State planning efforts underway to enhance and protect instream flows in the North Coast Region

Bryan McFadin

Senior Water Resource Control Engineer

North Coast Regional Water Quality Control Board

North Bay Watershed Association

June 5, 2020

CALIFORNIA Water Boards

Recent Efforts to Address Flow-Related Water Quality Concerns

Agenda:

- Terminology and context
- Regional Water Board efforts
- Statewide efforts to enhance flows
- Flow agreements

Acknowledgements

- Dan Schultz, SWRCB Water Rights Cannabis
- Dan Worth, SWRCB Water Rights Instream Flow
- Sarah Nossaman Pierce, California Sea Grant

Terminology

Beneficial Use (basin planning)

- The values and uses of water that are to be protected against water quality degradation

Department of Water Resources

- Manages state water infrastructure
- Water supply planning

Beneficial Use (water rights)

- The purpose for which water is being diverted

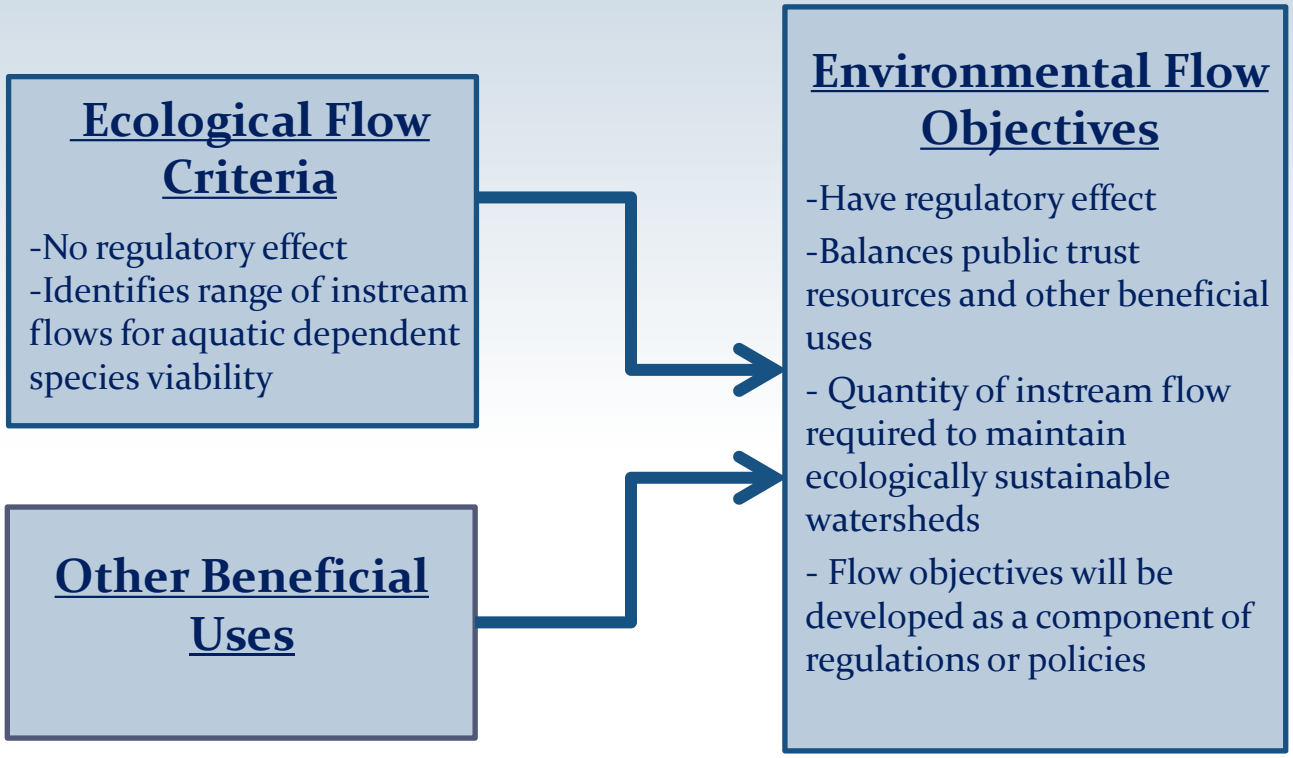
Division of Water Rights

- Division of the SWRCB in charge of allocation of water resources

Water Quantity Authorities

Agency	Planning/ Policy	Implementation/ Permitting	Instream Flow Recommendations
State Water Board	X	X	
Regional Water Boards	X		
Department of Fish and Wildlife		X	X

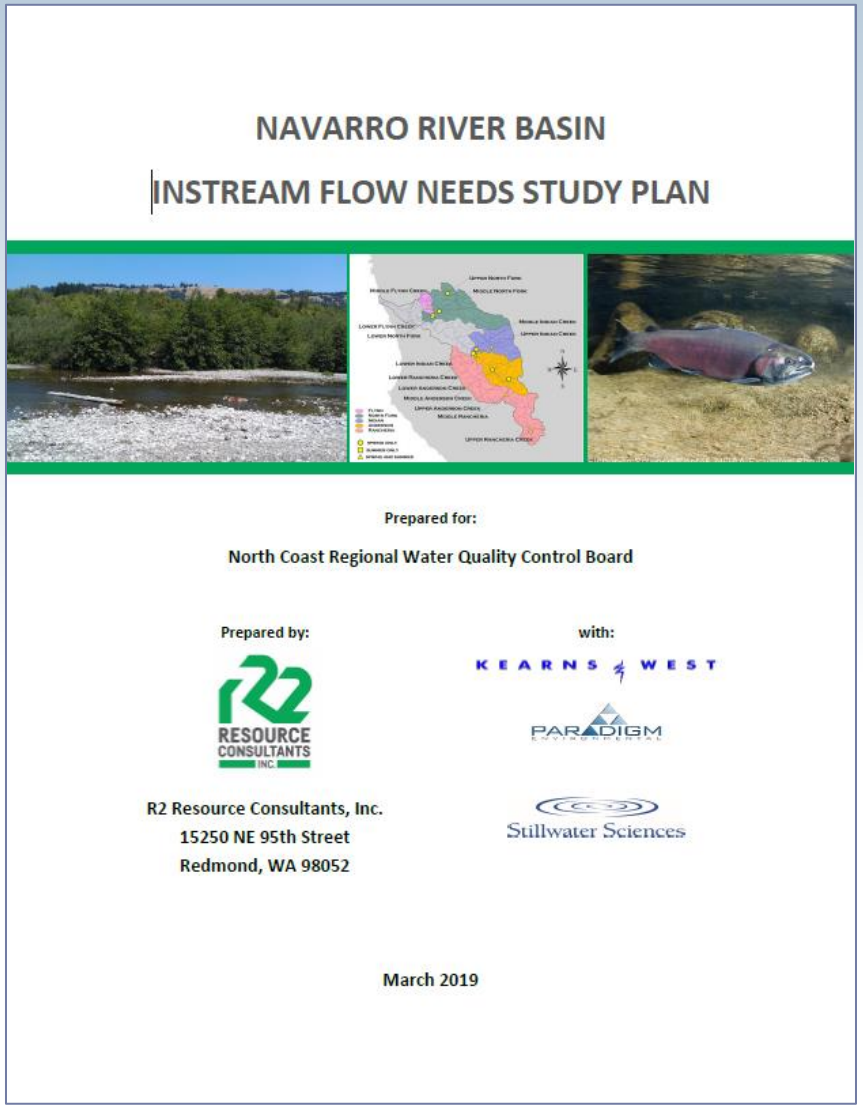
Terminology



Regional Water Board
Flow Objective Projects

Navarro River Watershed Flow Objectives

- Identified as a Basin Planning priority
- Study plan completed
- Standard instream flow analysis approaches, with additional water quality assessment
- Cost, capacity challenges
- Multi-year project



NAVARRO RIVER BASIN

INSTREAM FLOW NEEDS STUDY PLAN

Prepared for:

North Coast Regional Water Quality Control Board

Prepared by:

with:

R2 Resource Consultants, Inc.
15250 NE 95th Street
Redmond, WA 98052

March 2019

Navarro Flow Objectives

Standard Instream Flow Analysis Approach:

- Collect field data at representative locations over a range of flows
- Develop a hydraulic model to estimate habitat attributes as a function of flows
- Characterize the range of suitable values as a function of flows
- Develop a hydrologic model to understand natural flows, and evaluate support of habitat needs
- Focus: water quality, depth, velocity, and cover (hiding place) needs for spawning, rearing, and migration of salmonids,

Narrative Flow Objective Development

- Identified as a basin planning priority
- Currently evaluating conceptual approaches
  - Ranking and prioritization schemes
  - Incorporation of water conservation incentives in permits?
  - Targeted instream requirements vs comprehensive approach?

- Next steps:
  - Solidify approach and consult with Division of Water Rights
  - Continue developing the tool box

Streamflow Monitoring

Multi-purpose:

- Improve understanding of relationship between flow and water quality
- Gauge effectiveness of regulatory efforts
- Provide model calibration data
- Support California Water Action Plan efforts
- Screen for impacts associated with diversion practices
- Inform cannabis regulatory priorities
- Support local restoration efforts

Streamflow Monitoring

Watershed	Calibration/ Validation	Effectiveness	Flow-DO	Screening	Local Support	Stage Only
Trinity		X		X	X	
SF Eel	X			X		
Eel				X		
Van Duzen				X		X
Navarro	X		X	X		
Russian			X	X		

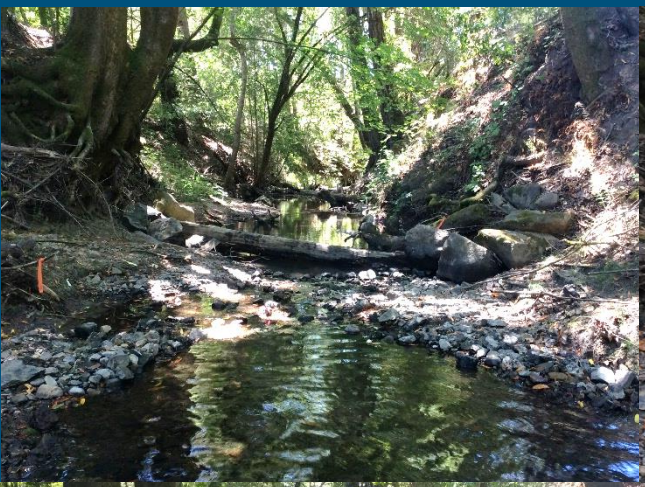
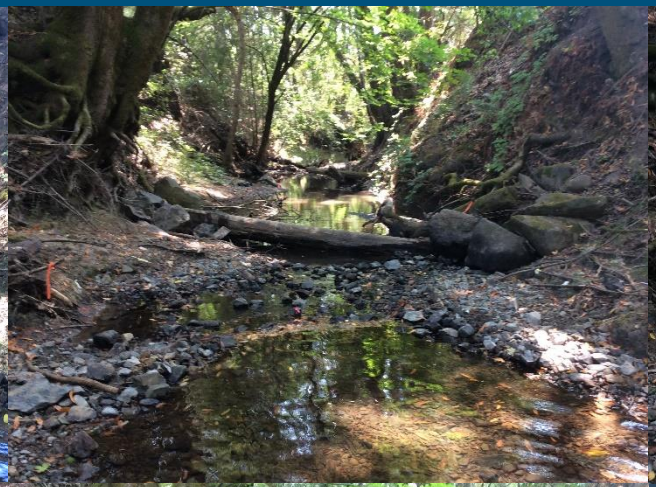
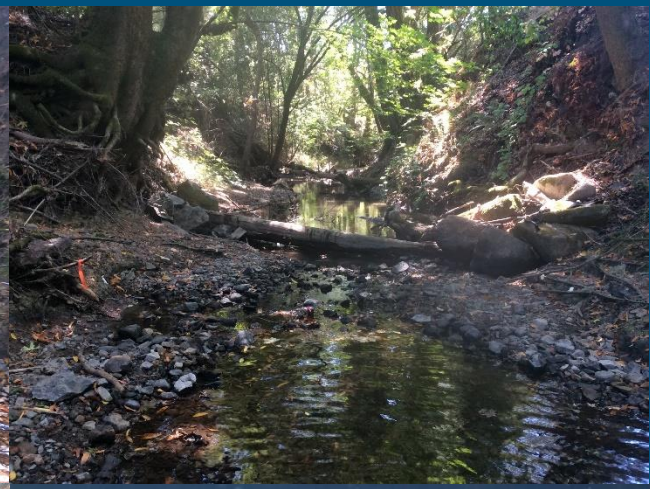
Exploring relationships of water quantity and water quality

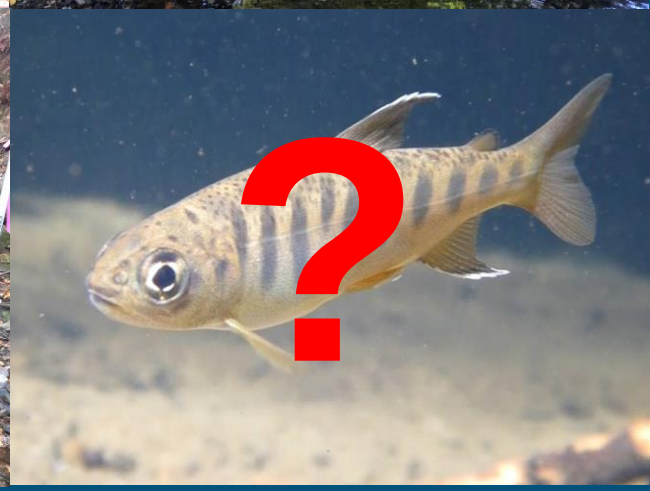
Dynamics that influence dissolved oxygen concentrations in salmonid rearing pools and possible implications for management

Sarah Nossaman Pierce, Mariska Obedzinski, Elizabeth Ruiz, Andy McClary, and Andrew Bartshire, California Sea Grant
Bryan McFadin and Lance Le, North Coast Regional Water Quality Control Board

Sea Grant California

CALIFORNIA WATER BOARDS North Coast - R1

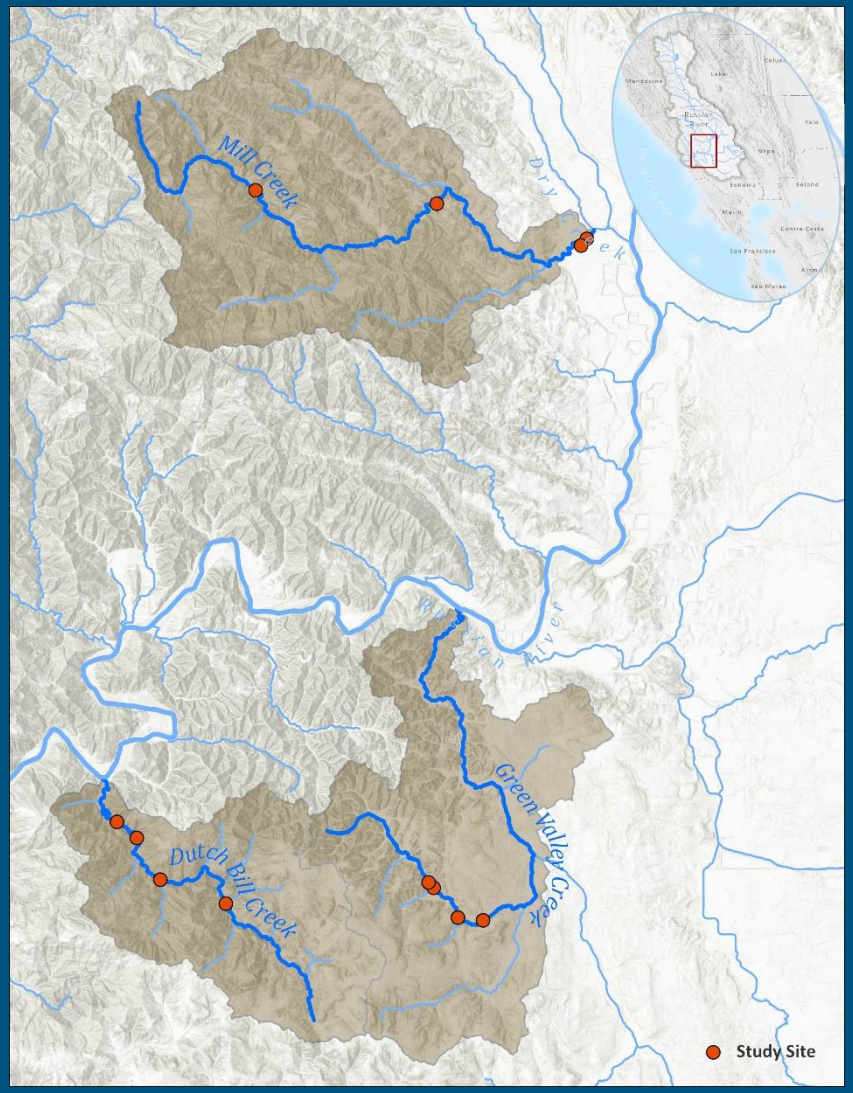
- Oversummer survival of coho salmon positively associated with Dissolved Oxygen (Woelfle-Erskine et al. 2017, Obedzinski et al. 2018)

- As flows recede over dry season, DO impairment can threaten over-summering salmonids even in reaches that remain wet

- Is there a readily-measured indicator that can help predict DO impairment?

- Pilot study: Do flow-related habitat parameters (e.g., discharge, depth, volume, etc) influence DO suitability through the summer dry season?

  - DO suitability = meets regional objective - daily minimum 6.0 mg/L



Study sites

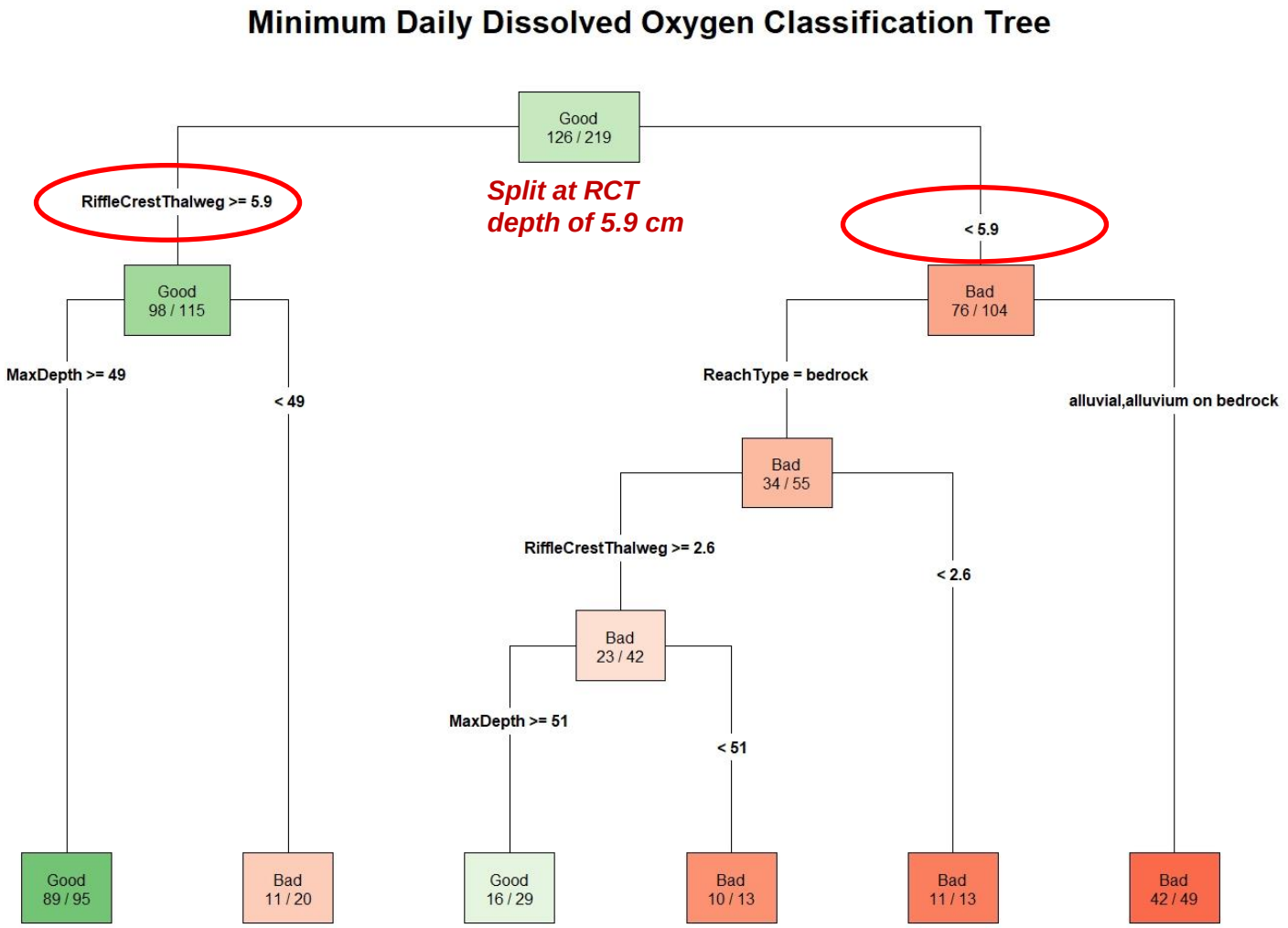
- High priority coho rearing streams lower Russian River basin (3rd order)
  - Dutch Bill Creek
  - Green Valley Creek
  - Mill Creek
- 12 sites, spanning range of conditions

Data collection

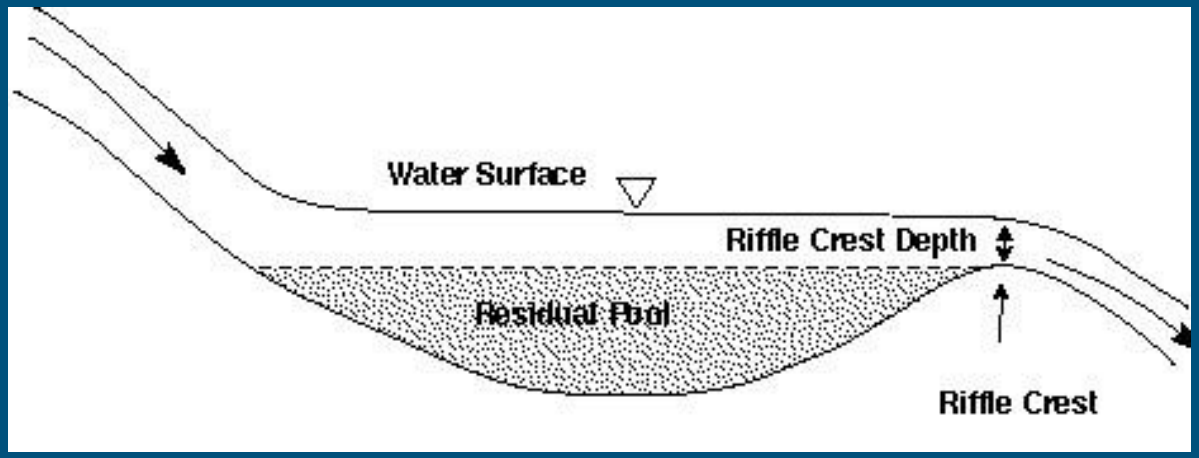
- Continuous:
  - Pool DO
  - Water temperature
  - Stage depth
- Biweekly:
  - Discharge
  - Riffle crest thalweg (RCT) depth
  - Riffle area
  - Pool area/wetted volume
  - Pool max depth
  - Connectivity
- Streambed geology at site
  - Bedrock, alluvial, or alluvium on bedrock
- Dominant substrate at RCT
- Riffle slope

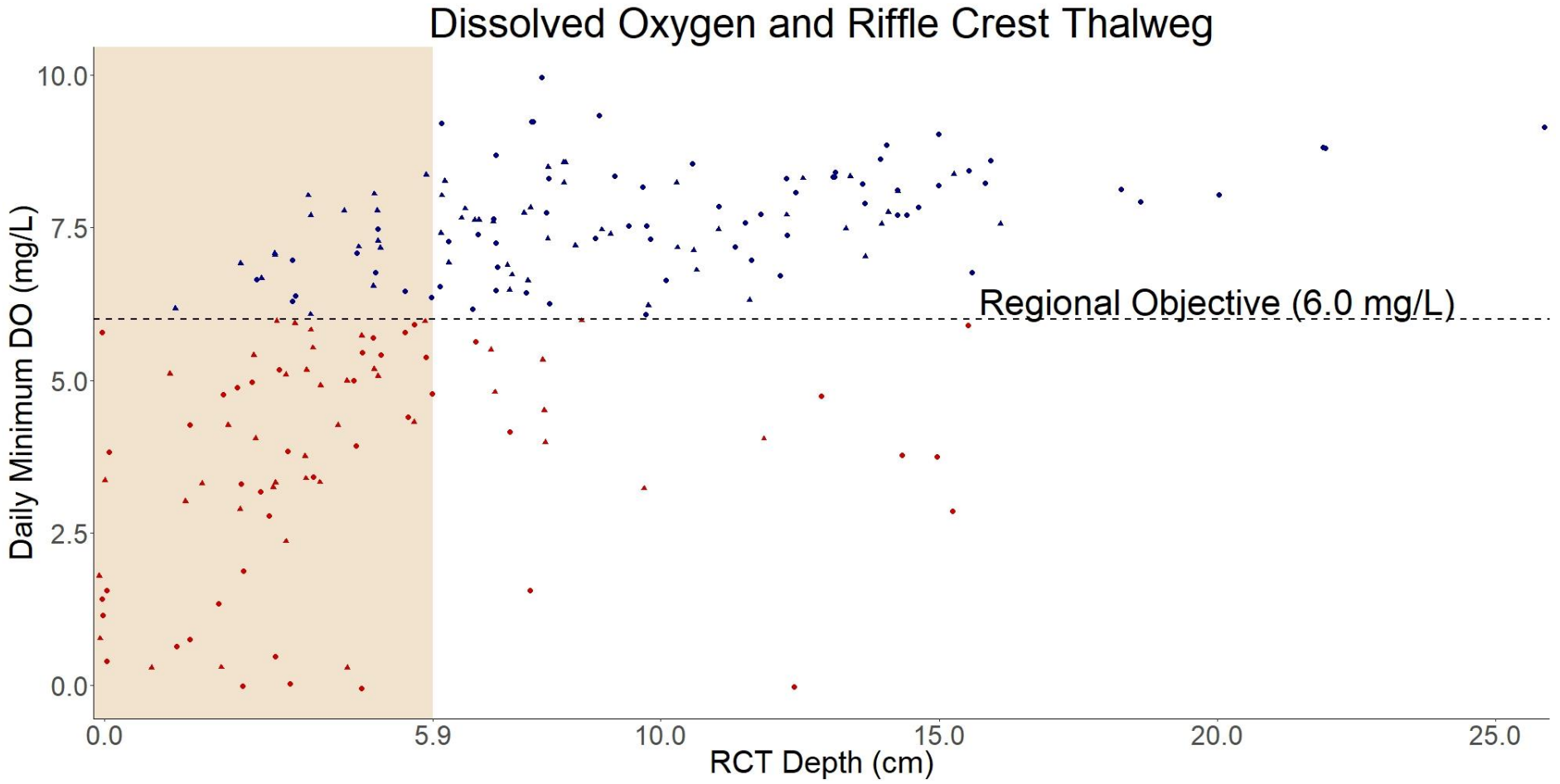
Good *= met minimum daily DO objective of 6.0 mg/L*

Bad *= did not meet objective*

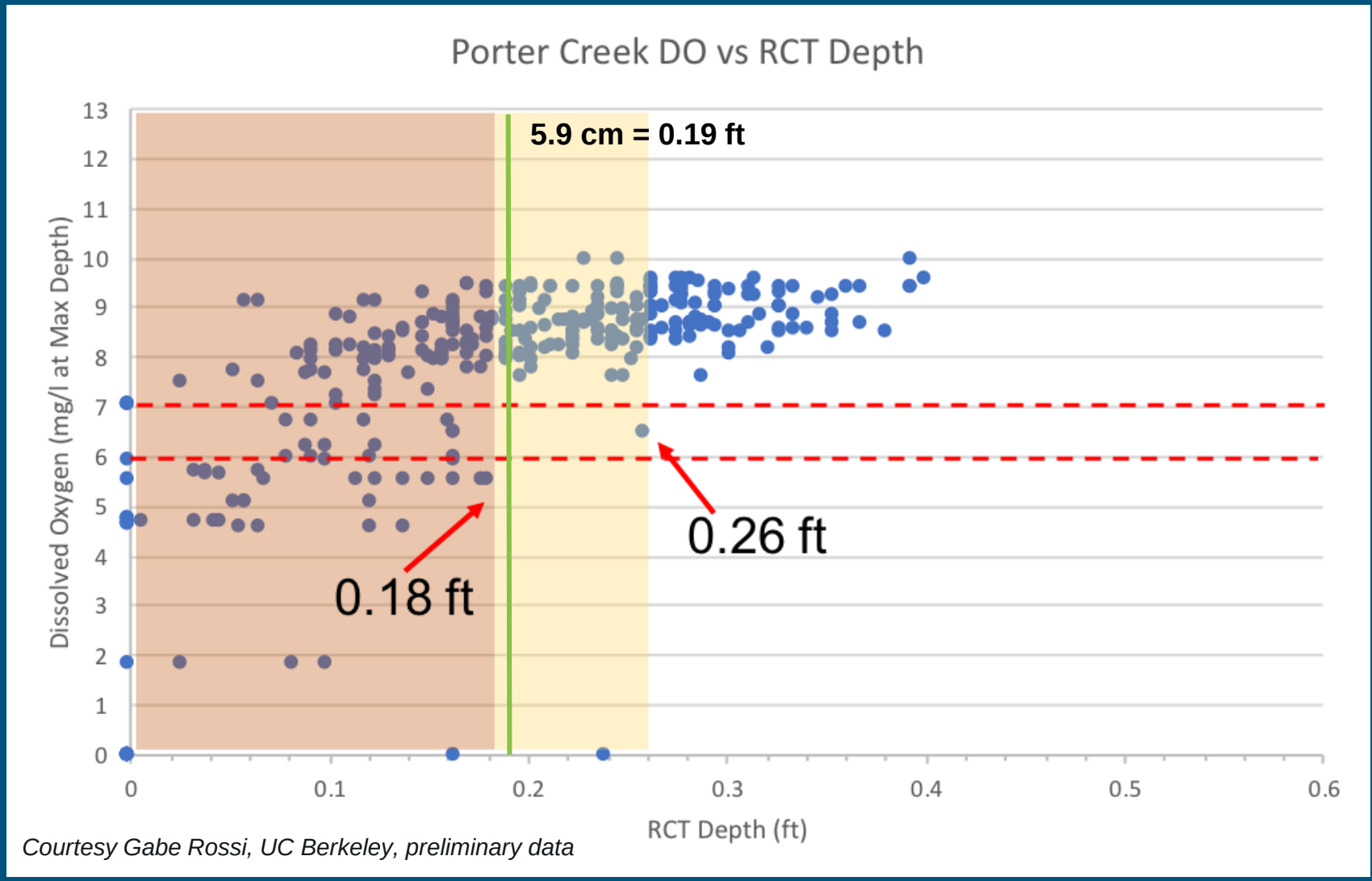


Riffle Crest Thalweg



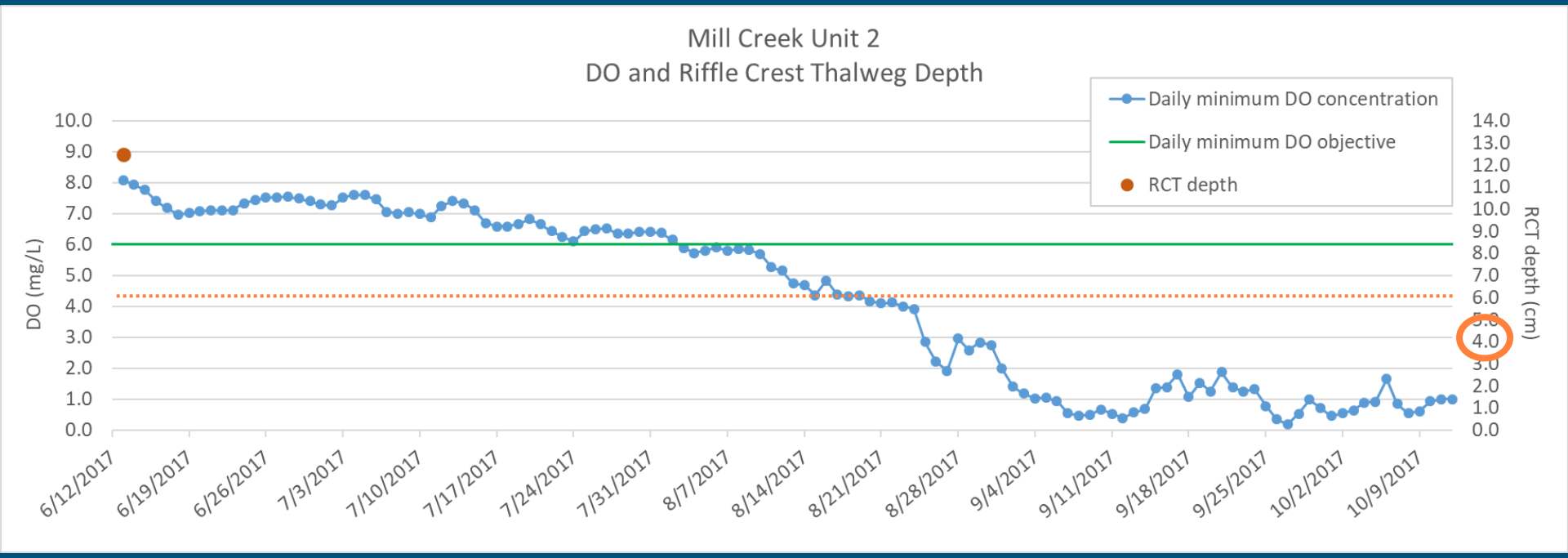


RCT depth of ~6 cm predicted whether DO met objective with 82% overall accuracy



Courtesy Gabe Rossi, UC Berkeley, preliminary data


max pool depth
riffle crest thalweg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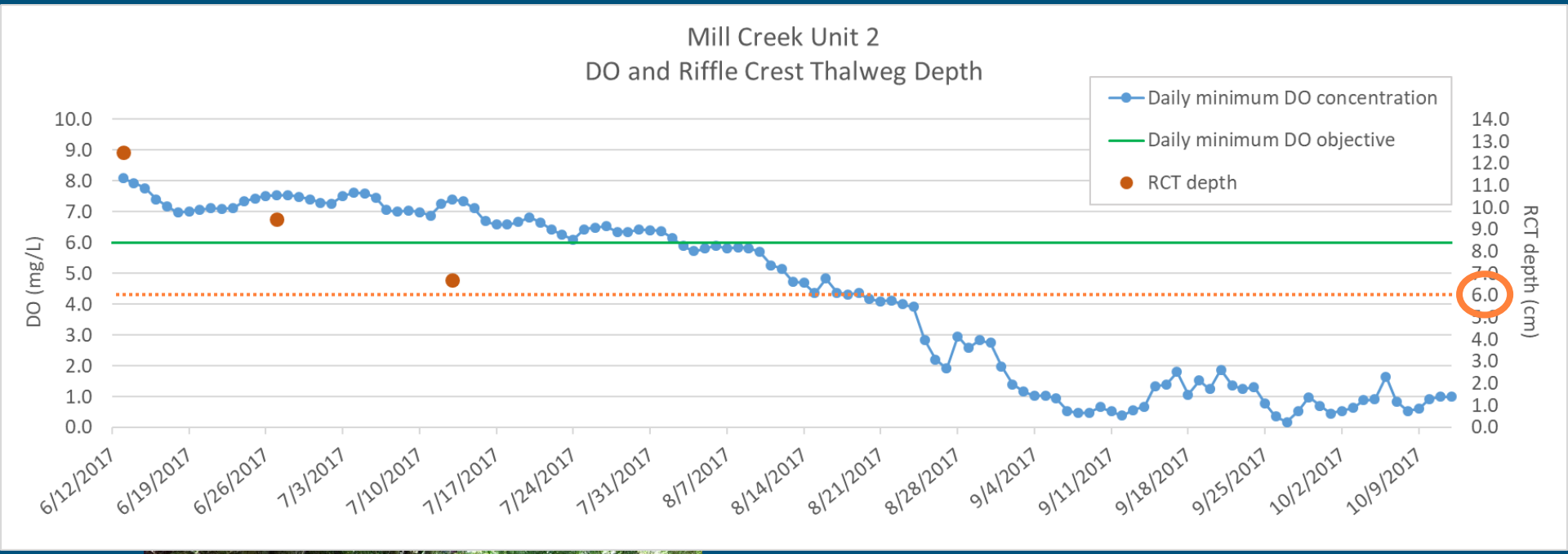
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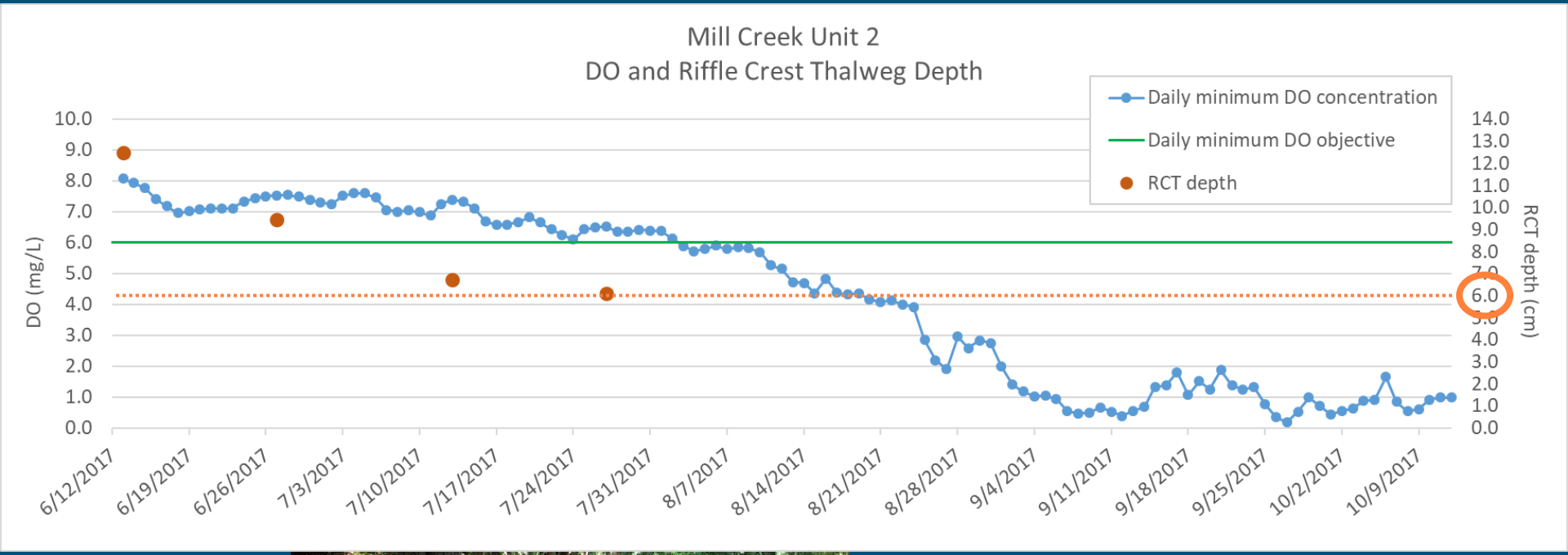
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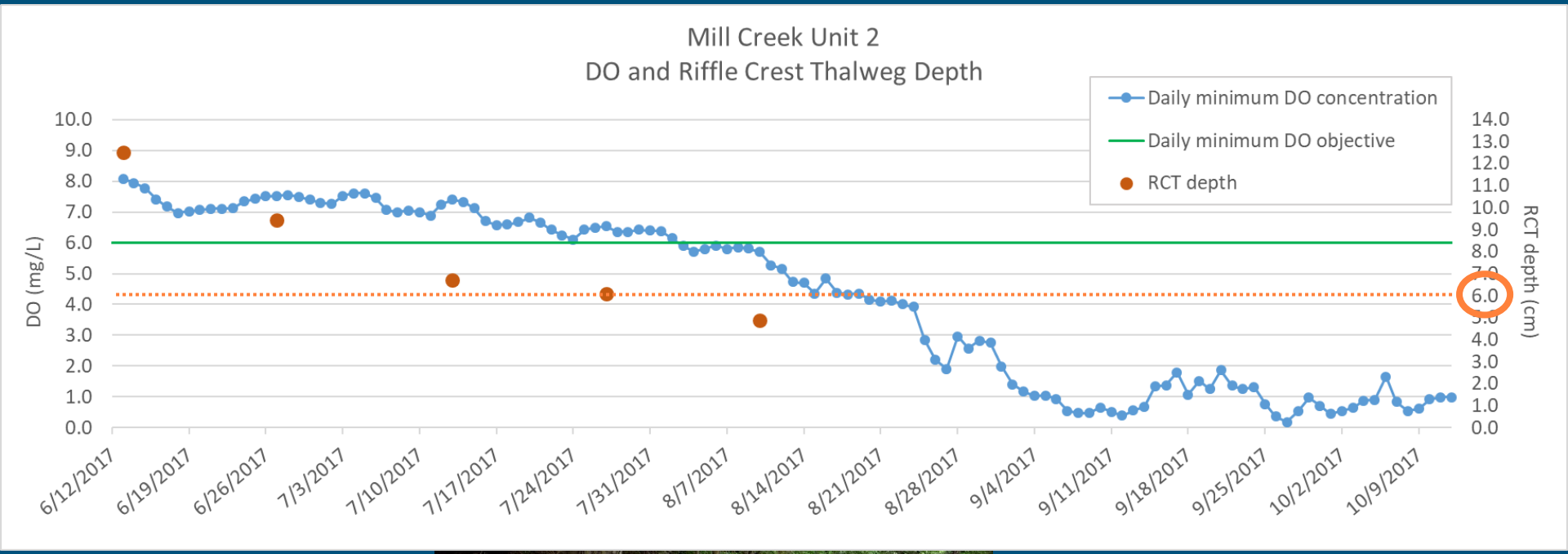
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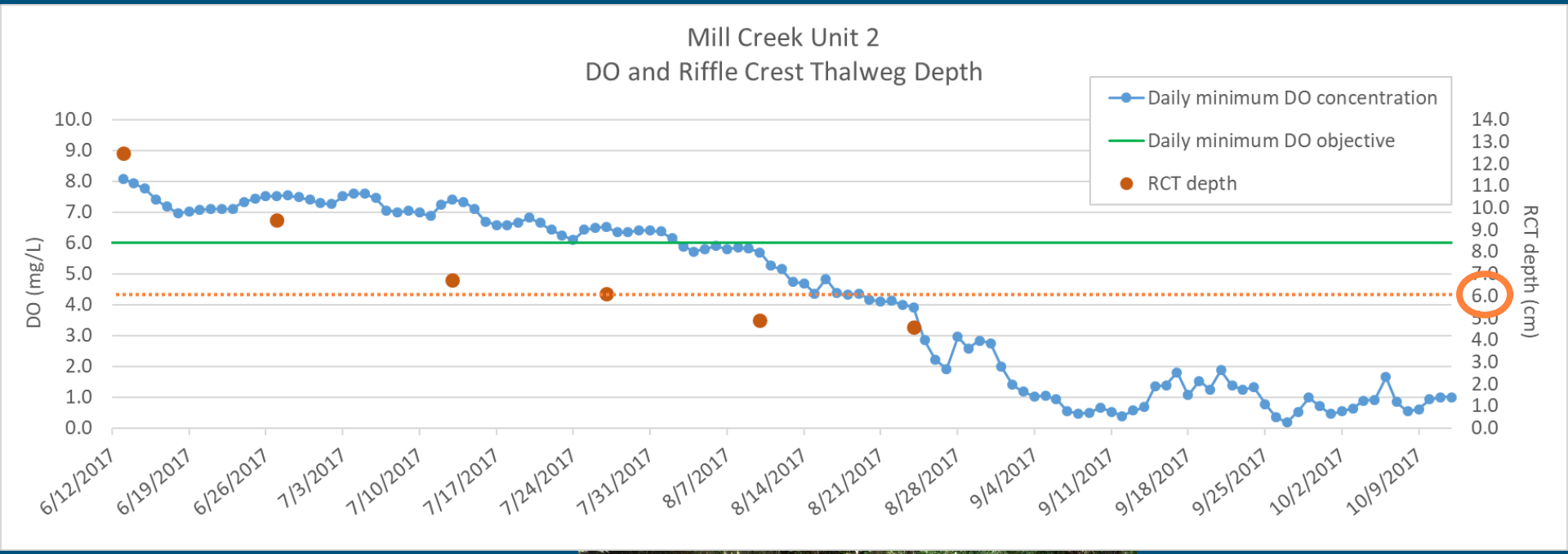
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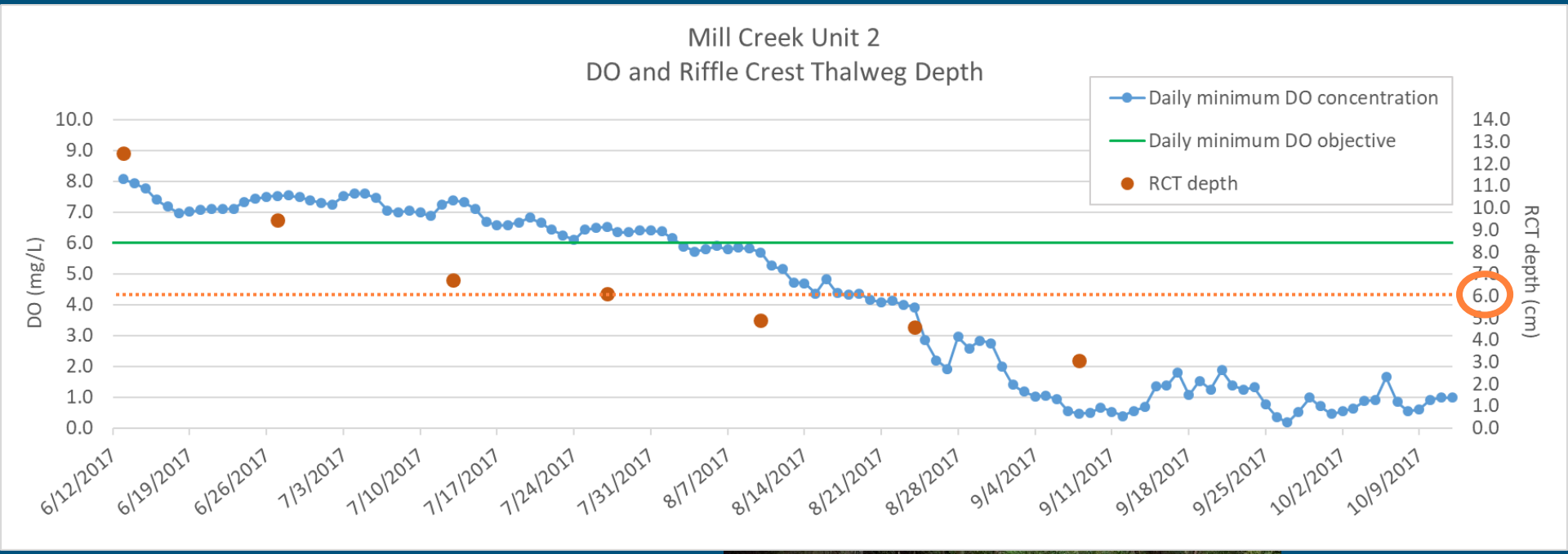
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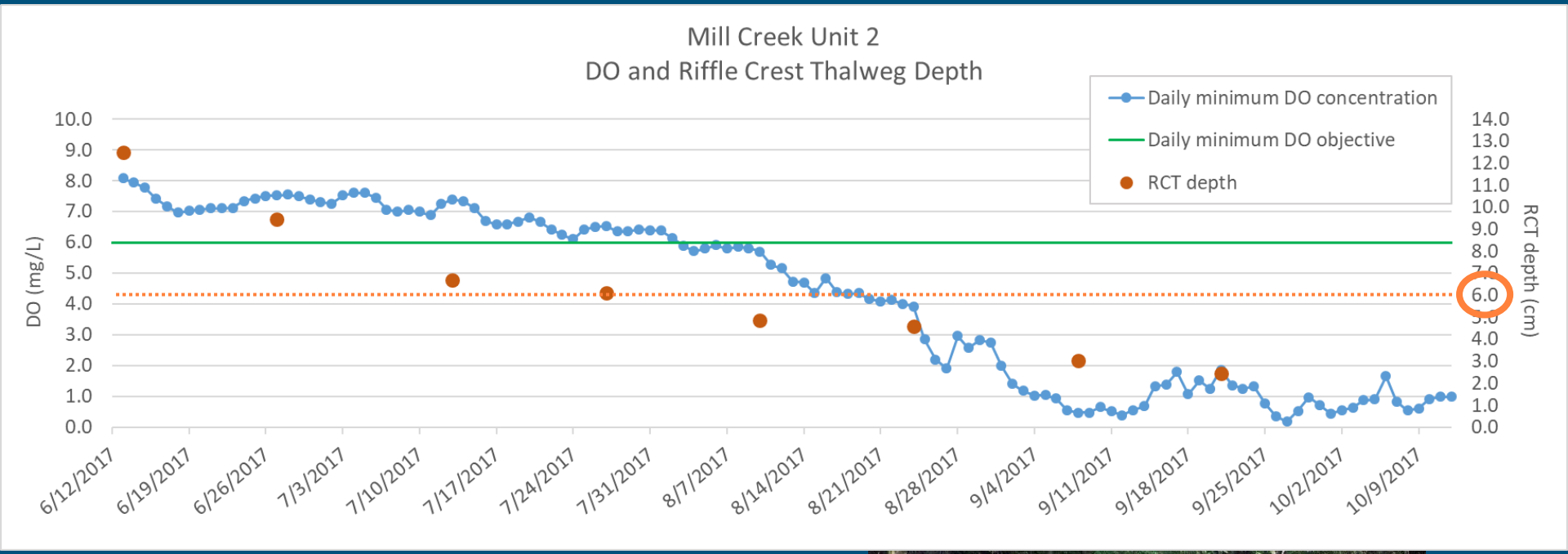
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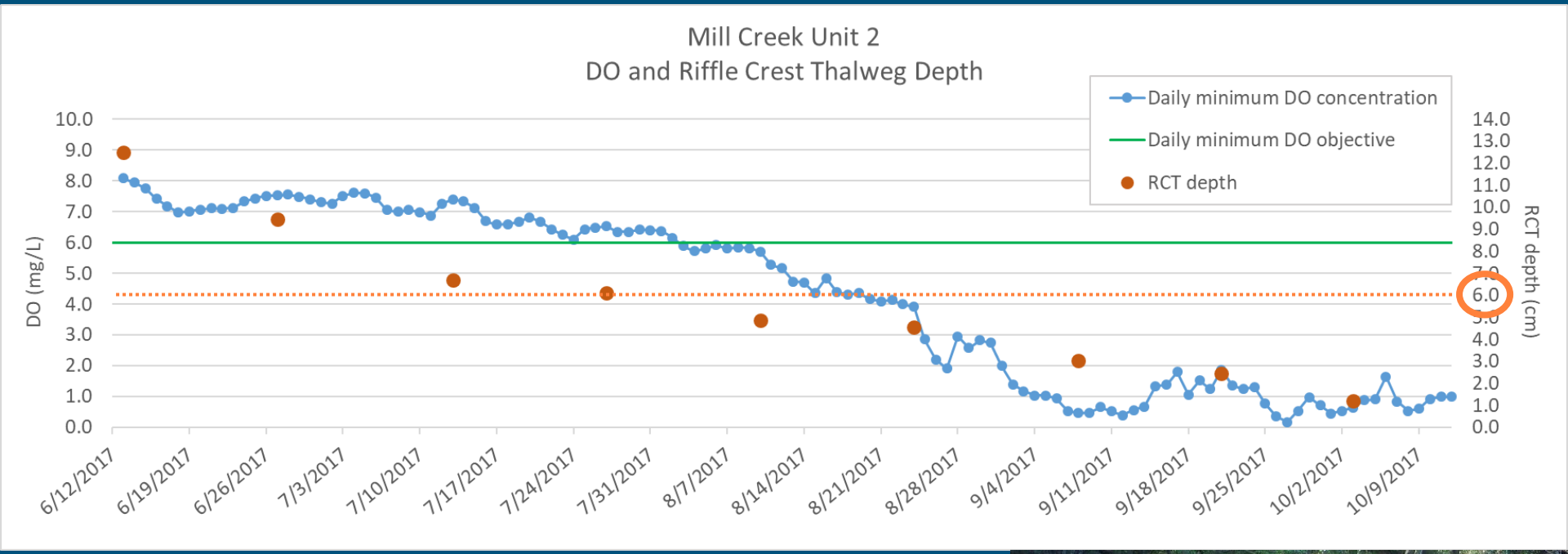
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Next steps

- Do findings hold true in other watersheds and water years?
- Paired down data collection:
  - DO and temperature
  - RCT depth
  - Pool max depth
  - Streambed geology classification
- Collect data on more coastal CA 2nd-3rd order streams
- Practical applications
  - Support development of meaningful management criteria protective of ecosystem functions

Science → Management

Approaches to using Riffle Crest Thalweg (RCT) thresholds to set DO-based flow criteria:

- Establish a relationship of flow to RCT depth to determine bypass flows corresponding with RCT threshold
- Site-specific relationship of RCT threshold to stage at individual diversions
- Assessment criteria

Statewide efforts to enhance flows…

Terminology

California Water Plan

- State's water management plan
- Maintained by CA Department of Water Resources
- Updated every 5 years

California Water Action Plan

- Governor's initiative
- Developed by CalEPA, CA Natural Resources Agency, CDFA
- Objectives:
  - more reliable water supplies
  - the restoration of important species and habitat; and
  - a more resilient, sustainably managed water resources system

California Water Action Plan
Action 4 – Protect and Restore Important Ecosystems

Sub-action: **Enhance Water Flows in Stream Systems Statewide (Page 12 of WAP)**

"*The State Water Resources Control Board and the Department of Fish and Wildlife will implement a suite of individual and coordinated administrative efforts to enhance flows statewide in at least five stream systems that support critical habitat for anadromous fish...*"


SHASTA RIVER
MILL CREEK
SOUTH FORK EEL RIVER
MARK WEST CREEK
VENTURA RIVER
Klamath River
Eel River
Sacramento River
Russian River
Eureka
Redding
Chico
Reno
Carson City
NEVADA
CALIFORNIA
Sacramento
Vacaville
Napa
Fairfield
Antioch
Stockton
San Francisco
Livermore
Modesto
Fremont
San Jose
Salinas
Fresno
Visalia
Bakersfield
Santa Maria
Lompoc
Palmdale
Lancaster
Santa Clarita
Oxnard
Priority Streams
California Water Action Plan
PRIORITY STREAMS
PRIORITY WATERSHEDS
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Division of Water Rights
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Sources: Esri, HERE, DeLorme, USGS, Intermap, Increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, and the GIS User Community

Water Action Plan Overview

- What environmental flows are needed?
  - Assessing existing flow studies and recommendations
  - California Department of Fish and Wildlife is conducting additional flow studies where needed
- State Water Board will consider flow recommendations and other available information
- May result in instream flow agreements, policies, regulations, or other implementation actions

Current WAP Activities

- State Water Board has started the process of developing hydrology models to provide information about water supply, water demand, instream flows, and surface water/groundwater interactions

- California Department of Fish and Wildlife is implementing instream flow studies in Ventura, South Fork Eel River, and Mark West Creek watersheds

- Regional Water Board staff: data collection, review and consultation, and other assistance

Water Quality Monitoring Council
California Environmental Flows Workgroup

- Mission: *Advance the science of ecological flows assessment and its application for supporting management decisions aimed at balancing natural resource needs with consumptive water uses to establish environmental flows*
- Meets Quarterly – November, February, May, and August on 2nd Tuesday of Month from 9:00 - 3:30
- Co-Chairs:
  - Dan Schultz, State Water Board – Water Rights
    Email: Daniel.Schultz@waterboards.ca.gov
  - Robert Holmes, CA Department of Fish and Wildlife –
    Email: Robert.Holmes@wildlife.ca.gov

California Env. Flows Workgroup

Products/Effort

- Guidance for environmental flow criteria
- Appropriate application of tools, databases and models
- Prioritize knowledge gaps that should be funded
- Communication, interpretation, and information on management approaches
- Ways to reconcile technical approaches used by different programs

Current Members

- State Water Board - Water Quality
- State Water Board - Water Rights
- Regional Water Quality Control Boards
- Department of Water Resources
- California Department of Fish and Wildlife
- US Fish and Wildlife Service
- US Forest Service
- US Geological Survey
- Bureau of Reclamation
- NOAA Fisheries
- Water Districts

California Environmental Flows Framework

Overview

- Framework for organizing information, methods and analyses, and providing consistent science-based recommendations to inform development of ecological flow criteria
- Based on a functional flows approach that considers all aspects of the annual hydrograph and associated ecological functions
- Funded by State Water Board through contract with UC Davis
- Anticipate peer review and final documents will be completed in 2020

California Environmental Flows Framework (cont.)

- Structure will allow for flexible development of ecological flow criteria based on reference hydrology
- Once complete, will:
  - Provide tools and guidance to develop appropriate flow metrics (e.g., peak magnitude, frequency, and duration of pulse flow events, spring recession flow duration and rate of change, dry-season base flow magnitude and duration, etc.)
  - Provide tools and guidelines for refining specific species or management needs
  - Include recommendations for monitoring and adaptive management programs
  - Provide natural flow estimates for streams throughout the state

California Environmental Flows Framework (cont.)

Potential regional applications:

- “Functional flow” estimates provide objective benchmarks to compare observed conditions against
- Potential for use in basin planning context as a basis for ranking and prioritizing needs and efforts

Voluntary Flow Agreements

- Watersheds:
  - Russian
    - Jackson Family Wines –Green Valley Creek
    - Camp Meeker Recreation and Park District – Dutch Bill Creek
  - Navarro, Mattole, Shasta, Scott, SF Eel
- Dedication – Use of water rights instream
- Augmentation – Releasing stored water
- Forebearance – Agreement to not divert
- Trading – Hot water for cold water
- Leasing – Water purchase

Questions?

bryan.mcfadin@waterboards.ca.gov