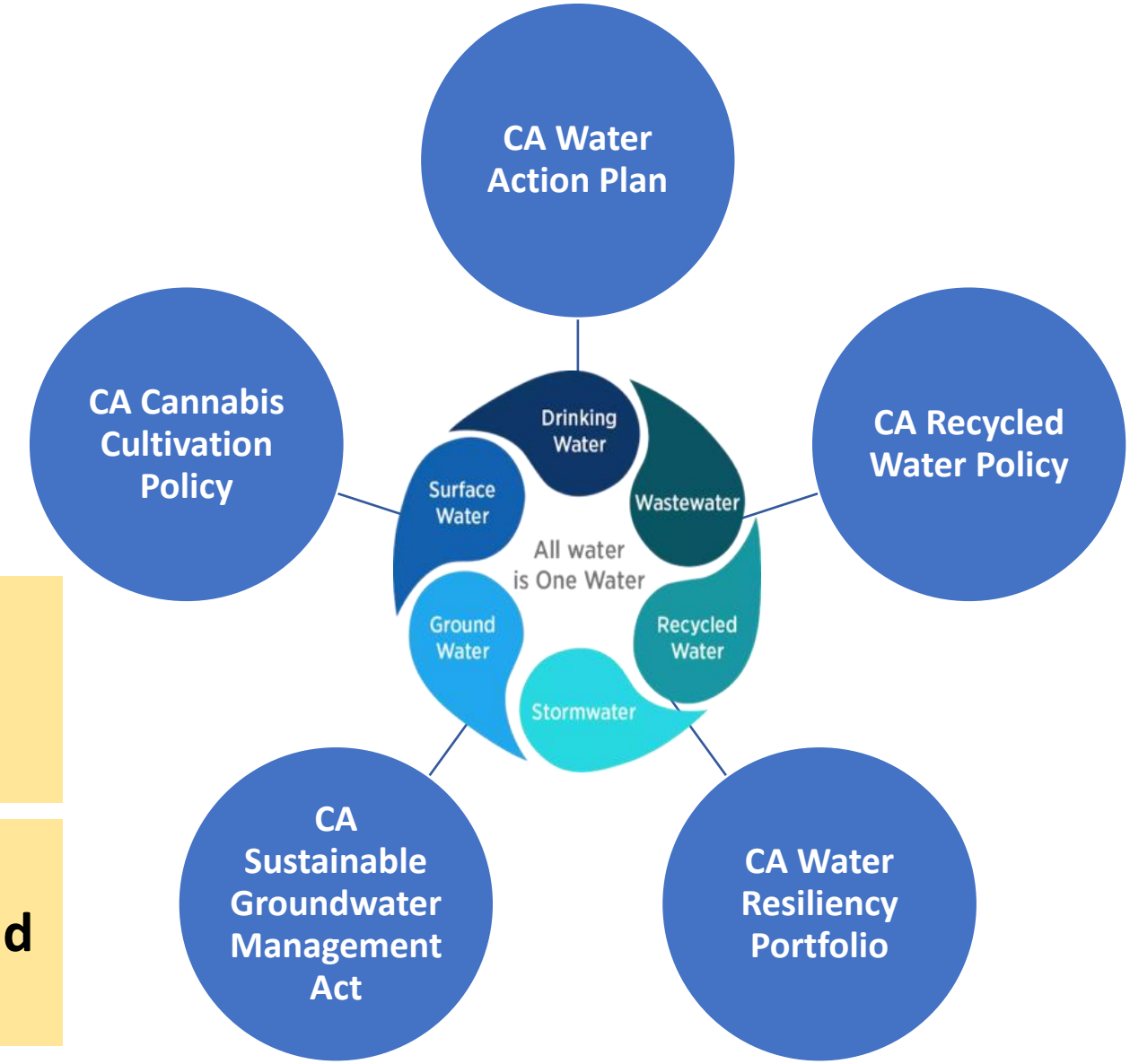
SCCWRP's Ecohydrology Research Program

Eric Stein – Biology Dept.
Kris Taniguchi-Quan
Katie Irving

Presentation to SCCWRP Commission
December 1, 2023

Numerous Policy Drivers that Demand Flow Management



How much water should be left in streams?

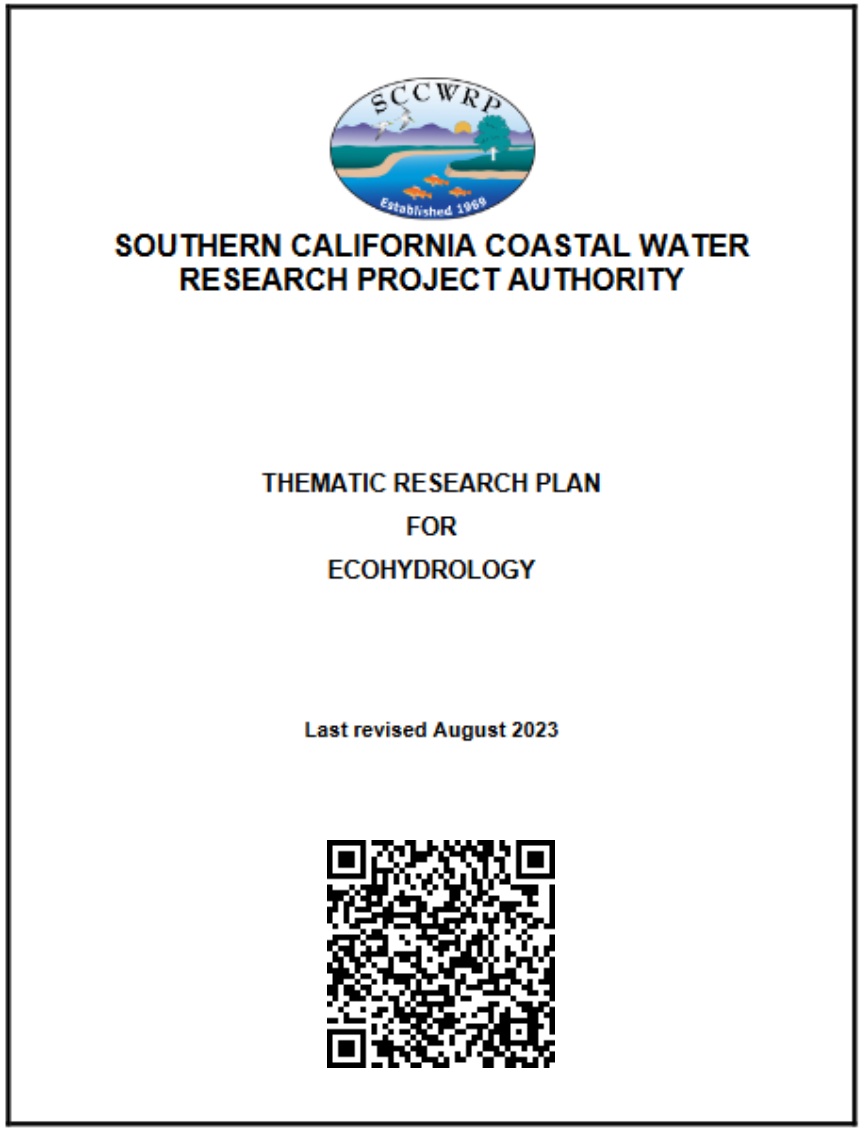
How much groundwater should be pumped?

How much wastewater should be recycled?

How much stormwater should be captured?

SCCWRP's Ecohydrology Research Plan

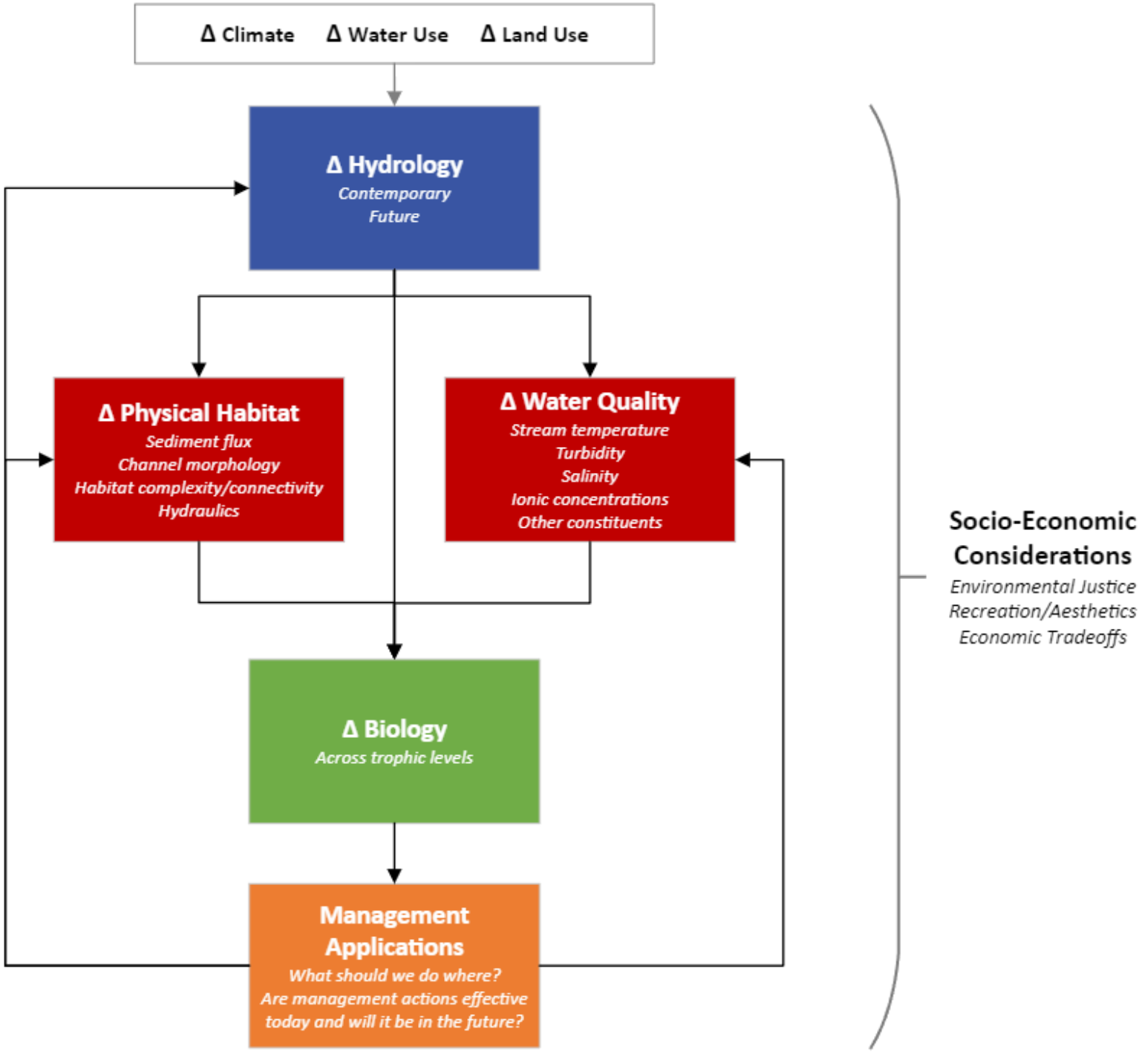
- Establishes a vision for research to address management needs
- Identifies 18 research "projects" organized around 4 technical elements
- Developed jointly by SCCWRP and CTAG
  - Intersessional included over 25 individuals representing all but one of SCCWRP's member agencies


SOUTHERN CALIFORNIA COASTAL WATER RESEARCH PROJECT AUTHORITY

THEMATIC RESEARCH PLAN
FOR
ECOHYDROLOGY

Last revised August 2023

Streams
Estuaries
Wetlands



Ecohydrology Research Plan Priorities

Technical Priorities

- Integrated Biological Response Models
- Support state gauging plan emphasizing low flow measures
- Groundwater Connections
- Sediment flux and transport analysis
- Disentangling effects of multiple stressors
  - ✓ Temperature, ionic concentrations, nutrients

Management Priorities

- Approaches to Tradeoff Analysis
- Adaptive Management Framework
- Effect of extreme events on instream flow recommendations

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Projects added by CTAG

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Joint CTAG/SCCWRP priorities

Management Priorities

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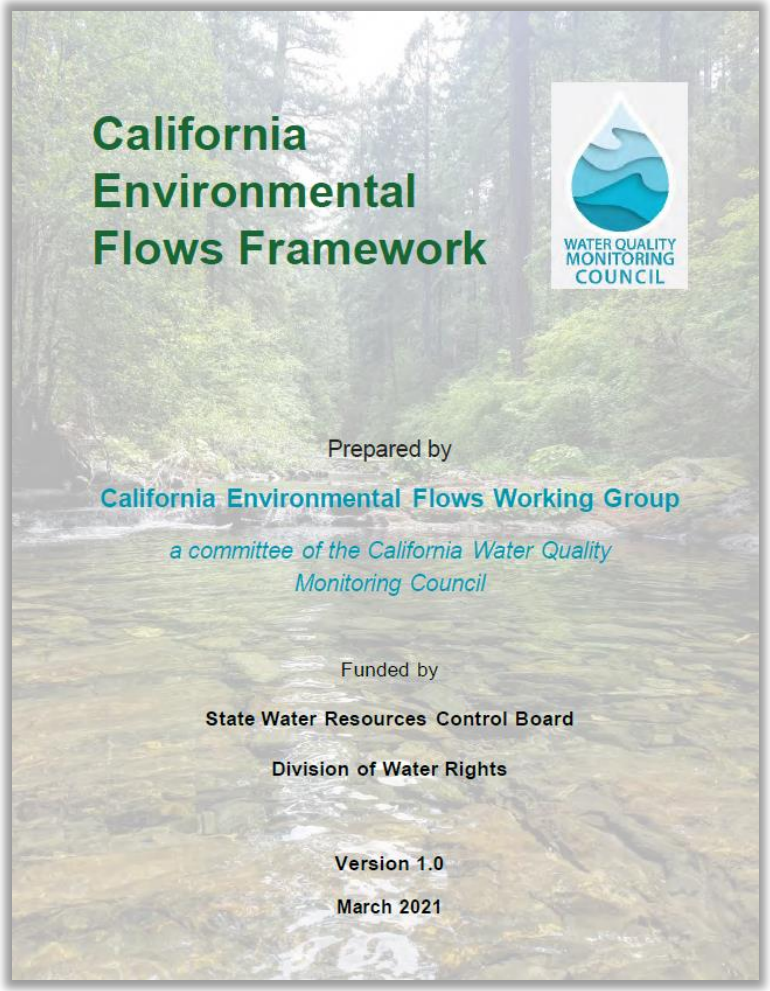
California Environmental Flows Framework (CEFF)

Provides statewide technical guidance for managers to develop scientifically defensible environmental flow recommendations following a functional flows approach



Co-developed by agencies of the State Environmental Flows Workgroup (SCCWRP is a co-lead)

Currently being implemented in several programs across the state

How much water should be left in streams?

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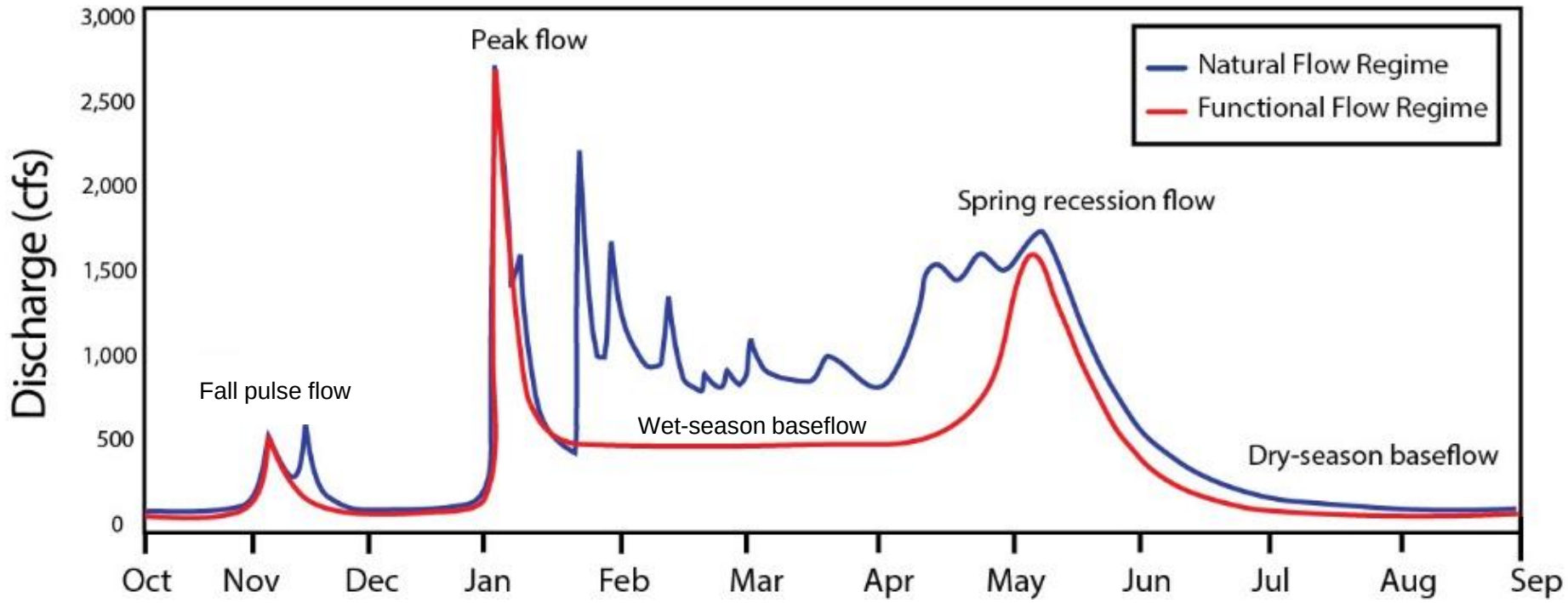
Berkeley UNIVERSITY OF CALIFORNIA · University of California Agriculture and Natural Resources · The Nature Conservancy · UCDAVIS UNIVERSITY OF CALIFORNIA · California Water Quality Monitoring Council · California Water Boards · California Department of Fish & Wildlife · Utah State University · SCCWRP · California Trout FISH · WATER · PEOPLE

CEFF is Based on a Functional Flows Approach

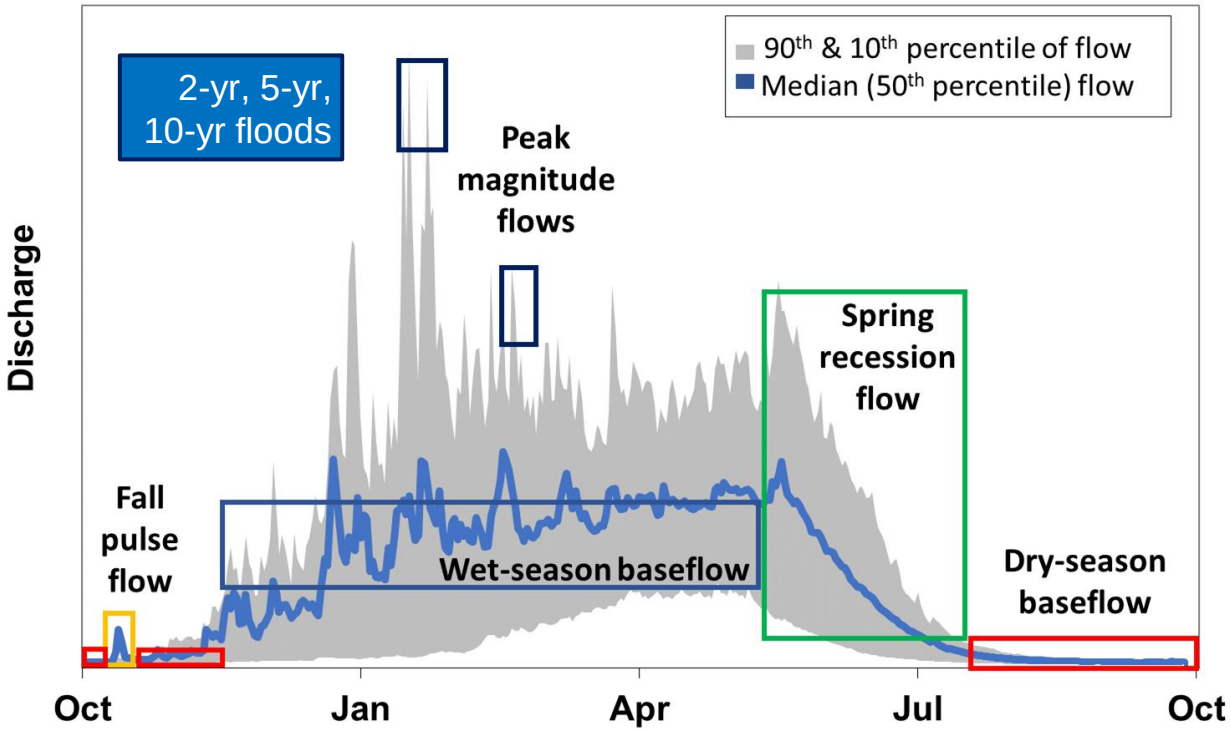
"Functional Flow" = hydrograph component that provides a distinct geomorphic, ecologic, or biogeochemical function

Reflective of natural patterns that occur in space & time

Yarnell et al. 2015



Functional Flow Metrics



Metrics relate to general stream health based on *natural flow conditions varying over time*

Yarnell et al. 2020 *RRA*

Flow Component	Flow Metrics
Fall pulse flow	Magnitude (cfs)
	Timing (date)
	Duration (days)
Wet-season base flow	Magnitude (cfs)
	Timing (date)
	Duration (days)
Wet-season peak flow	Magnitude (cfs)
	Duration (days)
	Frequency
Spring recession flow	Magnitude (cfs)
	Timing (date)
	Duration (days)
	Rate of change (%)
Dry-season base flow	Magnitude (cfs)
	Timing (date)
	Duration (days)

How CEFF Moves the Ball Forward

- Provides tools to identify protective flow ranges for all stream reaches in the state → year-round flow targets that address all functional flow components
- Provides a structured approach to developing region specific target ranges → provides a mechanism for local refinement of targets
- Provides process for evaluating human vs. ecological demands
- Is an agreed upon approach because it was co-developed by multiple agencies

Application of Ecohydrology Research Vision

Mature Applications

- MS4 flow management requirements
  - San Juan/Aliso Creeks, N. OC flow diversions, San Luis Rey
- Wastewater change petitions
  - Los Angeles River, San Gabriel River
- Instream flow criteria under CA Water Action Plan
  - Ventura River

Emerging Applications

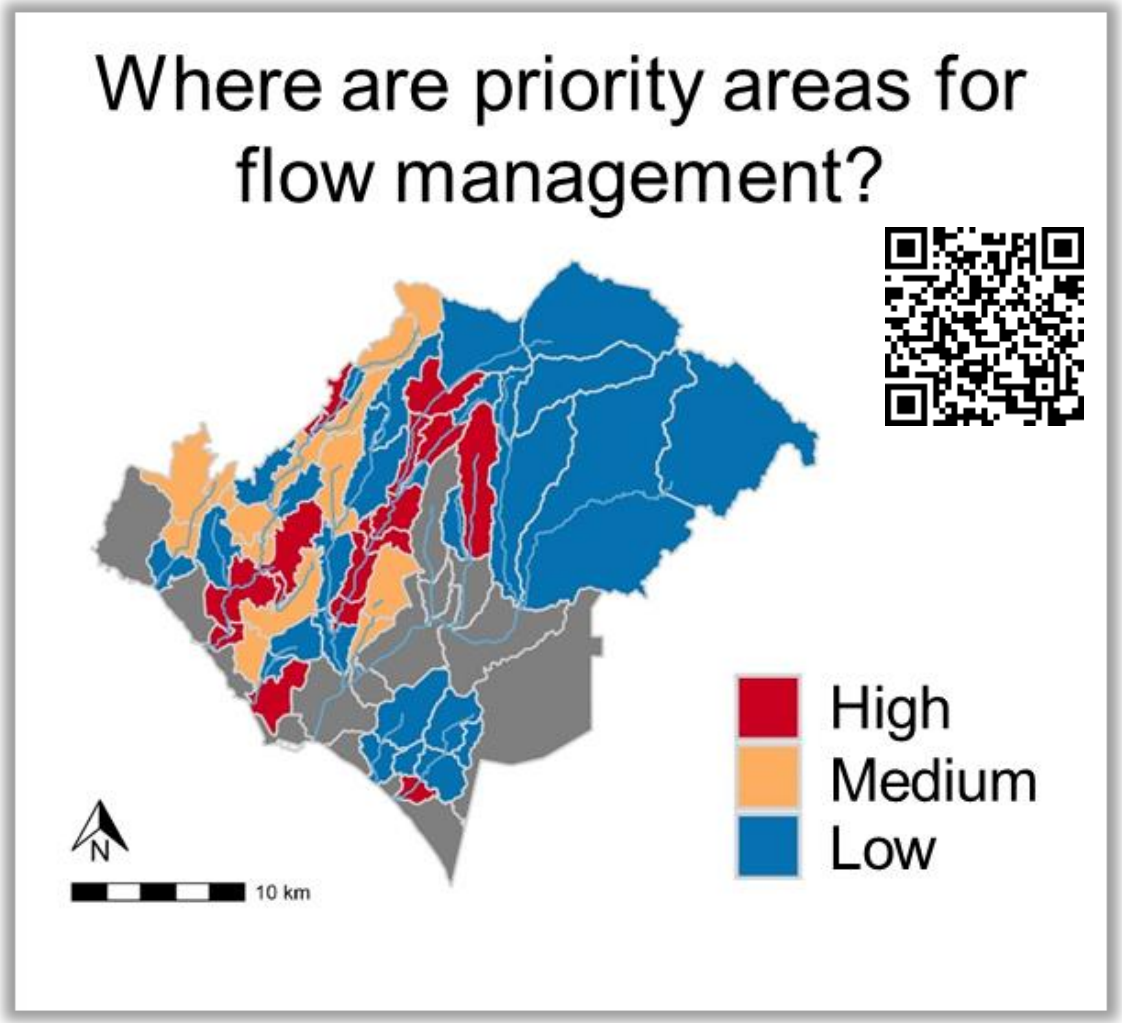
- Revised NPDES temperature requirements
  - San Gabriel River, Santa Clara River, LA River
- Groundwater Sustainability Plans (SGMA)
  - Upper Santa Clara River, Santa Ana River
- Stream flow diversion limits for Cannabis Program
  - Statewide (first phase in the North Coast region)
- DWR Flood-Mar water capture program
  - Statewide

Compliance with MS4 Flow Management Requirements

Aliso & San Juan Creek Study

- When, where, and how much stormwater capture and storm drain diversions should be implemented?

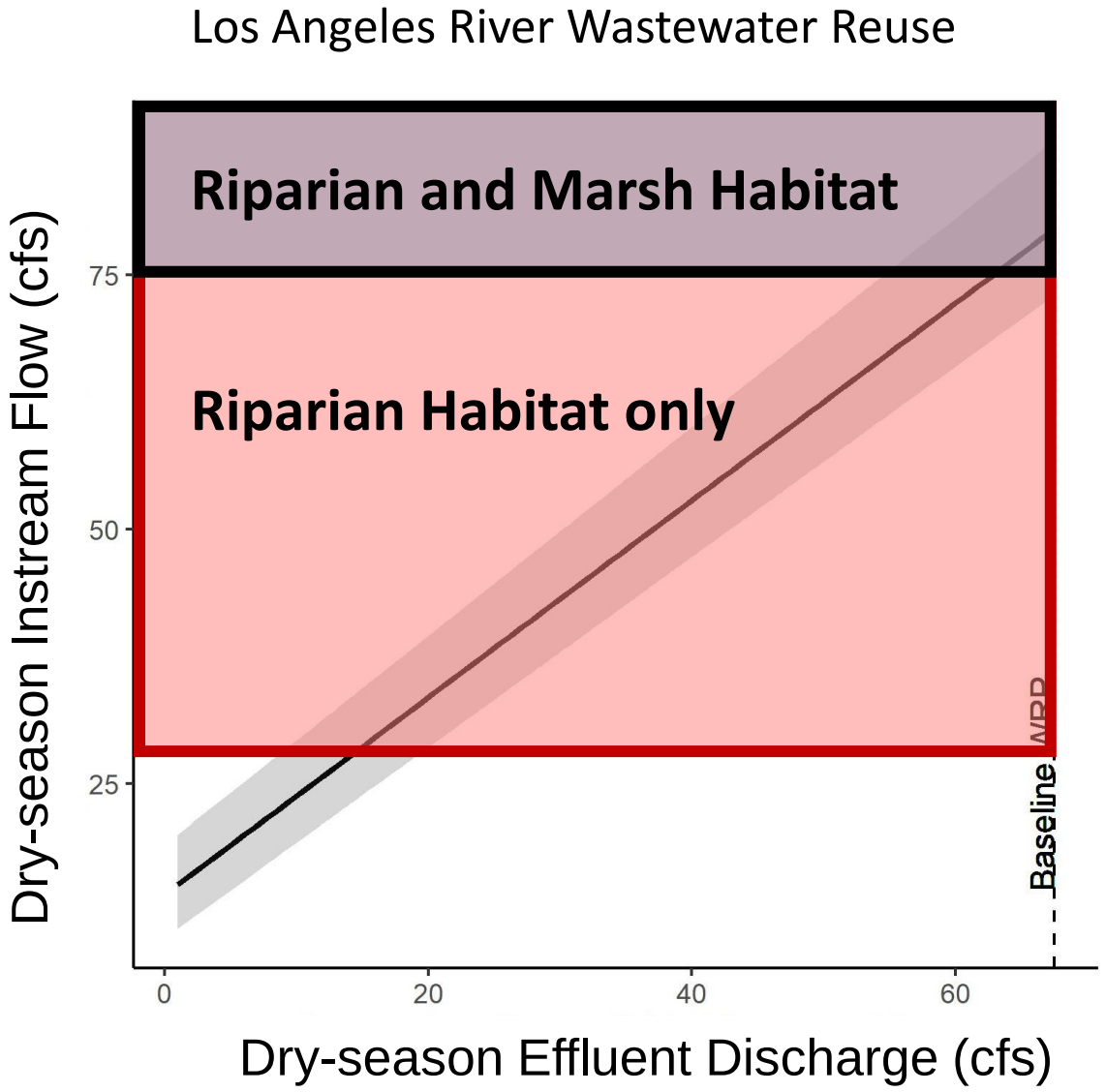
- Used CEFF to evaluate beneficial use support to inform stormwater management decisions and MS4 compliance
  - Developed *ecological flow criteria* as management target



Irving et al. 2022 *FES*

Establishing Allowable Reuse under Wastewater Change Petitions

- What are the ecological effects of wastewater reuse?
- Developed tools to evaluate tradeoffs between wastewater reuse and instream flows needed to support ecology



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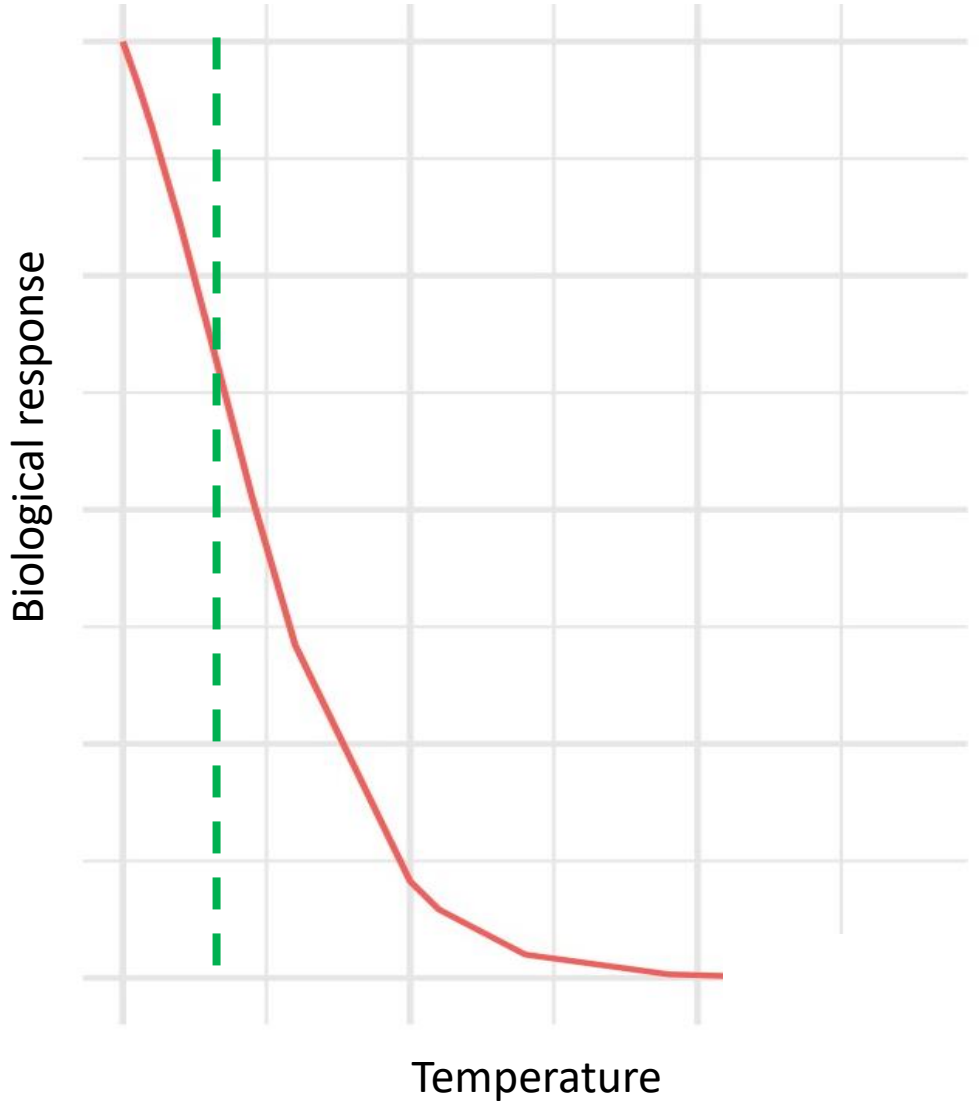
Temperature Management to Support Beneficial Uses

- Develop an approach for relating temperature effects to beneficial use attainment based on relevant ecological endpoints

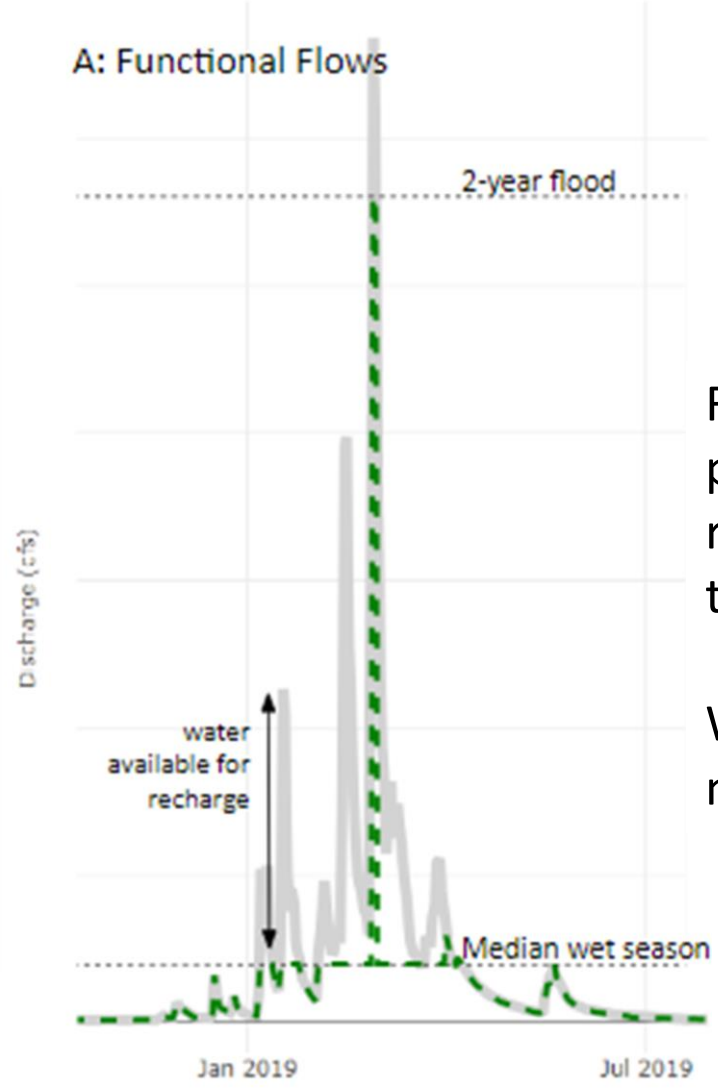
- Explore innovative management approaches to meet temperature requirements
  - Nature-based solutions



Groundwater Sustainability Plans

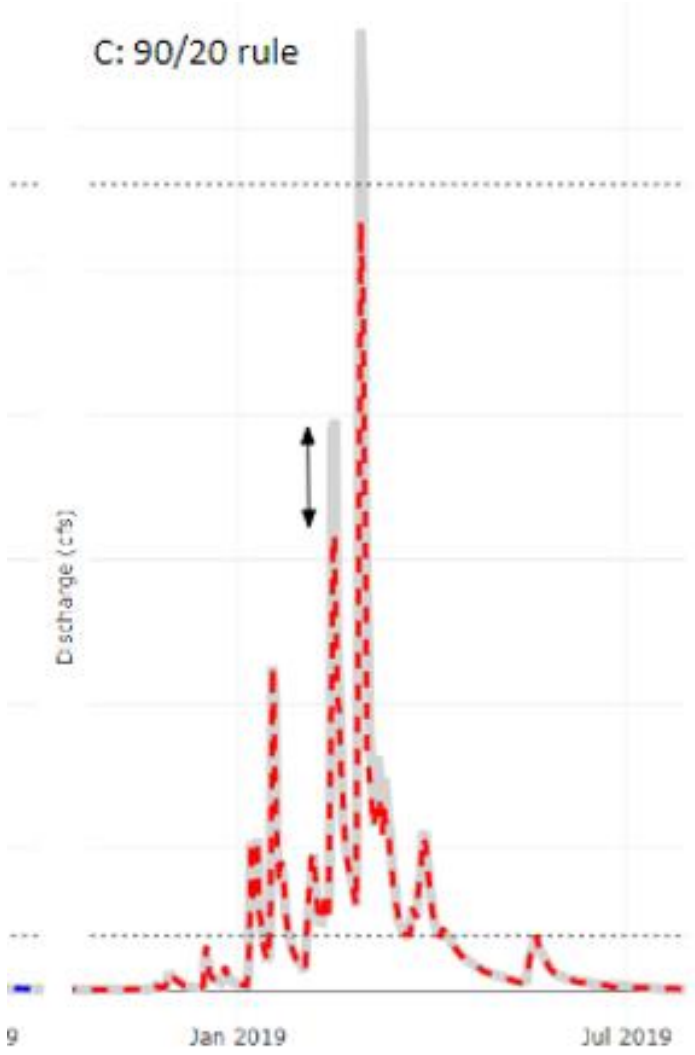
- Inform sustainable management criteria for depletion of interconnected surface waters
- Understand conditions required to maintain healthy groundwater dependent ecosystems (GDEs)

Informing Water Available for Recharge under DWR Flood-Mar Program



Functional flows approach provides for additional recharge capacity than the traditional “default” rule

When, where, and how much diversion can occur



Future Research Directions

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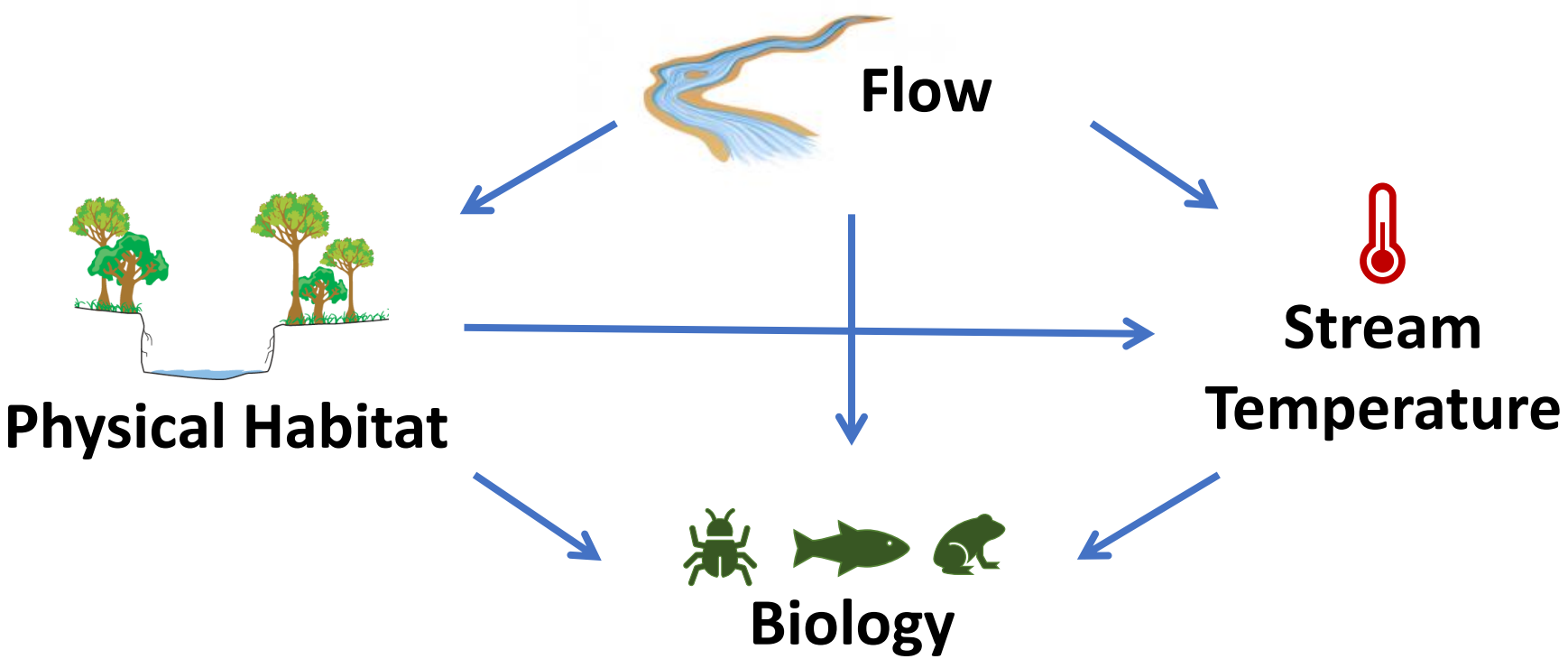
Building Integrative Models



Multiple Stressors

Multiple Species

Multiple Systems

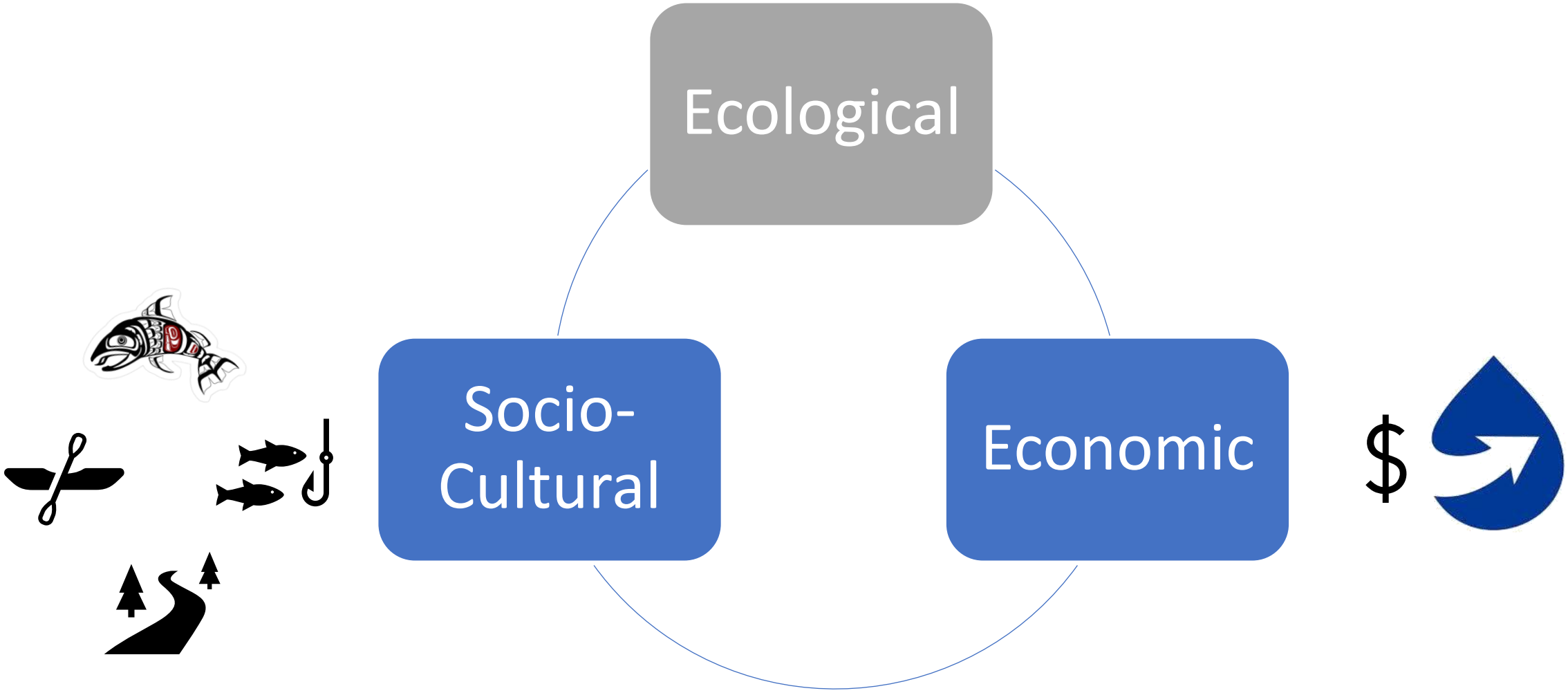
Flow Management Effects on Estuaries

Estuaries are influenced by both watershed and coastal management decisions

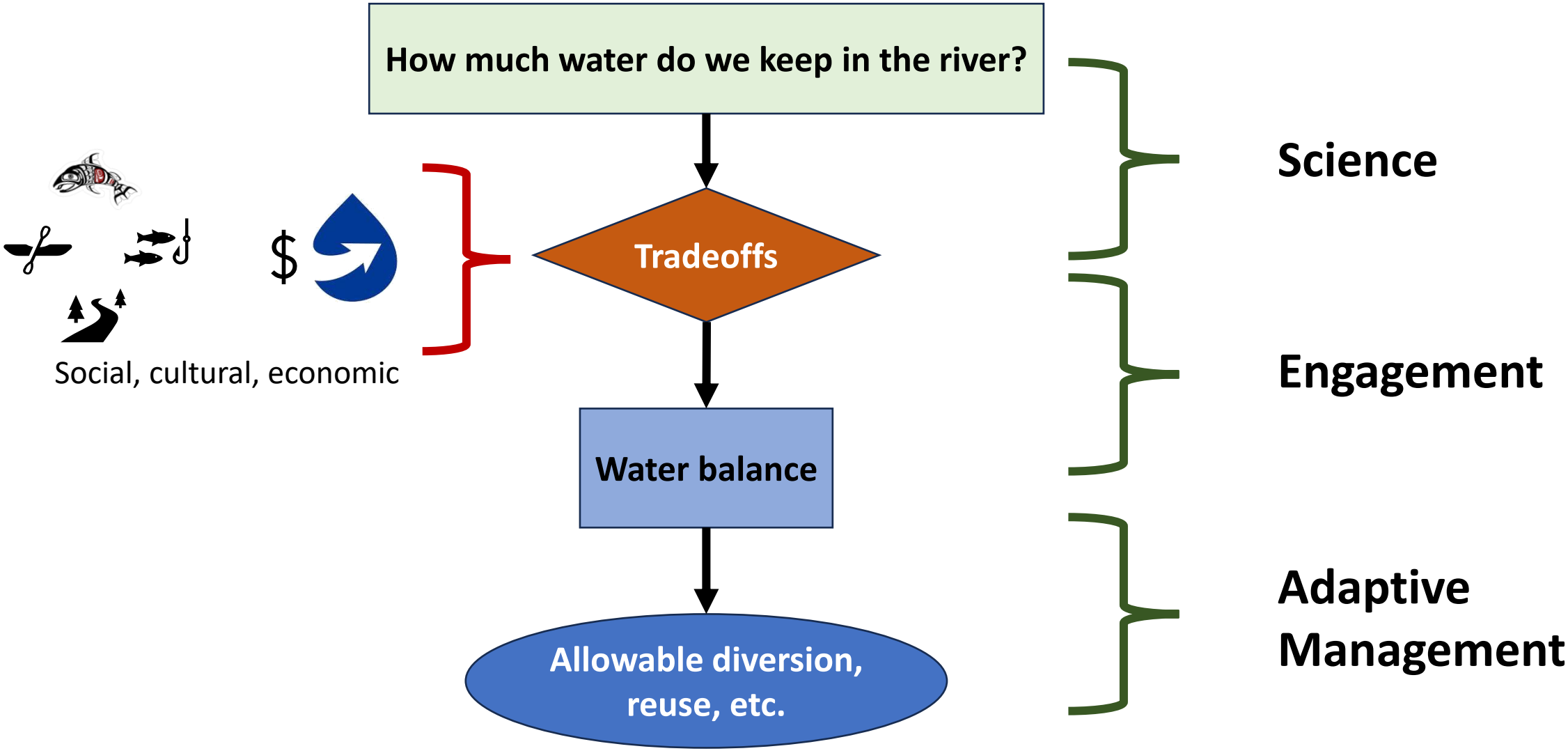
Need improved understanding of how to assess condition, impacts, and potential effect of management decisions

Will inform projects and priorities for climate resiliency research

Needs for Future Tradeoff Analysis



Completing the Flow Management Puzzle



Building a Community of Practice

- Strong interest in ecohydrology research from many water management entities
  - Research addresses multiple management needs
  - Surface water and groundwater

- To accelerate implementation, management community needs technical support and training
  - We plan to meet with you to discuss partnership opportunities

- Need to improve engagement with end-users and affected participants to make informed decisions
  - Trade-off analysis
  - Adaptive management

} **CTAG Priorities**

Questions

Eric Stein erics@sccwrp.org

Kris Taniguchi-Quan kristinetq@sccwrp.org

Katie Irving katiei@sccwrp.org

www.sccwrp.org