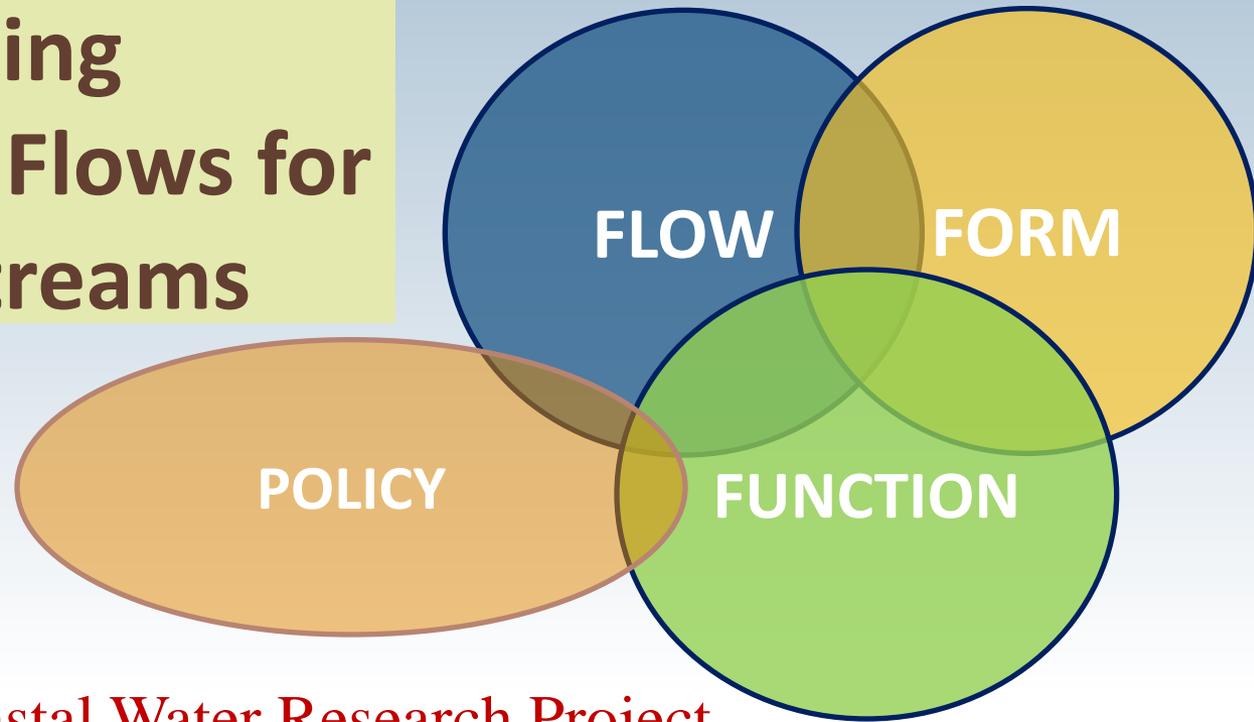


# Overview of a Tiered Framework for Establishing Environmental Flows for California Streams



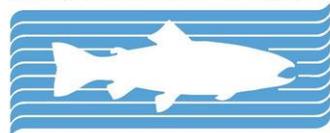
**Eric Stein**

Southern California Coastal Water Research Project



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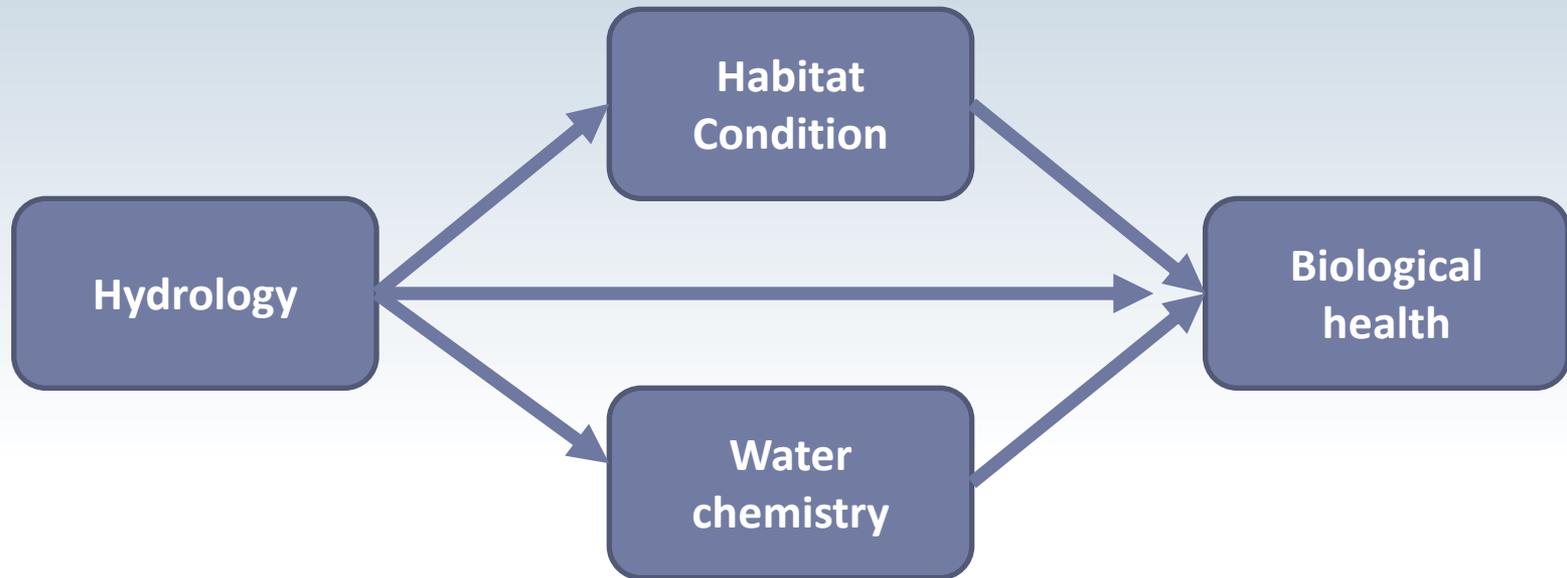
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# Roadmap for Today

- Overview of environmental flows needs for California
- Status of ongoing efforts
  - Challenges and opportunities
- Tiered framework for managing environmental flows
- Formation of a new Council workgroup

# Hydrology is an Integrative Driver of Stream Health

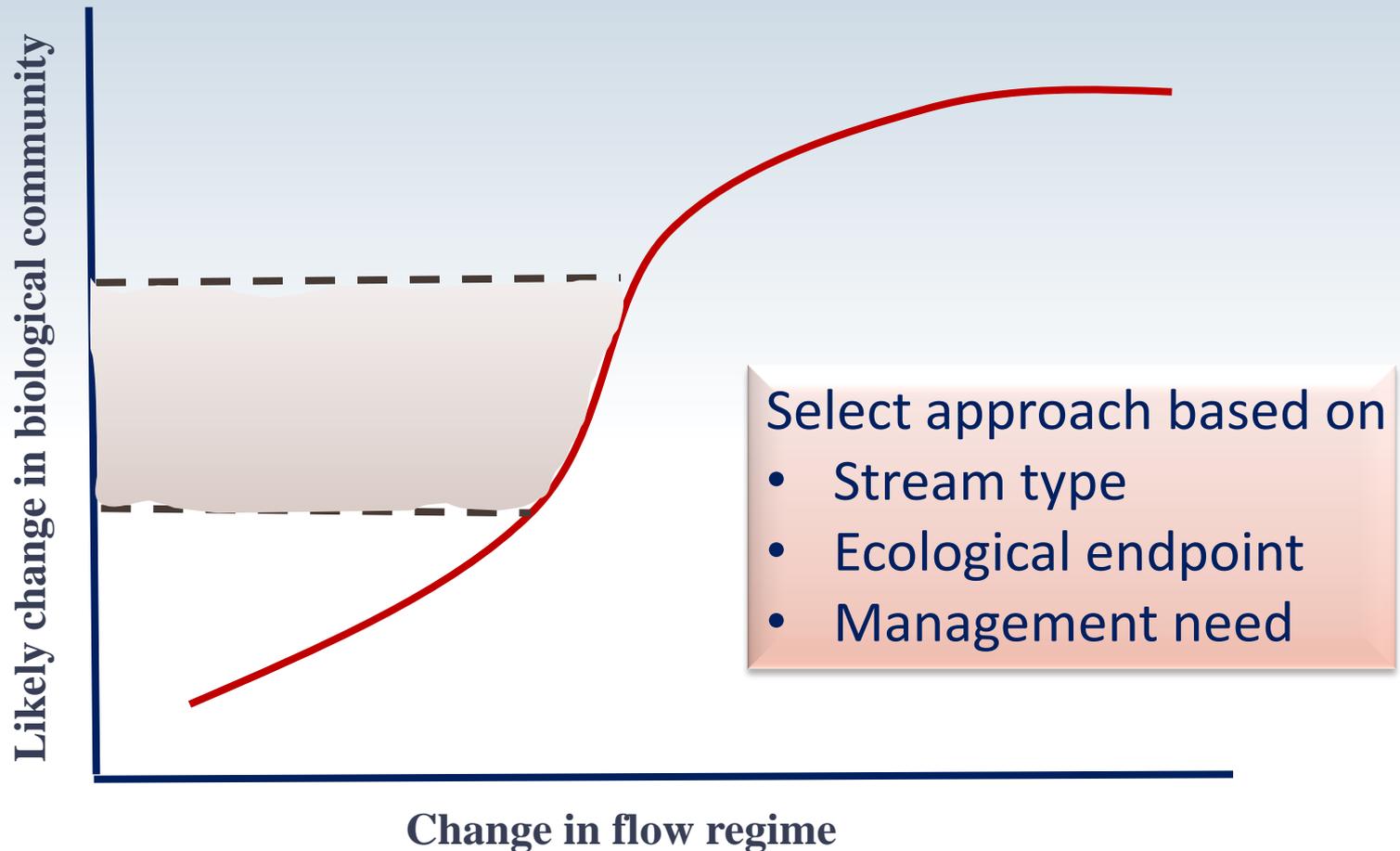


**If you can mitigate hydrologic alteration, you'll solve a lot of other problems**

# Statewide Needs

- Set instream flow standards to protect biological communities
- Assess vulnerability of streams to future changes in flow conditions
  - Prioritize areas for restoration/management
- Evaluate/inform management actions
  - e.g., reservoir operations, water withdrawals

# Setting Flow Targets to Inform Management Decisions



# Why is it So Hard?

- California is a very complex/diverse state

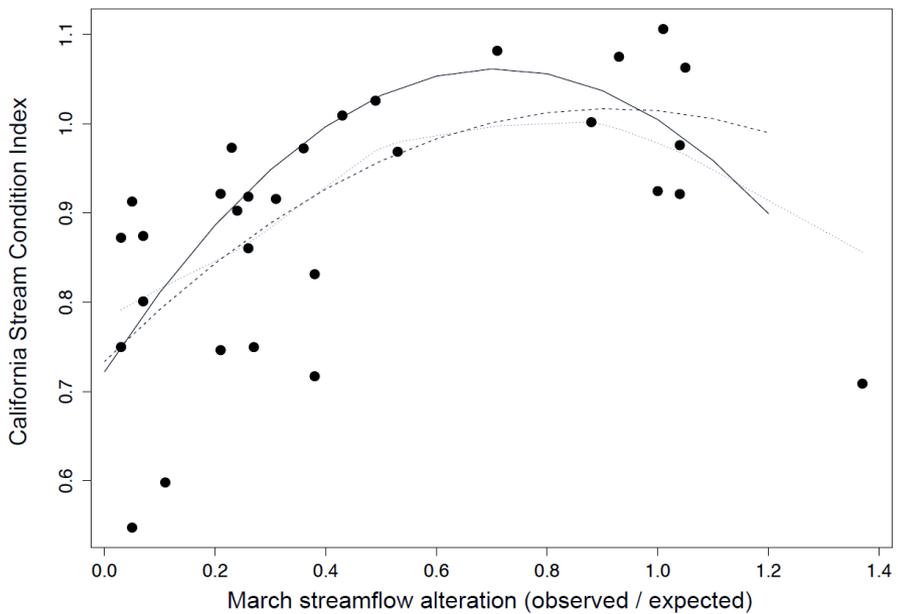
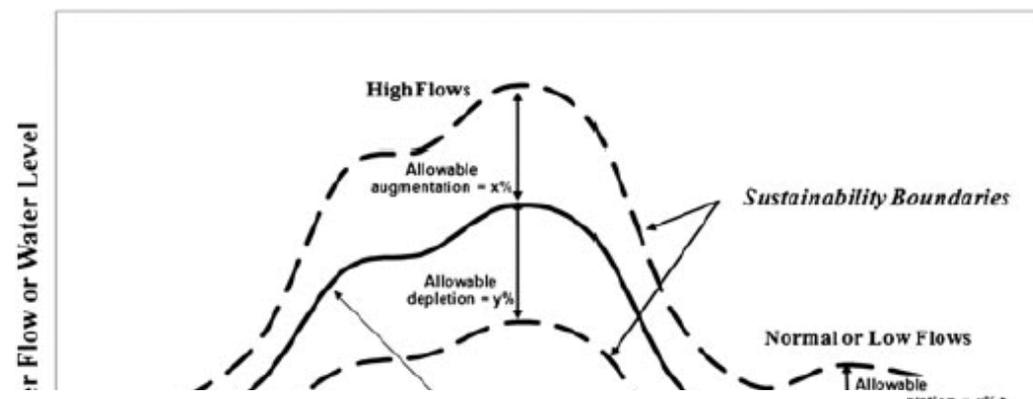
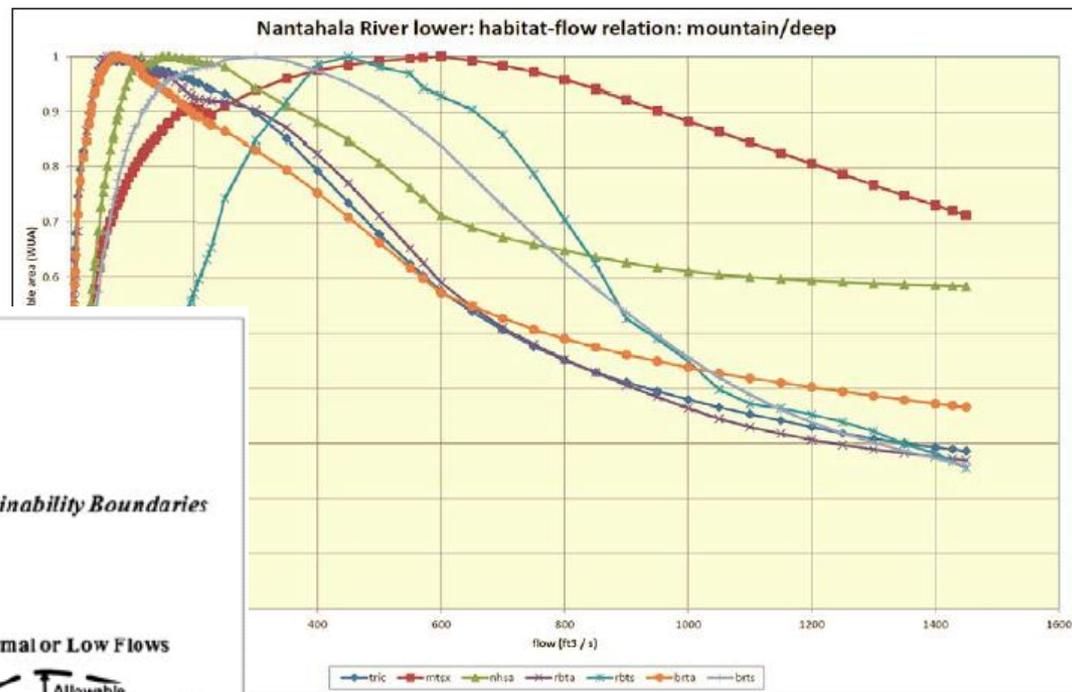


- Hard to balance environmental flow needs with a broad range of other demands

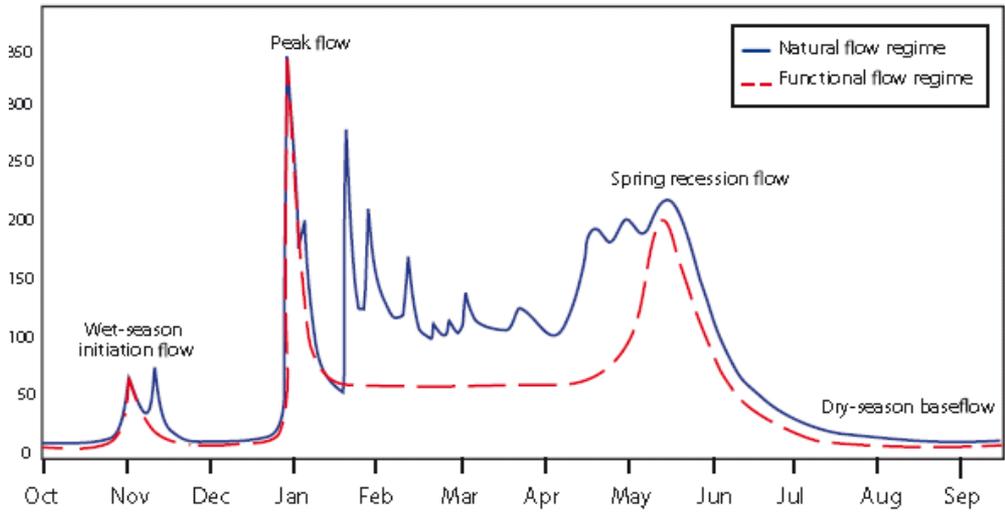


- No mechanism for coordination and information sharing among agencies and with the public

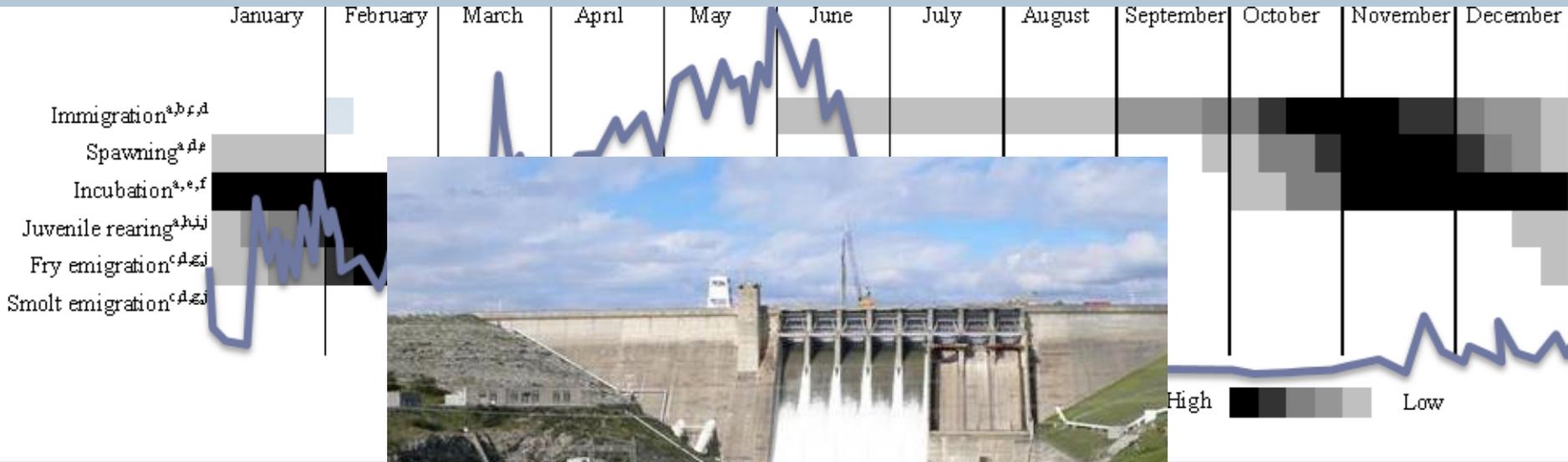
# Many Technical Approaches



of WUA habitat-discharge relation (mountain-deep species/life stages) in PHABSIM modeling.



# Issues Vary Across the State...



Physically Focused –  
engineering/geomorphology

Ecological management

Bank Full

Spawning flow

100 year flood

Rearing

Bed Mobilization

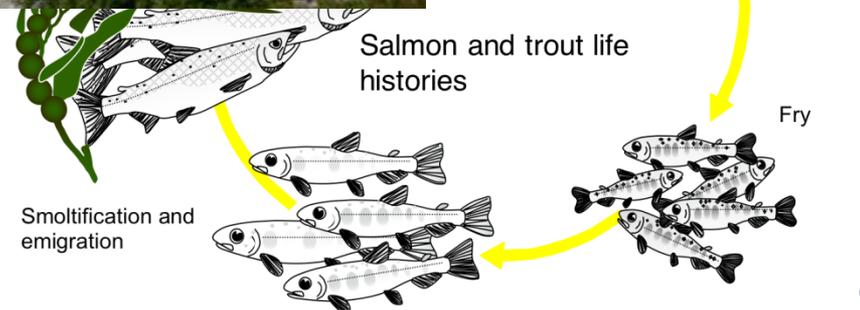
Life stage strategies

Effective Discharge

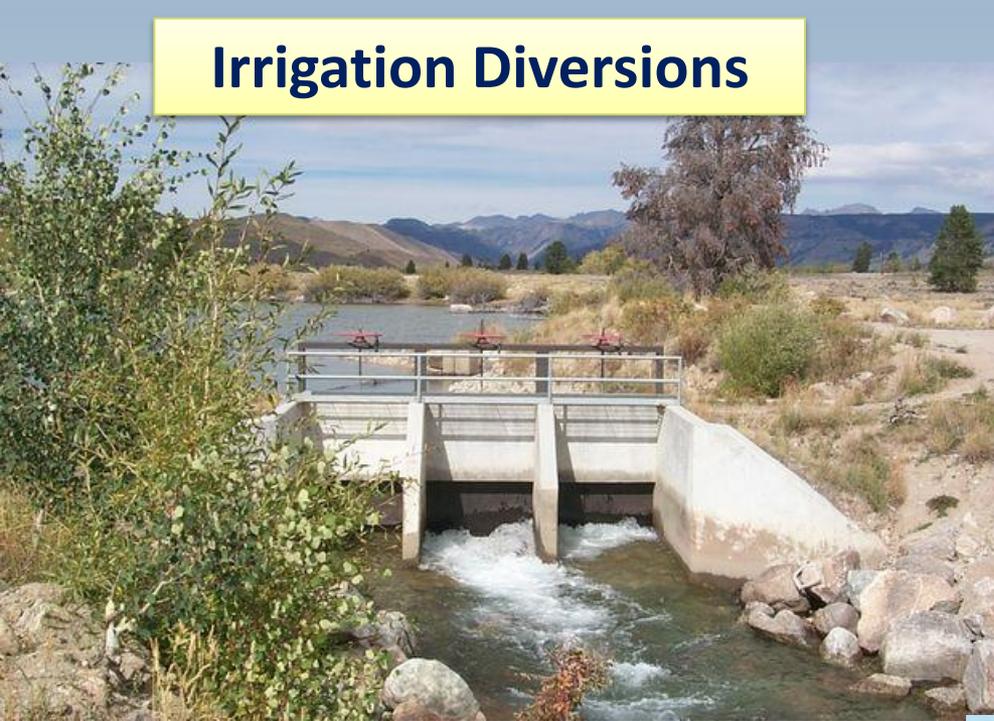
Habitat maintenance

Peak Discharge

Decoupling Predator/ Competitor Habitat



## Irrigation Diversions



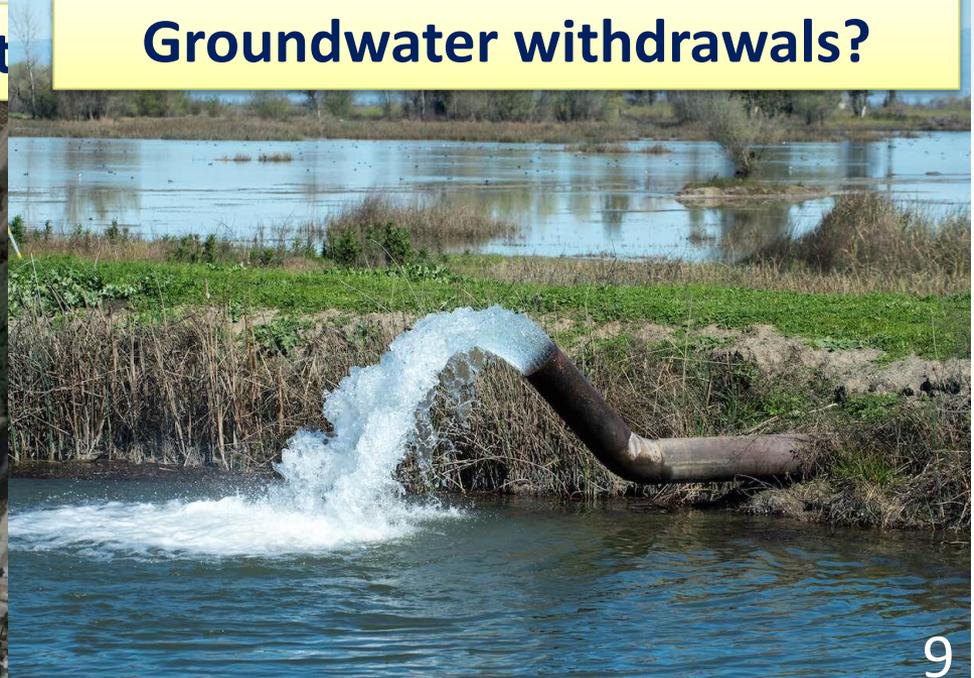
## Stormwater Retention



## Use or Reuse of Treated Effluent



## Groundwater withdrawals?



## CHANNEL TYPE

- Headwater
- Alluvial fan
- Upland uniform
- Cascade / step-pool
- Pool-riffle
- Plane-bed
- Anastomosing
- Large uniform boulder
- Large meandering sand

## 9. LARGE UNIFORM BOULDER



## 1. ALLUVIAL FAN



## 8. LARGE MEANDERING SAND



## 4. ANASTOMOSING



## 7. HEADWATER



## 2. POOL-RIFFLE



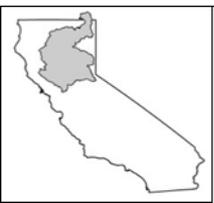
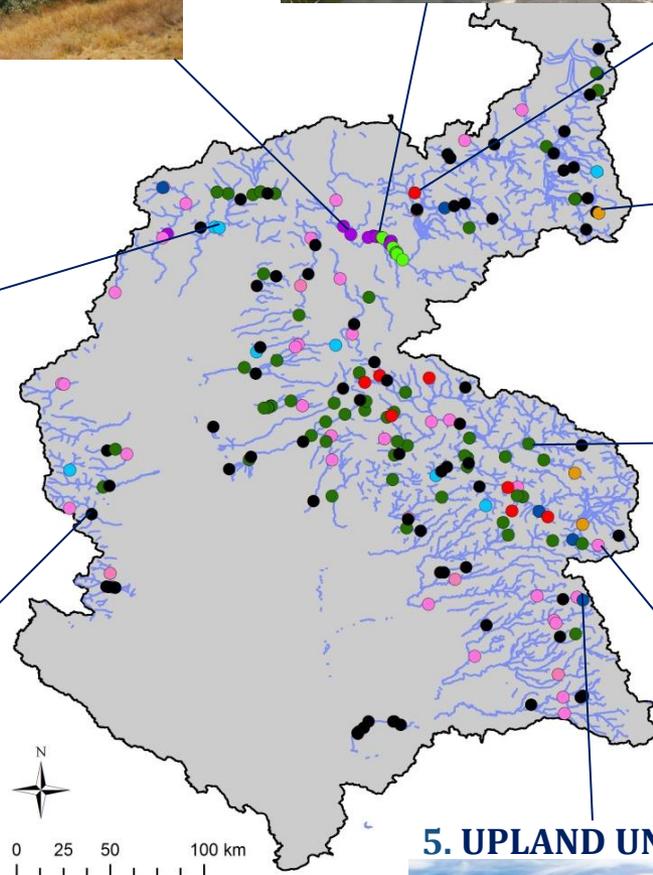
## 6. CASCADE/STEP-POOL



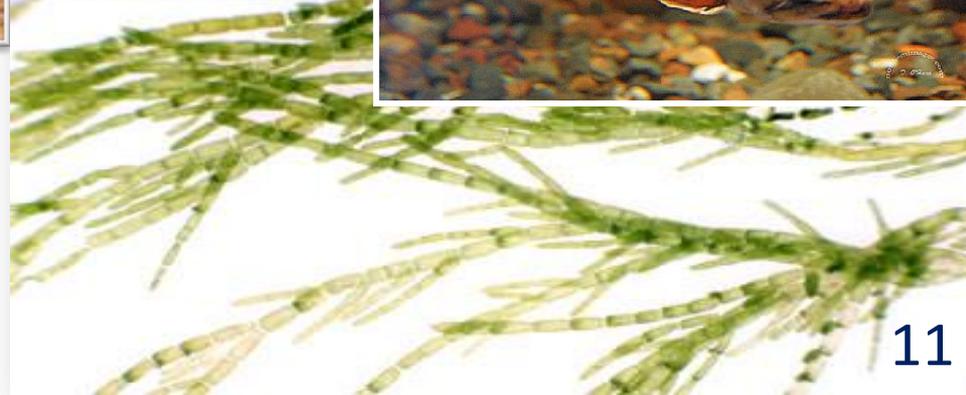
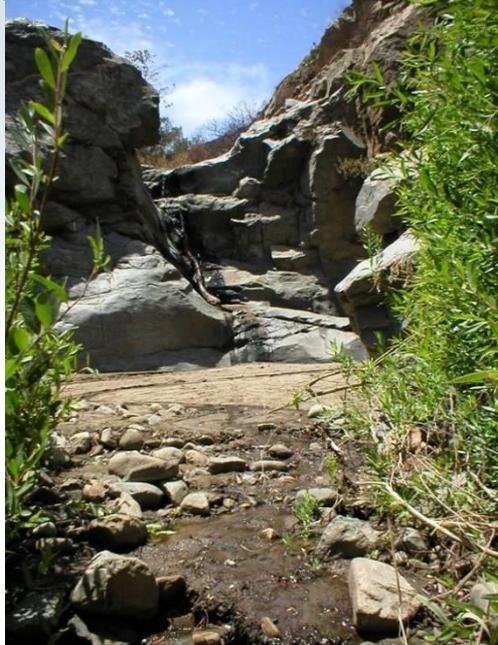
## 3. PLANE BED



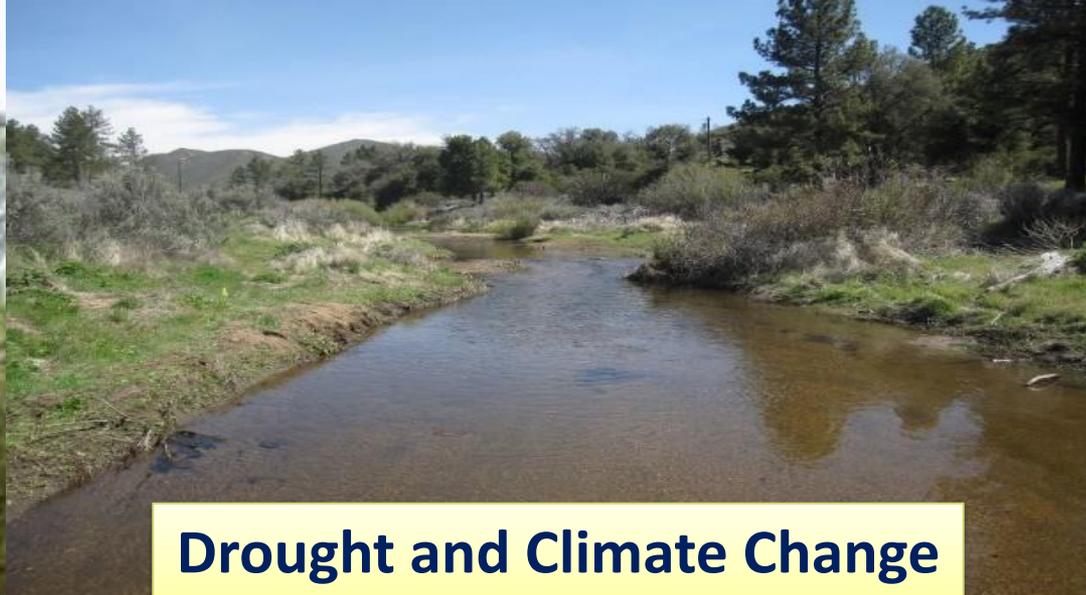
## 5. UPLAND UNIFORM



Lane, B., Pasternack, G., Dahlke, H., Sandoval-Solis, S. (2017). The role of topographic variability in river channel classification. *Progress in Physical Geography*



# Prioritizing Areas for Protection



**Drought and Climate Change**



7/19/2010 15:43



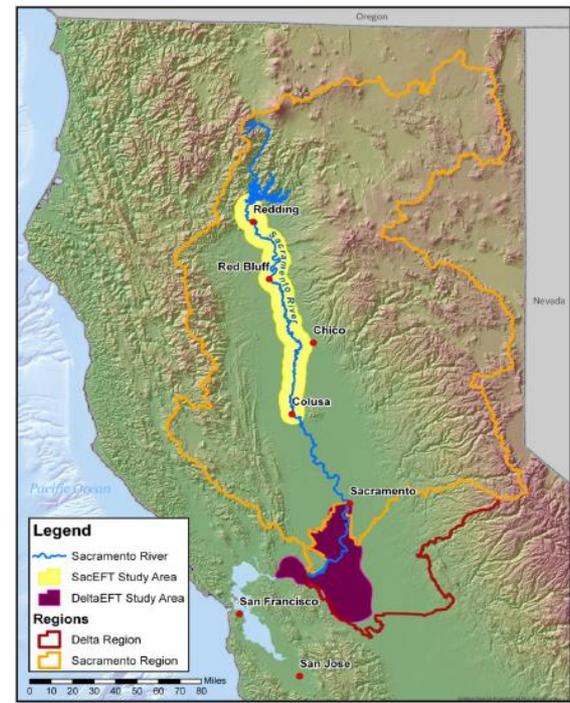
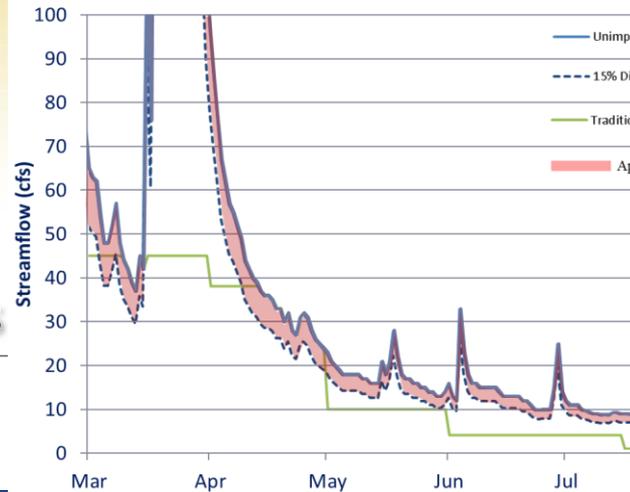
# Local Effort



## POLICY FOR MAINTAINING INSTREAM FLOWS IN NORTHERN CALIFORNIA COASTAL STREAMS

EFFECTIVE FEBRUARY 4, 2014

DIVISION OF WATER RIGHTS  
STATE WATER RESOURCES CONTROL BOARD  
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY



The two ecoregions of EFT: Sacramento River (SacEFT) and DeltaEFT (DeltaEFT).

— 1945 Daily Average Discharge USGS Douglas City Gage  
— 1945 NORMAL Water Year with Static Maintenance Flow Recommendations

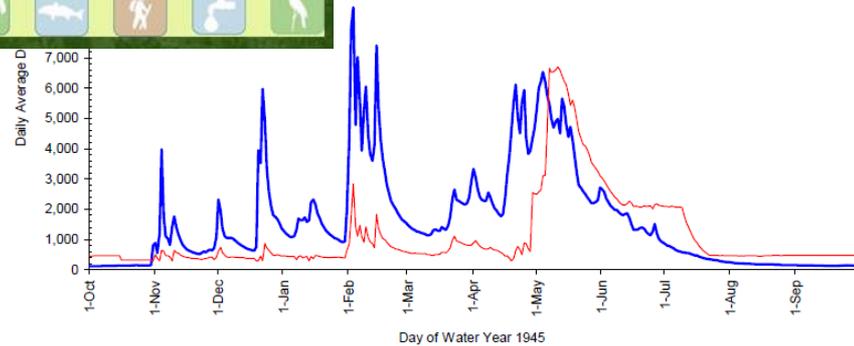


Figure 8.14a Hypothetical discharge at Douglas City gaging station with normal water-year class release from the TRD and tributary accretion for water year 1945.

"to restore and maintain the Trinity River  
— U.S. Department of Interior



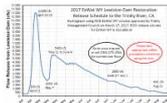
Check out TRRP's online map! You can select from a variety of data layers and aerial photography... going back to 1944!

### Latest Information



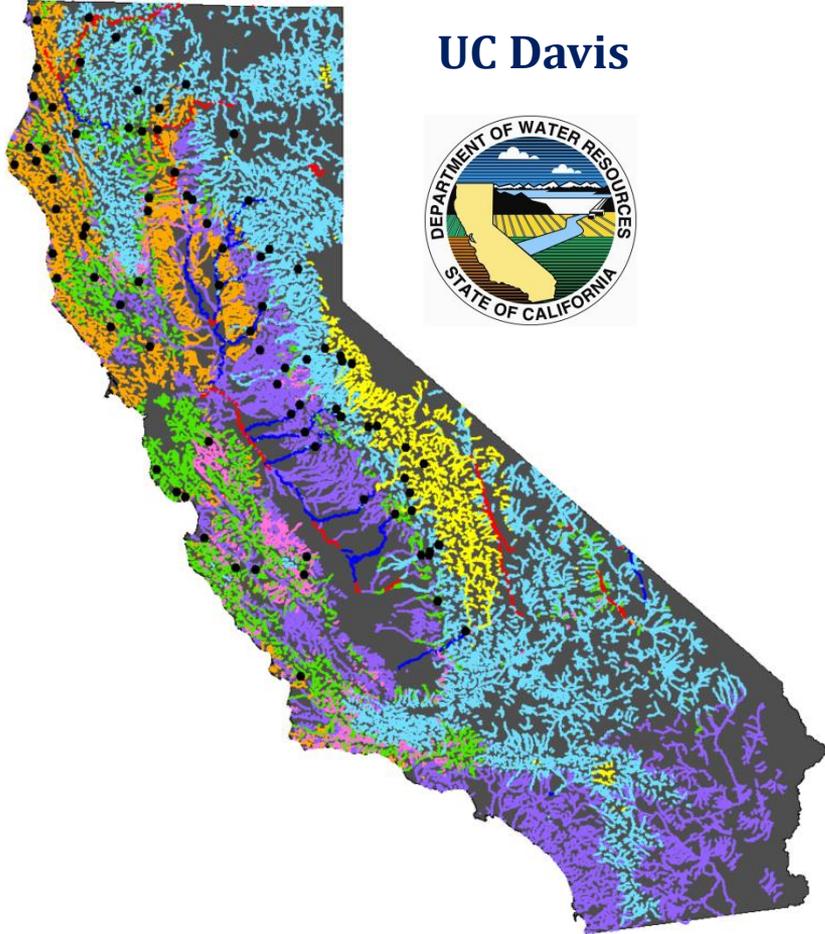
#### 2017 Hydrograph Recommendation

Water Year 2017 is an "Extremely Wet" year for the Trinity River flows as determined by the April first reservoir inflow forecast of 2,265,000 acre feet. A graphic of the Trinity Management Council's recommended flow schedule is available on our Current Restoration Flow Release Schedule page. A U.S. Bureau of Reclamation news release is [HERE](#).



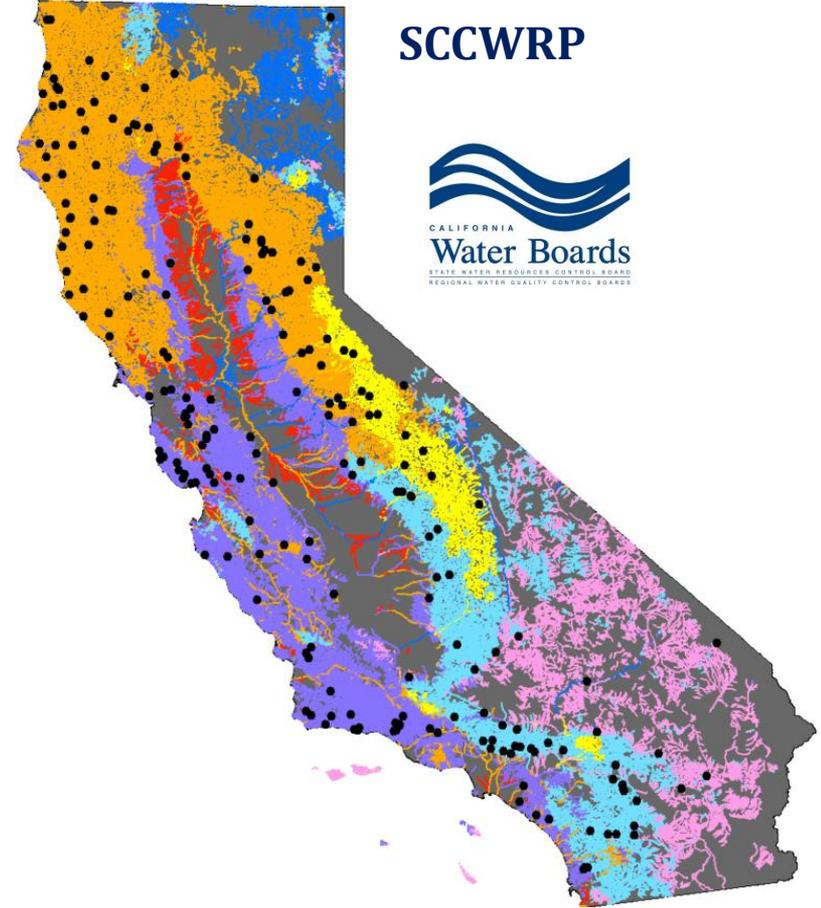
# Coordination Challenges

UC Davis



Lane, B., Dahlke, H., Pasternack, G., and Sandoval-Solis, S. (2017) Revealing the diversity of natural flow regimes in California with relevance for environmental flows applications, *JAWRA*

SCCWRP



Pyne, M., Carlisle, D., Konrad, C., Stein, E. (2017) Classification of California streams using combined deductive and inductive approaches: setting the foundation for analysis of hydrologic alteration, *Ecology*

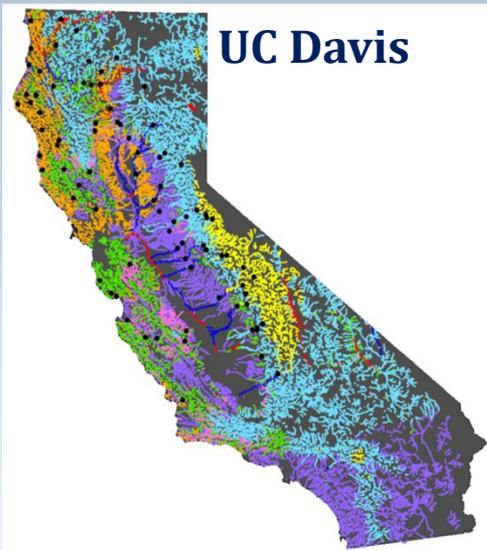
# Need for a Coordinated Framework

Many programs are attempting to set environmental flows

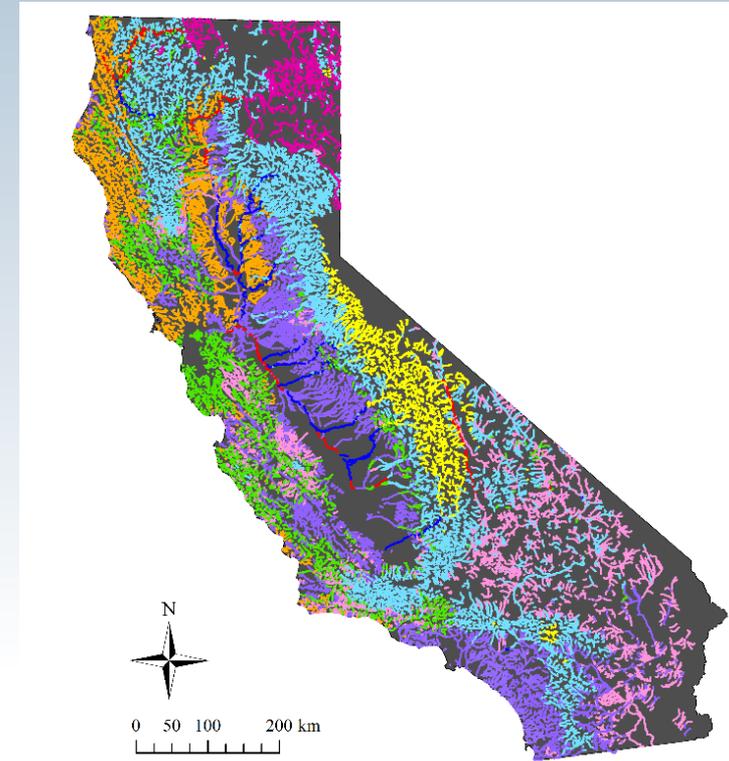
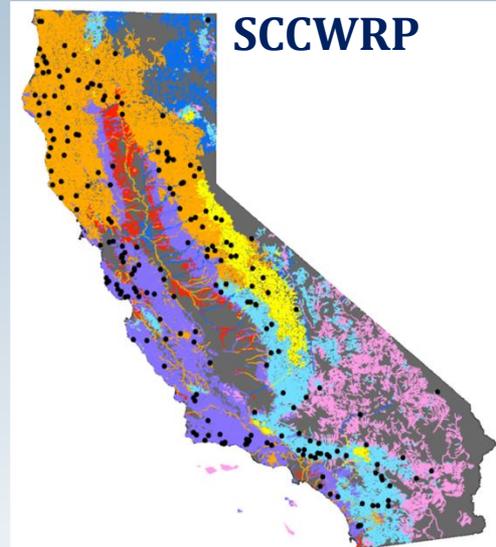
- Different systems
- Different endpoints
- Different management needs

- 
- Poor coordination
  - Challenge in sharing data
  - Uncertainty in which methods are most appropriate
  - Inefficiencies/redundancy in developing requirements
  - Difficulty in communicating to the public

# Coordination at the Technical Level

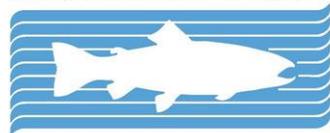


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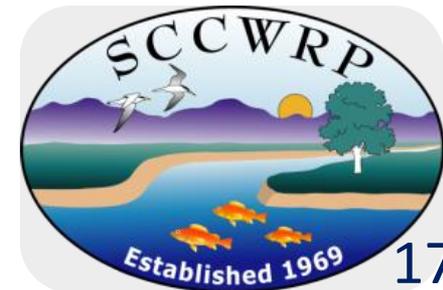
The Nature Conservancy  
Protecting nature. Preserving life.

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# Need for Agency Coordination

Statewide approach for setting coarse scale flow targets

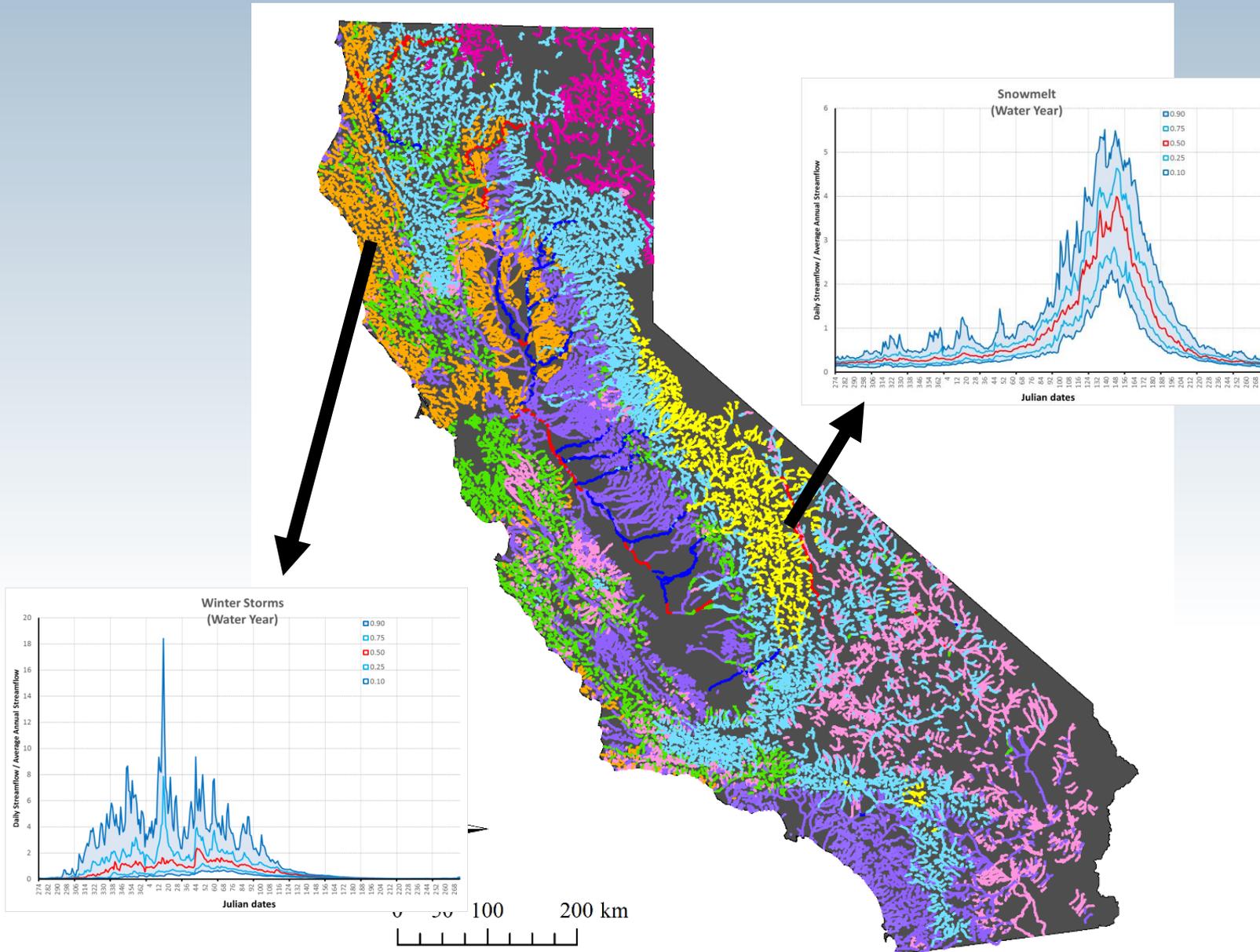


Site specific e-flows where necessary



Data sharing (open data) + information dissemination to the public

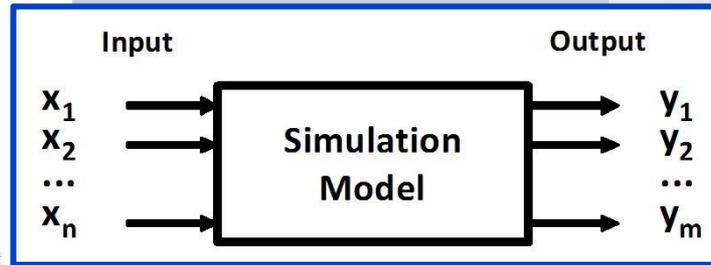
# Statewide Targets by Stream Class



# Local Targets

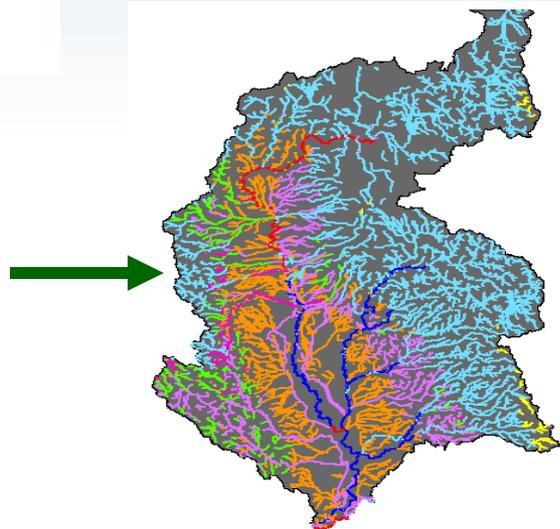
Stream Gages

Sites of Interest



Geomorphology

Ecology



Reach scale  
environmental  
flow methods



Flow targets

# California e-Flows Framework

## *Anticipated Products*

- Statewide stream classification
- First tier flow targets for each stream class
- Guidance for implementing site-specific e-flow recommendations
  - California E-flows users' manual
- Case study applications in key areas
- Website clearinghouse for recommended approaches, key data layers, case studies

Funded

Not Funded

# Environmental Flows Portal



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that may

- What is the current degree of hydrologic alteration?
- What are the main “stressors” affecting hydrologic condition?
- What are the risks to future hydrologic alteration?
- Has there been any environmental flows work done in my area?
- What tools or approaches are available? Appropriate?
  - How do I choose which tool to use?
  - What data is already available?

Search



Groups

1 ||

## Are Our Aquatic Ecosystems Healthy?

California has many types of aquatic habitats. Follow the links below to learn more ...



## Environmental Flows



### Wetlands Portal

Wetlands form along the shallow margins of deepwater ecosystems such as lakes, estuaries, and rivers. They also form in upland settings where groundwater or runoff

makes the ground too wet for upland vegetation.



### Streams & Rivers Portal

California's streams and rivers flow through diverse habitats, from mountain canyons, valleys, deserts, estuaries and urban areas. Riparian woodlands develop

along stream banks and floodplains, linking forest, chaparral, scrubland, grassland, and wetlands. California lakes, supporting deep water, wetlands, riparian woodlands, offer a quiet refuge for plants, animals and humans alike.



### Estuaries Portal

Estuaries are unique habitats found where rivers and the ocean mix. They feature a diverse array of plants and animals adapted to life along the mixing zone.



### Ocean & Coastal Portal

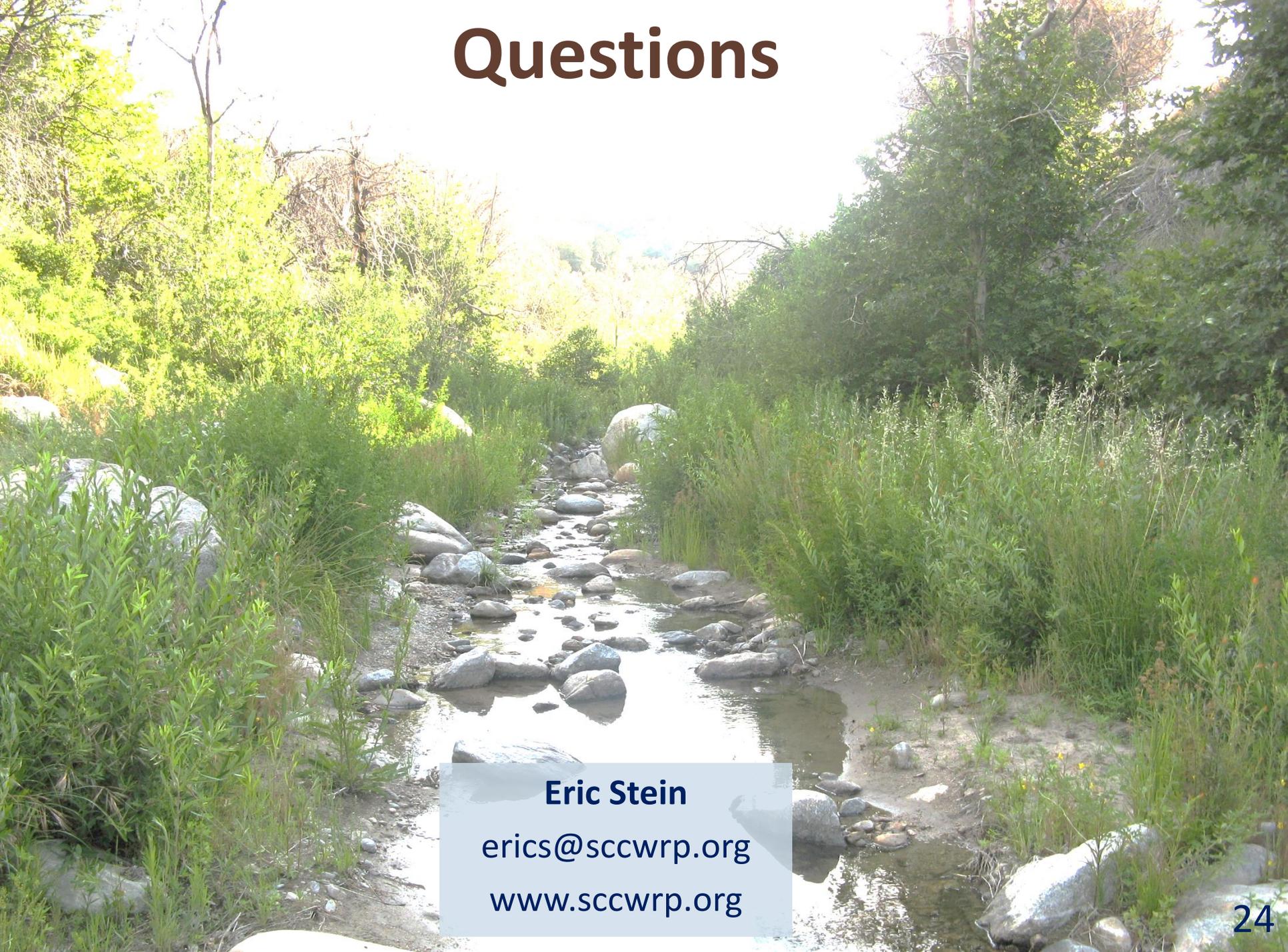
California has 1,100 miles of shoreline and 220,000 square miles of state and federal oceanic habitat, featuring one of the world's most diverse marine

ecosystems.

# Recommendations

- Support development of an environmental flows workgroup
- Complete efforts currently underway
  - RIFE Manual
  - First tier statewide environmental flow recommendations
- Identify agency staff to partner with technical team
  - refine goals, objectives & structure
- Outline content for new portal
- Report back to Council in 6 months with more detailed plan
  - “charter”, participants, portal outline

# Questions



**Eric Stein**

[erics@sccwrp.org](mailto:erics@sccwrp.org)

[www.sccwrp.org](http://www.sccwrp.org)