

# Groundwater Districts of the Sacramento Basin\*

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## Abstract

Geological boundaries of the Sacramento Valley have formed multiple groundwater basins within it. Features such as the Sutter Buttes volcanic field have greatly affected the location, shape, and depth of groundwater reserves. The Sustainable Groundwater Act of 2014 has set goals of sustainability through local management. Many of the groundwater basins in the Sacramento Valley are overdrafted and listed as having medium priority for action under the Act. This paper looks at these basins, identifies their areas and Lead Agencies, and looks at how data from oil and gas wells can aid in their interpretation.

## Websites Cited

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<https://www.kqed.org/science/1914130/how-much-drinking-water-has-california-lost-to-oil-industry-waste-no-one-knows>. Website accessed June 2018.



# **GROUNDWATER DISTRICTS OF THE SACRAMENTO BASIN**

Scott Hector & Karen Blake

Hobby Energy

Pacific Section AAPG Convention – 2018

# LEAD AGENCIES

## U.S. EPA

The *Safe Drinking Water Act (SDWA)* was passed in 1974 required the U.S. EPA to develop regulations to protect underground sources of drinking water from contamination or damage associated with injection activity.

## Cal/EPA

The **State Water Pollution Control Board**, as well as **9 regional boards**, were established by the *Dickey Water Pollution Act* of 1949.

California's clean water act is the 1969 *Porter-Cologne Water Quality Control Act* (Porter-Cologne Act). Through the Porter-Cologne Act, the State Water Board and the Regional Water Boards have been entrusted with broad duties and powers to preserve and enhance all beneficial uses of the state's immensely complex waterscape.

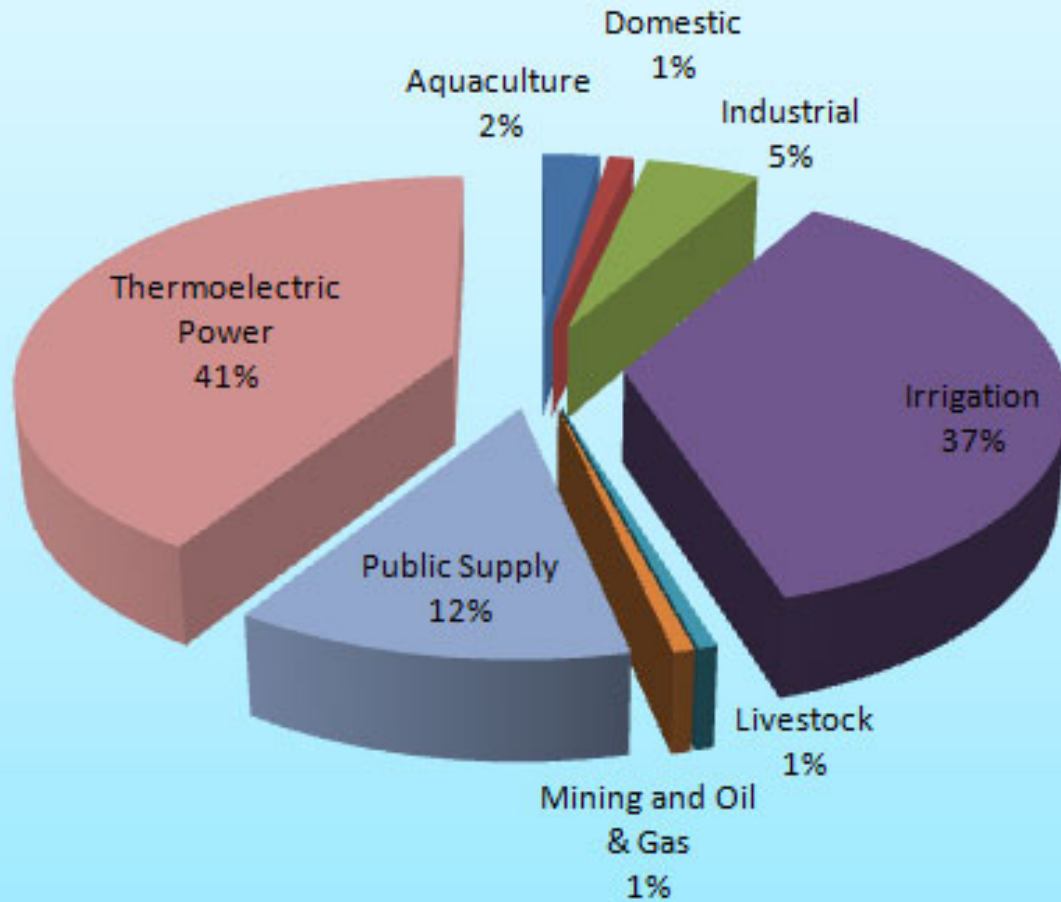
The State Water Board is separate from and has different responsibilities than the Department of Water Resources (DWR), which manages state-owned water infrastructure, such as dams, reservoirs and aqueduct. DWR, like any other water user, must apply for water rights permits from the State Water Board.

## California Natural Resources (CNR)

Department of Water Resources (DWR)

Department of Conservation / DOGGR

## Percentage of Water Used by Category



# ESTIMATED USE OF WATER IN THE UNITED STATES

(Source USGS 2005)

**Oil and gas operations  
are only part of the Mining category  
which in total comprised  
about 1% of the total water.**

# 2013 O&G WASTEWATER

In 2013, the oil and gas industry in California produced

**8 billion gallons of oil**

and

**130 billion gallons of wastewater**

In California, the oil and gas industry disposes of its waste in four primary ways:

- *Underground injection into Class II (UIC) disposal wells;*
- *Reinjection for enhanced oil recovery (EOR) - water flooding or steam injection;*
- *Irrigation, as is done in a few oil fields on the East side of Kern County; or*
- *Disposal into unlined pits.*

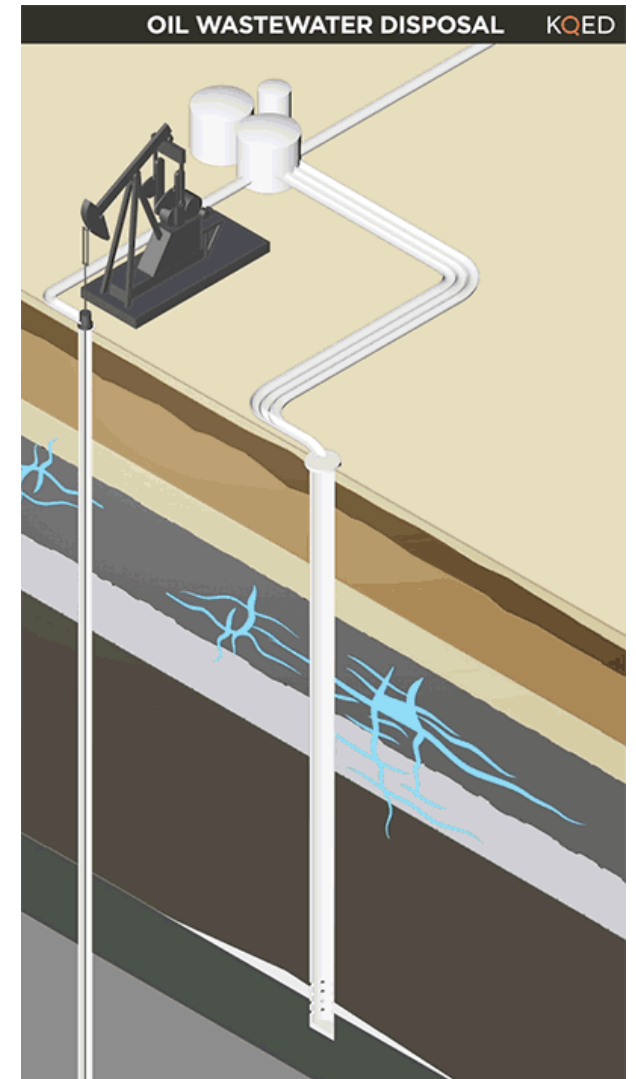
# DOGGR

## UIC Program

Thousands of projects have been approved since 1983, the year the U.S. EPA recognized the Division's UIC Program as being suitable to meet the requirements of the federal Safe Drinking Water Act for injection of fluids associated with oil and gas production.

Since then, the **Division, U.S. EPA**, and the **State Water Resources Control Board** have developed a plan to address wells injecting into non-exempt aquifers.

[Click to view video](#)





# DROUGHT

# SPRINGS

# NEW REGULATIONS

## And New Opportunities



A sign on a farm trailer reading "Food grows where water flows," hangs over dry, cracked mud at the edge of a farm April 16, 2009 near Buttonwillow, California. FILE PHOTO BY DAVID MCNEW/GETTY IMAGES



# **SUSTAINABLE GROUNDWATER MANAGEMENT ACT**

**(AB 1739, SB 1168, and SB 1319)**

The intent of the Sustainable Groundwater Management Act is to end nearly a century of over-pumping that caused thousands of wells to dry up and contributed to damaging subsidence.

Garth Stapley, The Modesto Bee



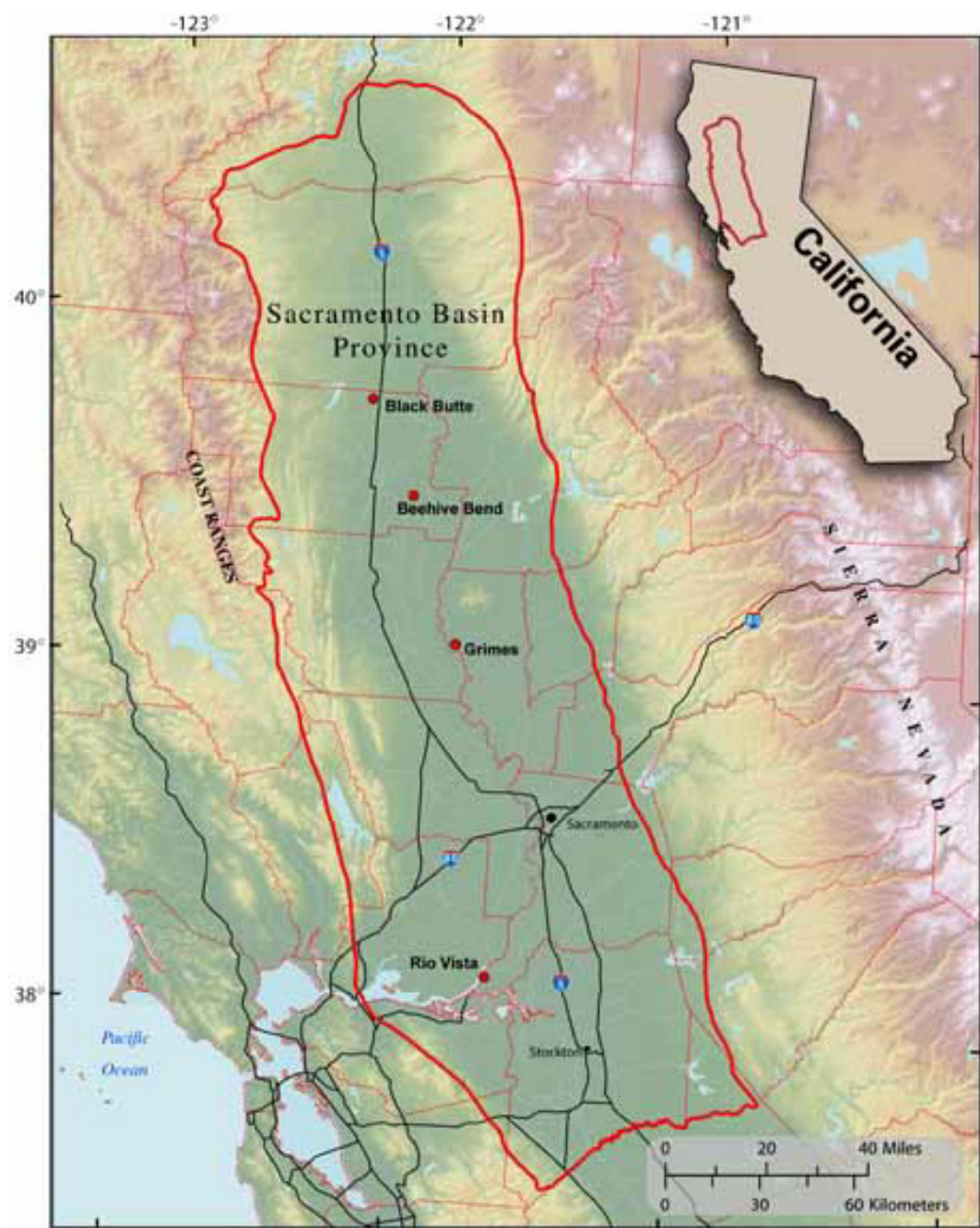
# **SUSTAINABLE GROUNDWATER MANAGEMENT ACT**

**(AB 1739, SB 1168, and SB 1319)**

SB 1168 will require groundwater basins in California, pursuant to the DWR criteria, to be managed under the Groundwater Sustainability Plan (GSP)

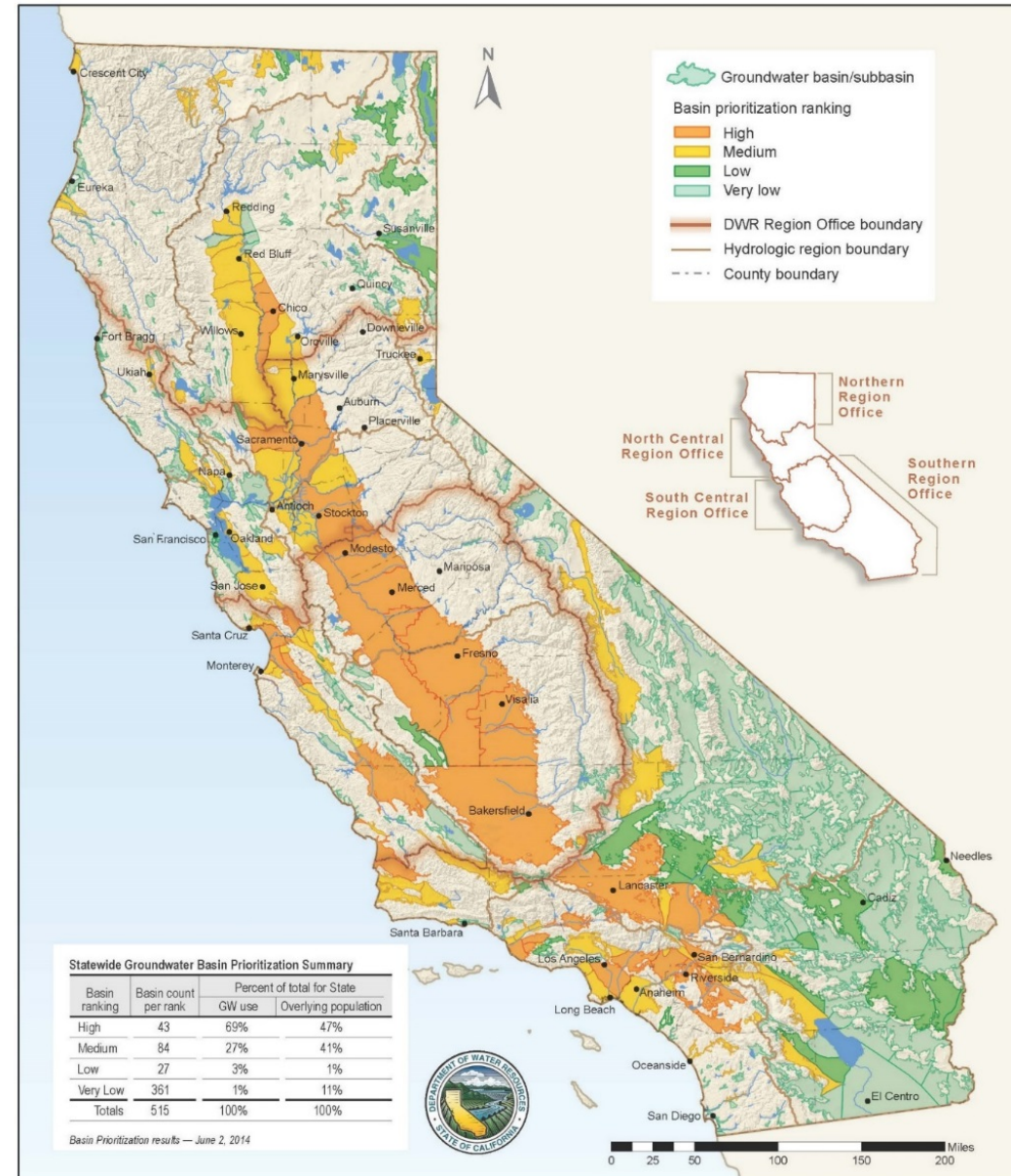
AB 1739 and SB 1319 will provide State oversight (DWR) authorization to ensure the GSPs conform to the requirements of SB 1168 and provide review of those GSPs every five years.

# USGS MAP OF SACRAMENTO BASIN PROVINCE



# CASGEM GROUNDWATER BASIN PRIORITIZATION

CASGEM Groundwater Basin Prioritization





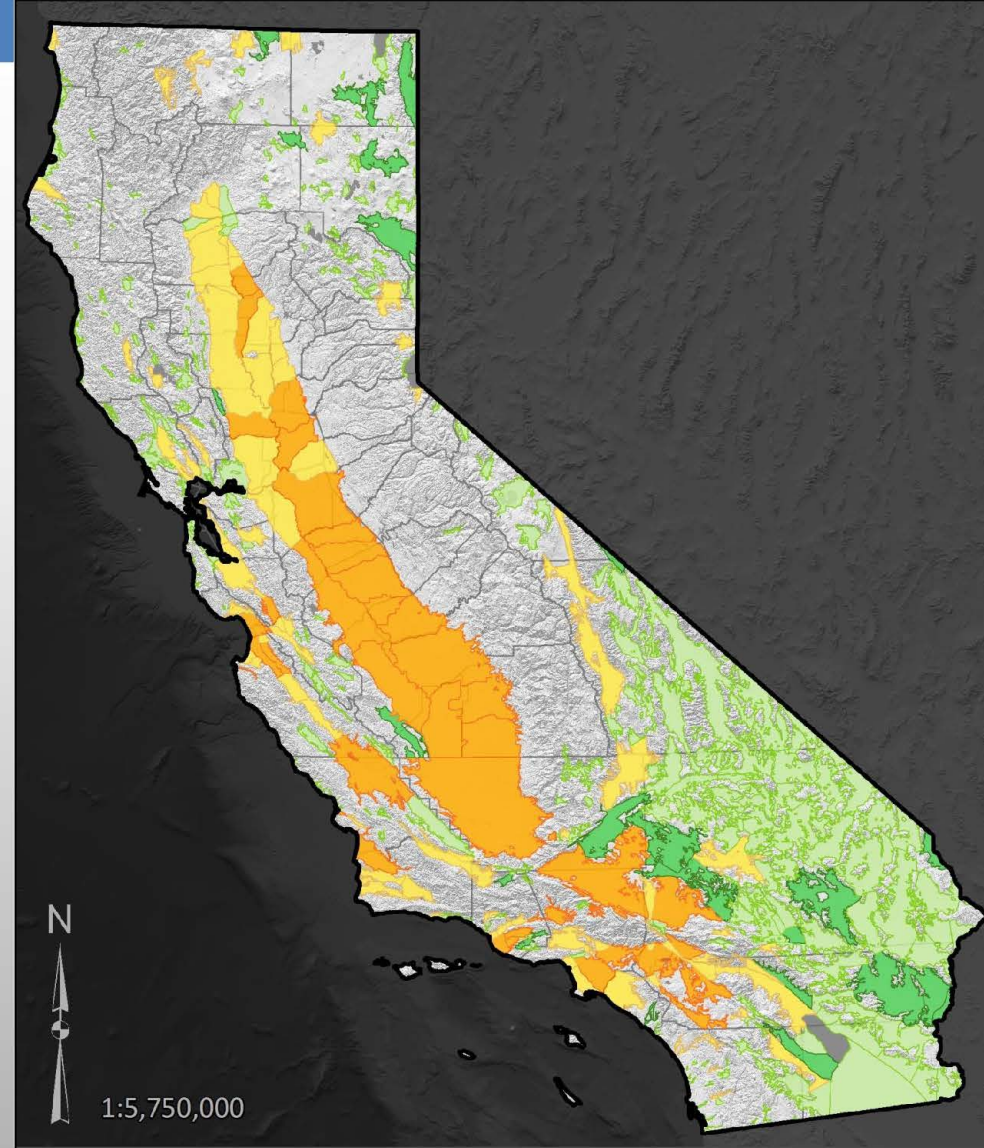
# STATEWIDE SGMA PRIORITIZATION

## STATEWIDE SGMA PRIORITIZATION

### Basins displayed by priority:

- 43 High Priority (O)
- 84 Medium Priority (Y)
- 27 Low Priority (G)
- 361 Very Low Priority (Lt. G)

Calculation involves:  
Population & Pop. Growth  
Irrigated acreage  
Public supply well distribution  
And other variables



# NUMBER OF GROUNDWATER BASINS

Hydrologic Region	CASGEM Groundwater Basin Ranking				Basin Count
	High	Medium	Low	Very Low	
	$\geq 21.08$	21.07 – 13.43	13.42 – 5.75	$< 5.75$	
North Coast	0	8	2	53	63
San Francisco Bay	0	7	0	26	33
Central Coast	9	15	0	36	60
South Coast	13	22	4	34	73
Sacramento River	5	18	4	61	88
San Joaquin River	7	2	0	2	11
Tulare Lake	7	1	1	10	19
North Lahontan	0	2	3	22	27
South Lahontan	2	4	4	67	77
Colorado River	0	5	9	50	64
Statewide:	43	84	27	361	515



# CASGEM ACCOUNT OF SACRAMENTO BASINS

## GROUNDWATER BASIN RANKING BY CASGEM

HIGH	MEDIUM	LOW	VERY LOW	BASIN COUNT
5	18	4	61	88

# SACRAMENTO BASIN HIGH BASIN RANKING BASINS

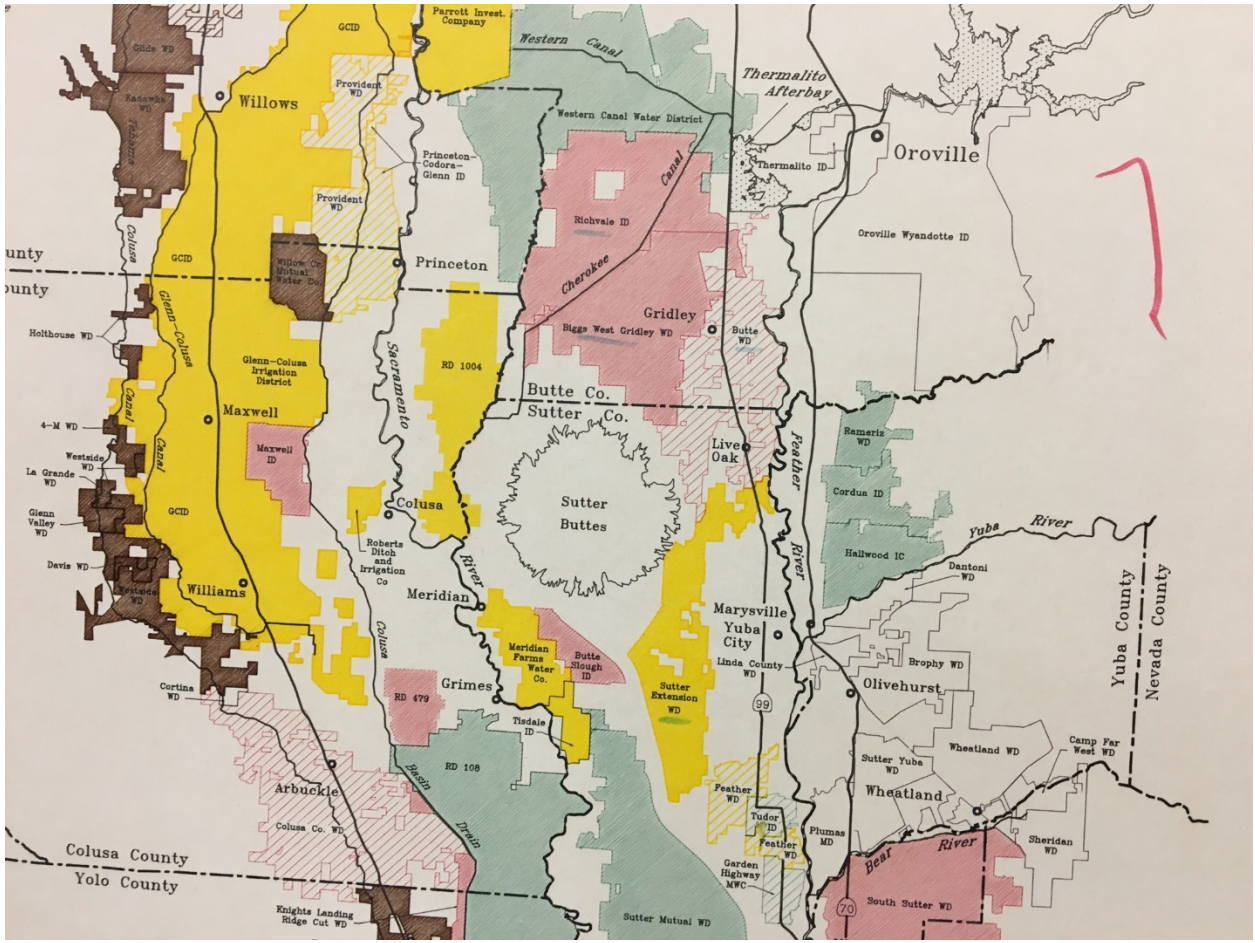
Critically Overdrafted Groundwater Basins – January 2016



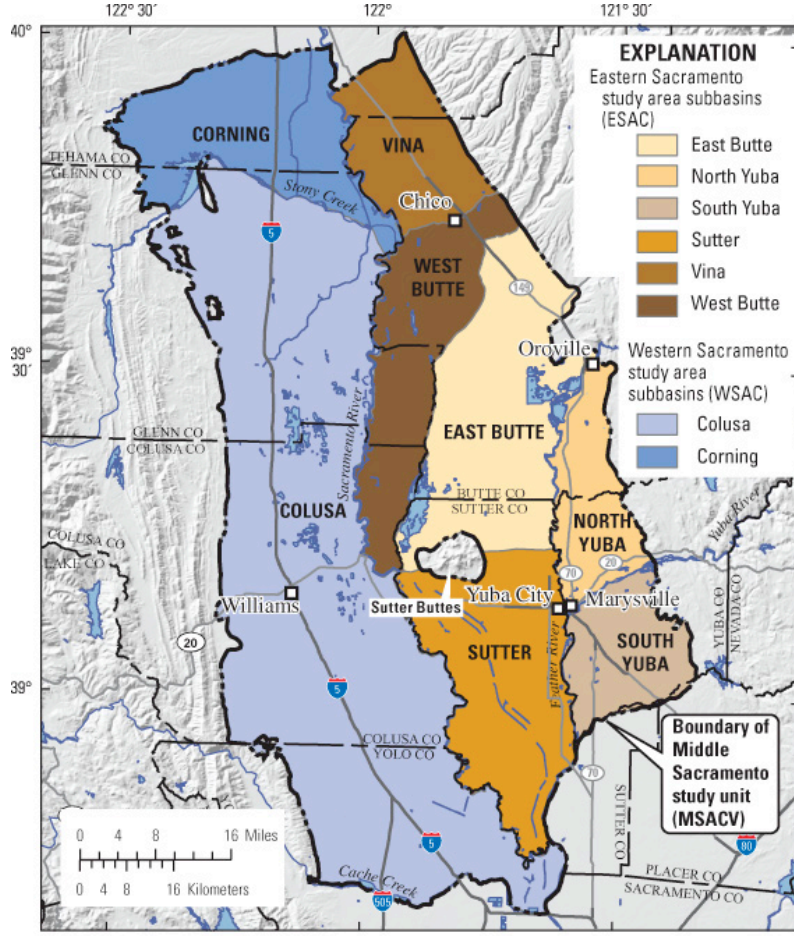
<b>SGMA NUMBER</b>	<b>BASIN NAME</b>	<b>REVISED OUTLINE</b>	<b>SGMA NUMBER</b>	<b>BASIN NAME</b>	<b>REVISED OUTLINE</b>
5.021.50	RED BLUFF		5.021.65	SOUTH AMERICAN	
5.021.51	CORNING	X	5.021.66	SOLANO	
5.021.52	COLUSA	X	5.021.67	YOLO	X
5.021.53	BEND		5.021.69	CAPAY VALLEY	
5.021.54	ANTELOPE				
5.021.55	DYE CREEK				
5.021.56	LOS MOLINOS				
5.021.57	VINA				
5.021.58	WEST BUTTE				
5.021.59	EAST BUTTE				
5.021.60	NORTH YUBA	X			
5.021.61	SOUTH YUBA				
5.021.62	SUTTER				
5.021.64	NORTH AMERICAN	X			

# Sutter Buttes Area – 2001 and Now

## Water Districts in 2001



## Sub-Basins Now







# **SUSTAINABLE GROUNDWATER MANAGEMENT ACT**

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# SUSTAINABLE GROUNDWATER MANAGEMENT ACT

Courtesy of David Sandino, DWR

## 3 Key Elements:

1. SUSTAINABILITY

2. LOCAL MANAGEMENT

3. WATER BOARDS – State will only step in if necessary to  
“OBTAIN THE SUSTAIN” (The “Backstop”)

# **Groundwater Sustainability Agencies (GSA)**

- 1. Must be Formed by June 30, 2017**
- 2. Applies to all basins – high & medium required**
- 3. Encouraged and authorized for low & very low rated sub-basins**
- 4. GSA's – one or more local public agencies with water supply, management or land use responsibilities**
- 5. Provide DWR Notice of Intent with boundaries**
- 6. Certain local agencies are designated as GSA's (e.g., Santa Clara Valley Water District, Alameda Zone 7, Alameda County, Desert Water Agency)**

# **GSA's Responsibilities for GSP**

**Prepare Groundwater Sustainability Plans (GSP) by**

- a. January 31, 2020 for critically overdrafted high & medium basins**
- b. January 31, 2022 for high & medium priority basins that are not critically overdrafted**
- c. Public hearing required**
- d. Notice to affected cities and counties**

# **GSP Sustainability Standard**

**Groundwater management that permits sustainable yield without undesirable & unreasonable results**

- 1. Chronic overdraft**
- 2. Reduction of groundwater**
- 3. Seawater intrusion**
- 4. Water quality**
- 5. Land subsidence**
- 6. Impacts on beneficial uses of surface water**

# What's In the GSP ??

1. Physical description of basin, groundwater levels, groundwater quality, subsidence, groundwater-surface water interaction, data on historical and projected water demands, monitoring and management, overdraft mitigation
2. Sustainability goal to be achieved IN 20 YEARS
3. Plan exempt from CEQA but not for the groundwater projects resulting from the GSP



# **GSA TOOL BOX**

- 1. Acquire surface water & groundwater rights**
- 2. Well Spacing**
- 3. Rotational use**
- 4. Metering**
- 5. Pumping units**
- 6. Fees for plans & water supply**
- 7. Enforcement (suit, delinquent assessments, administrative penalties)**

# SWRCB BACKSTOP

- 1. State Water Resources Control Board (SWRCB) may intervene if GSA is not formed by 2017 or if GSP is found inadequate by 2020 (critical overdraft) or 2002 (if sub-basin not in critical status)**
- 2. After 2025 if SWRCB & DWR find local plan is inadequate, SWRCB may designate basin as “probationary”**
- 3. If not cured in 180 days, SWRCB may create an interim GSP**

# CONCLUSIONS

- 1. The Sacramento Basin sub-basin contain no severely overdrafted areas**
- 2. Of the 515 areas mapped for the SGMA, only 88 are in the greater Sacramento River area, and only 18 of those are actually in the Sacramento Valley. Many of the 88 basins are small basins spread across the very northern part of the state.**
- 3. The 18 sub-basins that make up the Sacramento Valley area contain no oil fields**
- 4. The number of salt water injection wells and the amount of salt water brine from natural gas wells is very small**
- 5. Future participation by the oil and gas industry may be in providing data on the base of fresh water as mapped from the many natural gas wells drilled up and down the Sacramento Valley.**
- 6. Consultants may benefit from using this data to assist GSA's in defining the limits of the GSP's.**