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Item 8

Regional Water Board Actions to Support Salmonid Populations

Jonathan W. Warmerdam

North Coast Water Board

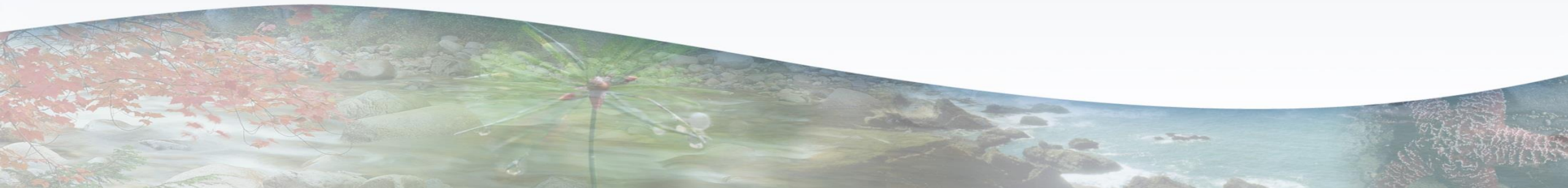
February 8, 2018

*Healthy watersheds. Effective regulation.
Strong partnerships.*



Presentation Topics

- SOS in the North Coast Region
- North Coast Water Board Sphere of Influence
- Restoration and Recovery Actions
- Time for Big Moves



	SPECIES COMMON NAME	STATUS SCORE	LEVEL OF CONCERN	
SALMON	California Coast Chinook Salmon	2.9	HIGH	
	Central Valley Fall-run Chinook Salmon	2.7	HIGH	
	Central Valley Late Fall-run Chinook Salmon	2.1	HIGH	
	Central Valley Spring-run Chinook Salmon	1.7	CRITICAL	
	Sacramento River Winter-run Chinook Salmon	1.3	CRITICAL	
	Southern Oregon/Northern California Coast Chinook Salmon	3.1	MODERATE	
	Upper Klamath-Trinity Rivers Fall-run Chinook Salmon	3.1	MODERATE	
	Upper Klamath-Trinity Rivers Spring-run Chinook Salmon	1.6	CRITICAL	
	Central California Coast Coho Salmon	1.3	CRITICAL	
	Southern Oregon/Northern California Coast Coho Salmon	1.7	CRITICAL	
	Chum Salmon	1.6	CRITICAL	
	Pink Salmon	1.6	CRITICAL	
	STEELHEAD	Central California Coast Steelhead	2.0	HIGH
		Central Valley Steelhead	3.1	MODERATE
Klamath Mountains Province Summer Steelhead		1.9	CRITICAL	
Klamath Mountains Province Winter Steelhead		3.3	MODERATE	
Northern California Summer Steelhead		1.9	CRITICAL	
Northern California Winter Steelhead		3.3	MODERATE	
South-Central California Coast Steelhead		1.9	CRITICAL	
Southern Steelhead		1.9	CRITICAL	
TROUT	Bull Trout*	0.0	EXTINCT	
	California Golden Trout	1.9	CRITICAL	
	Coastal Cutthroat Trout	2.7	HIGH	
	Coastal Rainbow Trout	4.7	LOW	
	Eagle Lake Rainbow Trout	2.3	HIGH	
	Goose Lake Redband Trout	3.1	MODERATE	
	Kern River Rainbow Trout	1.4	CRITICAL	
	Lahontan Cutthroat Trout	2.0	HIGH	
	Little Kern Golden Trout	2.0	HIGH	
	McCloud River Redband Trout	1.4	CRITICAL	
	Palute Cutthroat Trout	2.1	HIGH	
	WHITEFISH	Mountain Whitefish	3.4	MODERATE

SOS in the North Coast Region

- Salmon (8 species)
- Steelhead (5 species)
- Trout (2 species)

Species Status in North Coast

Coast Moderate Level of Concern (7 species)

- Chinook Salmon – Northern California Spring-run
- Chinook Salmon – Klamath/Trinity Fall-run
- Coho Salmon – Klamath/Trinity Winter-run
- Steelhead Trout – Northern CA Winter-run
- Steelhead Trout – Northern CA Winter-run
- Pink Salmon
- Summer Steelhead – Klamath Mountain
- Summer Steelhead – Northern CA

Water Board Authority

Beneficial use protection:

- Cold-Freshwater Habitat
- Rare, Threatened, or Endangered Species
- Migration of Aquatic Organisms
- Spawning, Reproduction, Early Development
- Wildlife Habitat
- Estuarine Habitat
- Native American Culture
- Subsistence Fishing
- Commercial and Sport Fishing
- Inland Saline Water Habitat
- Marine Habitat



North Coast Water Board Sphere of Influence*



*Not to scale



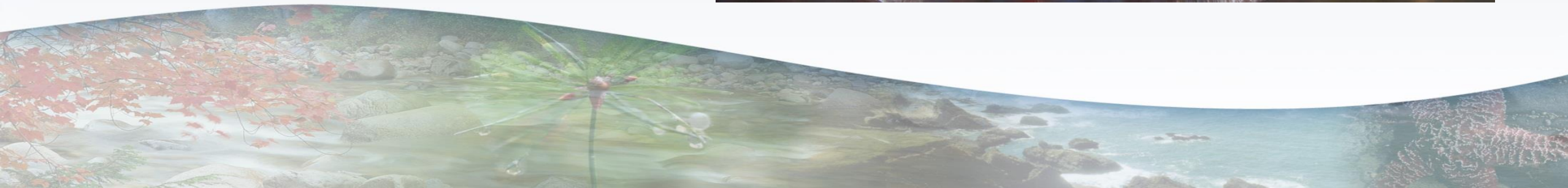
Prevent Pollution

- Construction storm water
- Municipal dischargers
- Landfills
- Development projects
- Timber harvest
- Roads
- Agriculture



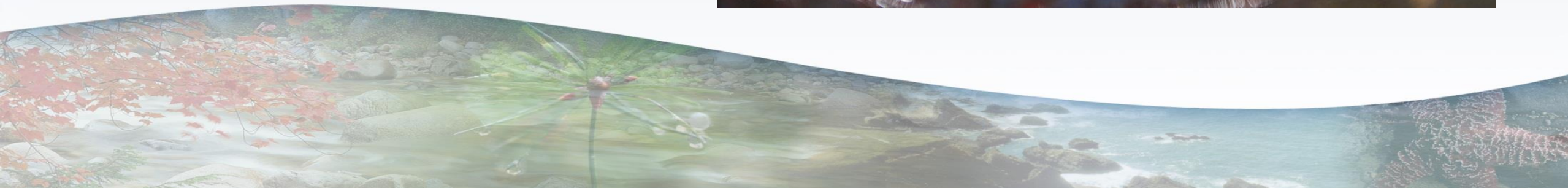
Develop Policy

- Basin planning
- 303d listing
- TMDLs
- Develop regulation
- Temperature Policy
- Climate change adaptation strategy



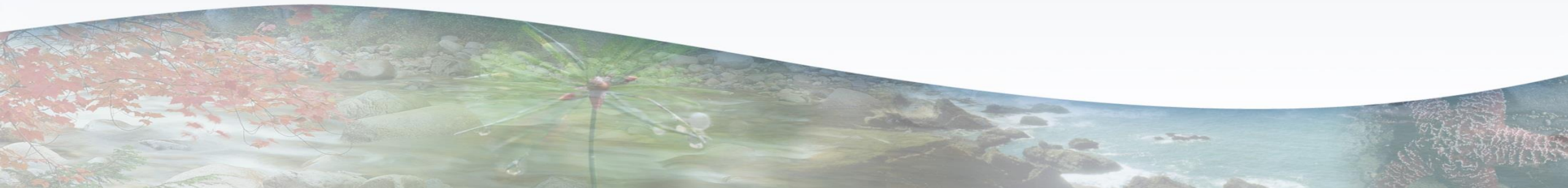
Develop Policy

- Policy in Support of Restoration in the North Coast Region
- R1-2015-0001
- Adopted January 2015



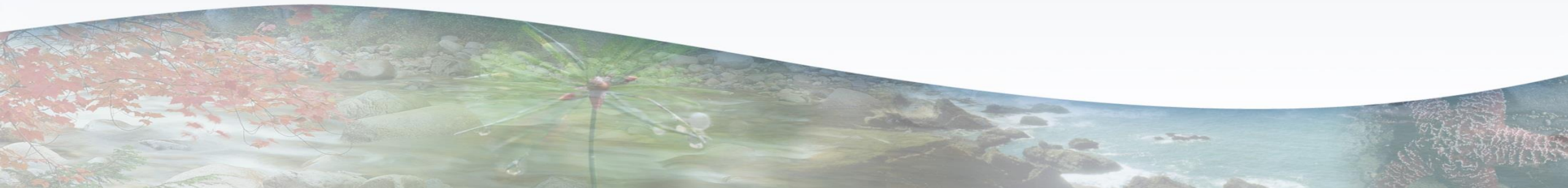
North Coast Water Board Grants / Contracts

- Federal 319(h) NPS Pollution Control (\$3.02 million)
 - Post-fire recovery projects (\$350k)
- Cleanup and Abatement Account
 - Post-fire recovery projects (\$800k)
- Timber Reg. & Forest Restoration Fund (\$2.95 million)
- Discretionary Contracts



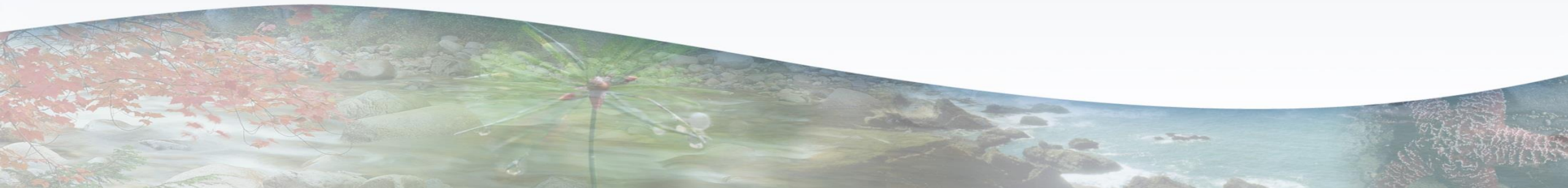
Coordinate Permitting

- Mendocino County Permit Coordination Program
- 5 County Roads Program
- Ownership-wide WDRs
- Wood for Salmon Working Group



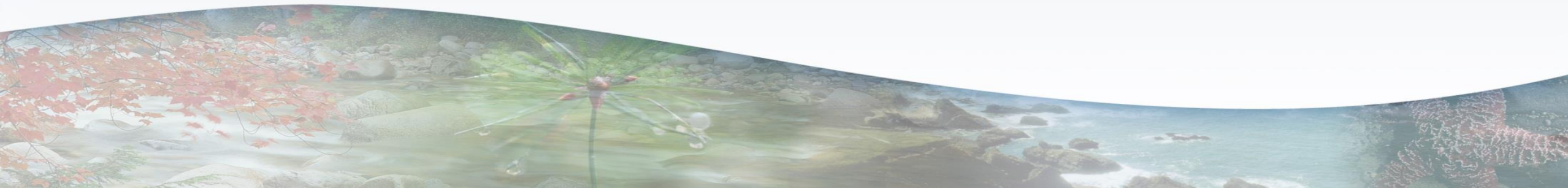
Foster Restoration Programs

- AB 1961 - Coho HELP Act (expired January 2018)
- AB 2193 - Habitat Restoration and Enhancement Act
- Forest Practice Rules – restoration pathway 916.9(v)
- California Forest Improvement Program (CFIP)
- Sustainable Conservation statewide restoration permitting



Restoration and Recovery Actions

What have
you done for
me *lately*?



Migration Barrier Removal



MILL CREEK DAM FISH PASSAGE PROJECT
Partners: Trout Unlimited, Prunuske Chatham Inc.
Funders: NOAA, CDFW, SCWA

Large Wood Restoration



LARGE WOOD AUGMENTATION IN MENDO. COAST

Partners: Trout Unlimited, Blencowe and Associates,
California Conservation Corps, Mendocino Redwood Co.

Funders: North Coast Water Board, NOAA

Riparian Planting and Fencing



NAVARRO RIVER HEADWATERS TMDL PROJECT

Partners: Mendocino RCD

Funders: North Coast Water Board

Flow Enhancement / Groundwater Recharge



BAKER CREEK RECHARGE PROJECT
Partners: Sanctuary Forest, BLM, Elijah Portugal
Funders: Wildlife Conservation Board (Prop 1)

Cold Water Refugia



LITTLE SPRINGS CREEK CULVERT REMOVALS

Partners: CDFW, The Nature Conservancy

Funders: To be determined....

Beaver Dam Analogues



SCOTT RIVER BEAVER DAM ANALOGUES

Partners: Scott River Watershed Council, NOAA, CDFW, NCRWQCB

Funders: USFWS - Partners Coho Enhancement Fund (BOR funds)

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Eurasian beaver activity increases water storage, attenuates flow and mitigates diffuse pollution from intensively-managed grasslands

Alan Puttock^{a,*}, Hugh A. Graham^a, Andrew M. Cunliffe^a, Mark Elliott^b, Richard E. Brazier^a

^a Geography, University of Exeter, Exeter, United Kingdom
^b Devon Wildlife Trust, Chislipie Hill, Exeter, United Kingdom

HIGHLIGHTS

- Beavers in wooded site, on first order tributary draining from agricultural land.
- Beaver activity has resulted in major changes to ecosystem structure at the site.
- Beaver activity increased water storage within site and attenuated flow.
- Reduced sediment, N and P, but more DOC in water leaving site.
- Important implications for nature based solutions to catchment management issues.

GRAPHICAL ABSTRACT

The graphical abstract contains two charts. The top chart, 'Flow In and Out of Beaver Site', is a line graph showing discharge (m³ s⁻¹) on the y-axis (0 to 0.12) and time on the x-axis. It compares 'Above beaver' (red line) and 'Below beaver' (blue line) discharge. The 'Above beaver' line shows a sharp peak, while the 'Below beaver' line shows a much lower, broader peak. The bottom chart, 'Suspended Sediment Above and Below Beaver Site', is a bar chart showing SS <math>SS_{500 (mg l⁻¹) on the y-axis (0 to 200) for 'Above beaver' and 'Below beaver' sites. The 'Above beaver' bar is significantly higher than the 'Below beaver' bar.

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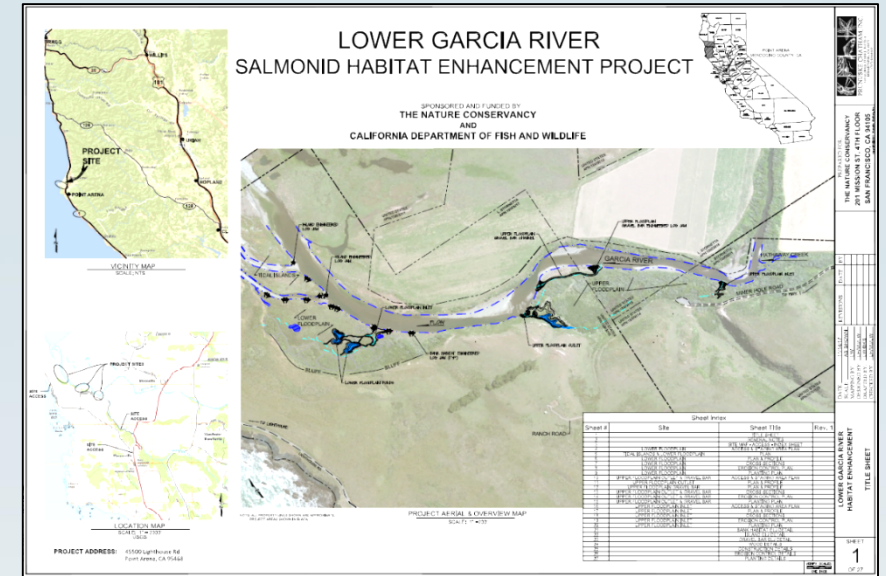
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Flow attenuation
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Water quality

ABSTRACT

Beavers are the archetypal keystone species, which can profoundly alter ecosystem structure and function through their ecosystem engineering activity, most notably the building of dams. This can have a major impact upon water resource management, flow regimes and water quality. Previous research has predominantly focused on the activities of North American beaver (*Gastor canadensis*) located in very different environments, to the intensive lowland agricultural landscapes of the United Kingdom and elsewhere in Europe. Two Eurasian beavers (*Gastor fiber*) were introduced to a wooded site, situated on a first order tributary, draining from intensively managed grassland. The site was monitored to understand impacts upon water storage, flow regimes and water quality. Results indicated that beaver activity, primarily via the creation of 13 dams, has increased water storage within the site (holding ca. 1000 m³ in beaver ponds) and beavers were likely to have had a significant flow attenuation impact, as determined from peak discharges (mean 30 ± 19% reduction), total discharges (mean 34 ± 9% reduction) and peak rainfall to peak discharge lag times (mean 29 ± 21% increase) during storm events. Event monitoring of water entering and leaving the site showed lower concentrations of suspended sediment, nitrogen and phosphate leaving the site (e.g. for suspended sediment; average entering site: 112 ± 72 mg l⁻¹, average leaving site: 39 ± 37 mg l⁻¹). Combined with attenuated flows, this resulted in lower diffuse pollutant loads in water downstream. Conversely, dissolved organic carbon concentrations and loads downstream were higher. These observed changes are argued to be directly attributable to beaver activity at the site which has created a diverse wetland environment, reducing downstream hydrological connectivity.

* Corresponding author.
E-mail address: A.K.Puttock@exeter.ac.uk (A. Puttock).

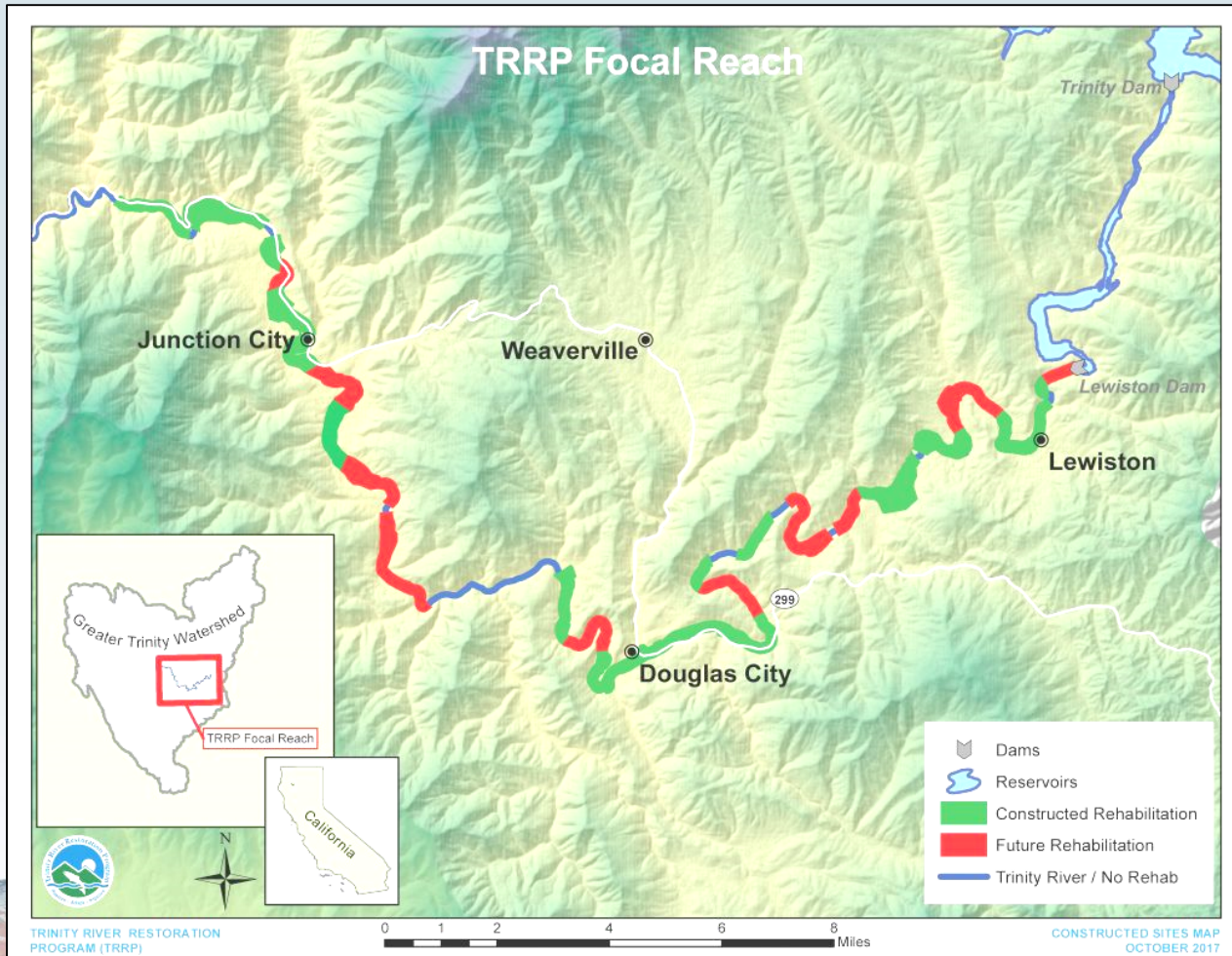
Estuary Restoration



Lower Garcia River Salmonid Enhancement Project
Partners: The Nature Conservancy, Prunuske Chatham, Inc.
Funders: CDFW - FRGP



Trinity River Restoration Program

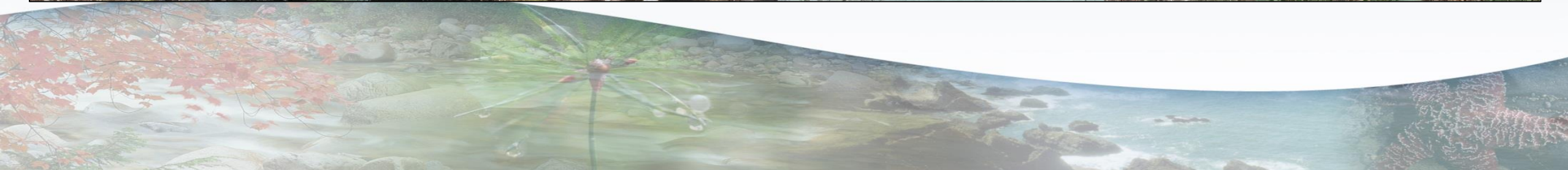


- Large-scale river restoration
- 1960s Central Valley Project
- 2000 Trinity River ROD
 - 50% of flows for CVP
 - 40 mile habitat restoration project
- NCRWQCB role
 - CEQA lead
 - Water quality certifications

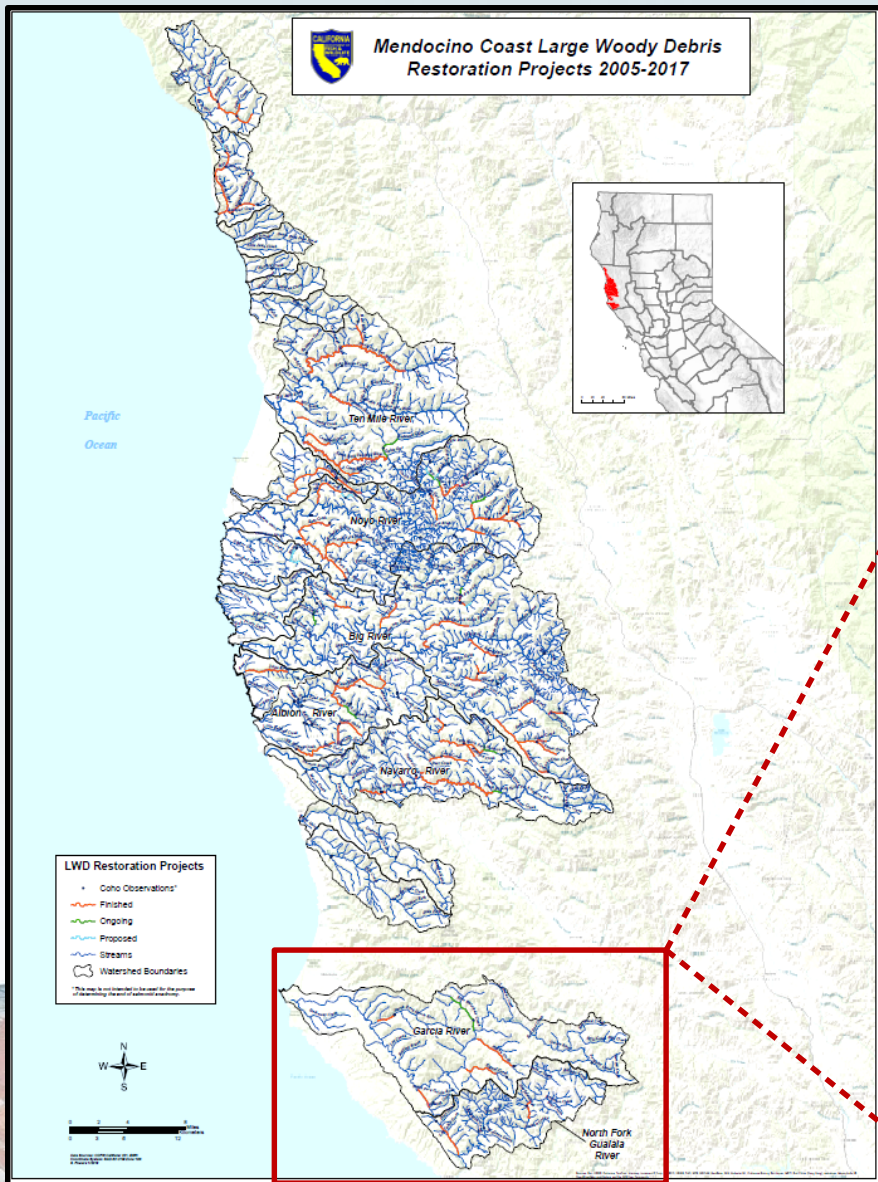
Time For Big Moves



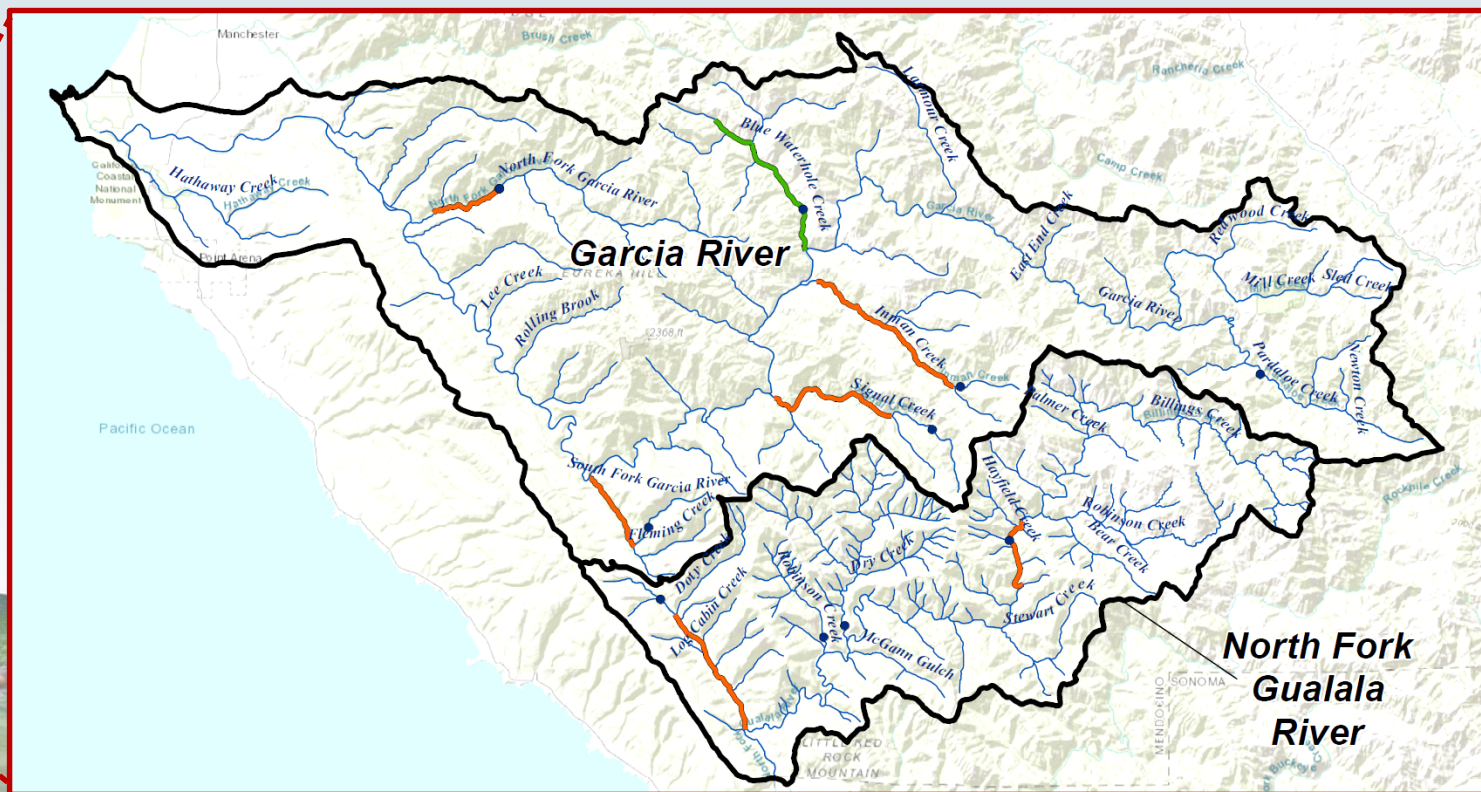
Support Process-Based Restoration



Large Scale Wood Re-loading

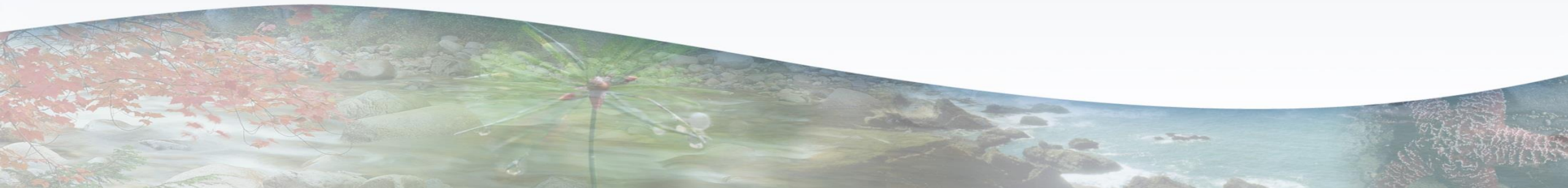


- Mendocino Coast = bulk of remaining CCC Coho Salmon
- 750+ miles of fish-bearing stream in Mendocino Coast
- 150 miles treated between 2004 and 2017 (all funding sources)
- 50+ years more at current pace



Incentivize Restoration

- Consolidate permitting
- Fund restoration
- Scale up restoration programs (e.g., California Forest Improvement Program)
- Make restoration part of doing business (e.g., timber harvest)
- Make legislation happen



Restore Natural Processes



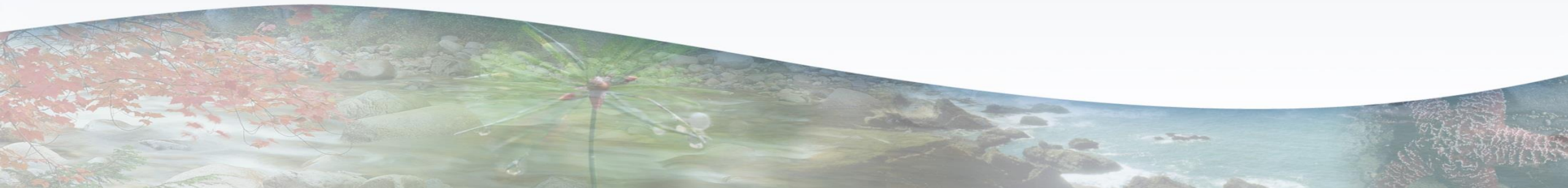
Restore Natural Processes



California Department of Fish and Game – 1950s

Invest in Recovery

- Lake Tahoe Water Clarity Investment - \$2 billion
- California Delta Tunnel Plan - \$8 to 16 billion
- California Climate Change Investments - \$2.5 billion
- Coho Salmon Recovery Plan Estimate - \$1.5 billion (50-100 years)



Klamath Dams Decommissioning



Klamath Reopening Day - 2020



What other actions can be taken to support salmonids?



Questions?



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Jonathan W. Warmerdam
NCRWQCB
(707) 576-2468

Jonathan.Warmerdam@waterboards.ca.gov

