

RECLAMATION

Managing Water in the West

CVP Operations Overview

January 2018



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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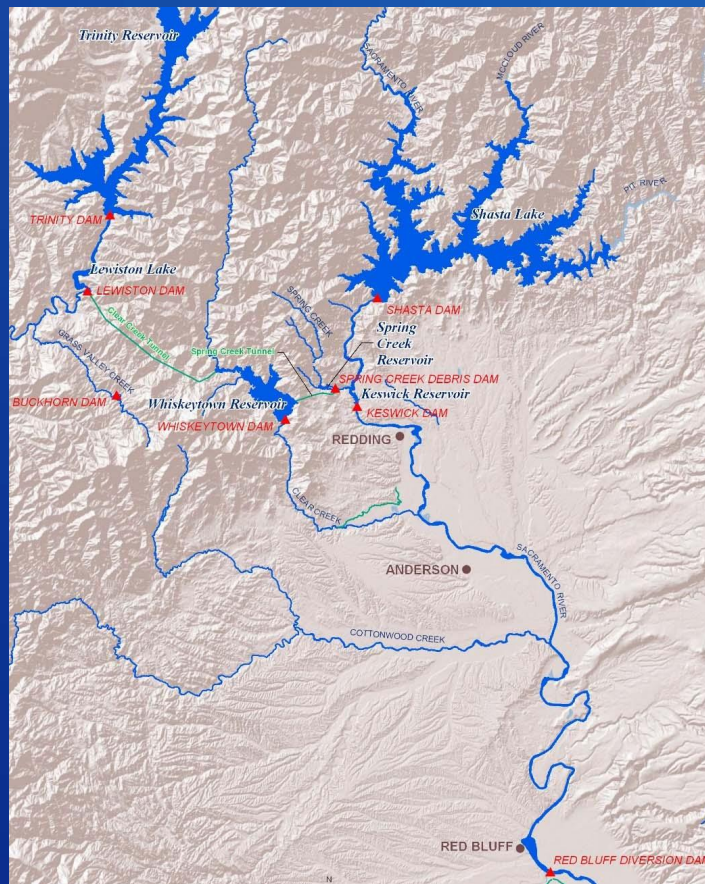
Central Valley Project Major Storage Facilities



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Northern System



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Trinity River Division



- Trinity Reservoir 2.4 MAF
- Avg Annual Inflow 1.3 MAF
- Trinity Powerplant 140 MW
- Carr Powerplant 184 MW

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Trinity Authorized Purposes

Power
Generation

Fish and Wildlife



River
Regulation

Recreation

Water Supply

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Trinity Reservoir Functions

- Integrated with CVP Operation
- Normal operations provide flood control benefits
- Fish and Wildlife Requirements – Trinity River Main-stem Fishery Restoration Record of Decision (2000)
- Temperature Objectives – SWRCB WR 90-5
- Trans-basin Diversion – hydropower generation and water temperature management

Whiskeytown

- Whiskeytown Lake 240 TAF
- Spring Creek PP 200 MW



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Whiskeytown ~ Operation Constraints



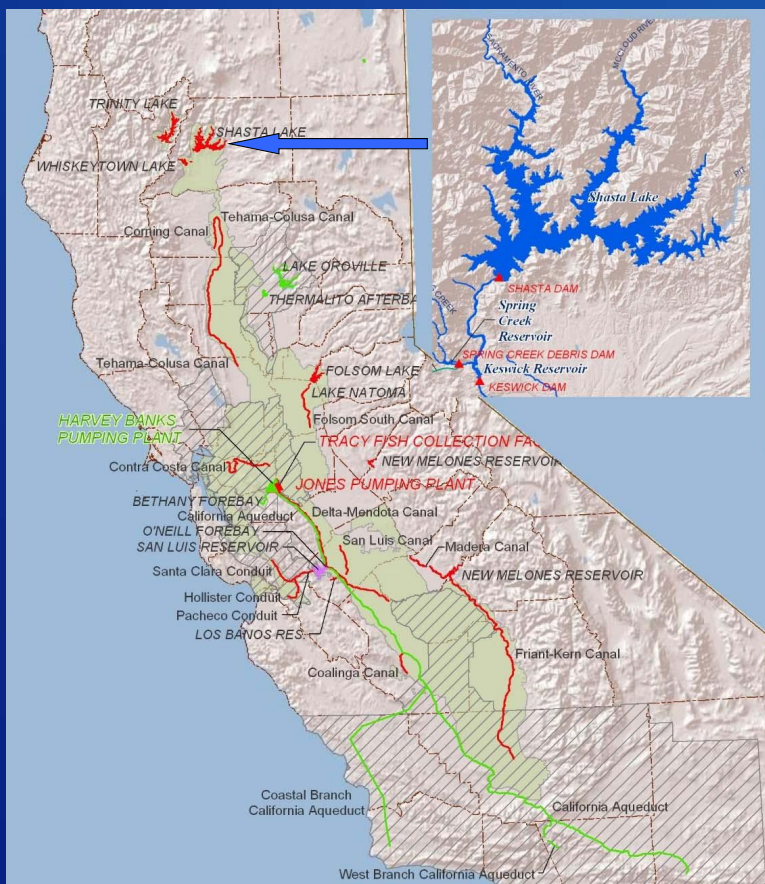
- Clear Creek Flows and Temperatures
- Sacramento River Operations

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Shasta Division

- Shasta Reservoir 4.5 MAF
- Avg Annual Inflow 5.4 MAF
- Shasta Powerplant 715 MW



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Sacramento River ~ Operation Constraints



- Sacramento River Water Temperatures
- Coordinated Flood Operations

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American River Division



- Folsom Reservoir 1.0 MAF
- Avg Annual Inflow 2.6 MAF
- Folsom Powerplant 215 MW

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American River ~ Operation Constraints



- Water Temperatures and Flows
 - Flood Control
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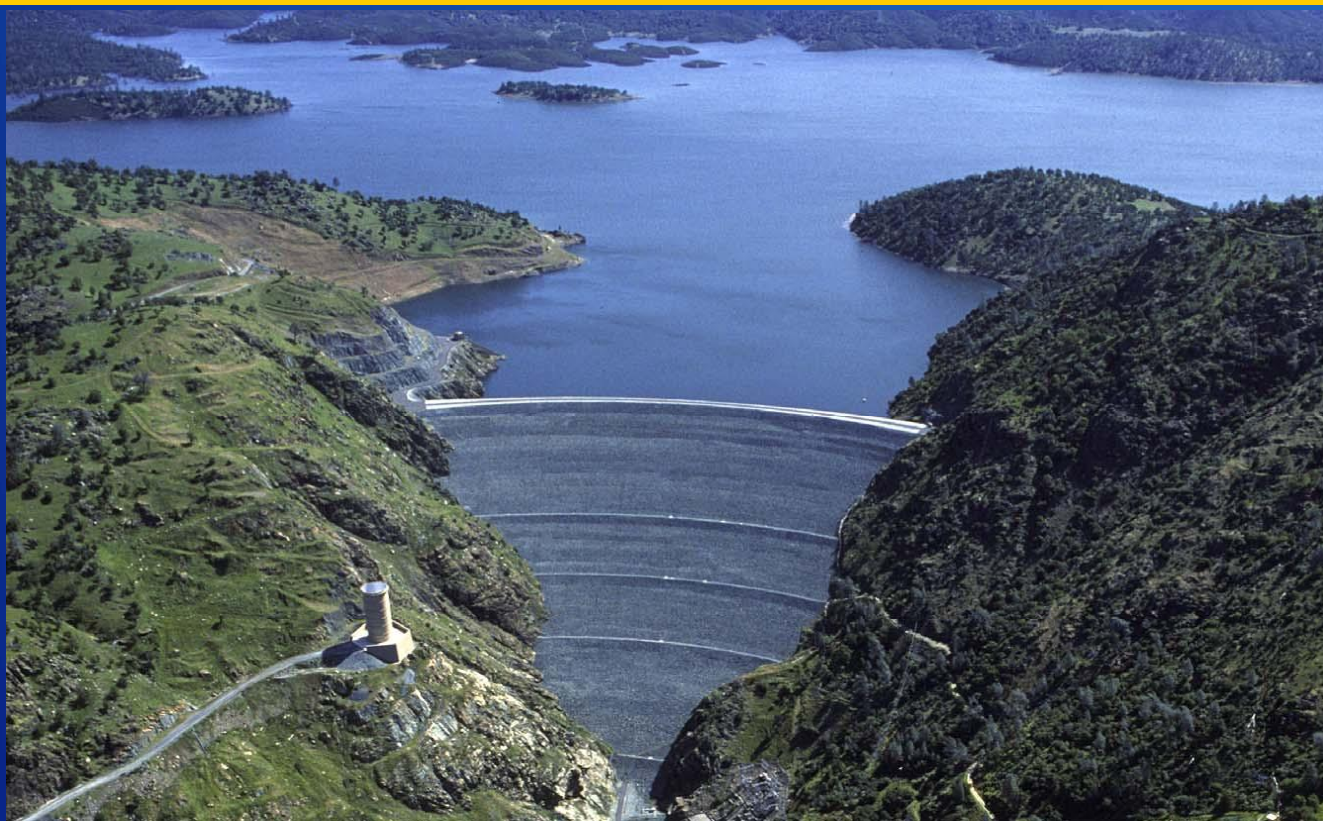
East Side Division



- New Melones Reservoir 2.4 MAF
- Avg Annual Inflow 1 MAF
- New Melones PP 380 MW

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East Side ~ Operation Constraints



- Vernalis Water Quality
 - In-stream Fishery Flows
 - Flood Control
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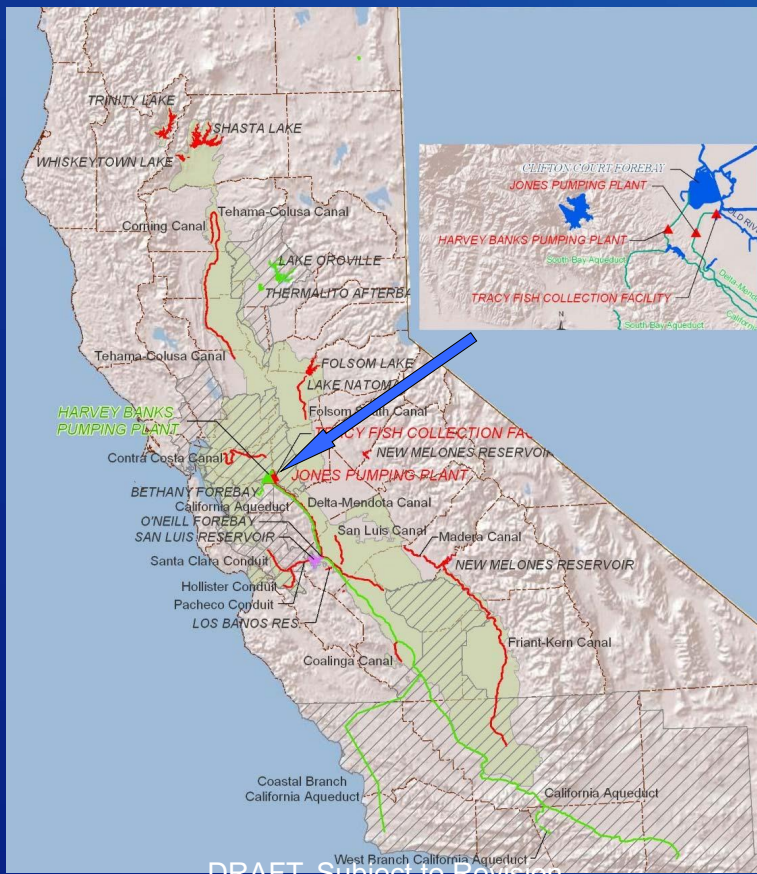
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This map illustrates the Bay Delta System, a complex network of waterways connecting the Sacramento and San Joaquin Rivers to San Francisco Bay. Key features include:

- Major Waterways:** Sacramento River, San Joaquin River, Delta Cross Channel, Old River, Mokelumne River, Colusa River, and various creeks like Putah Creek and Yuba Creek.
- Cities and Towns:** Woodland, Davis, Sacramento, Fairfield, Martinez, Stockton, Tracy, and Lodi.
- Infrastructure:** Several pumping plants are marked with red triangles, including Contra Costa Pumping Plant #1, Clifton Court Forebay Jones Pumping Plant, Harvey Banks Pumping Plant, and Tracy Fish Collection Facility. Other infrastructure includes the Delta Water Tunnel, Delta Cross Channel, and various aqueducts like the North Bay, Mokelumne, Contra Costa, and South Bay Aqueducts.
- Geographical Features:** The map shows the Delta region's topography, including the Delta Cross Channel and the Delta Water Tunnel.
- Scale and Orientation:** A scale bar at the bottom left indicates distances in miles (0 to 15). A compass rose at the bottom center shows North (N), South (S), East (E), and West (W).

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Delta Division



- Jones Pumping Plant 4,600 cfs
- Delta Mendota Canal 4,600 cfs
- Intertie (DCI) 450 cfs
- Delta Cross Channel Gates

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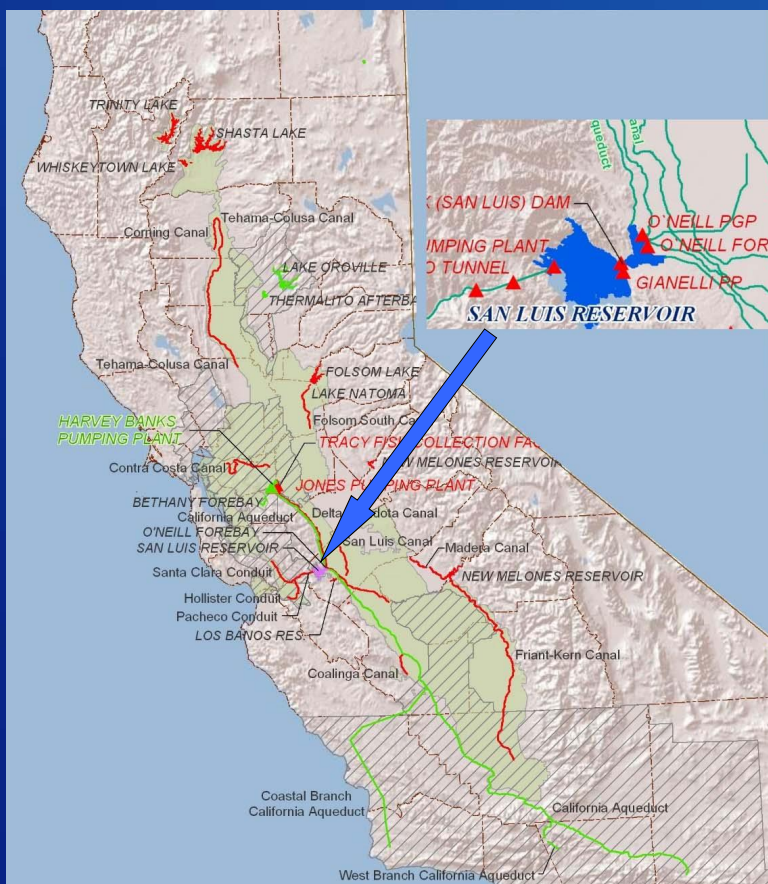
Delta ~ Operation Constraints



- Water Rights Decision 1641
- Biological Opinions
- Coordination with State Water Project
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San Luis Unit



- San Luis Reservoir 966 TAF (Federal Share)
- Giannielli Powerplant 424 MW
- Dos Amigos Pumping Plant 13,000 cfs
- O'Neill Pumping Plant 4,200 cfs
- Pacheco Pumping Plant 500

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San Luis ~ Operation Constraints

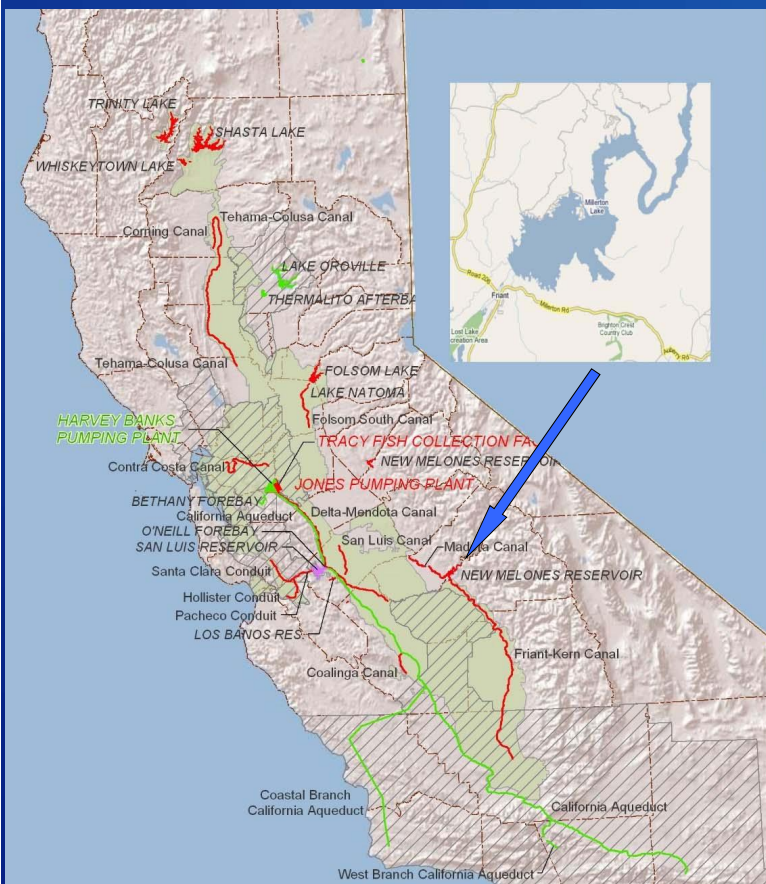


- San Luis Low Point
- Two Foot Drawdown Per Day
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Friant Division

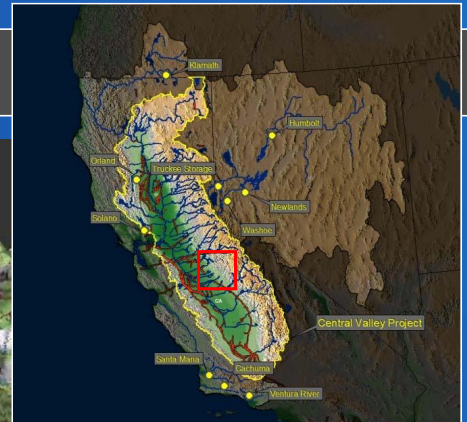


- Friant Reservoir 520 TAF
- Avg Annual Inflow 1.7 MAF
- Friant – Kern Canal
- Madera Canal

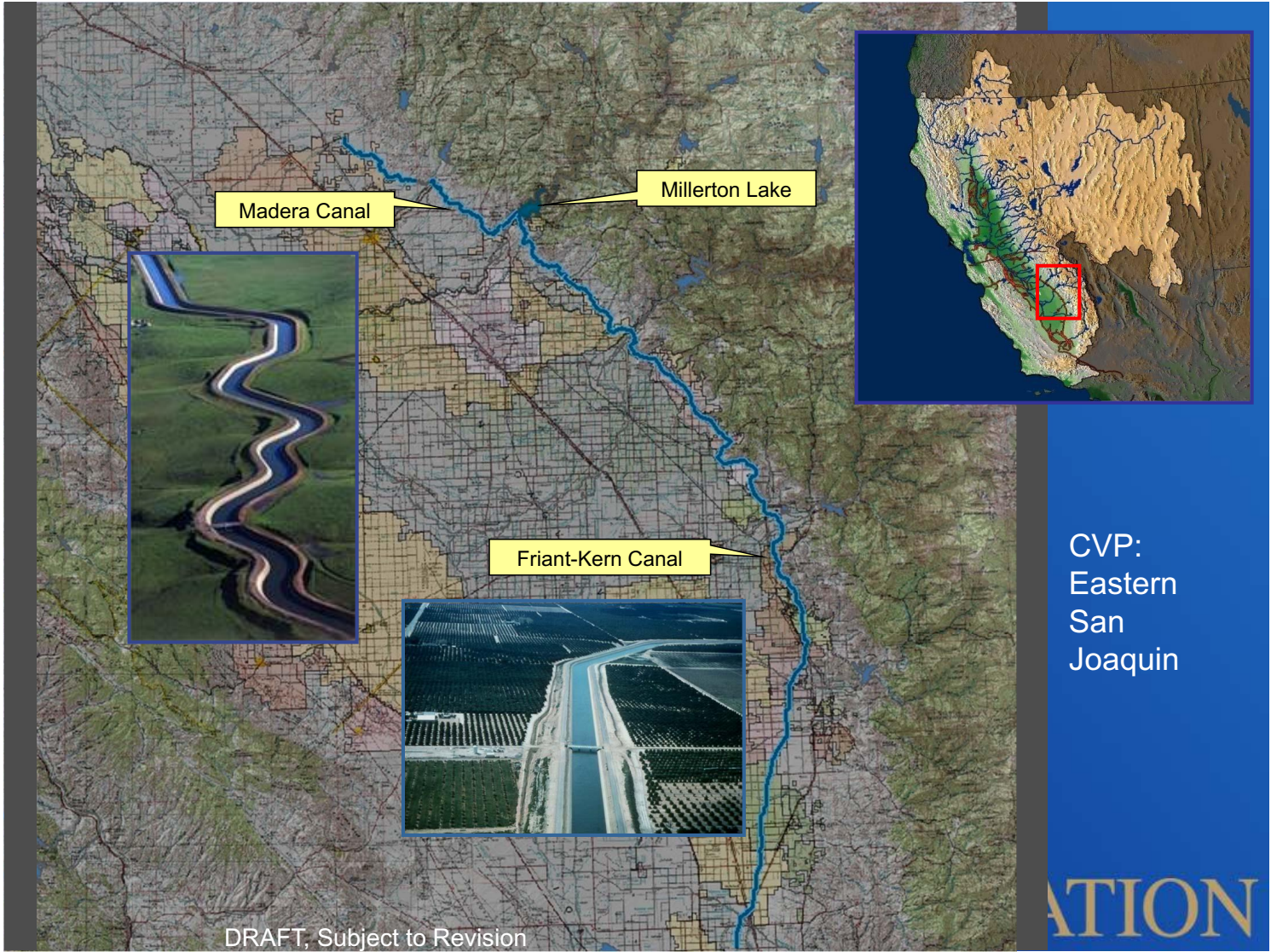
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A 3D topographic map of the Fresno area, showing the Kings River and the Kings River Dam. An inset image shows a photograph of the Kings River Dam and the surrounding landscape.



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CVP:
Eastern
San
Joaquin

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State Water Project

- Oroville 3.5 MAF
- Hyatt Powerplant 644 MW
- Banks Pumping Plant 11,000 cfs
- San Luis Reservoir 1062 TAF (State share)
- CA Aqueduct

Authorized Project Purposes

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

Coordinating the Operations

- U. S. Fish and Wildlife Service
- National Marine Fisheries Service
- Western Area Power Administration
- U. S. Army Corps of Engineers
- State Water Resources Control Board
- State Department of Water Resources
- State Department of Fish and Wildlife
- Local Stakeholders

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

Hydrologic Constraints

- Water supply greatest in the winter & spring.
- Demand peaks in the summer.
- Unfavorable hydrologic distribution pattern.
(i.e. early snow melt, small snow pack)
- Multi-year Drought

Environmental

- Water Quality Standards
- Minimum River Flow Requirements
- Delta Outflow Requirements
- Water Temperature Management

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Permits and Contractual Agreements

Key Operating Agreements and Standards

- Coordinated Operations Agreement
- Water Rights Decision 1641
- Biological Opinions
 - Winter-run & Spring-run Chinook Salmon
 - Central Valley steelhead
 - Delta Smelt
- San Joaquin River Agreement
- Central Valley Improvement Act

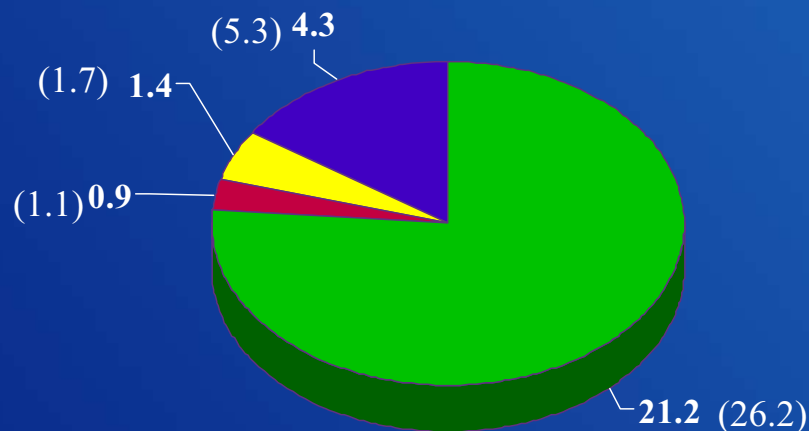
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Geographic Constraints

Sacramento/San Joaquin Delta

Avg Annual Inflow in MAF (Billion Cu Meters)



■ Sacramento ■ Delta Precip ■ Eastside Streams ■ San Joaquin

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What Constitutes Delta Control?

- The Delta controls when any change in the Delta requires a response from upstream reservoirs.
 - Typically under balanced conditions
 - Rarely, E/I conditions
- Delta *does not* typically control when:
 - Flood control operations are underway
 - During fishery related export reductions
 - When constraints on upstream reservoirs prevent adjustment of releases to achieve balanced conditions.

What Constrains Delta Operations?

- About 28 operational compliance points, with standards which vary by year type and date
 - Usually 1 to 5 dominate decisions at any given time
 - Flow, salinity (EC), CL-, Export/Inflow Ratio
- Largely a feedback driven system (gages) with poor predictability for EC (models project trends only)
- Fishery concerns
- South Delta water levels
- Upstream releases in dry years

Factors Affecting the Delta

- Tidal Cycles (Overwhelmingly a tidal environment)
- Atmospheric Pressure
- Wind Strength and Direction
- Antecedent Salinity Conditions (very strong persistence)
- Delta Inflow (Sac Valley accretion/depletion rates)
- Export Rates
- Delta Cross Channel Gate Position (water circulation patterns)

Key CVP-SWP Delta Compliance Management Tools

- Increase Delta Inflow (Response to seasonal or daily shifts in system depletions, EC, CL-, exports)
 - Shasta release 5 days away
 - Oroville release 3 days away
 - Folsom release 1 day away
 - After initial response, rebalance reservoirs
- Export Reductions (Response to Central /South Delta EC, CL-)
 - CVP export levels (single speed pumps, difficult to adjust)
 - SWP export levels (variable speed pumps, forebay)
- Delta Cross Channel Gates (water circulation effects)
- Combinations of all the above

Take Home Points

- Delta operations and compliance with current standards are based upon an integrated system of upstream reservoirs and export facilities and continuous compliance monitoring.
- Delay in implementing a required reservoir release change or export reductions to meet Delta compliance usually results in a much larger and longer duration management action(s) being ultimately required.
- System-wide operations flexibility is a key management asset in the Delta environment.

Questions?

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