

Today's Agenda:

Part 1 - Hydrogeologic Framework

9:30-10:30 Overview of Geologic Framework (Claudia Faunt, USGS)

- Geologic Units, Drillers Logs Database, Development of Texture Model

10:30-10:45 Break

10:45-11:15 Hydraulic Properties (Claudia Faunt)

11:15-11:30 Storage and Subsidence (Randy Hanson, USGS)

- Storage Properties and Delay, Critical Heads

11:30-12:00 Discussion

Part 2 - Surface Water and Climate

12:30-1:00 Surface Water and Flux from Adjacent Basins (Claudia Faunt)

- Inflows, Routed Network, Stream Properties, Diversions in Relation to Network, Gaged and Un-gaged Inflows from Surrounding Basins

1:00-2:00 Climate Data (Randy Hanson)

- Precipitation, Reference Evapotranspiration, Scripts/Tools, Climate

2:00-2:15 Break

2:15-? Website Overview (Claudia Faunt)

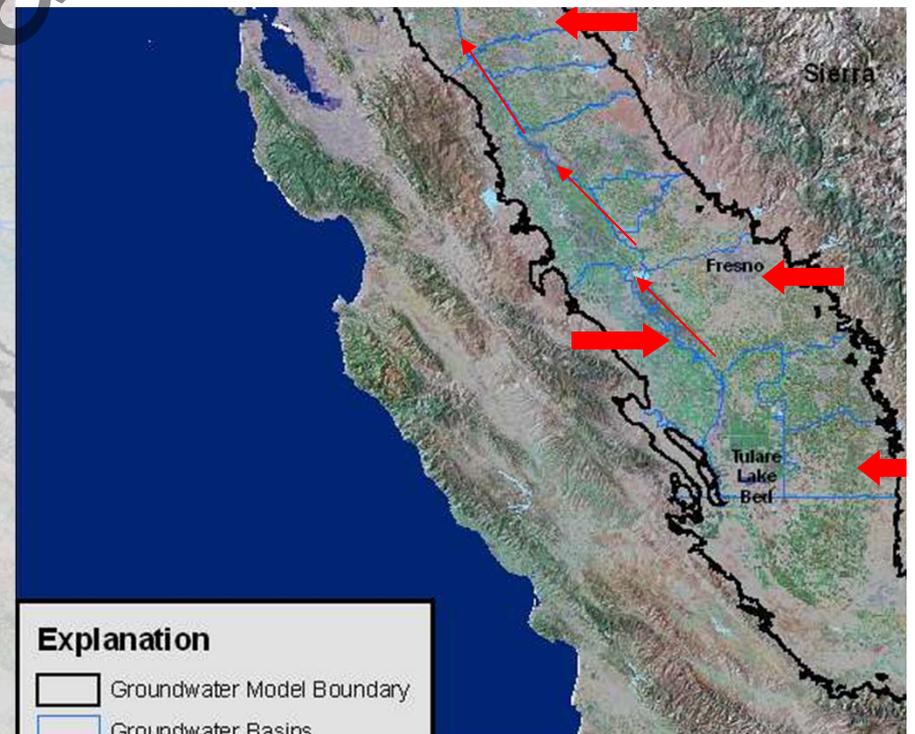
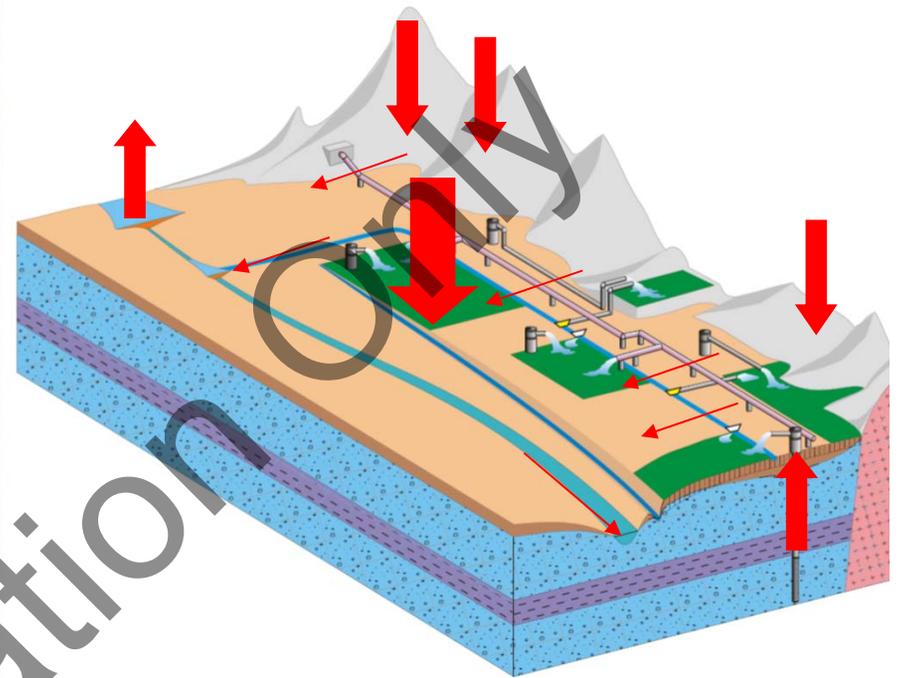
?-4:00 Discussion (including topics for next week)



System

Conceptualization: GROUNDWATER FLOW

- Directions
 - From edges toward the topographically low areas
 - Along trough toward the Delta
 - Under natural conditions, water table roughly paralleled the land surface (Tulare internally drained)
- INFLOW
 - Precipitation (generally lost to ET on valley floor)
 - Streamflow
 - Underflow from adjacent basins
 - Irrigation (Post-development irrigation return flow is 83% of recharge)
- OUTFLOW
 - Streamflow (Delta)
 - Evapotranspiration
 - Pumping
 - Loss of storage



System Conceptualization:

■ DEVELOPMENT AND IRRIGATED AGRICULTURE

- Major effects on **volume** and **distribution** of ground-water **recharge** and **discharge**

■ PRE-DEVELOPMENT

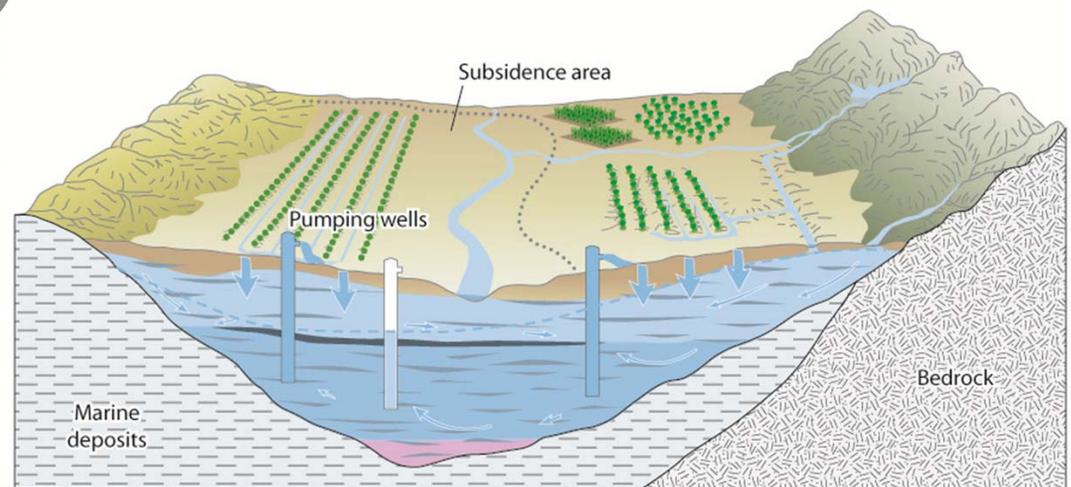
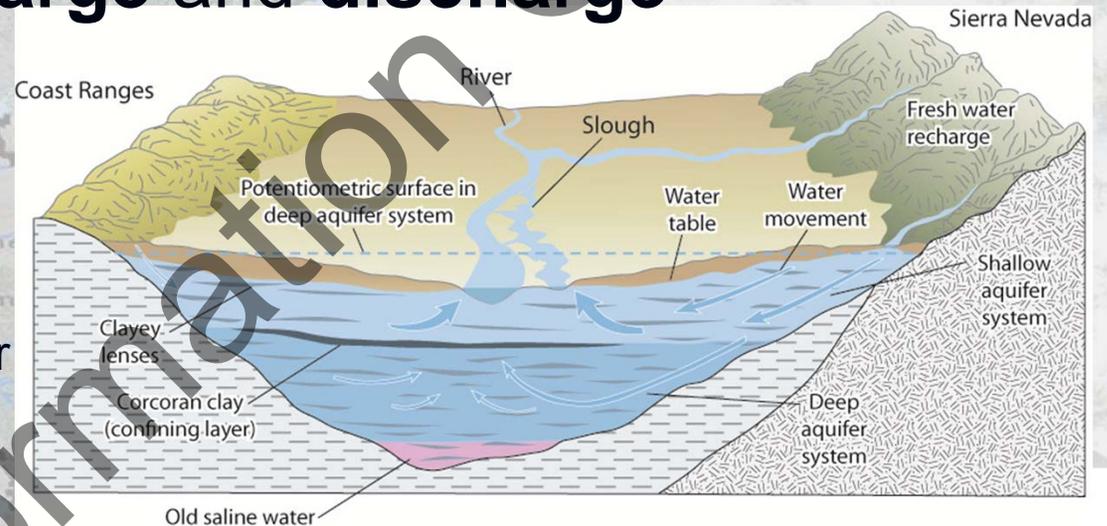
- Recharge and discharge approx. 2 million acre-ft/yr

■ DEVELOPMENT

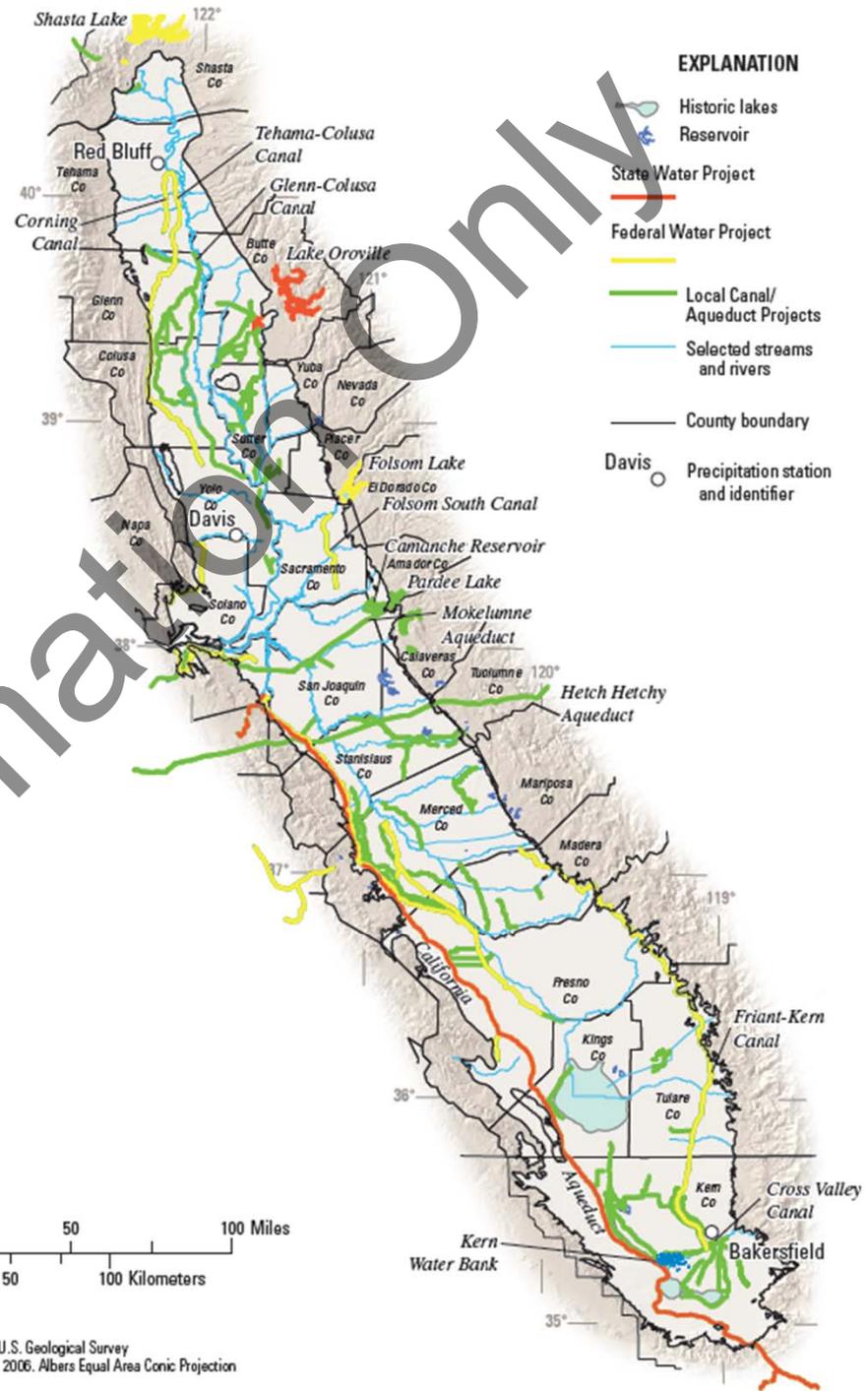
- Began in about 1850
- Most hydrologic data after major hydrologic changes

■ POST-DEVELOPMENT

- Engineered system
 - Canal network
 - Reservoirs control inflows
- Discharge increased to 12 million acre-ft/yr
- Recharge increased to 11 million acre-ft/yr

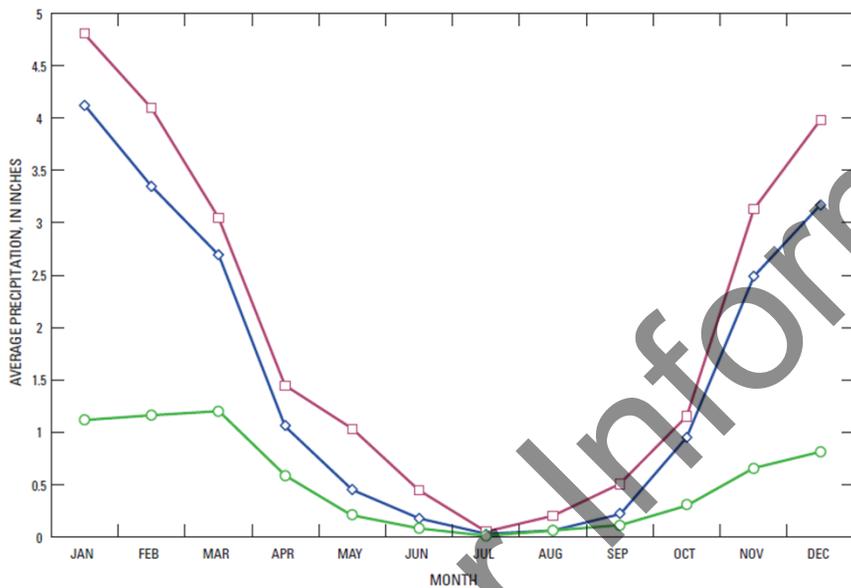


General features of the surface-water system in the Central Valley, California

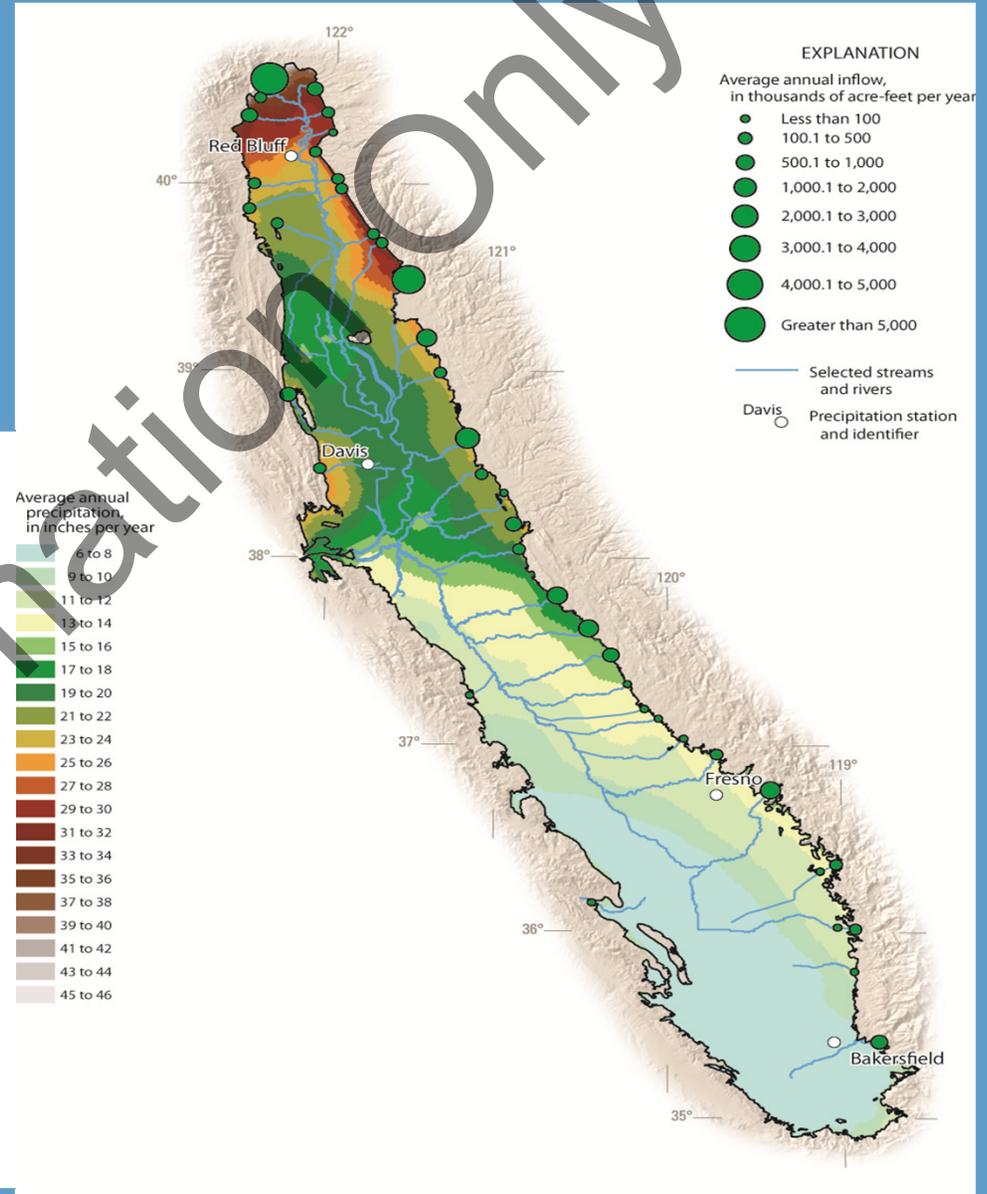


Climate: Precipitation and Inflows

- Vary Geographically
- Vary with Time
 - Annually
 - Seasonally

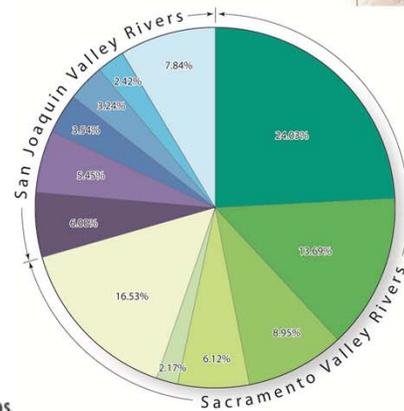
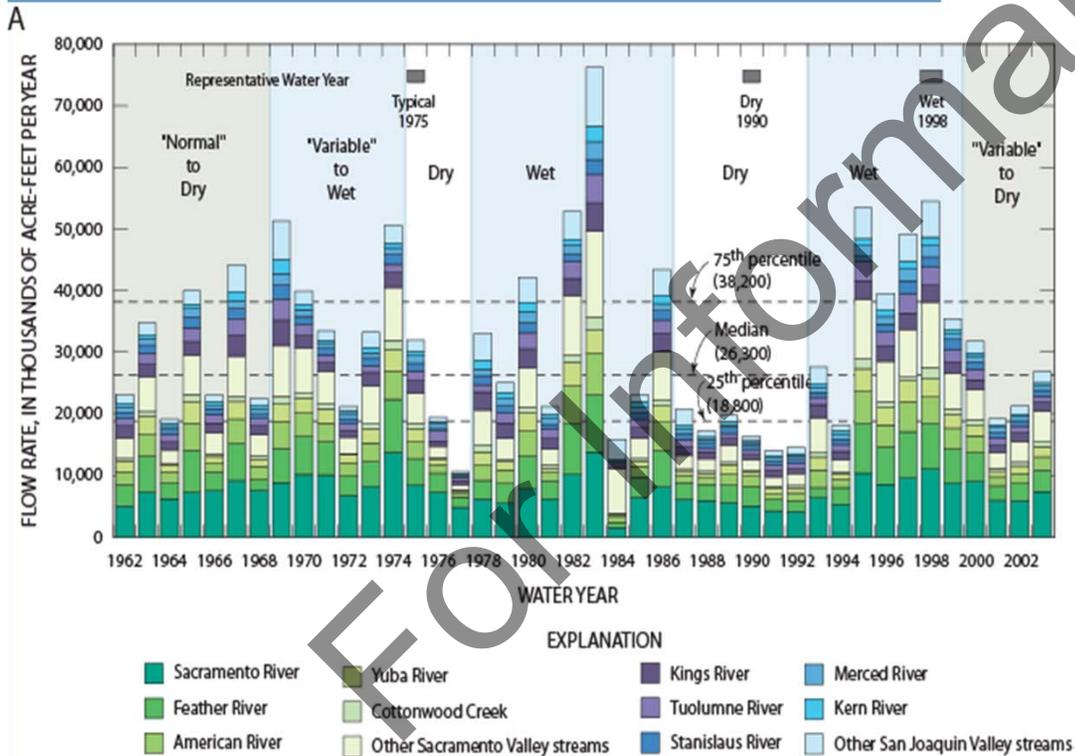
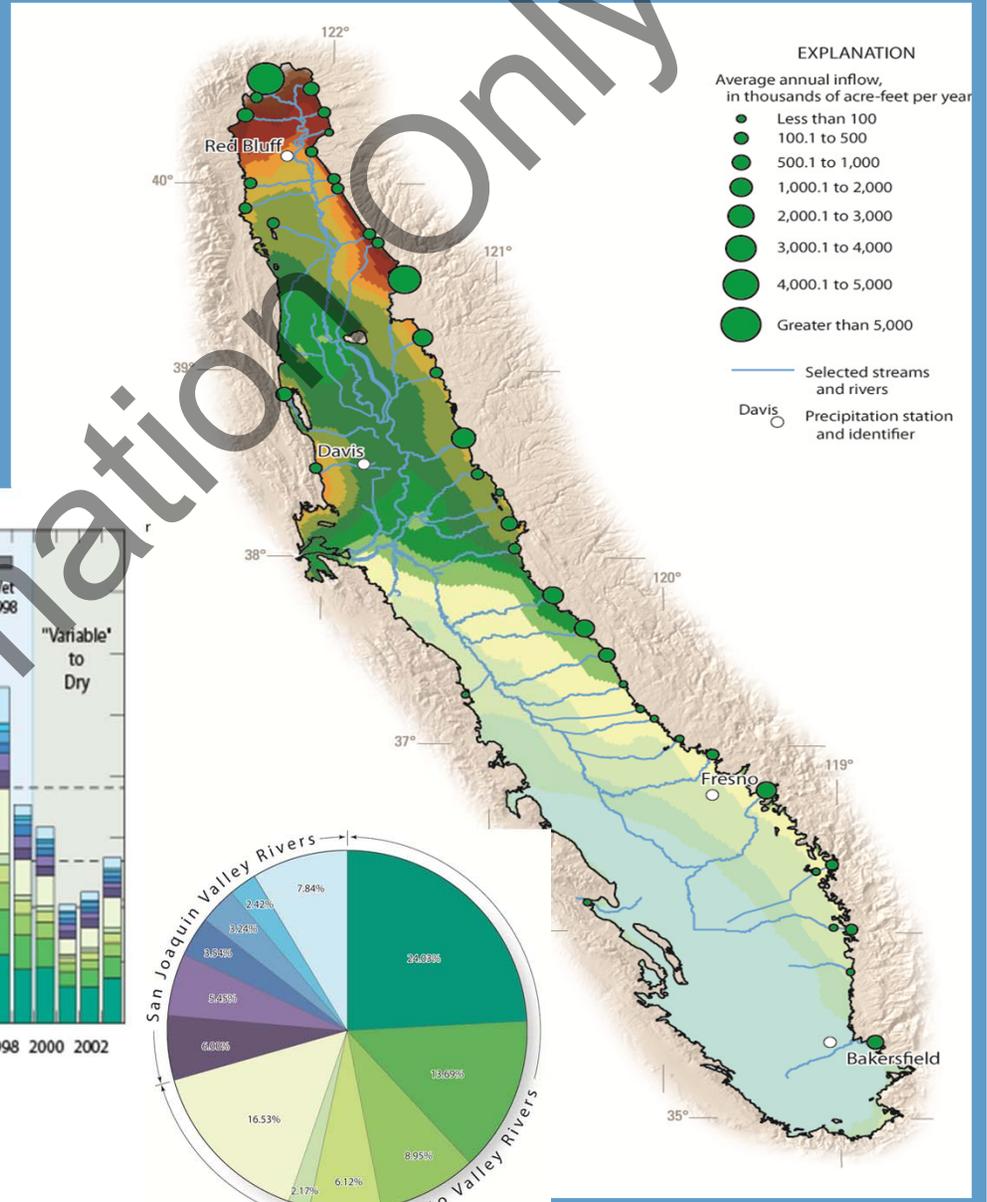


EXPLANATION
 Monthly average precipitation (1961 to 2003) at—
 ■ Red Bluff
 ◆ Davis
 ○ Bakersfield



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B

Stream and Canal Network

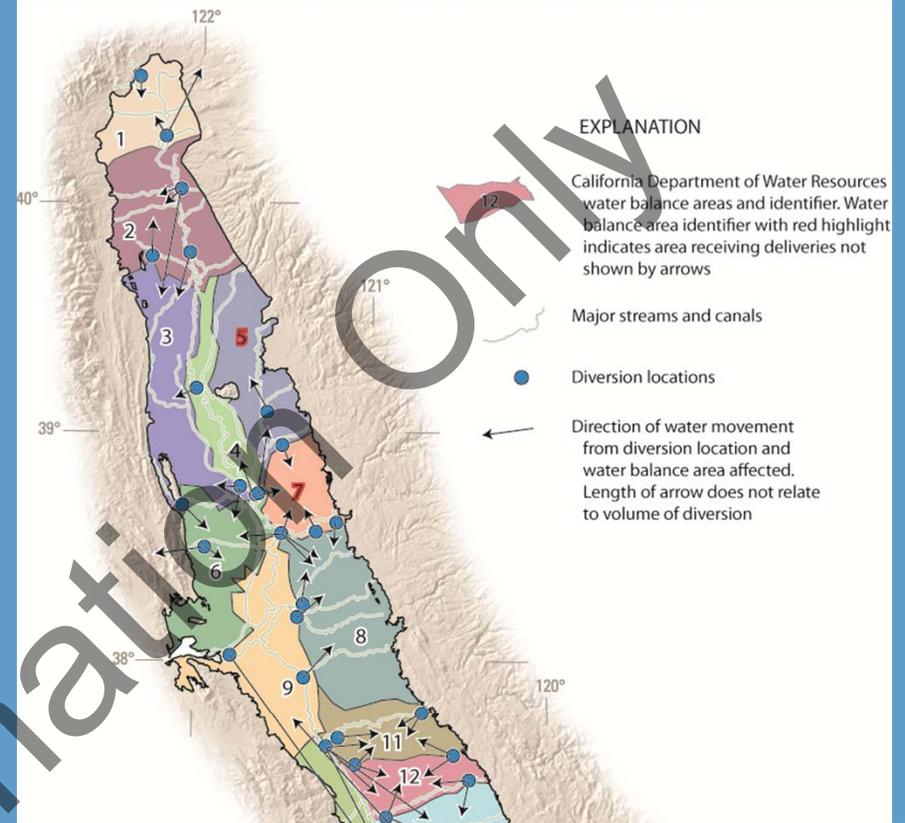
■ Inflows (43)

■ Source:

- DWR – 40 sites (many USGS measurements)
- USGS – 3 sites

■ Diversions (66) – Deliveries

- Source: DWR
- 64 to farm process
- 2 diverted outside of model
- Supply constrained demand



| No. | Name | Stream Node number | USGS Site Id | period of record |
|-----|--------------------------|--------------------|--------------|------------------|
| 1 | Sacramento R A Keswick | 205 | 11370500 | 1938-2009 |
| 2 | Cow C NR Millville | 211 | 11374000 | 1949-2009 |
| 3 | Battle C BL Coleman FH | 220 | 11376550 | 1961-2009 |
| 4 | Cottonwood Creek | 218 | 11376000 | 1940-2009 |
| 7 | Mill Creek | 243 | 11381500 | 1928-2009 |
| 8 | Elder Creek | 237 | 11379500 | 1948-2009 |
| 9 | Thomes Creek | 248 | 11382000 | 1920-96 |
| 19 | Putah Creek | 400 | 11454000 | 1930-2009 |
| 22 | Mokelumne River | 173 | 11323500 | 1904-2008 |
| 26 | Oristimba Creek | 128 | 11274500 | 1932-2009 |
| 32 | San Joaquin River | 54 | 11251000 | 1907-2009 |
| 41 | Los Gatos C AB Nunez Cyn | 0 | 11224500 | 1945-2009 |
| 42 | White R NR Ducor CA | 0 | 11199500 | 1942-2005 |
| 43 | Clear C NR Igo CA | 0 | 11372000 | 1940-2009 |

Stream and Canal Network



■ Inflows (43)

■ Source:

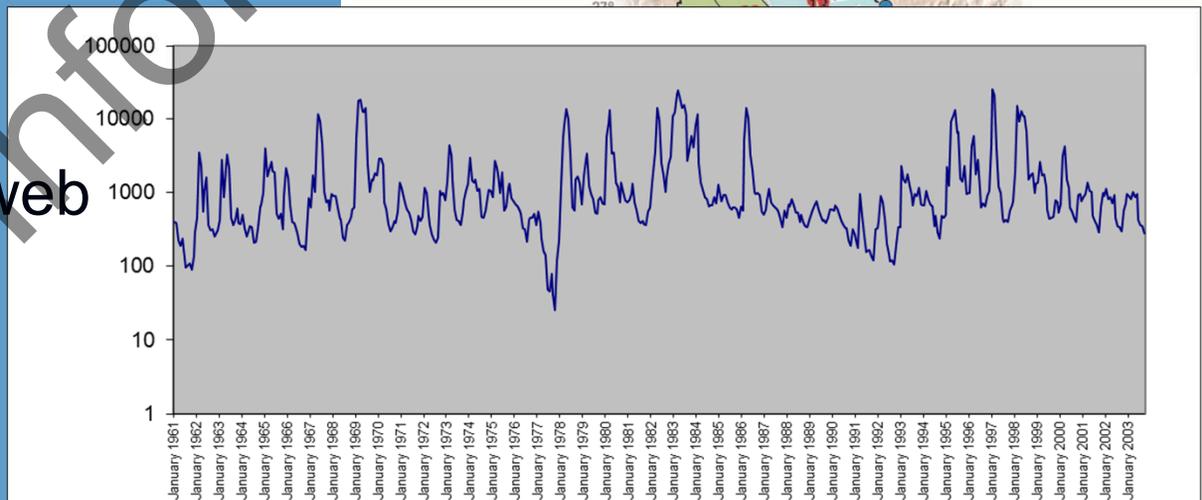
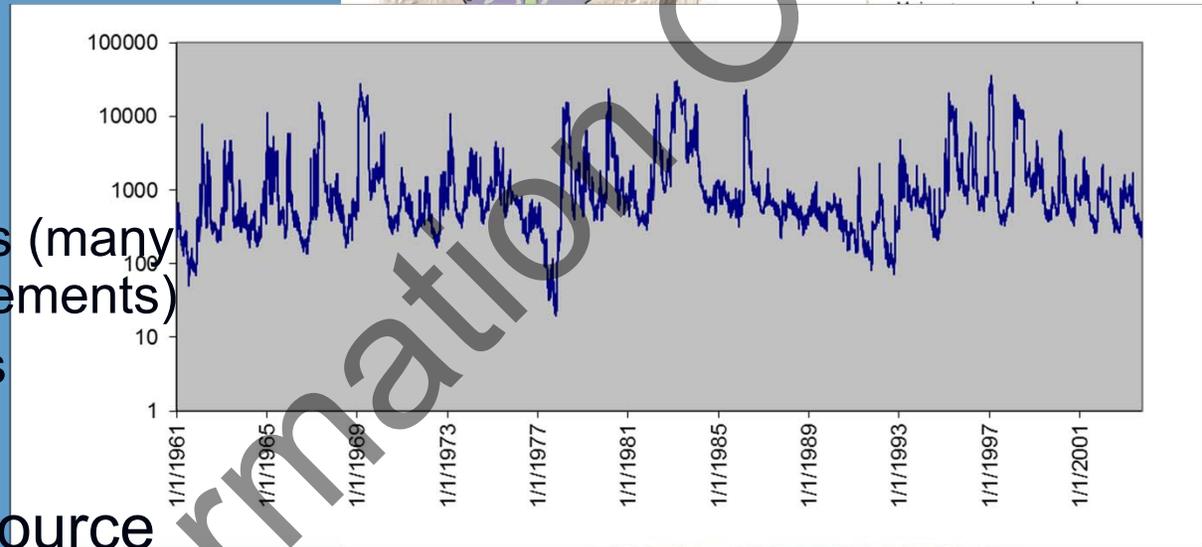
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Website

shapefile with source for each inflow

Hydrograph

links to USGS web



11274000 SAN JOAQUIN R NR NEWMAN

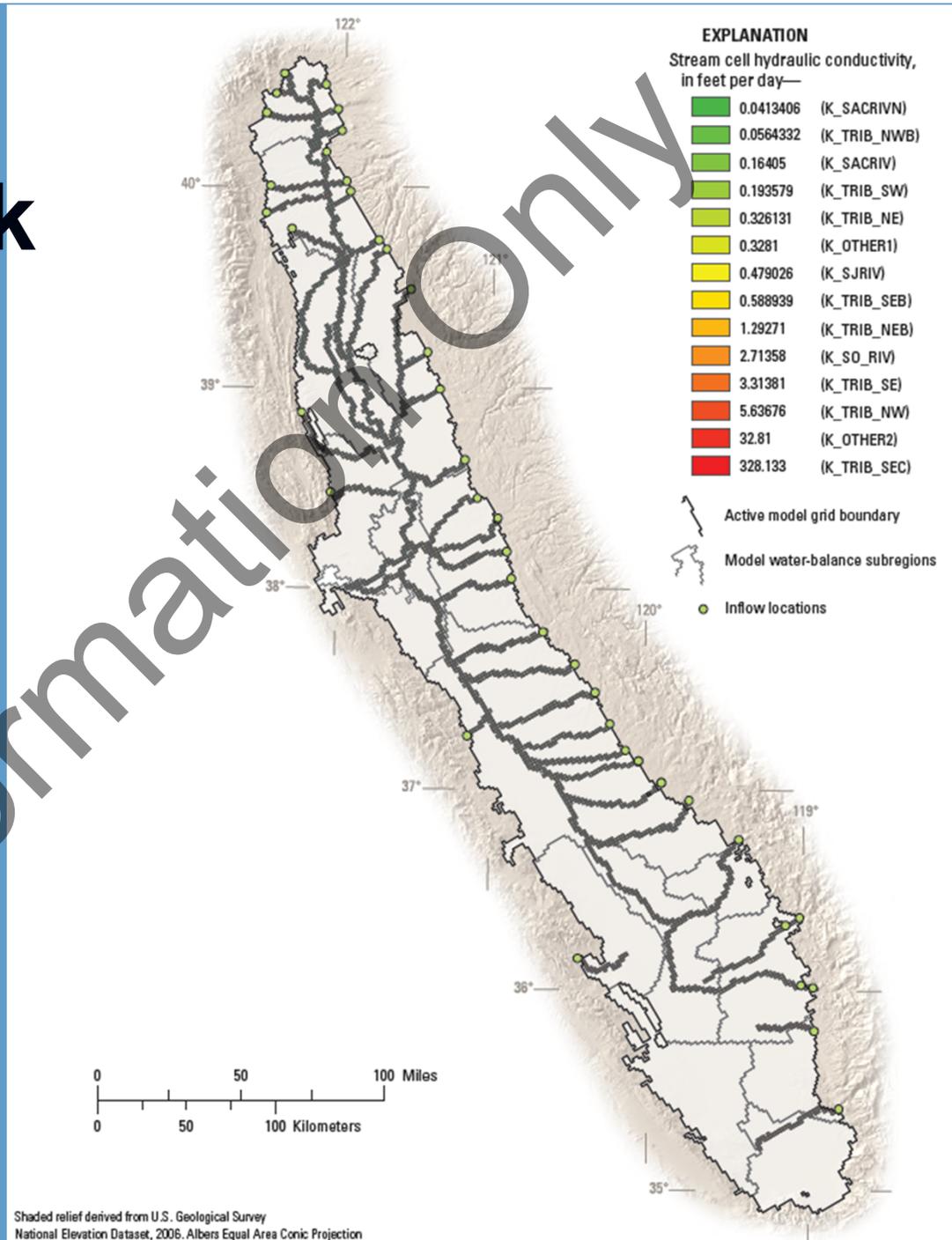
37.350493

-120.977150

Stream and Canal Network

■ Stream Channel

- Rating Tables
- Channel Geometry
- Roughness (Manning's n)



Stream and Canal Network

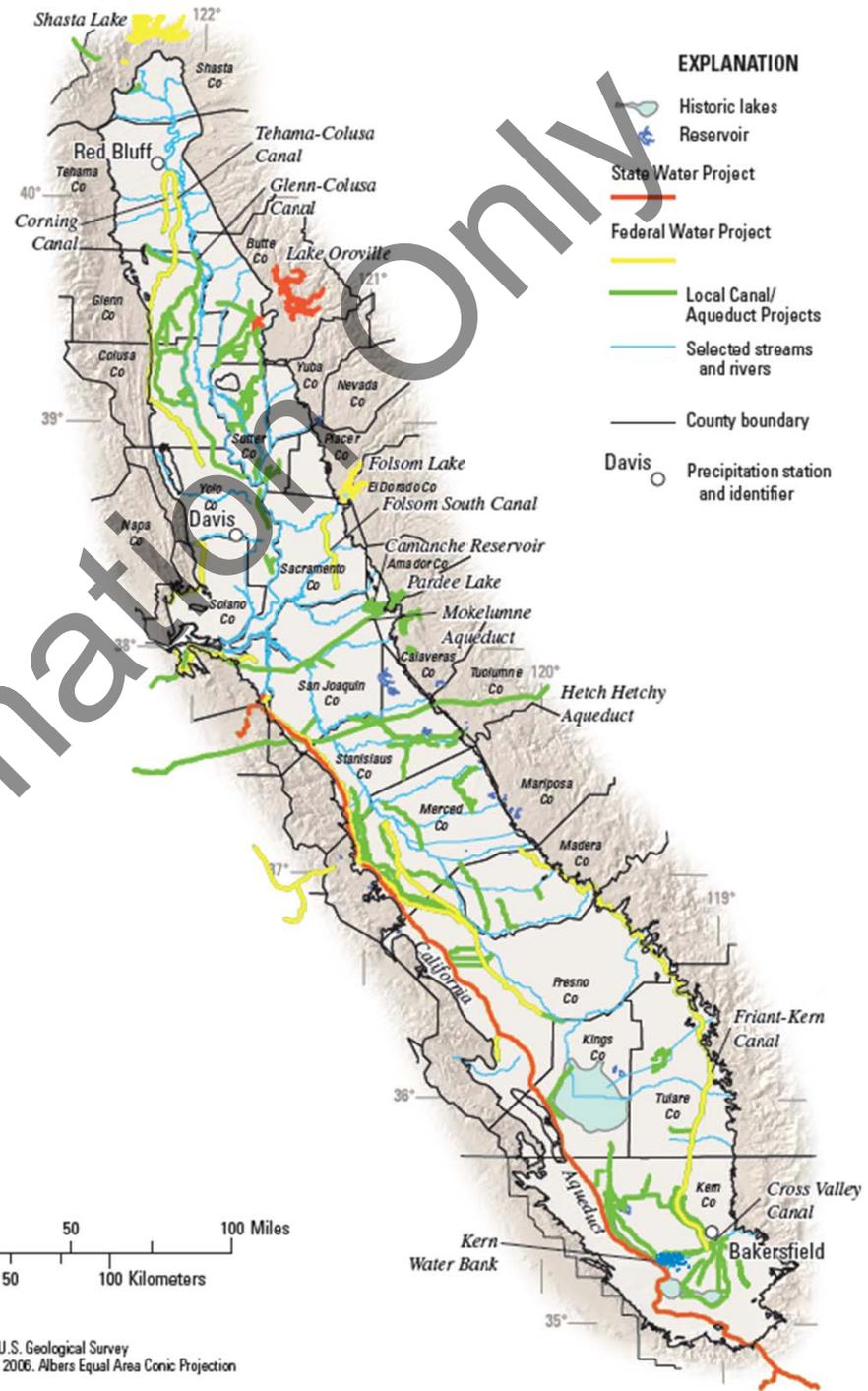
■ Gaining and Losing

- Mullen and Nady (1985)
- Others

■ Natural

■ Canals

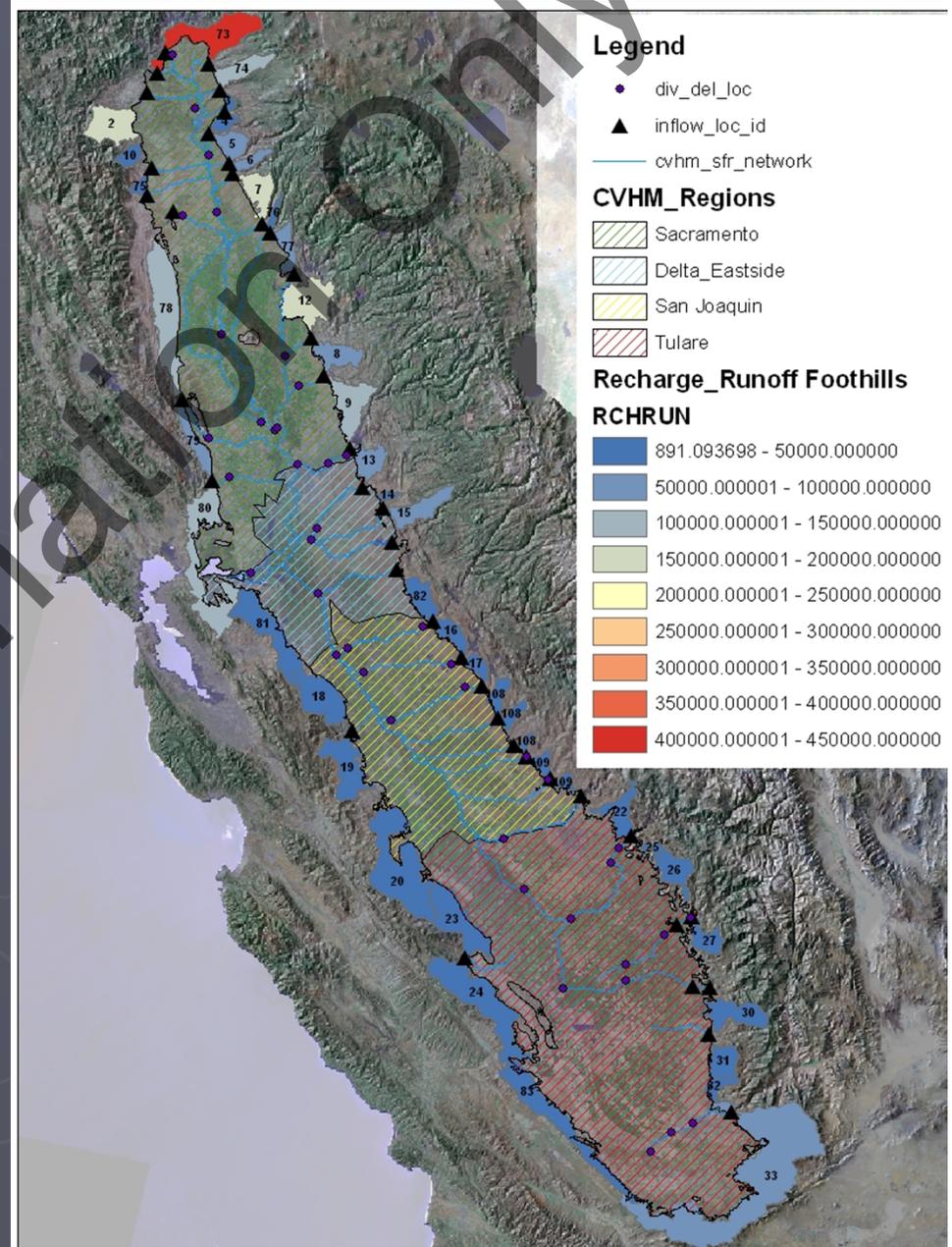
- lined
- unlined



Recharge from ungaged watersheds

- ▶ Based on Basin Characteristic Model (Flint and Flint, 2009)
 - 2.6 MAF/yr (28.9 MAF/yr gaged)

| REGION | FREQUENCY | FLOW (AF/yr) |
|----------------|-----------|--------------|
| Delta_Eastside | 4 | 181,307 |
| Sacramento | 19 | 2,027,001 |
| San Joaquin | 6 | 111,987 |
| Tulare | 12 | 277,608 |



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3:00-3:30 Website Overview (Claudia Faunt)

3:30-4:00 Discussion



Prototype Website:

<http://staging-ca.water.usgs.gov/projects/cvhm/index.html>

USGS Water Studies in California's Central Valley - Windows Internet Explorer

http://staging-ca.water.usgs.gov/projects/cvhm/index.html

USGS science for a changing world

California Water Science Center

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Central Valley Home Hydrologic Model Model Datasets Techniques Contacts

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CENTRAL VALLEY FACTS

- More than 250 different crops are grown in the Central Valley with an estimated value of \$17 billion per year
- Approximately 75% of the irrigated land in California and 17% of the Nation's irrigated land is in the Central Valley
- Using fewer than 1% of U.S. farmland, the Central Valley supplies 8% of U.S. agricultural output (by value) and produces 1/4 of the Nation's food, including 40% of the

California's Central Valley

The Central Valley covers about 20,000 square miles and is one of the most productive agricultural regions in the world. For this reason, groundwater supplies in the area are of utmost concern. The USGS is engaged in many research projects throughout the Central Valley.

Featured Projects

- Central Valley Groundwater Availability Study
- Documentation and Release of Digital Data Sets Supporting the Central Valley Hydrologic Model
- Delta-Mendota Canal: Evaluation of Groundwater Conditions and Land Subsidence
- California Aqueduct: Evaluation of Groundwater Conditions and Land Subsidence
- Hydrogeologic Characterization of the Modesto Area Groundwater Basin and Evaluation of Water Resource Management Alternatives
- San Joaquin River Restoration

Local intranet | Protected Mode: Off

