California Drought: What will it take to protect species?

February 15, 2023

Jeffrey Mount, Senior Fellow

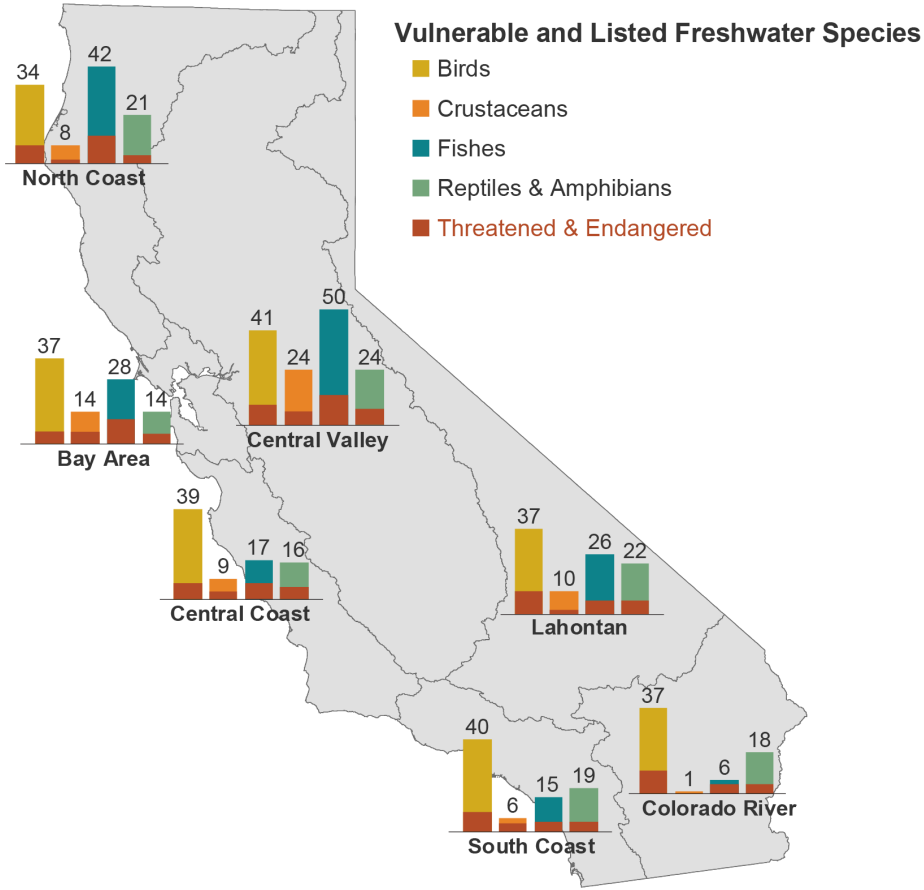
Supported with funding from the NOAA National Integrated Drought Information System (NIDIS) and the PPIC CalTrout Ecosystem Fellowship

A talk informed by the work of others

Peter Moyle

- Biologists/Ecologists
  - Ted Grantham
  - Letitia Grenier
  - Eric Stein
  - Josh Viers
  - Jim Cloern
  - Frank Davis
  - Mark Schwartz
  - Alison Whipple
  - Nate Seavy
  - Anna Sturrock
  - Carson Jeffres
  - Rob Lusardi
  - Caitrin Chappelle
- Hydrologists/Climatologists
  - Mike Dettinger
  - Daniel Swain
  - Sarah Null
  - HB Zeff
  - Sarah Yarnell
- Economists
  - Ellen Hanak
  - Richard Howitt
  - Josue Medellin-Azuara
  - Yusuke Kuwayama
  - Andrew Ayres
- Engineers
  - Jay Lund
  - Greg Gartrell
  - Alvar Escriva-Bou
  - Bill Fleenor
- Legal/Policy Experts
  - Brian Gray
  - Buzz Thompson
  - Jennifer Harder
  - Leon Szeptycki
  - Karrigan Bork

- **Outline of presentation**
  - Drought-resilient native species
  - Causes of decline in drought resilience
  - New proposed approach:
    - Makes the environment a priority, rather than constraint
    - Requires allocation of assets and good plans
  - But difficult discussions ahead on species viability under climate change



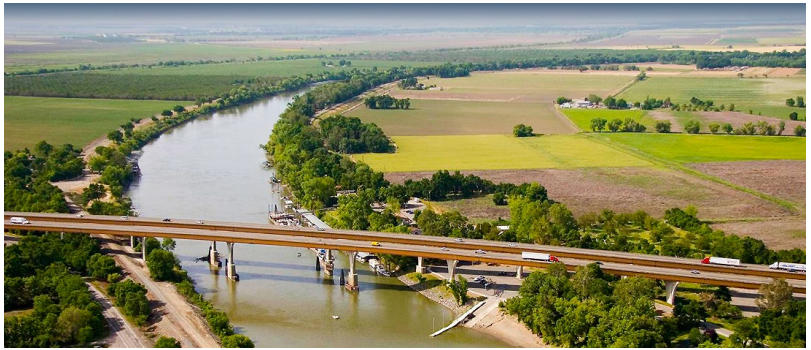
Source: Mount et al., 2019

Drought resilience strategies

- Avoidance
- Resistance
- Recovery

Working against drought resilience

- Disconnection
- Loss of flow variability
- Water quality degradation
- Introduced species
- Loss of genetic diversity



Drought Adaptation	Why no longer working
Anadromy	Populations decline when one part of life cycle consistently in poor condition
Fecundity	Abundant habitat no longer available during wet periods
Longevity	Drought-like conditions in most years due to land/water management
Tracking	Changes in inflow to estuaries and landscape changes make tracking ineffective
Long-distance movement	Dams and other structures block migration to refugia
Dispersal	Dams and other structures block dispersal after drought

A systemic problem: The environment is treated as regulatory constraint, not a management priority

- Reflected in flow and water quality standards
- Narrow focus on listed species, not ecosystems
- Thresholds in regulation produce bizarre changes in operations
- Regulations unable to adapt to changing conditions

- *The 2016 WIIN Act directs that the biological opinions governing project operations must "**provide the maximum quantity of water supplies practicable**" to CVP and SWP contractors "**without causing additional harm to the protected species.**"*

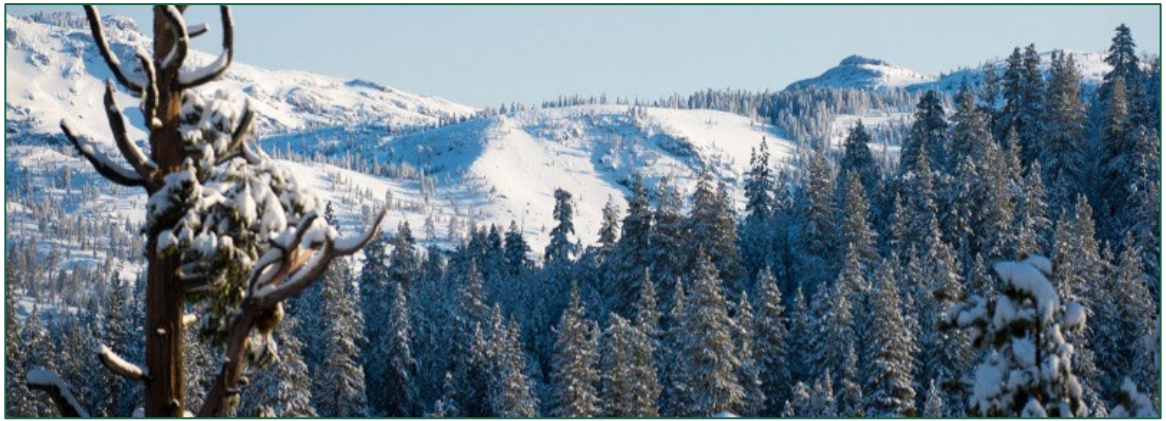
An alternative path: Ecosystem-based management instead of ESA-based management

- Manages for *ecosystem condition* rather than listed species
- Integrates human uses and emphasizes multiple benefits
- Produces greater net benefits and reduces water conflict

South Fork Eel River. Source: Ted Grantham

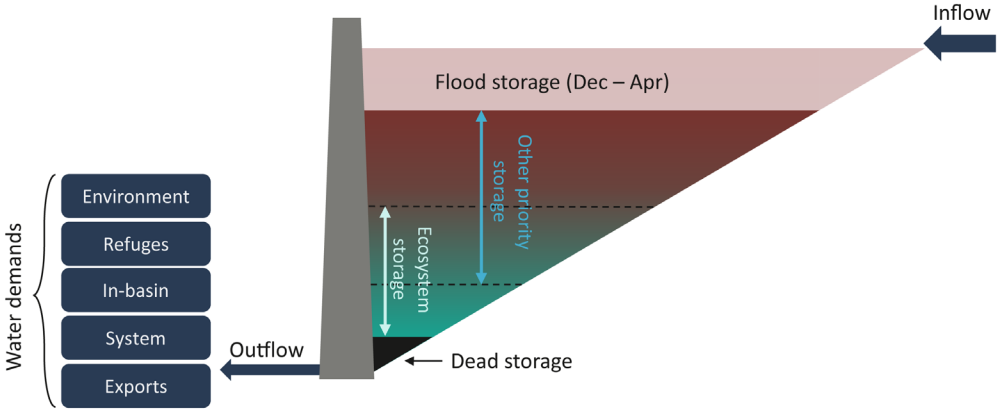
Partners need assets to bring to the table

- Ecosystem Water Budgets (EWB)
  - A defined quantity of water in a watershed that can be flexibly managed like a priority water right in order to meet ecosystem goals



Ecosystem water should be flexibly managed

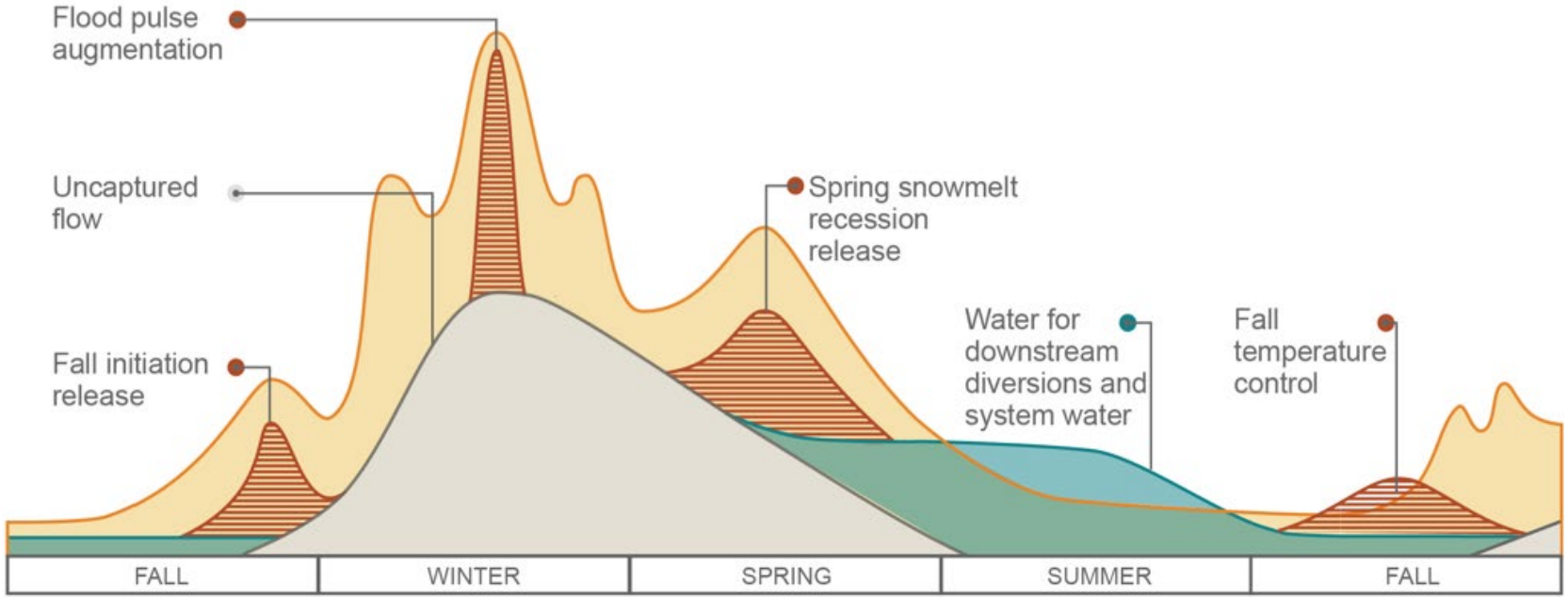
- Integrate into the water rights system within a watershed
- Create a management structure with ecosystem trustees
- Grant management flexibility, including trading and storage
- Improve certainty over allocation by fixing budget and term



- Source: Null et al. 2022. Storing Water for the Environment: Operating Reservoirs to Improve California's Freshwater Ecosystems.

10

Partners make efficient use of their assets: Functional flows/flow shaping



Yellow area = natural flow regime; blue areas = water for downstream diversions and system water; gray area = uncaptured flows; hatched red areas = EWB.

Efficiency of use requires pairing functional flows with structural habitat and drought refugia

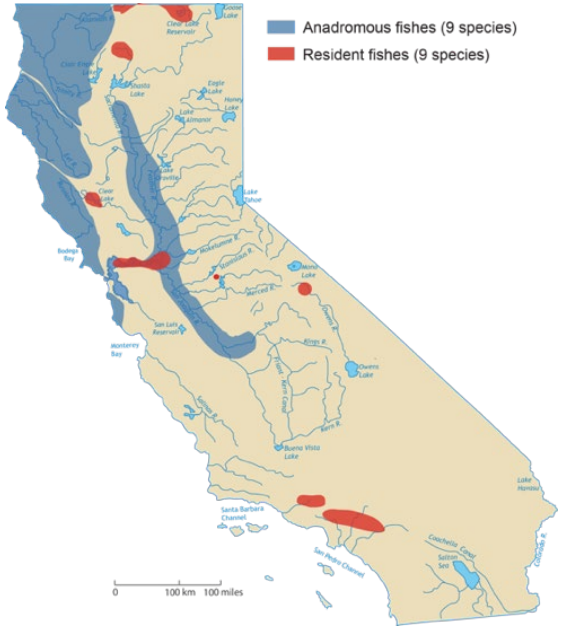
Photo: DWR

Photo: Josh Viers

And using these tools to address the root cause of decline in drought resilience

- Disconnection
- Loss of flow variability
- Water quality degradation
- Introduced species
- Loss of genetic diversity

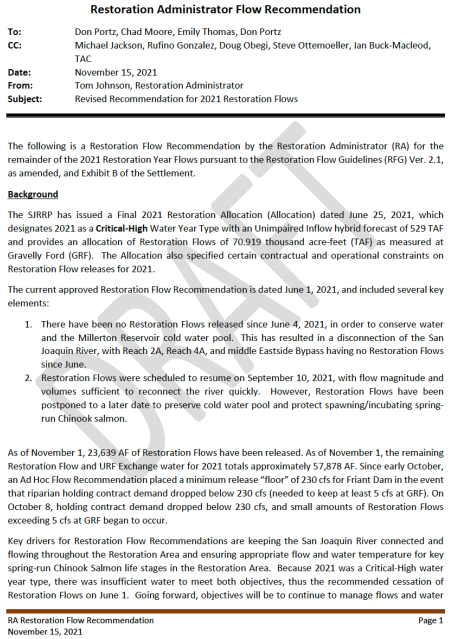
Half the fish at high risk of extinction in recent droughts are *not* listed under ESAs



Source: Hanak et al. (2015)

Partners have a watering plan and set priorities

- Planning and plans matter
- Few comprehensive, ecosystem-based watershed plans out there
- And a profound unwillingness to set priorities
- The Australian model: Annual Environmental Watering Plans
  - Vetted with users in advance
  - Decision tree released in the fall
  - Managed by a trustee
  - Linked to structural habitat



Restoration Administrator Flow Recommendation

To: Don Portz, Chad Moore, Emily Thomas, Don Portz
CC: Michael Jackson, Rufino Gonzalez, Doug Obegi, Steve Ottemoeller, Ian Buck-Macleod, TAC
Date: November 15, 2021
From: Tom Johnson, Restoration Administrator
Subject: Revised Recommendation for 2021 Restoration Flows

The following is a Restoration Flow Recommendation by the Restoration Administrator (RA) for the remainder of the 2021 Restoration Year Flows pursuant to the Restoration Flow Guidelines (RFG) Ver. 2.1, as amended, and Exhibit B of the Settlement.

Background

The SJRRP has issued a Final 2021 Restoration Allocation (Allocation) dated June 25, 2021, which designates 2021 as a **Critical-High** Water Year Type with an Unimpaired Inflow hybrid forecast of 529 TAF and provides an allocation of Restoration Flows of 70.919 thousand acre-feet (TAF) as measured at Gravelly Ford (GRF). The Allocation also specified certain contractual and operational constraints on Restoration Flow releases for 2021.

The current approved Restoration Flow Recommendation is dated June 1, 2021, and included several key elements:

1. There have been no Restoration Flows released since June 4, 2021, in order to conserve water and the Millerton Reservoir cold water pool. This has resulted in a disconnection of the San Joaquin River, with Reach 2A, Reach 4A, and middle Eastside Bypass having no Restoration Flows since June.
2. Restoration Flows were scheduled to resume on September 10, 2021, with flow magnitude and volumes sufficient to reconnect the river quickly. However, Restoration Flows have been postponed to a later date to preserve cold water pool and protect spawning/incubating spring-run Chinook salmon.

As of November 1, 23,639 AF of Restoration Flows have been released. As of November 1, the remaining Restoration Flow and URF Exchange water for 2021 totals approximately 57,878 AF. Since early October, an Ad Hoc Flow Recommendation placed a minimum release "floor" of 230 cfs for Friant Dam in the event that riparian holding contract demand dropped below 230 cfs (needed to keep at least 5 cfs at GRF). On October 8, holding contract demand dropped below 230 cfs, and small amounts of Restoration Flows exceeding 5 cfs at GRF began to occur.

Key drivers for Restoration Flow Recommendations are keeping the San Joaquin River connected and flowing throughout the Restoration Area and ensuring appropriate flow and water temperature for key spring-run Chinook Salmon life stages in the Restoration Area. Because 2021 was a Critical-High water year type, there was insufficient water to meet both objectives, thus the recommended cessation of Restoration Flows on June 1. Going forward, objectives will be to continue to manage flows and water

RA Restoration Flow Recommendation
November 15, 2021
Page 1

San Joaquin River Restoration Program Administrator's "watering plan"

Summary: What's it going to take to rebuild drought resilience

1. Make the environment a priority, not a constraint
2. Ecosystem-based management
3. Ecosystem water budgets and trustees to manage them
4. Functional flows paired with structural habitat
5. Plans with priorities
6. Finally, have difficult discussions about the future viability of species

Thanks

PPIC PUBLIC POLICY INSTITUTE OF CALIFORNIA

NOVEMBER 2017

Jeffrey Mount,
Brian Gray,
Caitrin Chappelle,
Greg Gartrell,
Ted Grantham,
Peter Moyle,
Nathaniel Seavy,
Leon Szeptycki,
Barton "Buzz" Thompson
with research support from Jelena Jezdimirovic

Supported with funding from the Dirk and Charlene Kabcenell Foundation, the S. D. Bechtel, Jr. Foundation, the US Environmental Protection Agency, and the Water Foundation

Managing California's Freshwater Ecosystems

Lessons from the 2012–16 Drought

PPIC PUBLIC POLICY INSTITUTE OF CALIFORNIA 25 YEARS

DECEMBER 2019

Jeffrey Mount,
Brian Gray,
Karrigan Bork,
James E. Cloern,
Frank W. Davis,
Ted Grantham,
Letitia Grenier,
Jennifer Harder,
Yusuke Kuwayama,
Peter Moyle,
Mark W. Schwartz,
Alison Whipple, and
Sarah Yarnell
with research support from Gokce Sencan

Supported with funding from the S. D. Bechtel, Jr. Foundation and the funders of the PPIC CalTrout Ecosystem Fellowship

A Path Forward for California's Freshwater Ecosystems

PPIC PUBLIC POLICY INSTITUTE OF CALIFORNIA

AUGUST 2020

Ted Grantham,
Jeffrey Mount,
Eric D. Stein,
Sarah Yarnell
with research support from Gokce Sencan

Supported with funding from the S. D. Bechtel, Jr. Foundation and the funders of the PPIC CalTrout Ecosystem Fellowship

Making the Most of Water for the Environment

A Functional Flows Approach for California's Rivers

About these slides

These slides were created to accompany a presentation. They do not include full documentation of sources, data samples, methods, and interpretations. To avoid misinterpretations, please contact:

Jeff Mount (mount@ppic.org, 415-291-4476)

Thank you for your interest in this work.