

Total Resource Management



Upper Feather River Watershed

1985 to Present

Feather River Coordinated Resource Management Group

**21 agencies and other members
(*DWR, CDF, DFG, USFS, NRCS, PG&E, Local Gov't*)**



Formed to address:

- **Loss of Floodplain Connection**
- **Loss of Vegetative Structure**
- **Loss of Biological Processes**
- **Loss of Physical Inputs**
- **Loss of Chemical Processes**

2003 to 2009 – Plumas Watershed Forum

Plumas County ~ Department of Water Resources ~ SWP Contractors

**Formed for watershed investment and management
for local and downstream benefit**

2008 Jones & Stokes Review:

- 1. Positive cost/benefit if new “useable” water valued at only \$150/af**
- 2. One-time construction cost for meadow/aquifer storage = \$550/af**



2005 to Present

Prop. 50/84 IRWM Planning and Implementation

MOU for Regional Water Management Group

30 agencies and NGOs

Improving Water Supply and Water Quality for all designated beneficial uses through a focus on “Watershed Management”

- Integrating land use and water use across jurisdictions, land ownerships, and beneficial uses of water.**
- A consistent strategy to restore hydrologic function and biological connectivity across urban and rural landscapes and land uses.**

Integrated Planning: Projects must integrate three or more important resource issues:

- 1. Water Quantity**
- 2. Water Quality**
- 3. Flood Control**
- 4. Temperature/Sediment**
- 5. Groundwater**
- 6. Land Management**
- 7. Habitat**

Resource Issues of Importance – Integrated Approach

Projects must advance integrated watershed resource goals:

1. Restore 250,000 acres of degraded alluvial valleys

1985 to 2010 - 3,900 acres and 44 miles of stream channel by Feather River CRM

1998 to 2010 - 4,300 acres of riparian restoration by Forest Service/Quincy Library Group

3% of the targeted landscape in 25 years

2. Forest management to enhance upland recharge on 2 million acres while sequestering carbon and reducing threat of catastrophic wildfire

> 100,000 acres (private lands)

> 187,000 acres (National Forest)

14% of the targeted landscape in 12 years

What have we learned in 25 years?

Some things have endured; some things have evolved.

Endured:

- Progress on the ground is the teacher and the driver of more progress. (adaptive management)
- On-the-ground knowledge is as important as state-of-the-art science for a continuous commitment to positive change. (civic science)
- Stewardship ethic permeates the community decade after decade and inspires outside support. (resource and environmental sustainability ethic)
- Local institutional memory offsets agency turnover and shifting politics, policies, and priorities. (institutional continuity with change)
- Restoring the natural functions and hydrology of healthy watersheds solves old problems and new ones. (working with nature for aggregated benefits)

What have we learned in 25 years?

Some things have endured; some things have evolved.

Evolved:

- **Interagency and NGO connections evolve to address emerging regional issues – snowpack change; Delta species crash; watershed health and human health connection (e.g. mercury, air quality)**
- **Examples:**
 - **DACs and tribal issues and entities span regions**
 - **Increased connections between rural and urban watershed communities on energy, water, and forests.**
 - **Problems grow larger and more connected, while local, state, and federal agency resources and budgets shrink.**

Degraded Pre-Project Condition



What does an
integrated approach
look like on the
ground?

Restoring of Natural Function

Pre-Project Last Chance Creek, Alkali Flat, 2003



Restoring Natural Function

Post-Project Last Chance Creek, Alkali Flat, May 2005



Restoring Natural Function

Post-Project Last Chance Creek, Alkali Flat, July 2005



Restoring Natural Function

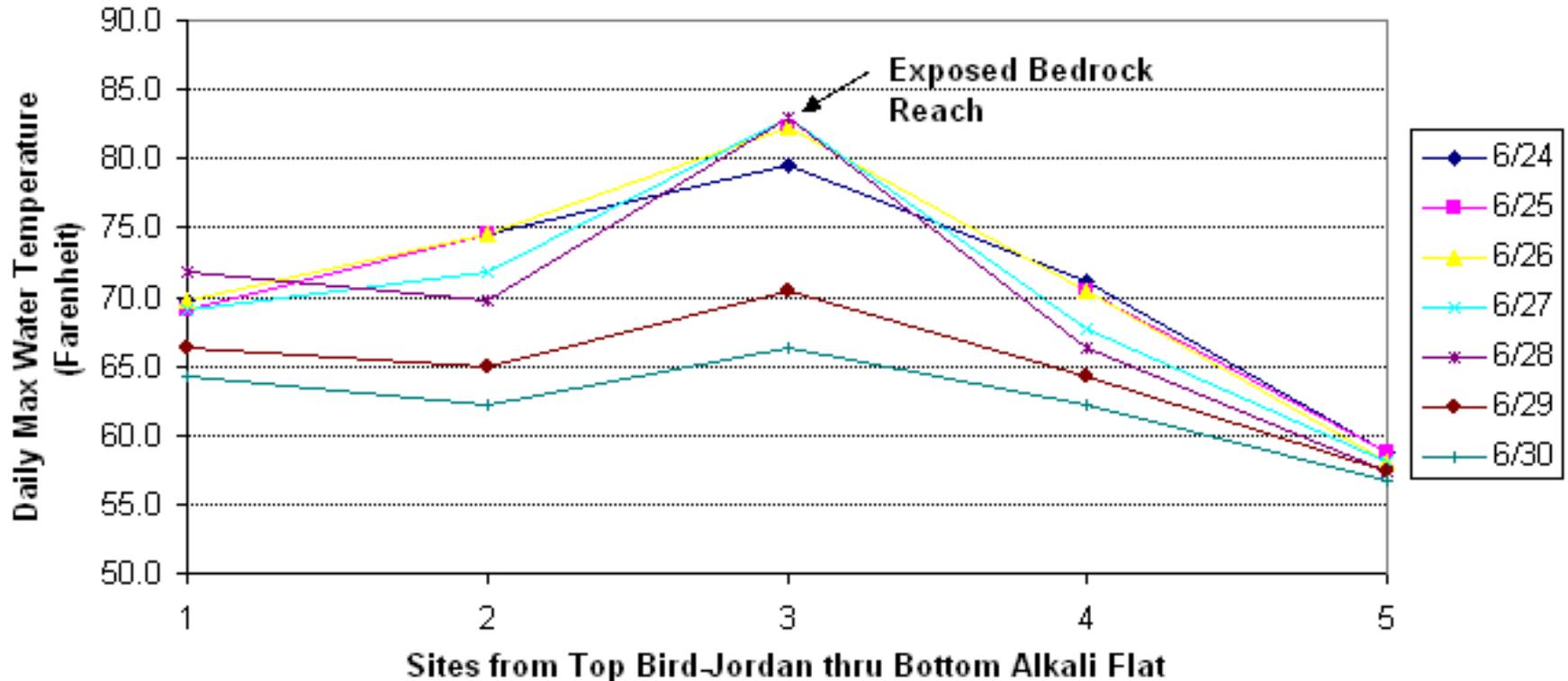
Last Chance Creek, Alkali Flat, 2005



What does an integrated approach look like on paper?

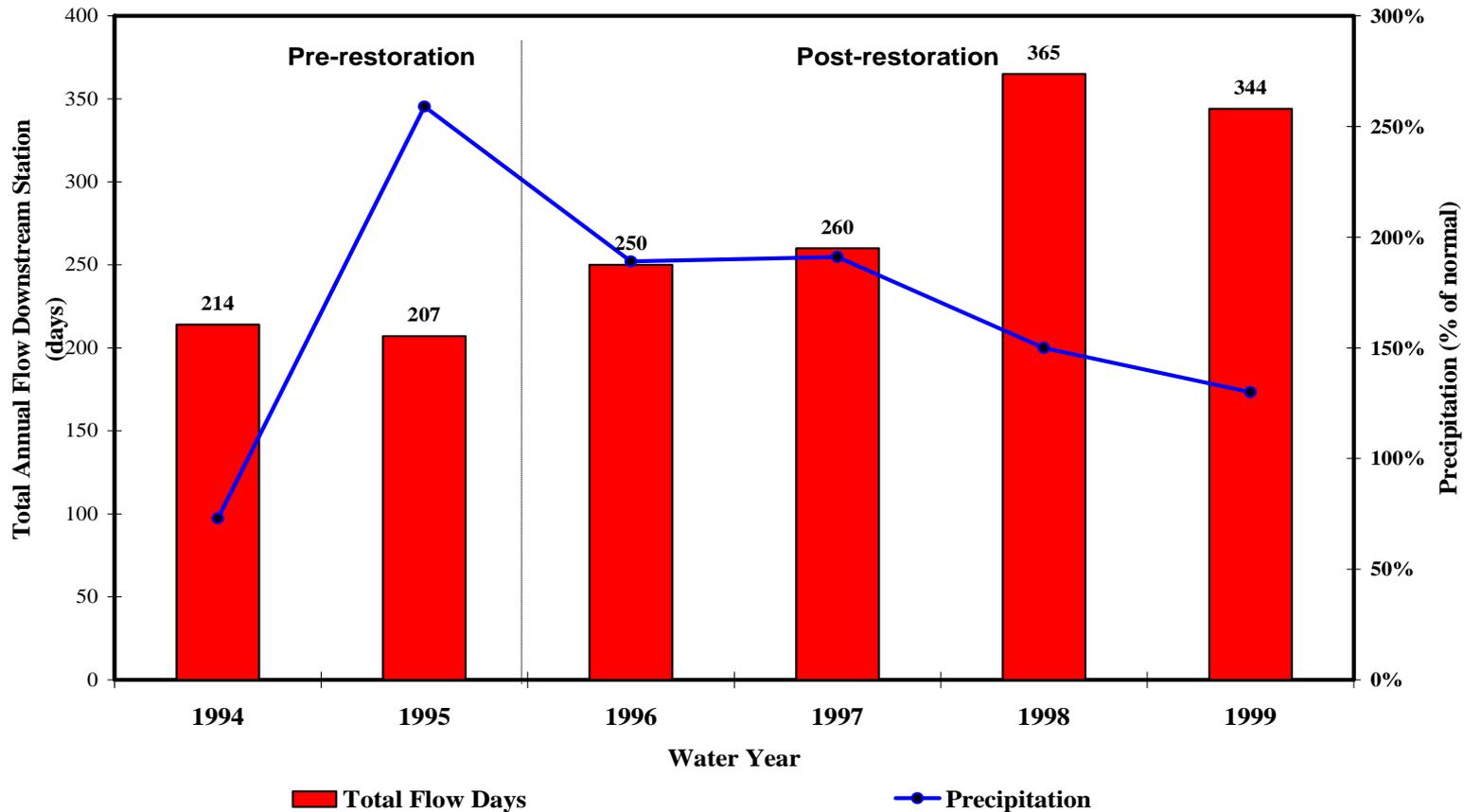
Project Outcomes – Decreased Water Temperatures

**Water Temperatures Through the Last Chance Project Area
in the Last Week of June 2004**



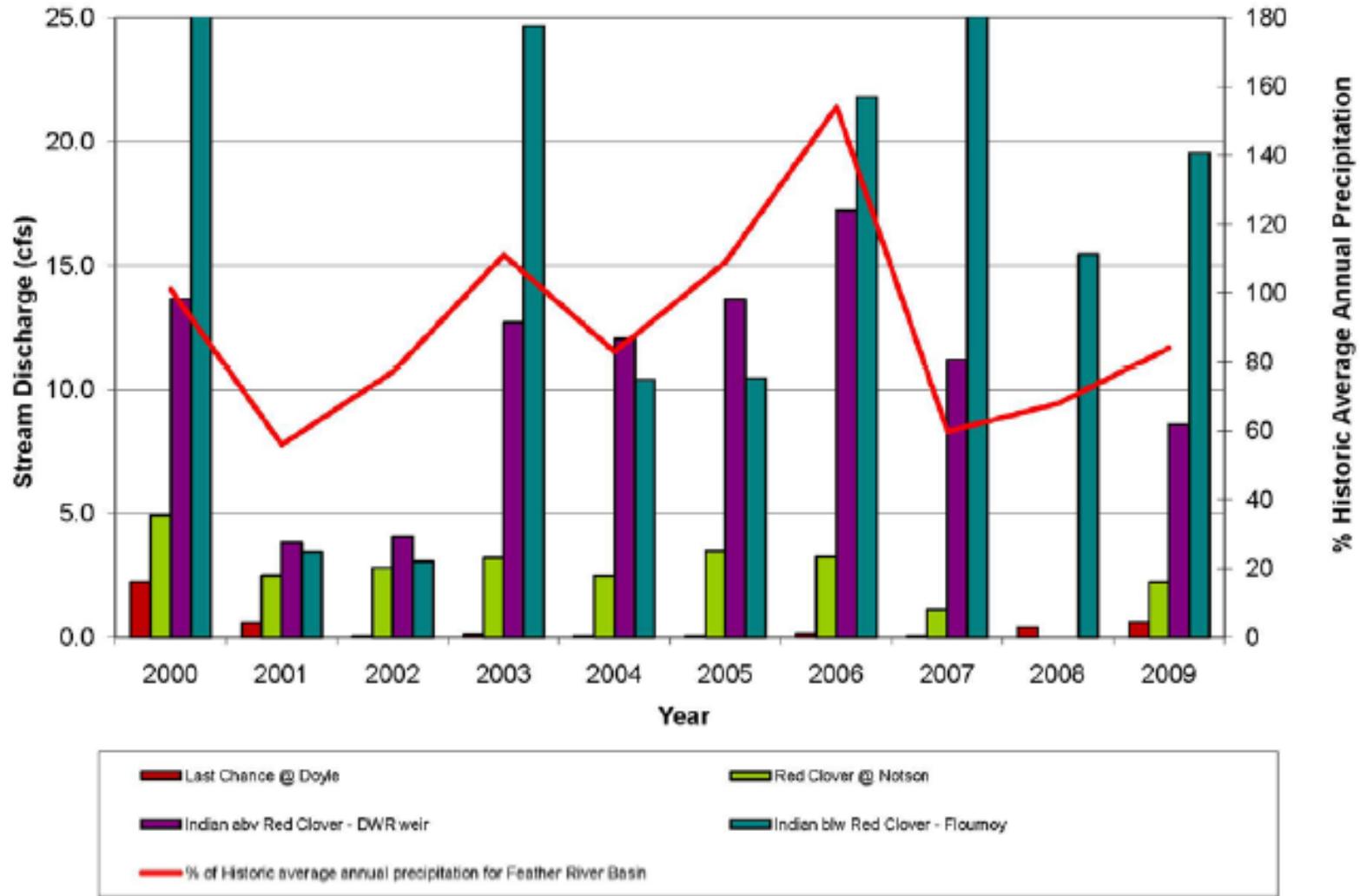
Project Outcomes – Extended Season Streamflow

Flow Duration in Cottonwood Creek near Big Flat Meadow



Cumulative Restoration Project Benefits

Weekly Average Minimum Flows 2000-2009
on Last Chance Creek and Red Clover Creek
and Indian Creek above and below the confluence of Red Clover Creek



Cumulative Restoration Project Benefits (cont.)

Over 1,800 acres of meadow restoration has occurred in the Last Chance Creek watershed from 2001 to 2007.

Precipitation in 2001 and 2002 (pre-project) is fairly comparable to 2007, 2008, and 2009 (post-project).

However, flows at the downstream monitoring point are dramatically higher in 2007-2009, and are also greater than the sum of the flows at the other three stations.

Incremental Progress

***Begging, Borrowing,
Just Short of Stealing***

**Feather River
Coordinated Resource
Management Group**

**Sources of Project
Funding**

1990 to 2005

Historic Funding Sources

Funding Source	Funded 1990-05	% Of Total Funding
Federal Agencies		
USDA-United States Forest Service	\$467,650	7%
USDA-Natural Resources Conservation Service	\$82,500	1%
Environmental Protection Agency	\$15,000	<1%
Bureau of Reclamation	\$980,000	14%
State Agencies		
California Department of Forestry & Fire Protection	\$105,000	2%
State Water Resources Control Board	\$3,422,104	49%
California Department of Water Resources	\$920,500	13%
Central Valley Regional Water Quality Control Board	\$109,000	2%
California Department of Fish & Game	\$100,000	1%
California Department of Transportation	\$100,000	1%
California Department of Parks and Recreation	\$39,930	<1%
UC Cooperative Extension	\$2,100	<1%
County & Local Public Agencies		
Plumas County	\$234,263	3%
Plumas County Community Development Commission	\$1,900	<1%
Quincy Community Services District	\$3,800	<1%
Plumas Unified School District	\$1,600	<1%
Feather River College	\$1,600	<1%
NorCal Nevada Resource Conservation and Development	\$9,500	<1%
Private Groups		
Pacific Gas & Electric	\$352,000	5%
Landowners	\$7,710	<1%
Sierra Pacific	\$15,000	<1%
Collins Pine	\$10,000	<1%
Total	\$6,981,157	98%

Cumulative Investment Benefits

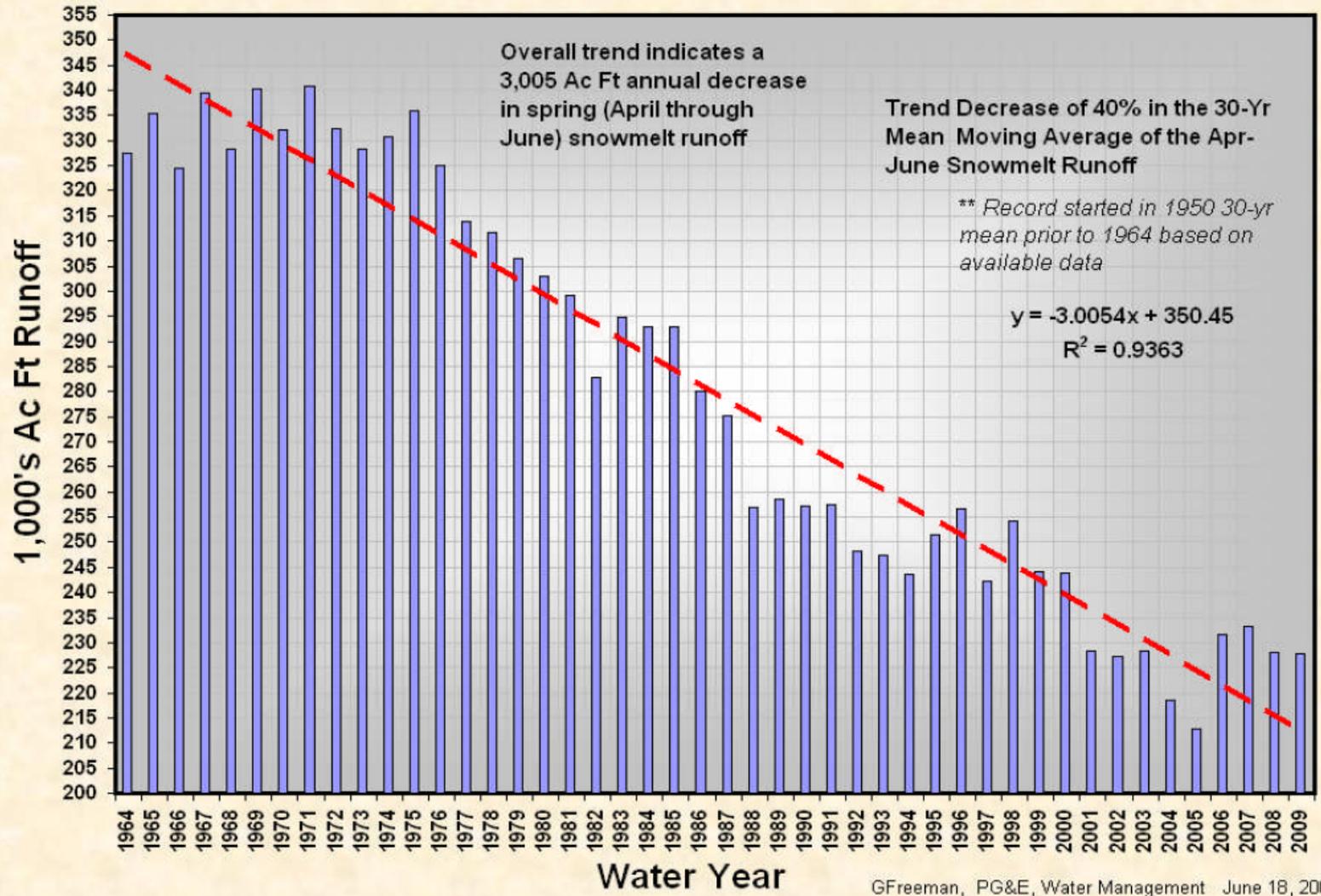
National Fish and Wildlife Foundation - 2009

- Sierra meadows business plan and investment program
- \$10-15 million aimed at sparking another \$200M in investment

Declining Runoff



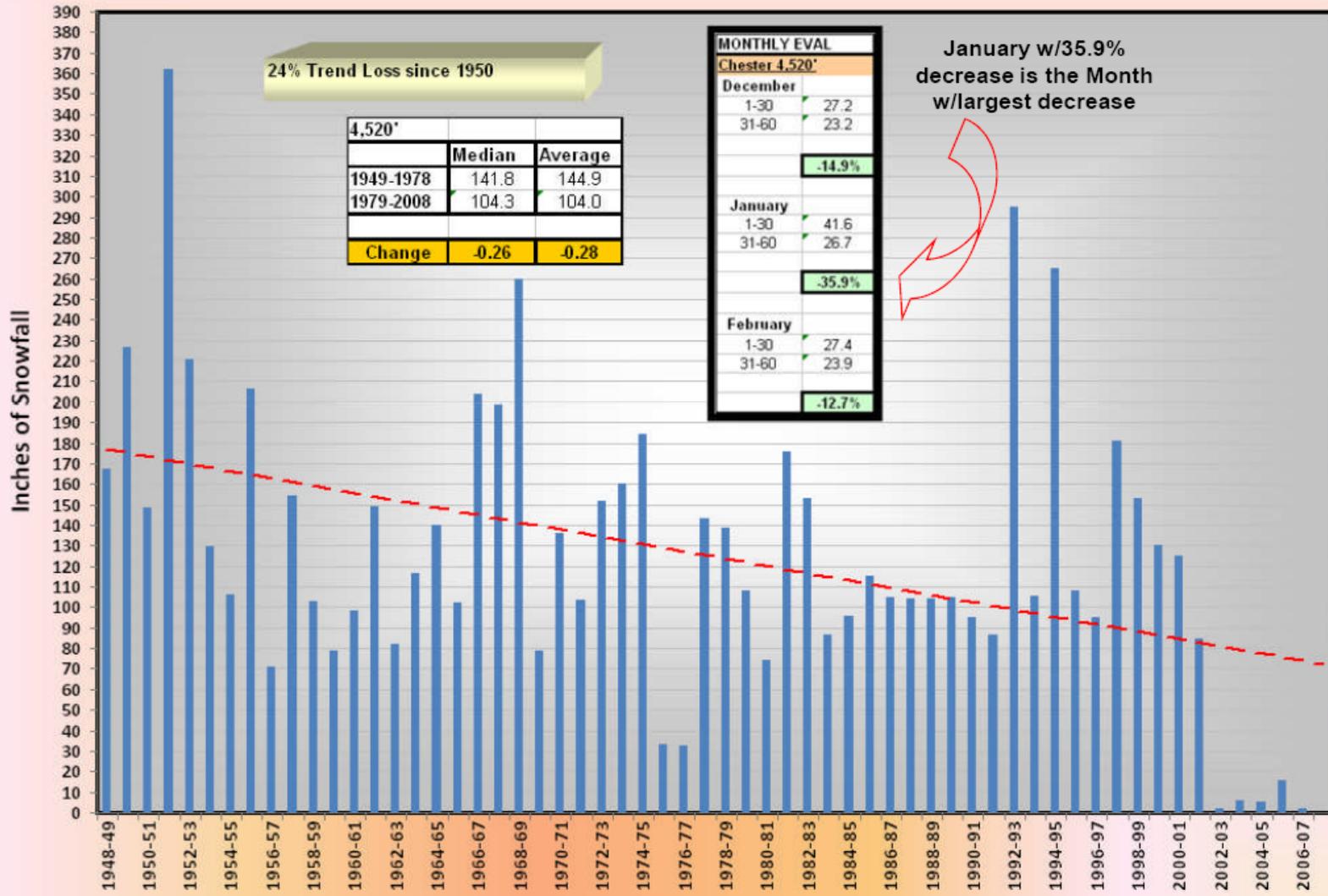
East Branch of No Fk Feather River, CA FNF
1935-2009 moving average of 30-yr** April-June mean Roff starting 1964



Reduced Snowpack Storage



Chester Annual Snowfall - 1949-2008 Elevation=4,520'

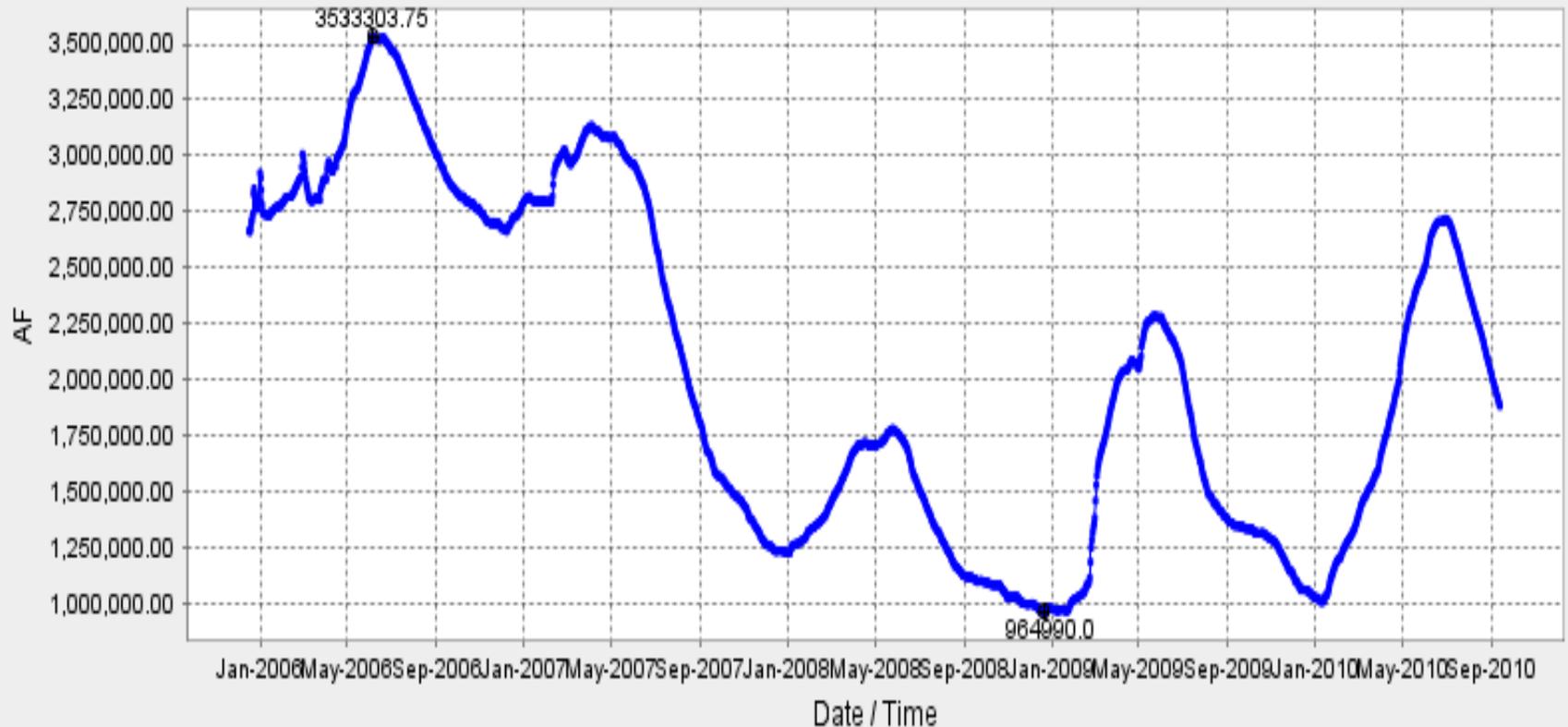


Declining Runoff – Downstream Effects

OROVILLE DAM (ORO)

Date from 12/15/2005 23:13 through 09/14/2010 23:13 Duration : 1733 days

Max of period : (06/06/2006 00:00, 3533303.75) Min of period: (12/20/2008 00:00, 964990.0)



RESERVOIR STORAGE - AF (3379)

Source: California Data Exchange Center

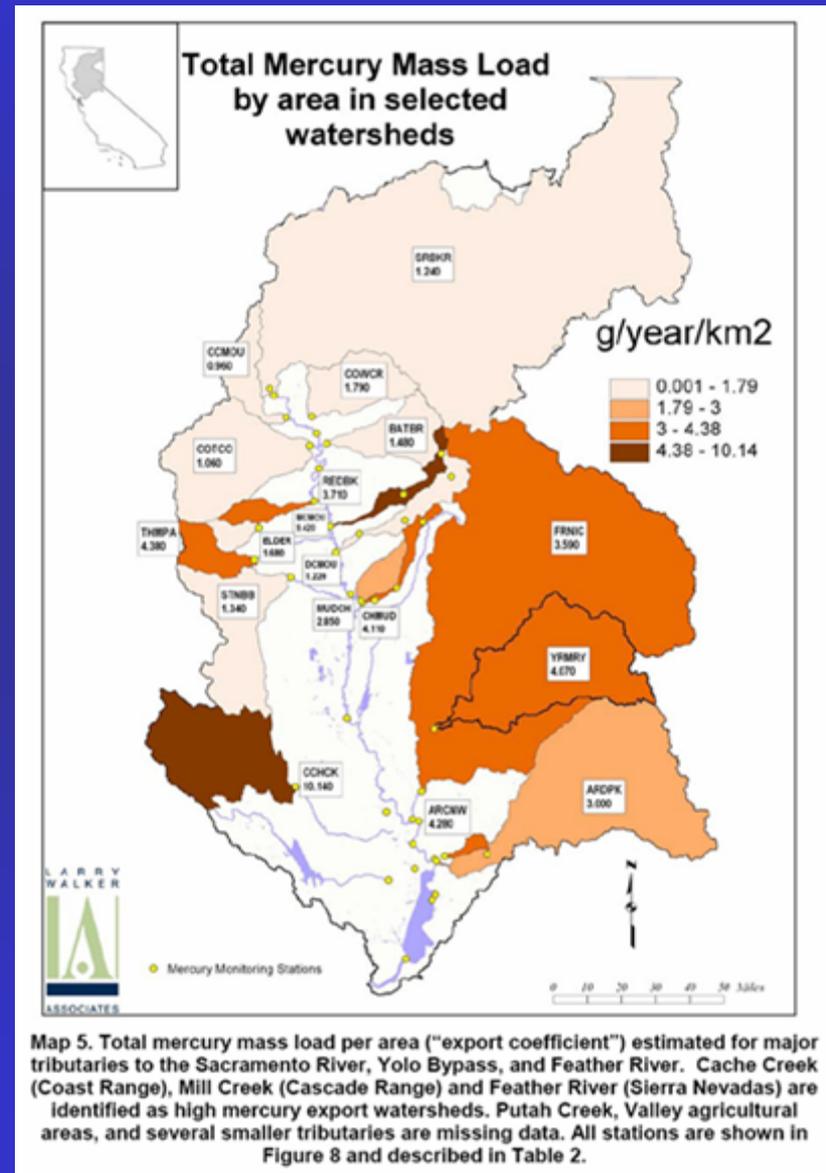
Regional Challenges – Declining Water Quality

Mercury Loads in the Sacramento River Region

“Mercury, a series of great opportunities disguised as insoluble problems.”

- Stephen McCord

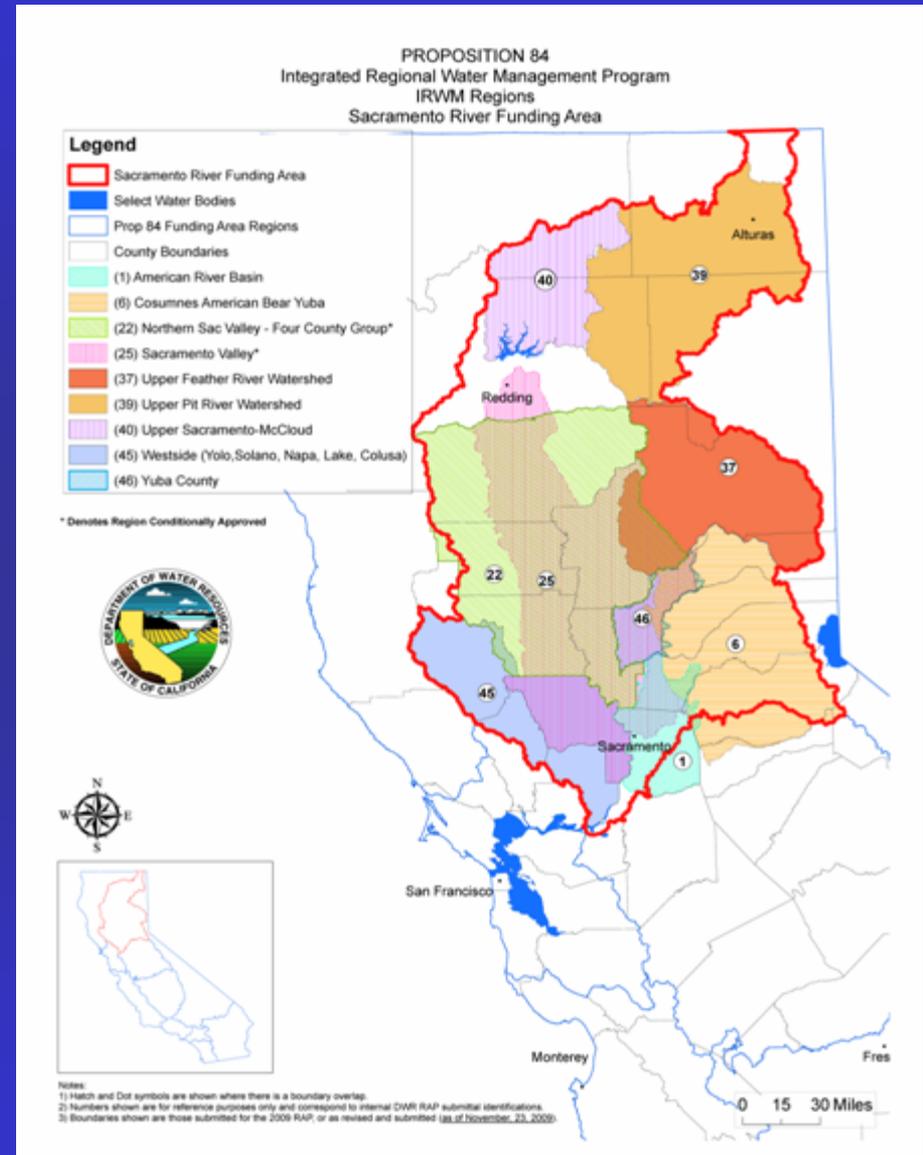
Delta Tributaries Mercury Council



Prop. 84 Interregional Mercury Planning Proposal by Sacramento River Watershed Program

Tribes, DWR, and the DMTC partner to link ecosystem and human health.

“Support inclusion of the California Indian Environmental Alliance (CIEA) to participate in Interregional Mercury Plan meetings, to identify tribal representatives in each IRWM Region, to summarize preferred communication methods between tribes and RWMGs, and to conduct outreach to include participation of California Indian Tribes and tribal members in the IRWM planning effort. CIEA has worked with tribes regionally to hold mercury strategic planning roundtables and to increase tribal participation in regional activities that regulate, reduce and address mercury. Tribes in the Cache Creek and Feather River watersheds have actively expressed interest addressing mercury contamination and their environmental departments have experience in management of similar projects CIEA will work with each RWMG to insure direct notification, outreach and consultation occurs to involve tribes directly.” - *Proposal Abstract*



Regional Challenges – Collapse of Delta Fisheries

Quantifiable Biological Objectives and Flow Criteria for Aquatic and Terrestrial Species of Concern Dependent on the Delta

DRAFT

California Department of Fish and Game

September 21, 2010

Category	Function	Flow (cfs) (Total 15000)	Year Type	Months												Citation	
				O	N	D	J	F	M	A	M	J	J	A	S		
Sacramento River	Increase juvenile salmon outmigration survival and abundance for fall-run Chinook salmon. Increases juvenile salmon outmigration survival	At Wilkins Slough: pulse flow: 20,000 cfs for 7 days ⁸	All		1	1	1										SWRCB (2010)
	Increase juvenile salmon outmigration survival by reducing diversion into Georgiana Slough and the central Delta	At Freeport: 13,000 - 17,000 ⁹	All		1	1	1	1	1	1	1	1					SWRCB (2010)
	Promote juvenile salmon outmigration	At Rio Vista: 20000 – 30000								1	1	1					DFG (2010a)



Q: Who will provide the leadership on inter-agency and inter-governmental solutions for landscape-based policy, funding, and pilot projects?



A: Natural Resources Agency

A: Tribes

A: USDA/Forest Service

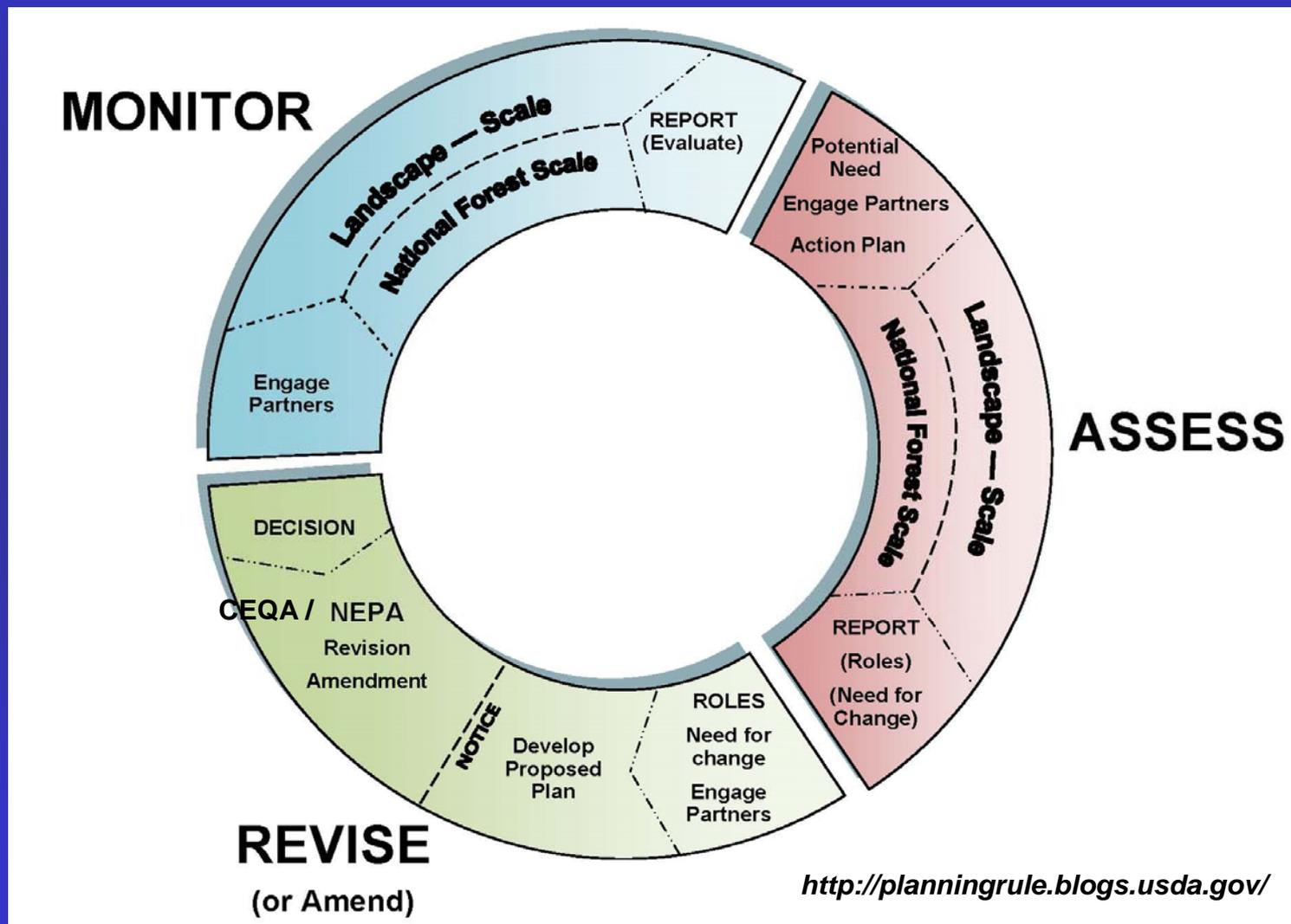
A: California Watershed Program

A: Sierra Nevada Conservancy

A: California Biodiversity Council



Recommendation #1: Scale up civic science, adaptive management, and inter-governmental coordination to address regional and statewide natural resource problems.



U.S. Forest Service



Enhance coordination between federal and state resource agencies to address interconnected forest, water, ecosystem, and human health problems.

“We propose that the 2011 Planning Rule guide management of NFS lands with a goal of maintaining and restoring healthy, resilient watersheds in order to protect and enhance America’s water resources for humans and the environment.”

“Water is a resource that epitomizes the need for a collaborative all-lands approach: in order to accomplish this goal, managers will need to work closely with neighbors, partners and stakeholders, within the context of the broader landscape.”

“Maintaining healthy watersheds and restoring damaged or degraded watersheds will help them be more resilient to climate change and other stressors, and will optimize their potential to continue to supply clean water and critical aquatic and terrestrial habitat, along with cultural services, recreation opportunities, and other benefits, far into the future.”



<http://planningrule.blogs.usda.gov/>

Recommendation #2:

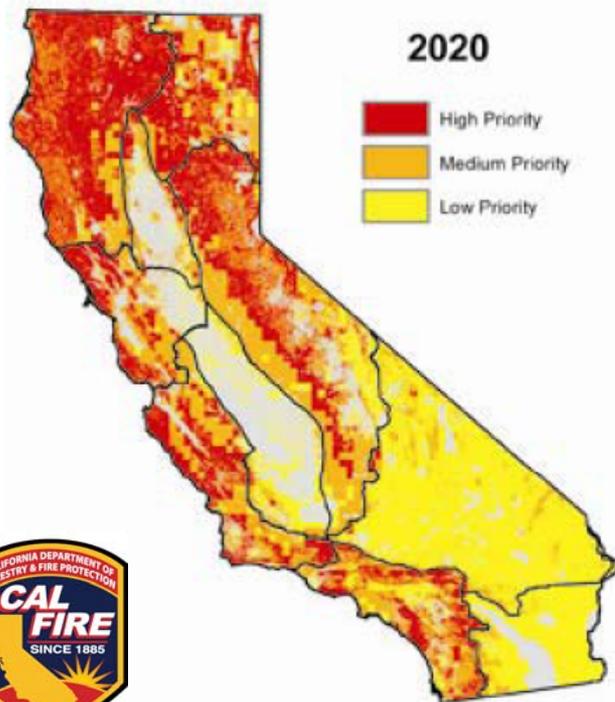
With the new Forest Service planning rule and forest plan updates, designate key National Forest System Lands in California as “*municipal watersheds*” –

- Feather
- Kings-Kern
- Inyo-Mono
- Pit
- American

“One issue is whether municipal watersheds should be placed under active or passive management regimes to sustain supplies of high-quality water over the long run. Many Forest Service specialists think that water supplies can be best protected by actively managing these watersheds to maintain forest vegetation and watershed processes within their natural range of variation.” -- Forest Service Chief Tom Tidwell

Recommendation #3: New challenges require new investments and an inter-agency approach to upland forest management

Climate Change Threats and Opportunities: Threats to Forest Carbon from Wildfire, Insects and Disease



High priority landscape acres by ownership	
USFS	12,240,000
BLM	1,350,000
DOD	240,000
Tribal	310,000
NPS	800,000
Other Federal	70,000
Other Gov	1,120,000
Private	13,390,000
NGO	100,000

*Inter-Agency Integration for Reduced Costs and Enhanced Ecosystem
and Public Health Benefits From Healthy, Fire-resistant Forests*



Potential Cost of a Catastrophic Wildfire

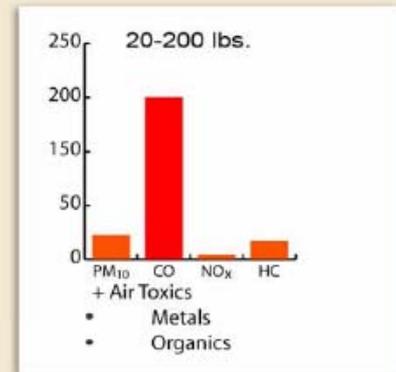
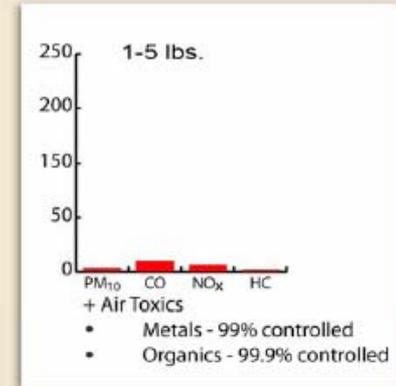
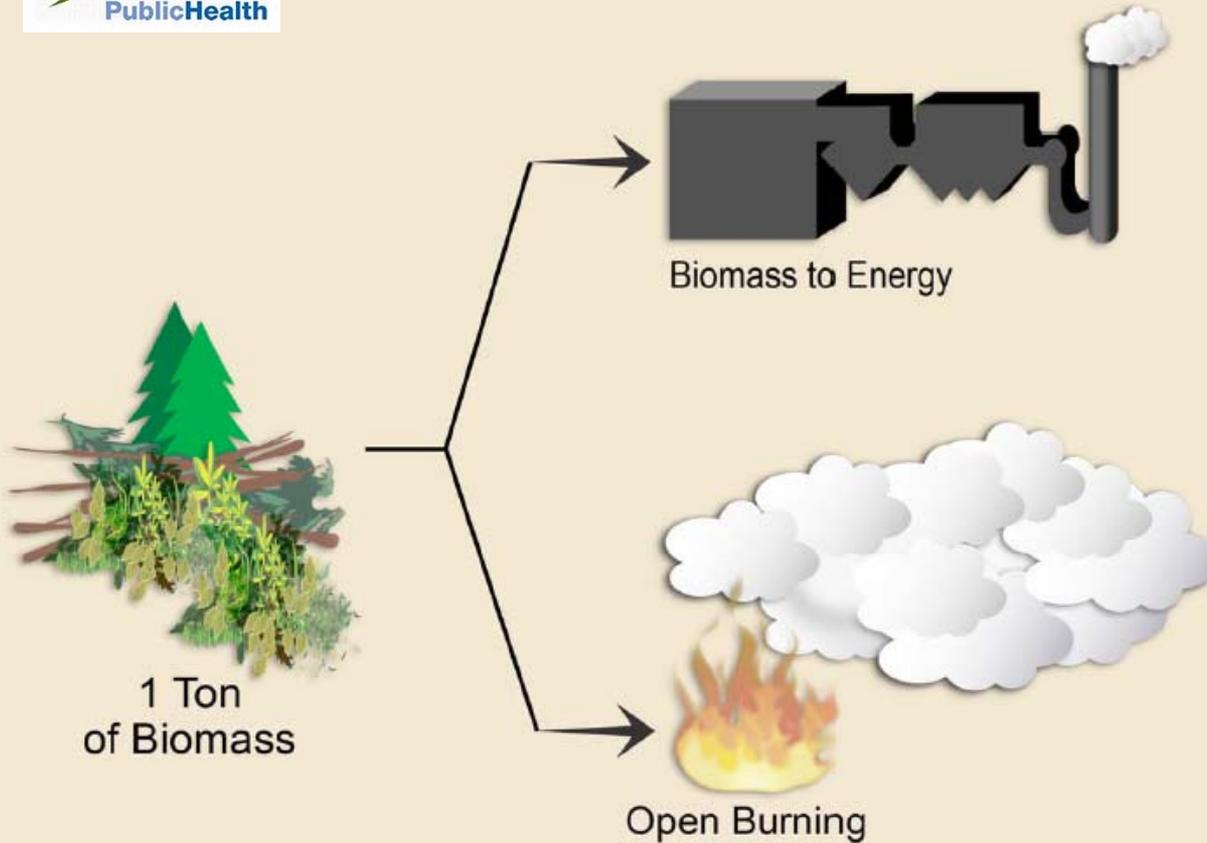
- Loss of homes/business (insurance premiums)
- Potential for loss of life & wildlife
- Air pollution increase
- Respiratory and cardiovascular impacts
- Watershed failure for decades
- Loss of forest for decades
- Increased green house gas release
- Professional firefighters cost
- Socio-psychological impacts

Fire Prevention costs a fraction of what a fire costs

Air Quality and Public Health Benefits Comparison

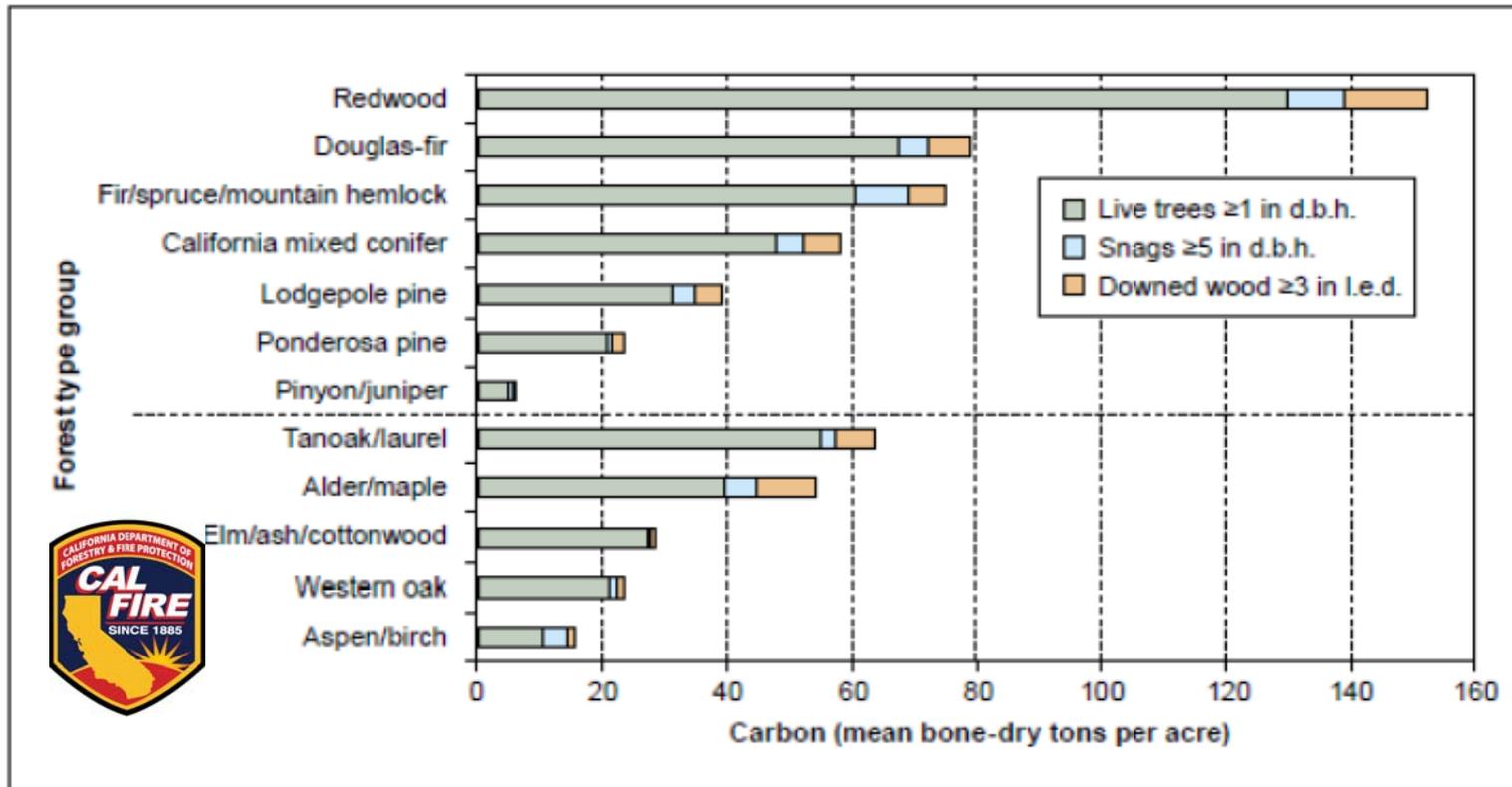


Air Quality Comparison (Relative Emissions)



Note: Other emissions not included are: Transport and firefighting related; localized emissions import from fuel processing plant; fugitive dust after burns; emissions from forest decay.

Forest Carbon In Live Tree, Snags and Downed Wood by Forest Type



Applying Recommendations to the Feather River Watershed

Recommendation #1: Scale up civic science, adaptive management, and inter-governmental coordination to address regional and statewide natural resource problems.

Recommendation #2: With the new Forest Service planning rule and forest plan updates, designate key National Forest System Lands in California as *“municipal watersheds”*

Recommendation #3: New challenges require new investments and an inter-agency approach to upland forest management

Applying Recommendations to the Feather River Watershed

- * Expand the physically-based modeling DWR and others have completed in portions of the Feather River system (Indian Creek, Last Chance, pending Middle Fork project) to cover the entire watershed and develop a full understanding of its current function and the range of options for both project operations and climate change adaptation.

- * Improve operational efficiency through adequate real-time monitoring and data collection for the 2.3 million-acre watershed above Lake Oroville.

Applying Recommendations to the Feather River Watershed

- * Improve water quality by implementing the recommendations of ICF Jones & Stokes presented in the May 2008 review of the Plumas Watershed Forum, which was commissioned by DWR and the State Water Project contractors. Among the recommendations:**
 - a. Recognize cost effectiveness of program**
 - b. Increase intervention funding**
 - c. Update the 2003 Feather River Watershed Management Strategy to reflect evolving priorities and lessons learned**
 - d. Work with water users and state and federal agencies to finance and sustain a multi-decade restoration effort**