



Surface Water Storage

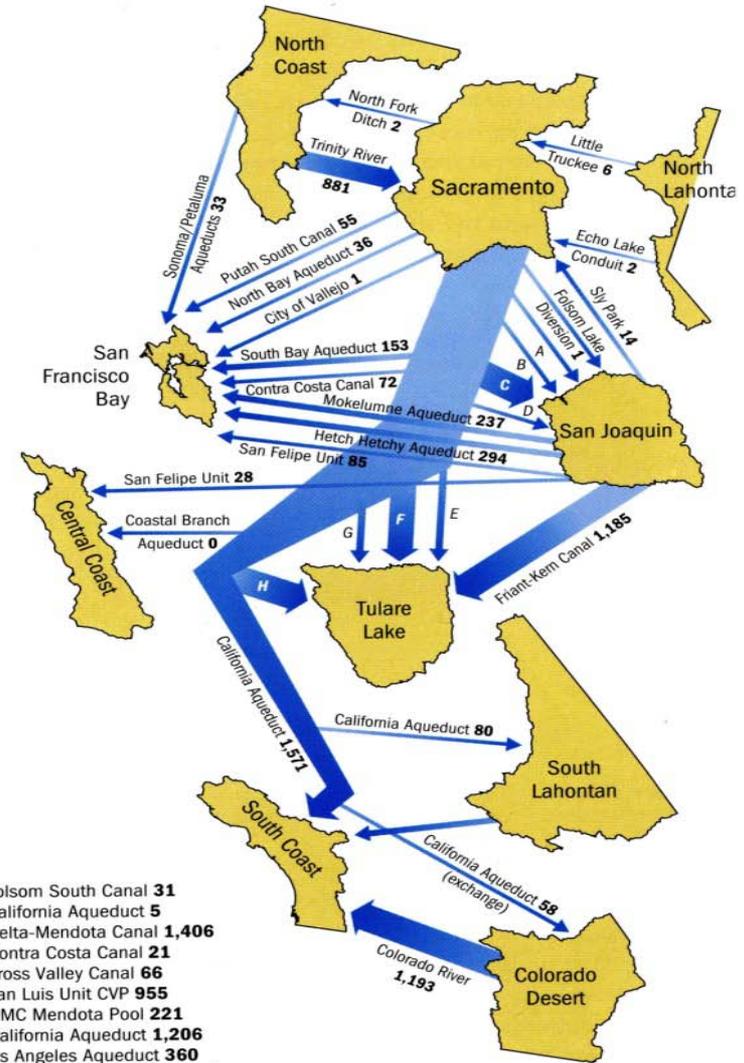
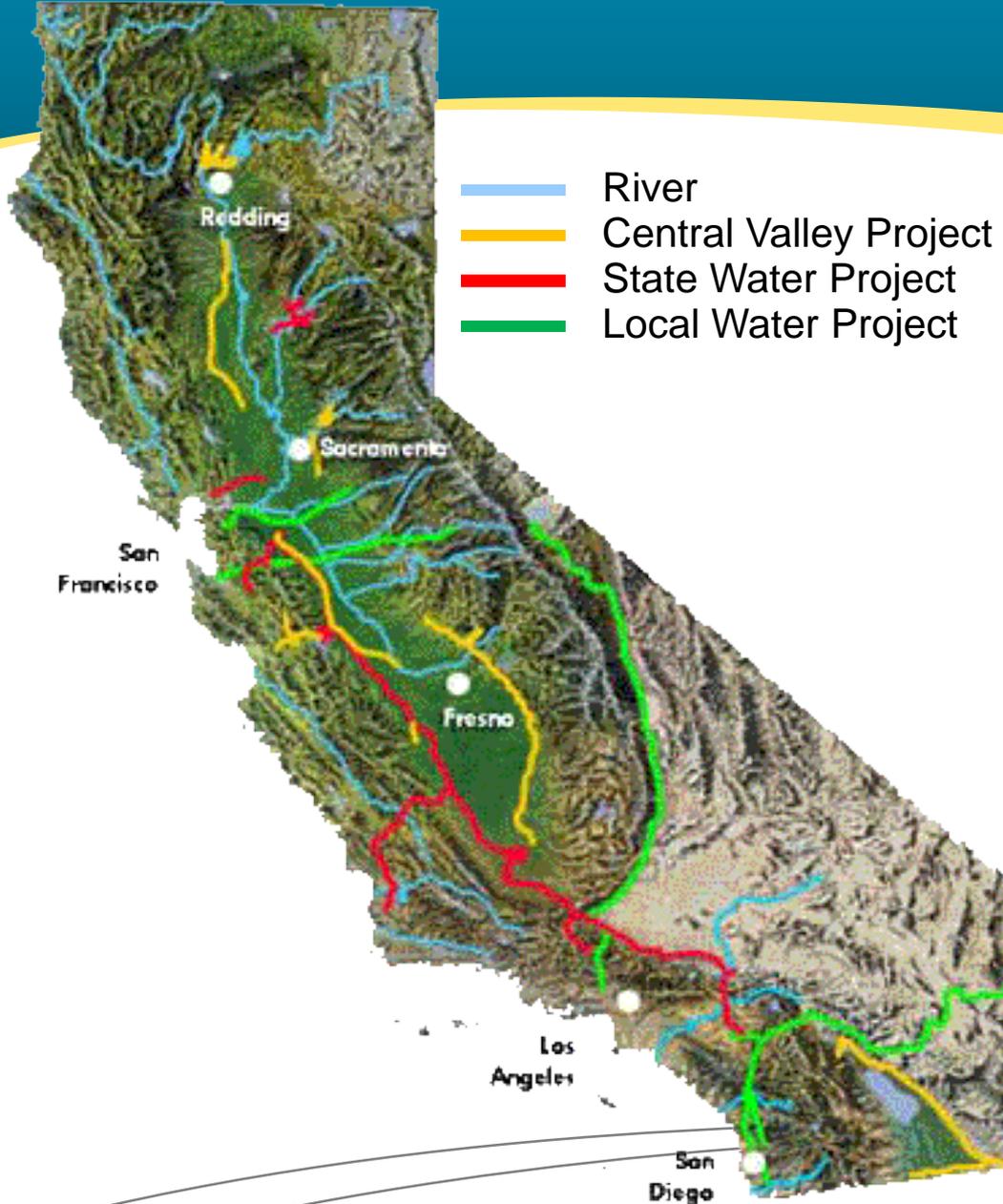
Bill Swanson, P.E.
Water Resources Director



MWH

BUILDING A BETTER WORLD

California Water Management Systems

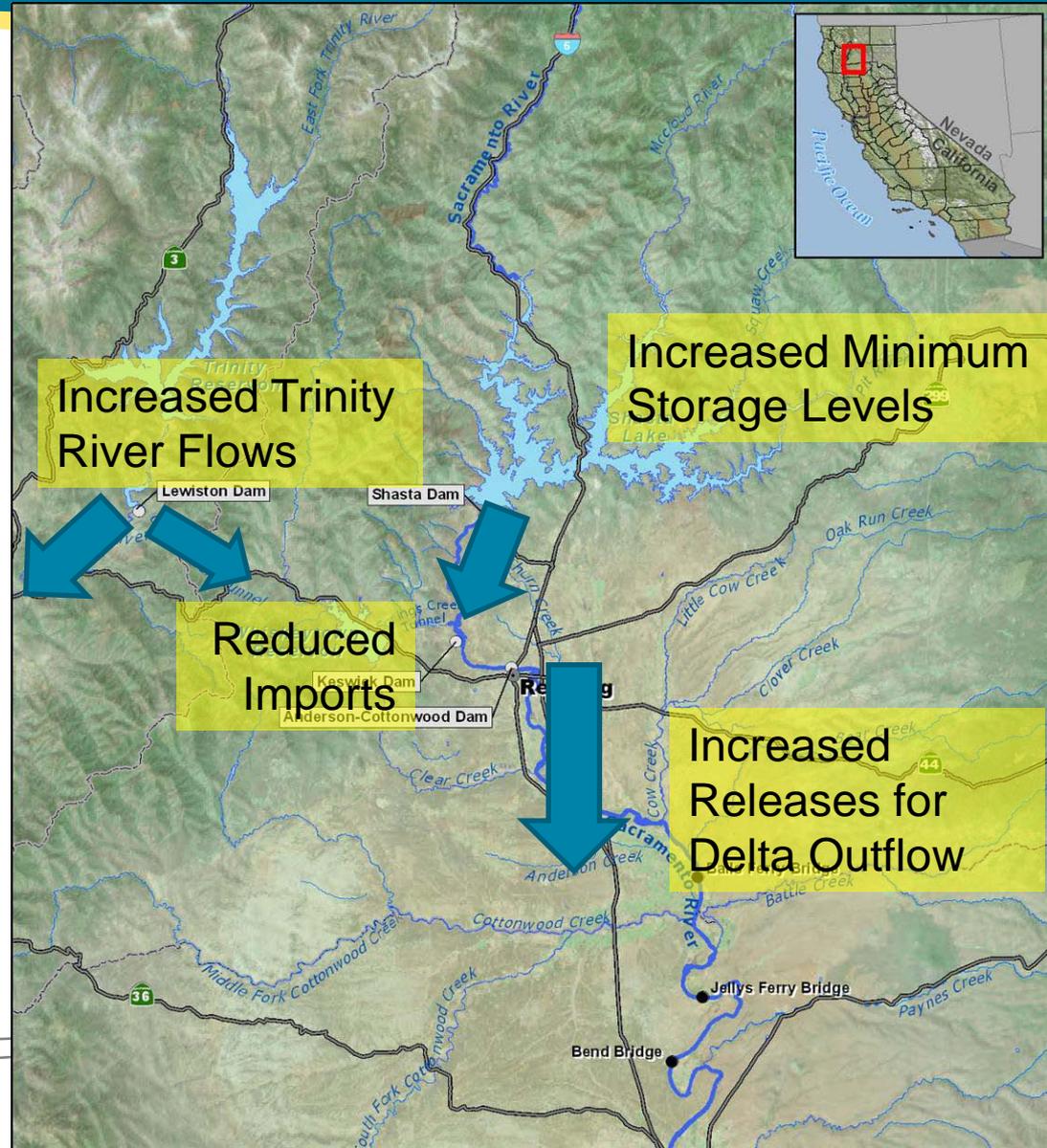


Map 11. Regional water imports and exports, at 1995 level of development (thousands of acre-feet per year). (Redrawn from California Department of Water Resources 1998.)

Changing Storage Operations In Reaction to Policy Changes and Social Values

Shasta-Trinity System

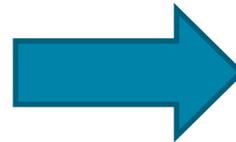
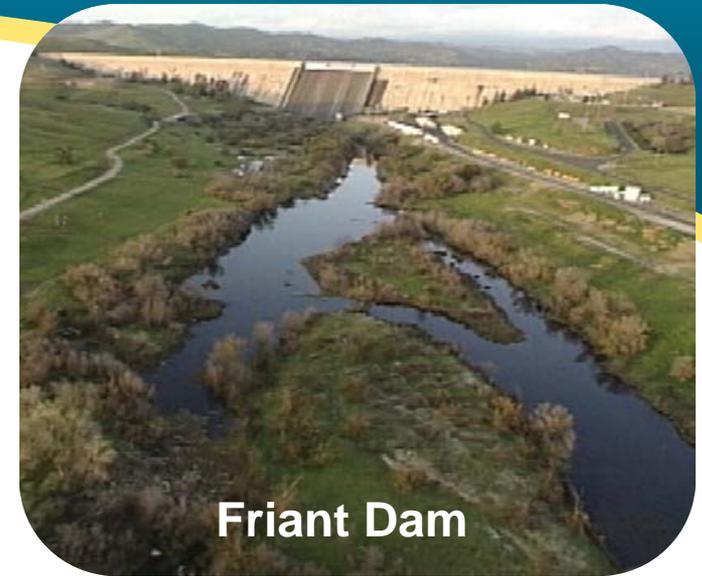
Reduced imports, additional minimum storage, and increased releases for Delta needs reduced water supply and power benefits of original projects



Changing Storage Operations In Reaction to Policy Changes and Social Values

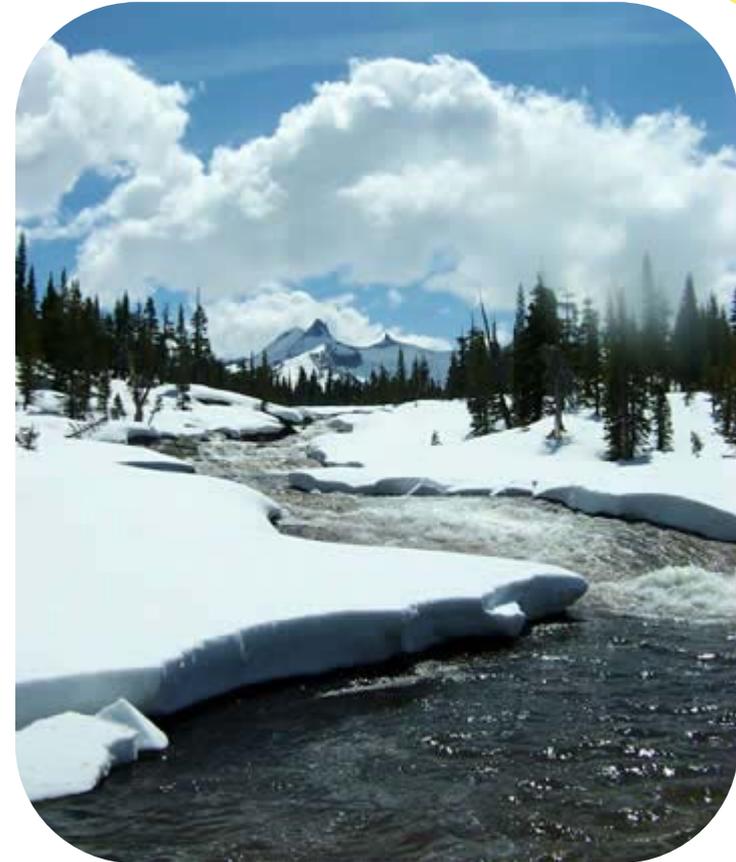
San Joaquin River

2006 Settlement established river releases as new operational priority



The Role of Surface Water Storage in California has Changed

- Reliable supplement to local supplies achieved through conservation, reuse, desalination
- Support environmental, urban, industrial, and agricultural demands
- Support Delta resource needs
- Enhance system flexibility
- Provide dry year / drought relief
- Provide emergency storage
- Adapt to climate change effects
- Enhance flood management, recreation, hydropower, etc



Public Benefits of Water Storage

➤ **Ecosystem improvement**

- Timing of water diversions, flow and temperature improvement, other aquatic restoration

➤ **Water quality**

- Provide significant public trust resources, or clean up and restore groundwater resources

➤ **Flood control**

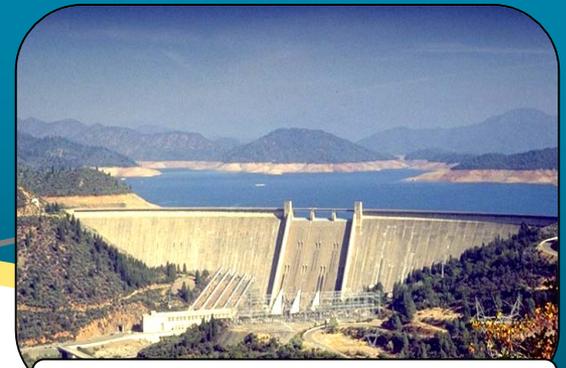
- Additional flood reservation space to adapt to effects of changing hydrology and decreasing snow pack on California's water and flood management systems

➤ **Emergency response**

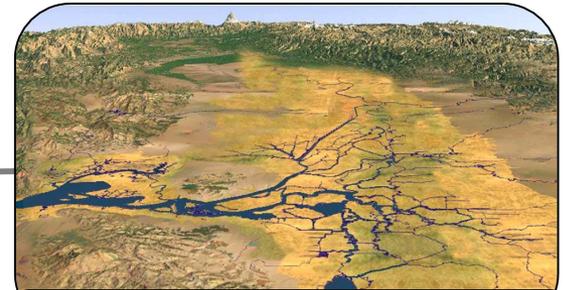
- Emergency supplies and flows for dilution and salinity repulsion following a natural disaster or act of terrorism

➤ **Recreation**

CalFed Storage Program



Raise Shasta Dam



In-Delta Storage



Upper San Joaquin River Basin Storage



North-of-the-Delta Offstream Storage

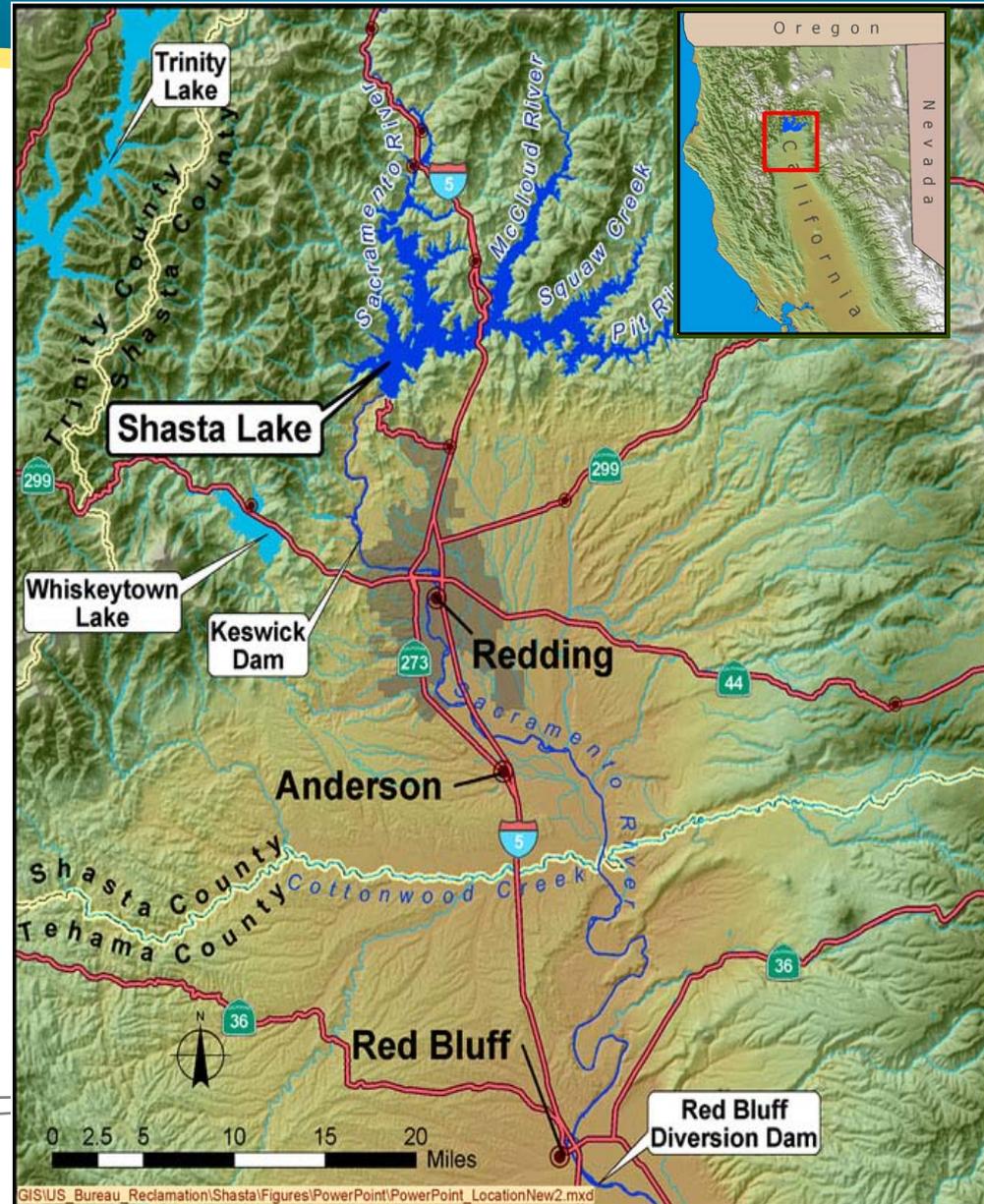


Expand Los Vaqueros Reservoir

Groundwater Storage and
Conjunctive Use

Shasta Lake Water Resources Investigation

- Raise Shasta Dam up to 18.5 feet
- Manage new supply for ecosystem improvements and water supply reliability purposes

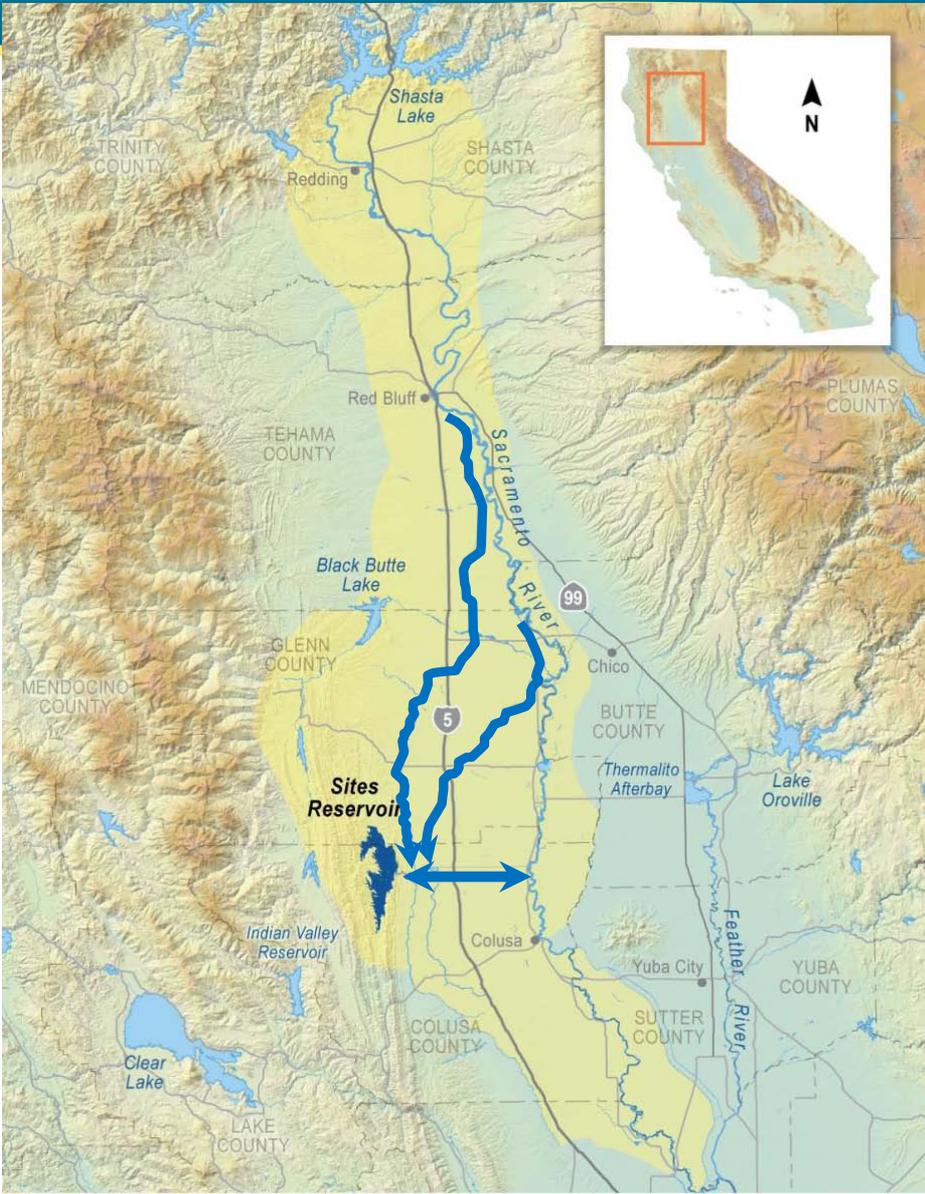


Potential Benefits of Shasta Enlargement

- Increased Anadromous Fish Survival
- Water Supply Reliability
- Ecosystem Restoration
- Flood Damage Reduction
- Hydropower Generation
- Recreation



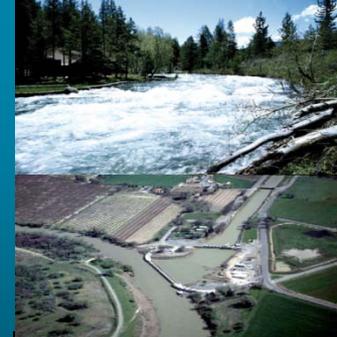
North-of-the-Delta Offstream Storage (NODOS)



- Divert water from Sacramento River to new off-stream reservoir
 - Two existing canals
 - One new pipeline
- Pump into reservoir and generate power on release
- Use water for
 - Sacramento Valley uses
 - Delta and export demands

Potential Benefits of NODOS

- **Water supply reliability** of existing contracts
- **Operational flexibility** in water management for agricultural, environmental, and municipal and industrial users
- **Increase survival of anadromous fish** populations in the Sacramento River, as well as survivability of other aquatic species
- **Hydropower generation** integrated with wind and solar generation
- **Improve water quality** in the Delta
- **Opportunities** for power generation, recreation, flood damage reduction



In-Delta Storage

- Convert Four Islands
 - 2 water storage islands
 - 2 habitat islands
- Fill storage islands during periods of high flow / higher water quality
- Release water for Delta export under variety of conditions
- Integrate operations with groundwater banks



Potential Benefits of In-Delta Storage

- Water supply reliability
- Operational flexibility
- Delta ecosystem restoration
- Water quality
- Emergency response
- Recreation



Los Vaqueros Reservoir Expansion

- Enlarge existing Los Vaqueros Reservoir
- Fill reservoir through screened diversion during periods of high Delta flows
- Deliver water during periods of lower Delta flows



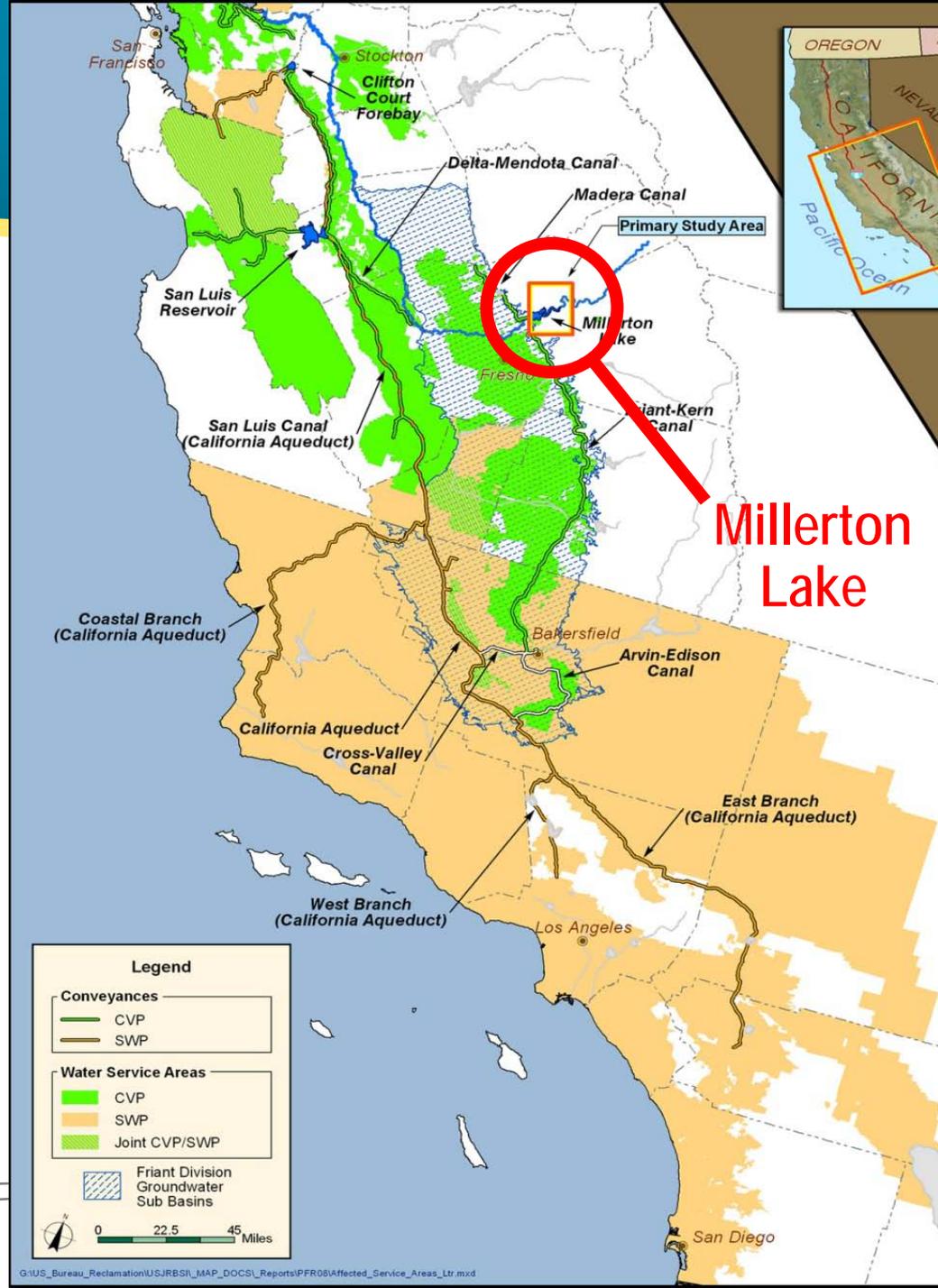
Potential Benefits of Expanding Los Vaqueros Reservoir

- Improve water supply reliability for Bay Area water users
- Increase flexibility for environmental water management
- Provide higher quality water supplies
- Emergency response



Upper San Joaquin River Basin Storage Investigation

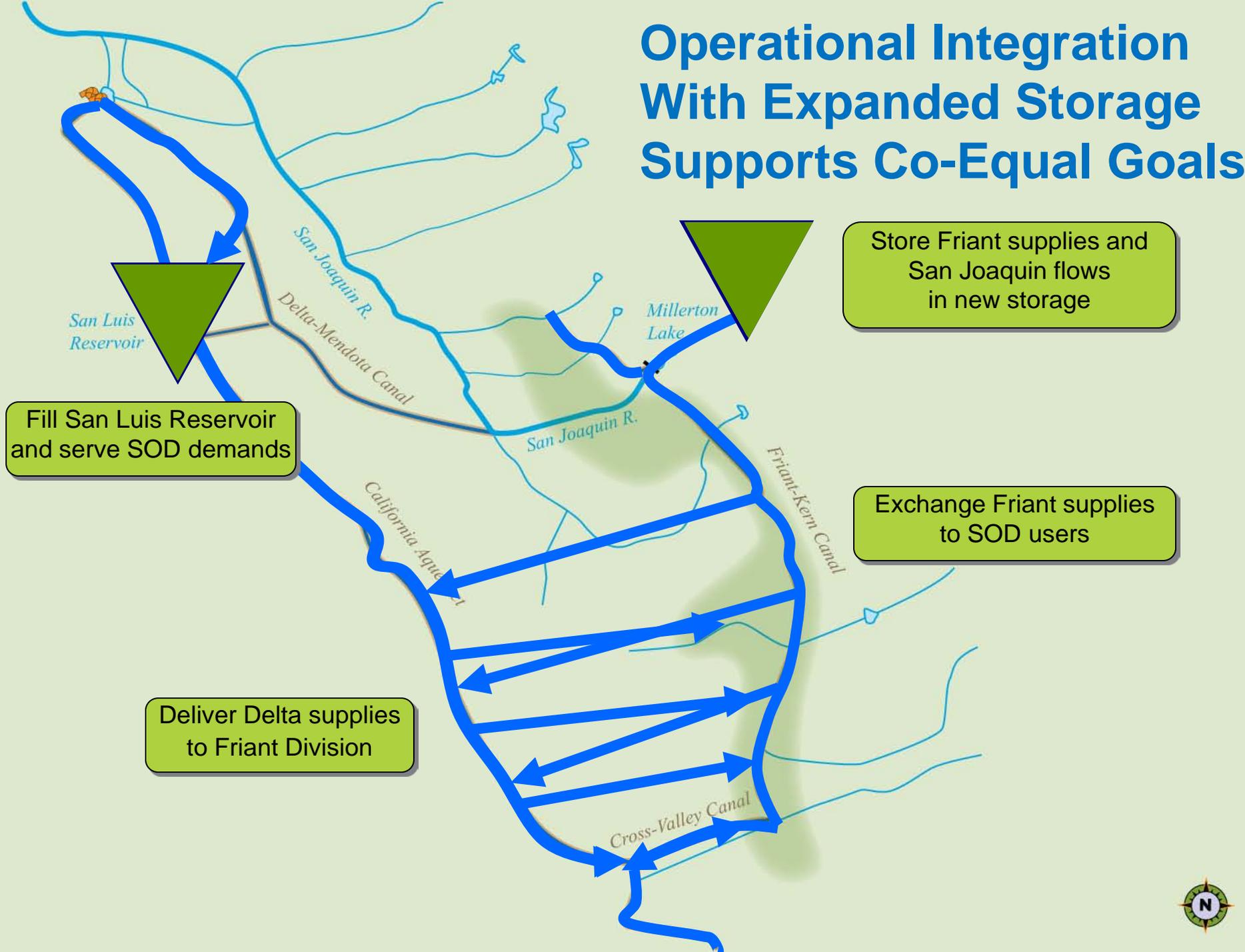
- New surface water storage to manage San Joaquin River supplies
- Current focus is Temperance Flat Reservoir, located in Millerton Lake
- Integrate with Delta and San Joaquin Valley water storage and conveyance operations



Millerton Lake Has Been Traditionally Operated Independent of the Larger State-Wide Systems



Operational Integration With Expanded Storage Supports Co-Equal Goals



Potential Benefits of Upper San Joaquin River Basin Storage

- **Increased water supply reliability, system operational flexibility, and emergency response**
 - Agricultural, municipal and industrial (M&I), and environmental purposes in the Friant Division, other San Joaquin Valley areas, and other regions
- **Enhanced water temperature, flow, and water quality conditions in the San Joaquin River**
 - In support of restoring and maintaining naturally reproducing and self-sustaining anadromous fish
- **Recreation, flood protection, power generation**

Questions To Be Considered in Developing New Storage for California

- **How do we quantify and value of public benefits?**
- **How do we value projects integration**
 - Projects are being considered individually, but provide system benefits
 - How do benefits combine for multiple projects?
- **What is the relationship of new storage to decisions on Delta restoration and conveyance?**

