Bay-Delta Water Quality Control Plan Update and Recirculated Draft Substitute Environmental Document

Hearing

November 29, December 16, 19, 20, 2016

January 3, 2017

State Water Resources Control Board

CALIFORNIA
Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

Hearing Purpose

The State Water Board is holding this public hearing to receive public comments on the:

- Draft Revised Substitute Environmental Document (SED)
- Amendment to the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan)

Hearing Dates:

Nov 29 - Sacramento

Dec 16 - Stockton

Dec 19 - Merced

Dec 20 - Modesto

Jan 3 - Sacramento

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Outline

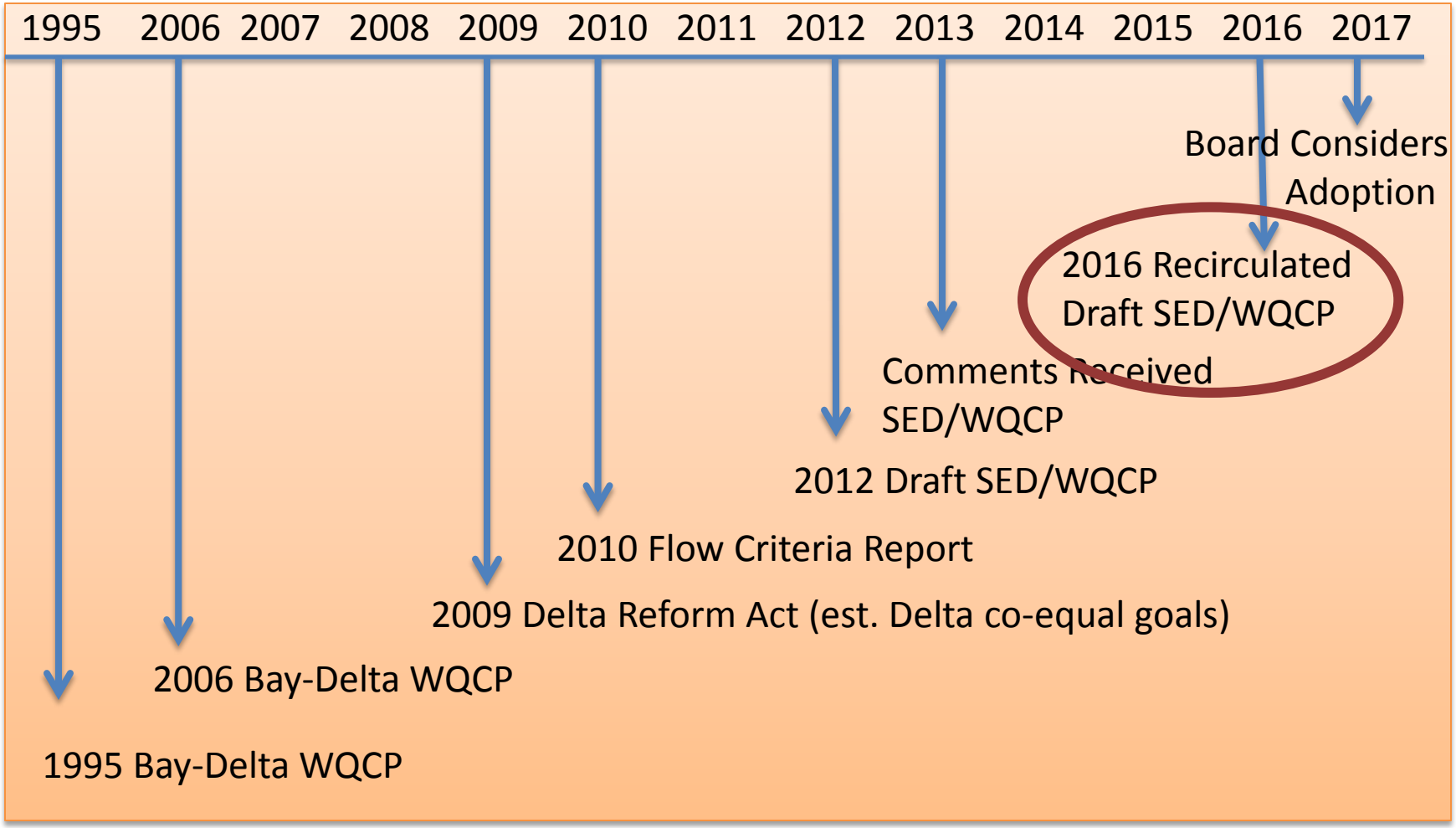
- Introduction and Overview
- Fish Benefits
- Models Used
- Effects
- Next steps

The Project

Update of Bay-Delta Plan:

- San Joaquin River flows for reasonable protection of fish and wildlife
- Southern Delta salinity for reasonable protection of agriculture
- Program of implementation

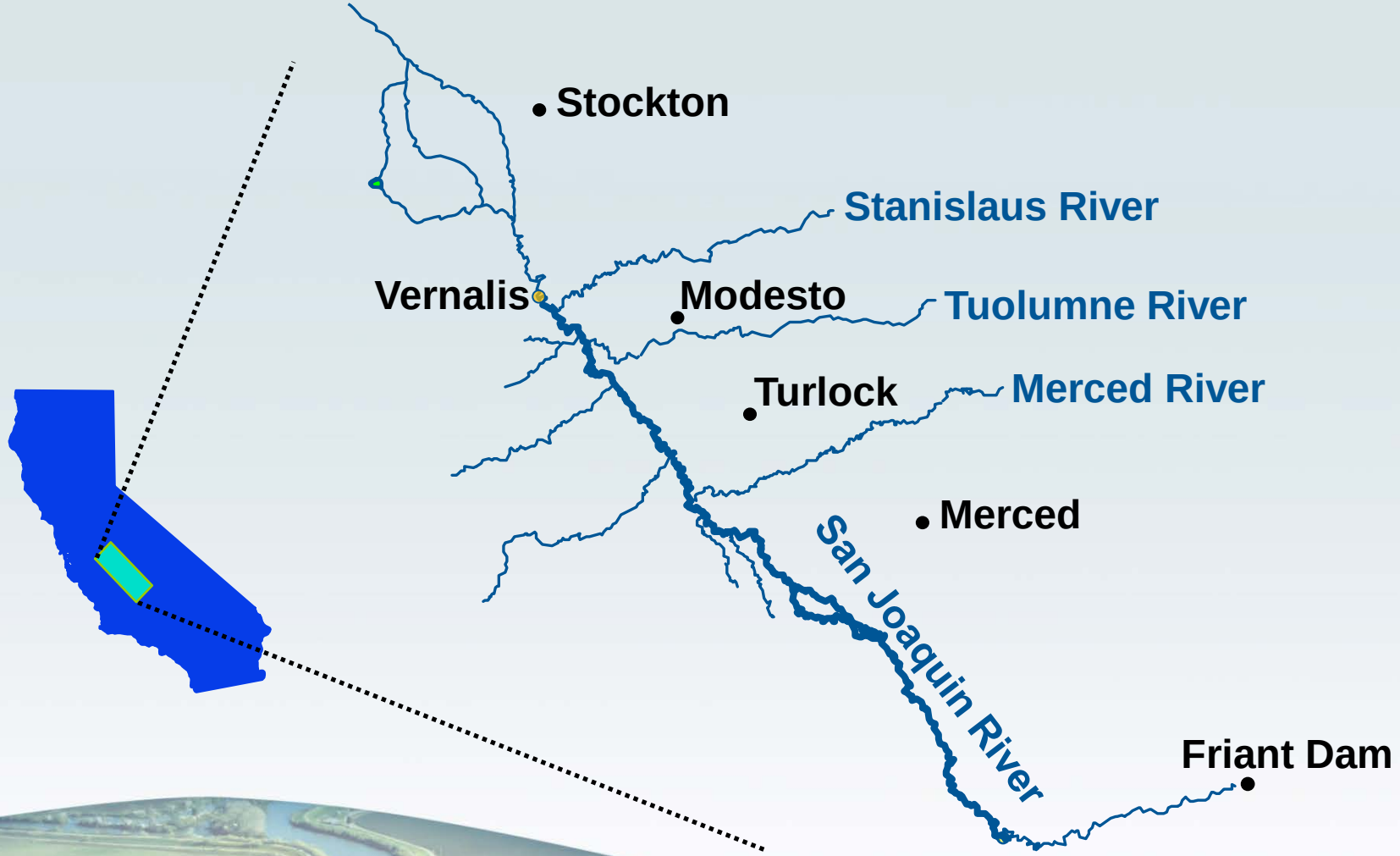
WQCP/SED Timeline

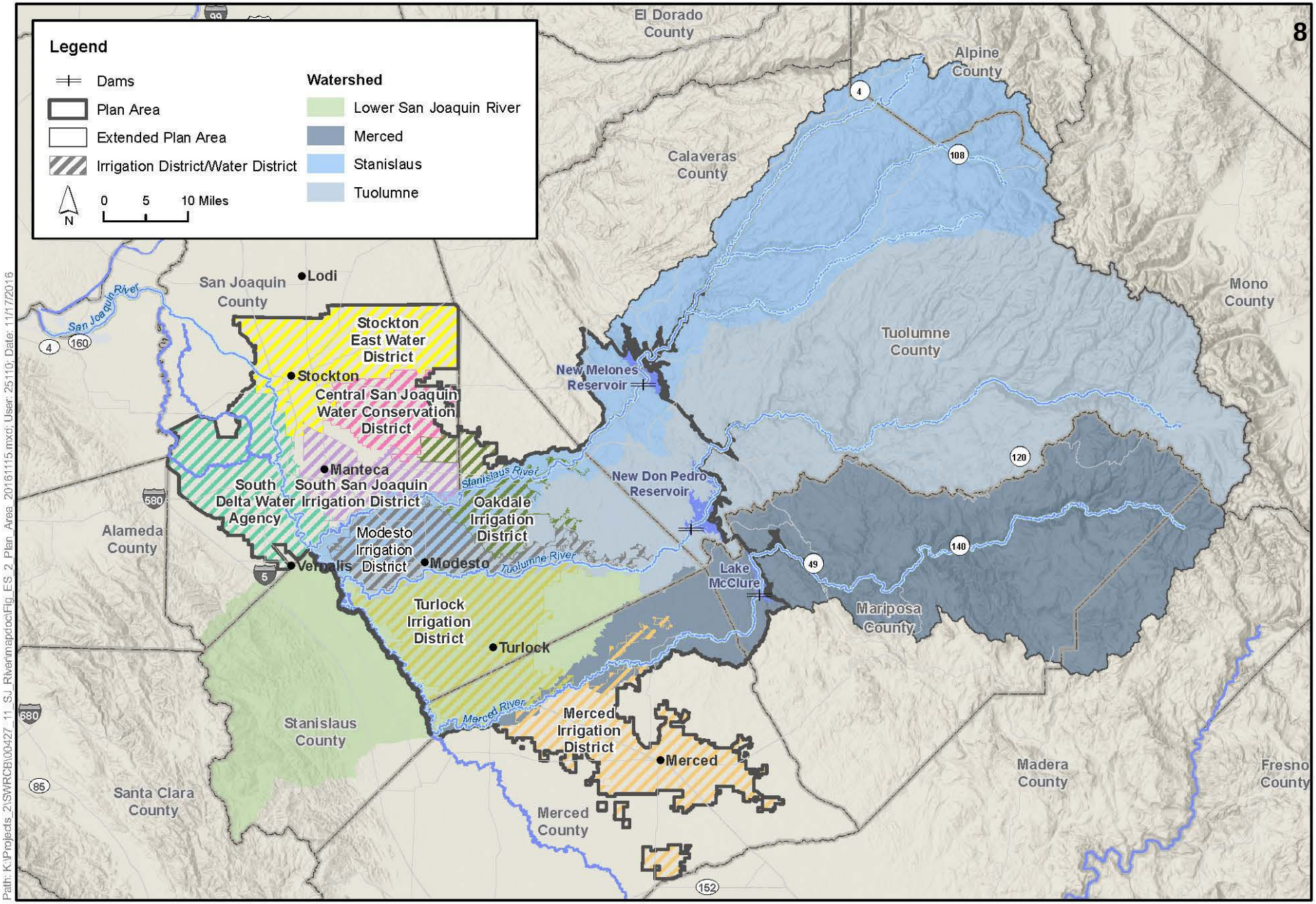


Current Plan Out of Date

- Plan last updated 21 years ago in 1995
- Species have been declining – the need for update was identified 10 years ago (in 2006 Plan update)
- Endangered Species Act increasing water restrictions
- Administration's California Water Action Plan directs the State Water Board to complete the update of the Plan to further achievement of the co-equal goals in the Delta
  1. Providing a more reliable water supply for California
  2. Protecting, restoring, and enhancing the Delta ecosystem

Lower San Joaquin River (LSJR) Basin





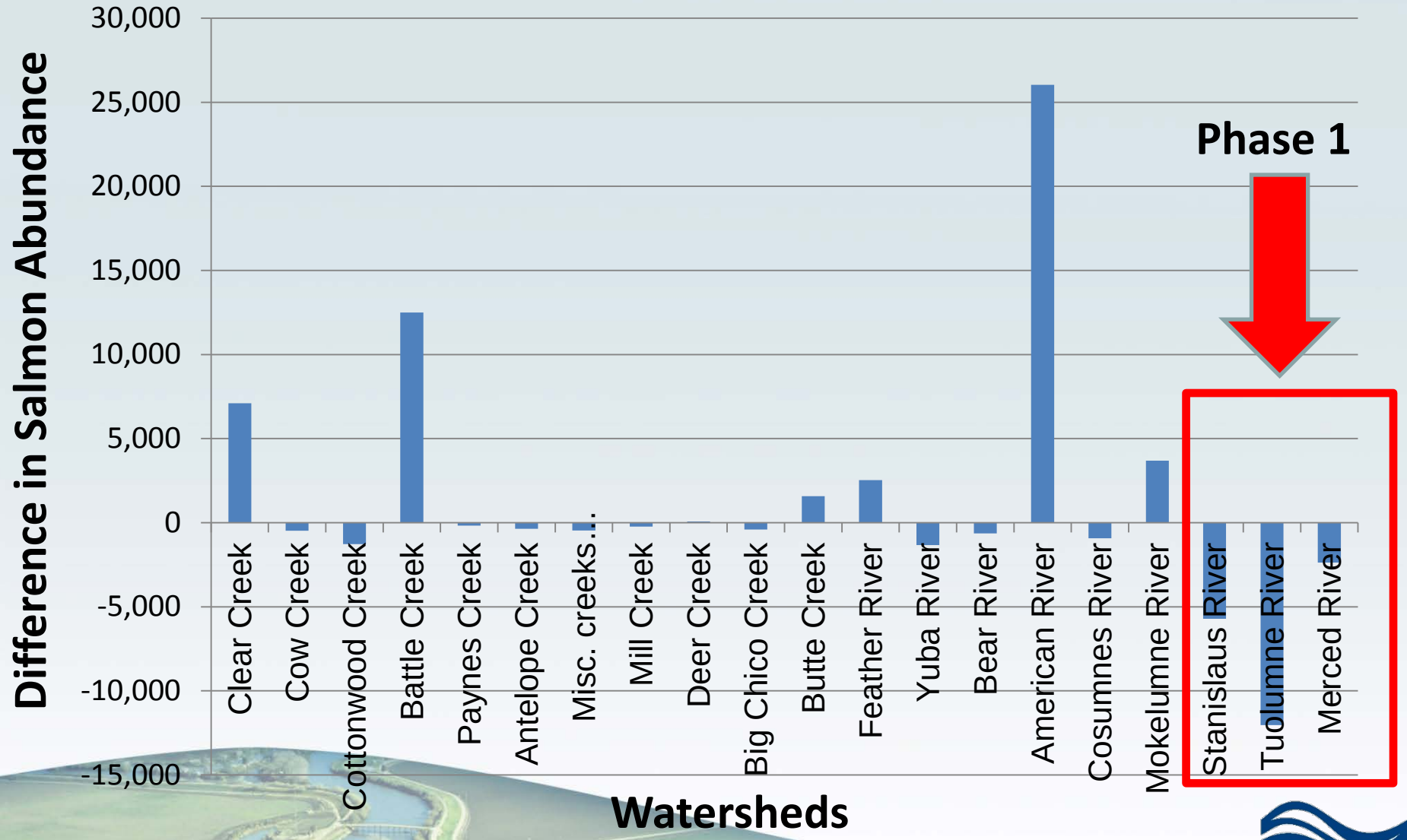
Purpose and Goal

- To establish flow objectives for the February–June period and a program of implementation for the reasonable protection of fish and wildlife beneficial uses in the LSJR Watershed, including the three eastside, salmon-bearing tributaries (the Stanislaus, Tuolumne, and Merced Rivers)
- To establish salinity objectives for the reasonable protection of southern Delta agricultural beneficial uses and a program of implementation to achieve the objectives

Why Focus on Flow?

- Scientific studies show that flow is a major factor in the survival of fish like salmon
- Many benefits of flow, including improved growth and survival of native fish by improving water temperatures and increasing floodplain habitat
- Flow affects risk of disease, risk of predation, reproductive success, growth, smoltification, migration, feeding behavior, and other ecological factors
- Non-flow measures can also be important but State Water Board has limited authority to require non-flow measures

Difference in Adult Fall-run Chinook Salmon Natural Production (1992 to 2011 average minus 1967 to 1991 average)



SED Figure 19-1
Corrected Tuolumne River

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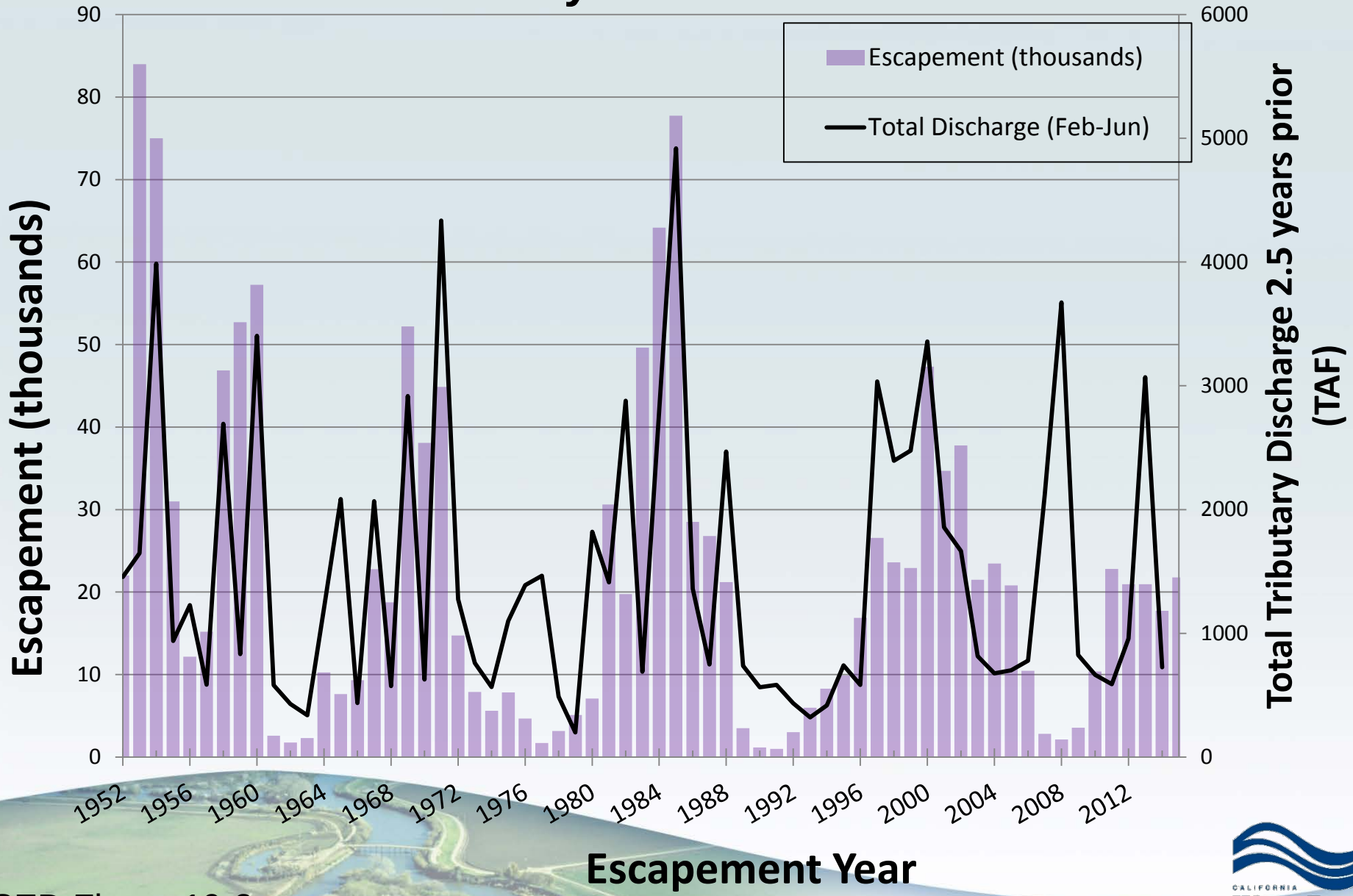
Adult Salmon Returns and Flows Experienced by Juveniles



SED Figure 19-2

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This is Hard, Requires Balancing

- State Water Board's 2010 flow criteria report – a purely technical assessment and no balancing – concluded that 60 percent of flow should be left in the LSJR for the benefit of fish
- Current uses (agriculture, drinking water) rely on up to 80 percent or more of the unimpaired flow
- Unlike the 2010 report, this staff proposal considers other uses and aims to strike a balance among competing uses of water
- The staff proposal recommends a range of between 30 and 50 percent of unimpaired flow, with a starting point of 40 percent – this is a big increase

This is Hard, Requires Balancing

- This is less than what environmental and commercial fishing interests favor, and more than agricultural and affected urban users want
- Balancing is hard, but is what we are called upon to do
- Because it is hard, State Water Board has a long history of encouraging settlements

Settlements are Encouraged

- The flow proposal includes “adaptive implementation,” which allows adjustments so water is used wisely and more effectively – implementation of non-flow measures could also reduce the flows needed
- Board is looking for durable local solutions that will improve flows and other conditions that can reduce the need for flow
- Local water agencies and local people working with agency experts and other organizations can provide the foundation for such durable solutions
- The California Natural Resources Agency is leading settlement discussions to explore the potential for a comprehensive agreement on environmental flows in both the San Joaquin and Sacramento River basins

Current SJR Spring Flow Objective

- One compliance location: Lower San Joaquin River at Vernalis (inflow to Delta)
- Minimum monthly average flow rates
- Includes "pulse" flow during a 31-day period in April and May of each year
- USBR only responsible water right holder

Proposed LSJR Flow Objective

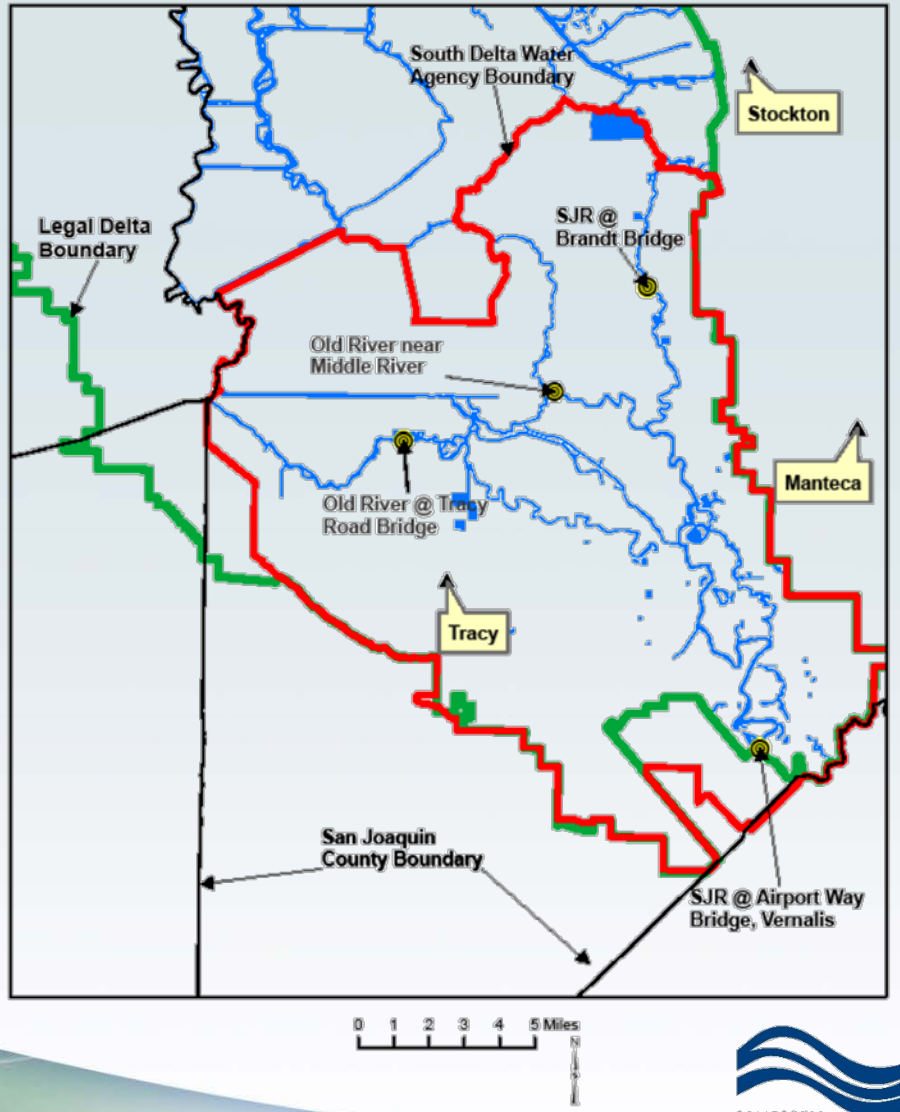
- Applies to salmon-bearing tributaries-- the Stanislaus, Tuolumne, and Merced Rivers
- Narrative Objective:
  - Maintain inflow conditions from the SJR watershed to the Delta at Vernalis sufficient to support and maintain the natural production of viable native SJR fish populations migrating through the Delta
- Numeric Objective:
  - Feb - June: 30% - 50% unimpaired flow
  - Starting point of 40%
  - Unimpaired flow: the natural water production of a river basin, unaltered by upstream diversions, storage, or by export or import of water to or from other watersheds

Proposed LSJR Flow Objective

- Adaptive Implementation
  - Adjustments within the 30% - 50% range
  - Adjustments within Feb - June period
  - Flow shifting to avoid temperature impacts in fall
- Stanislaus, Tuolumne, and Merced (STM) Working Group – implementing entity
  - Biological goals
  - Planning, monitoring, and reporting
  - Voluntary agreements

Current Southern Delta Salinity Objective

- April through August: 0.7 millimhos per centimeter (mmhos/cm) EC
  - based on the salt sensitivity and growing season of beans
- September through March: 1.0 mmhos/cm EC
  - based on the growing season and salt sensitivity of alfalfa during the seedling stage
- 4 Salinity compliance stations within the south Delta:
  - San Joaquin River at Vernalis
  - San Joaquin River at Brandt Bridge
  - Old River at Middle River
  - Old River at Tracy Road Bridge.



Hoffman Report, Figure 1.1.

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Proposed Southern Delta Salinity Objective

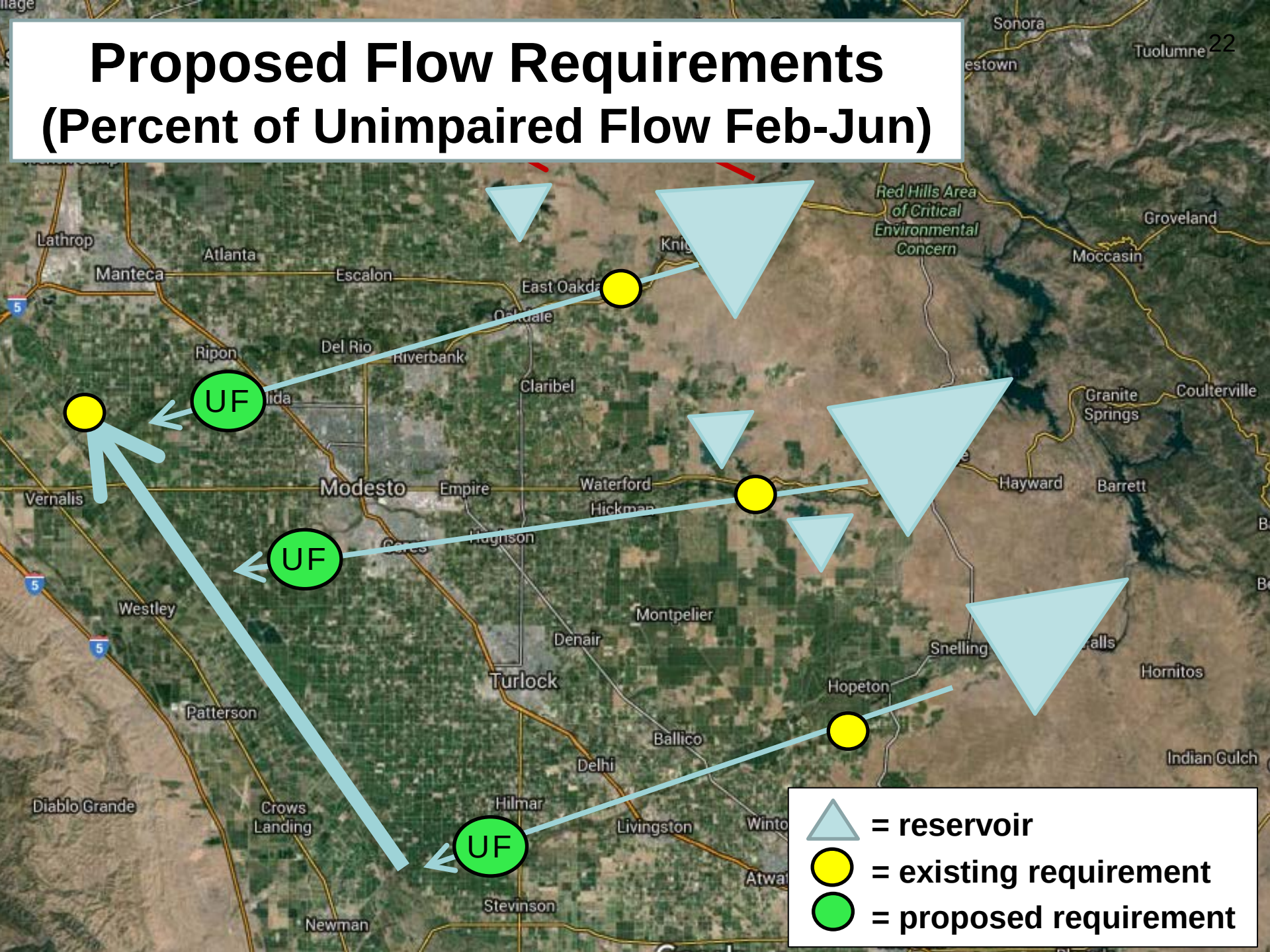
- Year round objective of 1.0 deciSemens per meter (dS/m) EC
- Three compliance locations changed to channel segments
  - SJR from Vernalis to Brandt Bridge
  - Middle River from Old River to Victoria Canal
  - Old River/Grant Line Canal from Head of Old River to West Canal
- Continued conditions in USBR and DWR's water rights
  - USBR - 0.7 EC at Vernalis April - Aug; 1.0 EC Sep - March
  - DWR & USBR - 1.0 EC year round in the interior Delta locations
  - DWR & USBR - Continued operations of agricultural barriers or other reasonable measures to address impacts of SWP/CVP operations on water levels and flow conditions

Proposed Southern Delta Salinity Objective

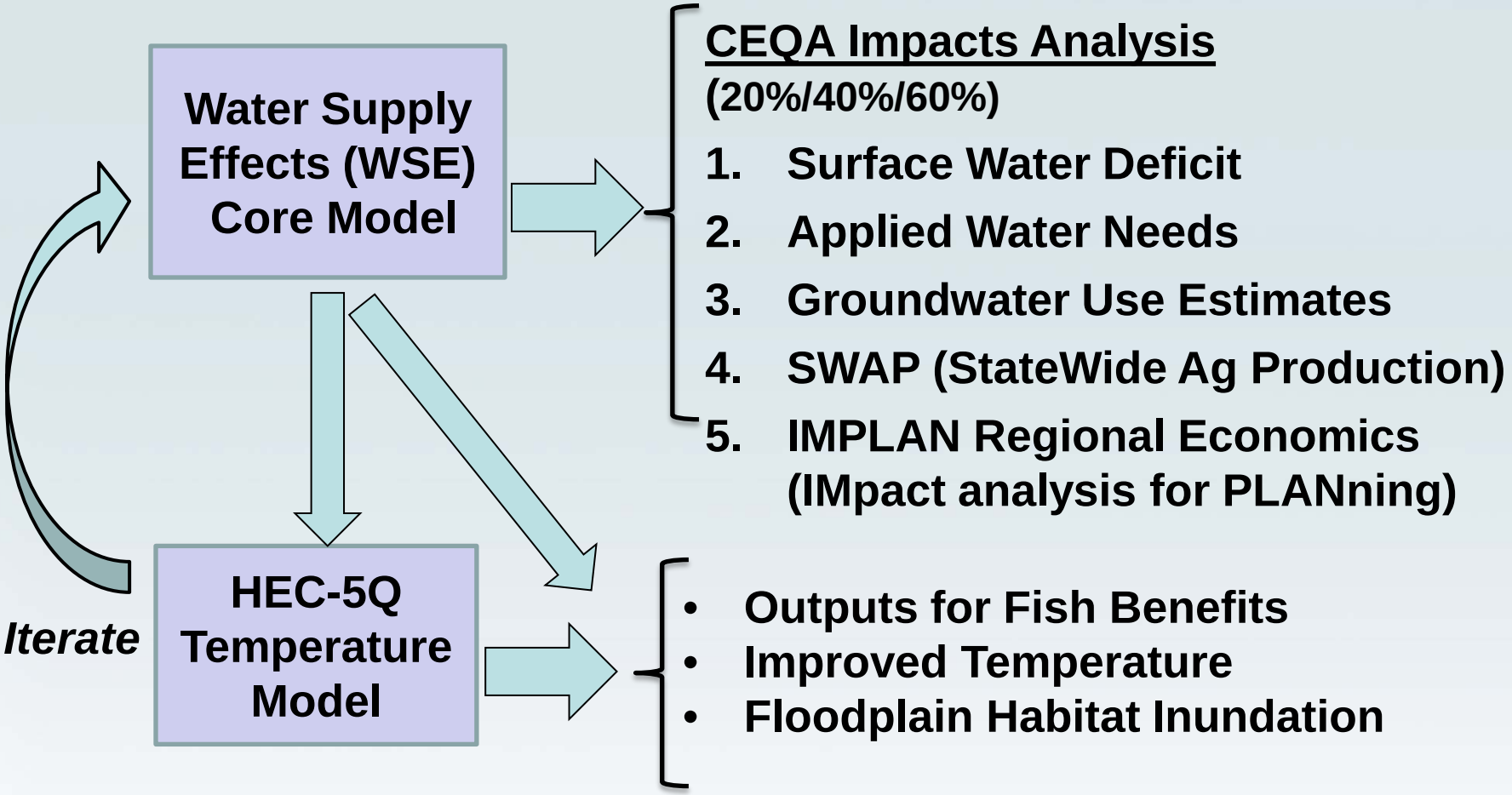
- Other Requirements
  - Comprehensive Operations Plan - Information, actions, performance goals to address SWP/CVP export operations on water levels and flow conditions affecting salinity
  - Monitoring and reporting
  - Study to characterize dynamics of water level, flow, and salinity conditions

- LSJR flow objectives would improve salinity conditions

Proposed Flow Requirements
(Percent of Unimpaired Flow Feb-Jun)



Modeling Flow Chart

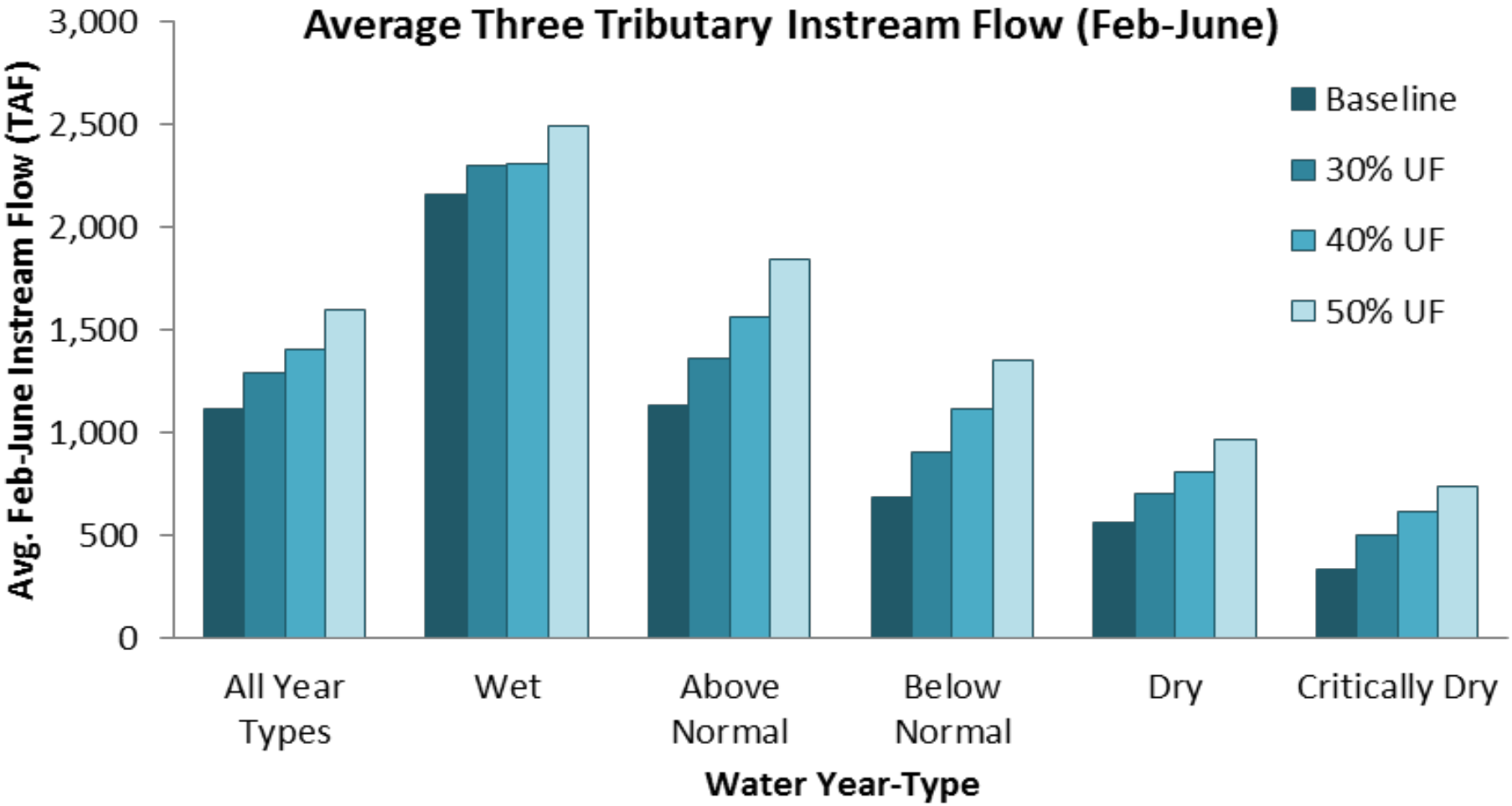


Programmatic Analysis

- Quantitative information from models informs physical changes that could result from the plan amendments and have the potential for quantifiable impacts on environmental resources:
  - River flows
  - Reservoir operations
  - Surface water diversions
  - Groundwater pumping
- Potential environmental impacts of these physical changes are evaluated in Chapters 5–17 of the SED
- Fish Benefits in Chapter 19

FISH BENEFITS

Instream Flows Under the Flow Proposal



Under the 40% unimpaired flow (UF) proposal, average annual instream flow Feb - June would increase by 288 thousand acre feet (TAF), or 26%.

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Ecosystem Benefits of the Flow Proposal

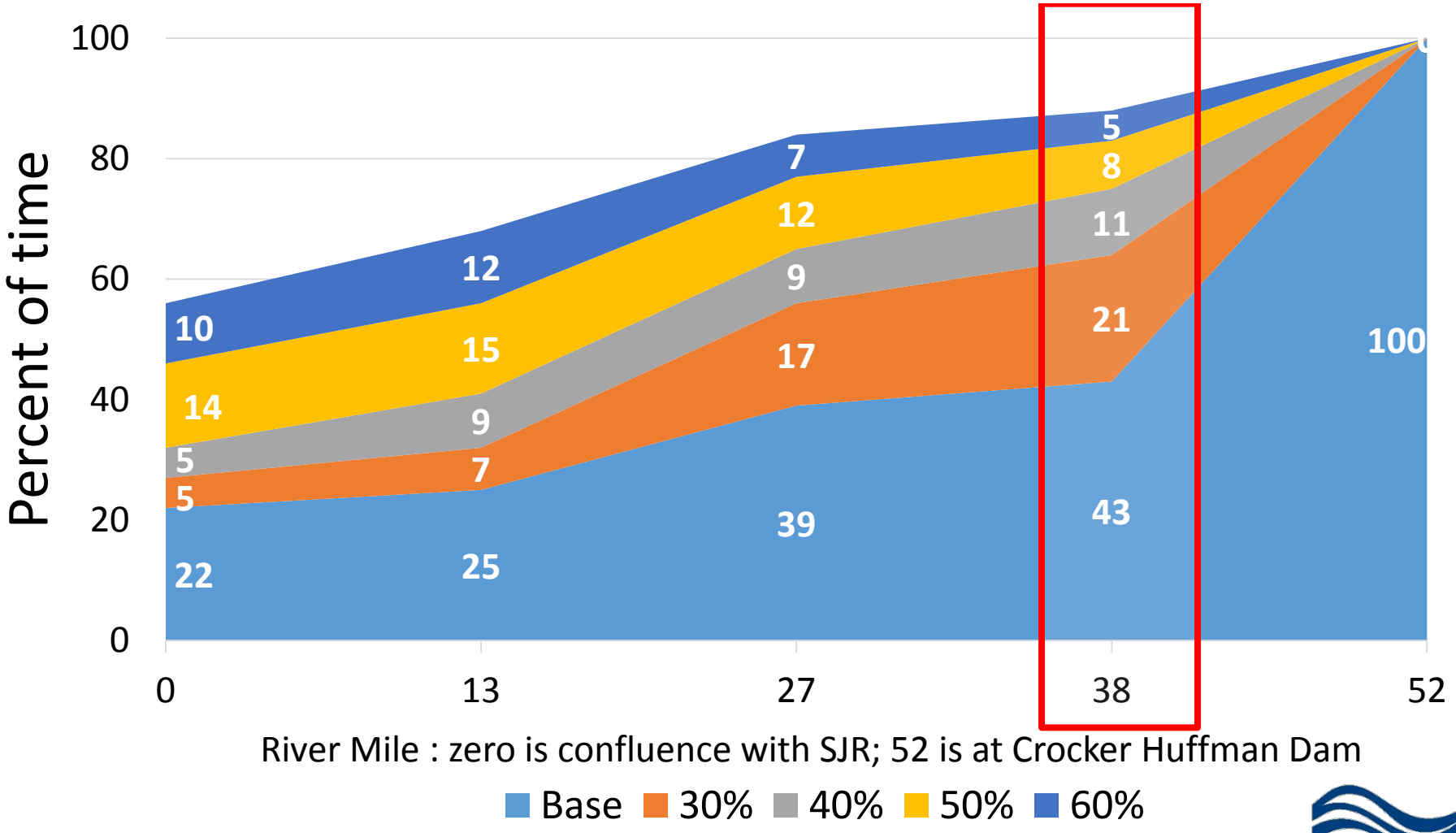
- Restoring the pattern and some limited magnitude of flow that are more closely aligned to the flow conditions to which native species are adapted
- Improving attainment of temperature criteria and increasing floodplain inundation, resulting in greater survival and resiliency of native fish

Increase in Percent of Time Temperature Criteria Achieved – Merced River at River Mile 38

Life Stage	Month	USEPA Criteria (degrees F)	Base	Unimpaired Flow Percent				
				20	30	40	50	60
Reproduction	Feb	55.4	74%	-2%	-2%	0%	3%	5%
Reproduction	Mar	55.4	28%	-1%	0%	4%	7%	14%
Core Rearing	Mar	60.8	87%	-1%	1%	6%	8%	9%
Core Rearing	Apr	60.8	43%	3%	21%	32%	40%	45%
Core Rearing	May	60.8	24%	12%	25%	32%	40%	45%
Smoltification	Apr	57.2	16%	0%	6%	8%	17%	22%
Smoltification	May	57.2	10%	0%	6%	9%	16%	24%
Smoltification	Jun	57.2	11%	0%	-2%	-1%	-3%	-2%
Summer Rearing	Jun	64.4	28%	6%	13%	18%	26%	31%

Excerpted from SED Table 19-9

Merced River – April Core Rearing Percent of Time Temperature Goal Achieved



From SED Figure ES-3

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Summary of Temperature Benefits for All Tributaries in Critically Dry Years

Life Stage	Month	USEPA Criteria (degrees F)	Total Mile*days Possible	Base	Base Percent of Mile*days Possible	Percent of Possible Mile*days for Different Unimpaired Flows				
						20	30	40	50	60
Core Rearing	Mar	60.8	5,090	3,803	75	76	80	85	88	91
Core Rearing	Apr	60.8	4,926	1,876	38	46	55	64	70	76
Core Rearing	May	60.8	5,090	1,135	22	30	39	46	50	55

Excerpted from SED Table ES-16

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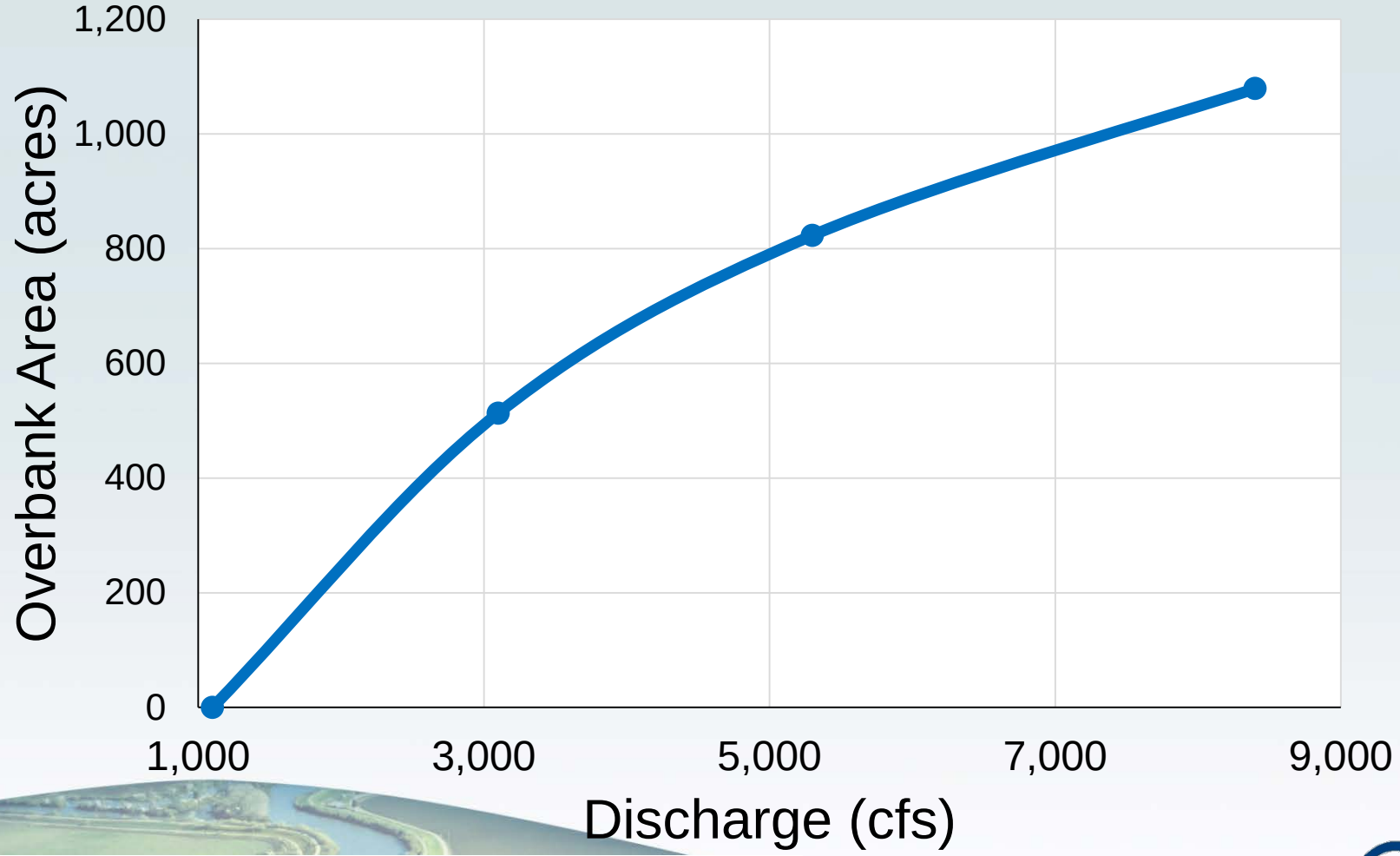
Lower Tuolumne River Overbank (Floodplain) Area



From Figure ES-4 (figure and relationship developed by USFWS (2008) – river mile 52 to 21.5

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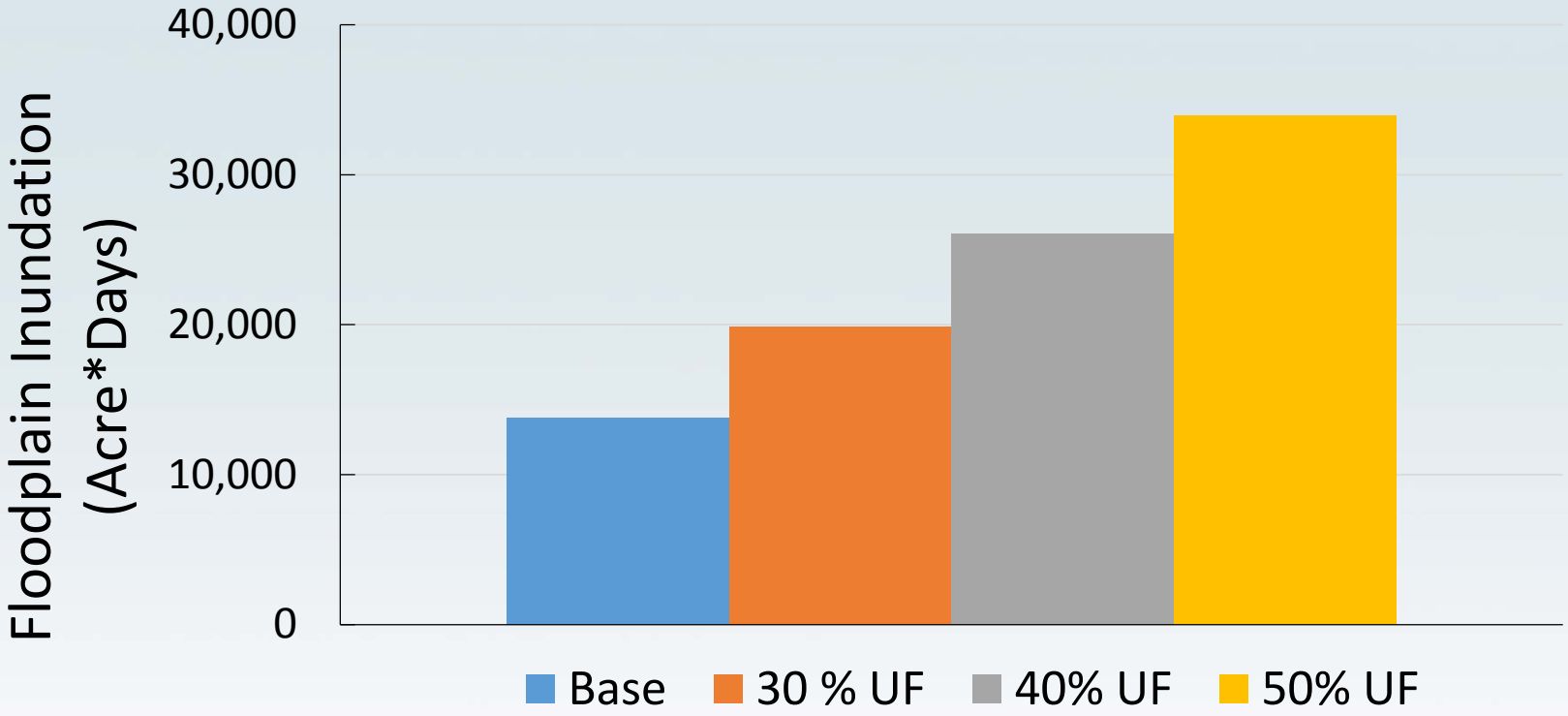
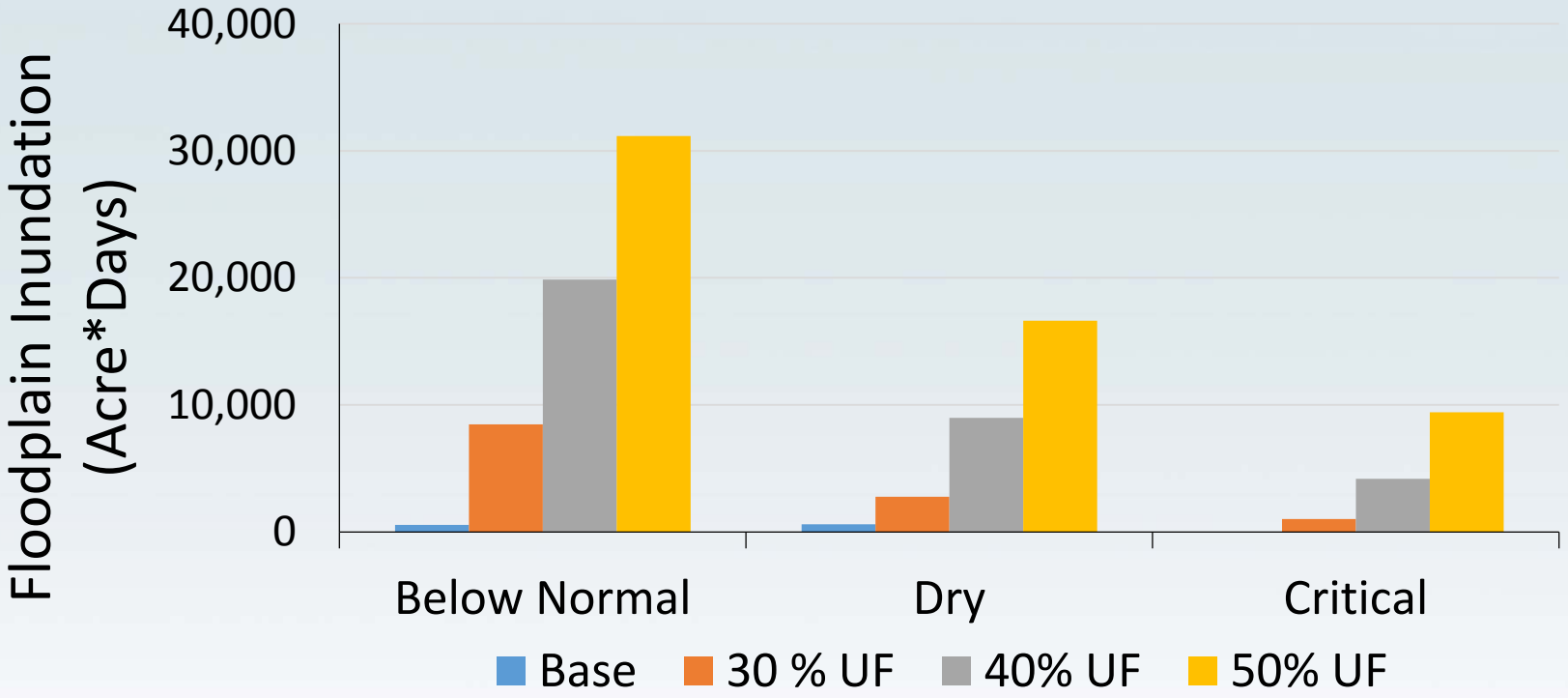
Average Floodplain Inundation
Tuolumne River, April – June



Based on Table ES-18

Average Floodplain Inundation

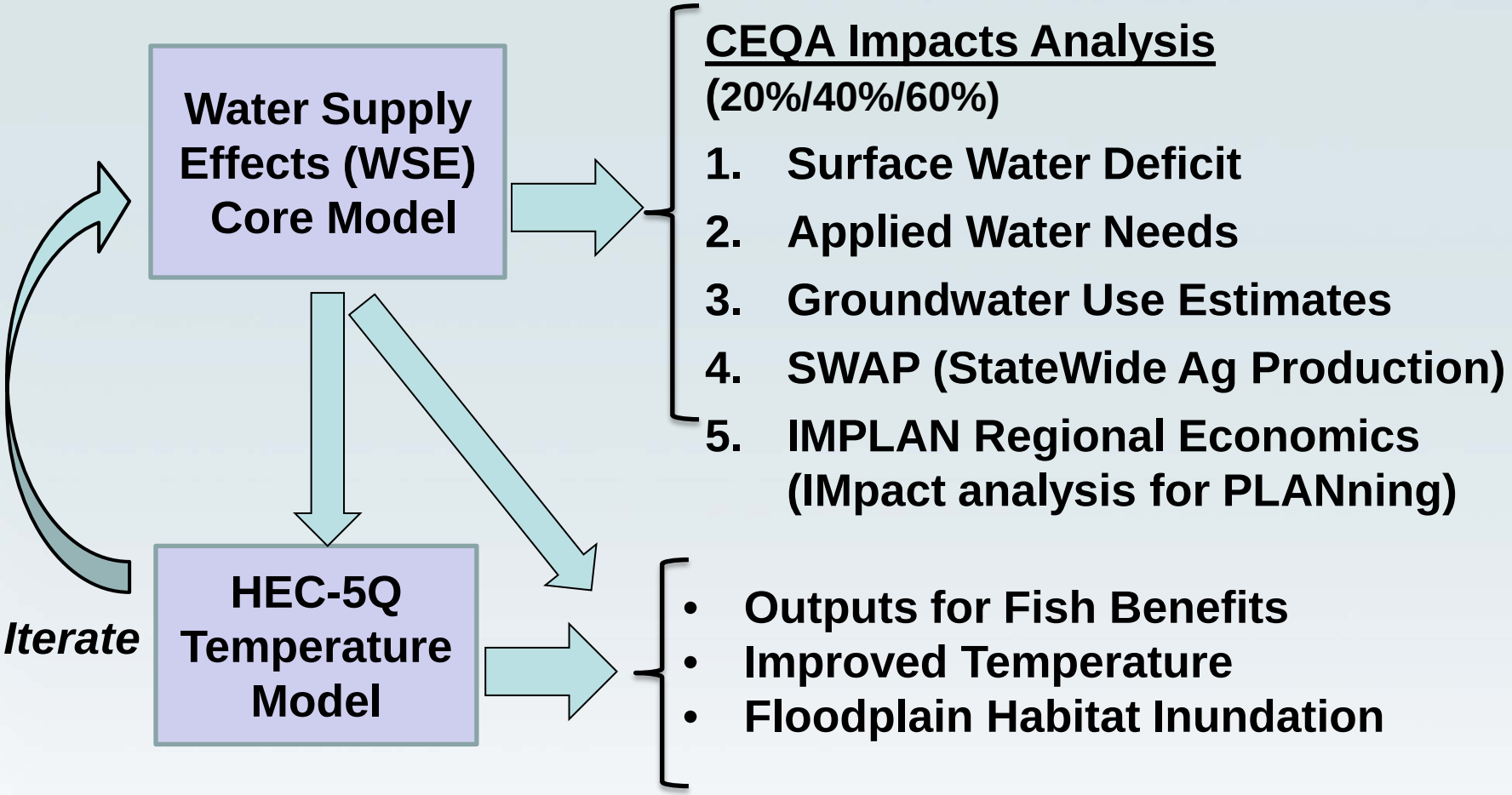
Tuolumne River, April – June in Below Normal, Dry, and Critical Years



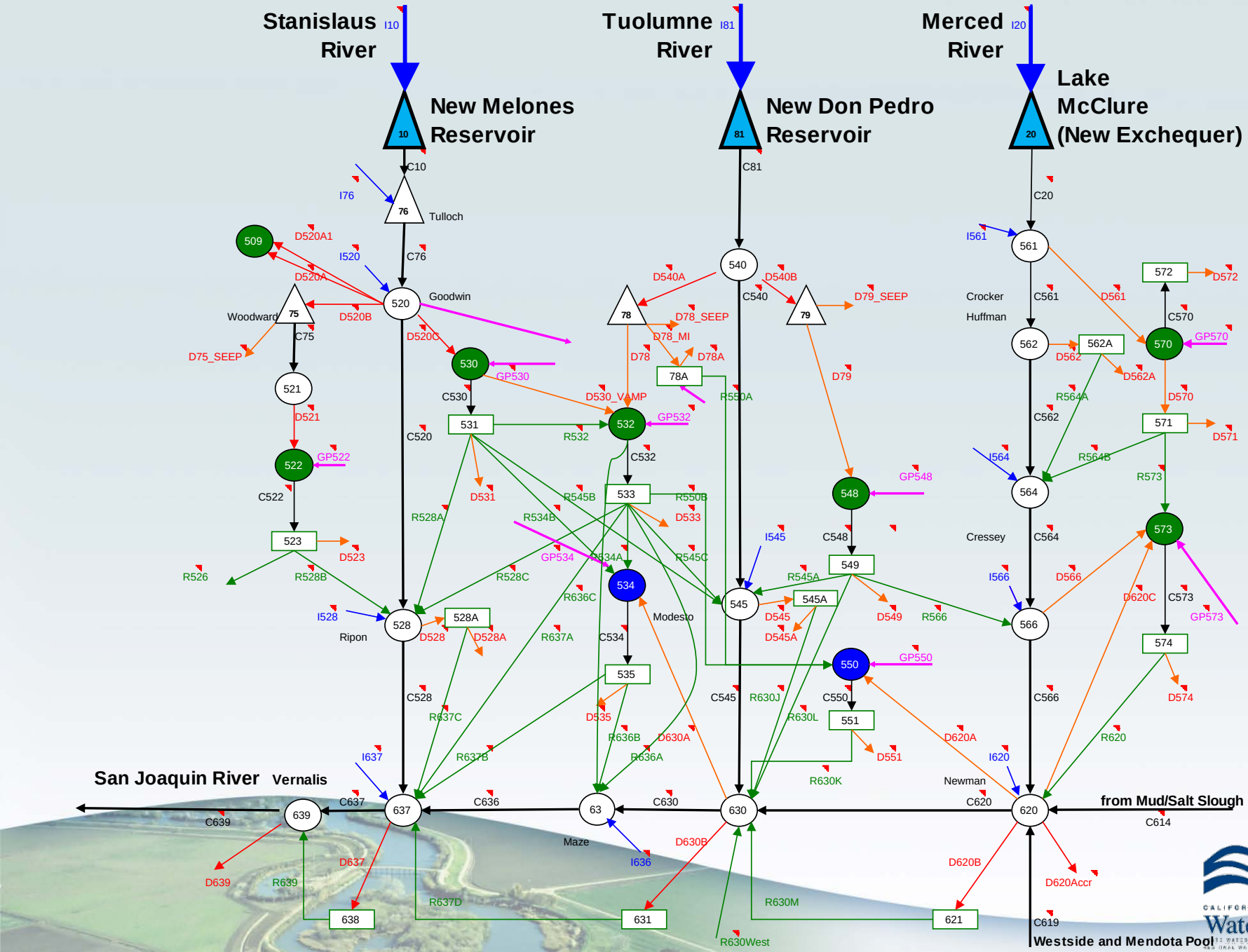
Based on Table ES-19

MODELS USED

Modeling Flow Chart

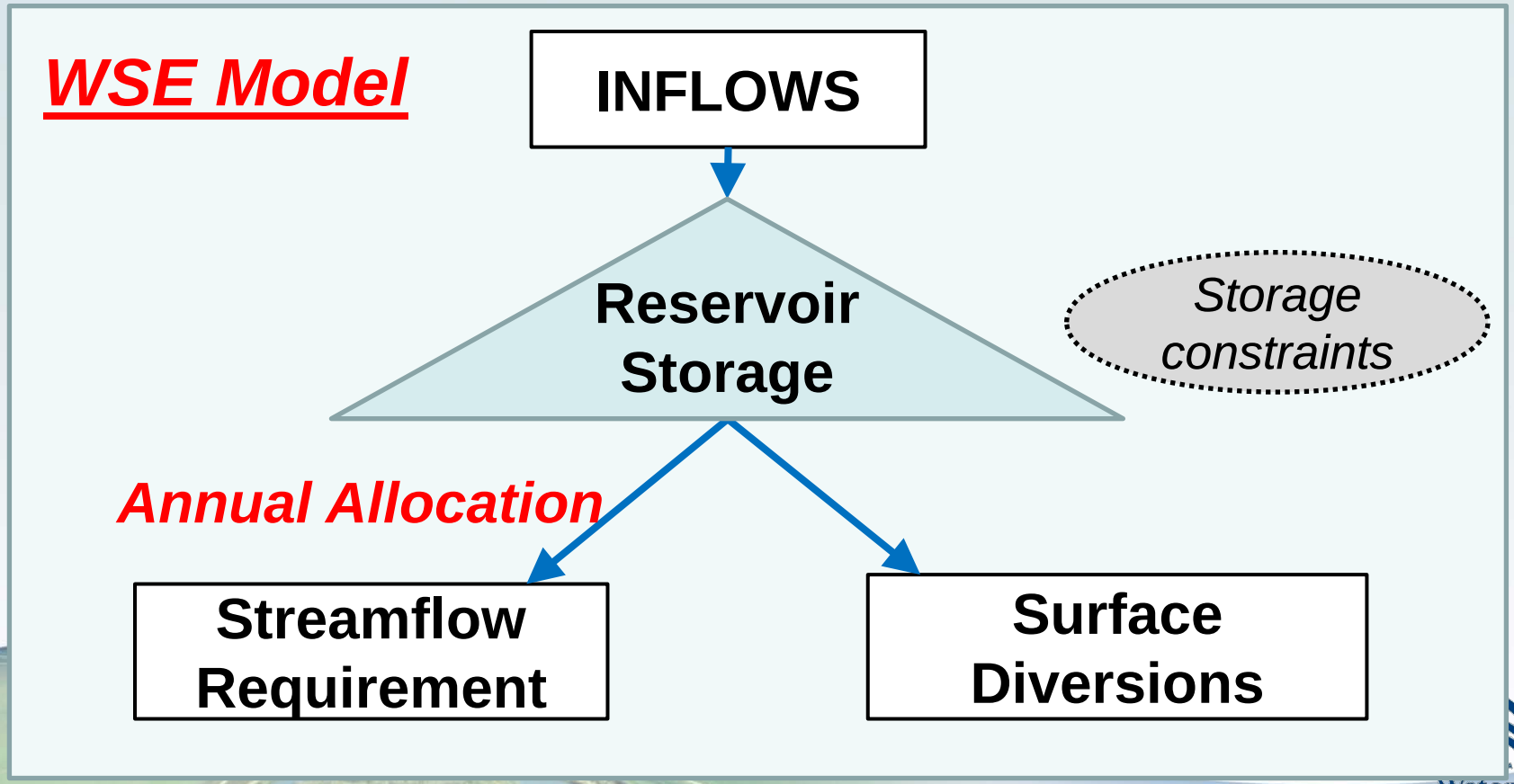


CALSIM SAN JOAQUIN RIVER SCHEMATIC

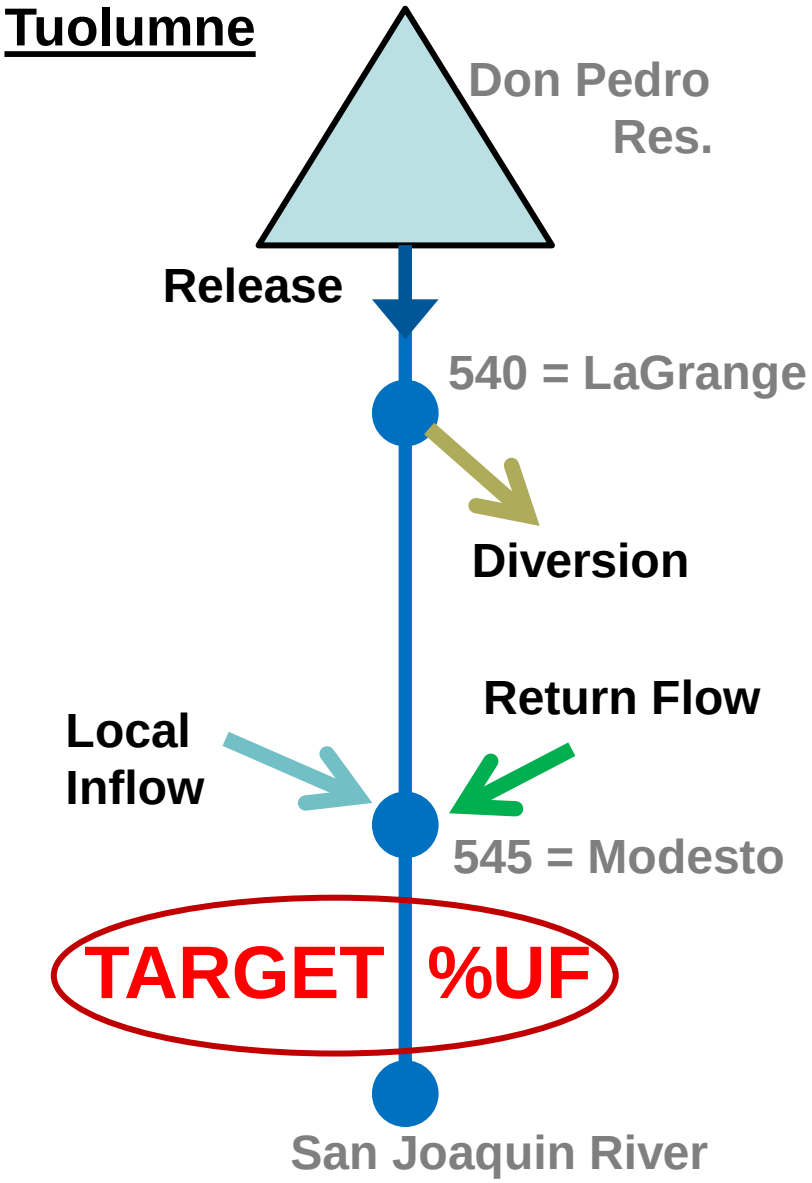


WSE = Water Supply Effects Model

- Excel spreadsheet to evaluate LSJR alternatives
- Uses CALSIM mass-balance framework
- Allocates surface water based on demand and availability

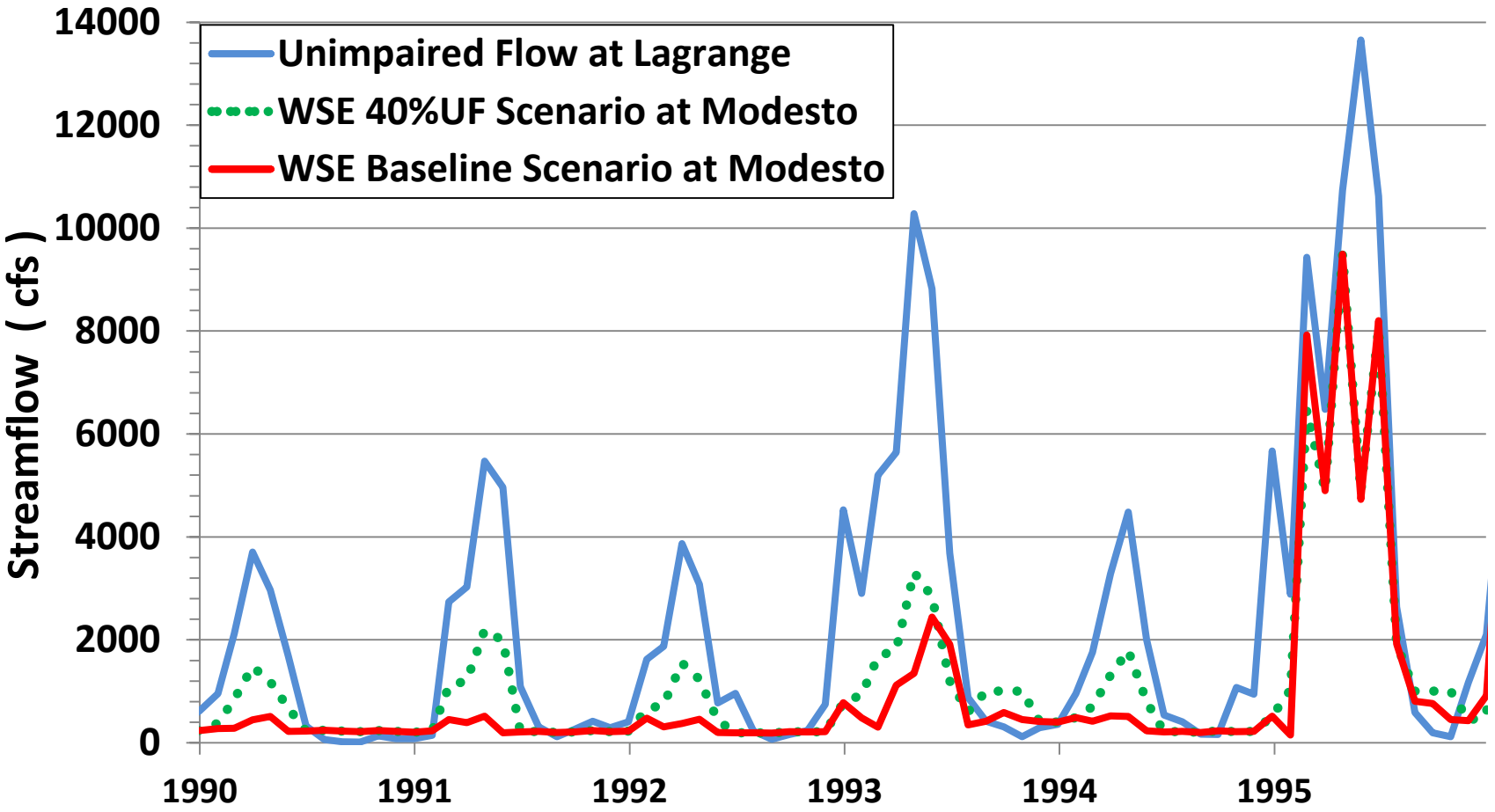


Streamflow target allocation



1. Calculate Available Water from All Inflows (incl. Return and Local Inflows)
2. Calculate Diversions Available
3. Reservoir release to meet target

Tuolumne River (1990-1995)



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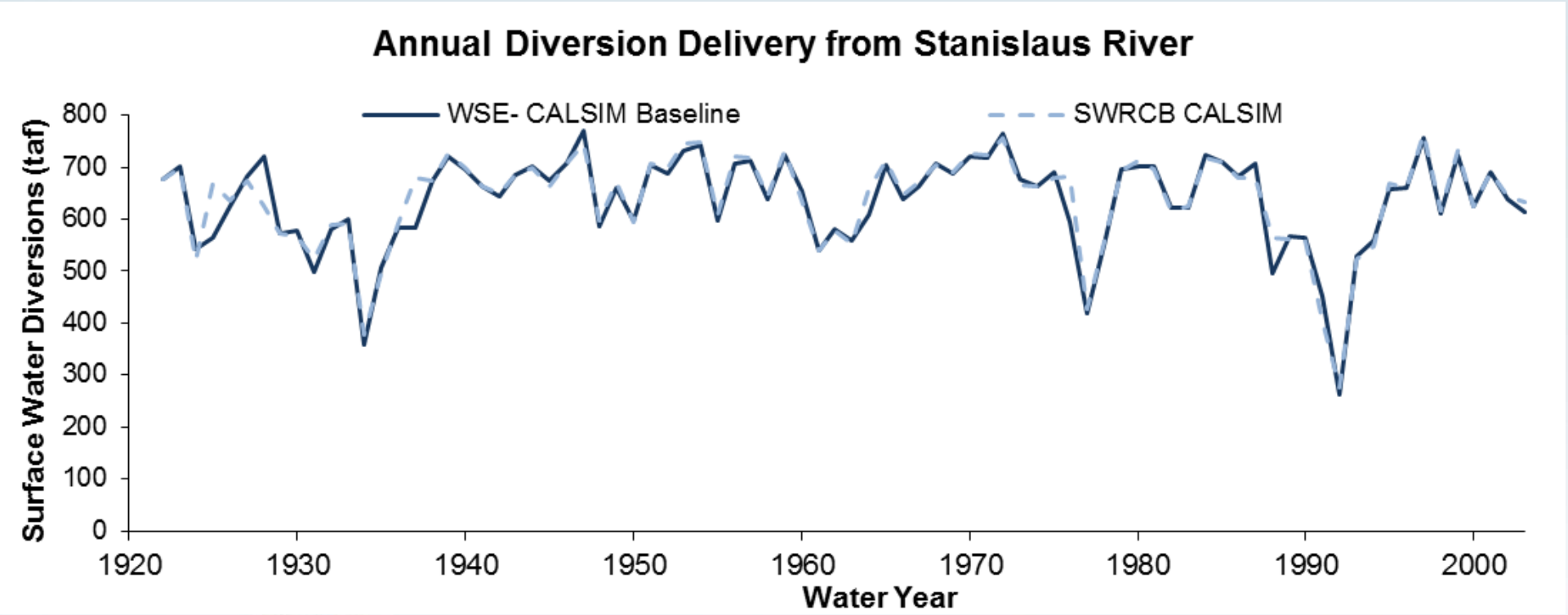
Modeling Analysis

- Compares scenarios for 82-year period
  - Baseline – ~2009 Existing Environment
    - D-1641 requirements + VAMP
    - Biological Opinion Streamflow requirements
    - FERC Streamflow requirements
  - Alternatives
    - 20% / 40% / 60% Unimpaired Flow
    - February through June
    - Shifting of flow to other months

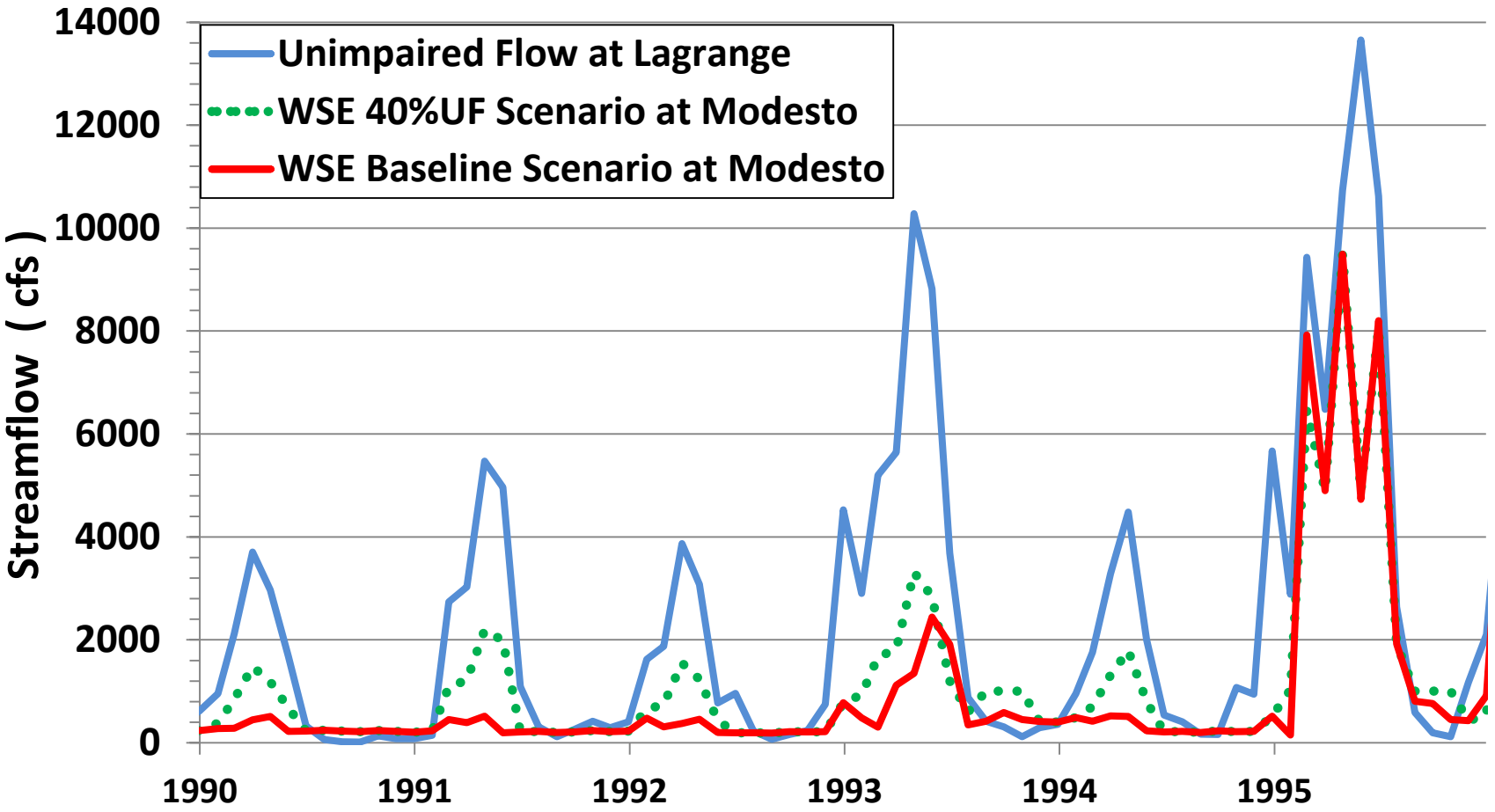
82-yr Diversion Comparison to CALSIM



San Joaquin River Basin-Wide Water Temperature Model (SJR HEC-5Q)

- US Army Corps of Engineers Hydraulic Engineering Center (HEC)
- Reservoir operations and temperature effects
- 2009 CALFED peer review
- Recent updates in 2013 by California Dept. of Fish and Wildlife
- Version that uses streamflows from CALSIM flow balance / WSE model framework

Tuolumne River (1990-1995)



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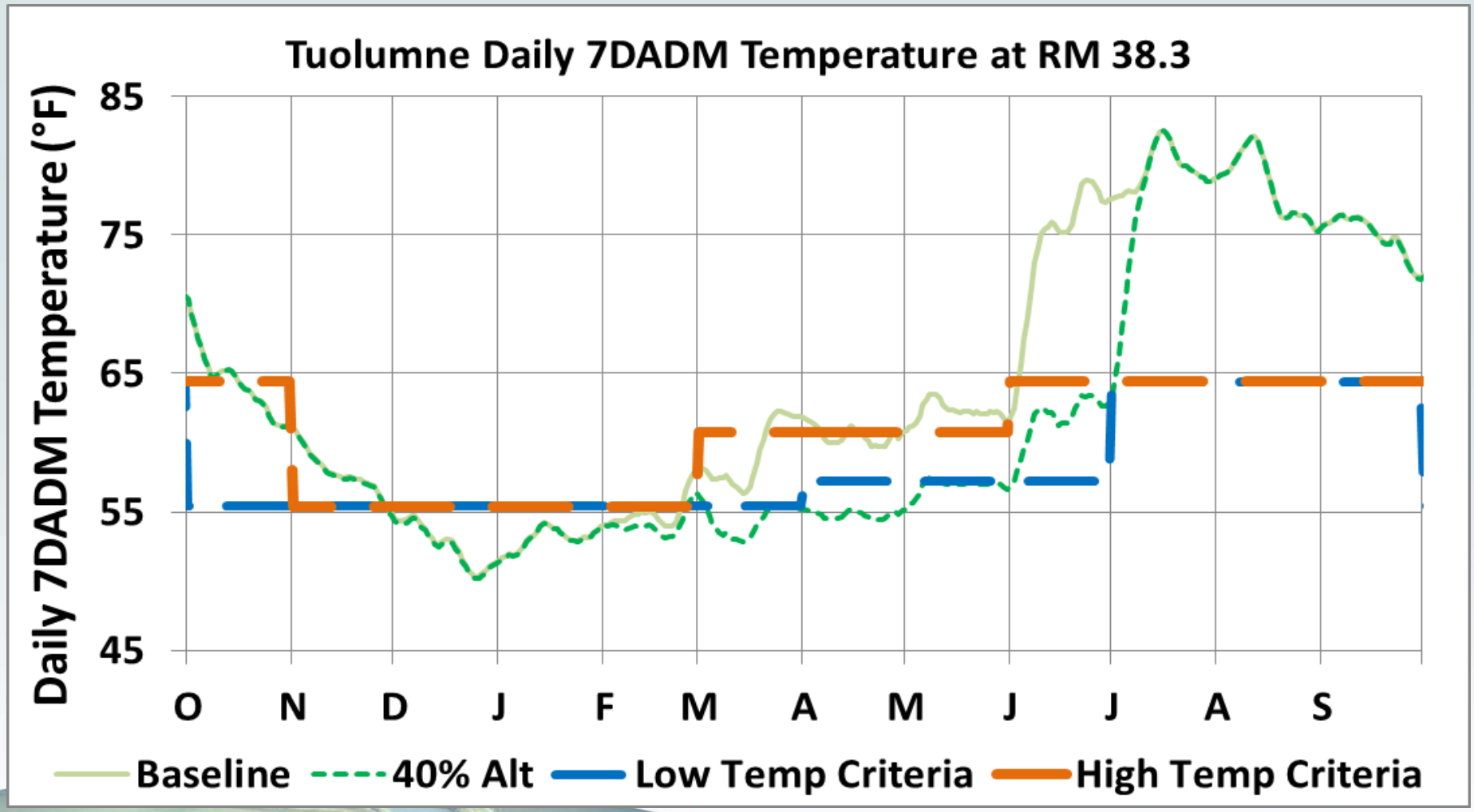
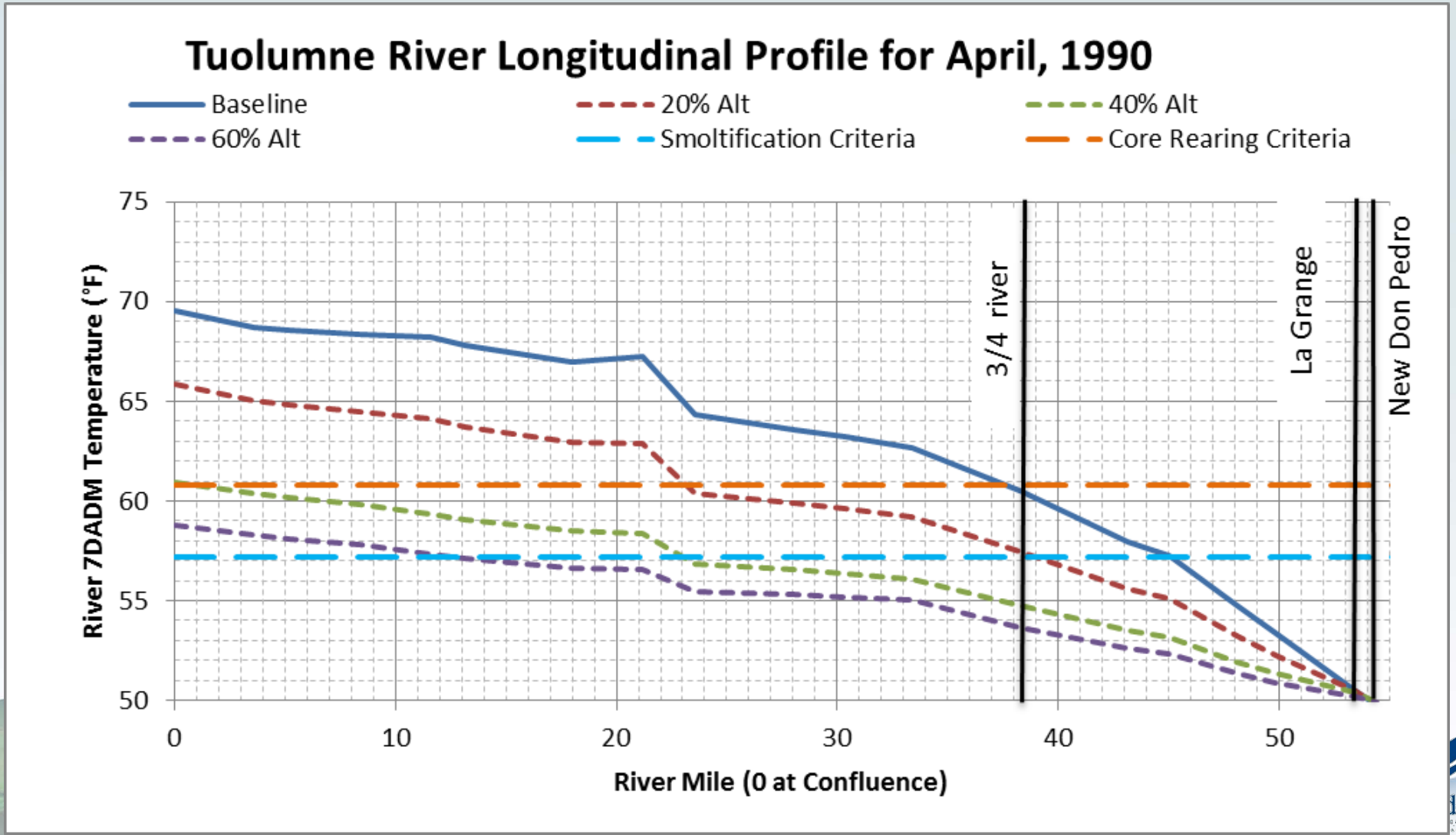
Tuolumne, Water Year 1990



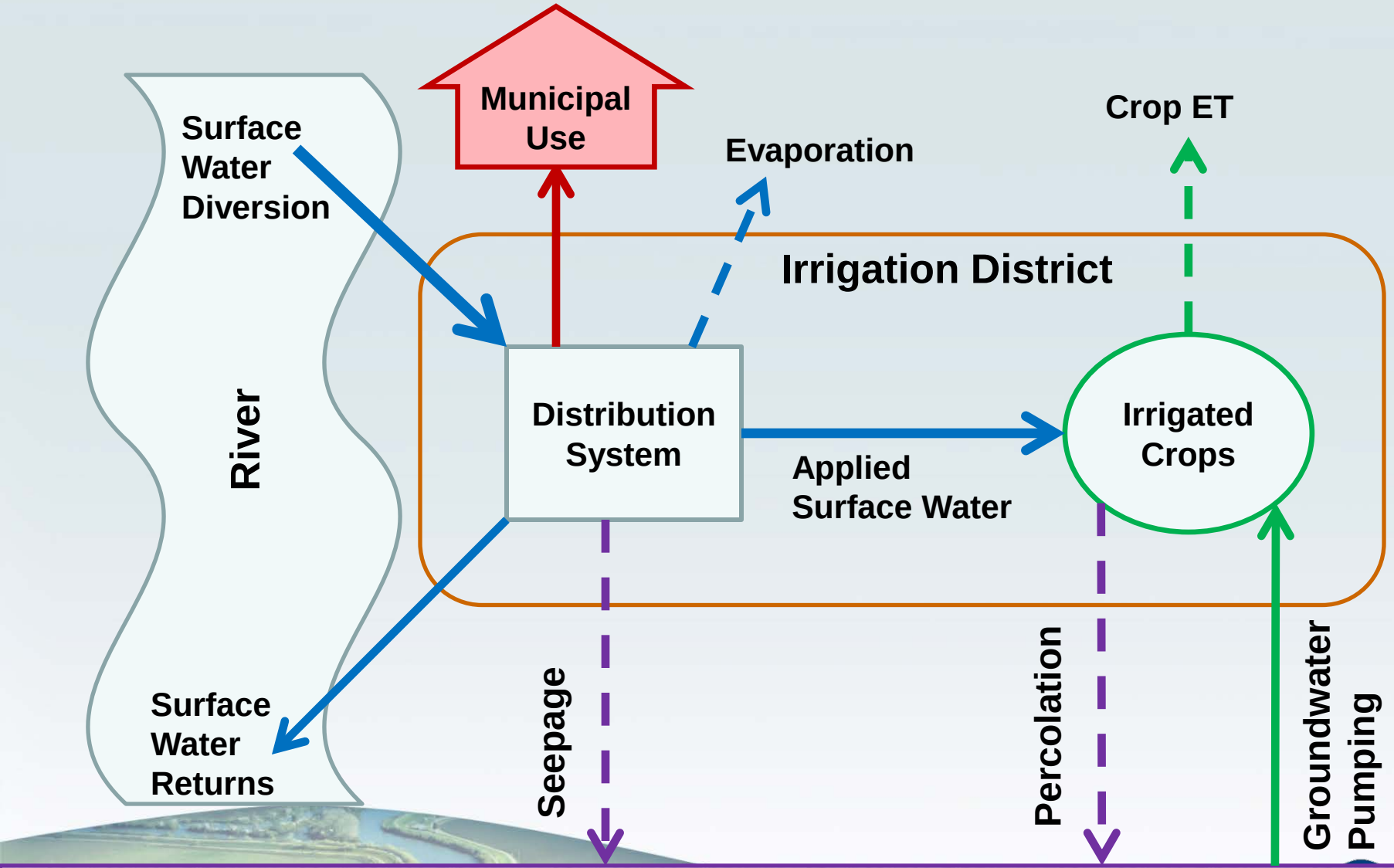
Tuolumne, April 1990 (Monthly Average 7DADM)



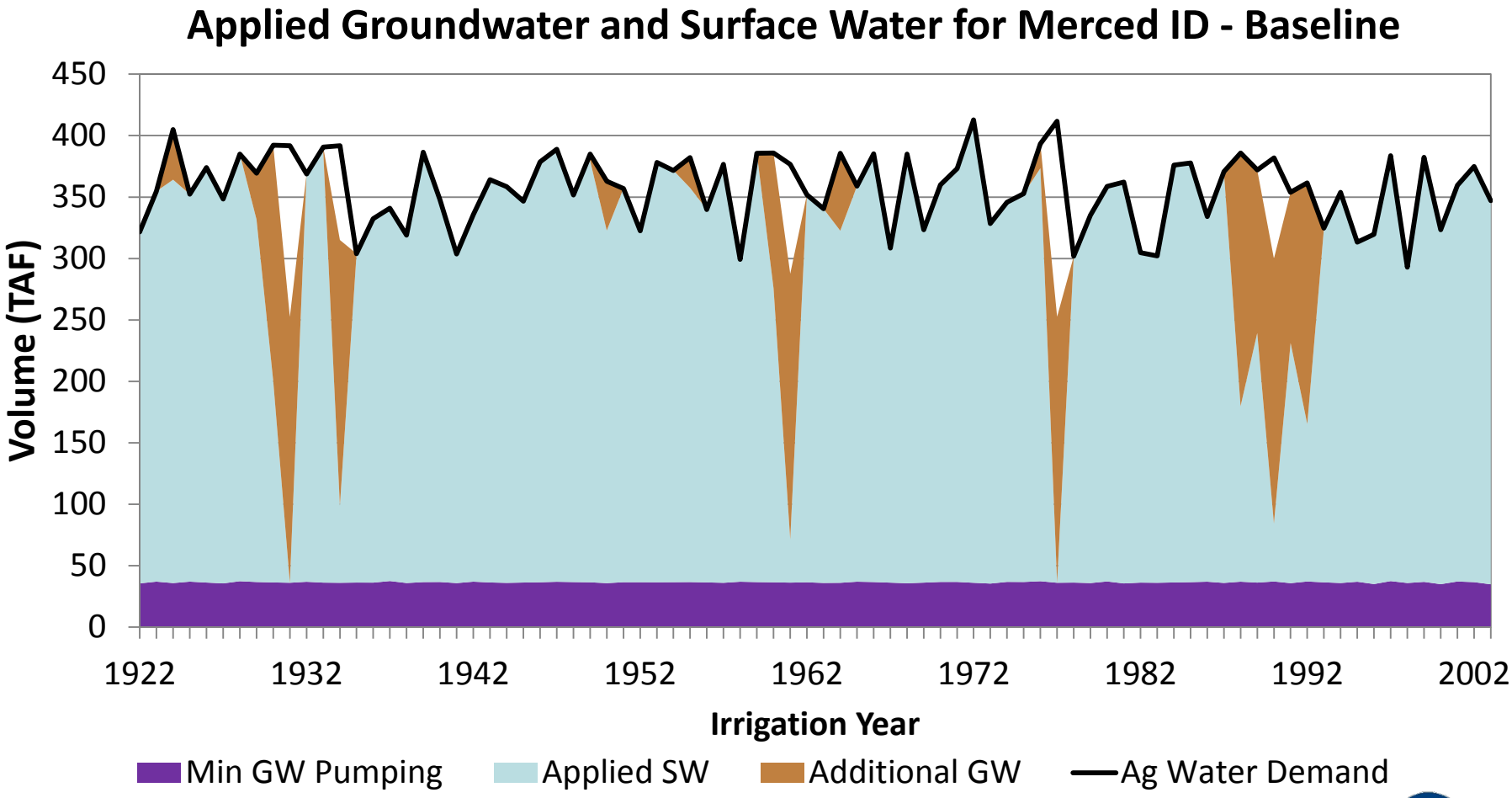
Groundwater Use Assessment

1. District crop demands met with surface water, if available
2. If shortage of surface water, pump groundwater
3. Groundwater pumping limited by estimated capacity (2009 levels)
4. In the future, pumping may be limited by the Sustainable Groundwater Management Act (SGMA)

District Water Balance



Agricultural Groundwater Use Analysis
Surface Water Replacement



Appendix G figure G.2-2A

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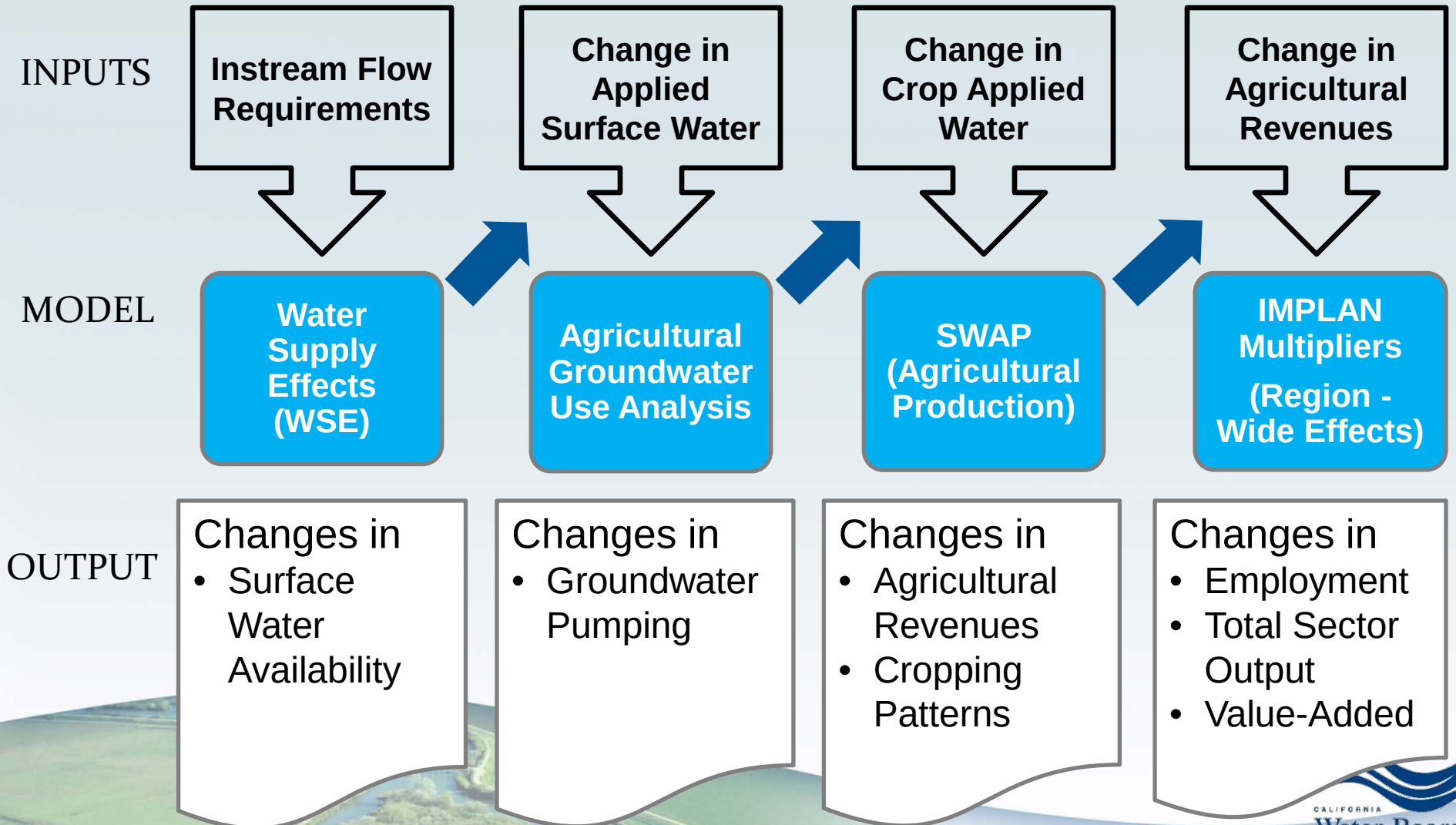
Suite of Models for Studying Economic Impacts to Agriculture



EFFECTS

Estimated Effect on Average Annual Surface Water Diversion

	Stanislaus (TAF)/(%)	Tuolumne (TAF)/(%)	Merced (TAF)/(%)	Total (TAF)/(%)
Baseline	637/100	851/100	580/100	2,068/100
30% UF Objective	-33/-5	-56/-7	-60/-10	-149/-7
40% UF Objective	-79/-12	-119 /-14	-95/-16	**-293/-14**
50% UF Objective	-136 / -21	-193/-23	-136/ -23	-465/-23

TAF = thousand acre-feet per year

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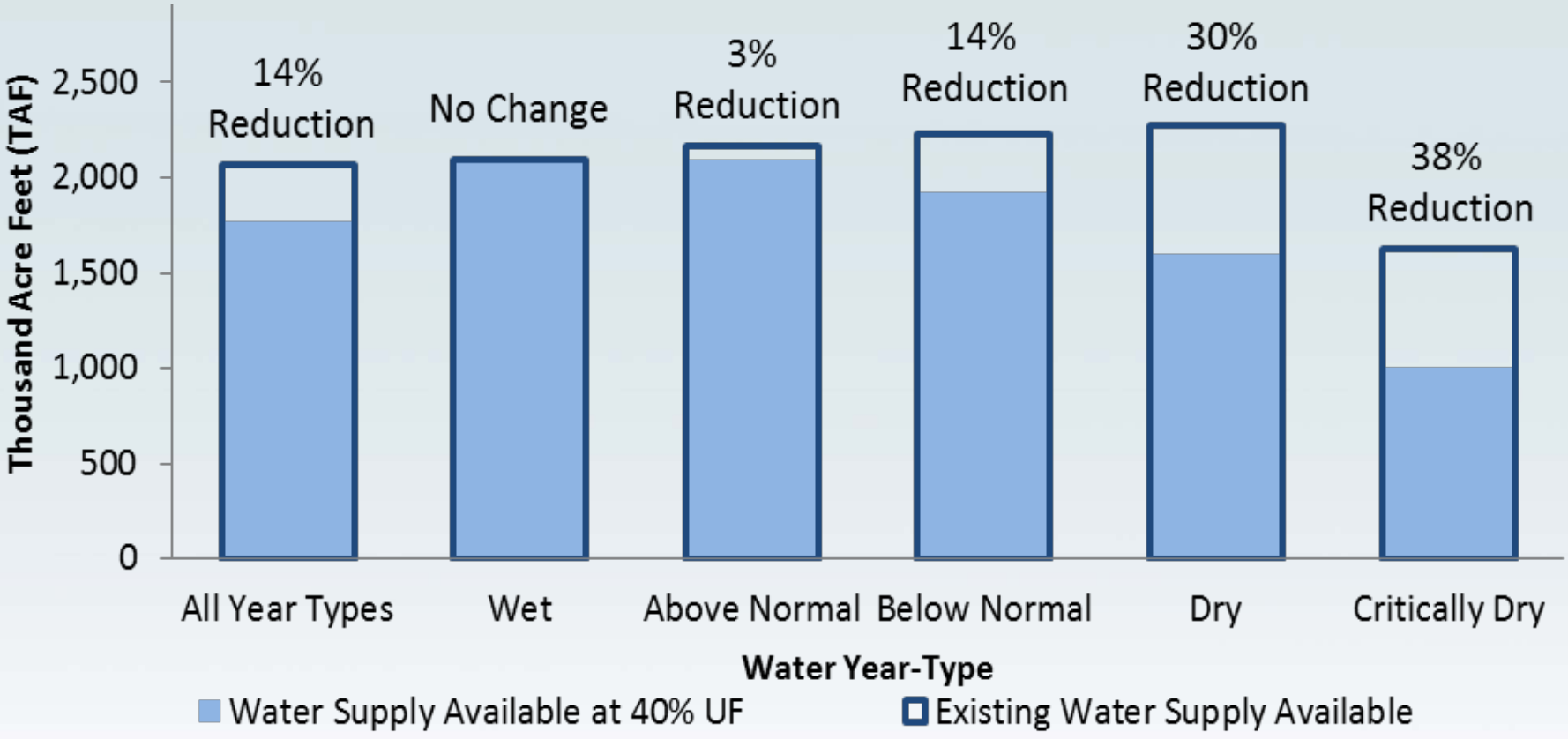
Reduction in Surface Water Availability by Water Year Type (40% UF)

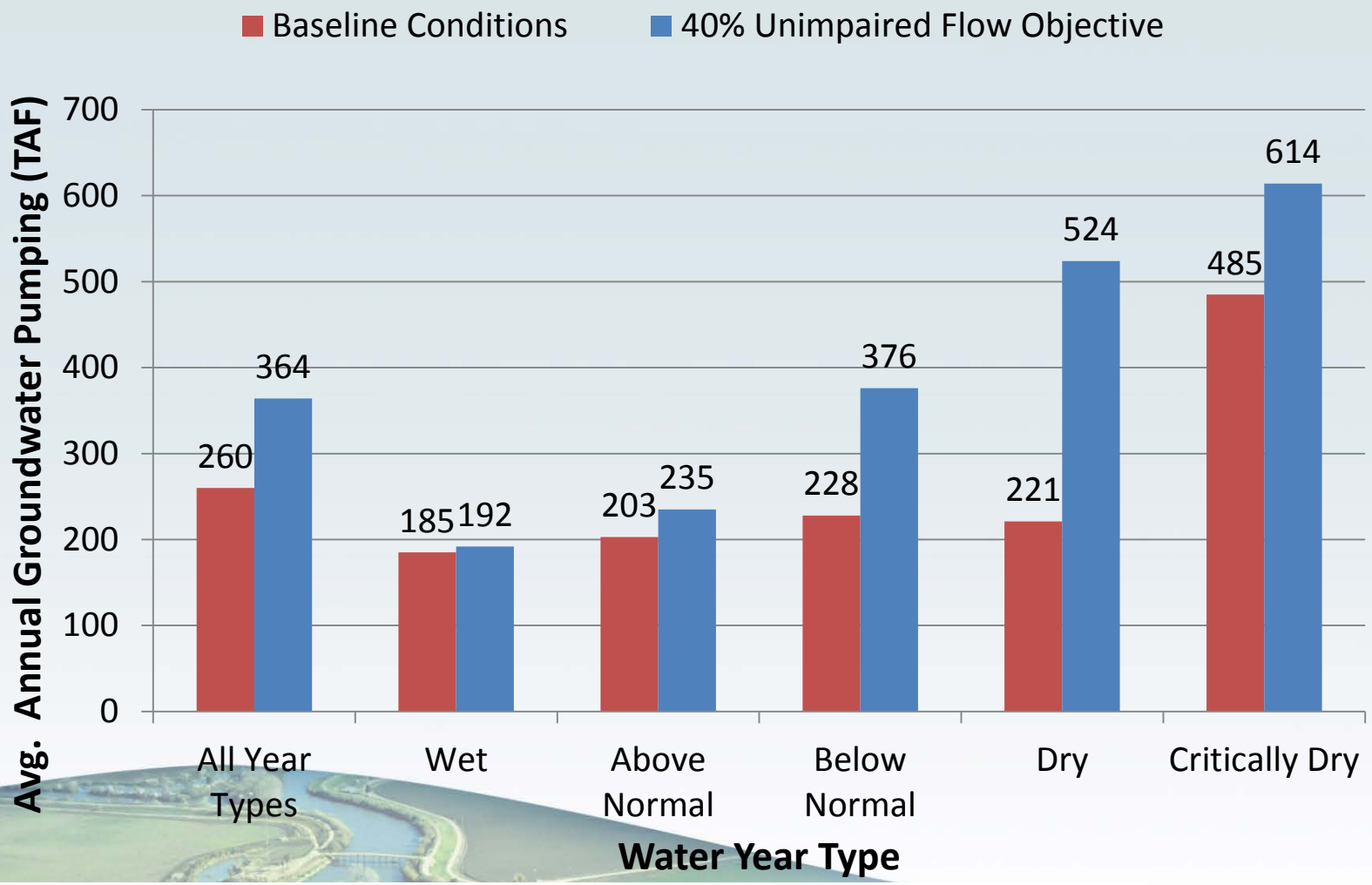


The greatest impact on diversions for human use would be in driest years; there would be almost no impact on diversions for human use in wet years.

Effects of the Flow Proposal

- Groundwater resources
  - Increase groundwater pumping and reduce recharge
  - Lower groundwater level
- Agriculture
  - Change cropping pattern and reduce irrigated acreage
  - Reduce agricultural revenue
- Drinking Water Supply
  - Need to construct new wells or deepen existing wells
  - Affect groundwater quality

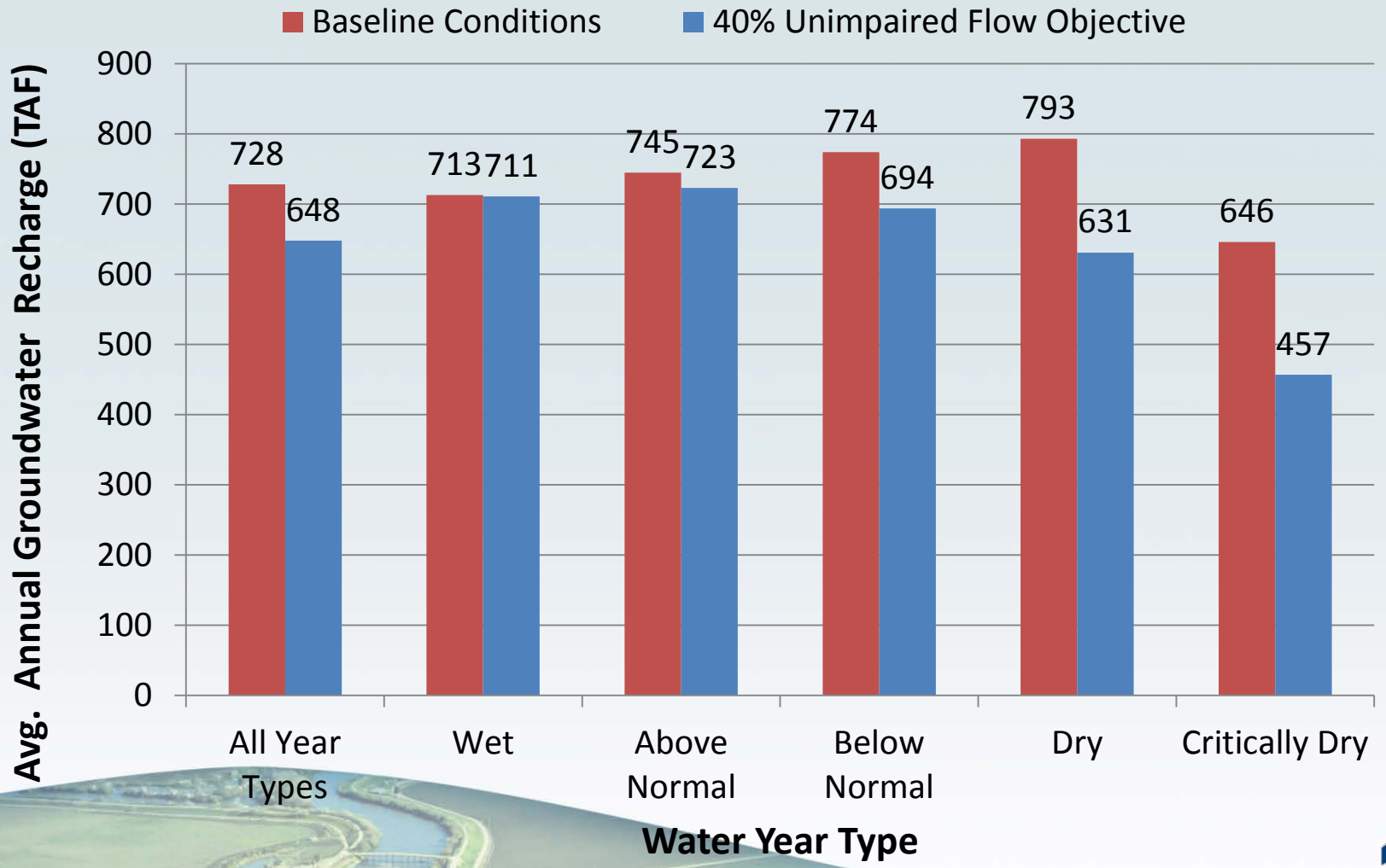
Average Annual Groundwater Pumping across all Irrigation Districts



Based on 2009 Maximum Groundwater Pumping Capacity (626 TAF/y)

California Water Boards

Average Annual Groundwater Recharge across all Irrigation Districts



Based on 2009 Maximum Groundwater Pumping Capacity (626 TAF/y)

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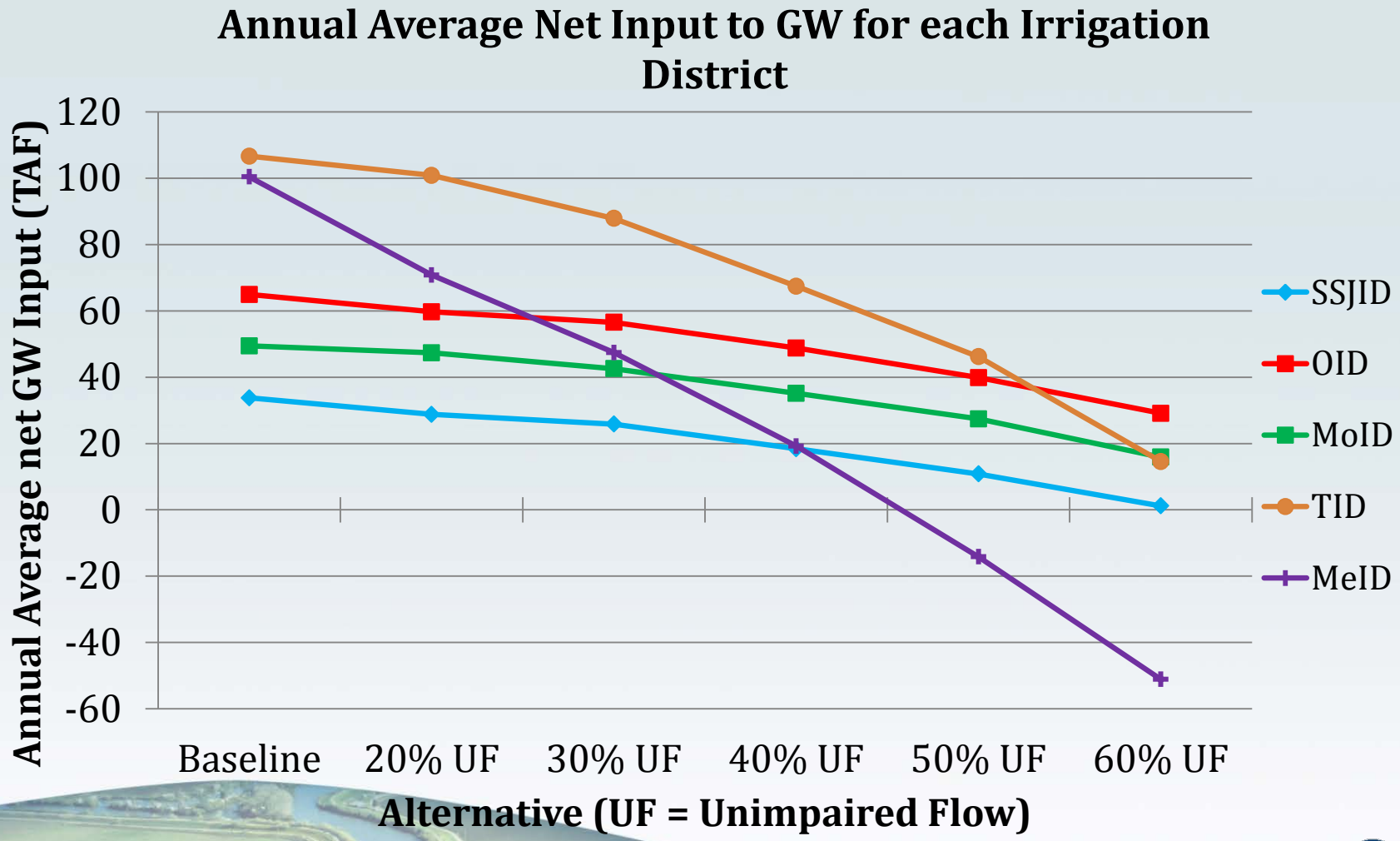
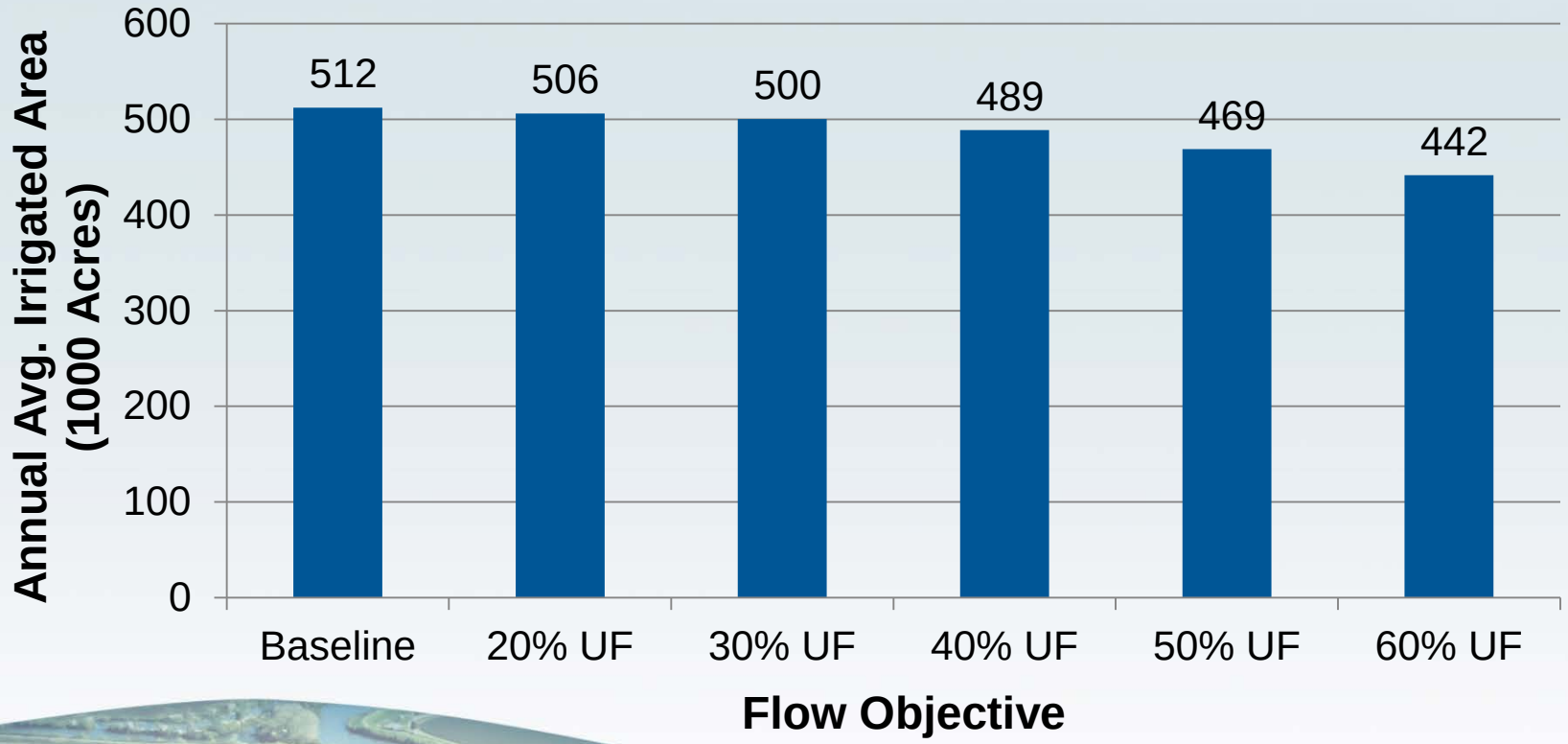
GW Net Input within the Districts



Positive Input = Net GW Recharge

Average Annual Irrigated Acreage in All Irrigation Districts

SWAP Results Based on Supply Shortage



UF = Unimpaired Flow

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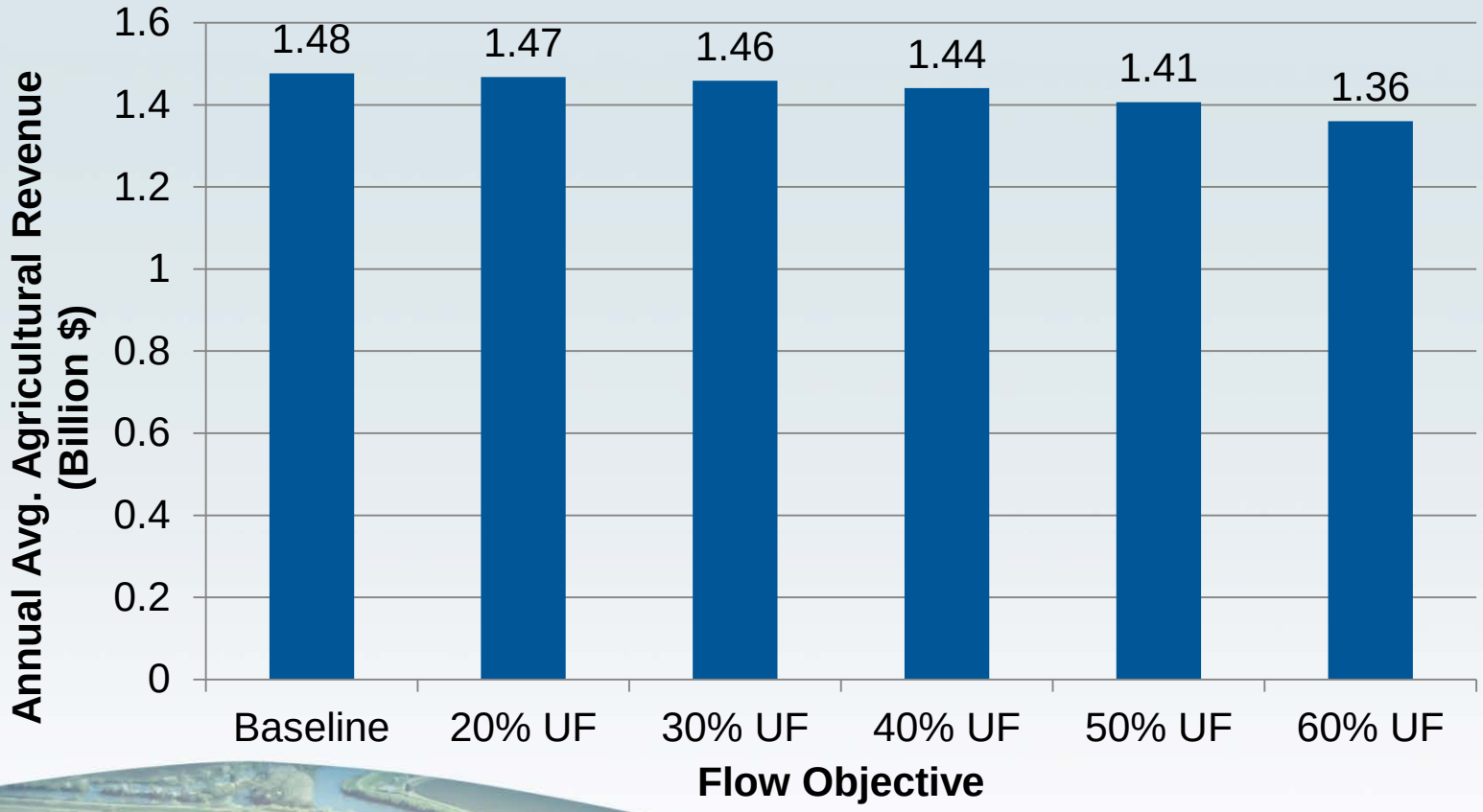
Annual Average Crop Revenue In All Irrigation Districts

SWAP Results Based on Supply Shortage



UF = Unimpaired Flow

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Potential Regional Agricultural Economic Impacts

Economic Effects	Baseline Total Output ($ Millions, 2008)	Change from Baseline ($ Millions, 2008)		
		30% UF Objective	40% UF Objective	50% UF Objective
Direct Effects	*$1,477*	*-$19*	*-$36*	*-$70*
Indirect and Induced Effects	*$1,109*	*-$14*	*-$27*	*-$53*
Total Sector Output	$2,586	-$33	-$64	-$124
% of Baseline Total Output	100%	-1.3%	-2.5%	-4.8%

Modified from Table G.5-4, Appendix G

Effects on Drinking Water

- May need to deepen existing wells or build more wells
- May increase pumping cost
- Could degrade groundwater quality
- Could make groundwater unavailable in some areas

Water Code section 13000

…attain the highest water quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible.

Phase 1 Next Steps

- Technical Workshops:
  - Dec 5: Sacramento (Water Supply Effects, Temperature Model, Ecological Benefits)
  - Dec12: Sacramento (Groundwater, Agricultural Economic Effects, Salinity, City and County of San Francisco Effects)
- Continued Dates for the Public Hearing:
  - Dec 16: Stockton
  - Dec 19: Merced
  - Dec 20: Modesto
  - Jan 3: Sacramento
- Draft SED & Plan Comments due: Jan 17, 2017
- Anticipated Final SED & Plan Release: May 2017
- Anticipated Board meeting to adopt: July 2017

If you would like to make a comment on the WQCP Update and SED you must send your comments by no later than 12:00 noon on January 17, 2017 to: commentlettters@waterboards.ca.gov with "Comment Letter – 2016 Bay-Delta Plan Amendment & SED" in the subject line.

You can also make oral comments during the hearing held on:

SACRAMENTO
Jan. 3, 2017 – 9 AM
CalEPA Headquarters Building
2nd Floor
1001 "I" Street

STOCKTON
Dec. 16, 2016 – 9 AM
Stockton Memorial Civic Auditorium
Main Hall
525 "N" Center St,

MERCED
Dec. 19, 2016 – 9 AM
Multicultural Arts Center
645 W. Main Street

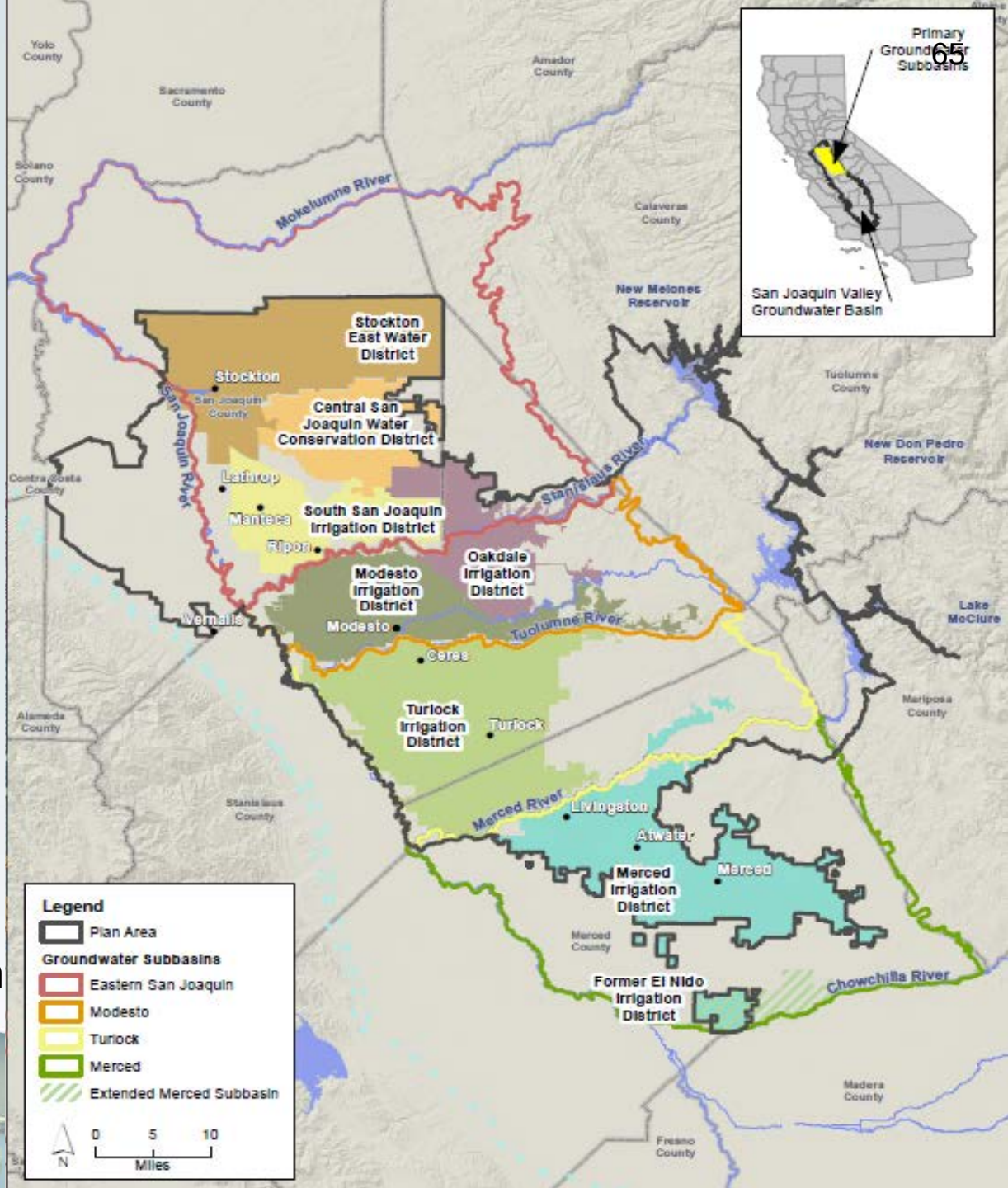
MODESTO
Dec. 20, 2016 – 9 AM
Modesto Centre Plaza
Tuolumne River Room
1000 "K" Street

For more information visit: http://waterboards.ca.gov/DeltaWQCP-Phase1

CALIFORNIA Water Boards

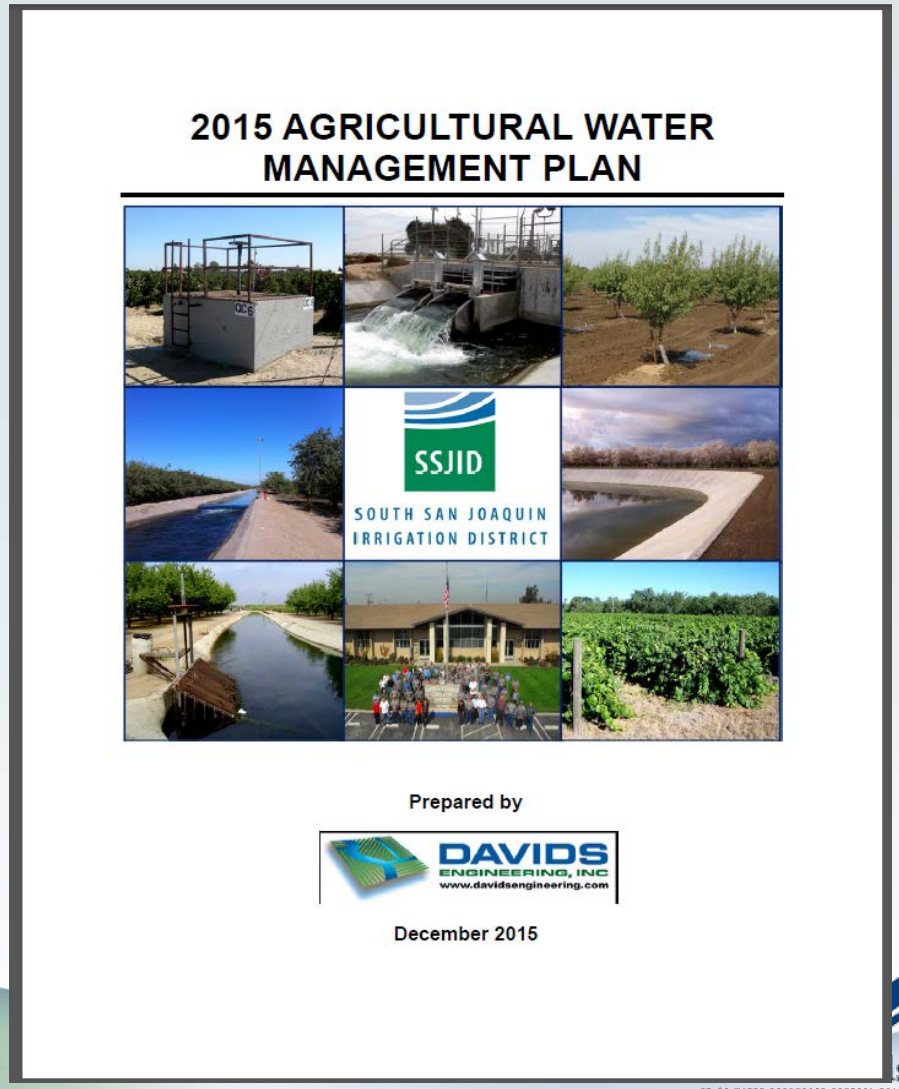
- **Irrigation Districts:**
  - Merced (MeID)
  - Turlock (TID)
  - Modesto (MoID)
  - Oakdale (OID)
  - South San Joaquin (SSJID)
  - Central San Joaquin Water Conservation District (CSJWCD)
  - Stockton East Water District (SEWD)

- **Groundwater Subbasins**
  - Merced
  - Turlock
  - Modesto
  - Eastern San Joaquin



Agricultural Water Use Data Sources

- **Demand parameters based on District AWMPs**
  - Municipal deliveries
  - Seepage from regulating reservoirs
  - Minimum annual groundwater pumping
  - Maximum Groundwater Pumping Capacity
  - Distribution loss factors
  - Deep percolation factors



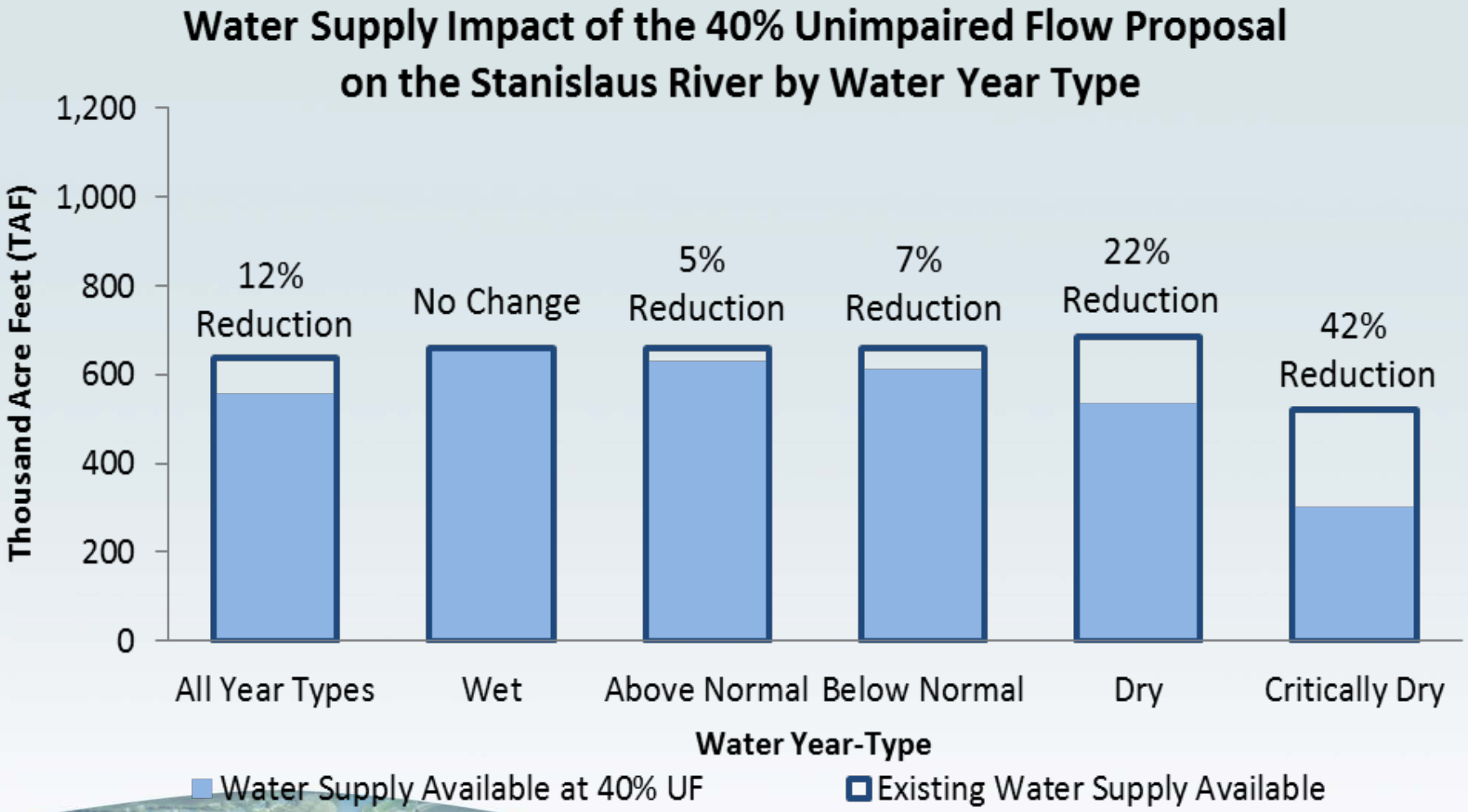
Public Water Suppliers

- A substantial increase in groundwater pumping would not necessarily result in violation of drinking water quality standards
  - Recent data do not indicate increased water quality standard violations in public water systems despite greatly increased groundwater pumping
- Service providers are required to take actions to ensure that the water is in compliance with relevant drinking water standards before it is served to the public

Domestic Wells

- Increased pumping could affect groundwater flow and quality, depending on many unknown factors
  - This could affect domestic wells
- No systematic monitoring of domestic wells
  - Testing well water and other best practices set forth in SED are important
- Important for local groundwater sustainability agencies to implement SGMA both for over pumping and water quality degradation

What are the Impacts of the Flow Proposal?



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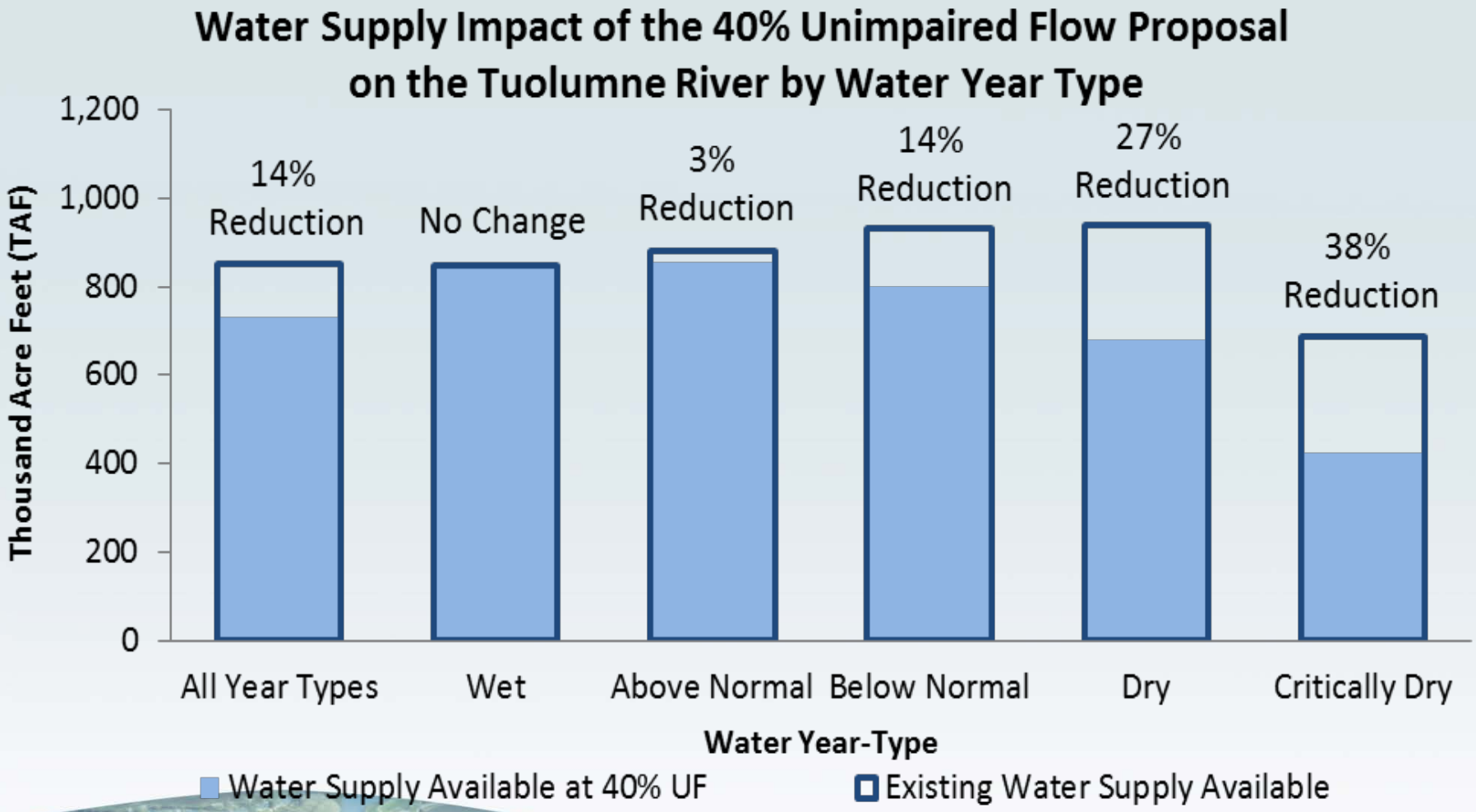

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