Fragmentation state

days with no flow over riffles.

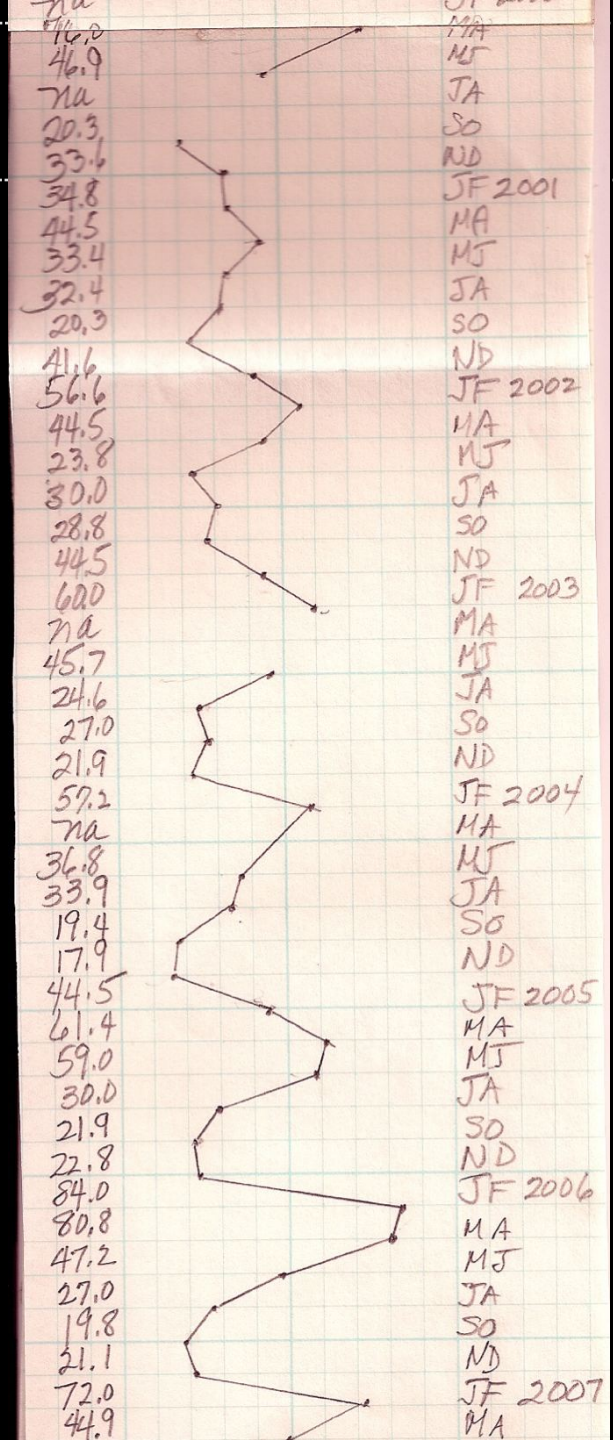
Wet-dry mapping:
→ citizen science
→ measure fragmentation state across years

2. Tapping local knowledge of aquifers

Dear Cleo,
You were right. The well went back down, but not all the way back down to 15.5' (back to 16.125). I am used to visualizing this cistern well like a sink. When the rain comes rapidly, the well fills up.

When the rain slows down, it drains into the underground ground level. I think I've said that the baseline used to be about 28'. Now the baseline is about 20'. So it'll take a lot more rain to get the underground level up to 20' or higher. Keep your fingers crossed.

Be well, Diane



3: Tapping local knowledge of salmonid fry survival

Phone message, 4/20/15

Reporting 2000-4000 1” fry

20-30% will be stranded in the upper quarter of the study area.

Looked at the parr marks—a lot of them coho, based on the spacing

Temperature 52 at the top, 56 at the bottom.

Fry were mostly in the riffles, very few in pools

Also saw 8-10 6” salmonids, maybe downstream smolts

Give me a buzz and maybe we’ll go down and take a closer look at them when they get bigger.

New perspectives: springs as multispecies commons

For people in Salmon Creek, their water supply involves

- pipes
- rain
- fog
- tanks
- streams
- aquifers
- trees
- salmon
- raccoons [etc]. ?

What if everyone in California though about water use as entangling us with aquatic ecosystems, rather than just supplying us with water?

[Woelfle-Erskine, Cleo. 2014. “Thinking with Salmon about Rain Tanks: Commons as Intra-Actions.” Local Environment.]

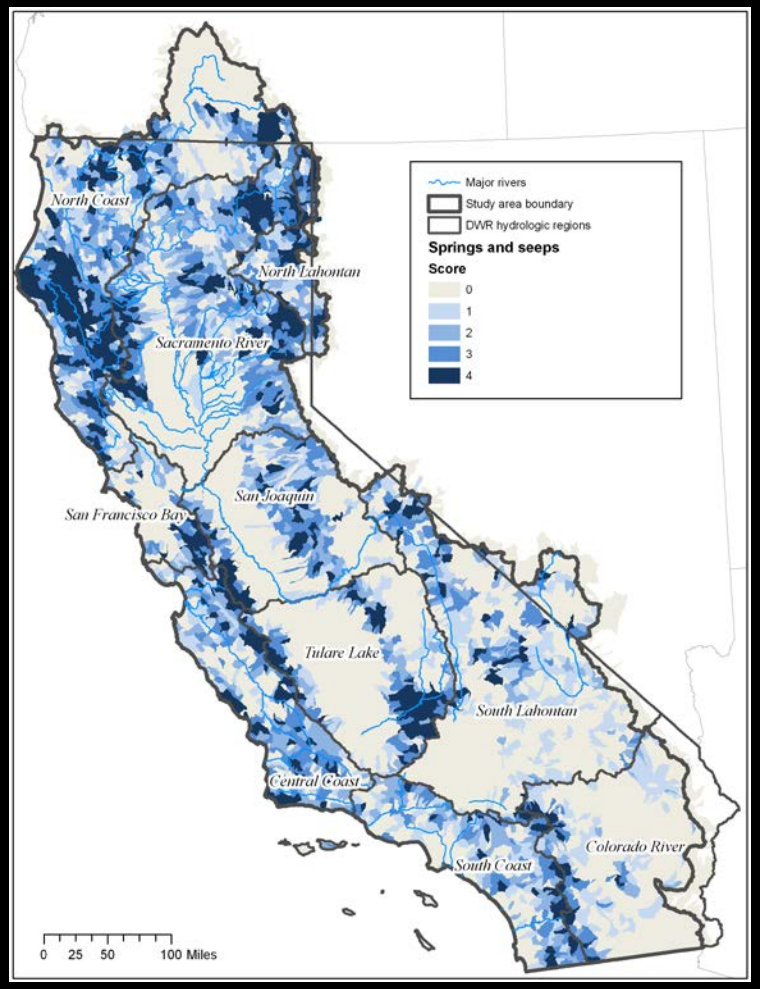
binaries: human / nature, fish / farms

Multispecies entanglements as a new way to balance: interdependence, not co-equal goals

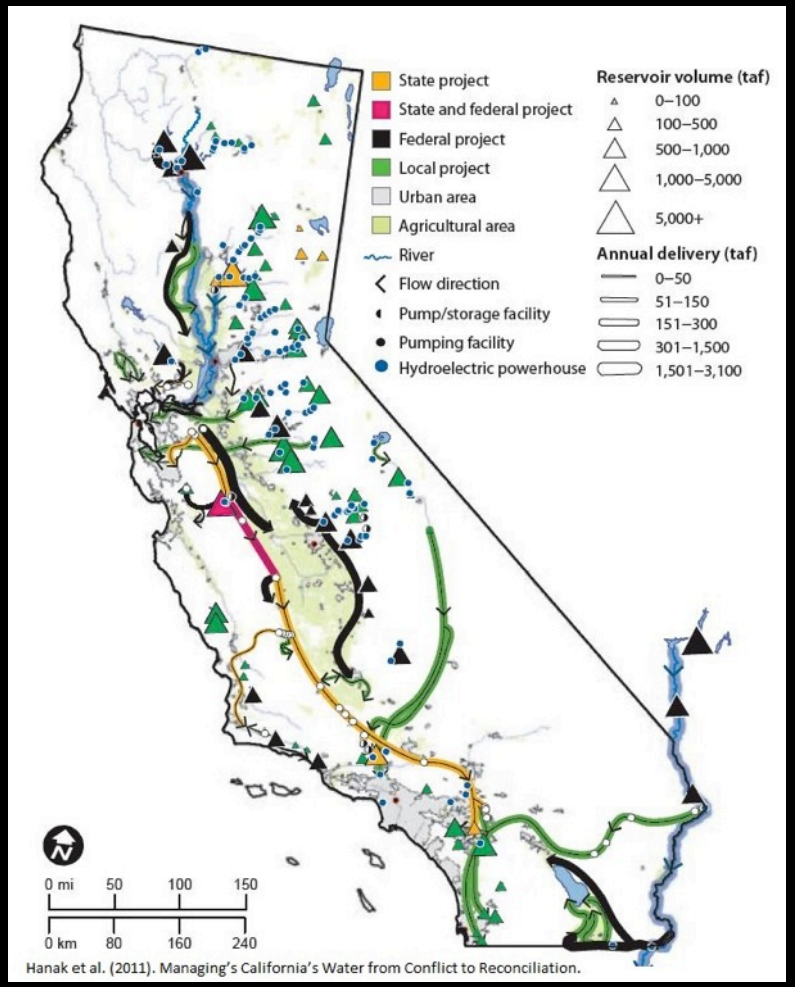
Coequal goals: Top-down water development begins from a binary, where water is extracts water from "natural water systems" for human use, setting up potential for conflict between human and ecosystem uses.

Interdependence: People see the water they use daily as entangled with other species and the watershed, and only able to arrive, be used, and recirculate as a result of intra-actions between these elements. [Barad 2007]

Hyporheic imaginaries are infiltrating Dam Nation



[Howard and Merrifield 2010]



[Hanak et al. 2011]

Scaling up vs. relation across scales [Sayre 2009]

LEAVE IT TO BEAVERS

Once considered a pesky rodent, the animals are busy saving California's salmon populations.

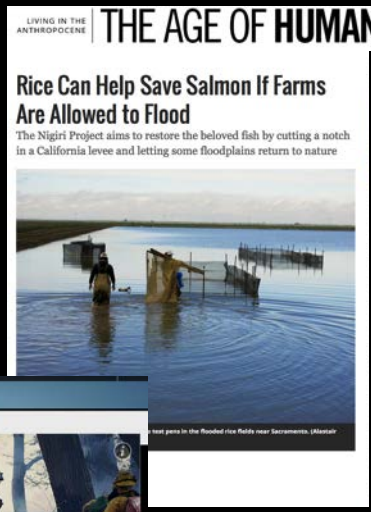
BY MARIA FINN | @MARIAFINN | 6 months ago

PHOTO: MÁRCIO CABRAL DE MOURA

Creeks that cool down as summer heats up

Posted on June 30, 2015 by UC Davis Center for Watershed Sciences

Big Springs Creek near Mount Shasta (background) hosts an abundance of aquatic plants that lower water temperatures when salmon and trout need it most, during the dogs days of summer. *Photo by Carson Jeffres/UC Davis*



LIVING IN THE ANTHROPOCENE | THE AGE OF HUMANS

Rice Can Help Save Salmon If Farms Are Allowed to Flood

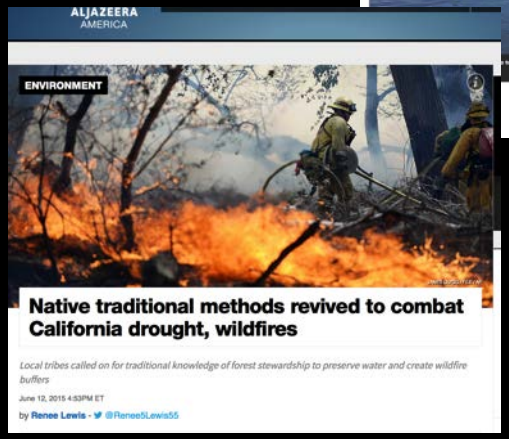
The Nigiri Project aims to restore the beloved fish by cutting a notch in a California levee and letting some floodplains return to nature

Home | Lifestyle | Home & Garden | Gardening

Rain gardens a good way to adjust to drought

The Pacific Grove Community Center recently installed this rain garden. When water enters the landscape from a diverted downspout, it is slowed down and filtered by movement through the soils and plant roots. Mainly native plants are used and all plants are drought-tolerant. (Courtesy of Oona Johnsen Landscape Architecture)

By Tom Karwin, *Monterey Herald*



ALJAZEERA AMERICA

ENVIRONMENT

Native traditional methods revived to combat California drought, wildfires

Local tribes called on for traditional knowledge of forest stewardship to preserve water and create wildfire buffers

June 12, 2015 4:53PM ET

by Renee Lewis - @ReneeSLewis55

Multispecies communities: Salmon are good to think with relationally and across scales

[Lummi Nation]

Questions for panelists

What collaborative research do you currently undertake? With whom?

What are some of the benefits of collaboration for science and for policy?

Do you want to collaborate more than you do?

What are challenges or barriers to collaboration beyond the agency context (with tribes, landowners, or citizen groups)?

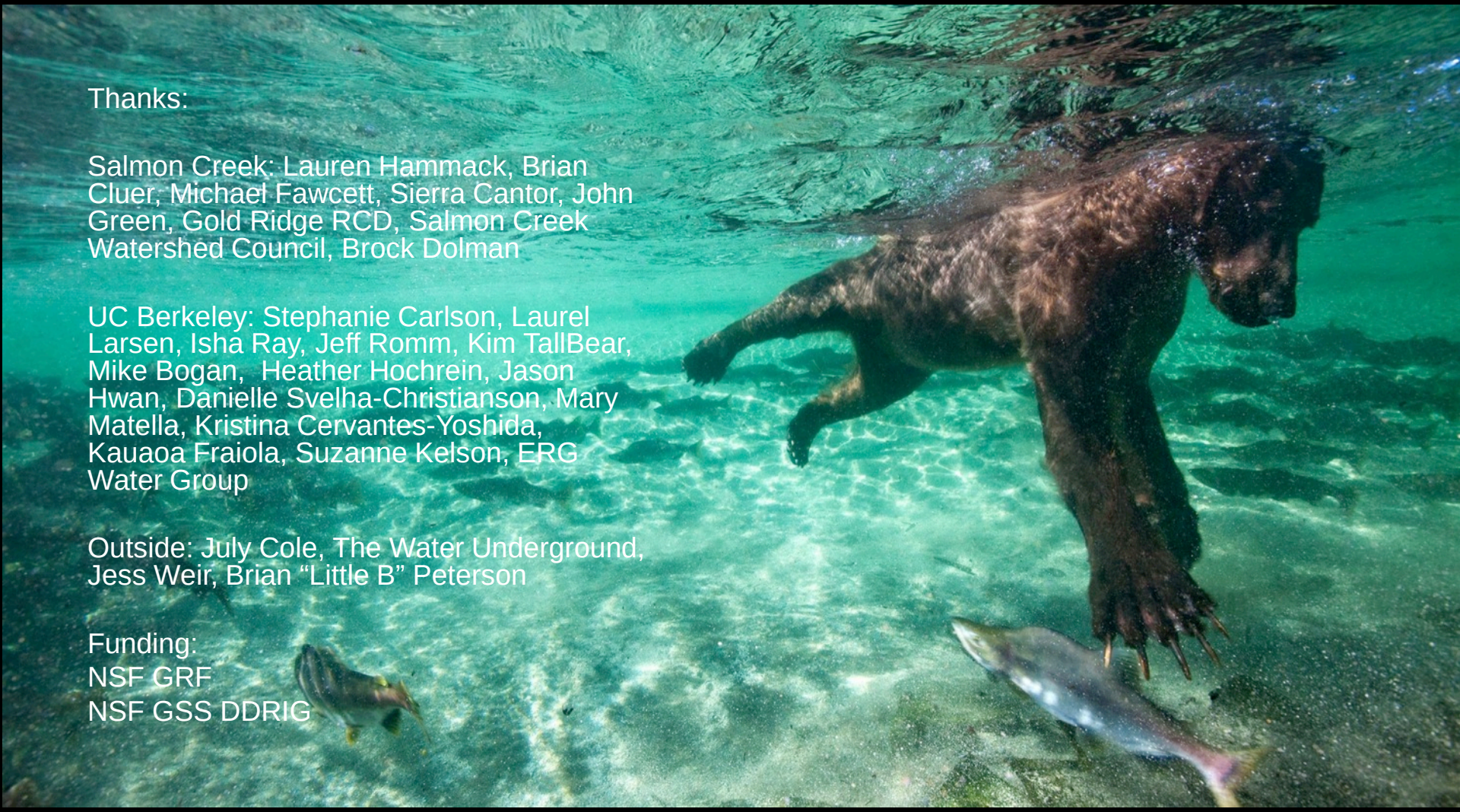
What tools does your agency use regulate, monitor, or otherwise govern water and salmon?

What state or federal or county regulations do you think would help your mission to conserve fish?

To provide water for all users?

To facilitate collaborative science?

Questions?



Thanks:

Salmon Creek: Lauren Hammack, Brian Cluer, Michael Fawcett, Sierra Cantor, John Green, Gold Ridge RCD, Salmon Creek Watershed Council, Brock Dolman

UC Berkeley: Stephanie Carlson, Laurel Larsen, Isha Ray, Jeff Romm, Kim TallBear, Mike Bogan, Heather Hochrein, Jason Hwan, Danielle Svelha-Christianson, Mary Matella, Kristina Cervantes-Yoshida, Kauaoa Fraiola, Suzanne Kelson, ERG Water Group

Outside: July Cole, The Water Underground, Jess Weir, Brian “Little B” Peterson

Funding:
NSF GRF
NSF GSS DDRIG

The then and there of California streams, a utopian gesture toward José Muñ


MOULTRIE
1DAY
TAN10A -
JUL.02,14 12:00 AM