

California **Water Plan** Highlights

INTEGRATED WATER MANAGEMENT



Update 2009 • Department of Water Resources

Overview Water Storage in California

Science of Storing Water
Assembly Hearing
March 20, 2013

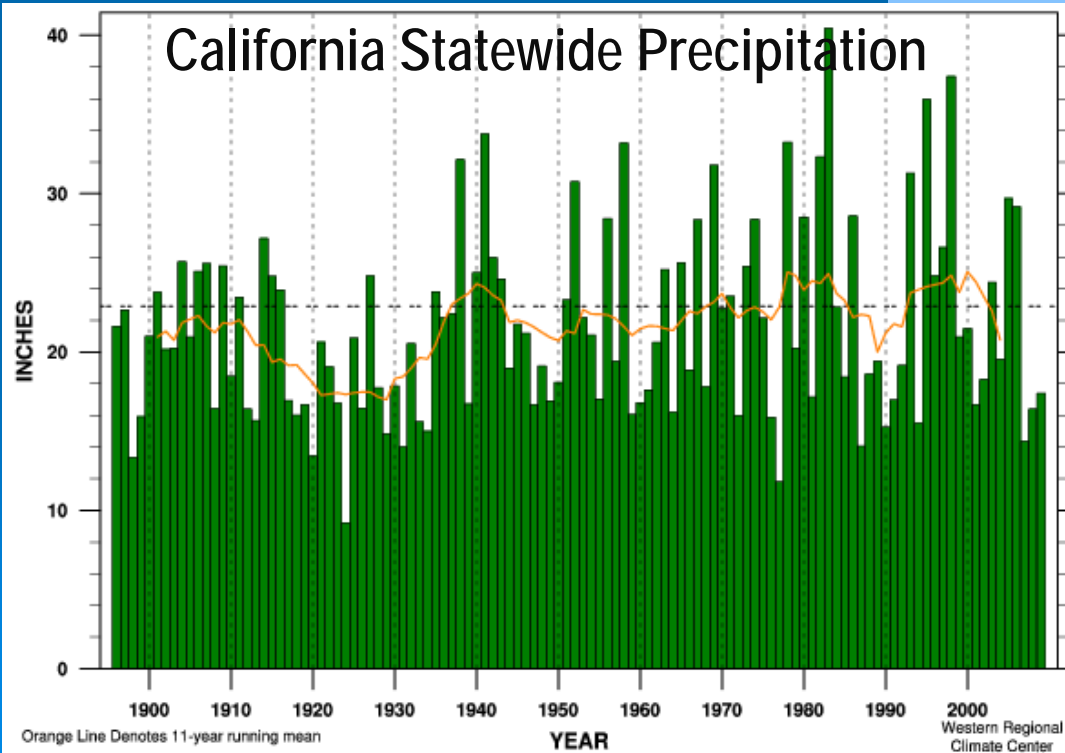
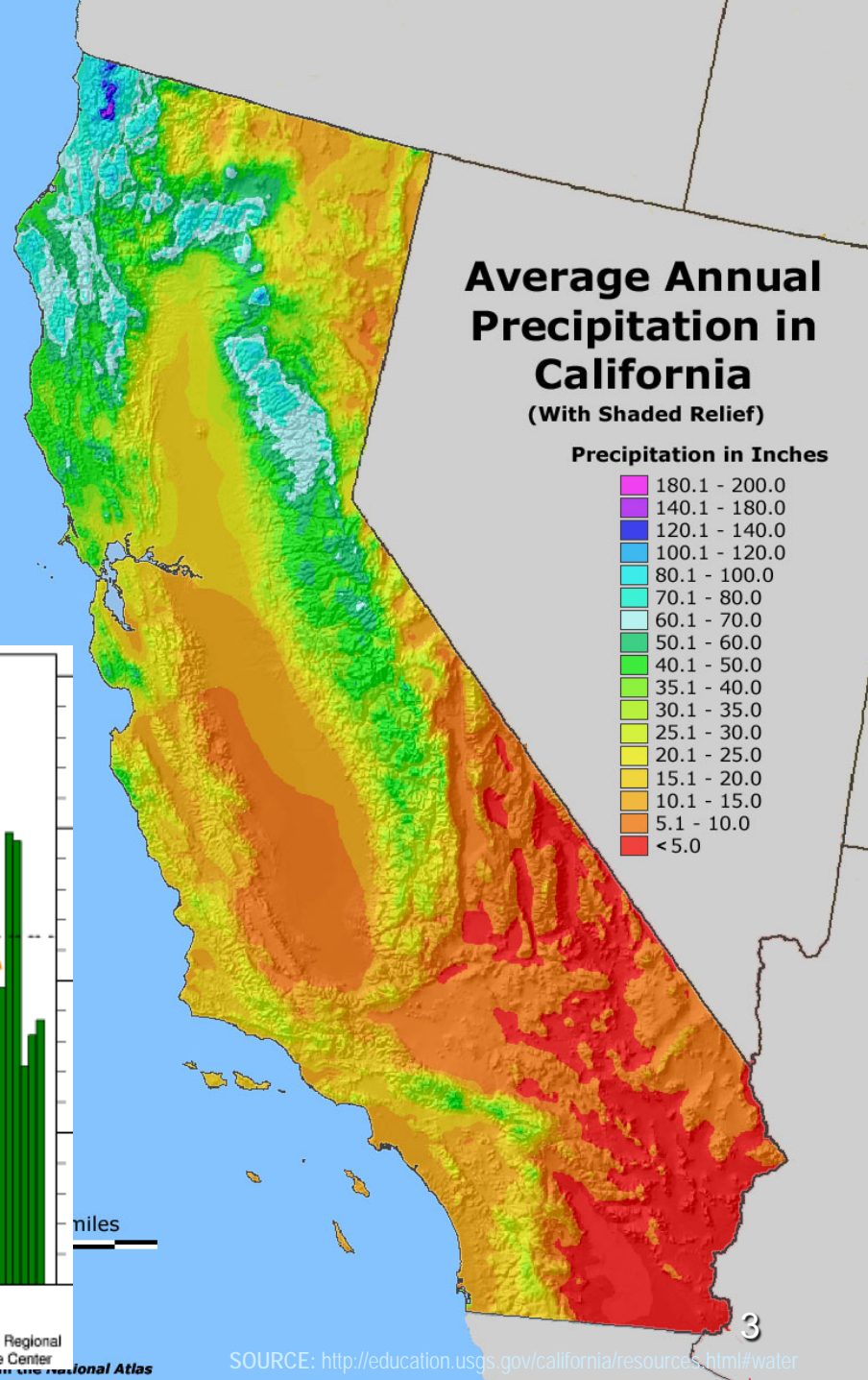
California has
10 Hydrologic Regions
with great diversity



California Precipitation

Variable & Extreme
Over Time & Location

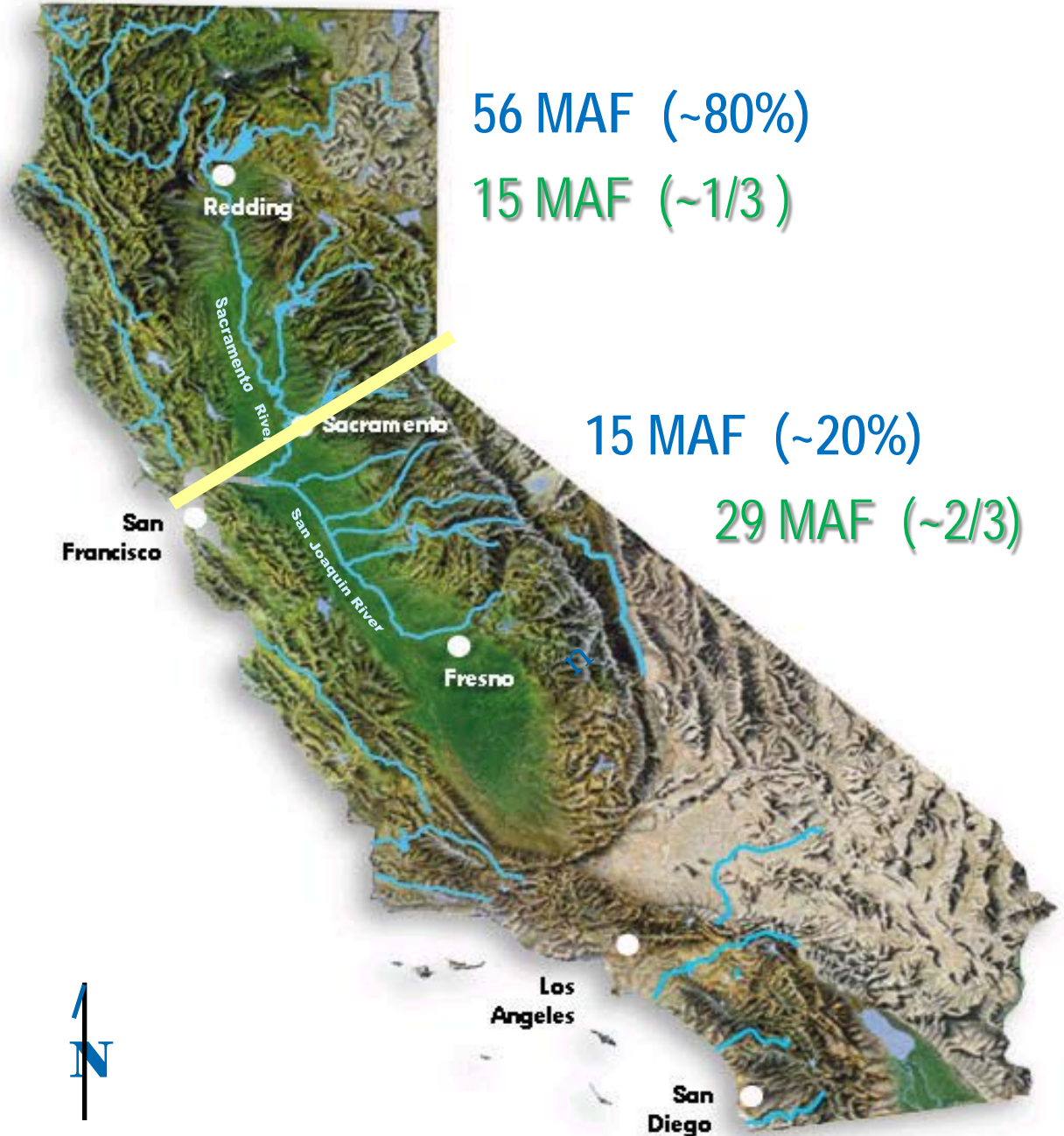
Most precipitation occurs
November - March



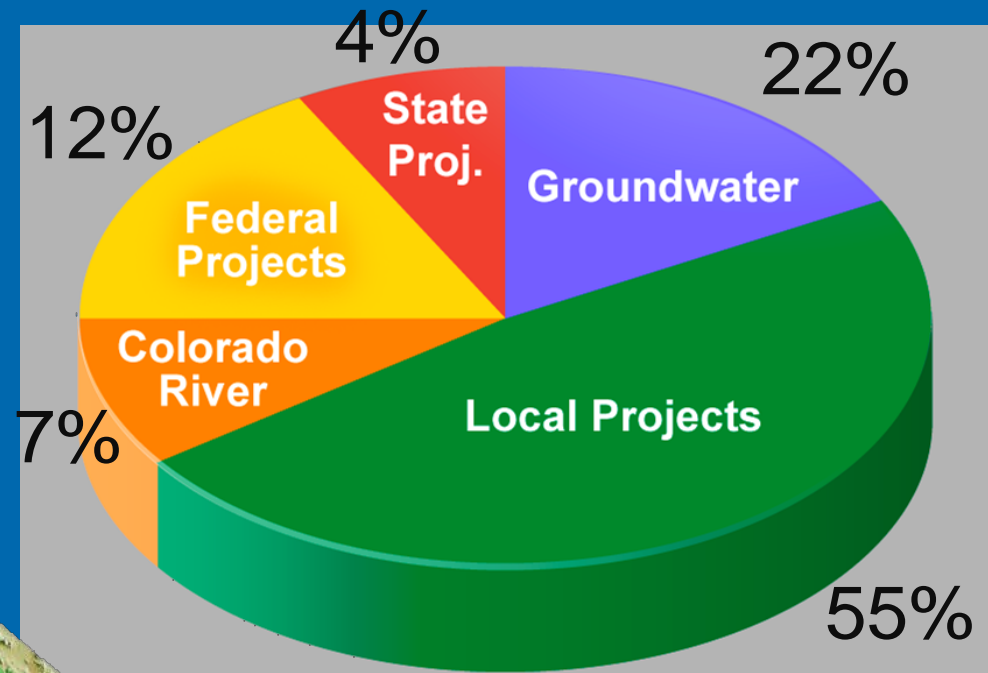
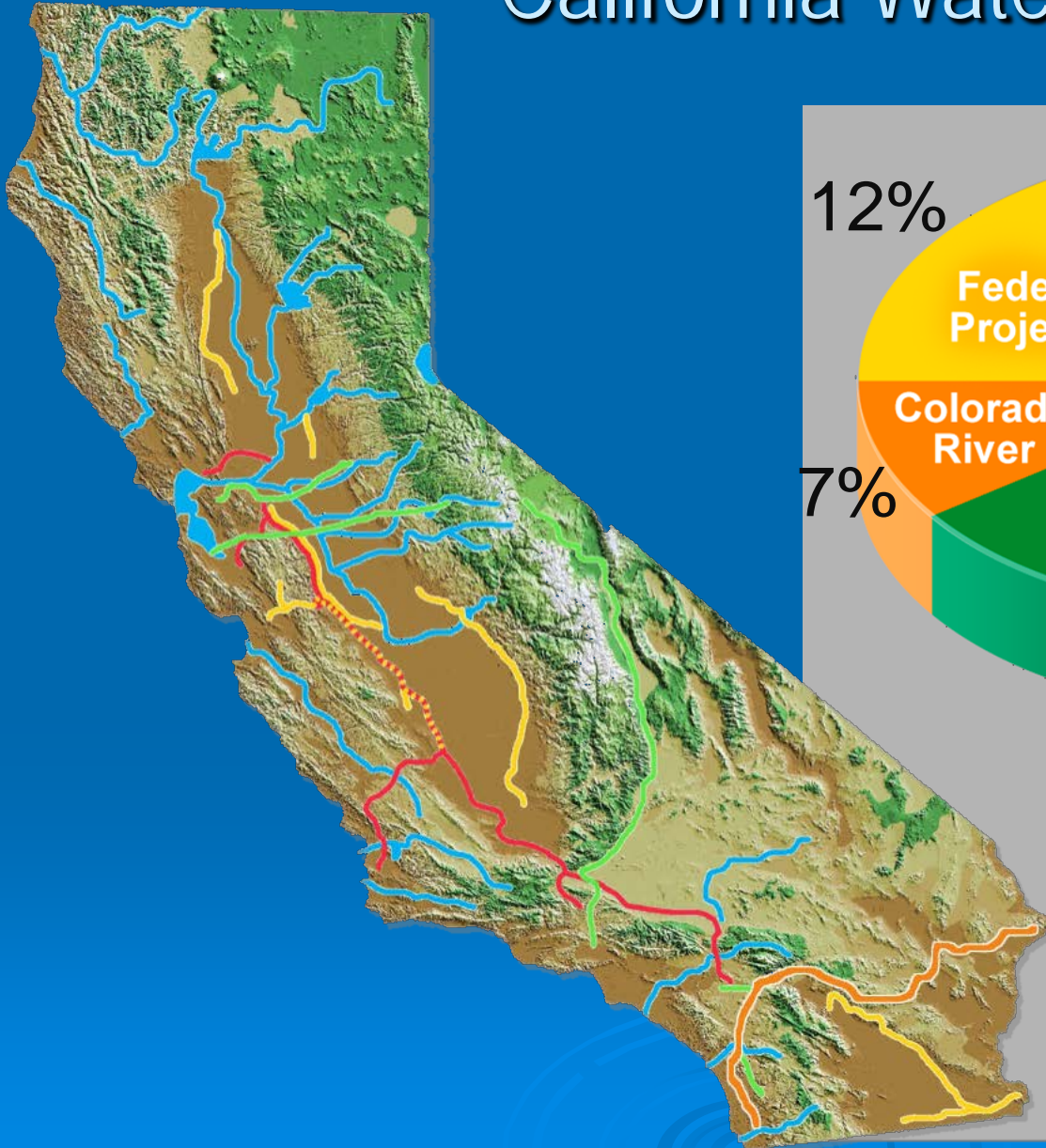
California's Major River Systems

Distribution of Average Runoff

Distribution of Water Use



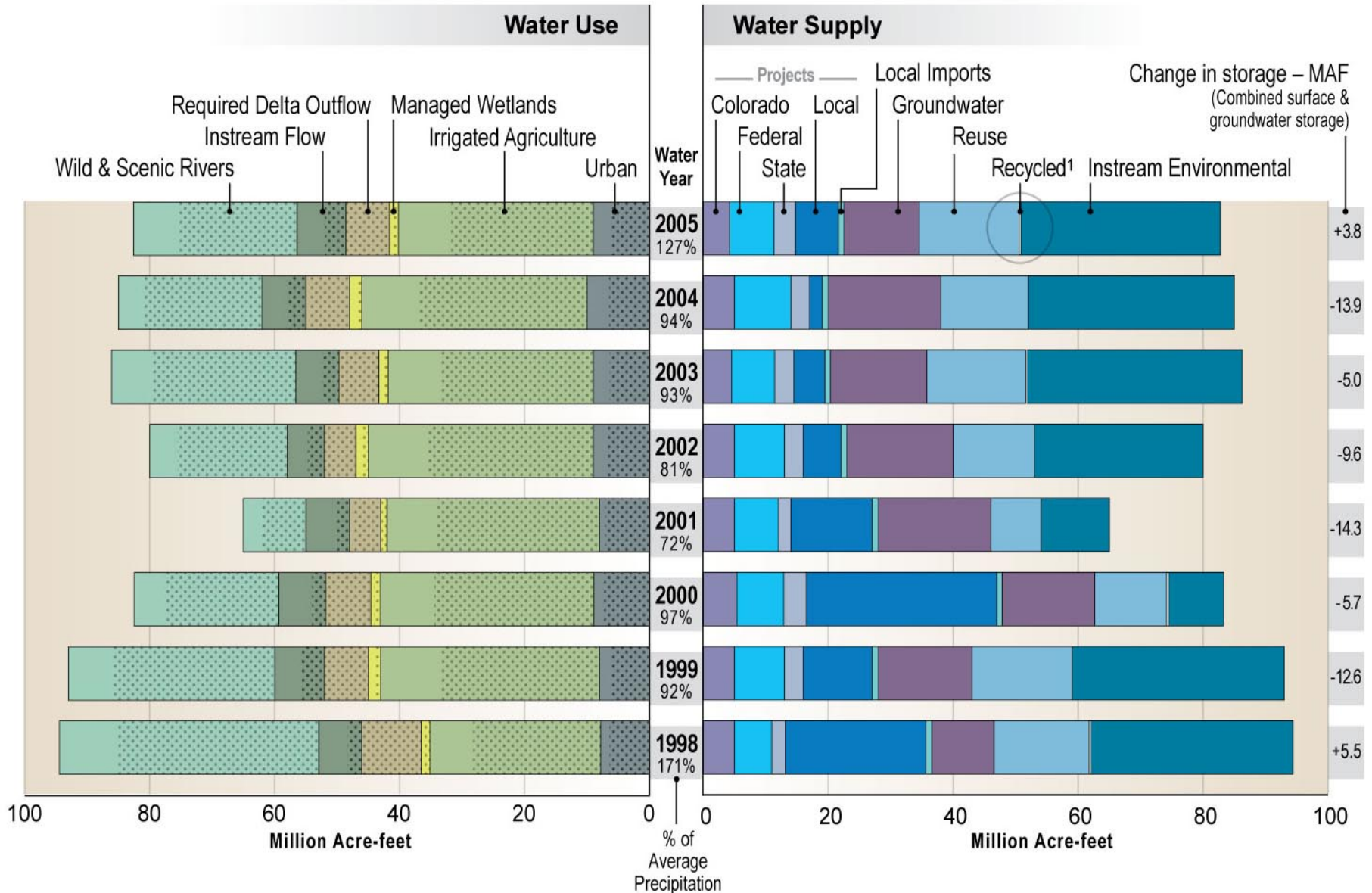
California Water Supply Systems



	Local	--	38.3 maf
	Colorado	--	4.8 maf
	Federal	--	8.1 maf
	State	--	2.9 maf
	Groundwater	--	15.0 maf

California's Water Resources: Variable & Extreme

Butterfly Chart for WY 1998 - 2005

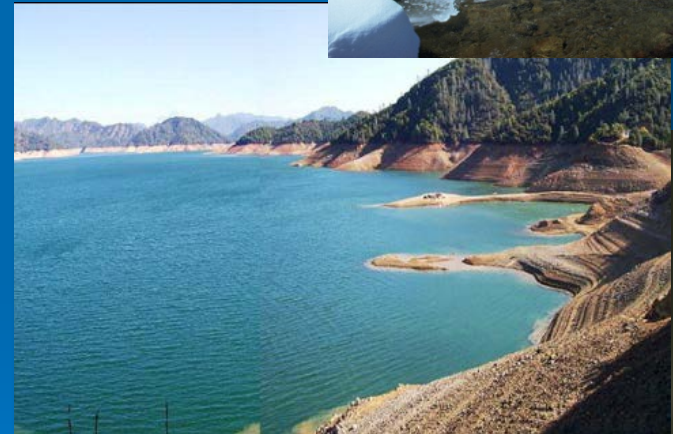


California's Storage Reservoirs

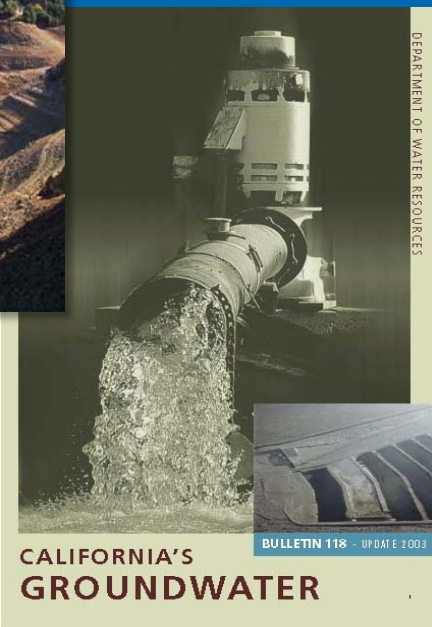
➤ Snow Pack



➤ Surface Storage



➤ Groundwater Basins



➤ Soil Water Retention

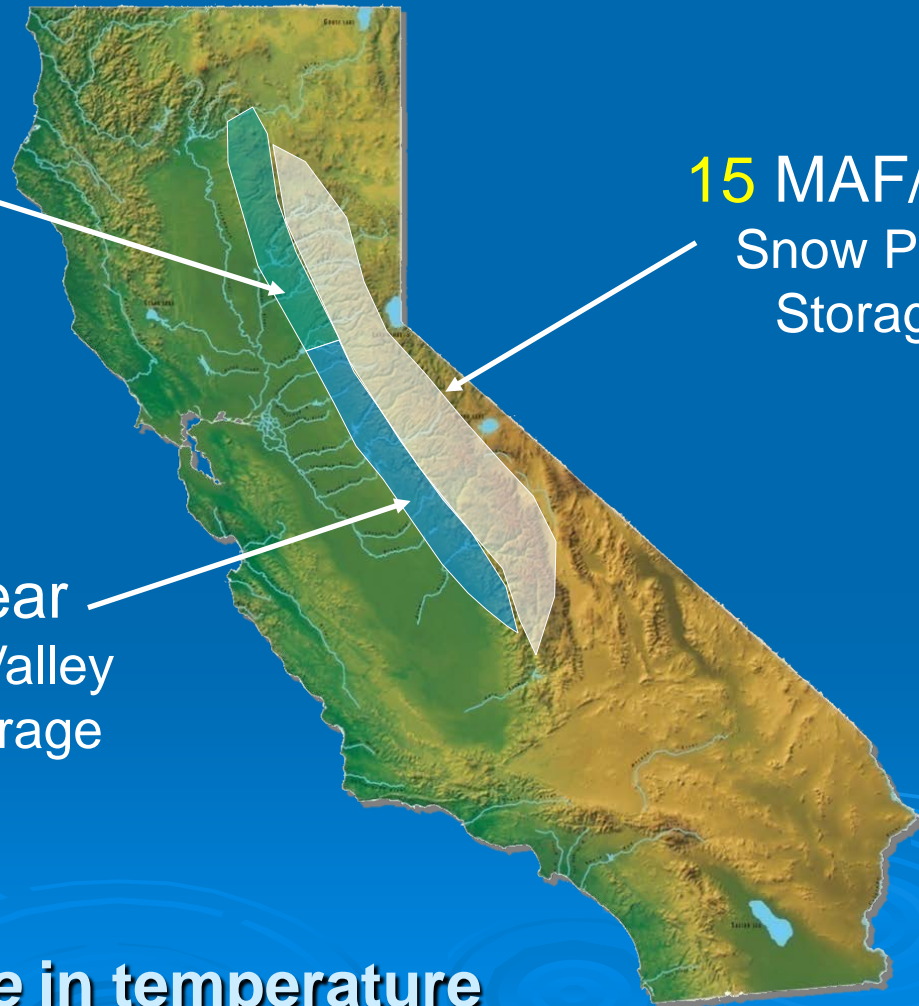
Snow Pack

California's Largest Surface Reservoir

13.5 MAF/year
Sacramento Valley
Reservoir Storage

15 MAF/year
Snow Pack
Storage

11 MAF/year
San Joaquin Valley
Reservoir Storage

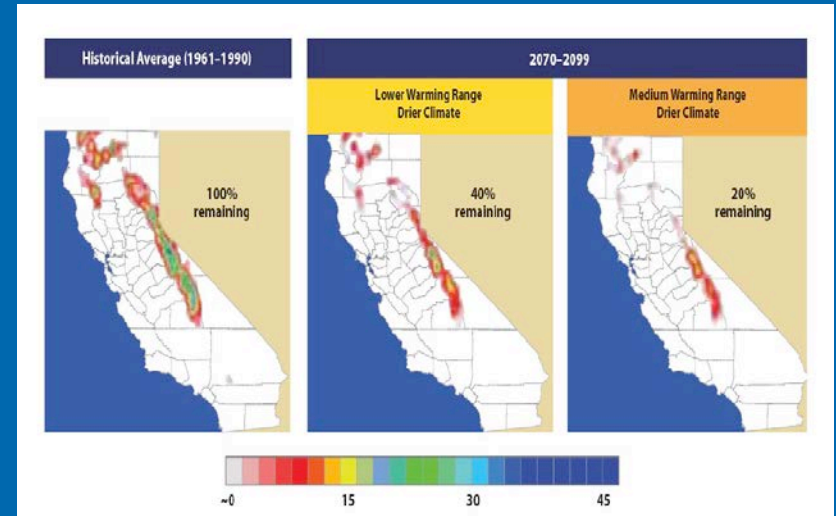


5° F increase in temperature
>>> 4 to 5 MAF decrease in Sierra snow pack

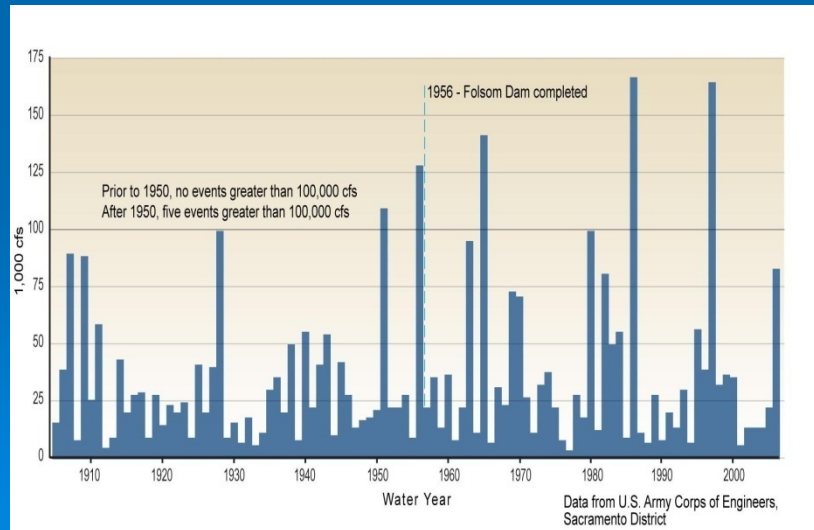
Climate Change: Future Hydrology Unlike the Past



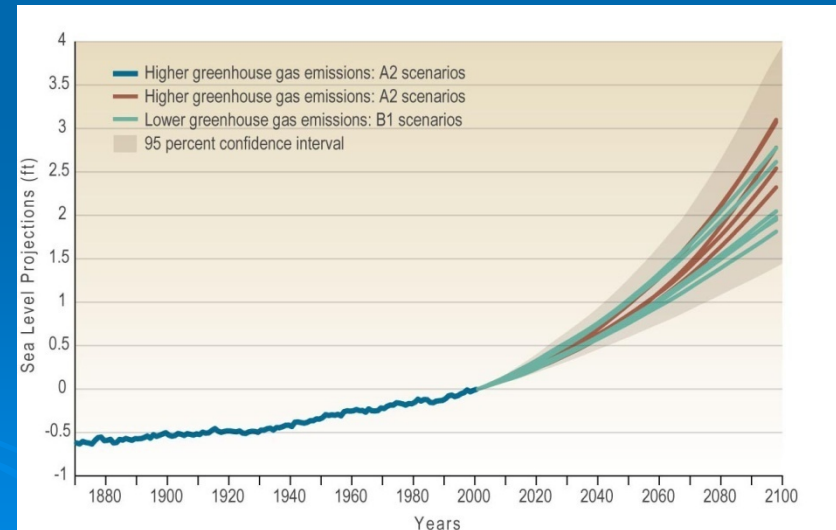
Higher air & water temperature



Early snowmelt & less snowpack



Changing runoff pattern



Rising sea level

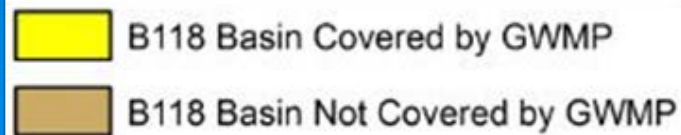
Groundwater Basins & Management

➤ 515 Basins & Subbasins

- 61,900 square miles
- In 57 of 58 counties
- ~40% of California

➤ GW Management

- Local/agency authority (Water Code, Ordinance, Adjudication)
- 118 Management Plans
- Cover ~25,900 sq. miles
- ~42% of GW Basin area



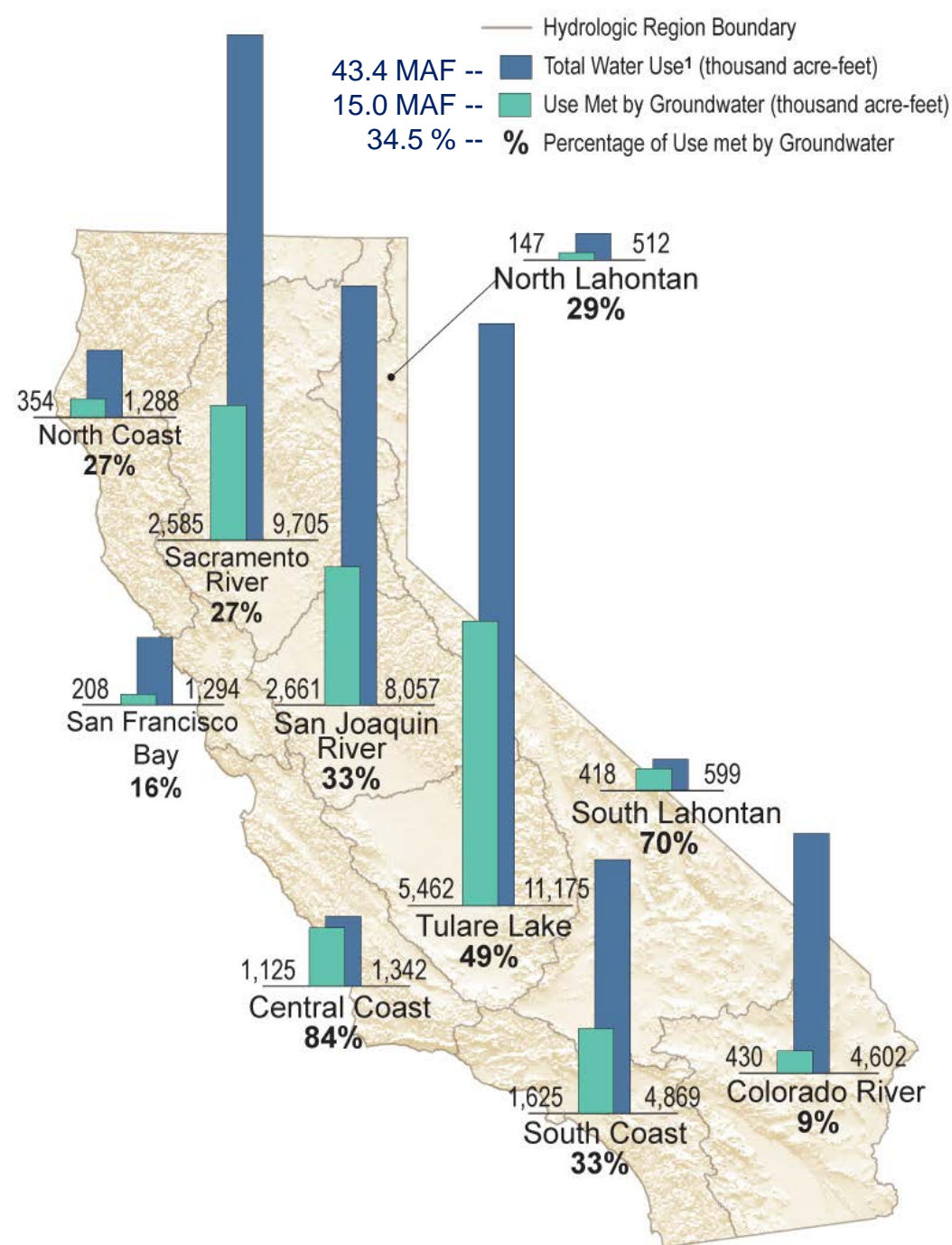
DRAFT



Regional Average Annual Groundwater Use

(1998-2005 data)

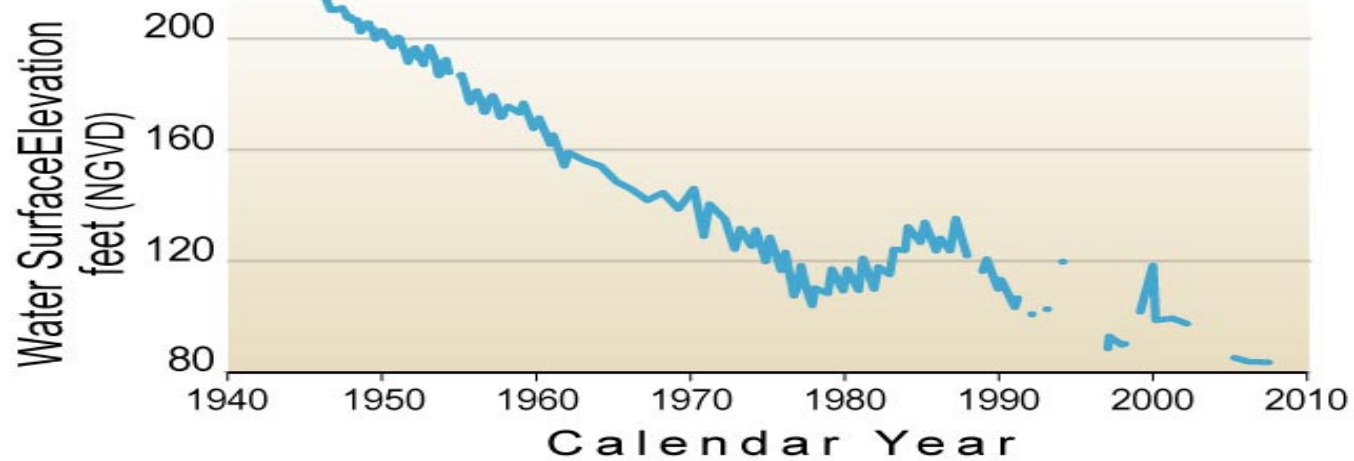
- ~15 million acre-feet pumped/yr
- Meets ~1/3 of water uses on avg & higher proportion in dry years
- Regional reliance varies greatly
- Some cities, coastal basins & rural areas depend entirely GW
- Overdraft @ 1 - 2 million AF/yr



1. Total Water Use is defined as the sum of water uses for agricultural, urban, and managed wetlands.

Groundwater Overdraft & Recovery

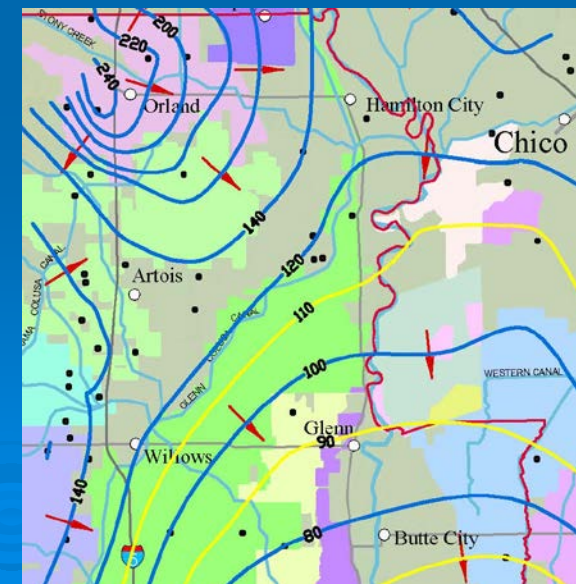
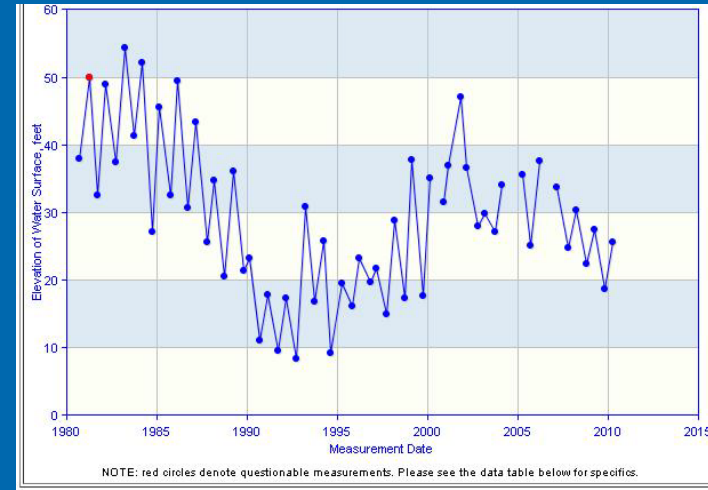
Kings Basin, Fresno County



Groundwater Elevation Monitoring & CASGEM

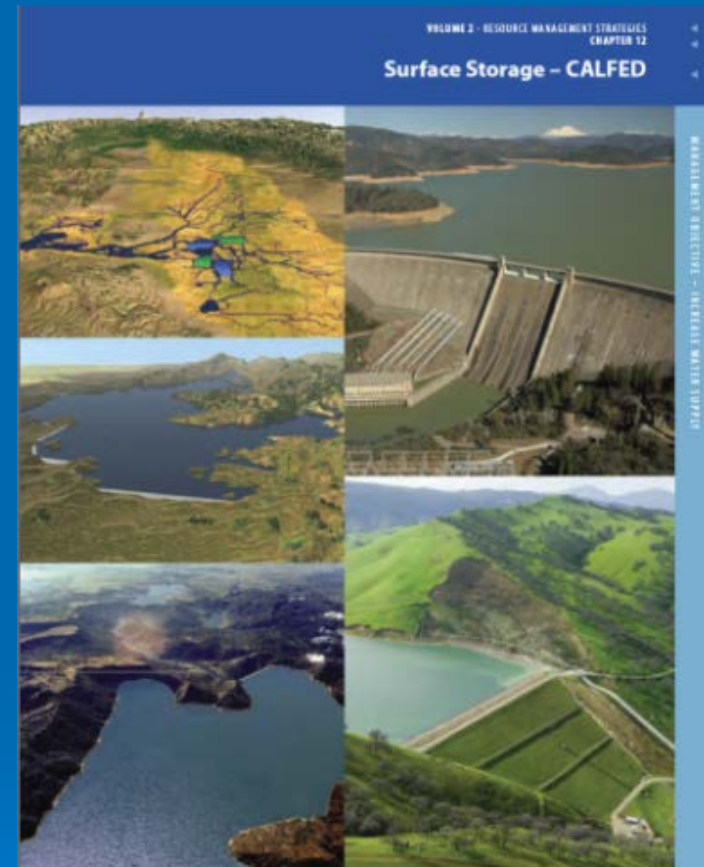
In November 2009, legislation established a voluntary Statewide groundwater monitoring program

- Local "Monitoring Entities" will *regularly & systematically* monitor and report groundwater elevations to demonstrate seasonal and long-term trends
- DWR is required to make groundwater data *readily & widely available* to public



CALFED Surface Storage Investigations

- Objectives
 - Improve Water supply reliability
 - Improve Water quality
 - Enhance Ecosystem
- Designed to improve environmental conditions in addition to mitigating for all project impacts
- Cost allocations based on “Beneficiaries Pay” principle



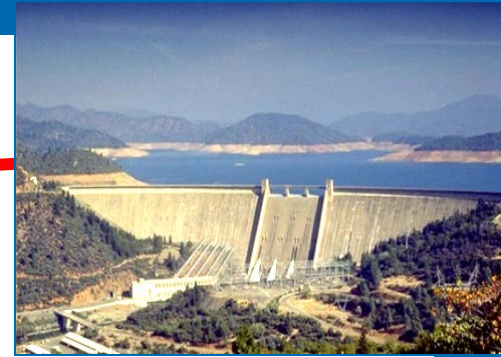
CALFED Surface Storage Investigations



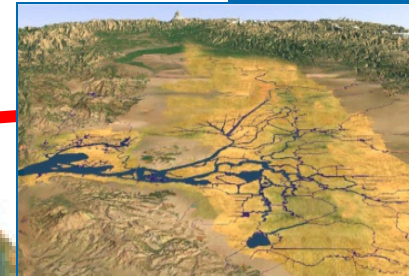
North-of-the-Delta
Off-stream Storage



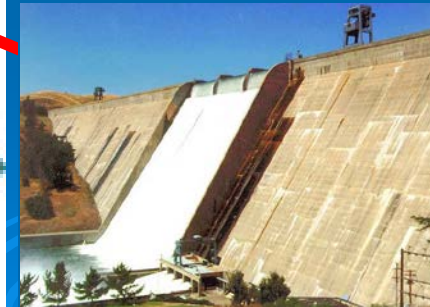
Los Vaqueros
Expansion



Shasta Project
Enlargement



In-Delta
Storage



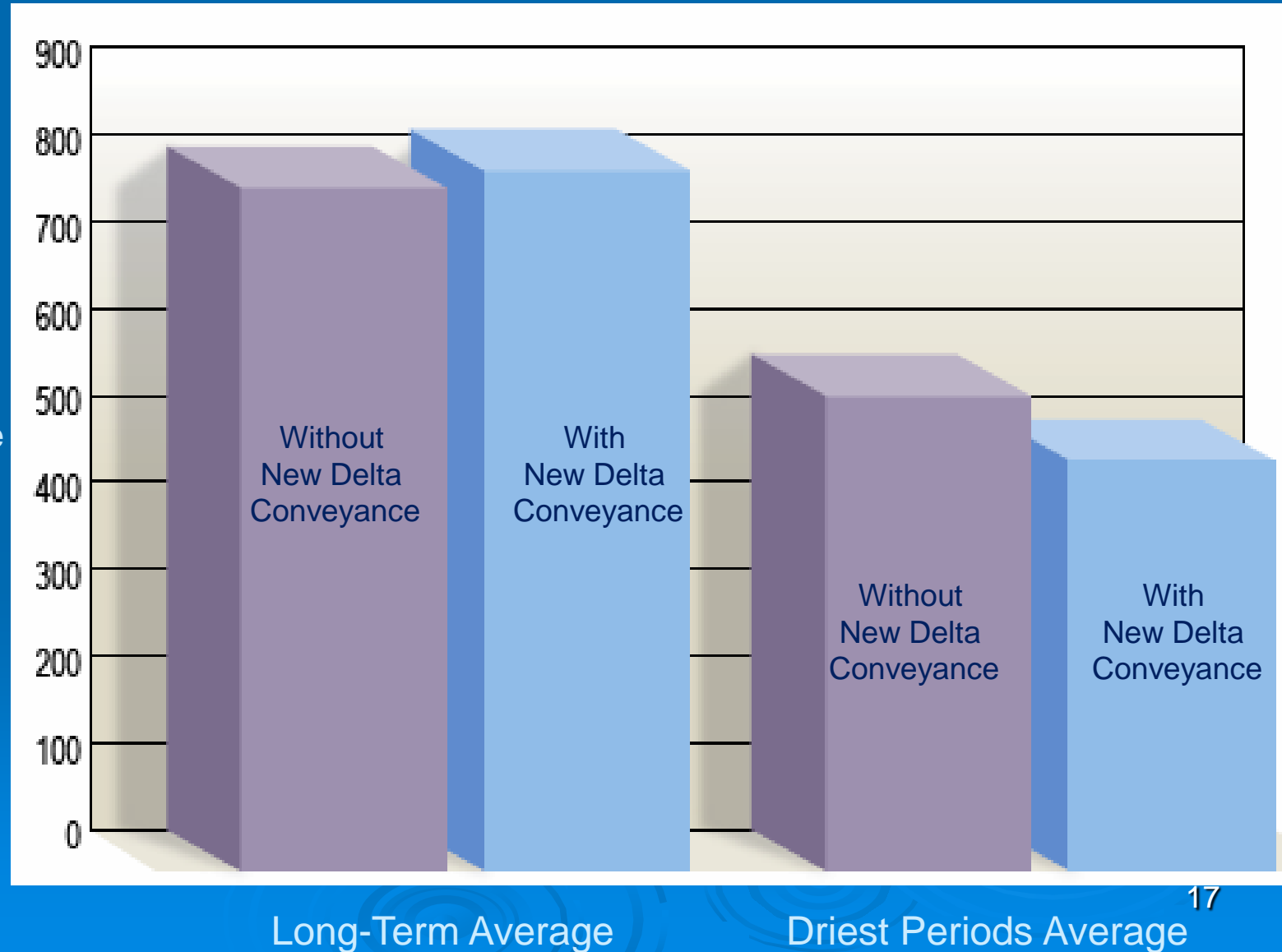
Upper San Joaquin
Basin River Storage

CALFED Storage - Public Benefits Provided

Eligible Public Benefits	Shasta Lake Enlargement	NODOS (Sites)	USJRBS (Temp Flat)	Los Vaqueros Enlargement
Ecosystem Improvements	✓	✓	✓	✓
Water Quality Improvements	✓	✓	✓	✓
Flood Control Benefits	✓	✓	✓	✓
Emergency Response	✓	✓	✓	✓
Recreation	✓	✓	✓	✓
Other Benefits				
Improve Water Supply	✓	✓	✓	✓
Improve System Flexibility	✓	✓	✓	✓
Hydropower & Renewable Int.	✓	✓	✓	✓

Potential Effects of New Delta Conveyance

Combined Yield of Four CALFED Surface Storage Projects



CALFED Storage Investigations Report Schedule

	Shasta Lake Enlargement	NODOS (Sites)	USJRBS (Temp Flat)	Los Vaqueros Expansion
Draft Feasibility Report	Feb 2012	Fall 2013	Fall 2013	Fall 2014
Draft EIR/EIS	Summer 2013	Fall 2013	Spring 2014	Fall 2014
Final FR & EIR/EIS	Fall 2015	Fall 2015	Fall 2015	Fall 2016

Elements of Conjunctive Management

➤ Surface Water Sources

- Imported water
- Local runoff
- Treated wastewater
- Conveyance

➤ Recovery & Use Methods

- Extraction and direct use
- Pump back to conveyance
- Surface water exchange
- Treatment
- Conveyance

➤ Recharge Methods

- Direct spreading
- Injection
- In-lieu recharge
- Induced natural recharge

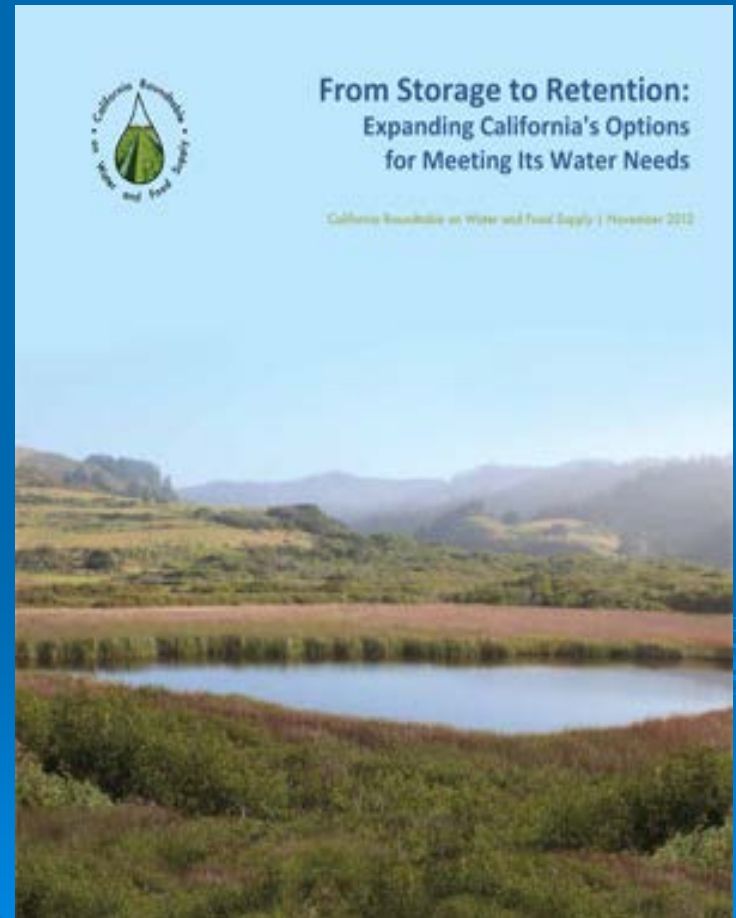
➤ Institutional Framework

- Laws, Regulations, Ordinances
- Contracts and Agreements
- Political Support
- Financing/Economics

From Storage to Retention

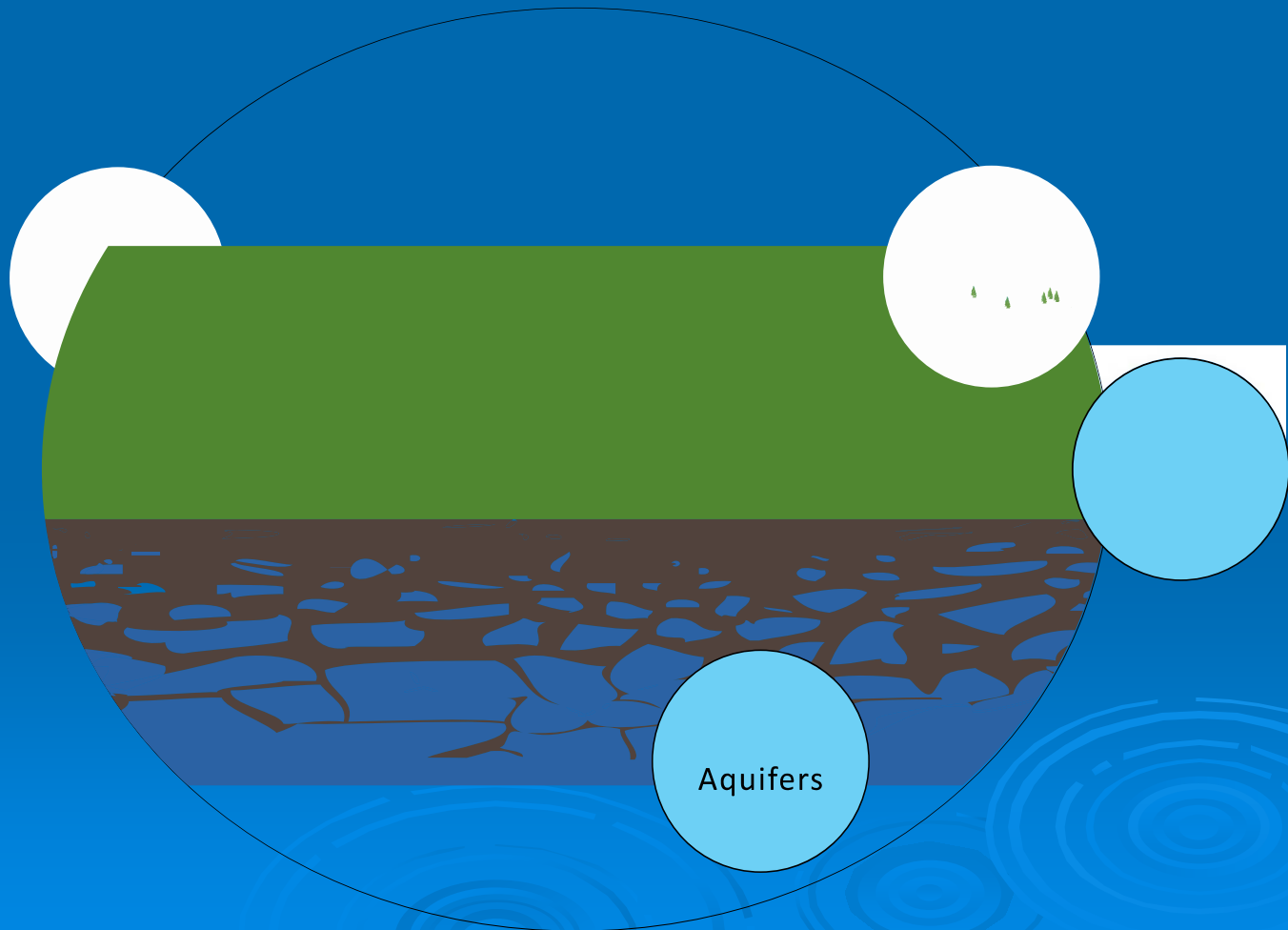
California Roundtable on Water & Food Supply

- Offers conceptual framing for water storage
- Calls for expansion of approaches to storing water —we need to leverage all options at our disposal
- Identifies priorities for action



Water Storage Reservoirs

Working Toward a More Effective Retention Model

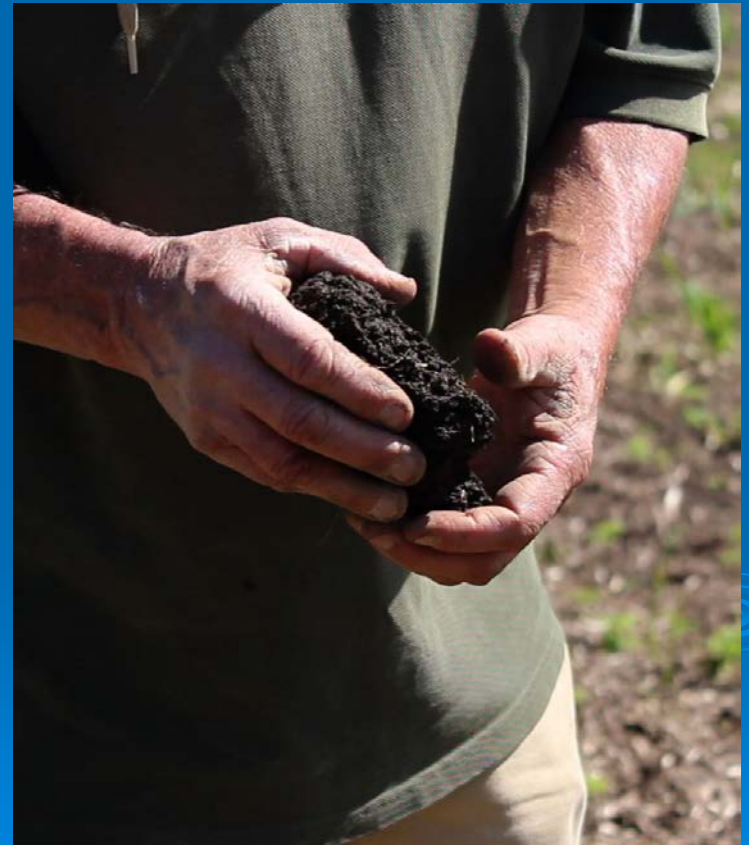


Core Elements Needed for Effective Water Retention

- **Integrated storage regime**
 - Upper watersheds and soils
 - Off-stream surface storage
 - Groundwater management and storage
- **Information & data**
- **Institutional coordination**
- **Financing**

For more information, see

<http://aginnovations.org/roundtables/crwfs/>



Update 2009 – State's Blueprint Integrated Water Management & Sustainability

VISION

- Public Health, Safety, Quality of Life
- Vitality, Productivity, Economic Growth
- Healthy Ecosystem, Cultural Heritage

Foundational Actions for SUSTAINABLE WATER USES

- Use Water Efficiently
- Protect Water Quality
- Expand Environmental Stewardship

Initiatives for RELIABLE WATER SUPPLIES

- Expand Integrated Regional Water Management
- Improve Statewide Water and Flood Management Systems

Integrated Regional Water Management

48 Regional Water Mgmt Groups



➤ Foster partnerships & promote regional solutions

➤ Diversify water portfolios & integrate supplies

➤ Leverage economies of scale to reduce costs

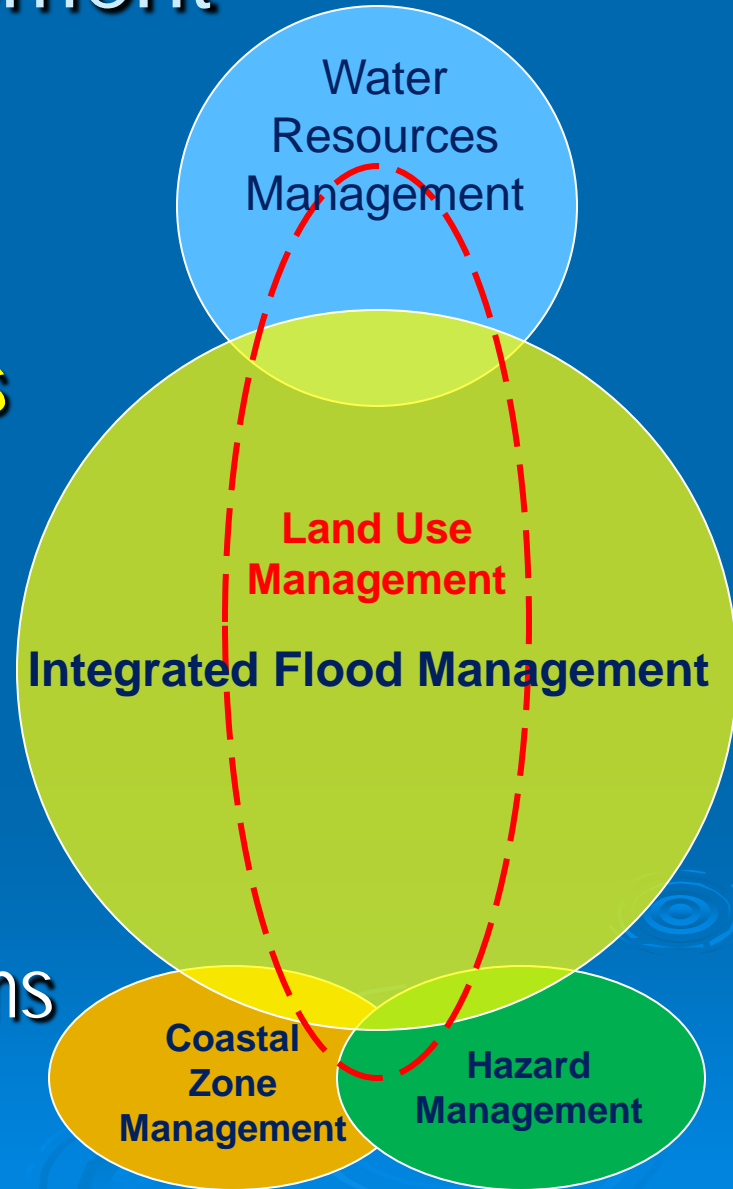
➤ Integrate data, tools & resources

➤ Invest in multi-benefit projects with sustainable outcomes

➤ Increase regional self-sufficiency

Integrated Flood Management

- Comprehensive approach to flood management
- Considers land & water resources at watershed scale
- Minimizes loss of life and property damage from flooding
- Maximizes benefits of floodplains
- Recognizes benefits to ecosystems from periodic floods



Improving Coordination Land Use Planning & Water Management



- Land use planning controlled locally
- Water management decentralized -- over 2,300 counties, cities, public agencies, and private water companies
- IRWM coordinates land use planning with water supply, quality, flood management, and climate adaptation
- State Government provides technical assistance and financial incentives
- More coordination among State agencies & with IRWM Partnerships

27+ 3 New Resource Management Strategies

A Range of Choices

Reduce Water Demand

- Agricultural Water Use Efficiency
- Urban Water Use Efficiency

Improve Operational Efficiency & Transfers

- Conveyance – Delta
- Conveyance – Regional / Local
- System Reoperation
- Water Transfers

Increase Water Supply

- Conjunctive Management & Groundwater Storage
- Desalination –Brackish & Seawater
- Precipitation Enhancement
- Recycled Municipal Water
- Surface Storage – CALFED
- Surface Storage – Regional / Local

Improve Flood Management

- Flood Risk Management

Improve Water Quality

- Drinking Water Treatment & Distribution
- Groundwater / Aquifer Remediation
- Matching Quality to Use
- Pollution Prevention
- Salt & Salinity Management
- Urban Runoff Management

Practice Resource Stewardship

- Agricultural Lands Stewardship
- Economic Incentives
(Loans, Grants & Water Pricing)
- Ecosystem Restoration
- Forest Management
- Land Use Planning & Management
- Recharge Areas Protection
- Water-Dependent Recreation
- Watershed Management

New – Education & Outreach
Sediment Management
Water & Culture

Partial List of References Related to Water Storage in CA

- California Water Plan Update 2009 & Update 2013 Drafts
 - California's Major Water Projects Map & Reservoir Summary
 - CALFED Surface Storage Resource Management Strategy
 - Regional/Local Surface Storage Resource Management Strategy
 - Conjunctive Management & Groundwater Management Strategy
- CALFED Surface Storage Program Progress Report -- DWR
- System Reoperation Study Plan, DWR
- CASGEM Brochure, DWR
- NASA Ames & DWR Groundwater Remote Sensing Study
- Methods for Evaluating Public Benefits of Storage Projects, DWR for California Water Commission
- From Storage to Retention, California Roundtable on Water & Food Supply



Questions & Comments



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