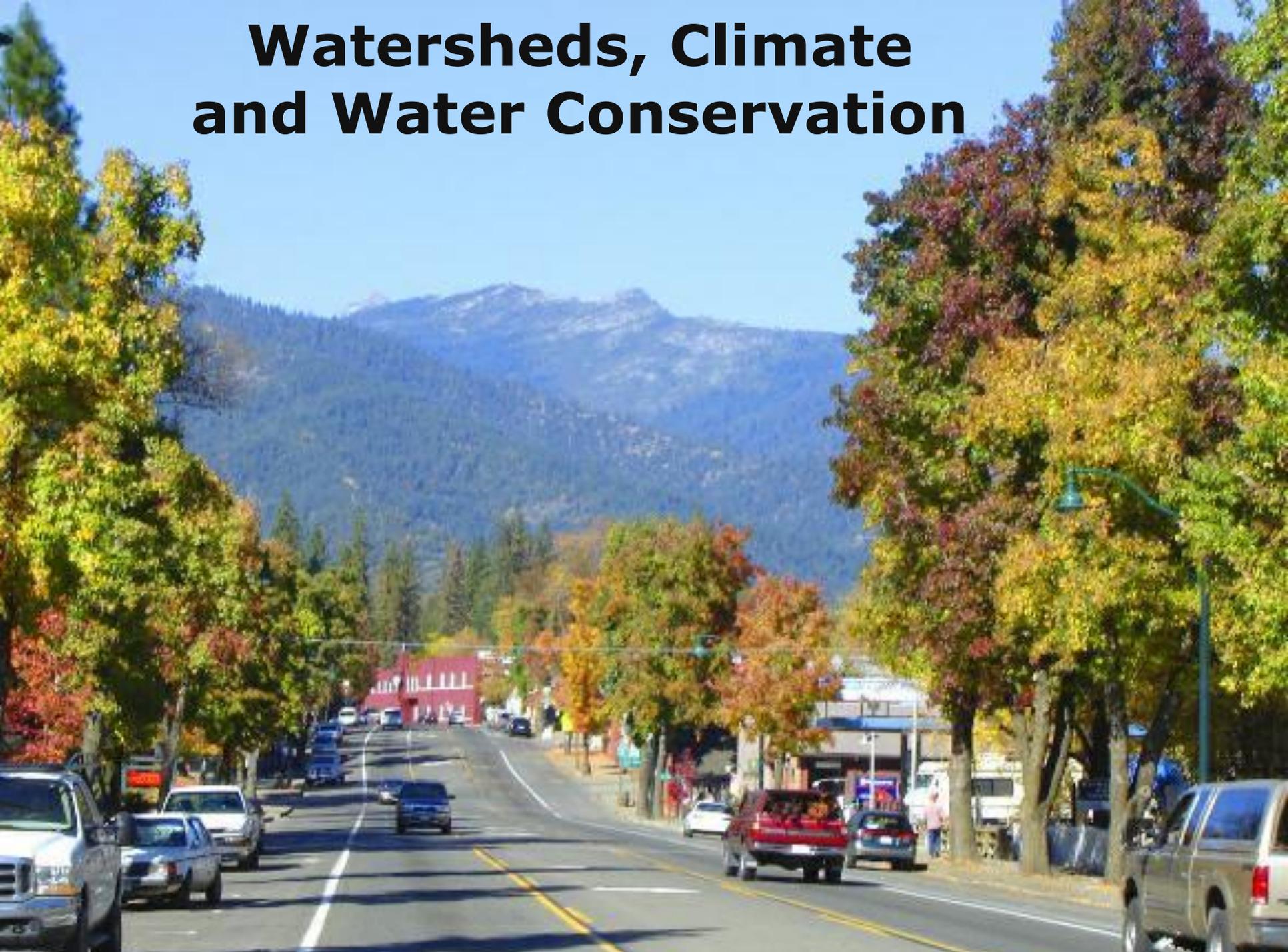
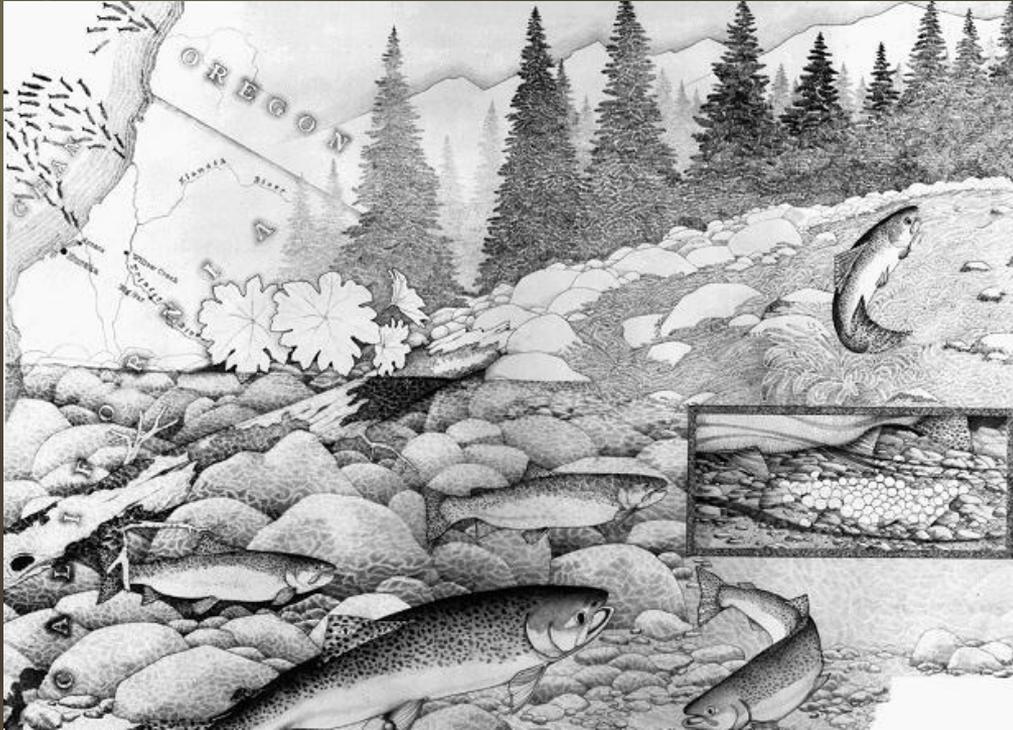


Watersheds, Climate and Water Conservation





Five Counties Salmonid Conservation Program



Goal: “To strive to protect the economic and social resources of Northwestern California by providing for the conservation and restoration of salmonid populations to healthy and sustainable levels and to base decisions on watershed rather than County boundaries.”

A photograph of a forest stream flowing over rocks. The water is clear and shallow, splashing over the stones. The surrounding forest is dense with trees, many of which have moss growing on their trunks and branches. The ground is covered with fallen brown leaves. The overall scene is a natural, somewhat overgrown woodland environment.

Target Priority Problems/Opportunities:

Migration Barriers

Water Quantity

Water Quality

Education/Training

Incentives

Habitat Improvements

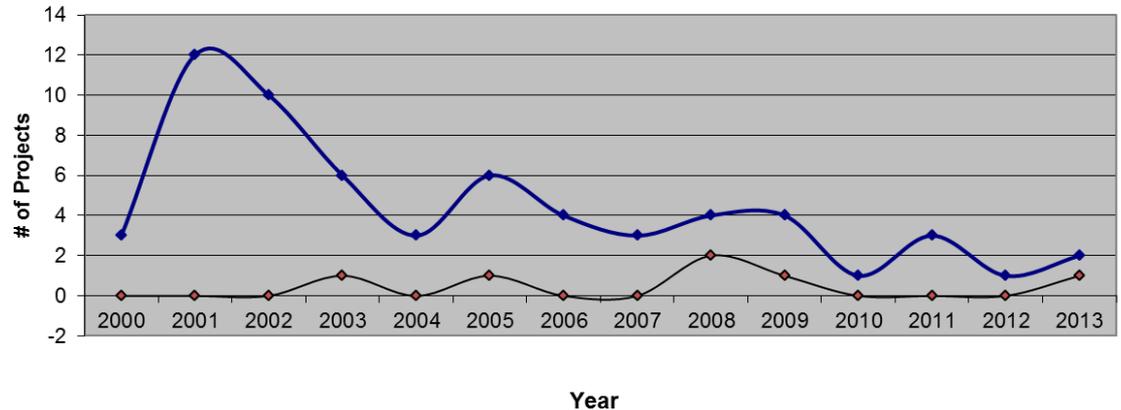
Avoid Lawsuits

5C Celebrating 15 Years of Restoration



Morrison Gulch, Humboldt County- Barrier Removed in 2002

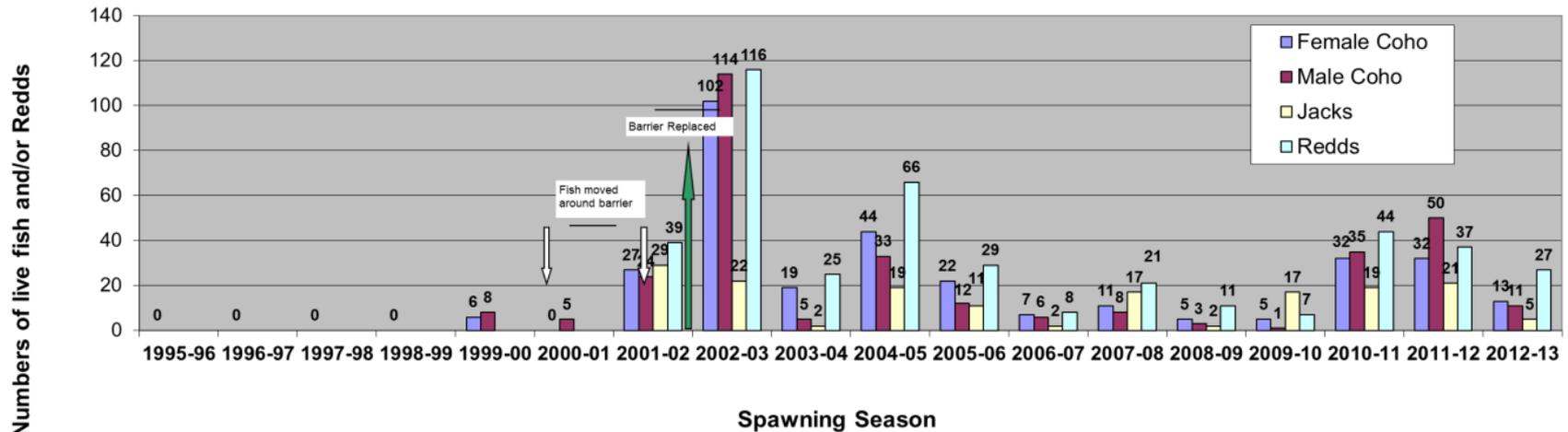
5C Program Barrier Removal Projects: 2000-2013*



*3 Siskiyou County Projects were built in 1998. The Forest Service and Mattole Restoration Council have completed 2 County Road Projects. 5C has contributed to 6 State/Federal & Private Projects

5C/Counties Projects Have Opened 145+ Miles of Salmonid Habitat

Morrison Gulch - Post-Project Spawning Survey Summaries, 2001-2011



Sidney Gulch



1986



1990



2006



2001



2011

West Weaver 2010



Little Browns Creek 2007



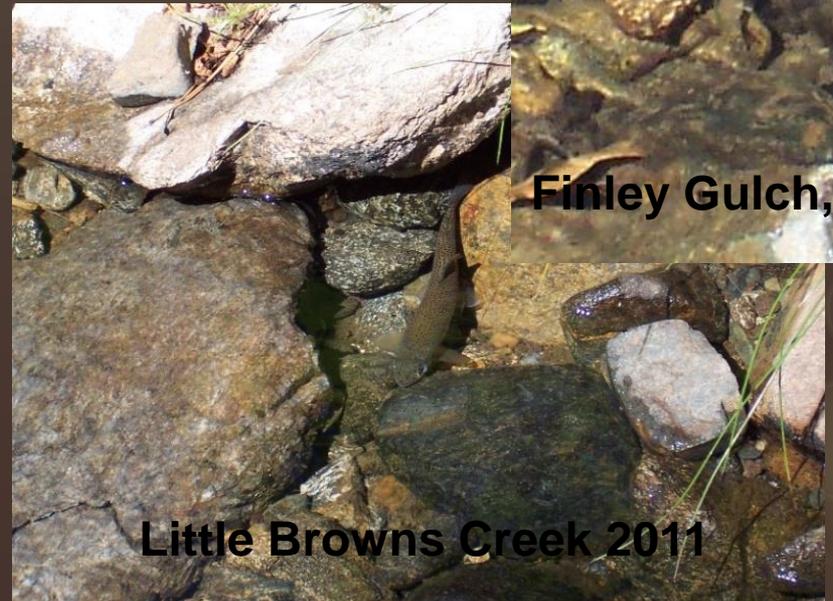
East Weaver 2012



Finley Gulch, 2010



Little Browns Creek 2011





Klamath-Trinity Climate Variability

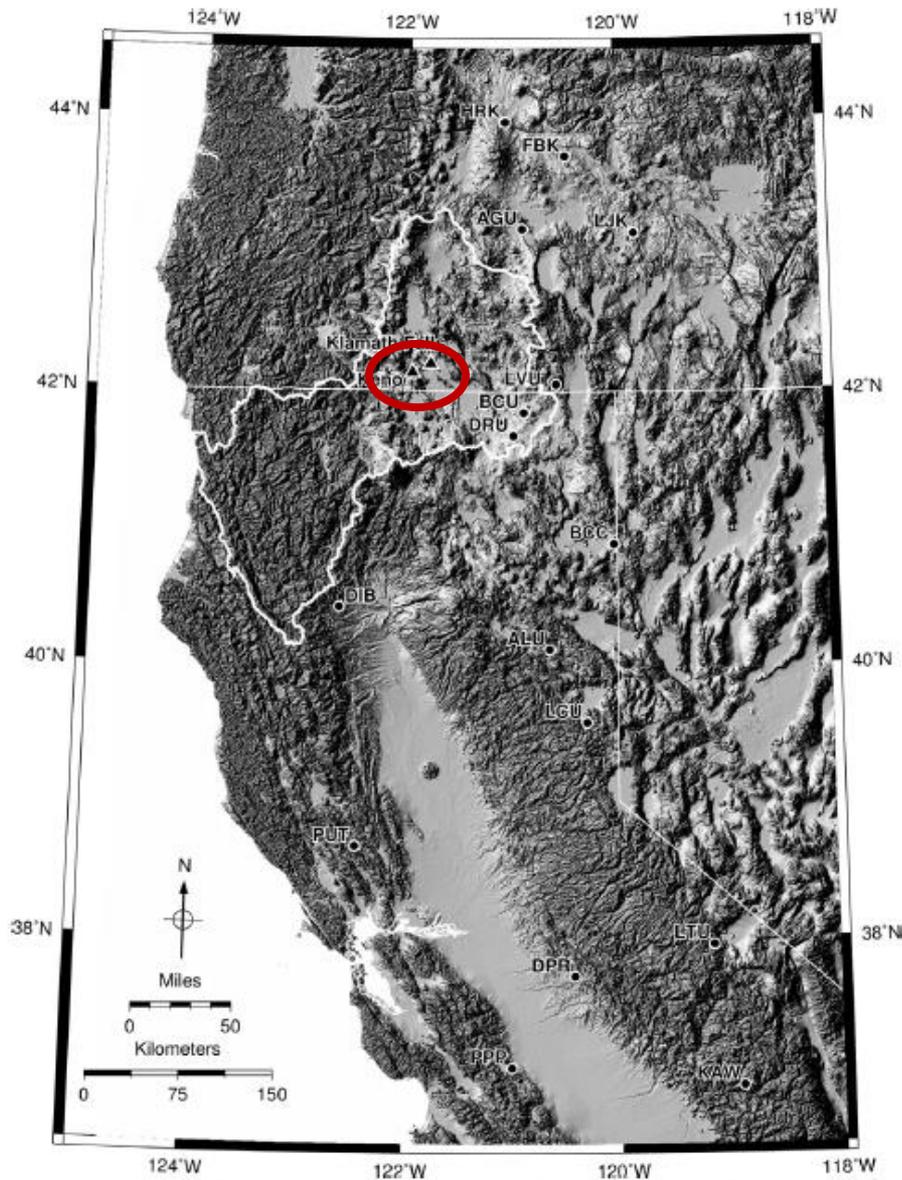


Fig. 1. Klamath River basin (white outline) and tree-ring chronology sites (circle) with Klamath Falls and Keno gauge (triangles).

Klamath-Trinity Climate Variability

Tree-ring reconstructed hydroclimate of the Upper Klamath basin



Steven B. Malevich*, Connie A. Woodhouse, David M. Meko

Laboratory of Tree-Ring Research, The University of Arizona, Tucson, AZ, United States

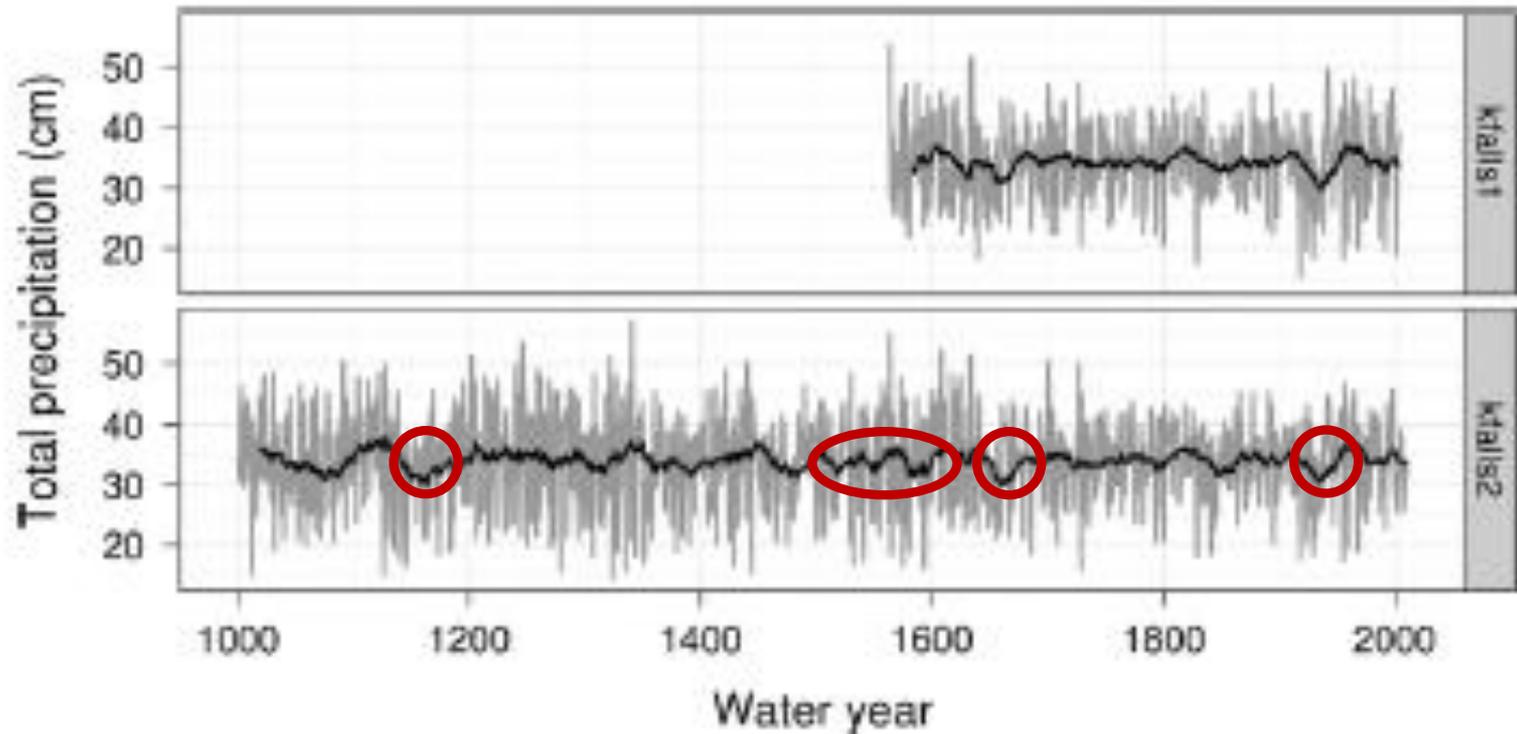
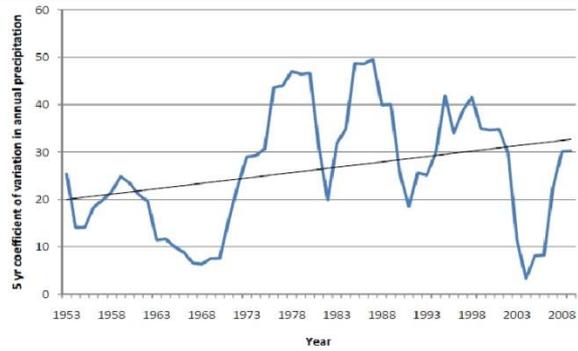
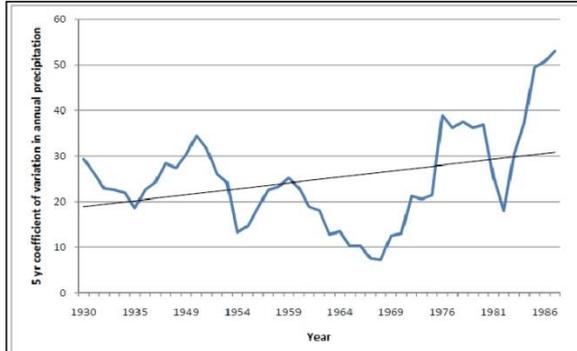


Fig. 5. The *kfalls1* (1564–2004) and *kfalls2* (1000–2010) reconstructions. Annual values are in gray and 20-year moving averages in black.

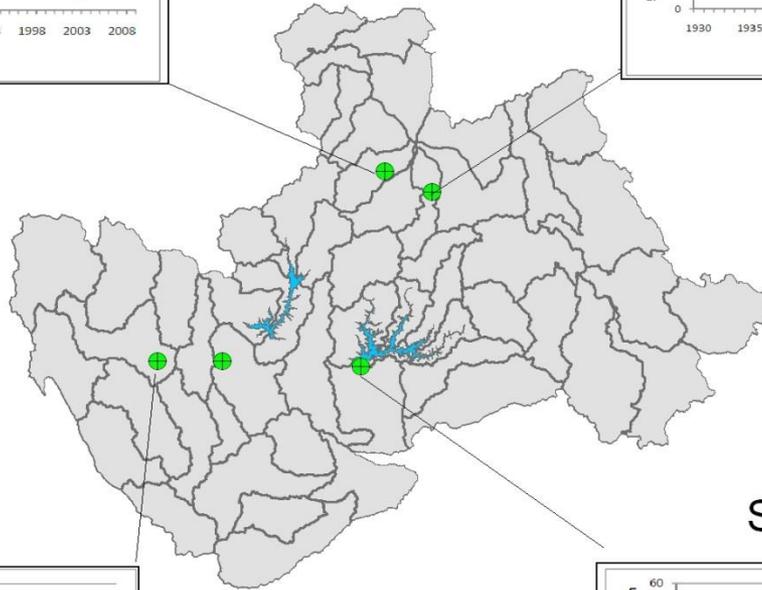
Klamath-Trinity Climate Variability



Mt Shasta

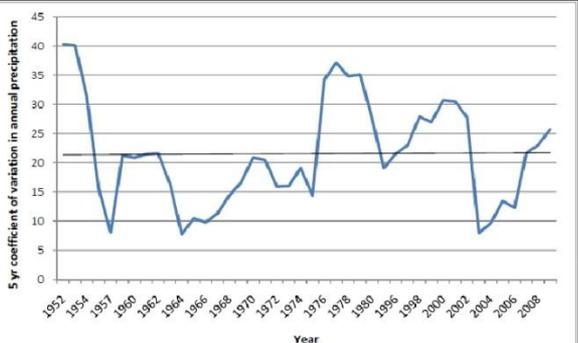


McCloud

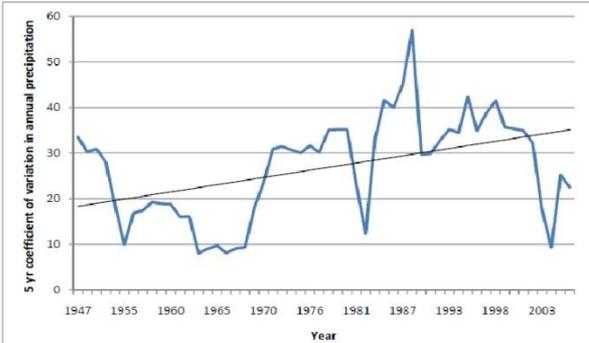


Big Bar

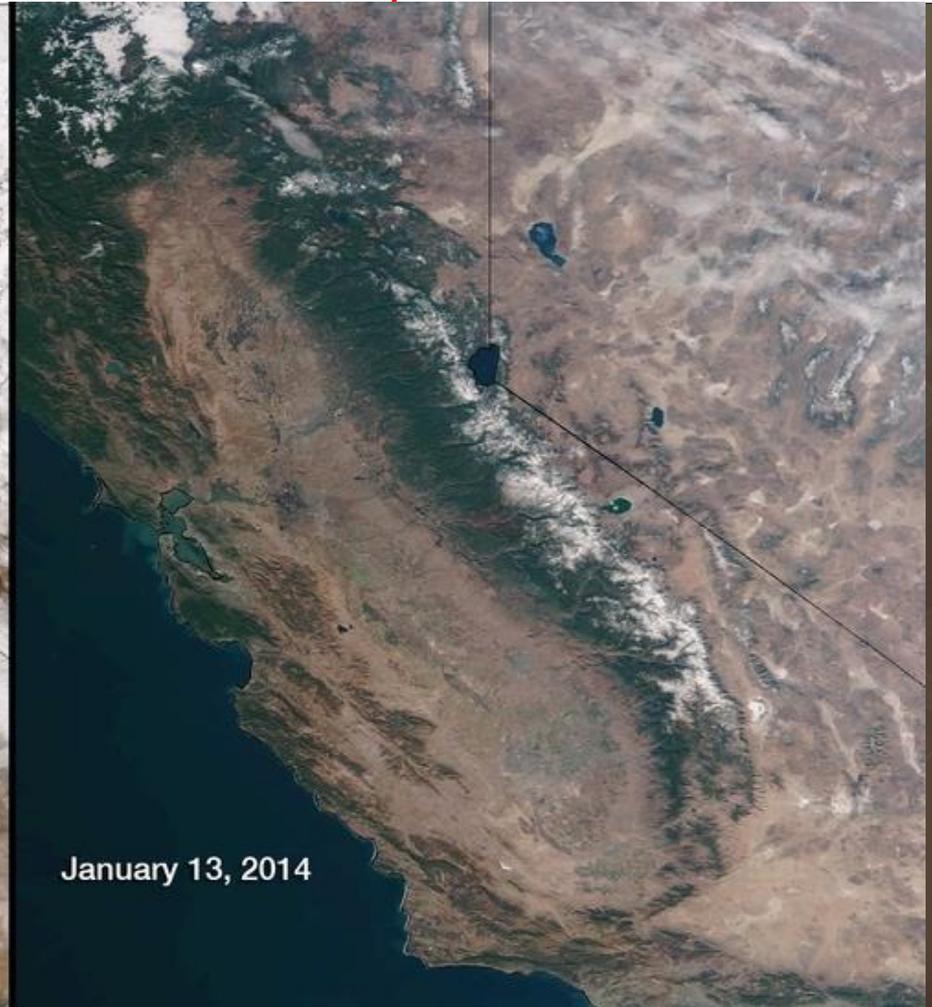
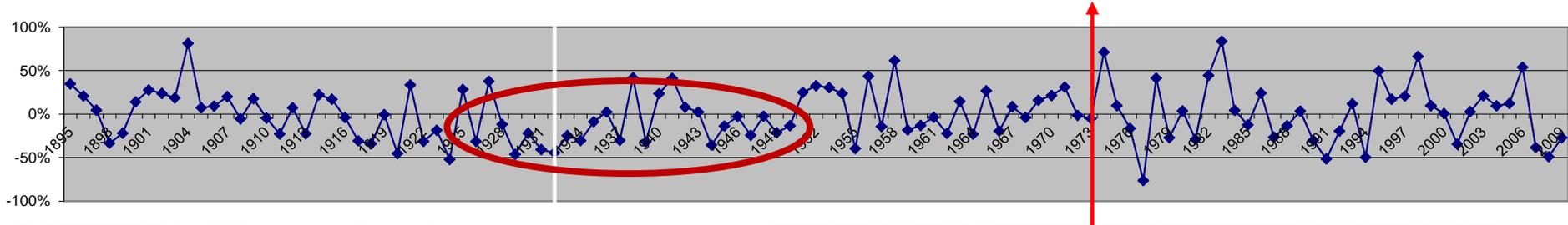
Shasta Dam



Weather Station
Precipitation Trends



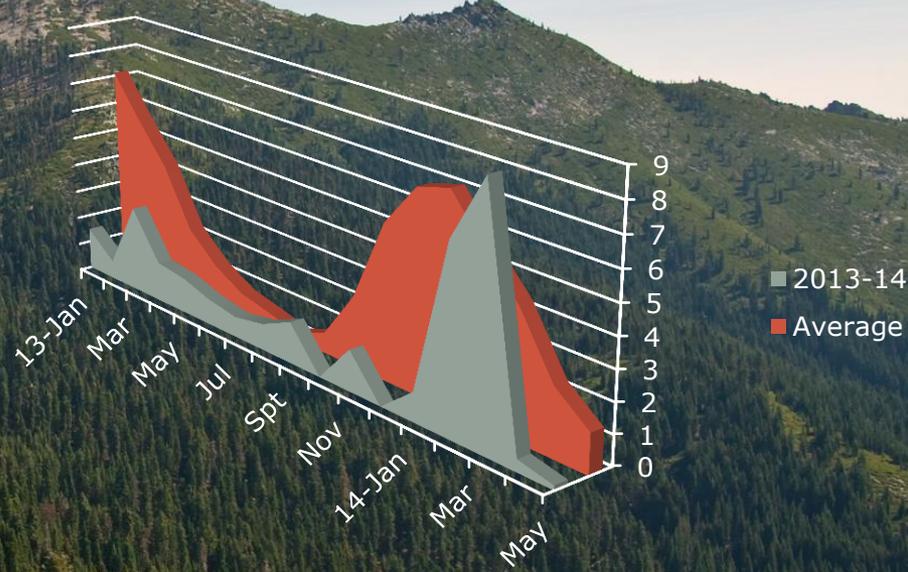
Weaverville Climate Variability



Weaverville Climate Variability



- 2013
- 2012
- 2011
- 2010
- Average

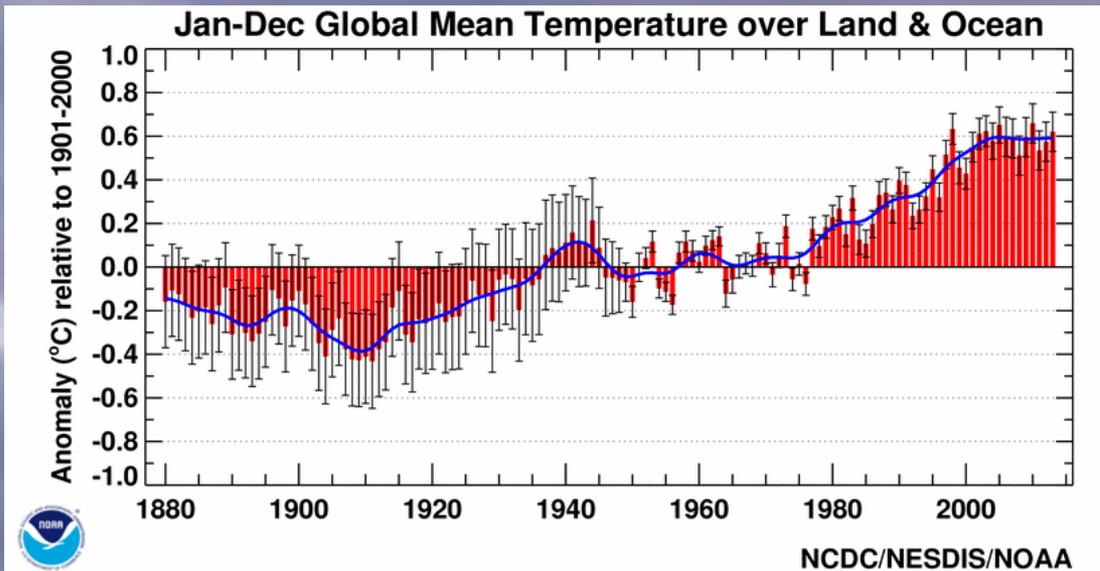


- 2013-14
- Average

13 Calendar Year-
Driest in History

As of May 16th, 2014 Calendar
Year- 43% of Average (50% of
Hydrologic Year)

Weaver Creek Watershed



- Globally, Earth had its fourth warmest January this year since modern temperature record-keeping began in 1880, according to a report released Thursday by the National Oceanic and Atmospheric Administration.
- KRCR TV March 21st- Warmest Winter Ever in Redding 4 Degrees Warmer than Average
- The overall rate of SWE loss in the Pacific Northwest, including northwest California has averaged 30% for the period 1950–2000 (Mote, 2003a). This contrasts with only a 1% SWE loss in the remainder of California.

REDUCE LAWNS AND ANNUAL PLANTINGS

Weaverville Rainfall

2013-14 Average

Sept-13	1.43	0.69
Oct-13	0.01	2.39
Nov-13	1.42	5.19
Dec-13	0.00	6.78
Jan-14	0.99	7.10
Feb-14	6.22	5.62
Mar-14	8.50	4.29
A&M-14	0.58	3.66
	16.29	35.72



If the winter rainfall is well below average reduce crop size, install rainwater catchments, use conservation techniques. Don't truck water in to supplement. You are just robbing "Peter to pay Paul"

RETHINK WATER WITHDRAWALS



Pumps draining water tanks do not rapidly draw down a creek and do not require coordination with other water diversions in the stream.

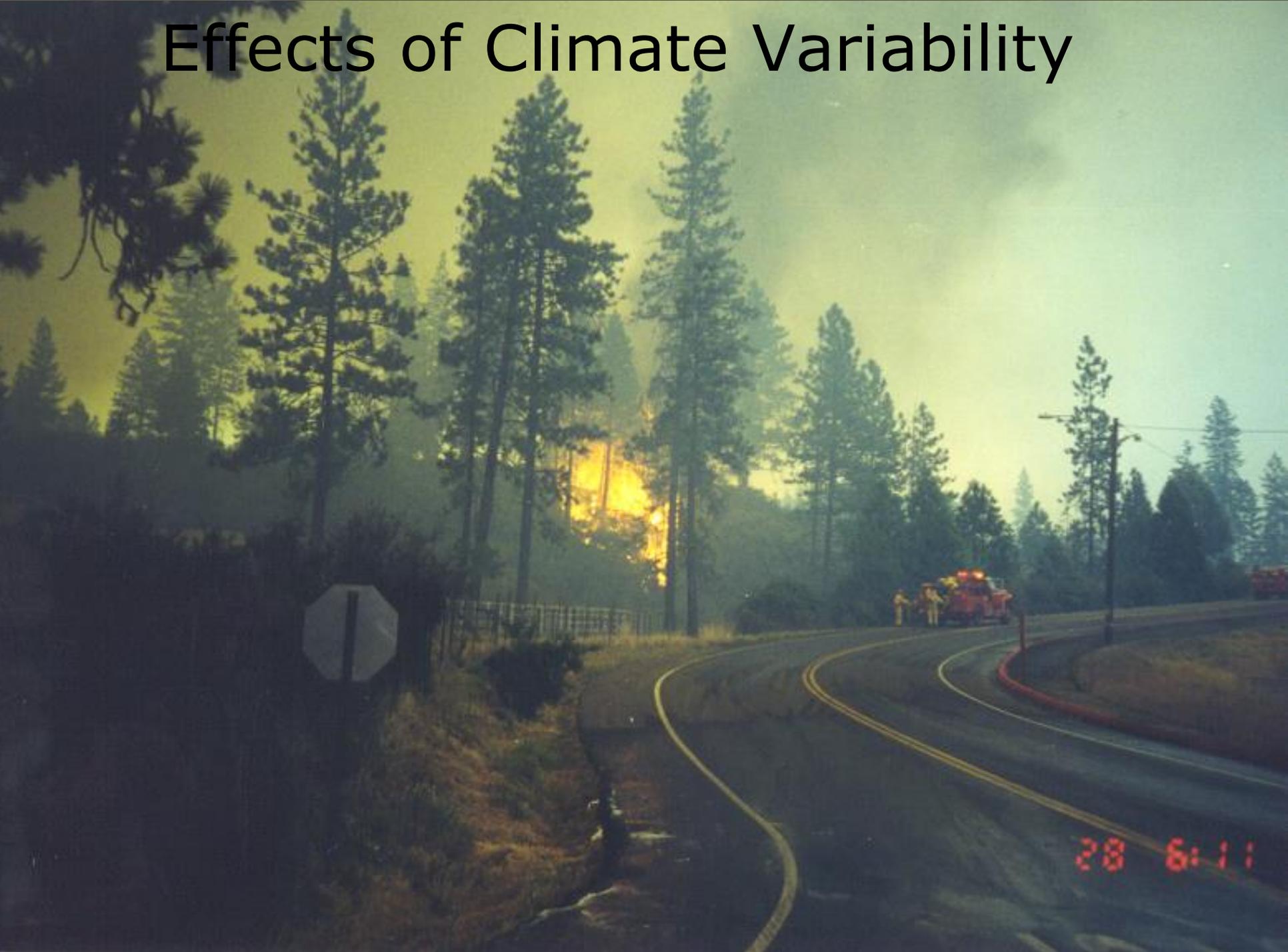
0.25 Gallon/Minute= 360 Gallons Per Day (Average daily water consumption is <500 gallons/day).

Pumps can draw from 3-300 gallons/minute and more than one pump on at the same time in a stream can result in fish kills.



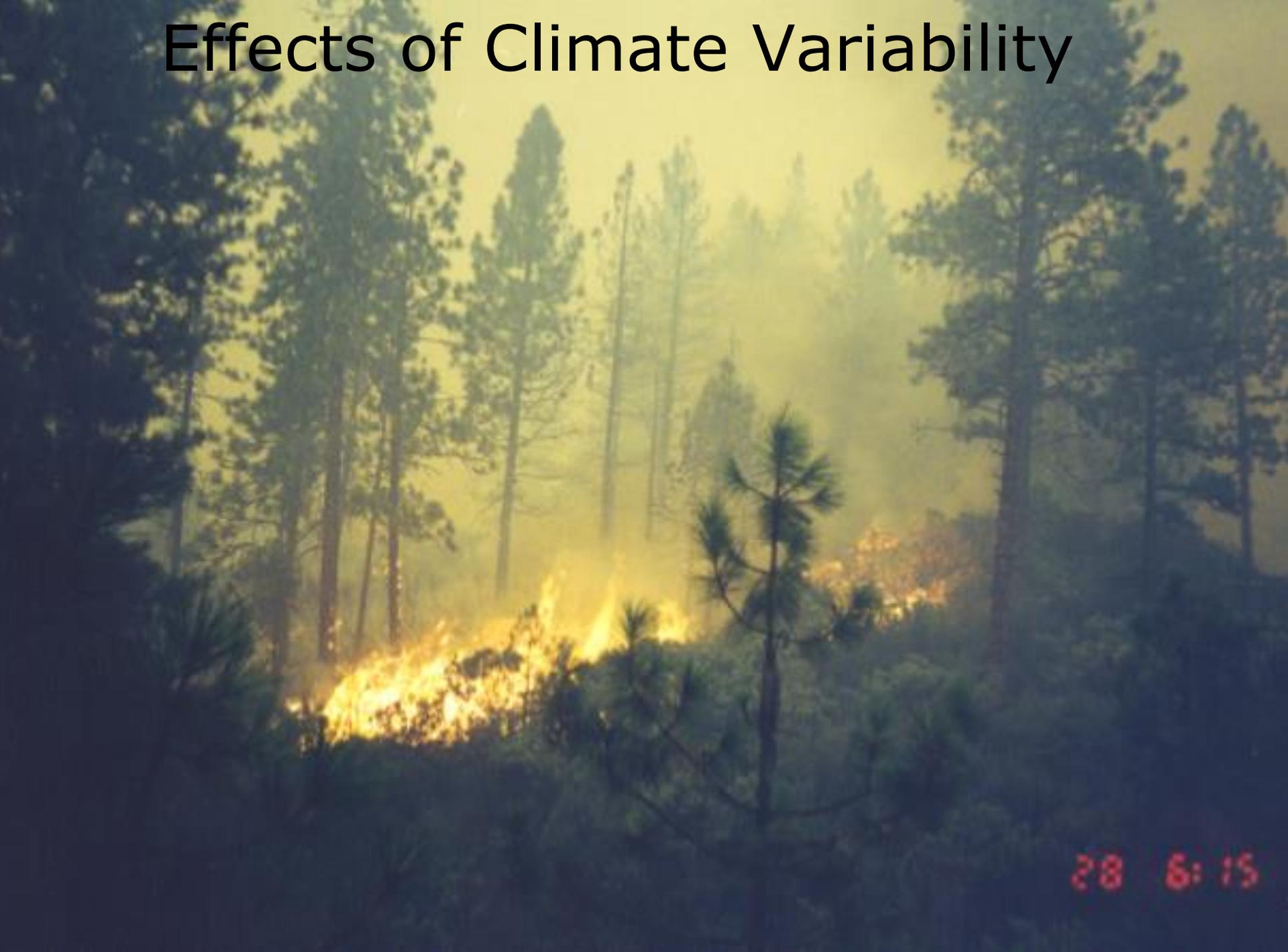
Little Browns Creek, 2010

Effects of Climate Variability

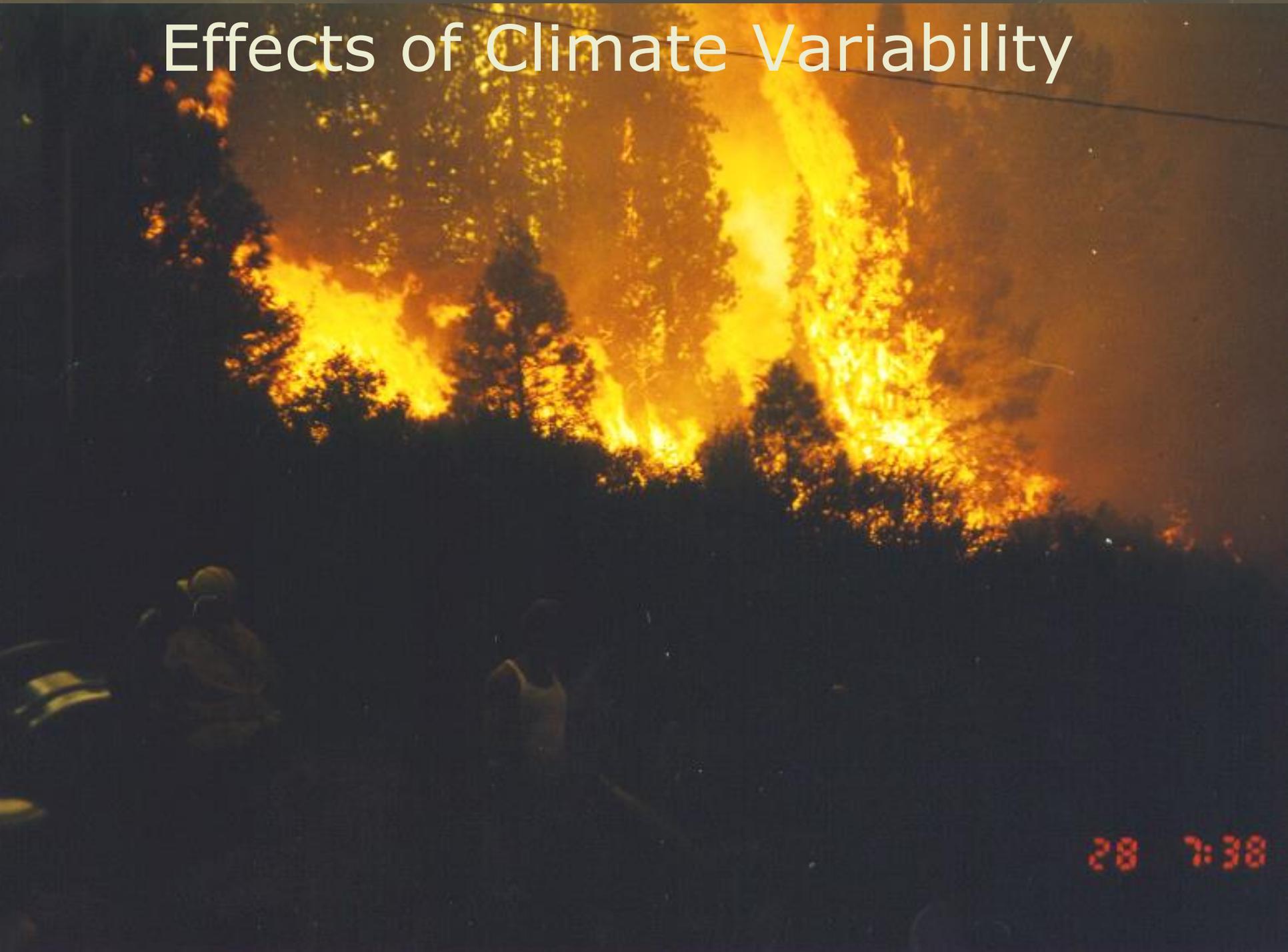


28 6:11

Effects of Climate Variability



Effects of Climate Variability



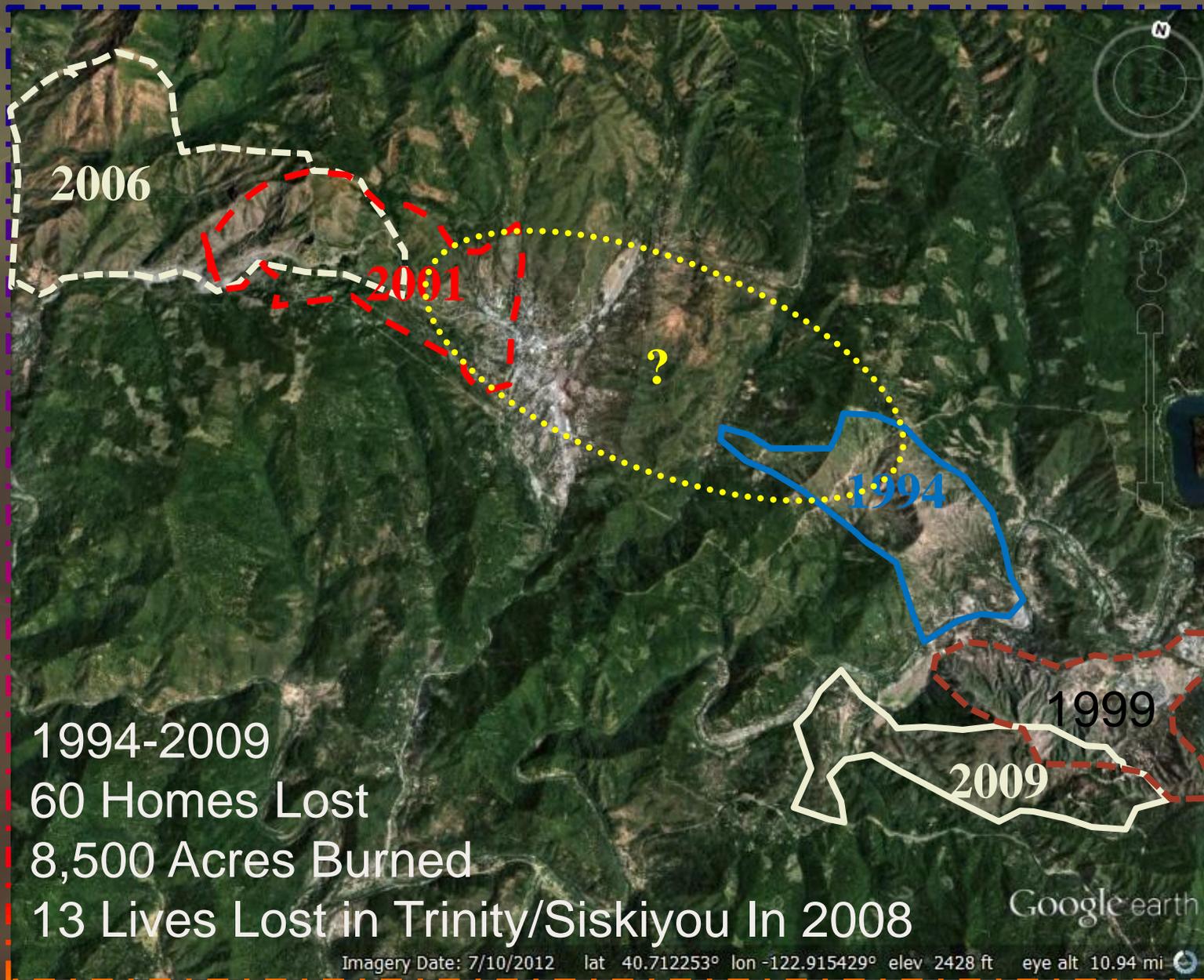
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Vertical and Horizontal Alignment of Fire Weather Factors



Oregon Fire, 2001 & Browns Fire, 1994

Weaver Creek Watershed, Fires



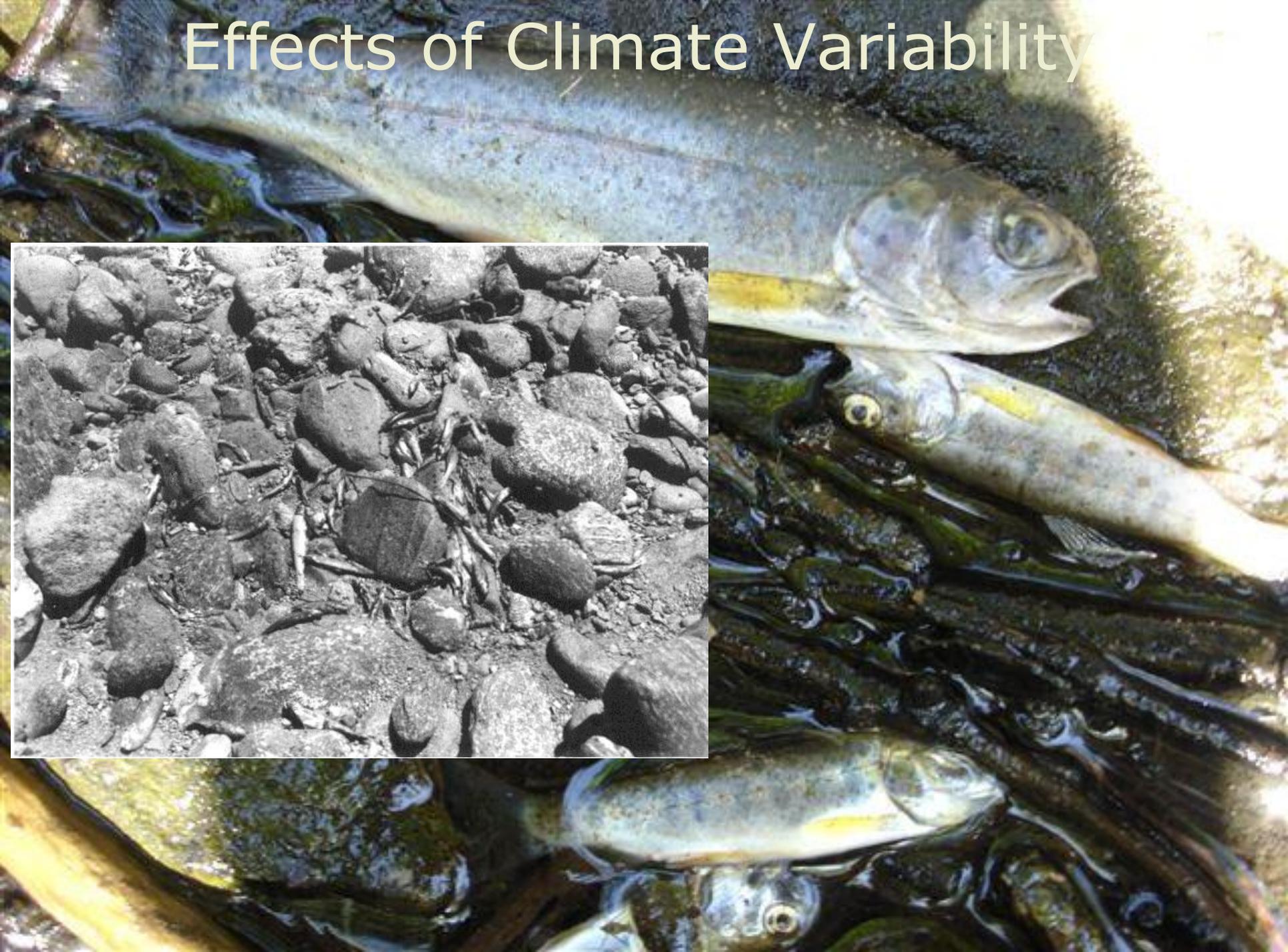
Adapt to Fire and Flood Environment: Whole Different Power Point Presentation



Effects of Climate Variability



Effects of Climate Variability





Summary: Implications of Climate Change for the EPA National Water Program

- Climate change will affect every aspect of the national water program
- Impacts are local, adaptation is local
- We need to use risk management to adapt while building understanding
- This will require a flexible and iterative approach that does not assume that hydrologic cycles of the future will be like the past



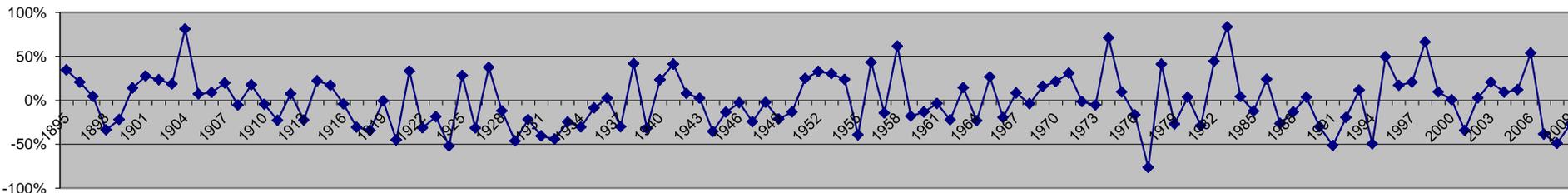
Trinity County Barrier Removal Projects



**West Weaver
Creek, 2000**



**West Weaver
Creek, 2006**



Trinity County Barrier Removal Projects



Conner Creek



Soldier Creek



Restored Natural Stream Function



2004



2006

Large Wood Routing



Restored Natural Stream Function



Restored Natural Stream Function



Little Browns Creek, 2005



Little Browns Creek, 2010



Stream Channel Restoration



Stream Channel Restoration

Roughened Channel



Stream Channel Restoration



Stream Channel Restoration

Large Wood Placement



Stream Channel Restoration



Finley Gulch, 2008 & 2009



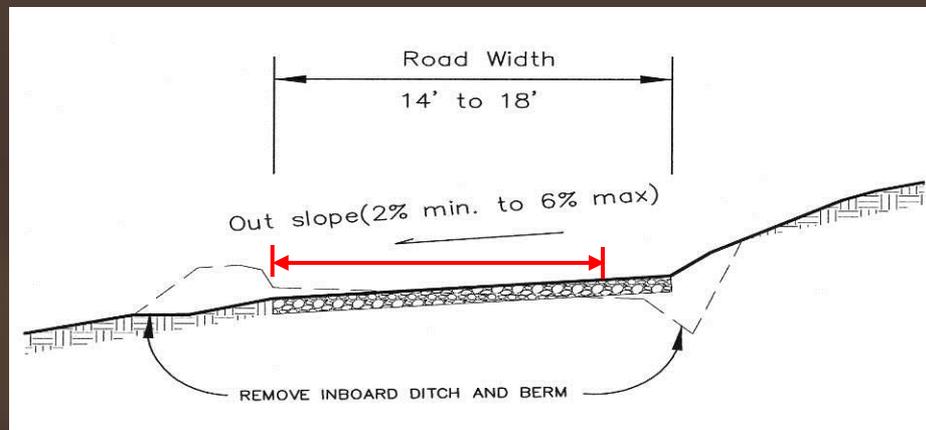
Restoring Slope Hydrology

Low Impact TO Hydrology



- Disconnect Excessive Ditch Flow
- Reconnect Streams to Natural Channels

Low Impact To Hydrology Road



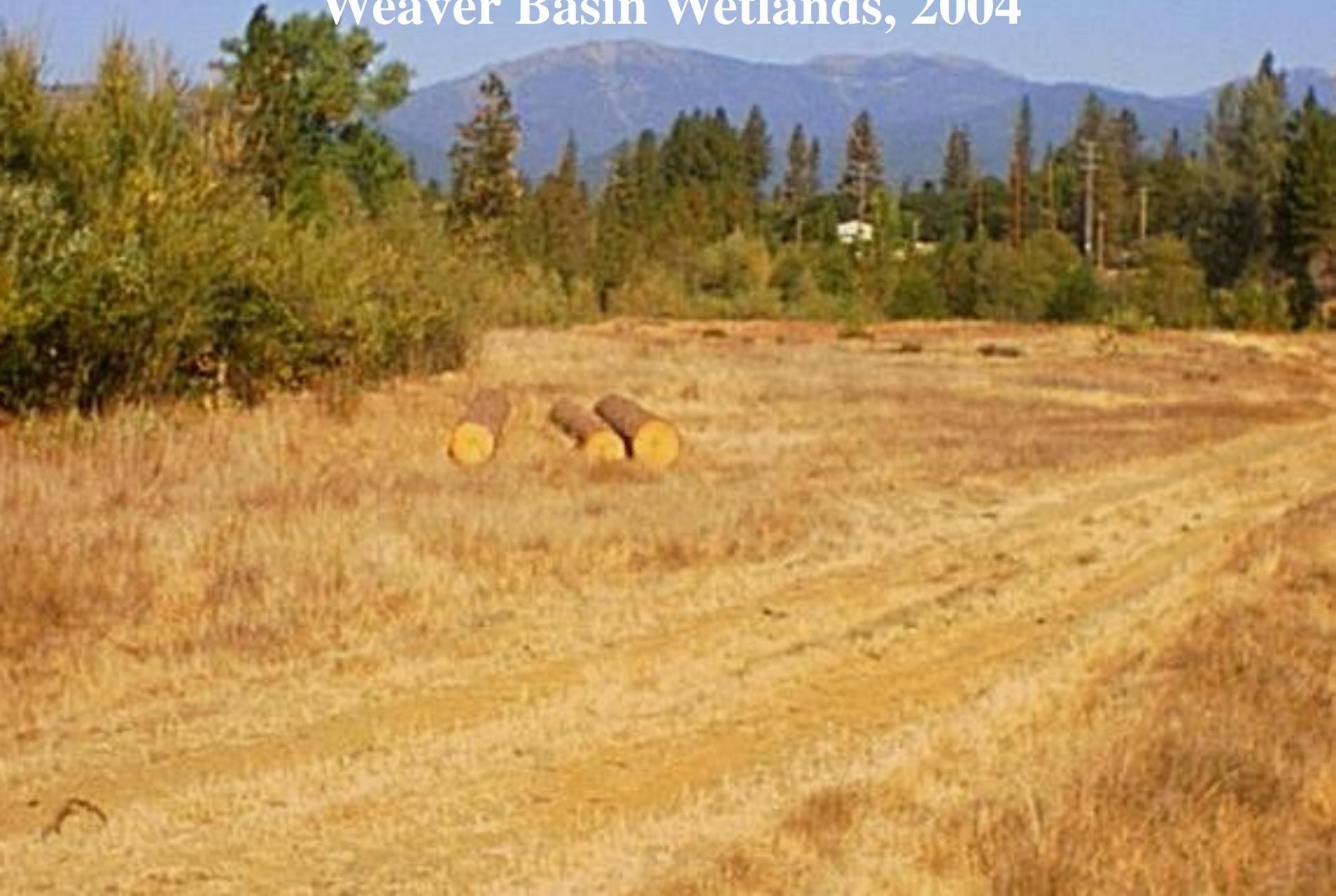
Low Impact To Hydrology Road



County Road Drainage Upgrade Projects



Trinity Alps Industrial Park Conversion to Weaver Basin Wetlands, 2004



Weaver Basin Wetlands, 2009



Non-County Projects



Road Decommissioning



ROOFTOP RAIN WATER



Looking Ahead Migration Barriers



Migration Barriers



Sidney Gulch

Weaver Basin Wetlands, 2007



Water Resources Overview

- Trinity County (3,180 sq mi):
 - 14,165 total population's domestic water use (USGS, 2005):
 - ~56% served by public water supply: ~1.7 Million Gallons/Day
 - ~44% self-supplied: ~1 Million Gallons/Day
 - 3.15 Million Gallons/Day water withdrawals for Irrigation (USGS, 2005)
 - 21.6 Million Gallons/Day total water withdrawals for all uses (USGS, 2005)
- Trinity River Watershed:
 - 2,000 sq mi including 932 sq mi in South Fork Trinity River Watershed
 - 1,871 miles of mapped, blue line streams including 886 miles in South Fork Trinity River Watershed

Current Water Policy

- Trinity County Land Use, Policies And Regulations:
 - General Plan Goals, Objectives and Policies
 - Critical Water Resources Overlay Zoning
 - Discretionary Permit and Map Conditions
 - FIRM Floodplain Mapping & Use Restrictions
 - Well Drilling Permits
- CA Dept. of Water Resources- Statement of Water Diversion and Use
- CA Dept. Fish & Wildlife Streambed Alteration Agreements
- State Porter-Cologne Act
 - North Coast Regional Water Quality Control Board (NCRWQCB) Basin Plan and standards
- Federal Clean Water Act
 - Total Maximum Daily Load Sediment Allocations
 - Section 401 Permit
 - Section 404 Consultation with Army Corp of Engineers
- **State and Federal Endangered Species Act**
 - CA Dept. of Fish & Wildlife Coho Recovery Strategy
 - NMFS- SONCC Recovery Plan

Mainstem Trinity River Study

- Part of collaborative NCIRWMP effort, Prop 50 funded
- GIS based water resources planning project designed to facilitate local and regional planning for multiple objectives on watershed scale
- Data analyzed and reported in Community and Watershed Planning Areas (CWPAs) & CWPA Watersheds (CWPAWs), created based on both watershed boundaries and County General Plan community planning areas



Assessment of Risk to Meeting Beneficial Uses of Water by CWPA

CWPA NAME	Current Condition	Ministerial Development	Increased Development
Big Bar	Minimal	Low (Drink)	Low (Drink)
Big Flat	Minimal	Low (Drink)	Moderate (Drink)
Burnt Ranch	Low (Sed.)	Low (Sed., Drink)	Moderate (Drink, Sed)
Cedar Flat	Low (Sed.)	Low (Sed., Drink)	Moderate (Drink, Sed)
Corral Bottom	Minimal	Low (Drink)	Moderate (Drink, Sed)
Del Loma	Minimal	Minimal	Low (Drink)
Denny	Minimal	Minimal	Minimal
Douglas City	Moderate (Fish, Sed.)	High (Fish, Sed)	At Risk (Fish, Sed)
Hawkins Bar	Minimal	Low (Sed., Drink)	Moderate (Drink, Sed)
Helena	Minimal	Minimal	Minimal
Junction City	Low to Moderate (Sed, Fish)	Low to Moderate (Sed, Fish)	Moderate (Sed, Fish)
Lewiston	At Risk (Sed.)	At Risk (Sed.)	At Risk (Sed, Sew, Fish, Drink)
Lower South Fork	Minimal	Low (Drink)	Moderate (Drink, Sed)
Salyer	Low (Sed.)	Low (Sed., Drink)	Moderate (Drink, Sed)
Weaverville	Not Properly Functioning (Sed, Fish, Drink)	Not Properly Functioning (Sed, Fish, Drink)	Not Properly Functioning (Sed, Fish, Drink)

Recommendations

- 14 Study Area Recommendations such as:
 - Secure funding to develop County Ordinance establishing grey water re-use standards for non-human and/or incidental human contact uses (e.g., landscaping, fire protection)
 - Assess cumulative demand and effects on stream beneficial uses when reviewing all discretionary development proposals.
 - Conduct a surface water use assessment of any surface water diversion proposed for a discretionary development proposal and require water conservation design standards.
 - Develop water budgets for watersheds with water shortages or low available water supply.
 - Incorporate goals, objectives, and measures into the General Plan to encourage in-fill development, low impact development, and on-site stormwater management.
- Additional recommendations for individual CWPAs

Weaverville CWPA Recommended Actions Undertaken Since the Evaluation Was Done:

- *Grants to expand water storage from the Trinity River for the WCSD could be pursued. If this is accomplished, corresponding decreases of water diversion from East and West Weaver Creeks during summer low flow periods could occur. In 2013, WCSD Expanded its Infiltration Gallery Capabilities At the Trinity River.*
- *Grants could be pursued to modify or remove the WCSD East Weaver Dam while assuring that the WCSD can continue to reliably utilize the creek to meet water demand. The 5C has obtained initial feasibility funding to look at alternative intake structures and dam removal on East Weaver Creek.*



Weaverville CWPA Recommended Actions Undertaken By the 5C & Partners Since the Evaluation Was Done:

- *Local, state, and federal grants should be pursued to construct the WSD reclaimed water infrastructure upgrades. The designs for the reclaimed water plant next to the WSD treatment plant were completed in 2010.*
- *Water conservation strategies for both the community and individual water systems should be developed and implemented in this CWPA.*
 - *WCSD replaced a 24,000 Gallon leaking redwood tank with a 30,000 gallon, 3 tank system on Timber Ridge*
 - *4 Demonstration Rooftop Rainwater Catchment Systems were installed in Weaverville*
 - *An Agricultural Ditch Modification Project in East Weaver Creek will Increase Summer Flows in the Creek*
 - *Workshops on Water Conservation Have Been Completed*





RETHINK WATER WITHDRAWALS

Time stream pumping to match natural diurnal flow patterns.

A single mature Douglas-fir tree can transpire (pump) up to 100 gallons of water from the soil per day. Most of this pumping occurs during the afternoon hours

An acre of mature conifer forest can transpire up to a million gallons per growing season.

Mountain streams flow goes down in response to soil water pumping actions (at the same time that temperatures go up).

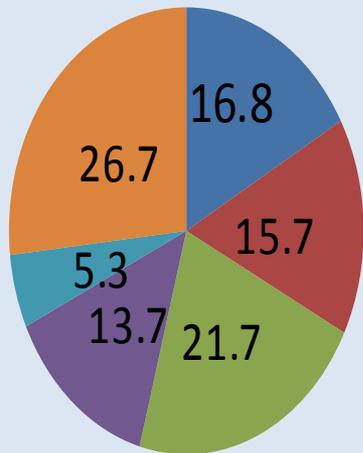
http://kula.geol.wvu.edu/rjmitch/L10_evapotranspiration.pdf



REPAIR

Gallons Lost To Leaks Over a Person's Lifetime (75 years) = 258,370

How does your household use water?

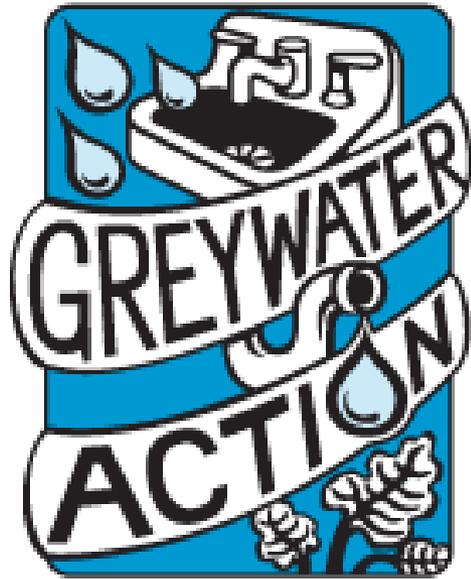


Source: American Water Works

- Shower
- Faucet
- Clothes Washing
- Leaks
- Other
- Toilet



RECLAIM USED WATER



FOR A SUSTAINABLE
WATER CULTURE

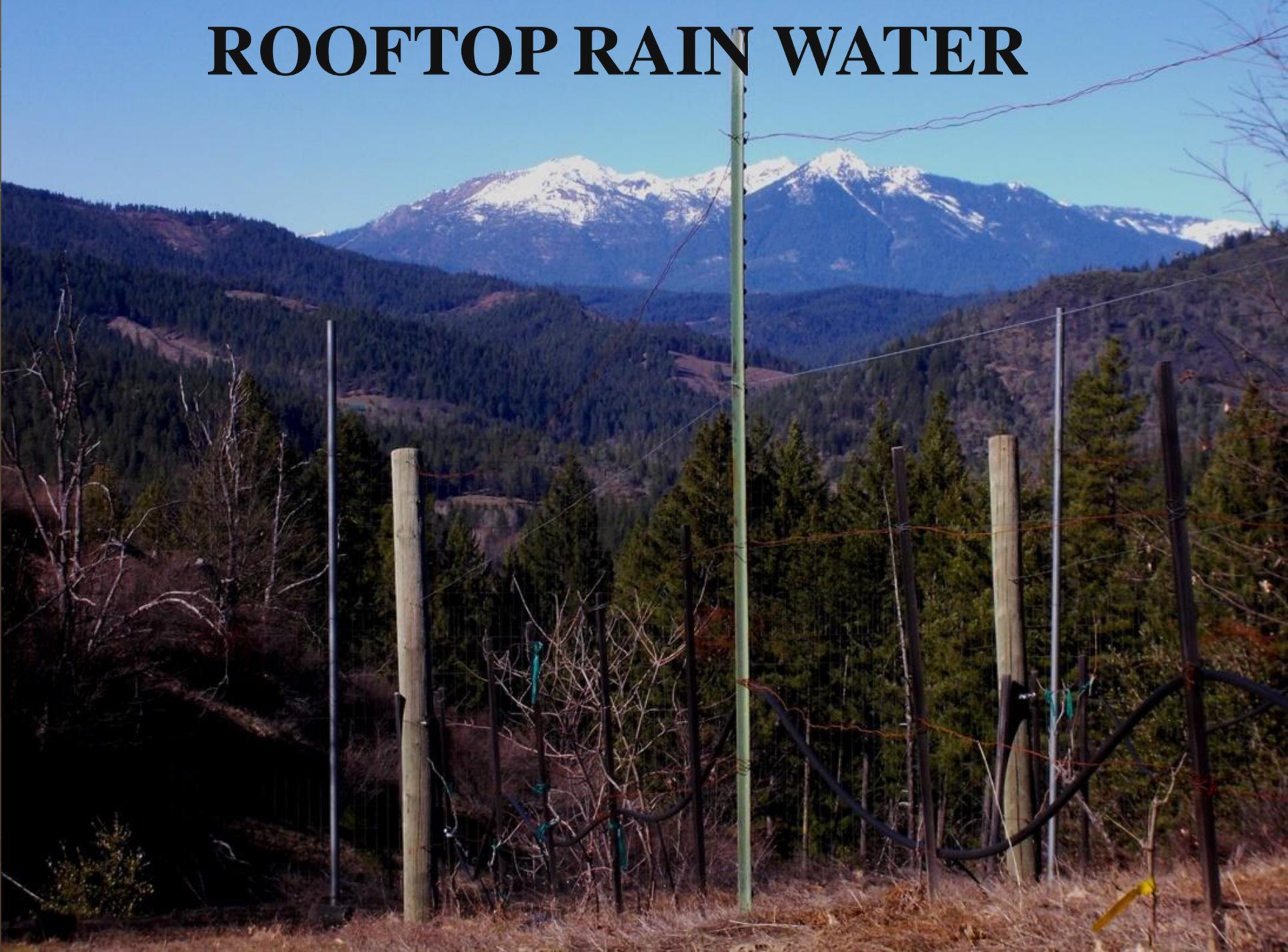


“It’s easy to follow the guidelines required for a no-permit system from the new California plumbing code. The system needs to have a way to switch back to the sewer/septic, not have any pooling of greywater, be discharged under 2 inches of mulch, and a few more basic guidelines.” <http://greywateraction.org/projects/greywater-recycling>

ROOFTOP RAIN WATER



ROOFTOP RAIN WATER



REDUCE WATER DEMAND

Landscape:

Plant Drought Tolerant Species

Skip the Annuals In the Garden This Year

Switch From Sprinkler To Drip Irrigation





Private Road Decommissioning



