

Groundwater and Sustainability



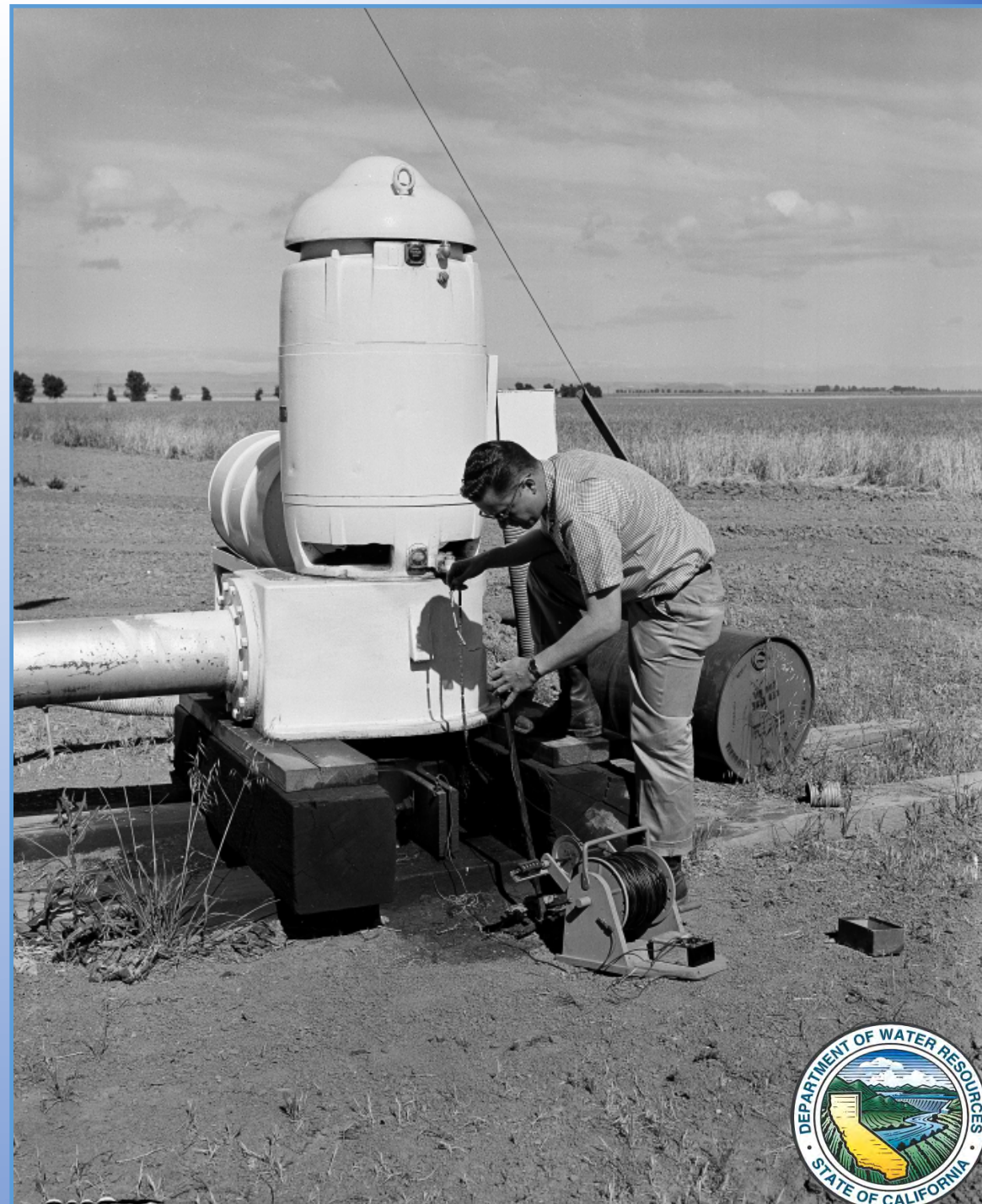
Department of Water Resources

South Central Region Office

June 2016

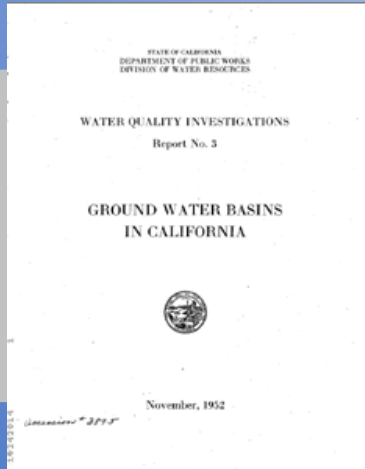
Outline

- California Groundwater Overview
- Basin Priority
- Groundwater Use
- SGMA Overview/Update



Development of California Groundwater Basins and Subbasins

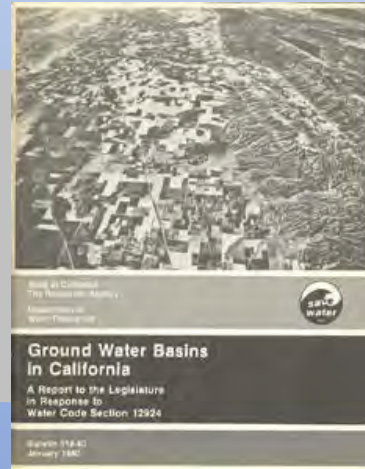
- Groundwater Basins & Subbasins Are Defined in DWR Bulletin 118 Using the Best Available Data
- Modifications to Basin Boundaries Have Occurred During B-118 Updates



1952



Bulletin 118
1975



Bulletin 118
1980



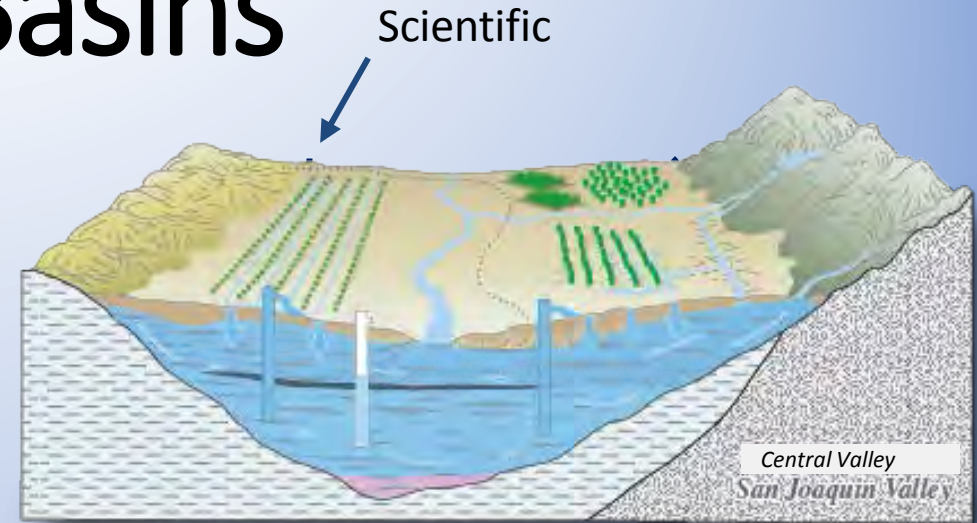
Bulletin 118
2003



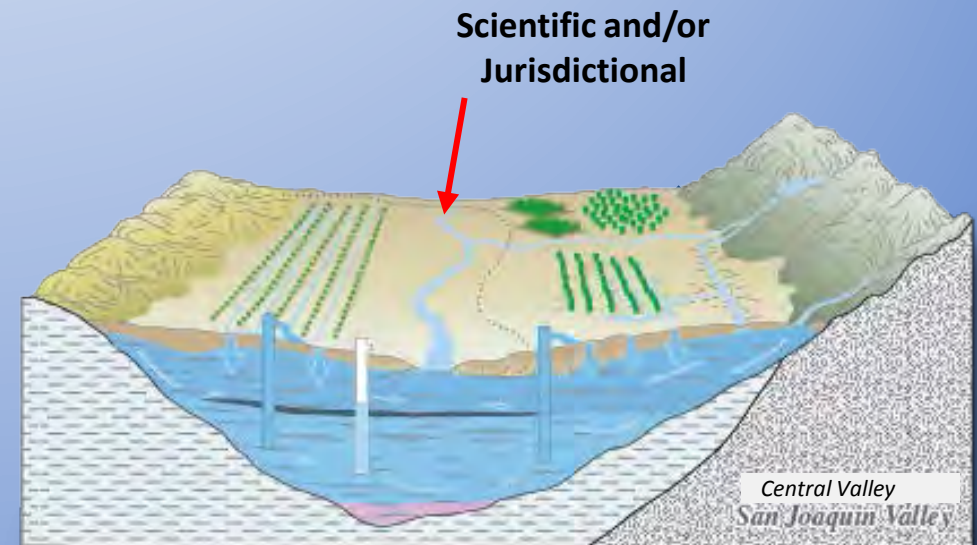
Alluvial Groundwater Basins

Groundwater Basin – An alluvial aquifer or a stacked series of alluvial aquifers with reasonably well-defined boundaries in a lateral direction and having a definable bottom

Groundwater Subbasin – A subbasin is created by dividing a groundwater basin into smaller units using geologic and hydrologic barriers or institutional boundaries



Modified from Faunt, 2009

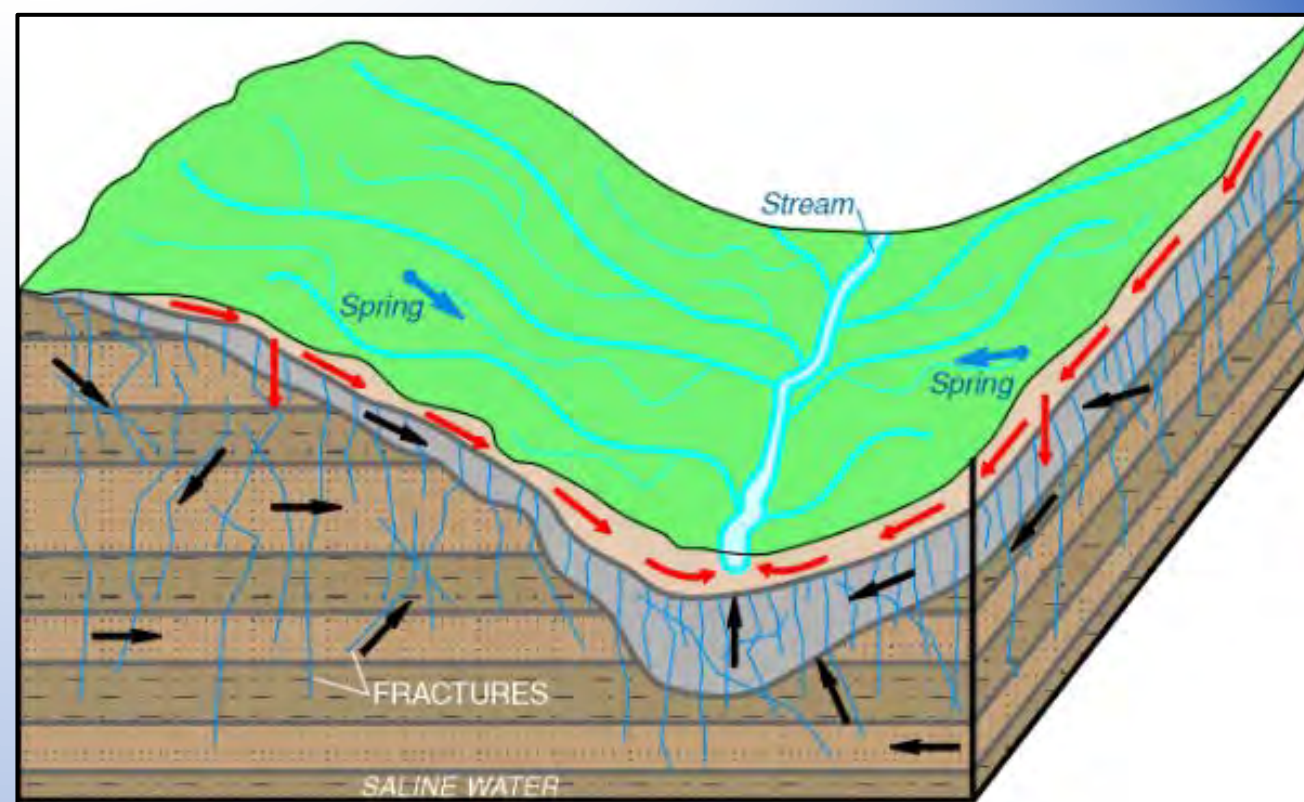


Modified from Faunt, 2009



Crystalline-Rock Aquifers

- Consolidated “hard” rock
- Underlies mountainous & highland areas
- Only permeable where fractured
- Low yield



NOT TO SCALE

EXPLANATION









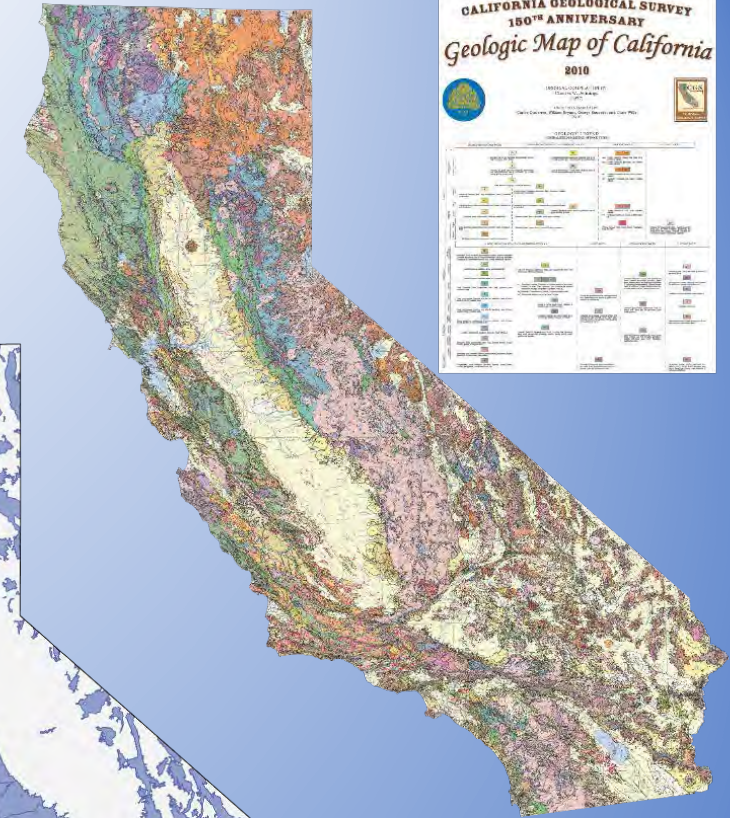
	COLLUVIUM SOIL		GEOLOGIC CONTACT
	WEATHERED BEDROCK (REGOLITH)	GENERALIZED GROUND-WATER-FLOW PATHS	
	SILTSTONE		YOUNGER GROUND WATER
	SANDSTONE OR SHALE		OLDER GROUND WATER
			MIXTURE OF YOUNGER AND OLDER GROUND WATER (SPRING)

Figure 5. Conceptual ground-water flow in a fractured-rock setting (modified from Harlow and LeCain, 1991).



California Groundwater Basins

- 515 Groundwater Basins
- ~40% of groundwater use
- Varying level of detail in existing dataset



2003

B-118 Groundwater Basins

CASGEM Basin Prioritization

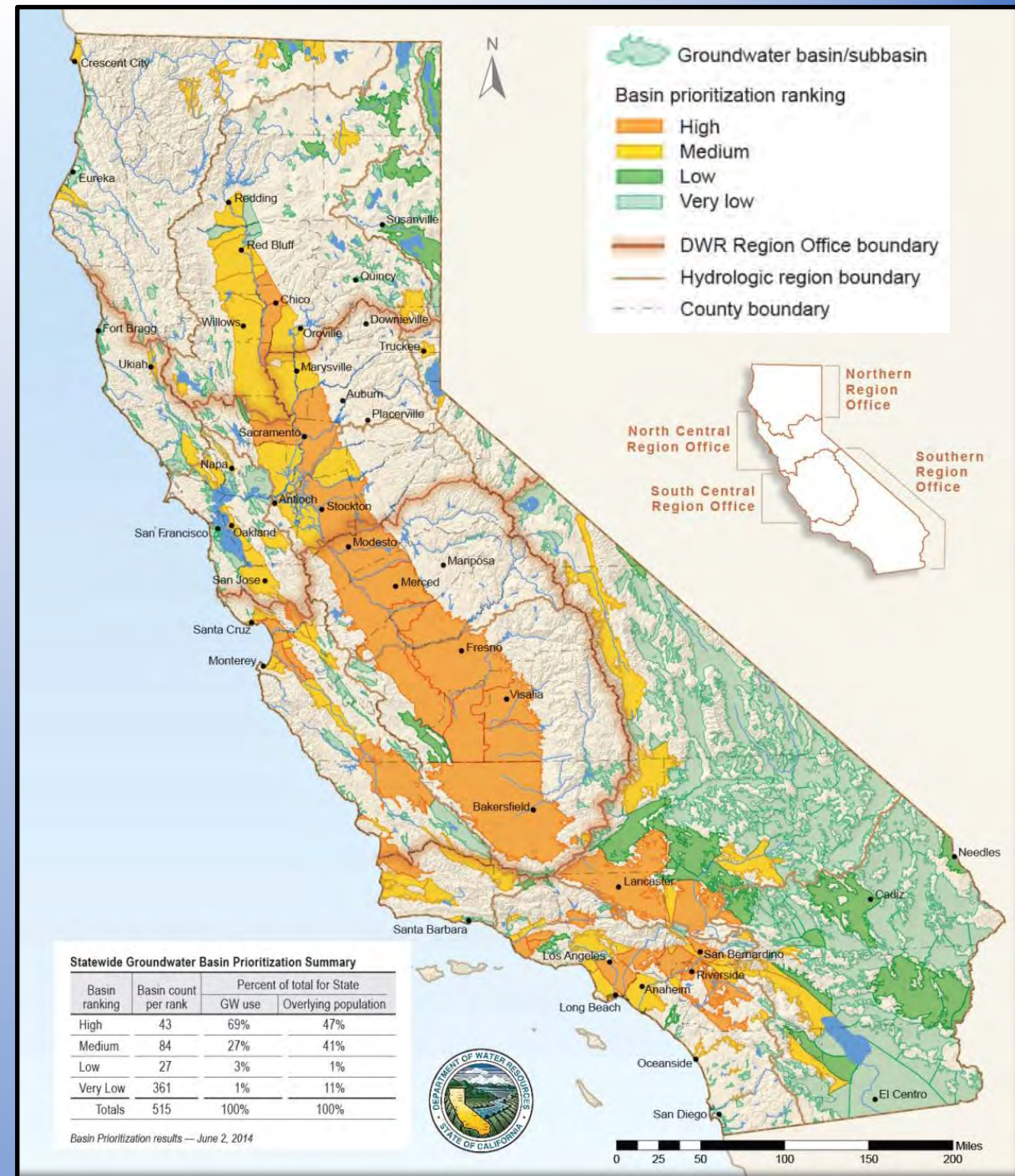
Statewide Breakdown

Basin Ranking	Basin Count per Rank	Percent of Total for Hydrologic Region	
		GW Use	Overlying Population
High	43	69%	47%
Medium	84	27%	41%
Low	27	3%	1%
Very Low	361	1%	11%
Totals	515	100%	100%

127 High & Medium Priority basins

96% of groundwater use
88% of overlying population

<http://www.water.ca.gov/groundwater/casgem/>



Critically Overdrafted Basins/Subbasins

- Updated in 2016
- 7 new basins/subbasins
- 21 Total
- 11 in Central Valley

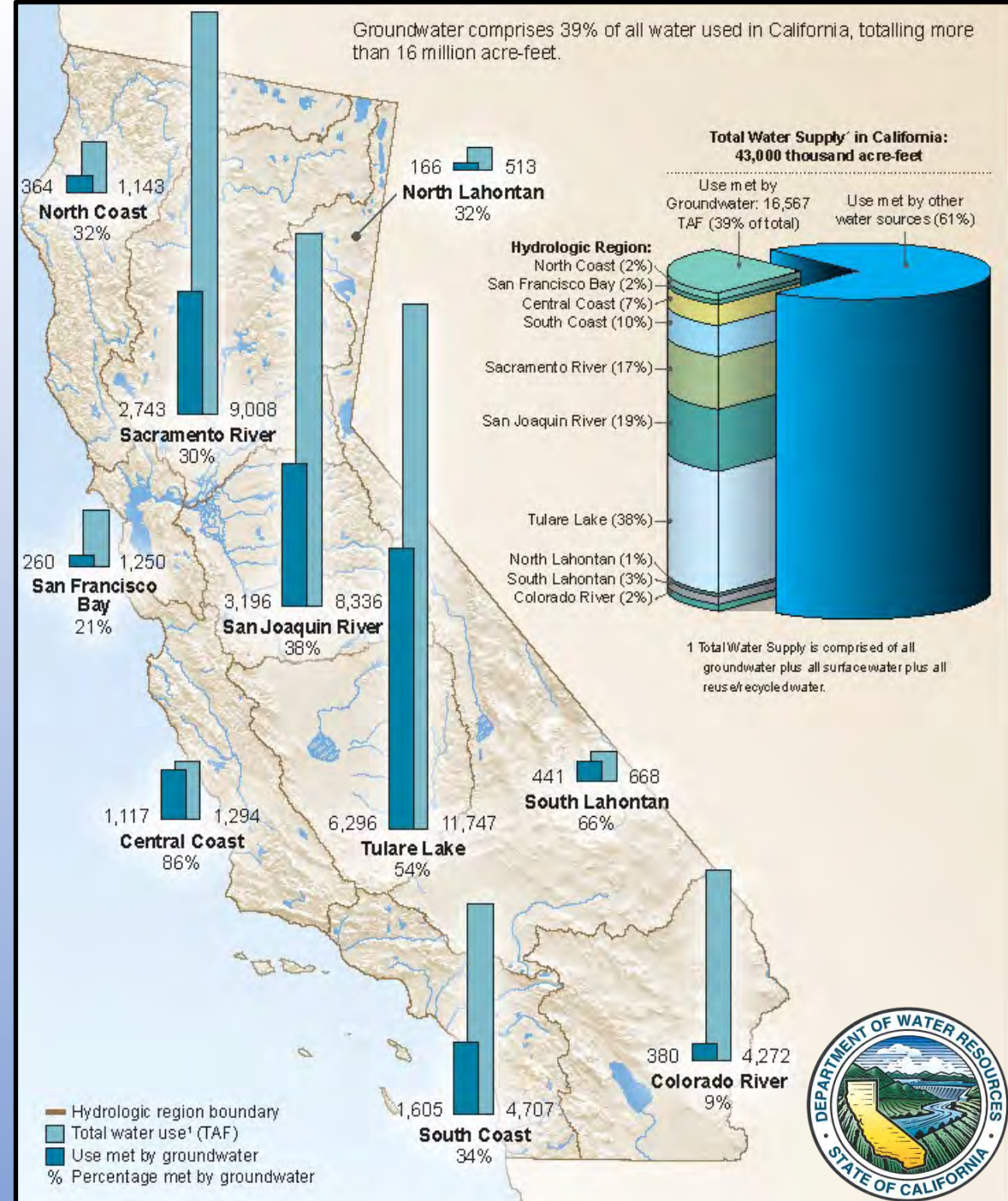


Statewide Groundwater Use

Regions with highest use:
(relative to statewide total)

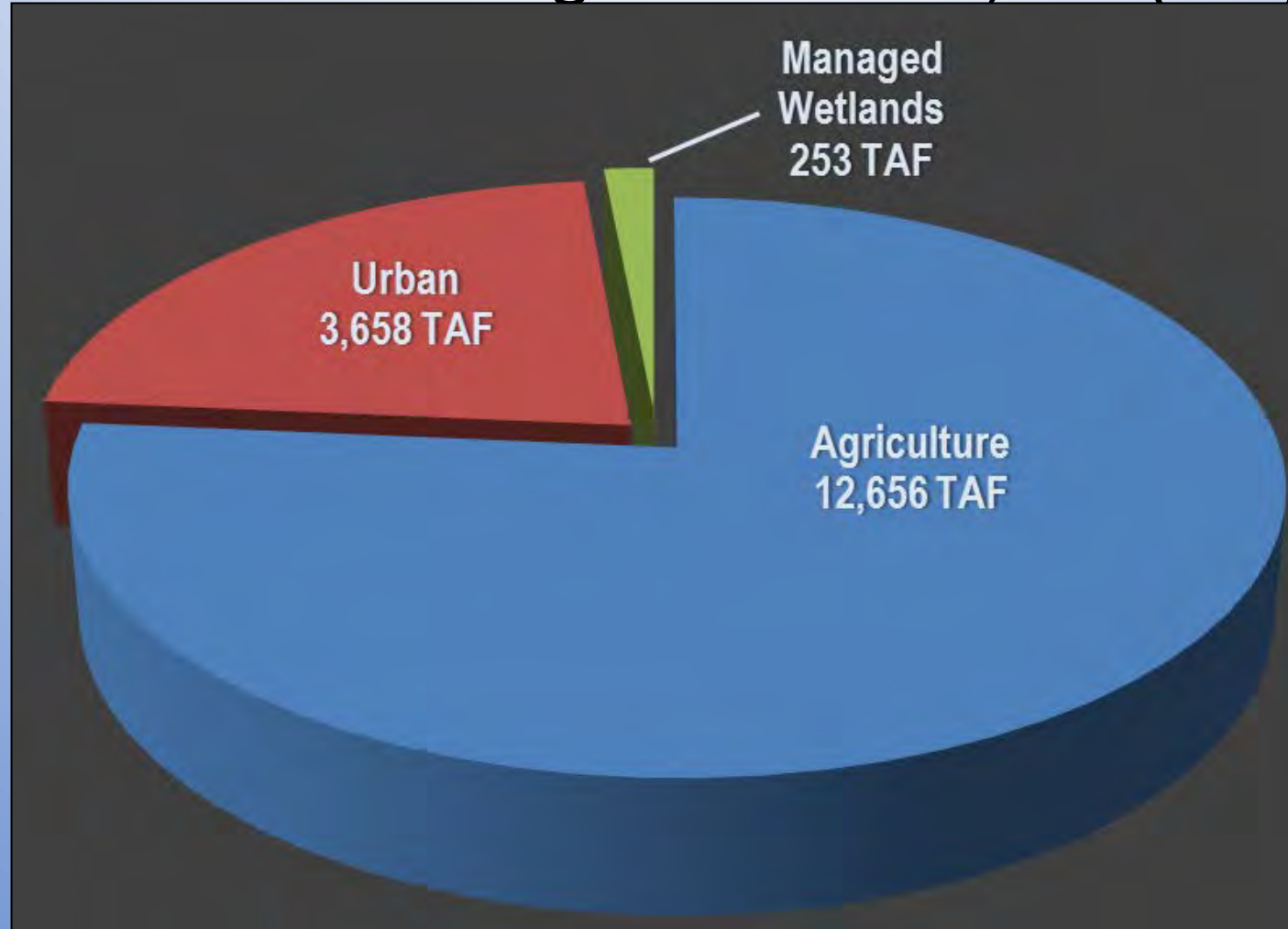
- Tulare Lake 38%
- San Joaquin River 19%
- Sacramento River 17%
- South Coast 10%

(2005 to 2010 Average Annual Data)



Statewide Groundwater Use

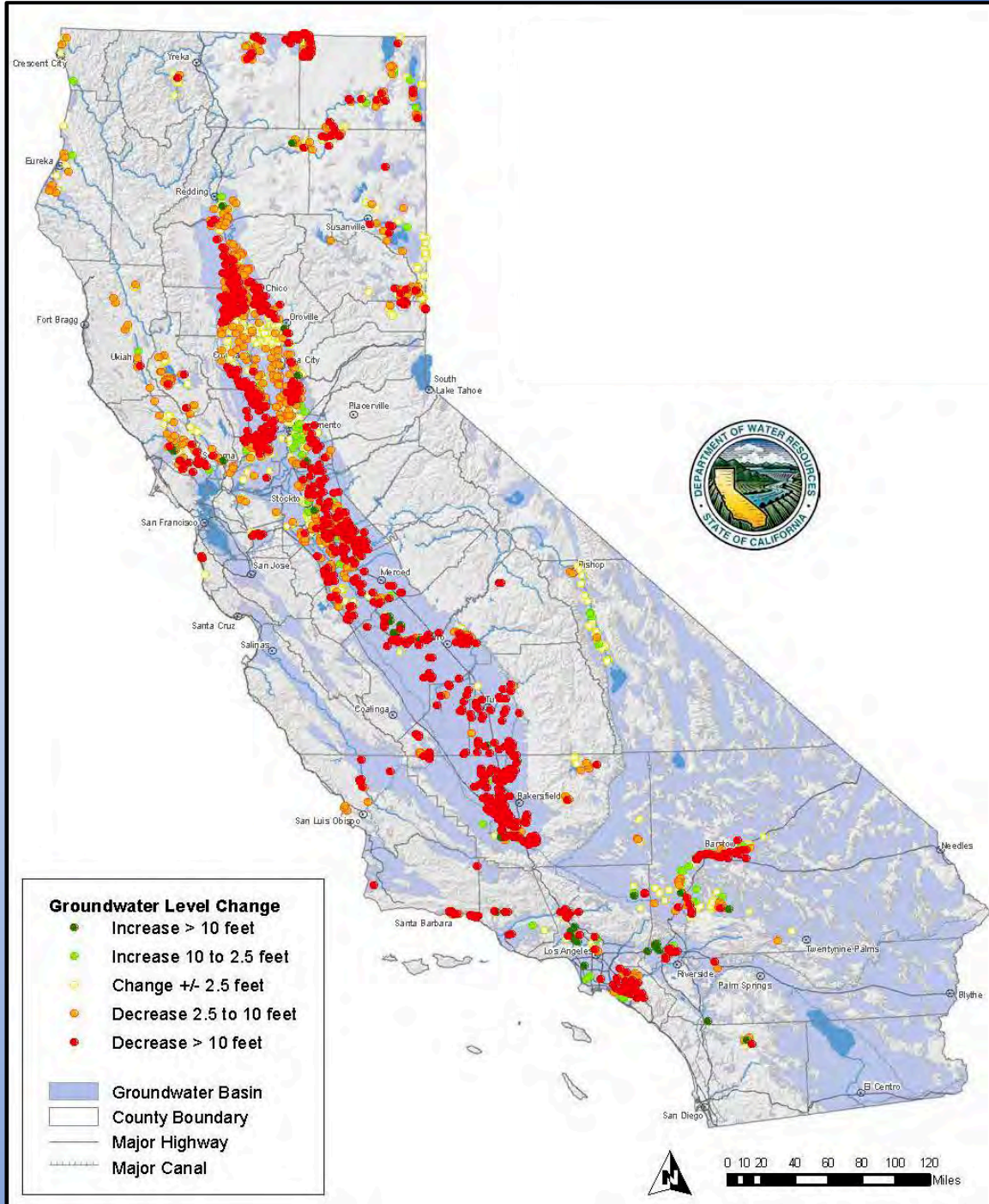
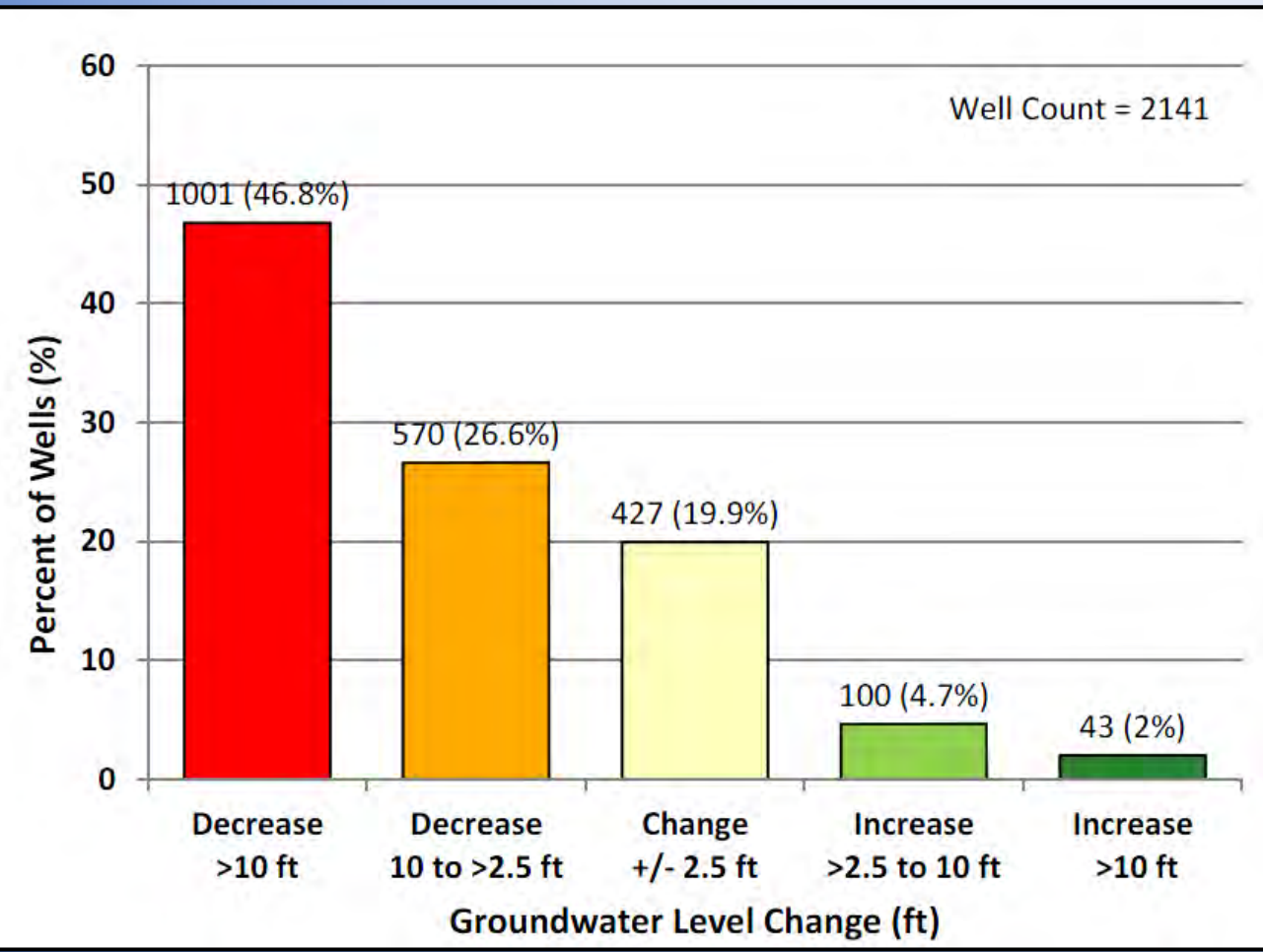
2005-2010 Average Annual: 16,567 (TAF)



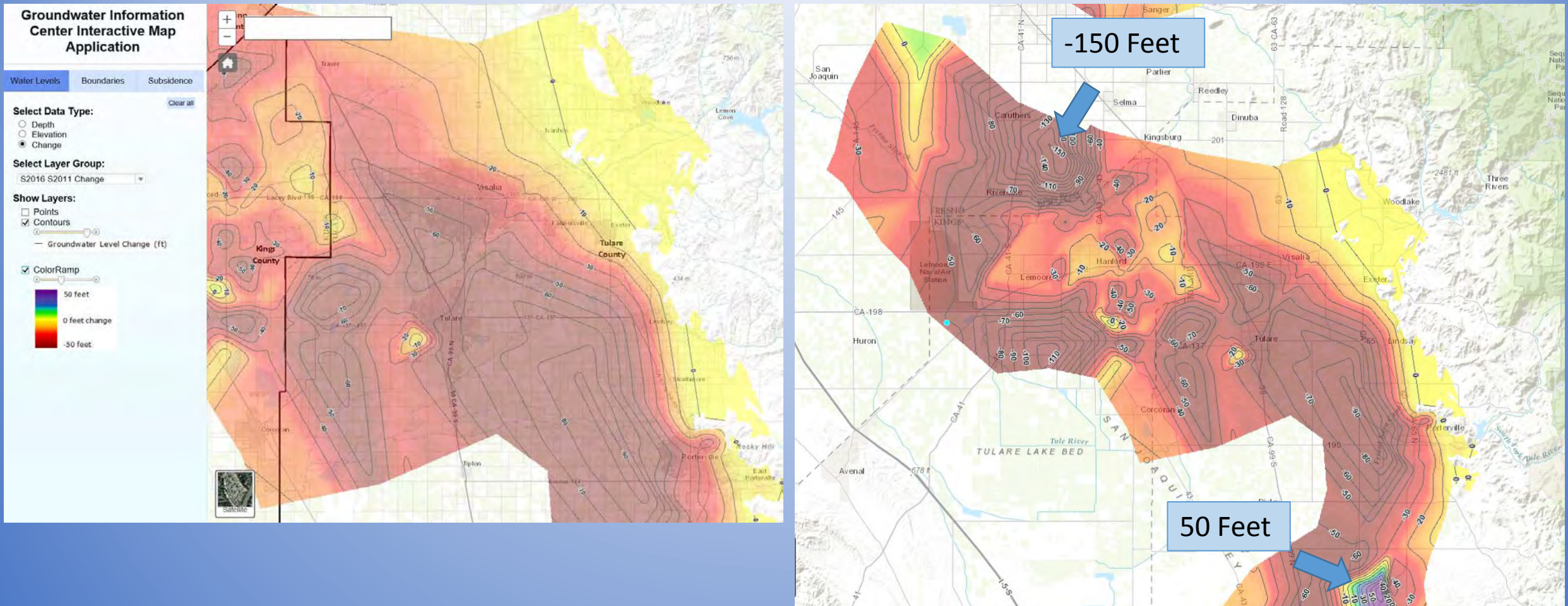
Source: California Water Plan Update 2013



Groundwater Level Change: Spring 2005-2015

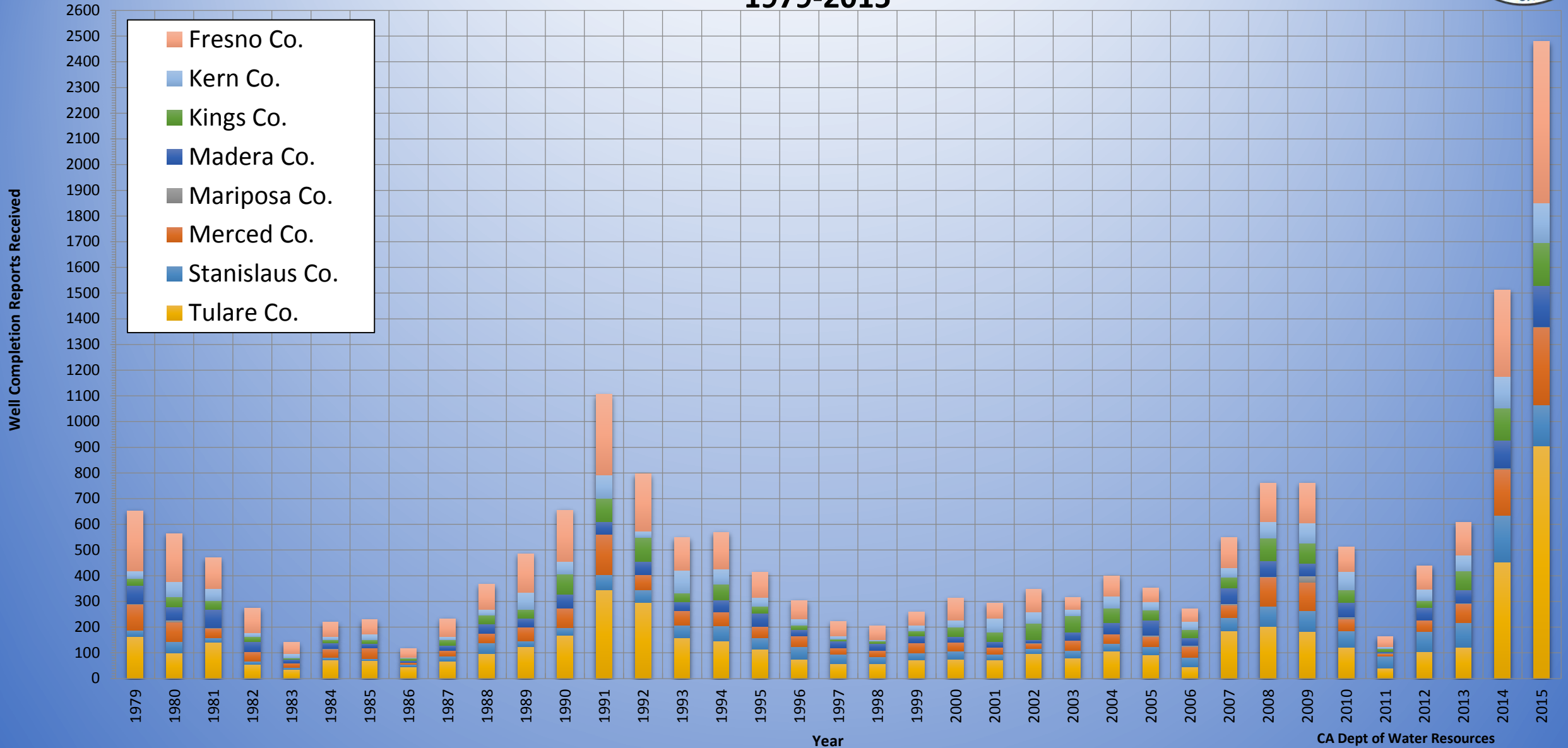


Spring 2011-2016 Change in GW Elevation – Kaweah, Tule, Tulare GW Basins





New Irrigation Well Completion Reports Received San Joaquin River and Tulare Lake Hydrologic Regions 1979-2015



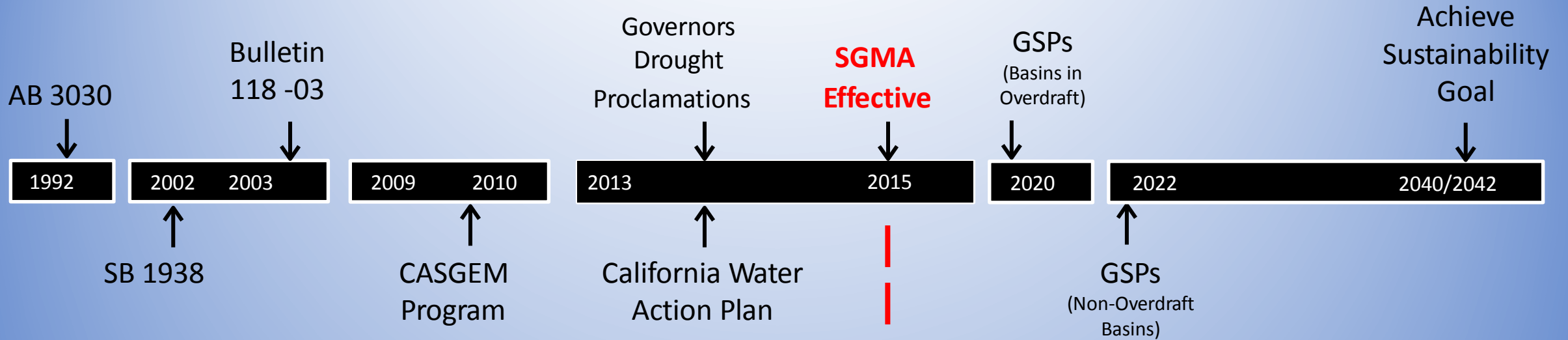
2014 Historic Groundwater Legislation

Sustainable Groundwater Management Act (SGMA)

- 2016
 - Regulations for:
 - Basin boundaries
 - GSPs and Alternatives
- 2017
 - BMPs
 - GSAs (H&M)
- 2020
 - Critical overdraft basins managed under GSPs
- 2022
 - All H&M basins under GSP
- ~2040
 - Achieve sustainability



California's Major Groundwater Milestones



Voluntary Groundwater Management

- Service Area Planning
- Mixed Levels of Implementation
- Variable Authority
- Grant Incentives

Required Groundwater Management

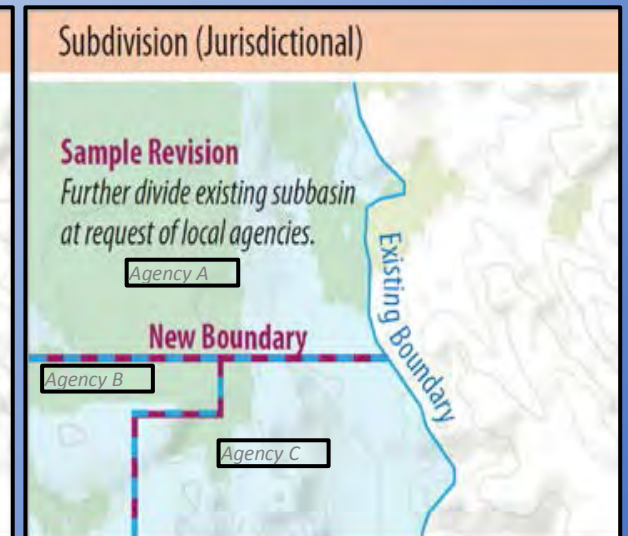
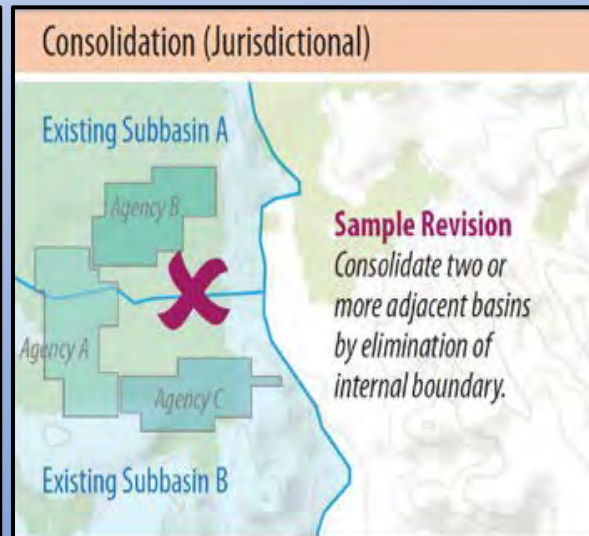
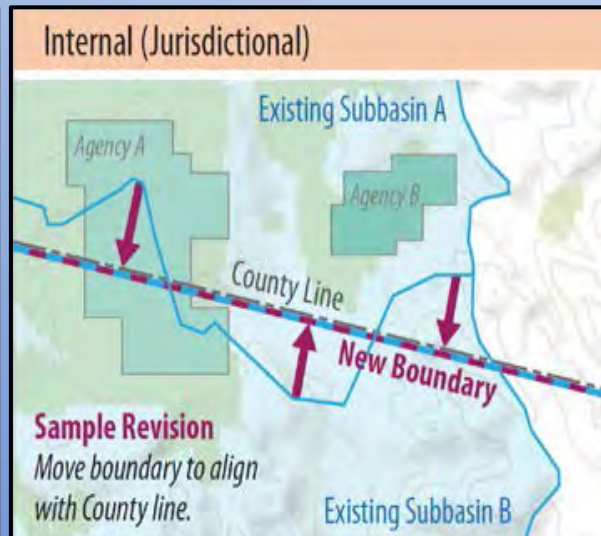
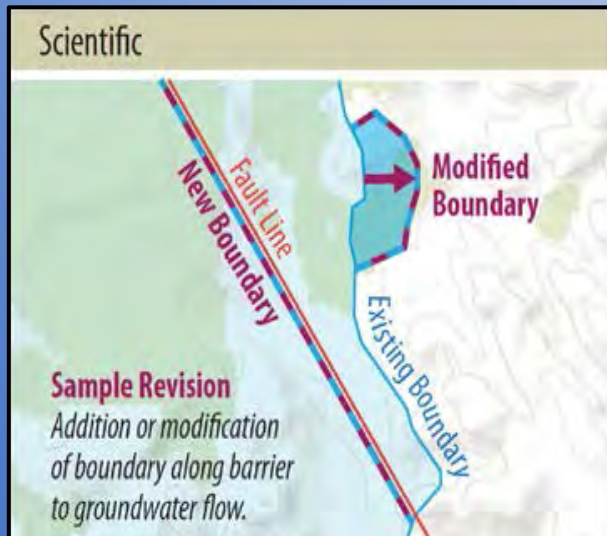
- Entire Basin Planning
- Required Implementation
- GSA Have New:
 - Authorities
 - Responsibilities
- State Backstop



Basin Boundary Modifications

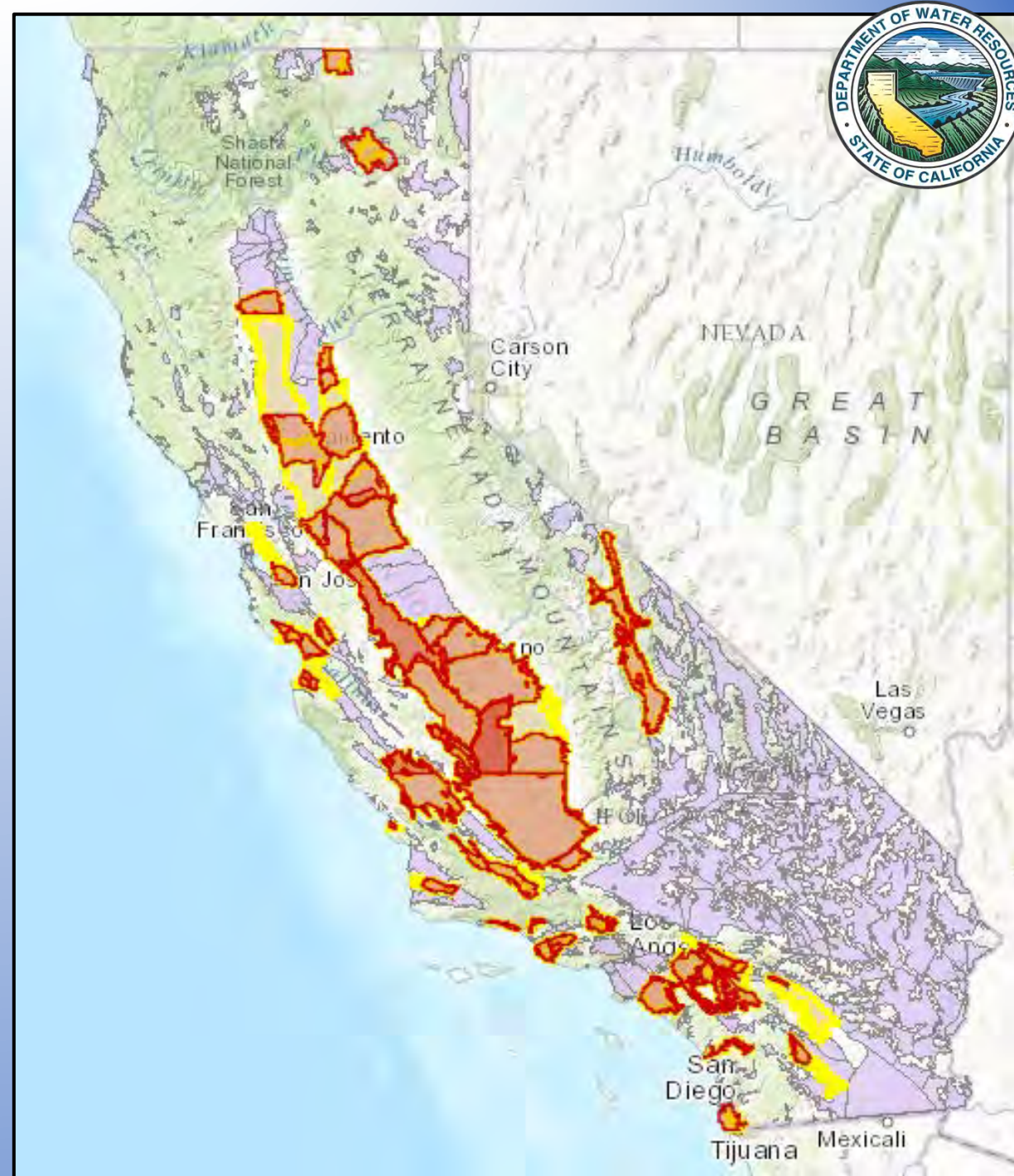
- Reviewing requests by local agencies to modify current groundwater basin/subbasin boundaries
- Requests are based on
 - Scientific Evidence
 - Jurisdictional Reasoning

Scientific	Jurisdictional
------------	----------------



Basin Boundary Requests

- 55 Requests from local agencies to modify a basin/subbasin
- Potential for 50 basins/subbasins to change
- DWR making additional modification based on latest available science



Groundwater Sustainability Agencies

Groundwater Sustainability Agency - means one or more local agencies that may impose fees or take other actions to develop and enforce a groundwater sustainability plan

Local Agency – A local public agency that has water supply, water management, or land use responsibilities within a groundwater basin

**May be one or more GSA's within each basin or subbasin but must coordinate together*

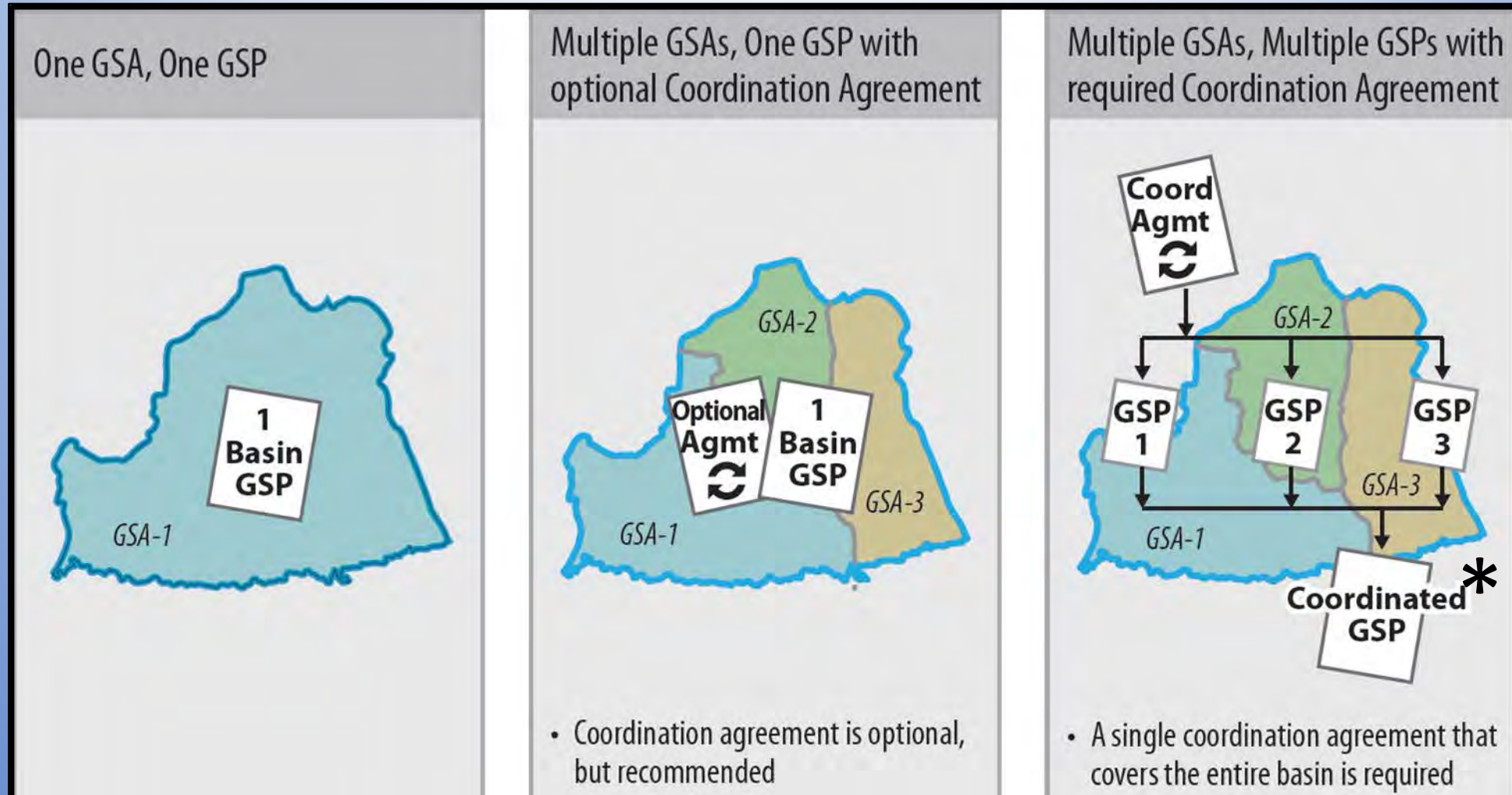


GSA's by the Numbers

- 78 Total GSA Notices
- 49 GSA's experiencing overlap
- 19 "Exclusive" GSA's
- 9 GSA notices in 90-day period
- 5 GSA notices incomplete
- 37 (H&M) basins/subbasins with GSA's formed
- 25 counties with GSA



GSP Possibilities Within a Basin/Subbasin



*Possible revision to draft GSP Regulations



Required Coordination for Multiple GSA's

- 1. Inter-Basin Coordination:** Voluntary coordination between two or more basins that are hydraulically connected
- 2. Intra-Basin Coordination:** Required coordination for basins with multiple GSPs and recommended for basins with multiple GSAs preparing a Single GSP

Inter-Basin Coordination

(voluntary)



Intra-Basin Coordination

(required)



Overview of Groundwater Sustainability Plans

- Article 1. Introductory Provisions
- Article 2. Definitions
- Article 3. Technical and Reporting Standards
- Article 4. Procedures
- Article 5. Plan Content
- Article 6. Evaluation and Assessment
- Article 7. Reports, Assessments, and Amendments
- Article 8. Coordination Agreements
- Article 9. Alternatives and Adjudicated Areas



Groundwater Sustainability Plans

- Article 1. Introductory Provisions
- Article 2. Definitions
- Article 3. Technical and Reporting Standards
- Article 4. Procedures
- **Article 5. Plan Content**
- Article 6. Evaluation and Assessment
- Article 7. Reports, Assessments, and Amendments
- Article 8. Coordination Agreements
- Article 9. Alternatives and Adjudicated Areas



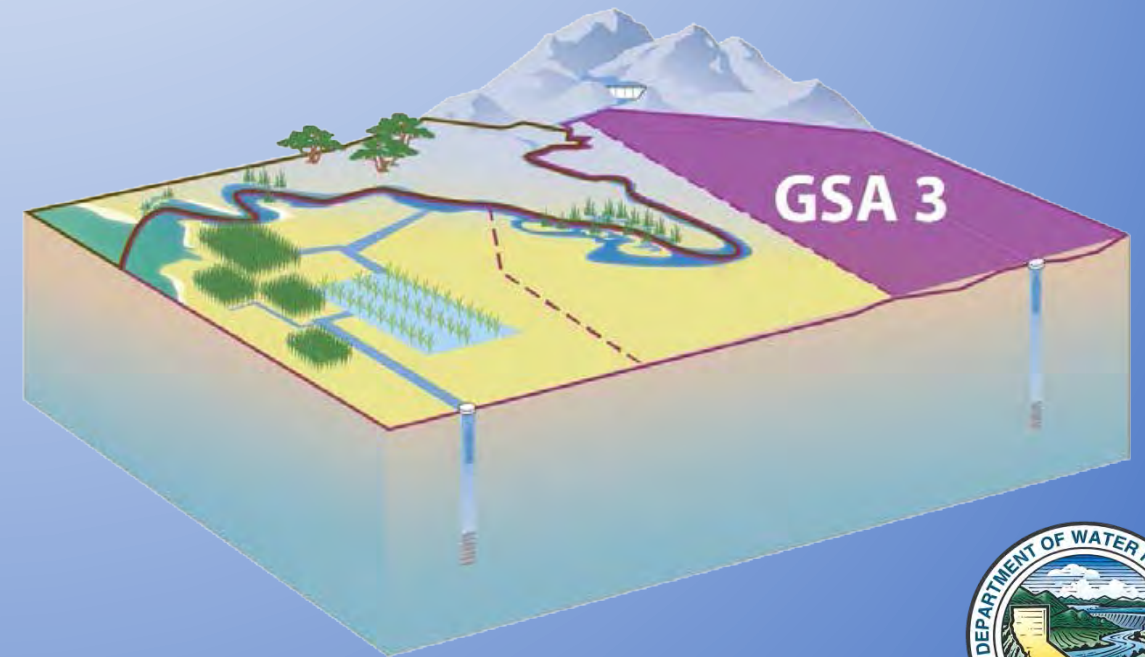
Article 5. Subarticle 1. Administrative Information

Executive Summary

Agency Information

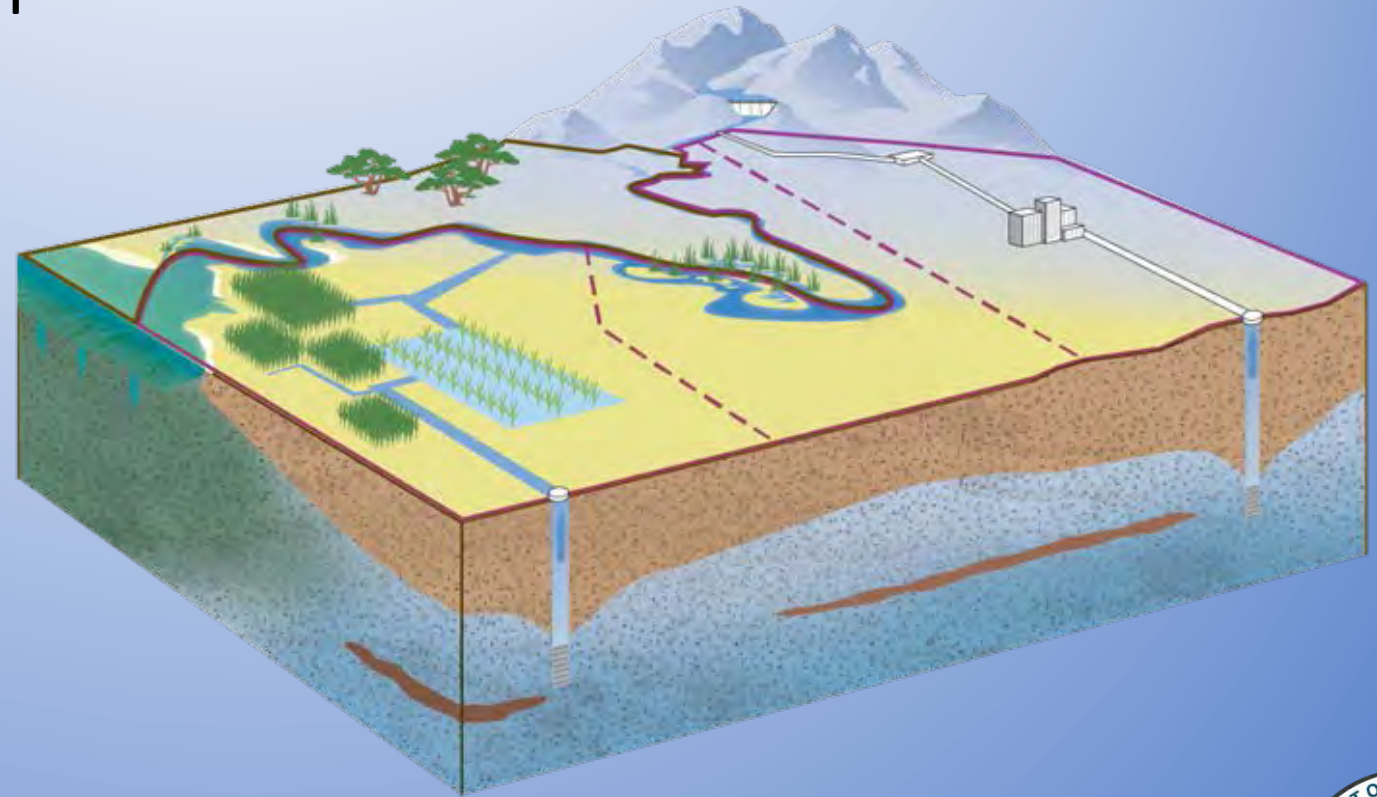
Description of Plan Area

- Jurisdictional Boundaries
- Delineation of Land Uses
- Well Distribution
- Existing Monitoring and Management Programs
- Summary of Land Use Plans



Article 5. Subarticle 2. Basin Setting

- Hydrogeologic Conceptual Model
- Basin Conditions
- Water Budget
- Management Areas





Article 5. Subarticle 3. Sustainable Management Criteria

- Sustainability Goal (*Basin Wide – Goal*)
- Undesirable Results (*Basin Wide - Impacts*)
- Minimum Thresholds (*Site Specific - Impacts*)
- Measurable Objectives (*Measures Taken to Achieve Goal*)

Sustainability Goal

- Basin wide Goal
- Achieved by 2040/2042

Sustainable Groundwater Management

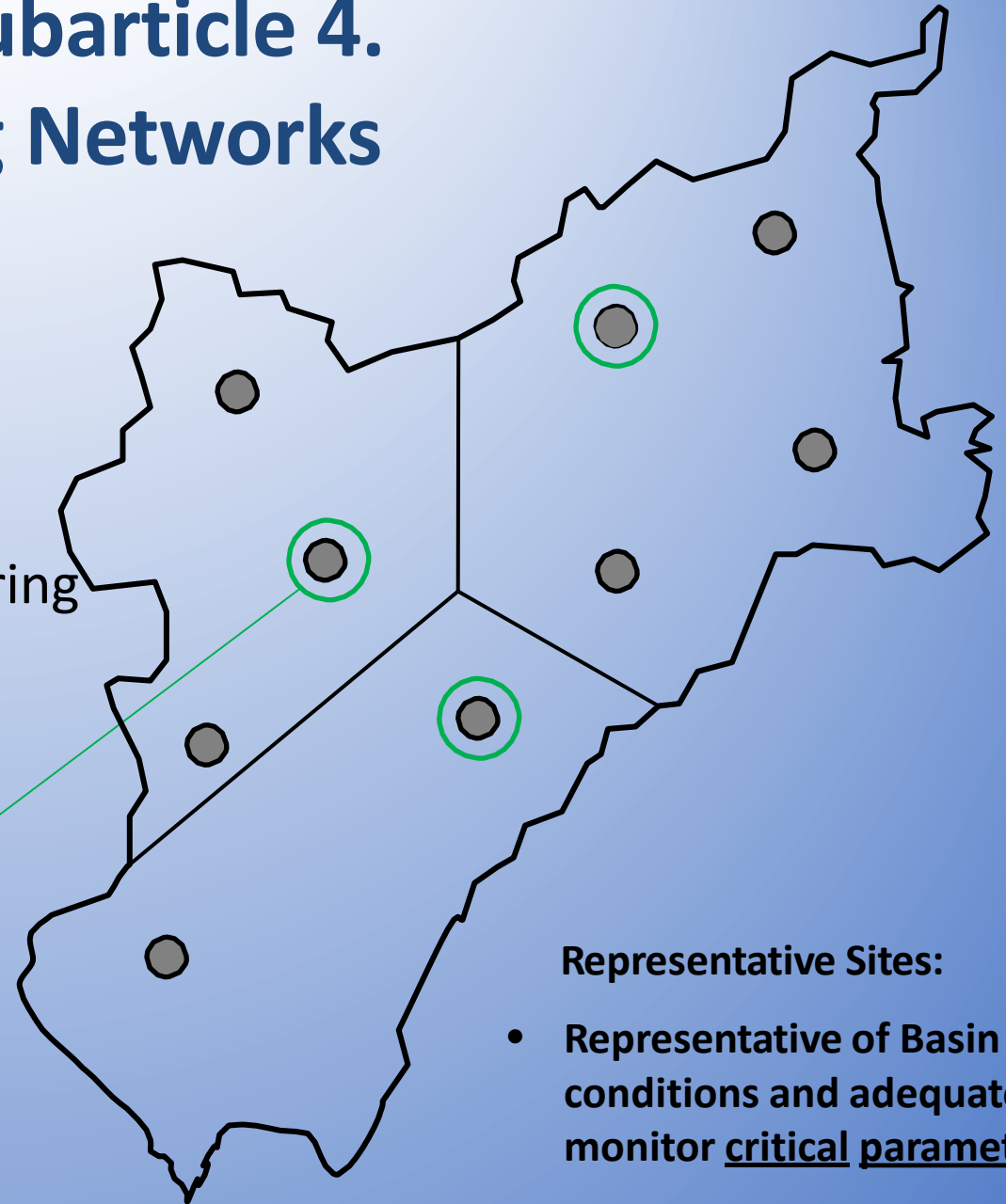
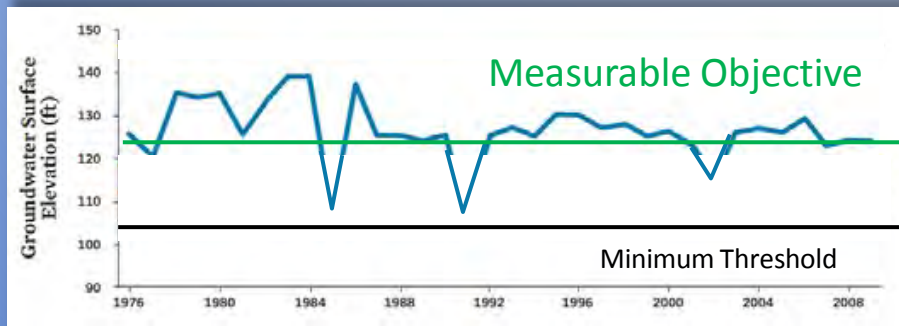
- During Plan Implementation
- Avoid Undesirable Results

Sustainable Yield

- Basin wide Sustainable Yield
- Achieved by 2040/2042
- Avoid Undesirable Results

Article 5. Subarticle 4. Monitoring Networks

- Monitoring Network
- Representative Monitoring
- Assessment and Improvement of Monitoring Network



Representative Sites:

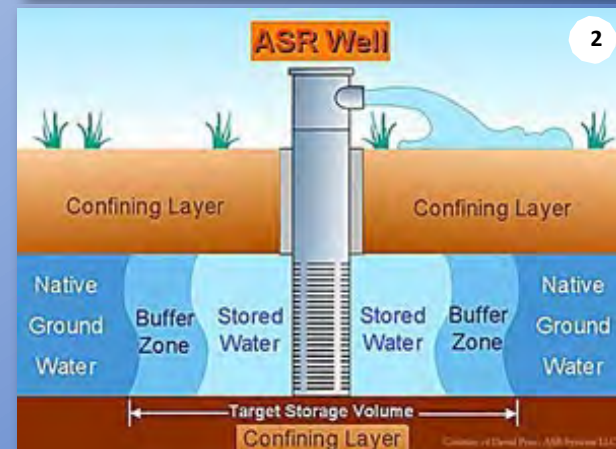
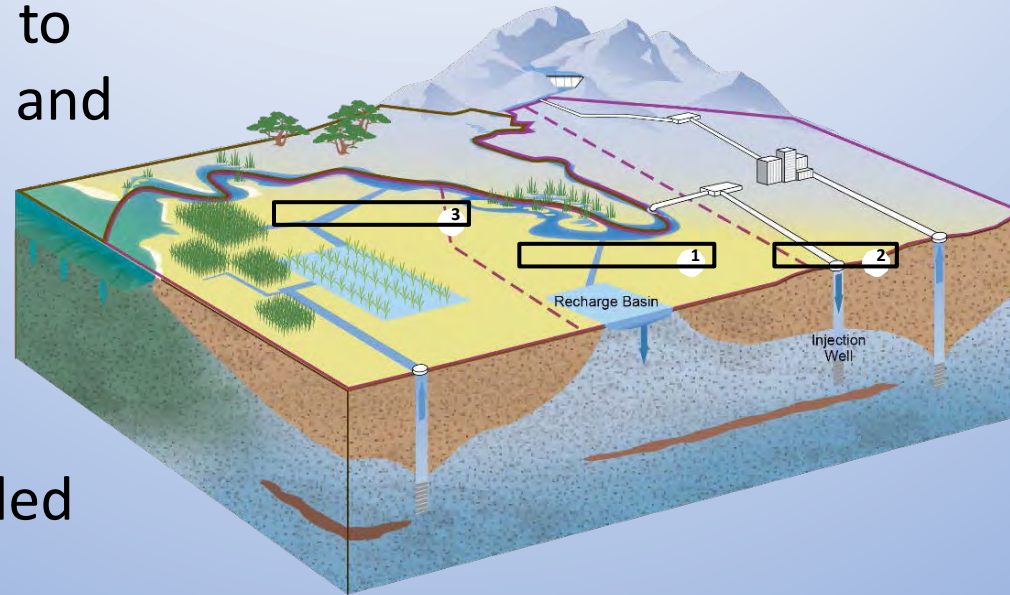
- Representative of Basin conditions and adequate to monitor critical parameters



Article 5. Subarticle 5.

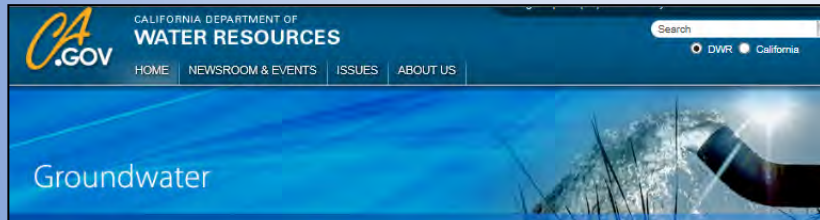
Projects and Management Actions

- GSP developed and adopted to meet measurable objectives and prevent undesirable results
- Contingency projects or actions that would be triggered if groundwater conditions have not responded to previous management actions
 - Supported by available scientific data, analytical methods, and groundwater models, if available



DWR Groundwater

<http://www.water.ca.gov/groundwater/>



Introduction

Groundwater resources play a vital role in maintaining California's economic and environmental sustainability. During an average year, California's 515 alluvial groundwater basins and subbasins contribute approximately 38 percent toward the State's total water supply. During dry years, groundwater contributes up to 46 percent (or more) of the statewide annual supply, and serves as a critical buffer against the impacts of drought and climate change. Many municipal, agricultural, and disadvantaged communities rely on groundwater for up to 100 percent of their water supply needs. Groundwater extraction in excess of natural and managed recharge has caused historically-low groundwater elevations in many regions of California.

DWR has a long-standing history of collecting and analyzing groundwater data, investigating and reporting groundwater conditions, implementing local groundwater assistance grants, encouraging integrated water management, and providing the technical expertise needed to improve statewide groundwater management practices. In addition, DWR is responsible for implementing the Sustainable Groundwater Management Act (SGMA), the California Statewide Groundwater Elevation Monitoring (CASGEM) program, and characterizing California's groundwater basins through updates to Bulletin 118.

The Sustainable Groundwater Management (SGM) Program

To implement the increased responsibilities given to DWR by the 2014 Sustainable Groundwater Management Act (SGMA), DWR has expanded its existing local assistance programs in the Division of Integrated Regional Water Management (DIRWM) and has developed a Strategic Plan for the Sustainable Groundwater Management (SGM) program. [More info...](#)

Groundwater Information Center (GIC)

The Groundwater Information Center (GIC) is DWR's portal for groundwater basics, technical groundwater information, groundwater management plans, water well basics, and statewide reports, maps, and figures. [More info...](#)

