

RECLAMATION

Managing Water in the West

NRC Committee Review

Central Valley Project

UC Davis

January 2010



U.S. Department of the Interior
Bureau of Reclamation

California Water Projects

- Central Valley Project
- State Water Project
- Local Water Projects



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CVP Authorized Purposes

- Flood Control
- River Regulation (Navigation)
- Fish and Wildlife Needs
- Municipal & Agricultural Water Supplies
- Power Generation
- Recreation

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CVP Features Summary

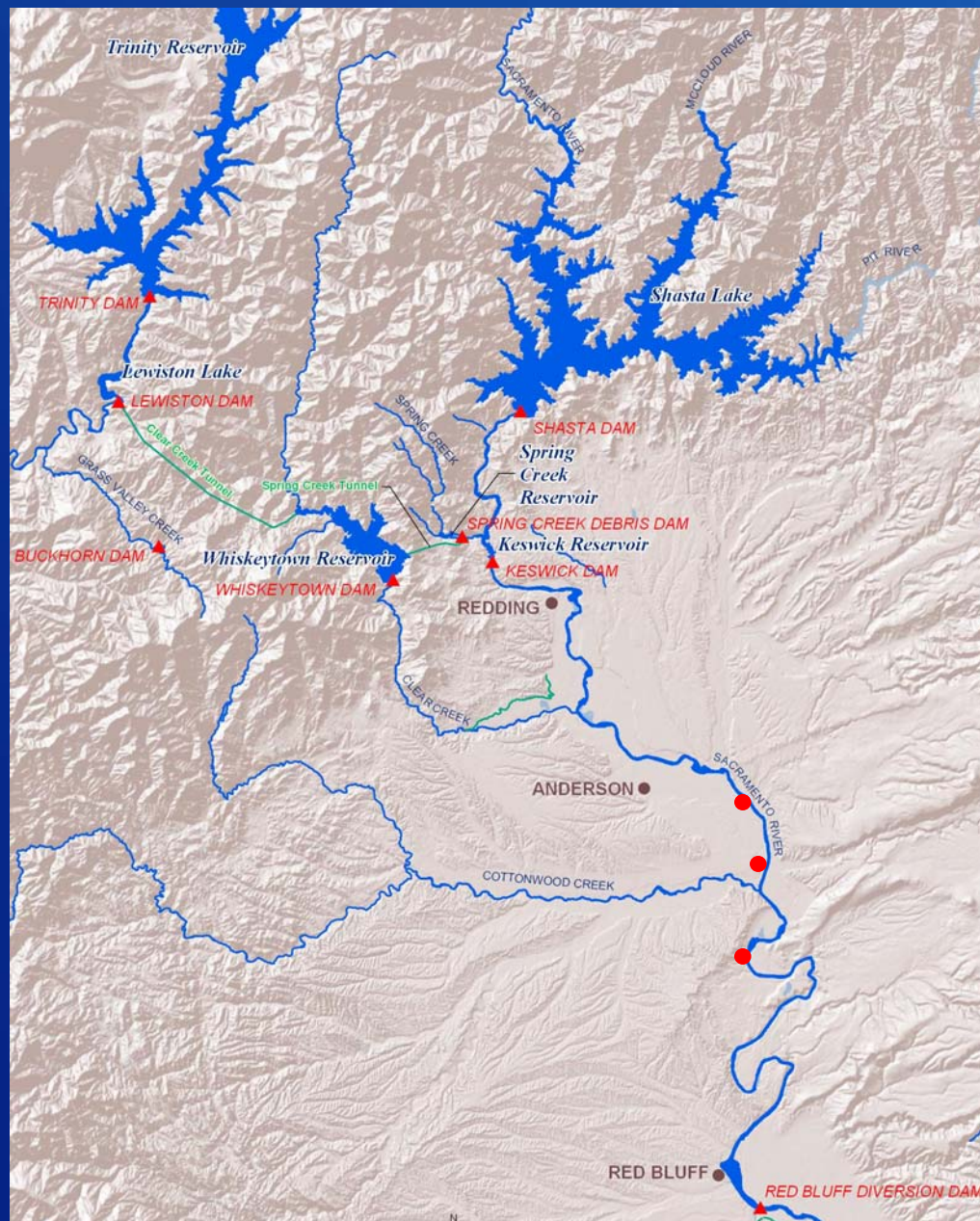
- 18 Dams and Reservoirs
- 500 Miles (800 Kilometers) of Canals
- 11 Powerplants
- 10 Pumping Plants
- 20 Percent of State's Developed Water Supply (about 7 million acre-feet, 8.6 billion cu meters)
- 30 Percent of the State's Agricultural Supply (about 3 mil acres of farm land, 1.2 mil hectares)
- 13 Percent of State's M&I Supply (about 2 million people served)

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The map illustrates the extensive water infrastructure in California's Central Valley. Major projects are labeled in large blue text: Trinity, Shasta, Folsom, New Melones, Friant, and San Luis. The map shows the Sacramento-San Joaquin River Delta, the Central Valley, and the California Aqueduct. Key features include:

- Trinity:** Trinity Lake, Whiskeytown Lake, Corning Canal, Tehama-Colusa Canal.
- Shasta:** Shasta Lake, Thermalito Afterbay, Lake Oroville.
- Folsom:** Folsom Lake, Lake Natoma, Folsom South Canal, Tracy Fish Collection Facility.
- New Melones:** New Melones Reservoir, Jones Pumping Plant.
- Friant:** Friant Reservoir, Friant-Kern Canal.
- San Luis:** San Luis Reservoir, Santa Clara Conduit, Hollister Conduit, Pacheco Conduit, Los Banos Reservoir, Coalinga Canal.
- Other Projects:** Harvey Banks Pumping Plant, Bethany Forebay, O'Neill Forebay, Contra Costa Canal, Delta-Mendota Canal, San Luis Canal, Madera Canal, Coastal Branch California Aqueduct, West Branch California Aqueduct.

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Sacramento River

Shasta – 4.5 maf

Trinity – 2.4 maf

Whiskeytown – 240k af

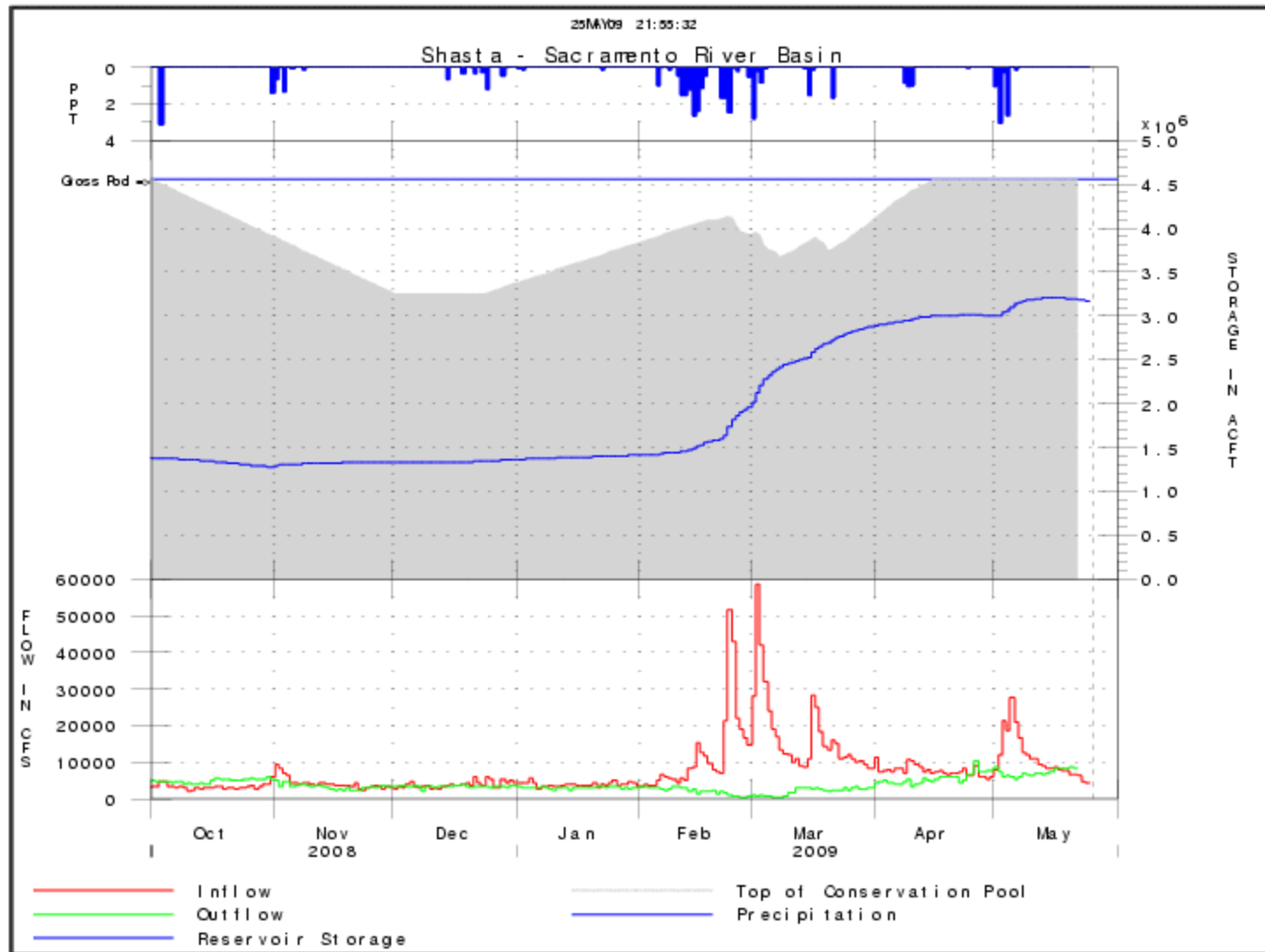
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Sacramento River ~ Shasta Dam



- Sacramento River Water Temperatures
- Navigation Control Point
- Coordinated Flood Operations
- Red Bluff Operations

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Trinity ~ Operation Constraints



- Trinity River Restoration Flows
- Trinity River Water Temperatures
- Dam Safety Restrictions

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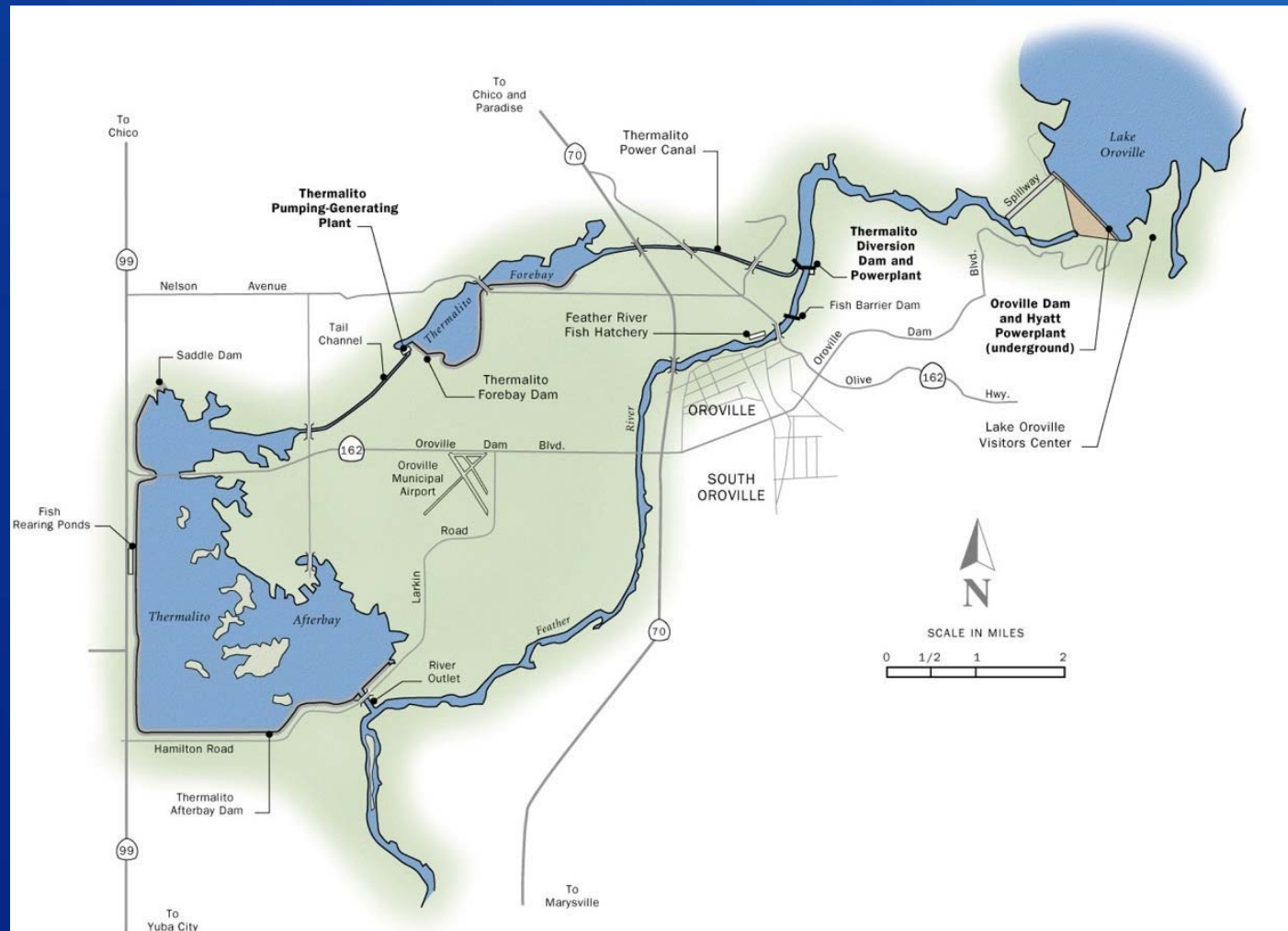
Whiskeytown ~ Operation Constraints



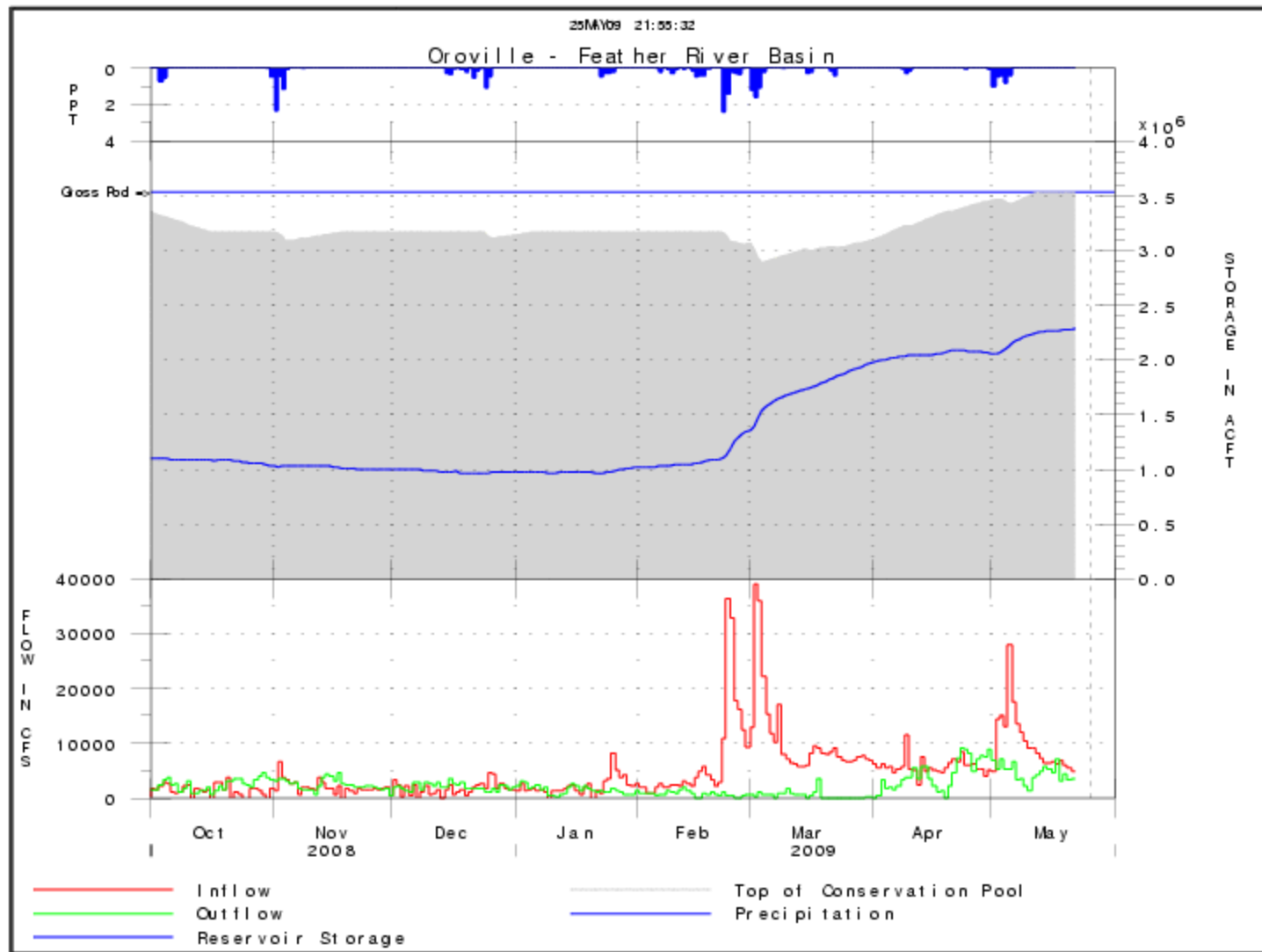
- Clear Creek Flows and Temperatures
- Sacramento River Operations

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Oroville Facilities ~ Feather River



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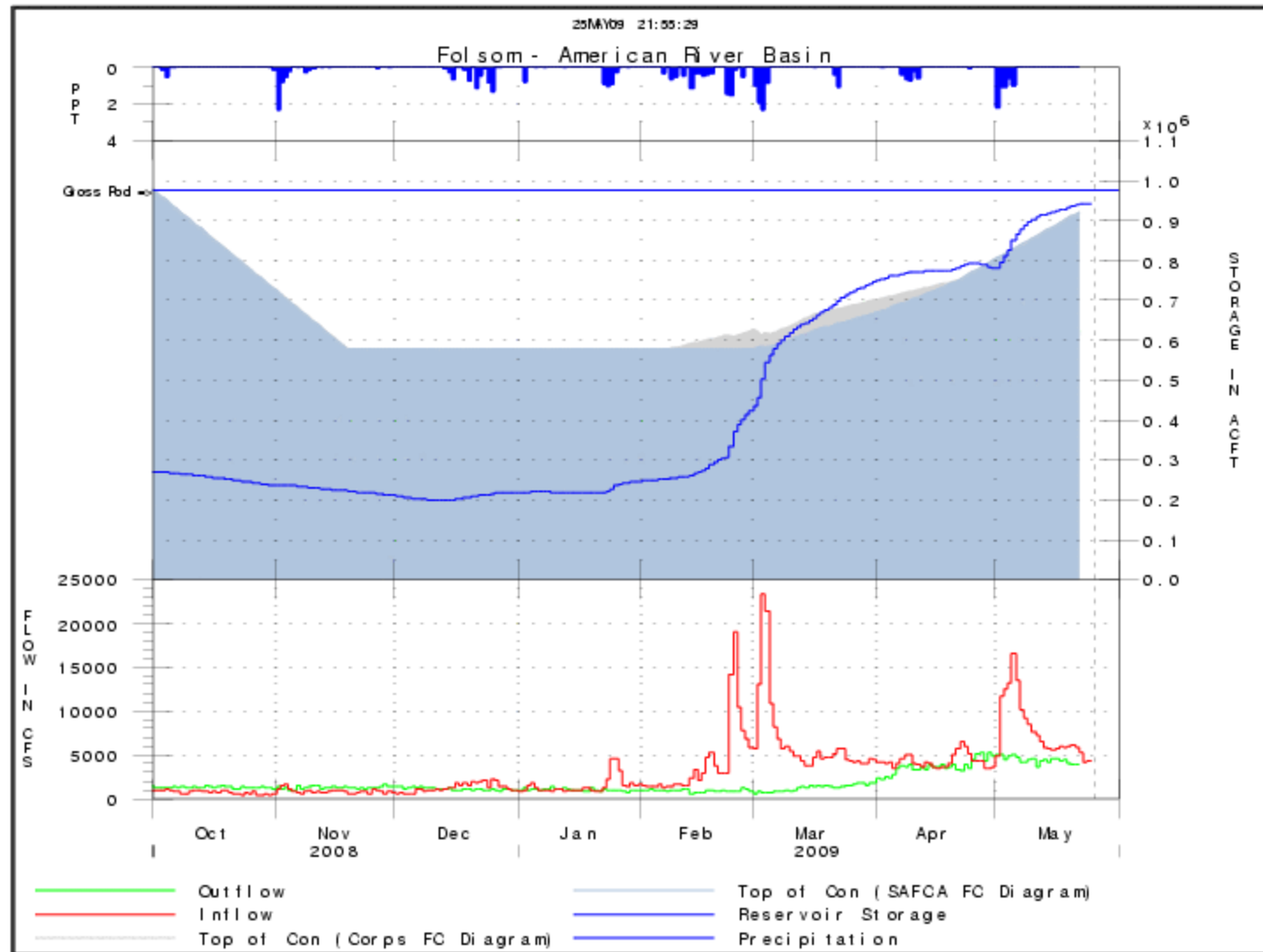
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American River ~ Operation Constraints

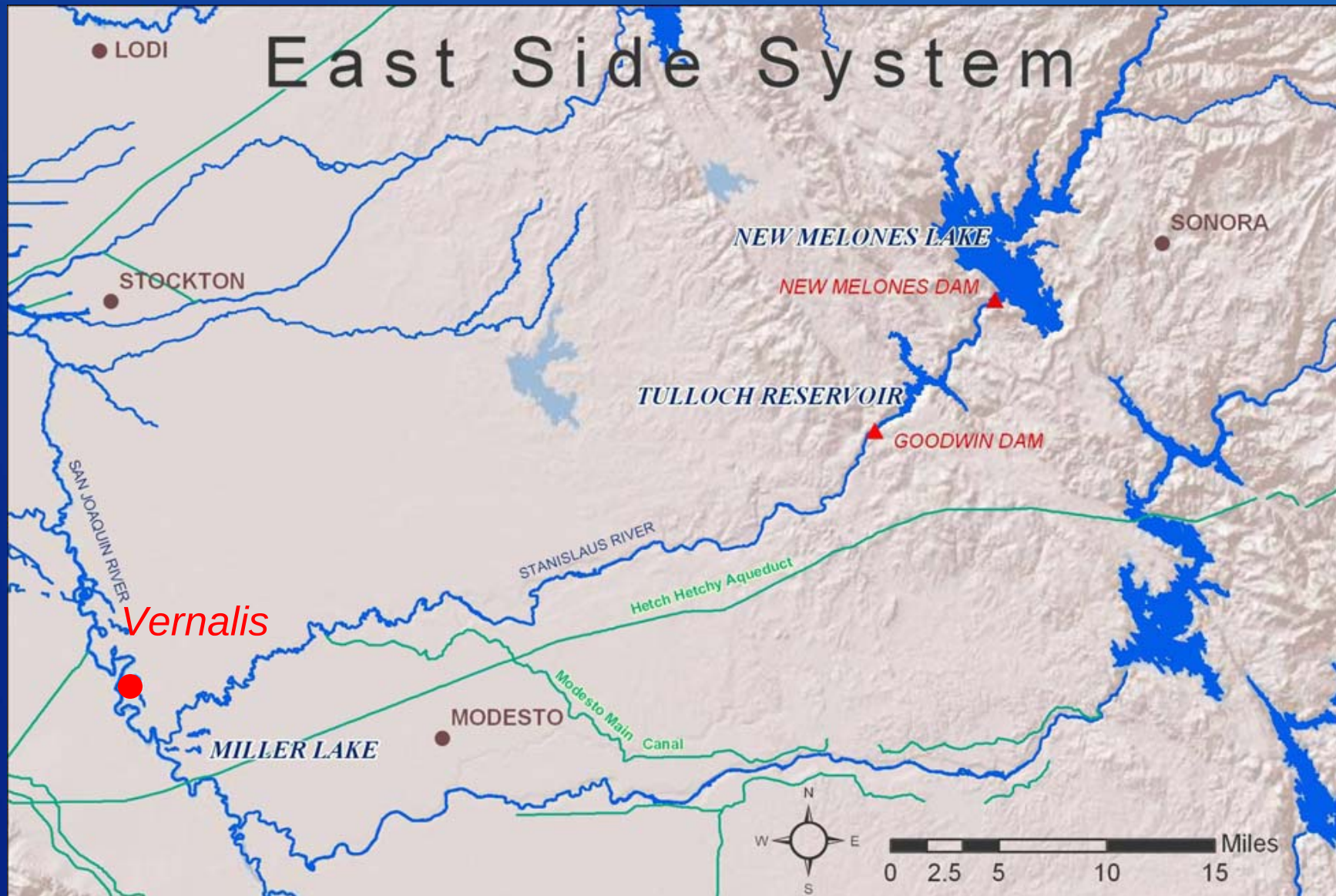


- Water Temperatures and Flows (steelhead v. fall-run) ~ 1 maf capacity
- SAFCA Flood Control Diagram
- High Visibility Project

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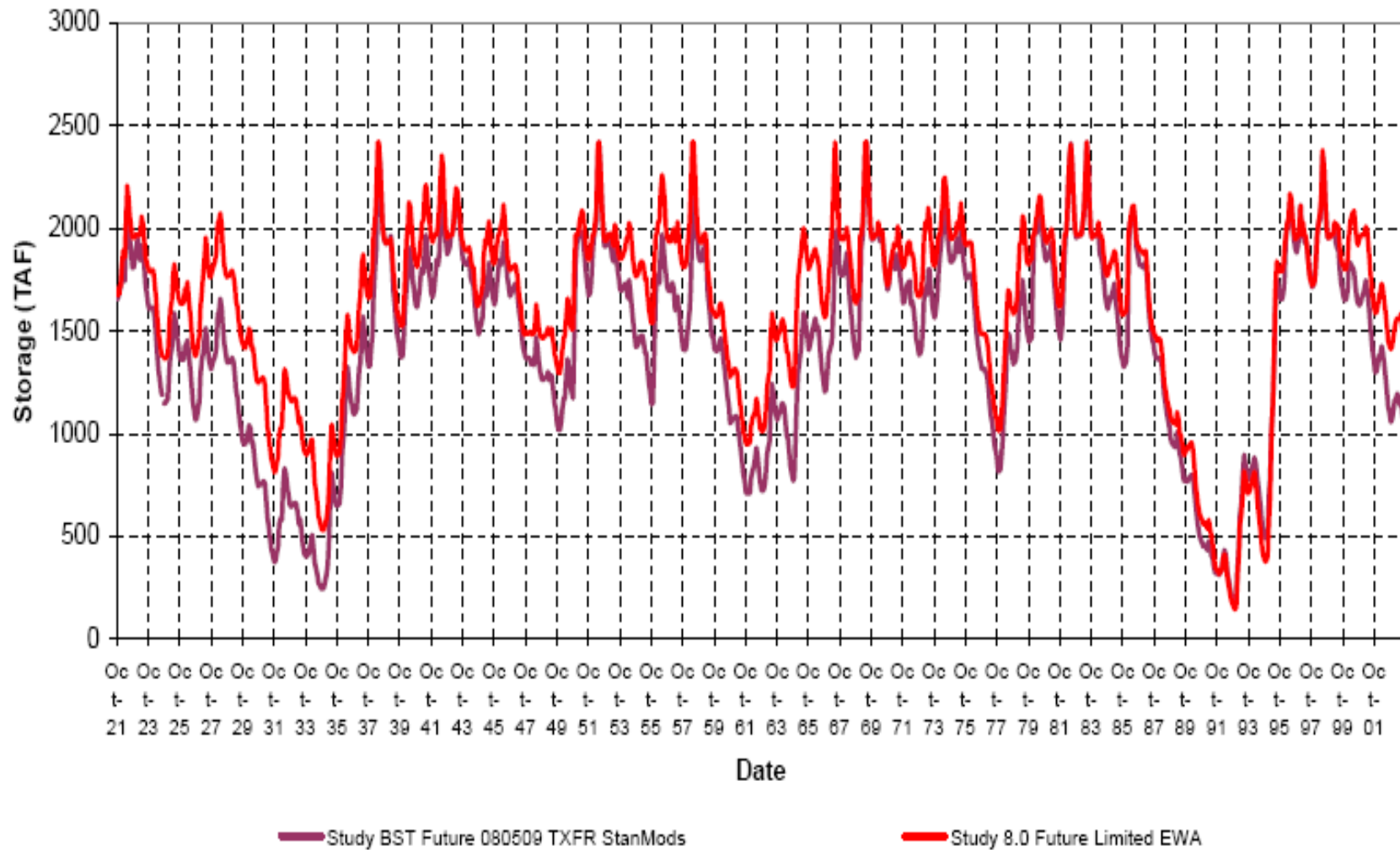
New Melones ~ Operation Constraints



- Vernalis Water Quality (salinity)
- In-stream Fishery Flows
- Over-allocated basin – Multi-year Strategy

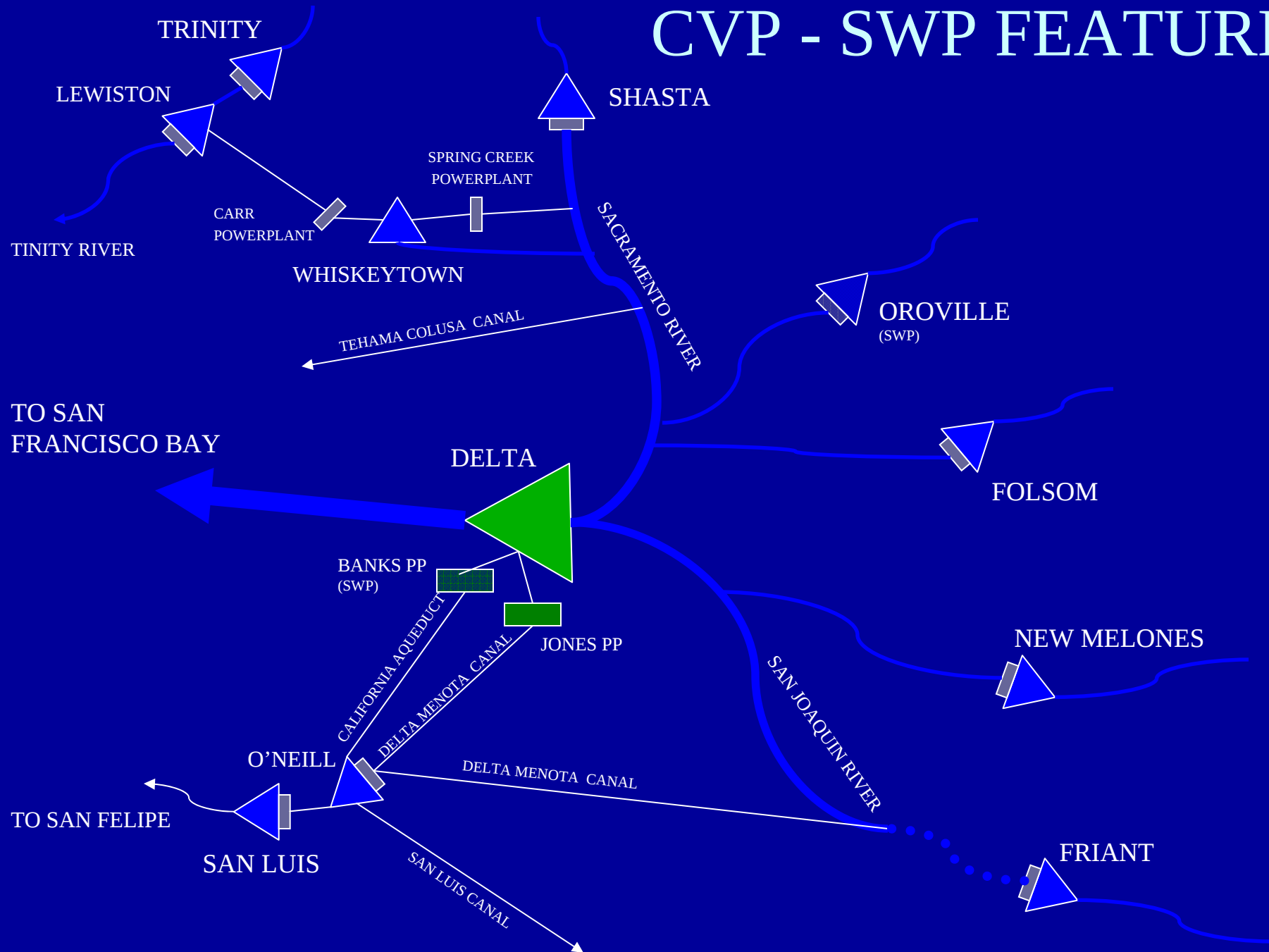
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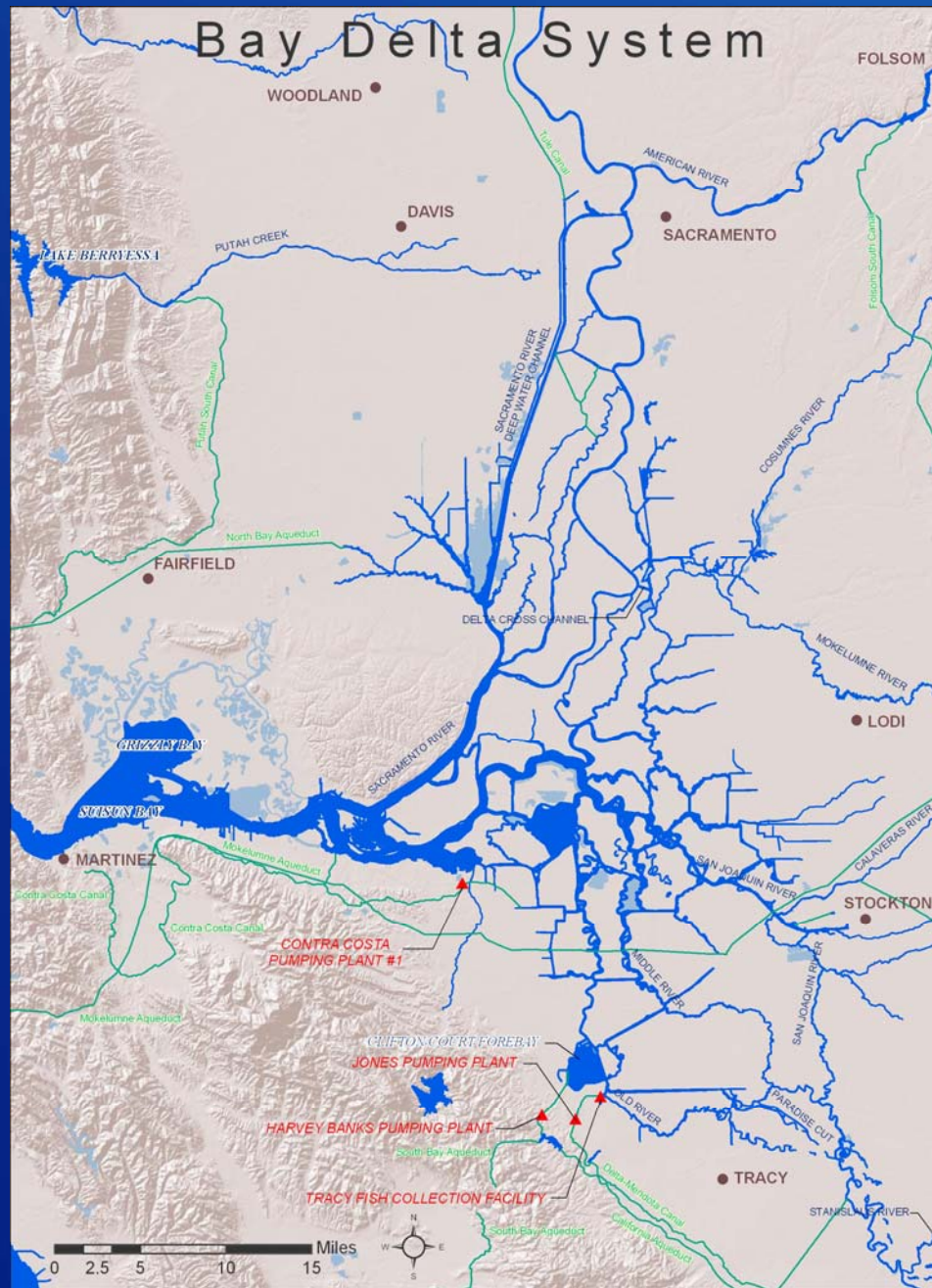
New Melones Reservoir



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CVP - SWP FEATURES



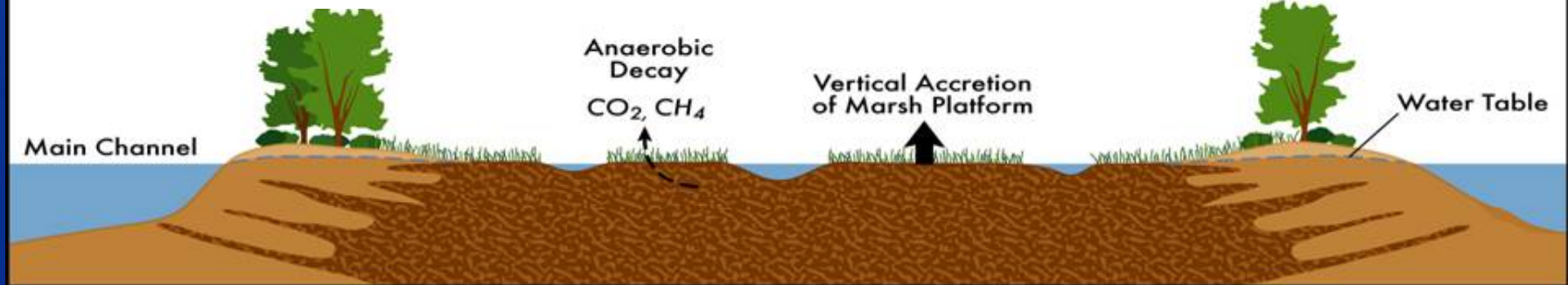


The Sacramento-San Joaquin Delta

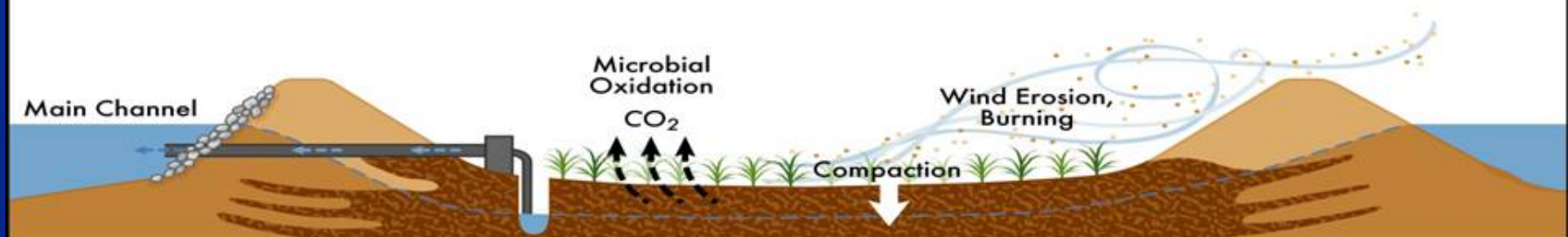
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Land Subsidence – Failure Risk

Pre-1880's



Present Time



Levee Failure



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Delta ~ Operation Constraints



- Water Rights Decision 1641
- Biological Opinions
- Coordination with State Water Project

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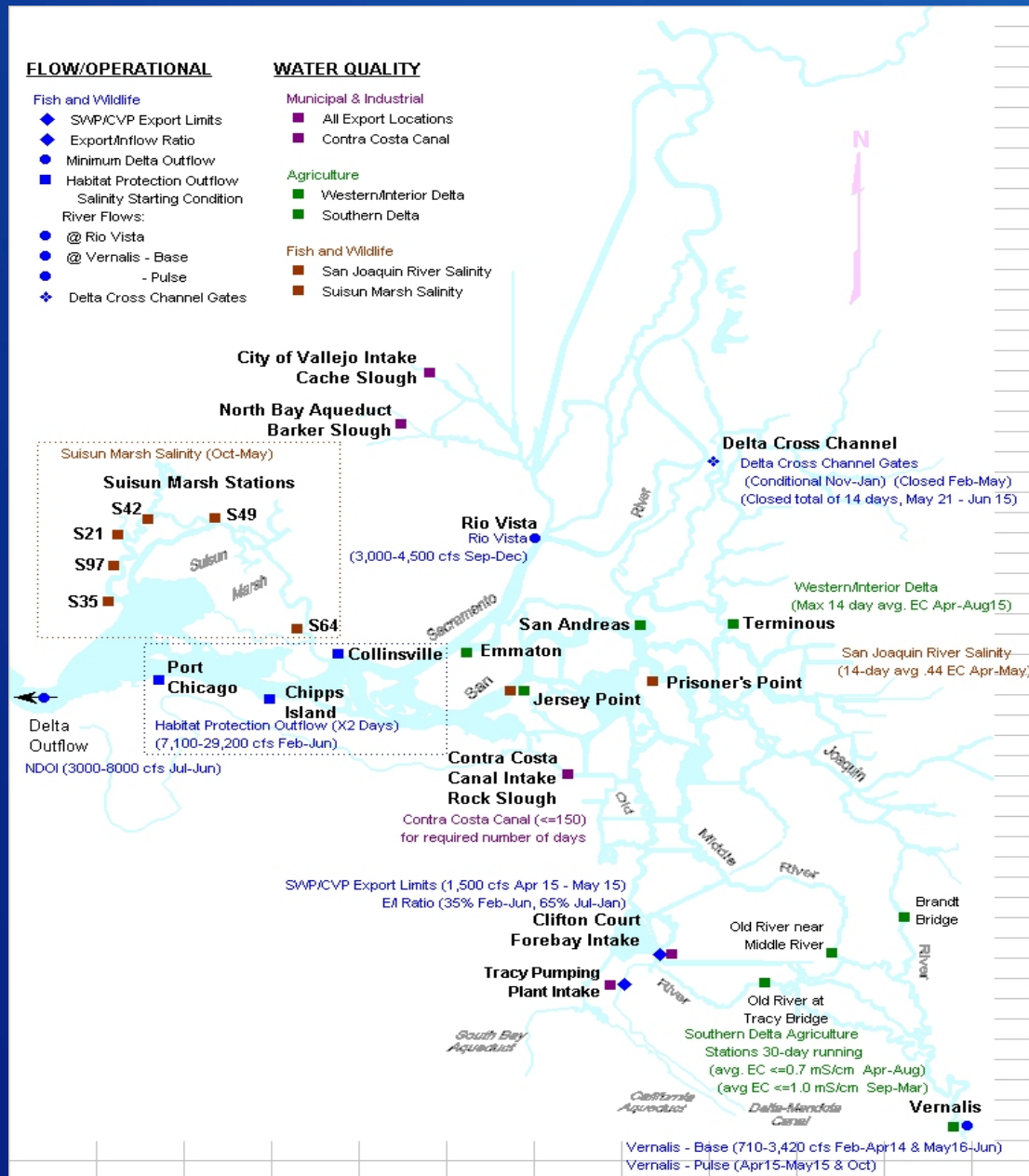
Permits and Agreements

Key Operating Agreements and Standards

- Water Right Permits
- Water Rights Decision 1641
- Biological Opinions
- Flood Control Manuals
- Central Valley Project Improvement Act
- Coordinated Operations Agreement

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Delta Water Quality Standards



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Water Quality Standards

Bay-Delta Standards

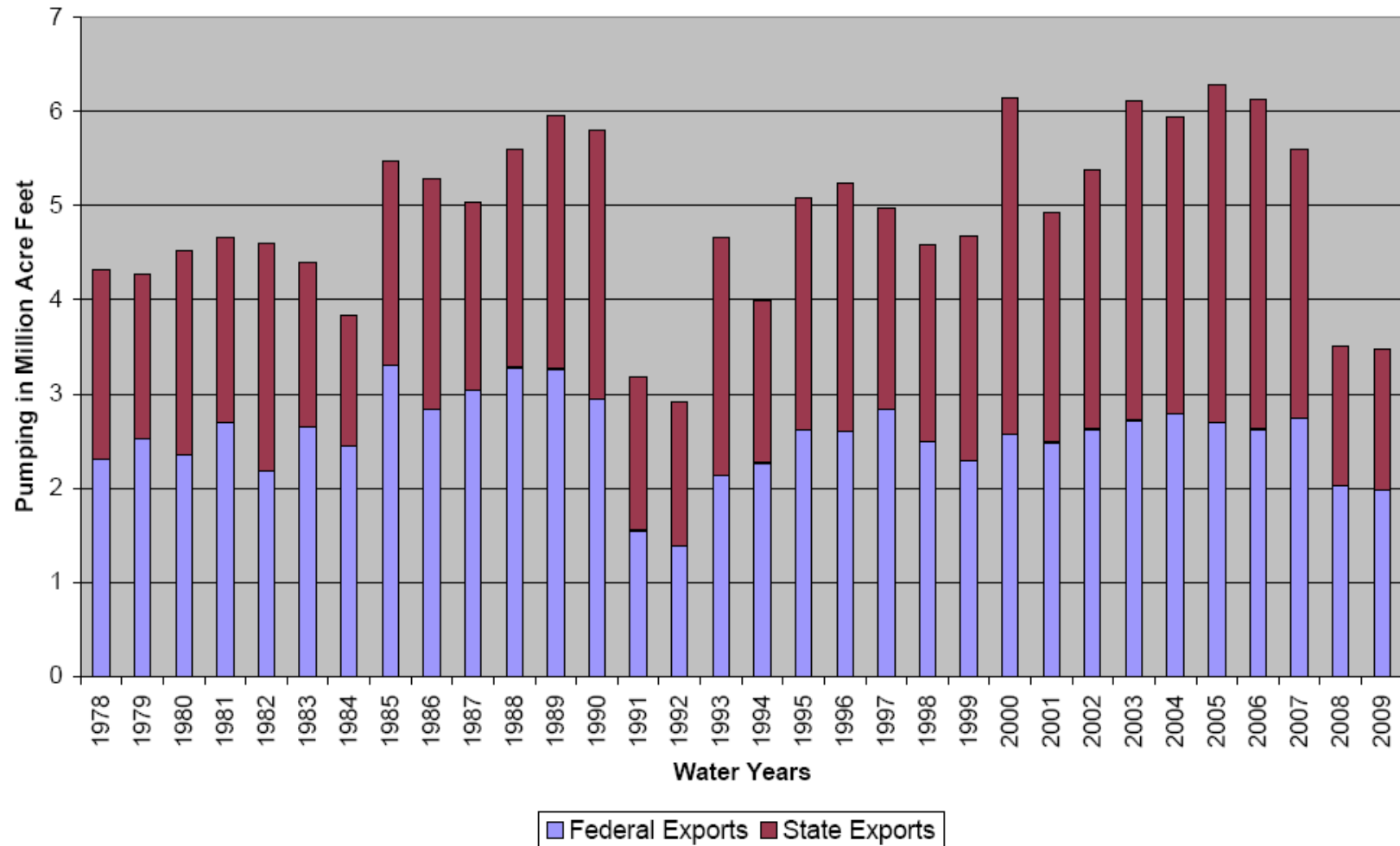
DRAFT

Contained in D-1641

CRITERIA	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FLOW/OPERATIONAL												
• Fish and Wildlife												
SWP/CVP Export Limits				1,500cfs [1]								
Export/Inflow Ratio [2]	65%		35% of Delta Inflow [3]					65% of Delta Inflow				
Minimum Delta Outflow	[4]							3,000 - 8,000 cfs [4]				
Habitat Protection Outflow			7,100 - 29,200 cfs [5]									
Salinity Starting Condition [6]		[6]										
River Flows:												
@ Rio Vista								3,000 - 4,500 cfs [7]				
@ Vernalis - Base		710 - 3,420 cfs [8]				[8]						
- Pulse				[9]				+28TAF				
Delta Cross Channel Gates	[10]		Closed			[11]					Conditional [10]	
WATER QUALITY STANDARDS												
• Municipal and Industrial												
All Export Locations								≤ 250 mg/l Cl				
Contra Costa Canal								150 mg/l Cl for the required number of days [12]				
• Agriculture												
Western/Interior Delta								Max 14-day average EC mmhos/cm [13]				
Southern Delta [14]		1.0 mS				30 day running avg EC 0.7 mS				1.0 mS		
• Fish and Wildlife												
San Joaquin River Salinity [15]				14-day avg; 0.44 EC								
Suisun Marsh Salinity [16]	12.5 EC	8.0 EC		11.0 EC					19.0 EC	[17]		15.5 EC

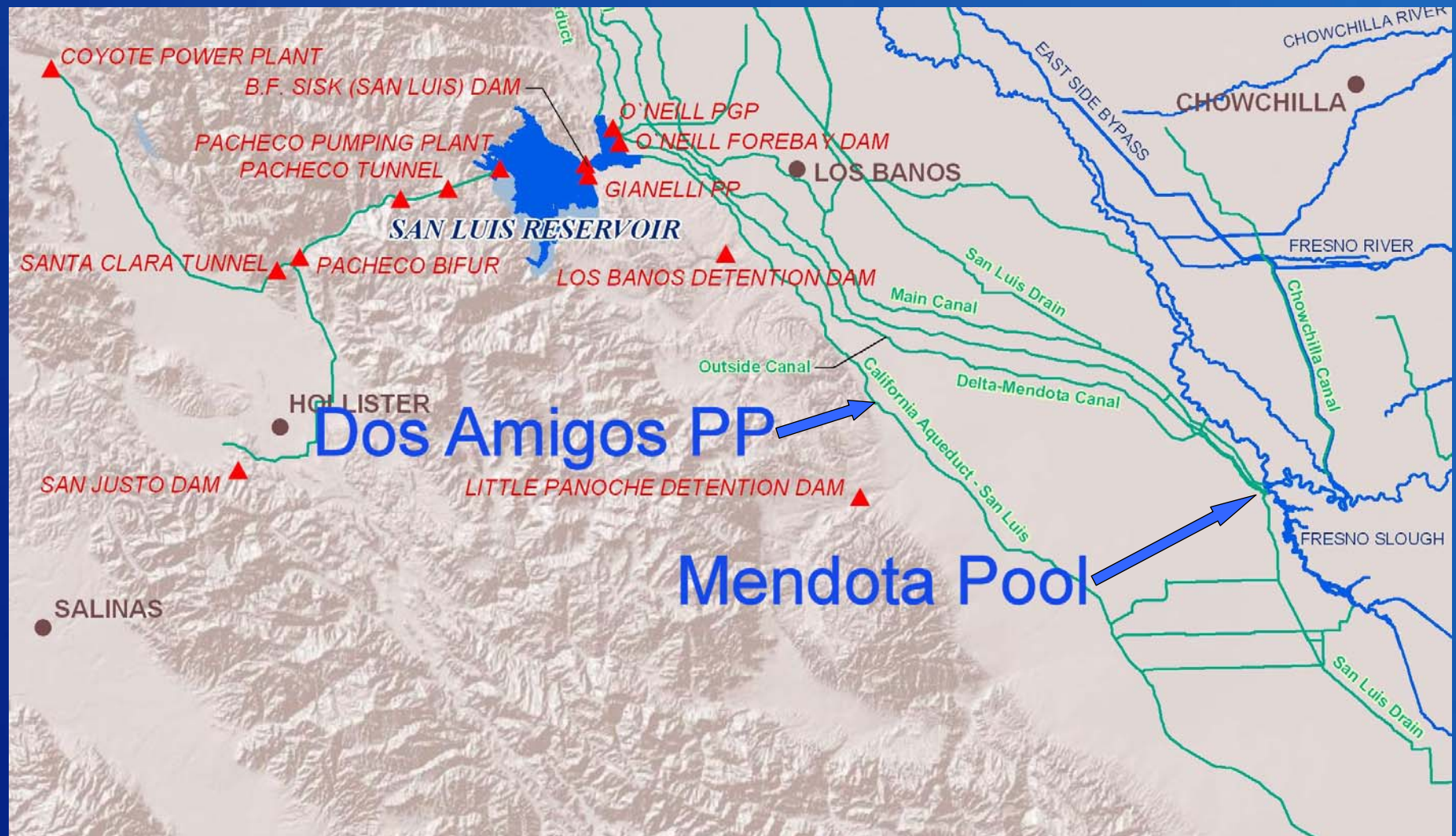
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Delta Exports
Water Years 1978 through 2009



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CVP Westside System



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San Luis ~ Operation Constraints



- San Luis Low Point
- Two Foot Drawdown Per Day

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Friant ~ Operation Constraints



- Limited Downstream Channel Capacities
- Complex Flood Control Diagram

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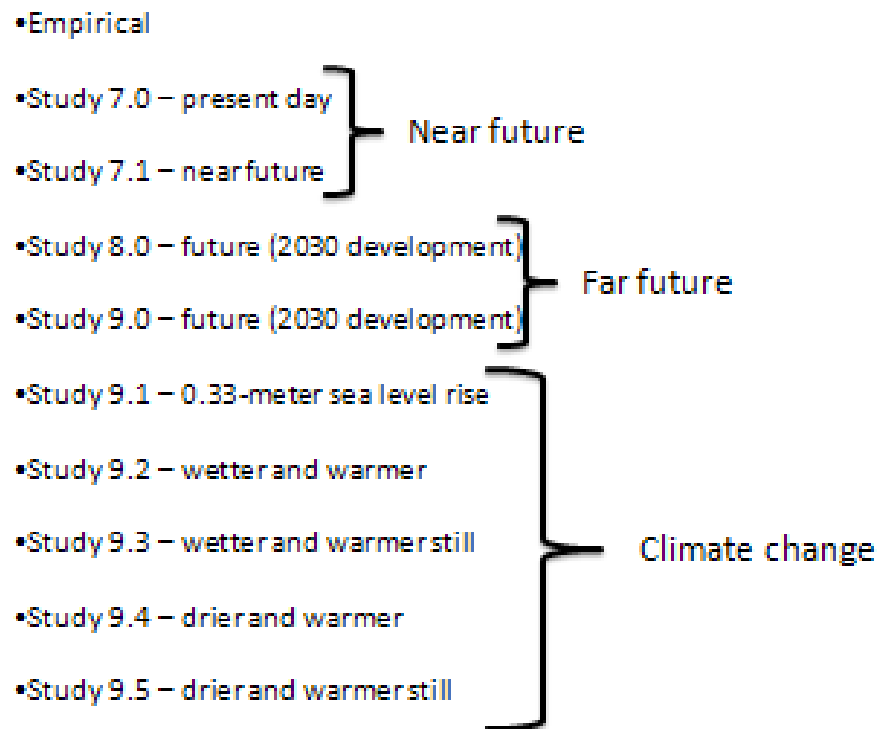
System Constraints

- Maximize contractual water supply deliveries given the constraints of the system:
 - Geographic
 - Hydrologic
 - Physical Capacity
 - Flood Control requirements
 - Environmental (i.e. water quality, outflow)
 - Contractual and Water Rights Requirements
 - Economic
 - Demand Patterns

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CalSim II Modeling Runs

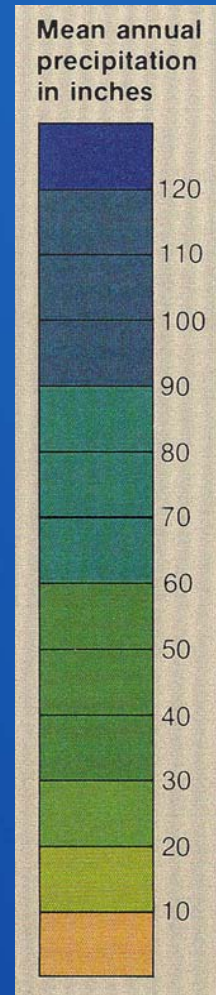
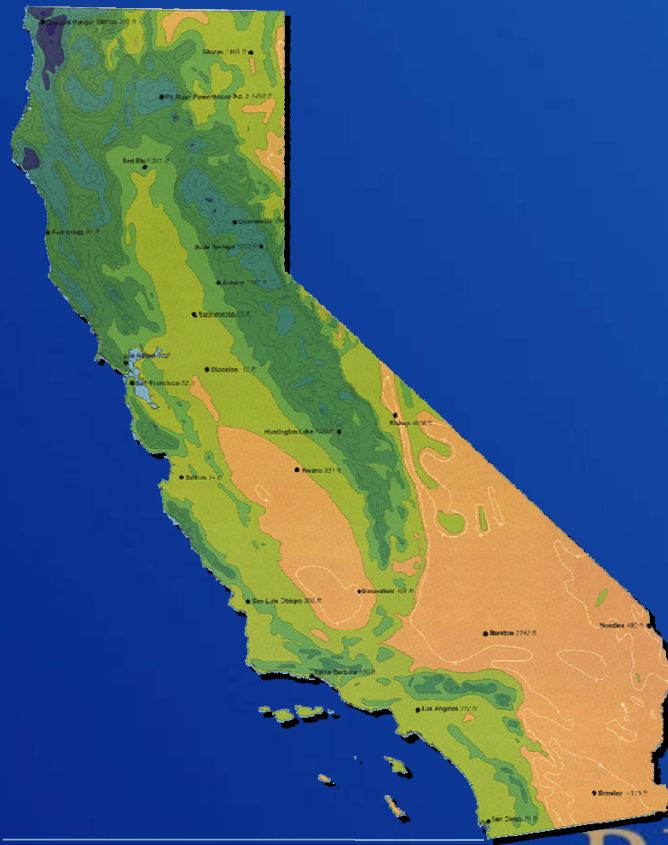
Model Scenarios



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Geographic Constraints

- Majority of water supply in the north.
- Majority of demand in the south.

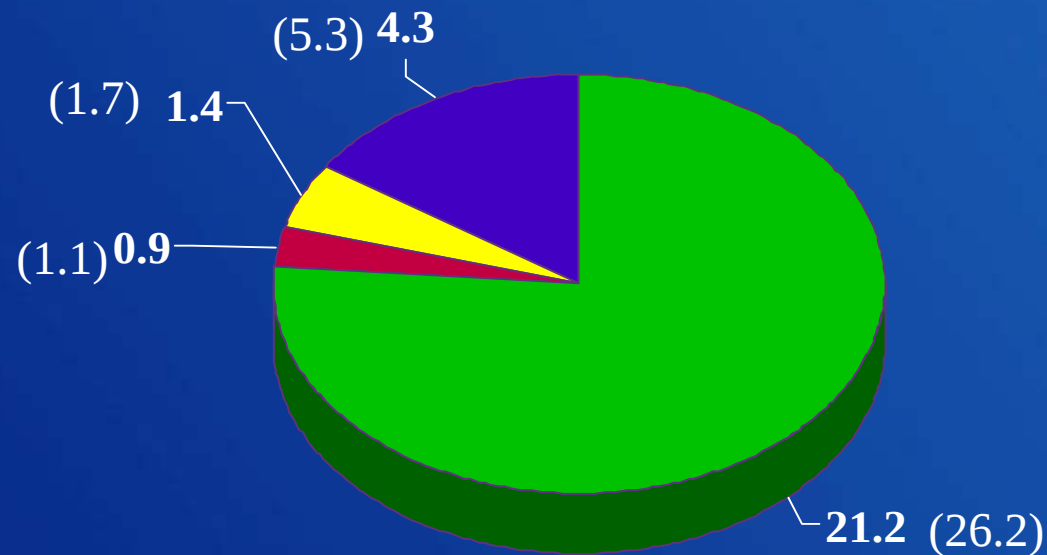


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Geographic Constraints

Sacramento/San Joaquin Delta

Avg Annual Inflow in MAF (Billion Cu Meters)



■ Sacramento ■ Delta Precip ■ Eastside Streams ■ San Joaquin

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Questions ?



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