

# **GROUNDWATER CONDITIONS IN THE NORTHERN SACRAMENTO VALLEY**



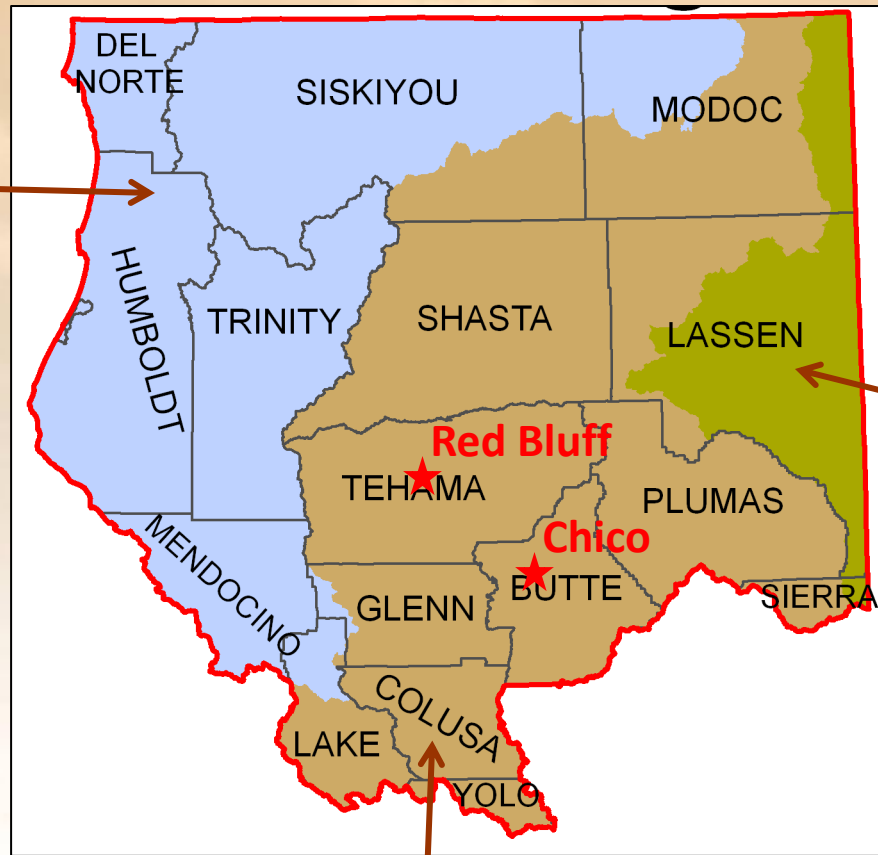
**LOCAL MANAGEMENT OF WATER RESOURCES IN THE NORTHERN SACRAMENTO VALLEY MEETING  
DECEMBER 16, 2011**



# DEPARTMENT OF WATER RESOURCES

## DIVISION OF INTEGRATED REGIONAL WATER MANAGEMENT

### NORTHERN REGION



**NORTH COAST  
HYDROLOGIC REGION**

**NORTH LAHONTAN  
HYDROLOGIC  
REGION**

**SACRAMENTO RIVER  
HYDROLOGIC REGION**



# OVERVIEW

- WATER USE IN CALIFORNIA AND THE NORTHERN SACRAMENTO VALLEY
- HYDROLOGIC CONDITIONS
- GROUNDWATER LEVEL MONITORING
- GROUNDWATER CONDITIONS
- GROUNDWATER CONDITIONS IN THE RED BLUFF DIVERSION DAM AREA

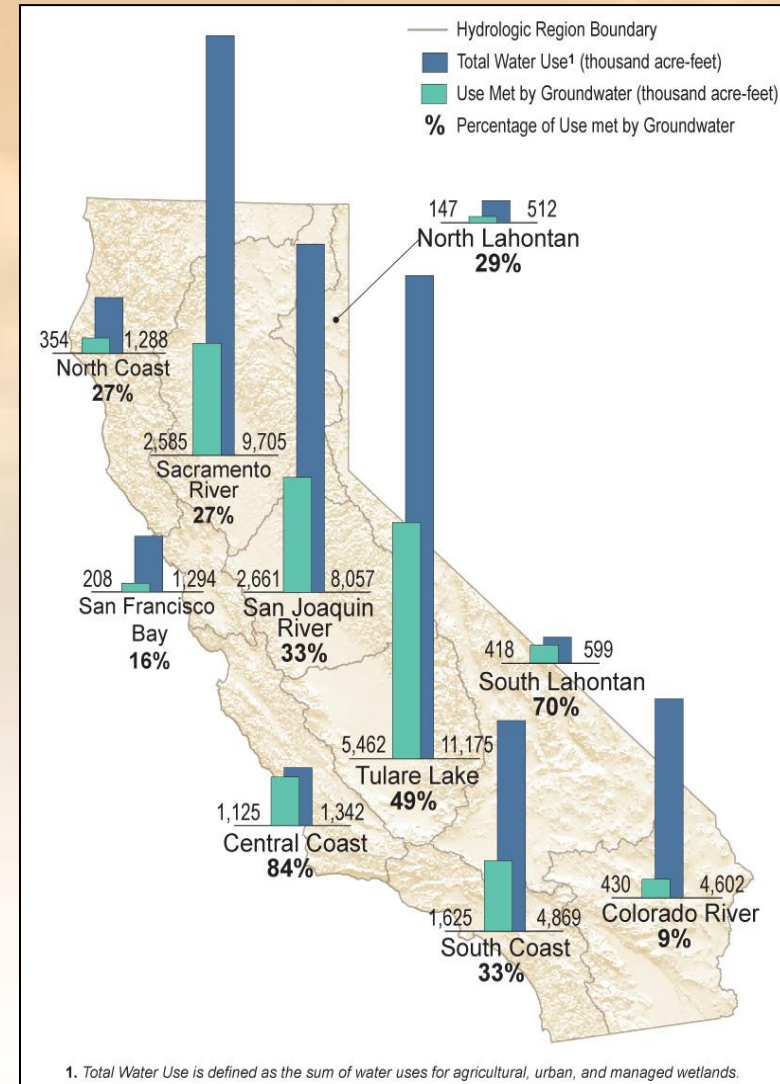


# **WATER USE IN CALIFORNIA AND THE NORTHERN SACRAMENTO VALLEY**

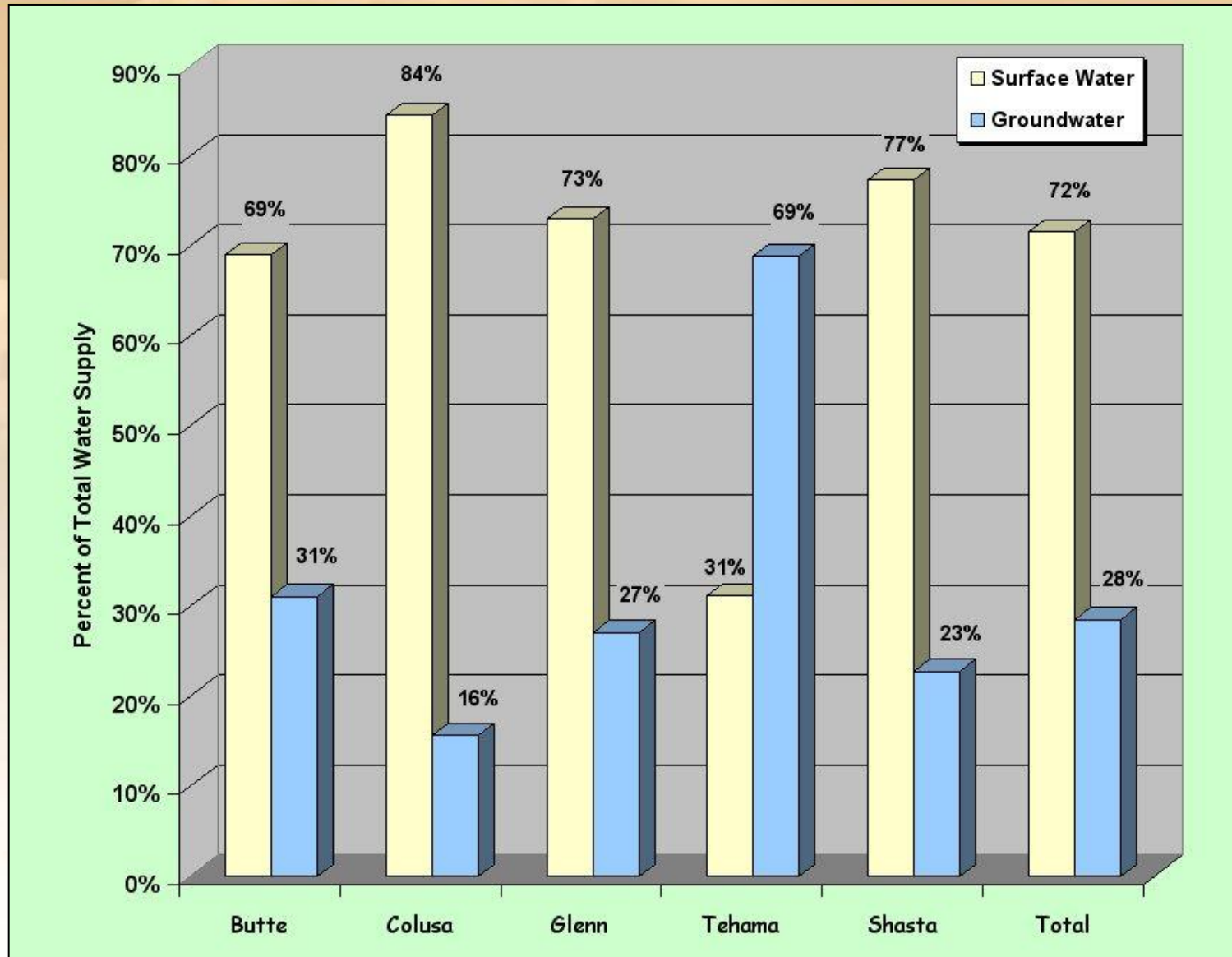


# GROUNDWATER USE IN CALIFORNIA

- 30% OF TOTAL WATER USE IS PROVIDED BY GW, ON AVERAGE
- UP TO 40% OR MORE PROVIDED BY GW IN DRY YEARS
- 43% OF CALIFORNIANS OBTAIN DRINKING WATER FROM GW
- CALIFORNIA IS THE SINGLE LARGEST USER OF GW IN THE NATION
- ESTIMATED 14.5 MAF OF GW EXTRACTED IN CA IN 1995, REPRESENTS NEARLY 20% OF ALL GW EXTRACTED IN THE U.S.
- SOME CITIES AND COASTAL BASINS ARE ENTIRELY DEPENDENT ON GROUNDWATER
- 1995 POPULATION - 32 MILLION  
2020 POPULATION - 46 MILLION



# SACRAMENTO VALLEY - WATER SUPPLY BY SOURCE



SOURCE: DWR NRO 2005 LAND & WATER USE DATA



# HYDROLOGIC CONDITIONS

- PRECIPITATION
- RUN-OFF
- RESERVOIR STORAGE

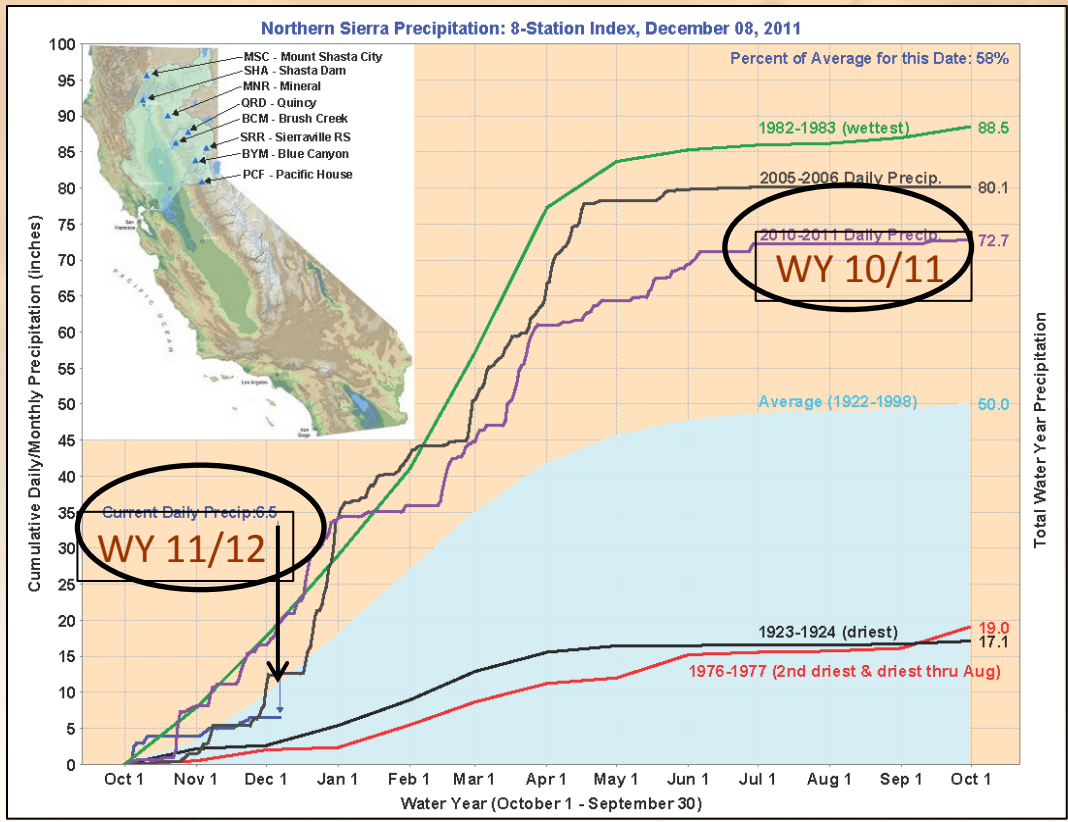


# PRECIPITATION: SACRAMENTO RIVER HYDROLOGIC REGION

Northern Sierra Precipitation: 8-Station Index  
as of 12/1/11

WY 11/12	Total (Inches)	Monthly Avg (Inches)	Percent of Monthly Avg
October	3.9	3	130
November	2.6	6.3	41
December	0	8.4	0
January		9	
February		8	
March		6.9	
April		3.9	
May		2.1	
June		1	
July		0.2	
August		0.3	
September		0.9	
Water Year Average		50	
	6.5	9.3 (Avg to date)	70% (Avg to date)

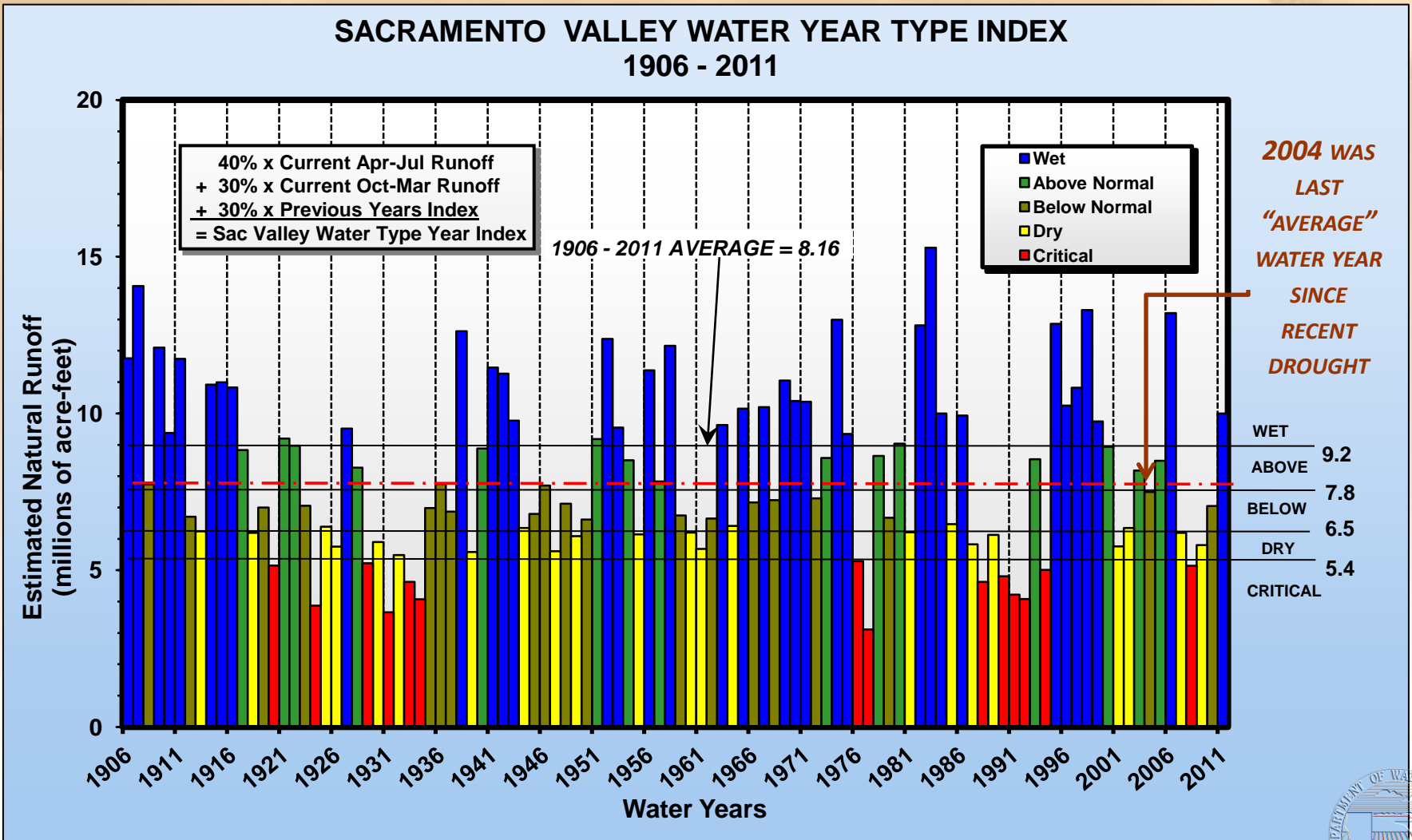
Driest Water Years		Wettest Water Years	
Inches	Year	Inches	Year
17.1	1924	84.8	1982
28.0	1931	88.5	1983
27.7	1939	85.4	1995
28.3	1976	82.4	1998
19.0	1977	80.1	2006



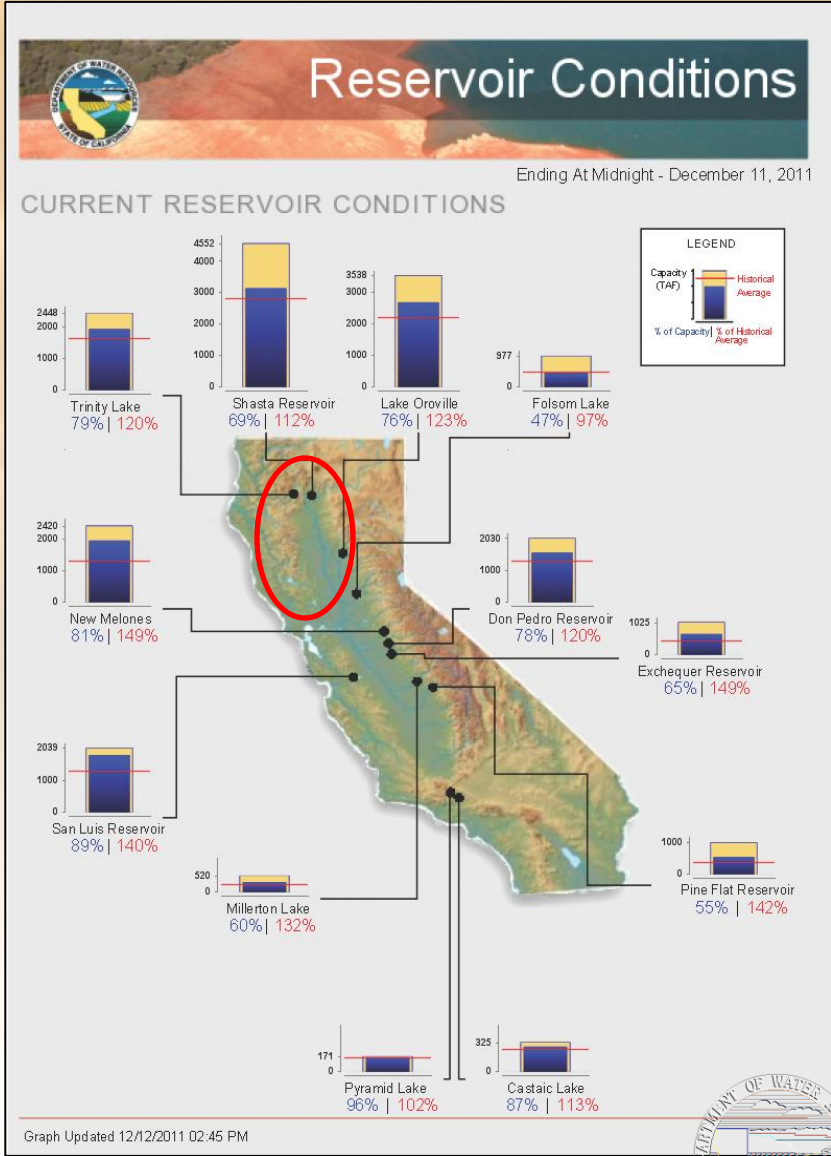
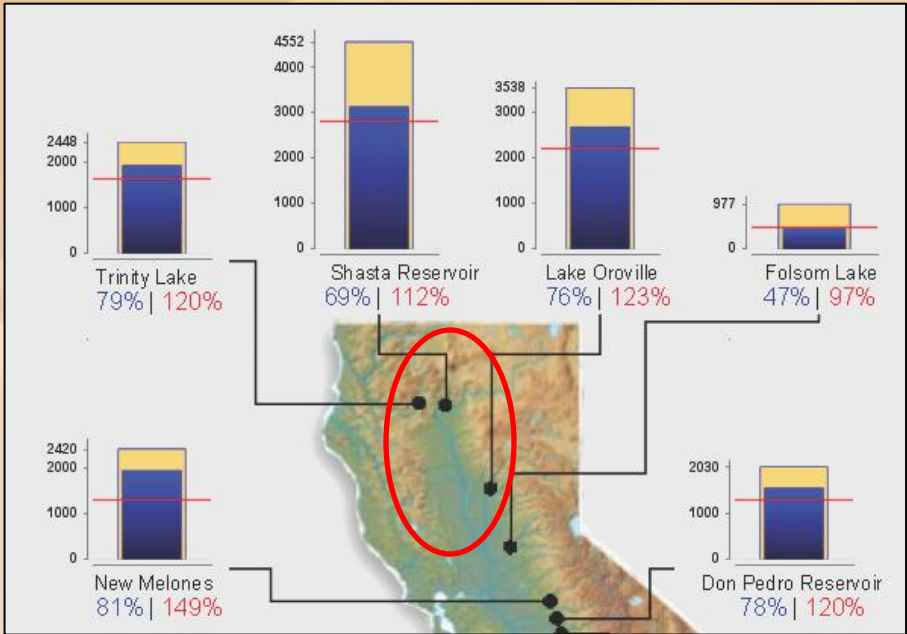


# RUN-OFF: WATER-YEAR INDEX (105 YEARS OF RECORD)

## SACRAMENTO HYDROLOGIC REGION - 77% OF AVERAGE (AS OF DEC. 1, 2011)



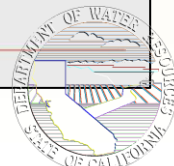
# RESERVOIR STORAGE – WATER YEAR 11/12



**SACRAMENTO RIVER HYDROLOGIC REGION**  
*AS OF 12/1/11*

- LAKE SHASTA 113 % OF AVG, 69% FULL
- LAKE OROVILLE 128 % OF AVG, 79% FULL
- TRINITY LAKE 122 % OF AVG, 81% FULL

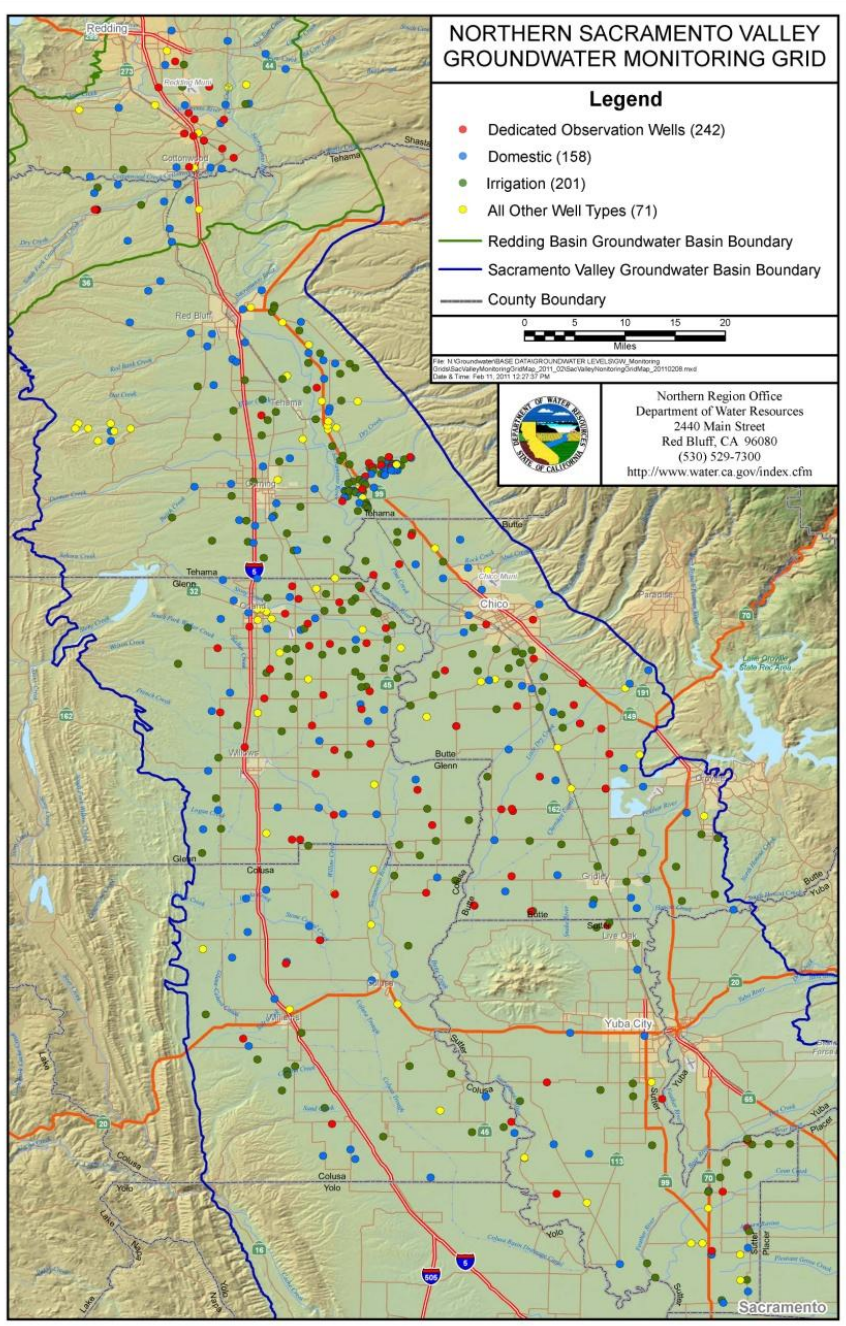
**STATEWIDE RESERVOIR STORAGE : 125 % OF AVG**



# GROUNDWATER MONITORING



# SACRAMENTO VALLEY GROUNDWATER MEASUREMENT GRID



- +/- 700 WELLS ARE MEASURED IN THE SPRING, SUMMER, AND FALL IN THE NORTHERN SACRAMENTO VALLEY
- ABOUT 200 WELLS IN THE SACRAMENTO VALLEY HAVE CONTINUOUS DATALOGGERS THAT RECORD HOURLY MEASUREMENTS
- +/- 1,300 WELLS MEASURED IN THE SPRING AND FALL IN NORTHERN CALIFORNIA



# MEASURING GROUNDWATER LEVELS



**OBSERVATION WELLS  
WITH DATALOGGERS**

## DOMESTIC WELLS



**LARGE PRODUCTION  
IRRIGATION WELLS**

## IRRIGATION WELLS



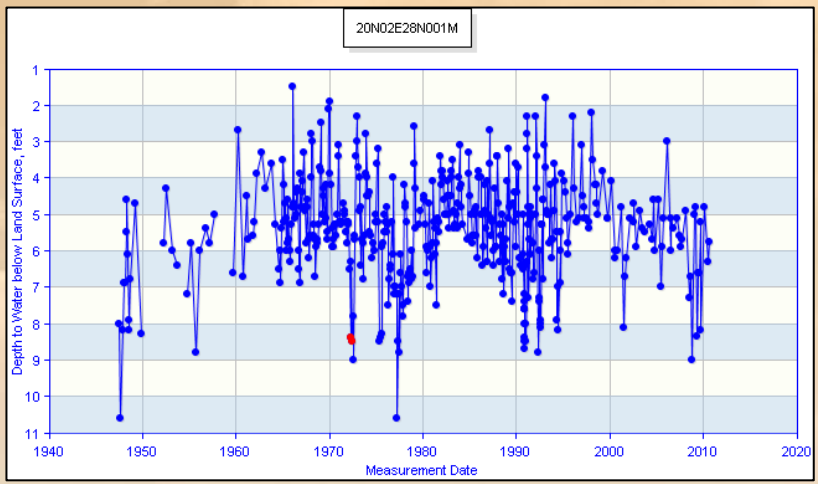
### WHAT CAN AFFECT GROUNDWATER LEVELS REGIONALLY AND LOCALLY?

- **LAND-USE CHANGES-CROP EVAPOTRANS. NEEDS MAY DIFFER CAUSING MORE OR LESS GW USAGE**
- **IRRIGATION METHOD CHANGES-IE: FLOOD IRR.-MORE POSSIBILITY OF GW RECHARGE VS. MICROSPRINKLERS-ONLY ENOUGH WATER APPLIED TO MEET THE CROPS NEEDS, LESS POSS. RECHARGE**
- **EARLY/LATE BLOOM/HARVEST-CAN SHORTEN OR EXTEND PUMPING SEASON**
- **PRECIPITATION YEAR TYPE-AFFECTS SEASONAL RECHARGE AND WATER USE**
- **PUMPING IN THE AREA OF THE WELL BEING MEASURED-MAY LOWER GROUNDWATER LEVELS IN THE MEASURED WELL**
- **THE WELL BEING MEASURED IS PUMPING-GROUNDWATER LEVELS LOWER THAN STATIC**
- **THE WELL WAS PUMPED RECENTLY-GROUNDWATER LEVELS MAY NOT HAVE RECOVERED TO STATIC**

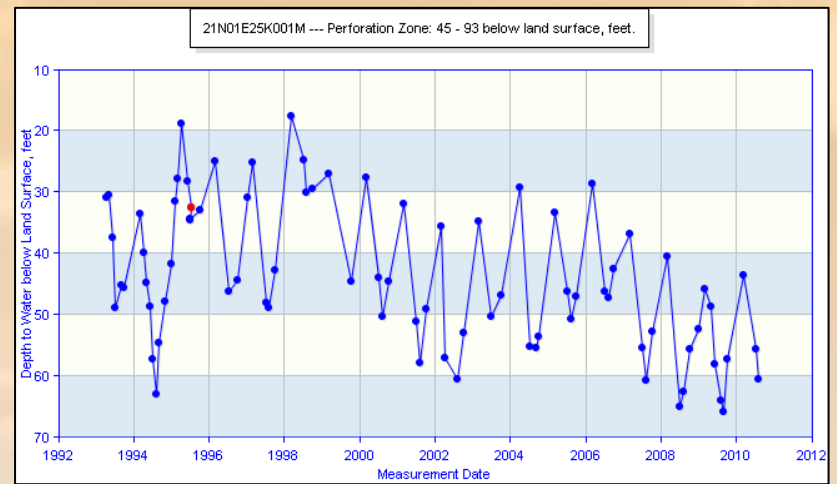


# GROUNDWATER HYDROGRAPHS

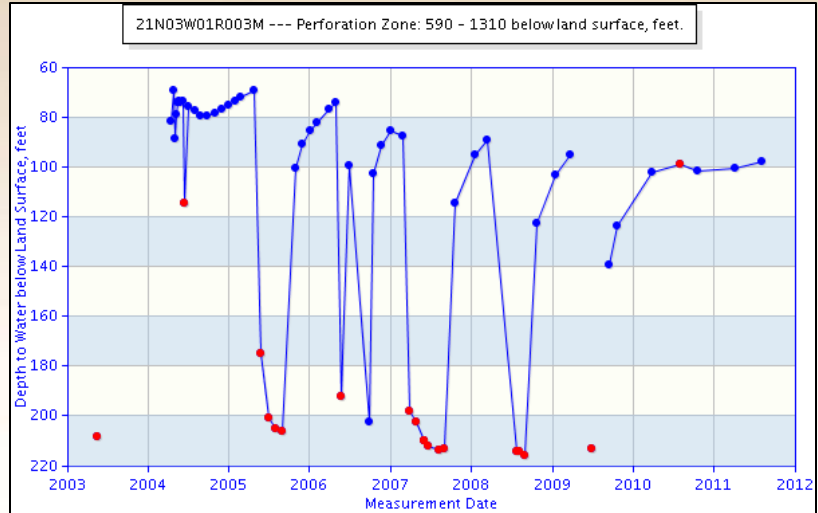
### IRRIGATION WELL



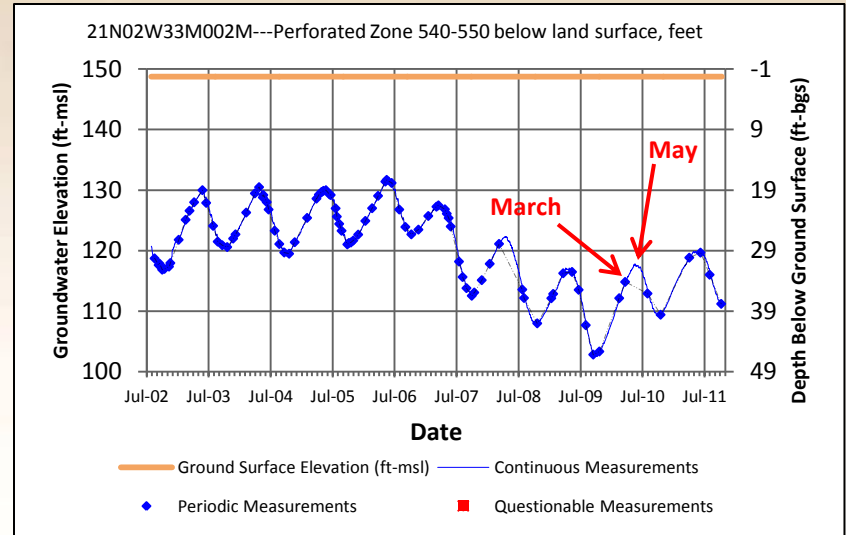
### DOMESTIC WELL



### IRRIGATION WELL - PUMPING

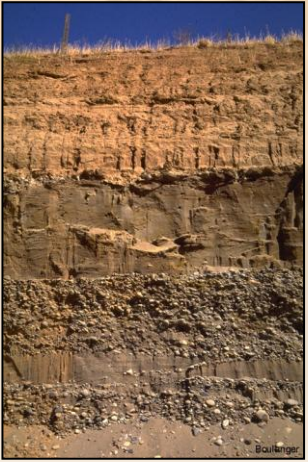


### OBSERVATION WELL

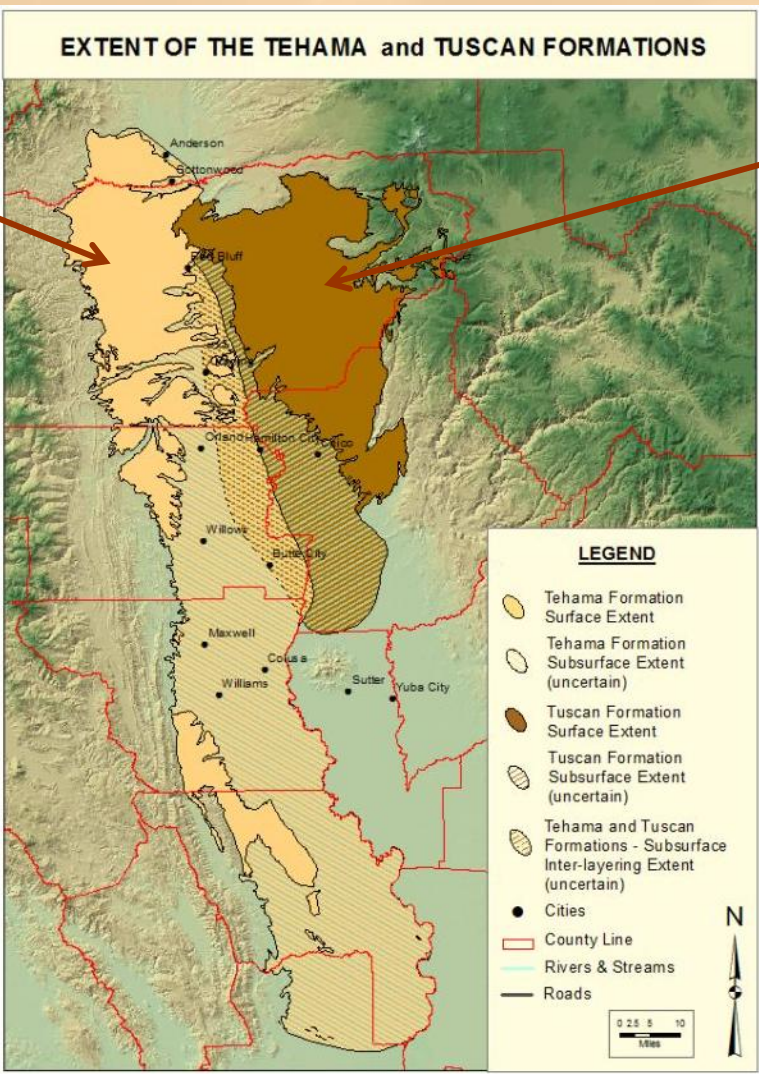


# MAJOR WATER-PRODUCING AQUIFERS IN THE NORTHERN SACRAMENTO VALLEY

**TEHAMA  
FORMATION**



**TUSCAN  
FORMATION**



# GROUNDWATER CONDITIONS



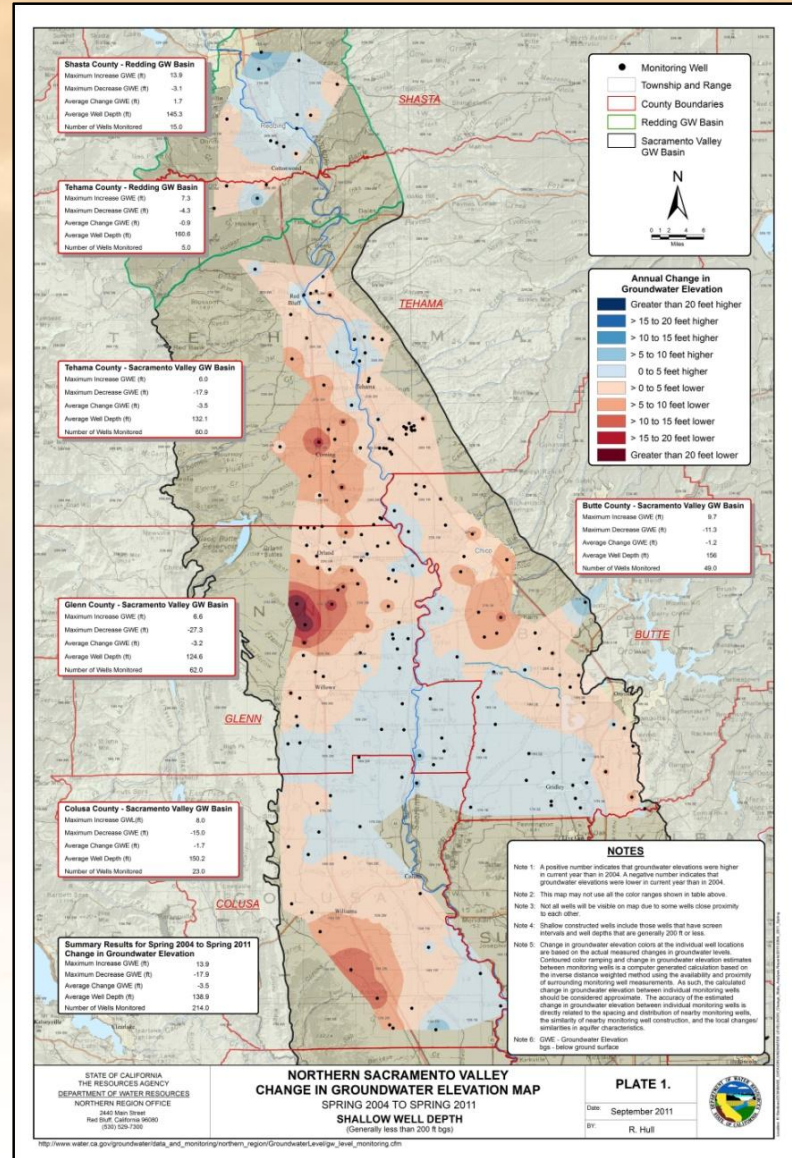
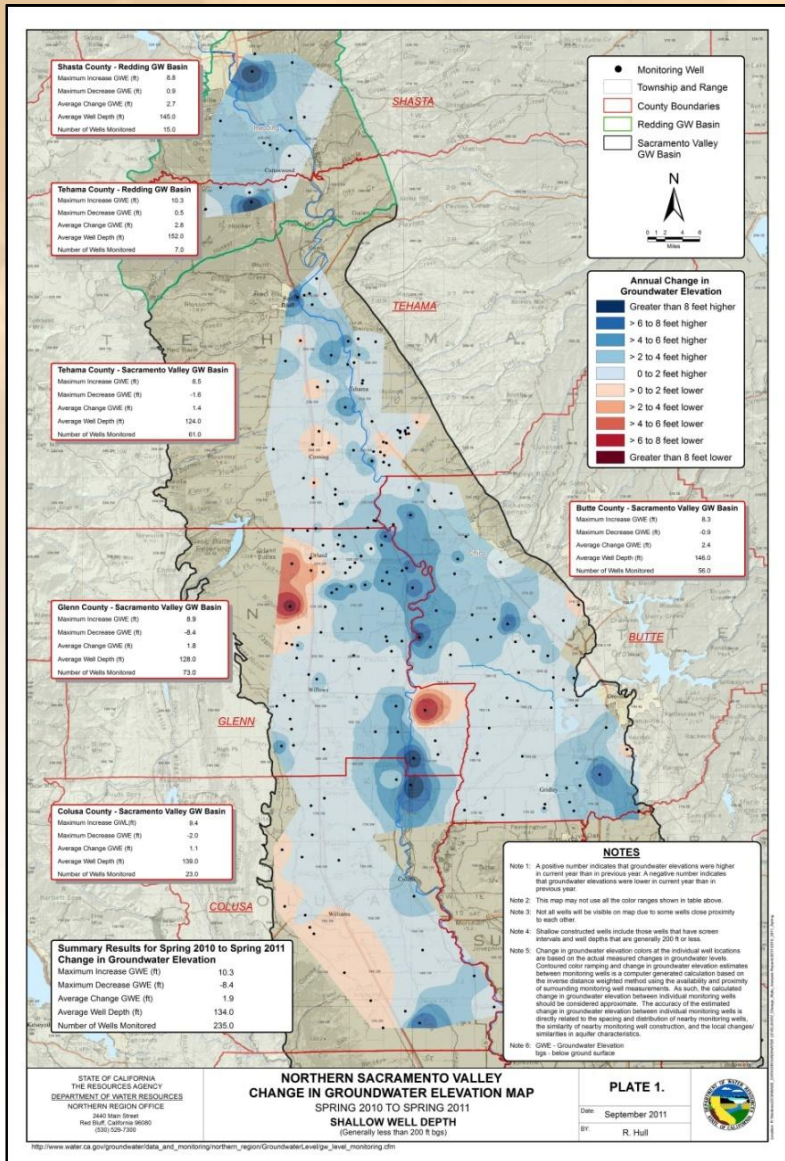


# CHANGE IN GROUNDWATER ELEVATION

WELL DEPTHS LESS THAN 200 FT

SPRING 2010 TO SPRING 2011

SPRING 2004 TO SPRING 2011

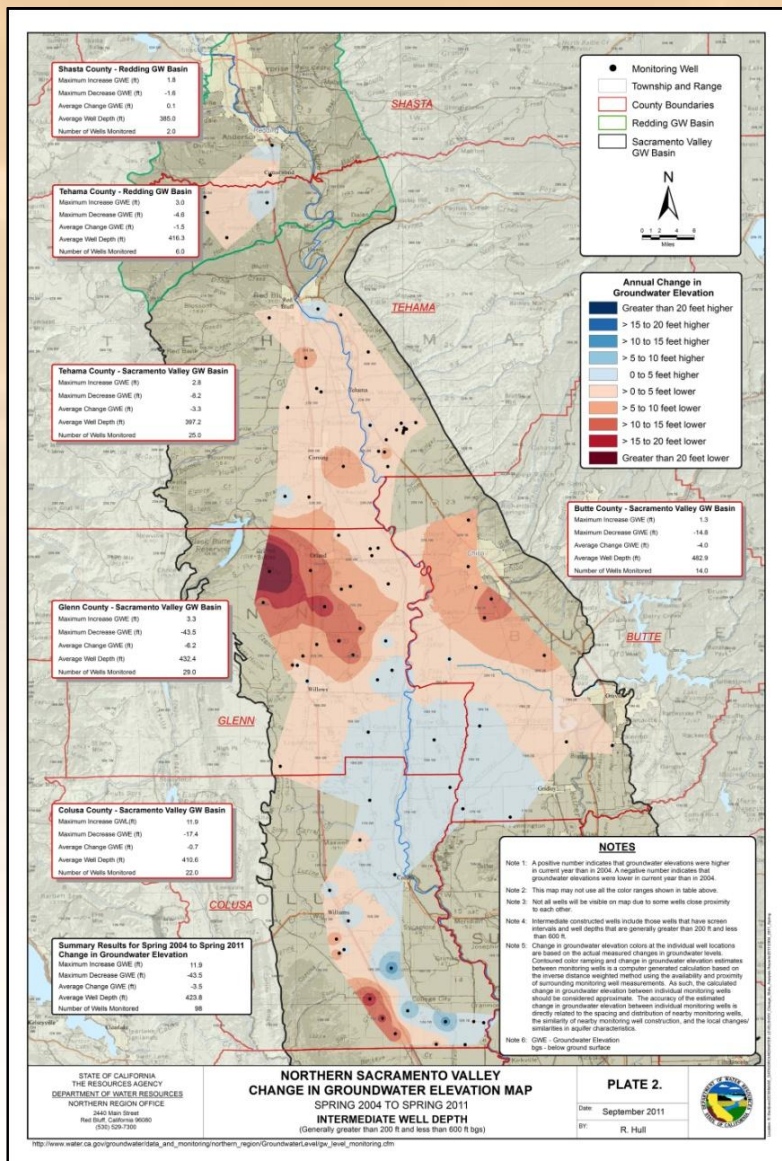
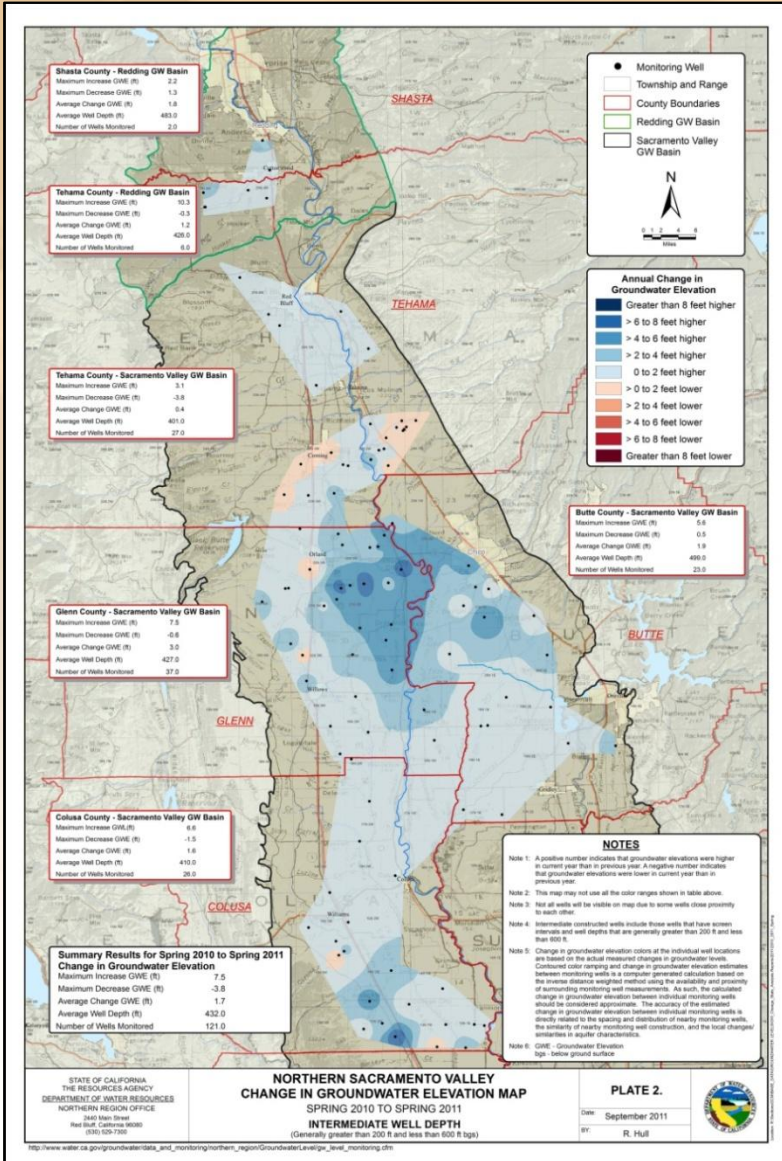


# CHANGE IN GROUNDWATER ELEVATION

WELL DEPTHS: 200 TO 600 FT

SPRING 2010 TO SPRING 2011

SPRING 2004 TO SPRING 2011

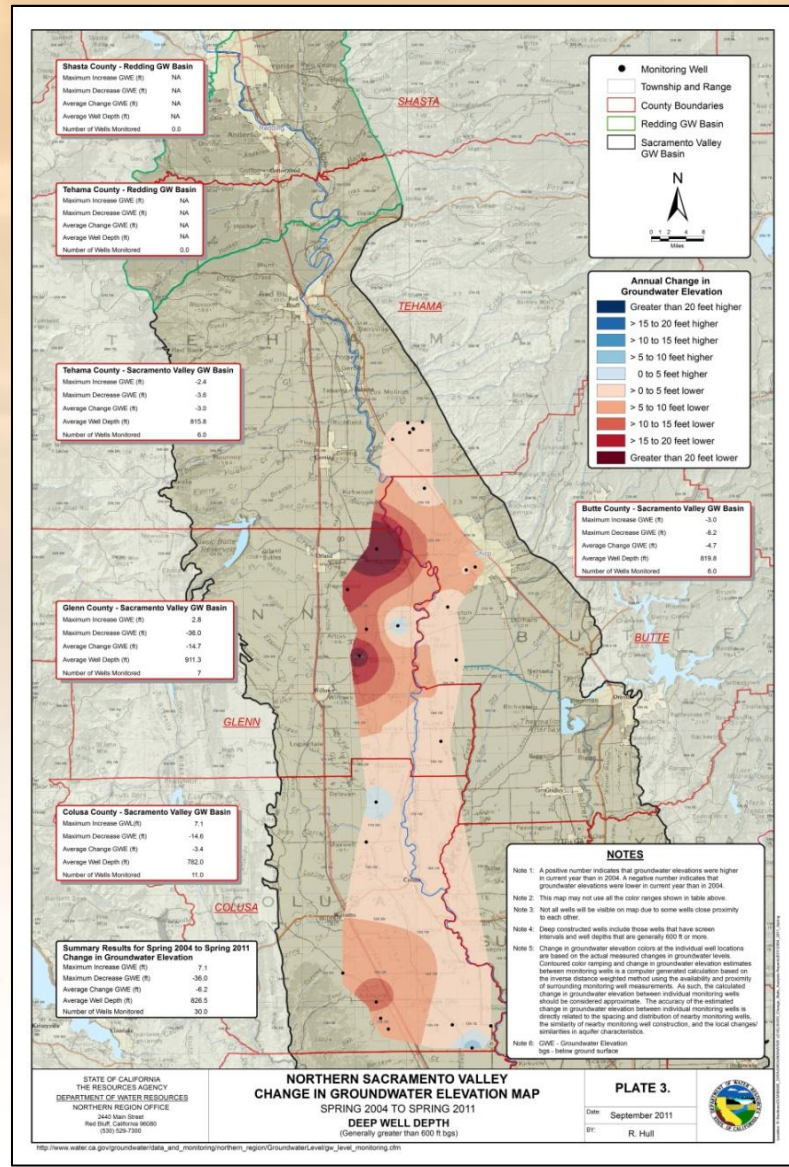
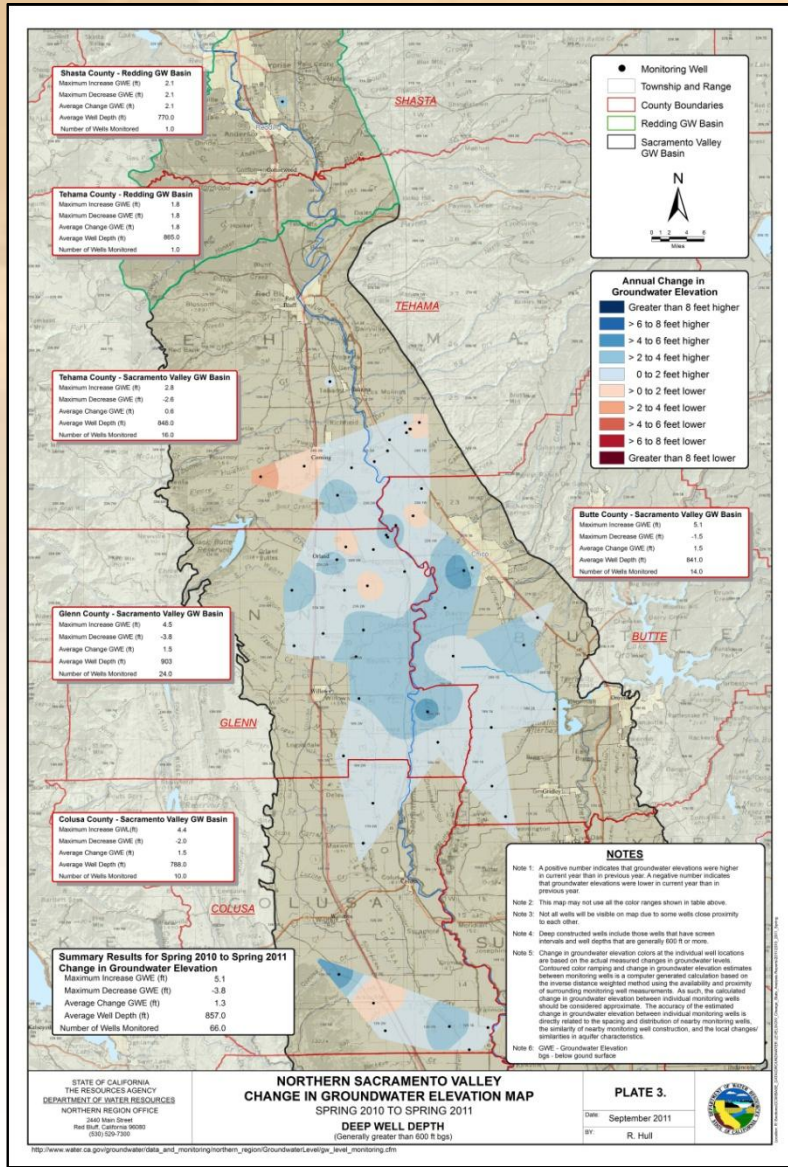


# CHANGE IN GROUNDWATER ELEVATION

WELL DEPTHS: GREATER THAN 600 FT

SPRING 2010 TO SPRING 2011

SPRING 2004 TO SPRING 2011



# AVERAGE GROUNDWATER LEVEL CHANGE (FEET)

(ALL WELL DEPTHS)

## SACRAMENTO VALLEY GROUNDWATER BASIN

	<u>SPRING 2004 TO SPRING 2011</u>	<u>SPRING 2010 TO SPRING 2011</u>
BUTTE COUNTY	-2.1	+2.1
COLUSA COUNTY	-1.6	+1.3
GLENN COUNTY	-4.9	-2.1
TEHAMA COUNTY	-3.4	+1.0
AVERAGE	-3.3	+1.7

## REDDING GROUNDWATER BASIN

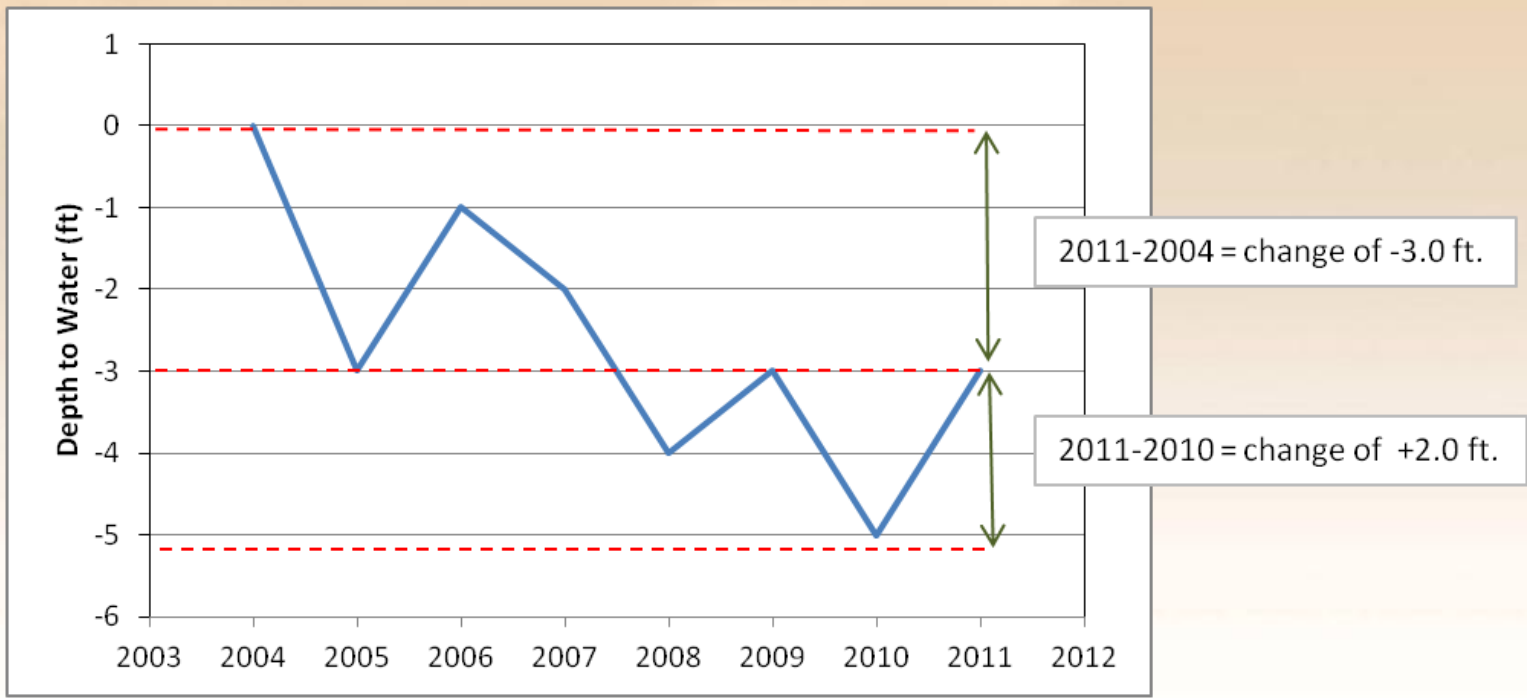
	<u>SPRING 2004 TO SPRING 2011</u>	<u>SPRING 2010 TO SPRING 2011</u>
TEHAMA COUNTY	-1.2	+2.0
SHASTA COUNTY	+1.6	+2.5
AVERAGE	+0.5	+2.3



# AVERAGE GROUNDWATER LEVEL CHANGE (FEET)

## EXAMPLE

	<u>SPRING 2004 TO SPRING 2011</u>	<u>SPRING 2010 TO SPRING 2011</u>
EXAMPLE COUNTY	-3.0	+2.0

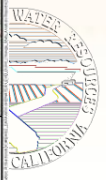
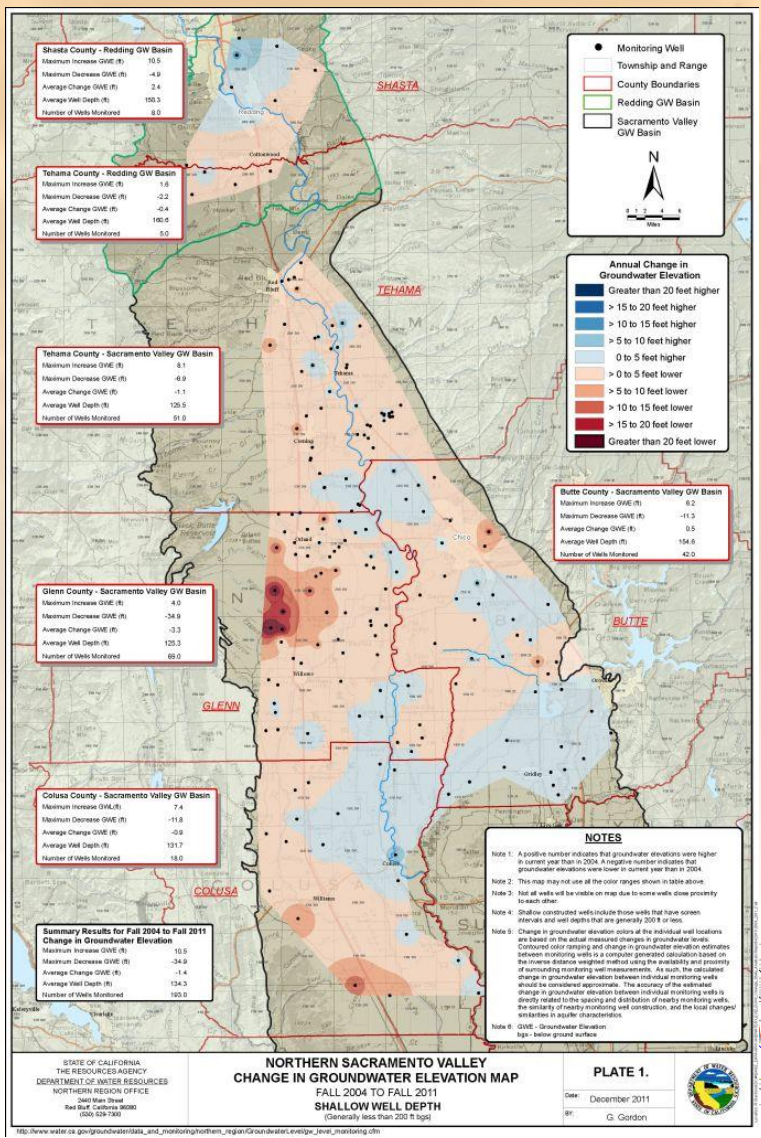
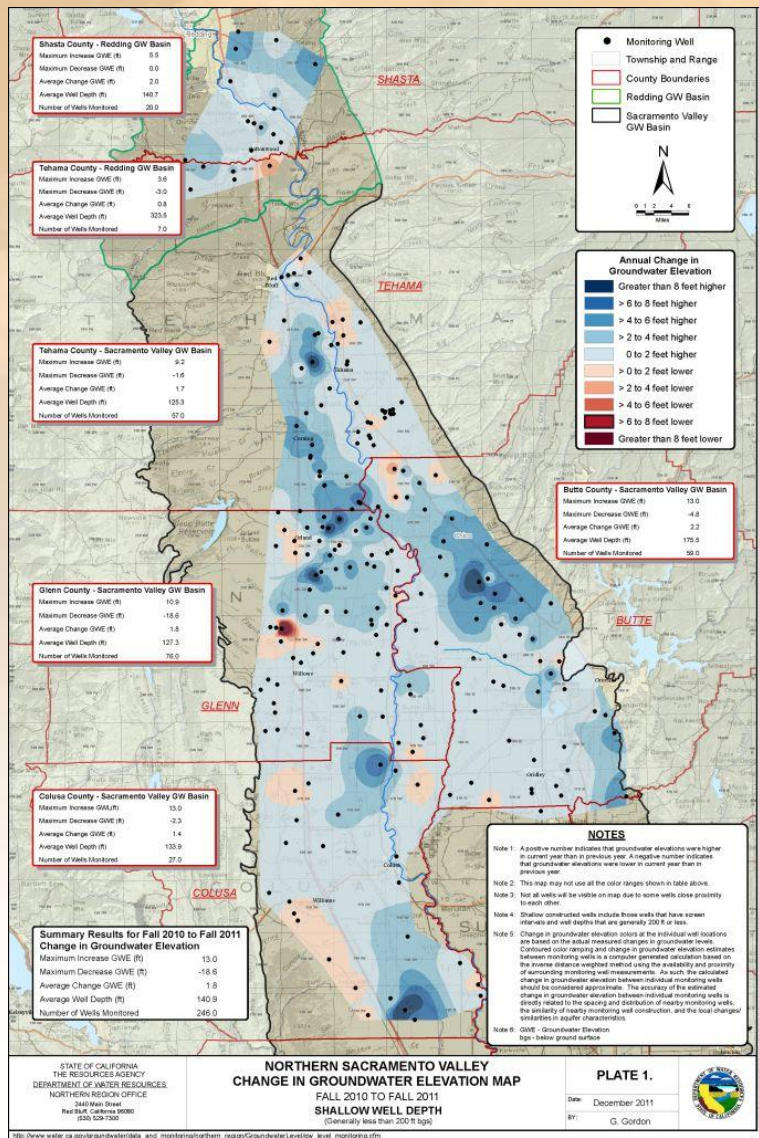


# CHANGE IN GROUNDWATER ELEVATION

## Well Depths Less than 200 ft

Fall 2010 to Fall 2011

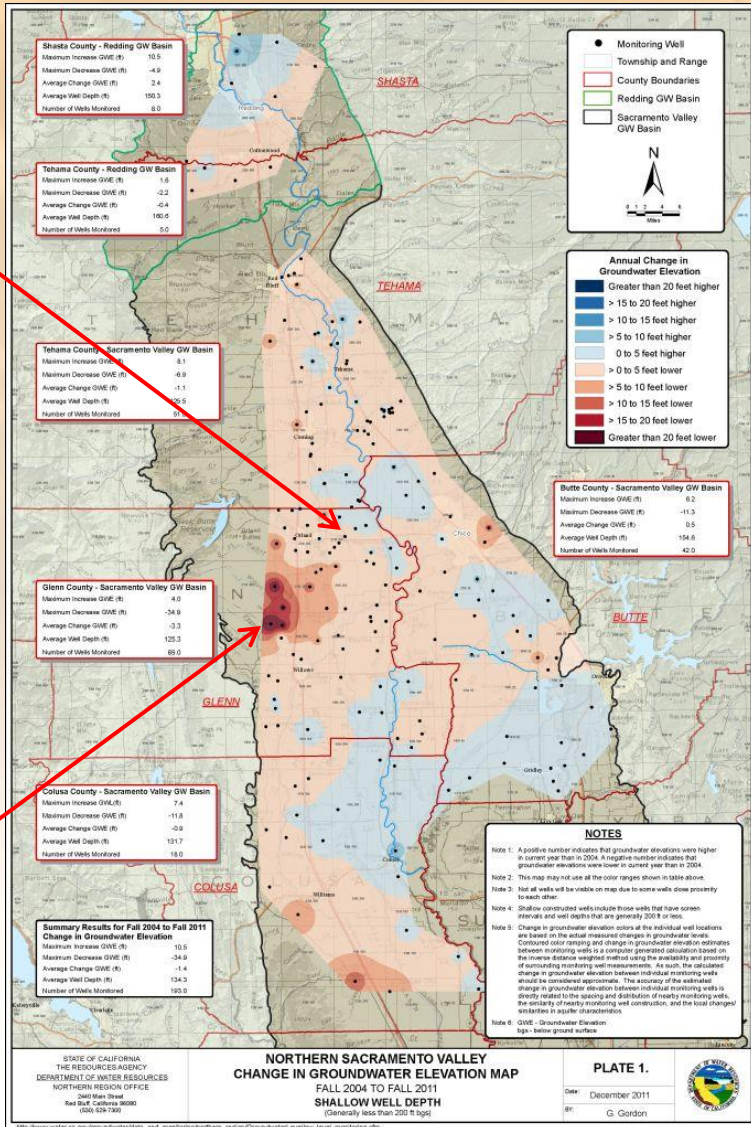
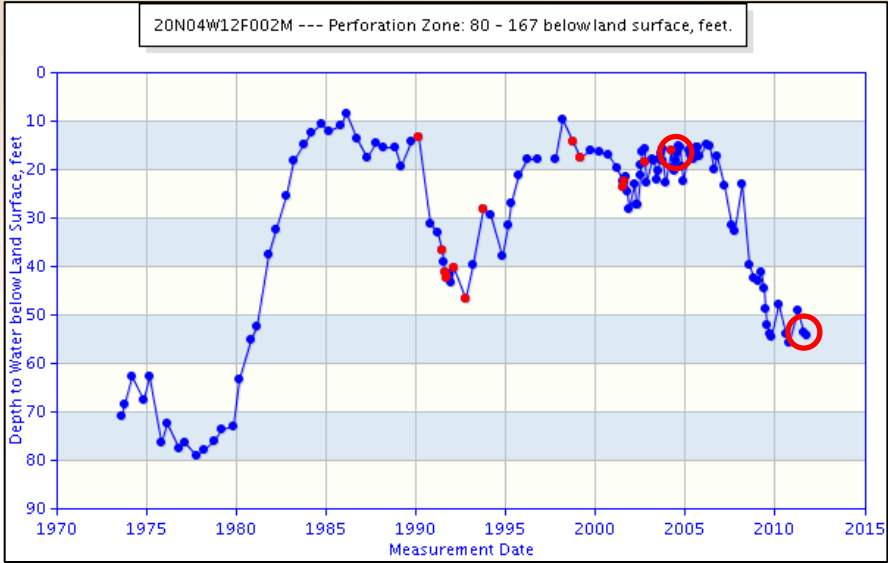
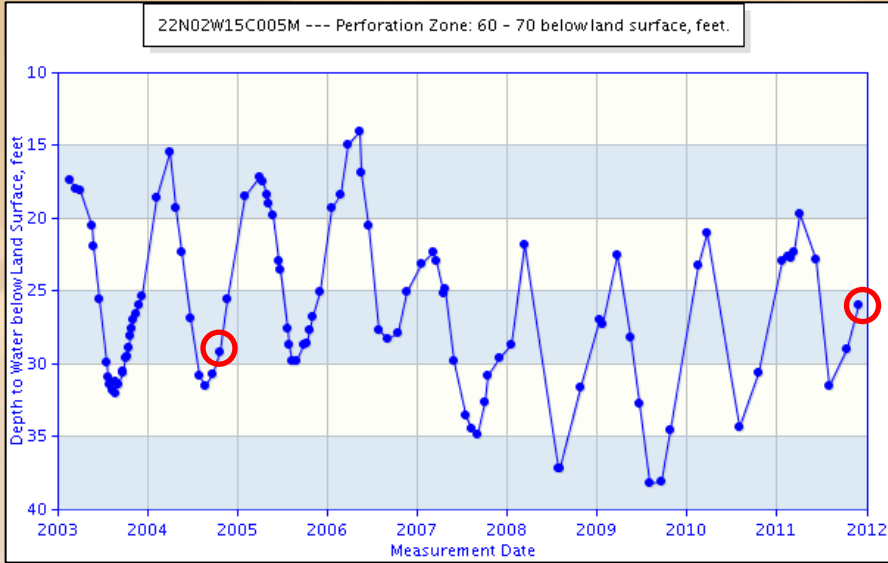
Fall 2004 to Fall 2011



# CHANGE IN GROUNDWATER ELEVATION

Well Depths Less than 200 ft

Fall 2004 to Fall 2011

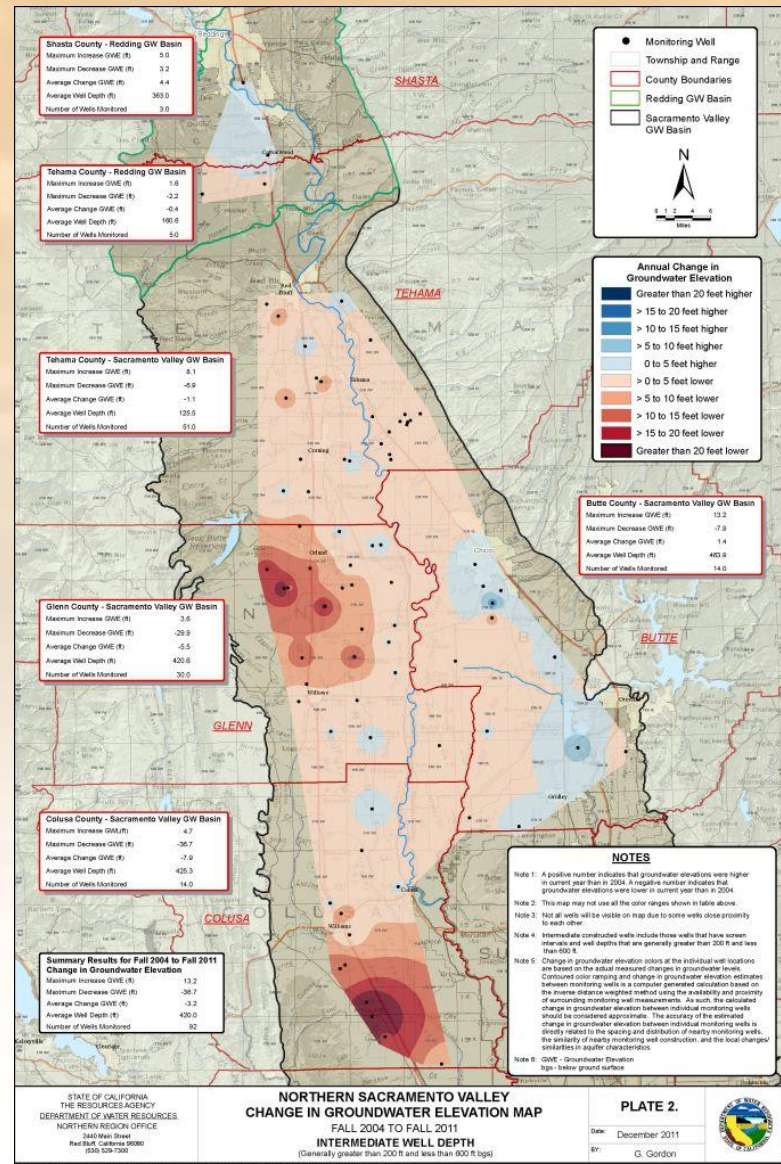
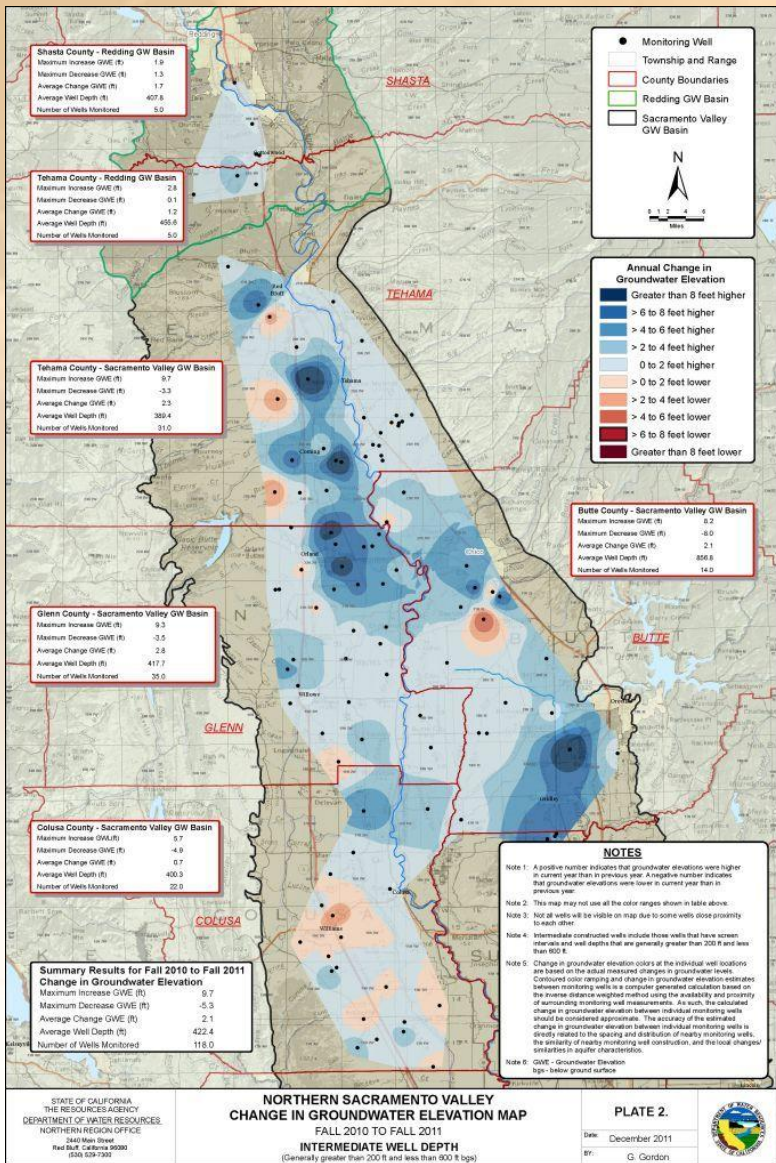


# CHANGE IN GROUNDWATER ELEVATION

Well Depths: 200 to 600 ft

Fall 2010 to Fall 2011

Fall 2004 to Fall 2011



http://www.water.ca.gov/groundwater/tables\_and\_monitoring/tables\_nvgw/groundwater/elevation\_well\_monitoring.htm

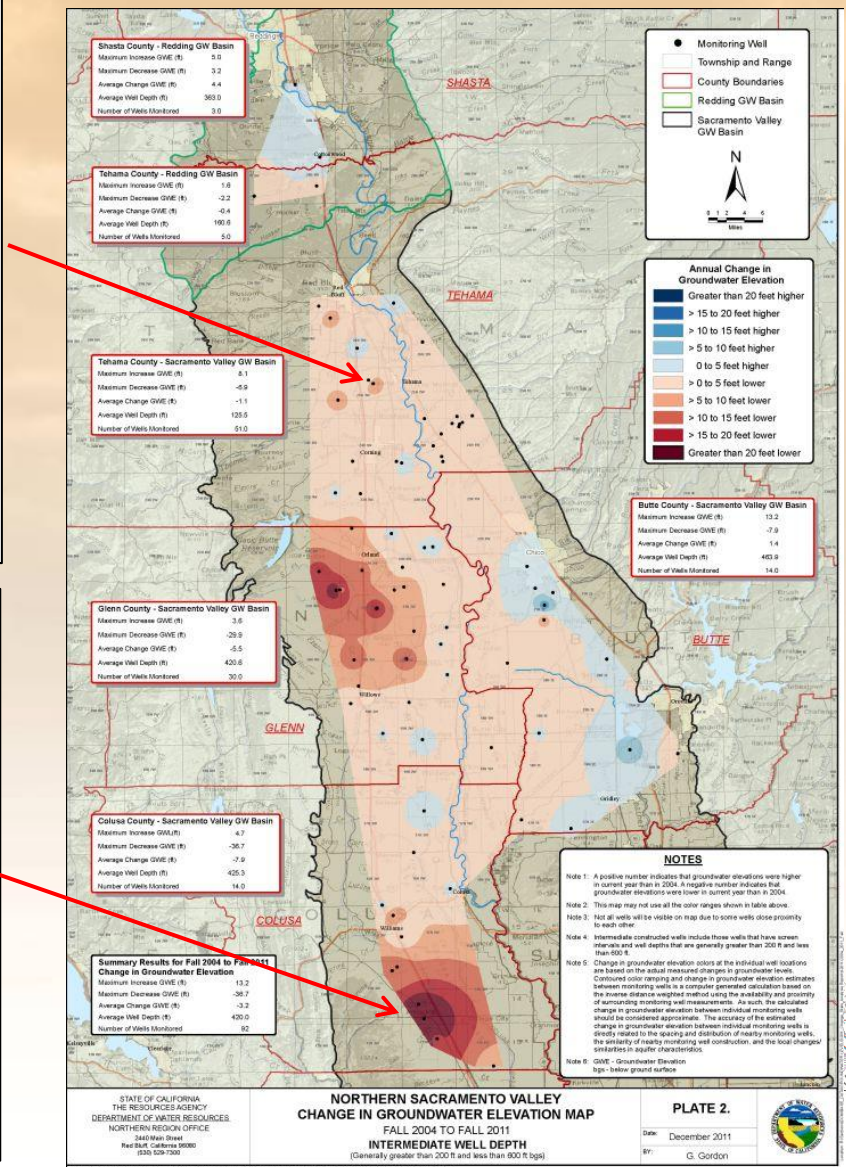
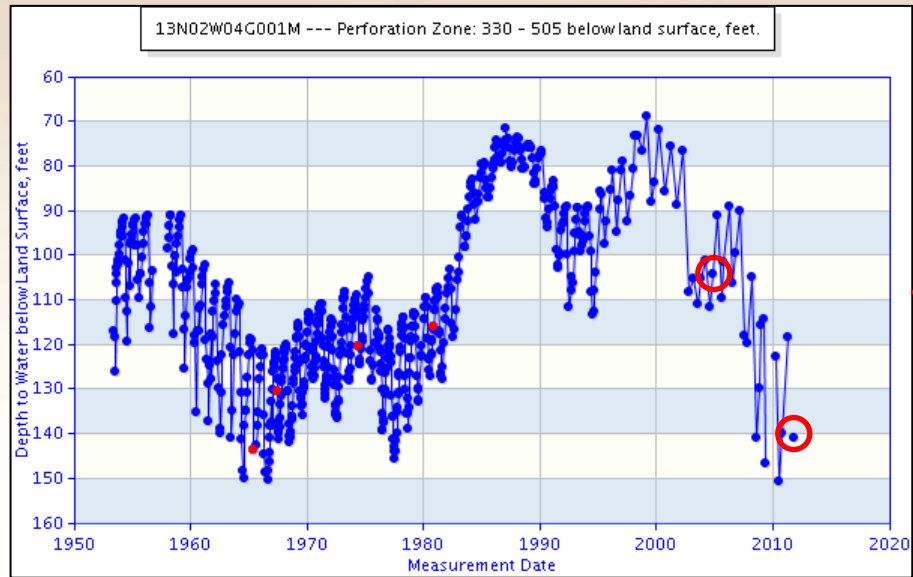
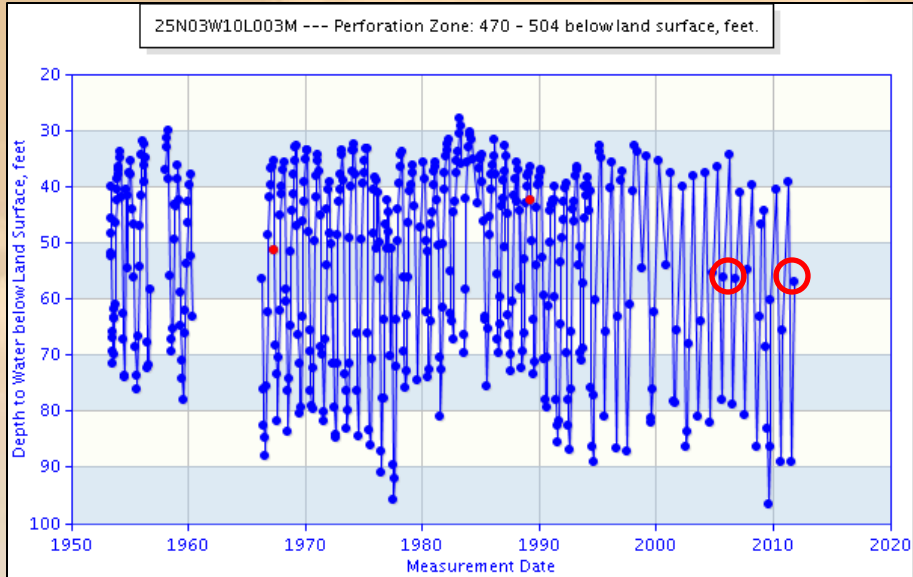
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# CHANGE IN GROUNDWATER ELEVATION

Well Depths: 200 to 600 ft

Fall 2004 to Fall 2011

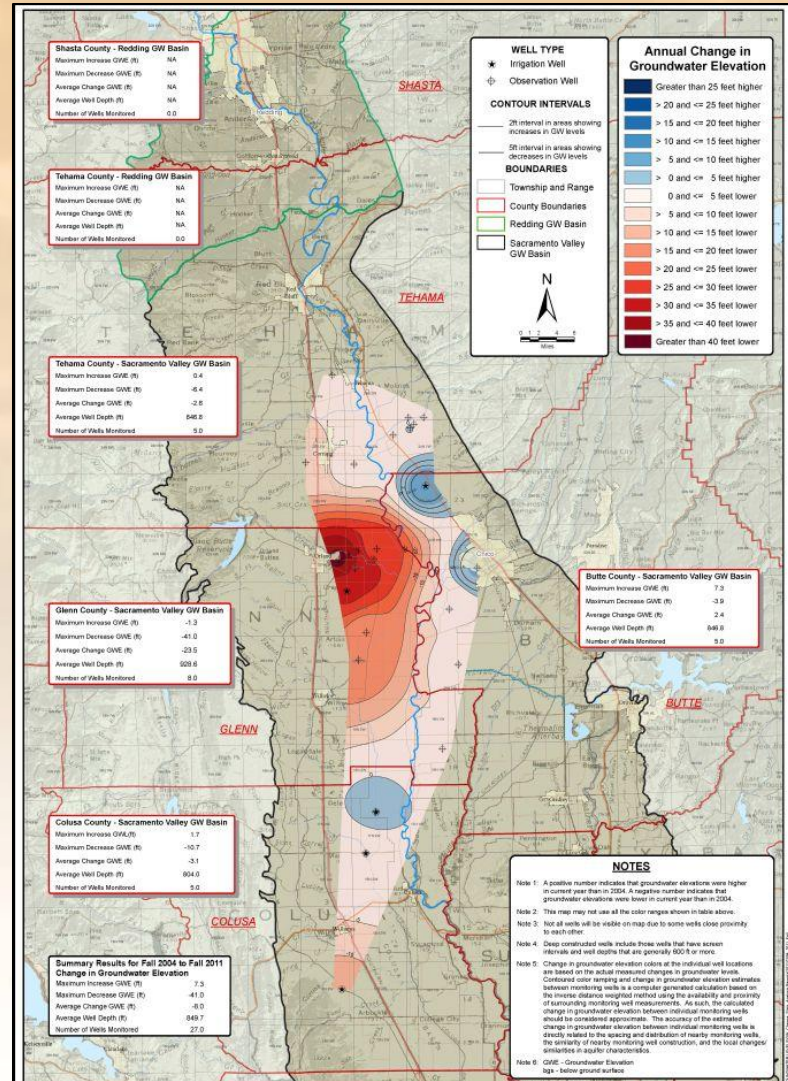
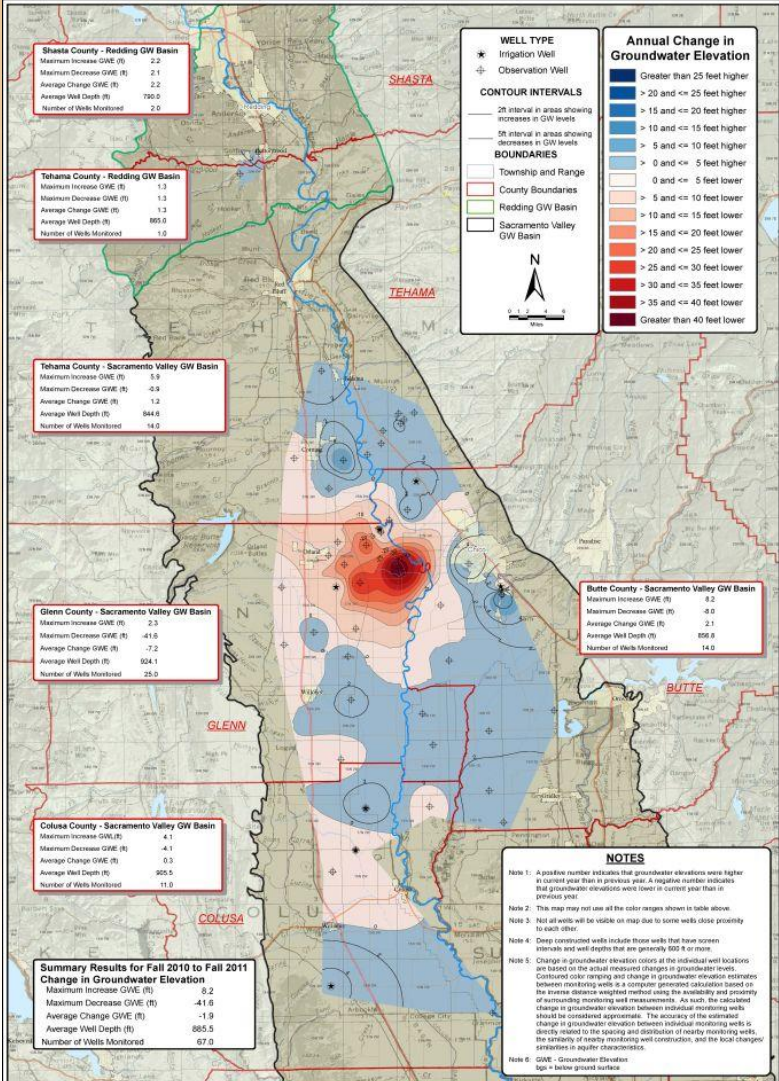


# CHANGE IN GROUNDWATER ELEVATION

Well Depths: Greater than 600 ft

Fall 2010 to Fall 2011

Fall 2004 to Fall 2011

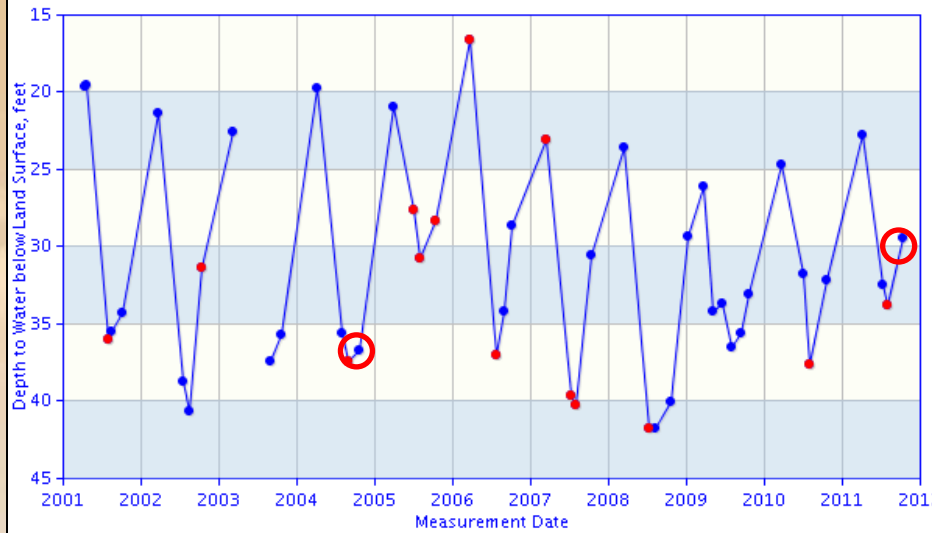


# CHANGE IN GROUNDWATER ELEVATION

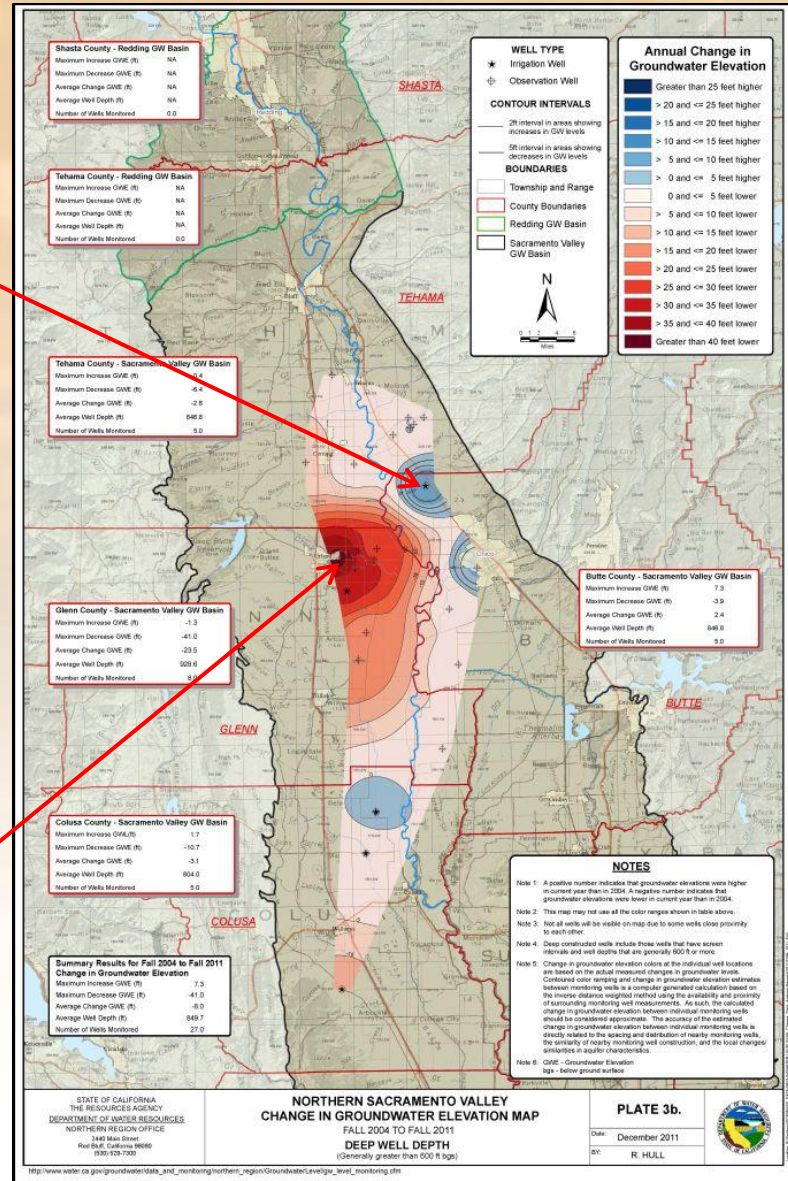
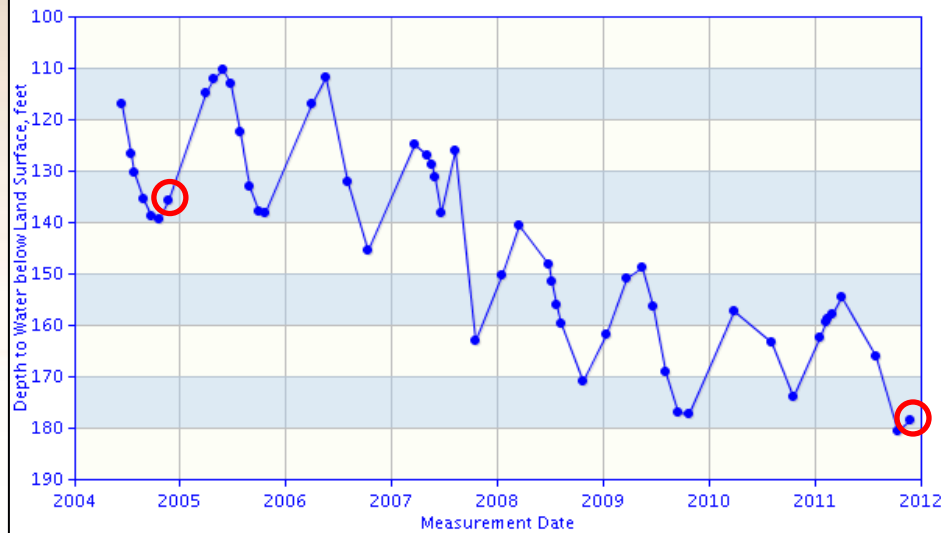
Well Depths: Greater than 600 ft

Fall 2004 to Fall 2011

Z3N01W10E001M --- Perforation Zone: 600 - 668 below land surface, feet.



Z2N03W24E001M --- Perforation Zone: 800 - 820 below land surface, feet.



# AVERAGE GROUNDWATER LEVEL CHANGE (FEET)

(ALL WELL DEPTHS)

## SACRAMENTO VALLEY GROUNDWATER BASIN

	<u>FALL 2004 TO FALL 2011</u>	<u>FALL 2010 TO FALL 2011</u>
BUTTE COUNTY	+0.8	+2.2
COLUSA COUNTY	-3.8	+1.0
GLENN COUNTY	-5.4	-0.4
TEHAMA COUNTY	-1.5	+0.7
AVERAGE	-2.8	+1.3

## REDDING GROUNDWATER BASIN

	<u>FALL 2004 TO FALL 2011</u>	<u>FALL 2010 TO FALL 2011</u>
TEHAMA COUNTY	-0.5	+1.0
SHASTA COUNTY	+2.9	+2.0
AVERAGE	+1.4	+1.7



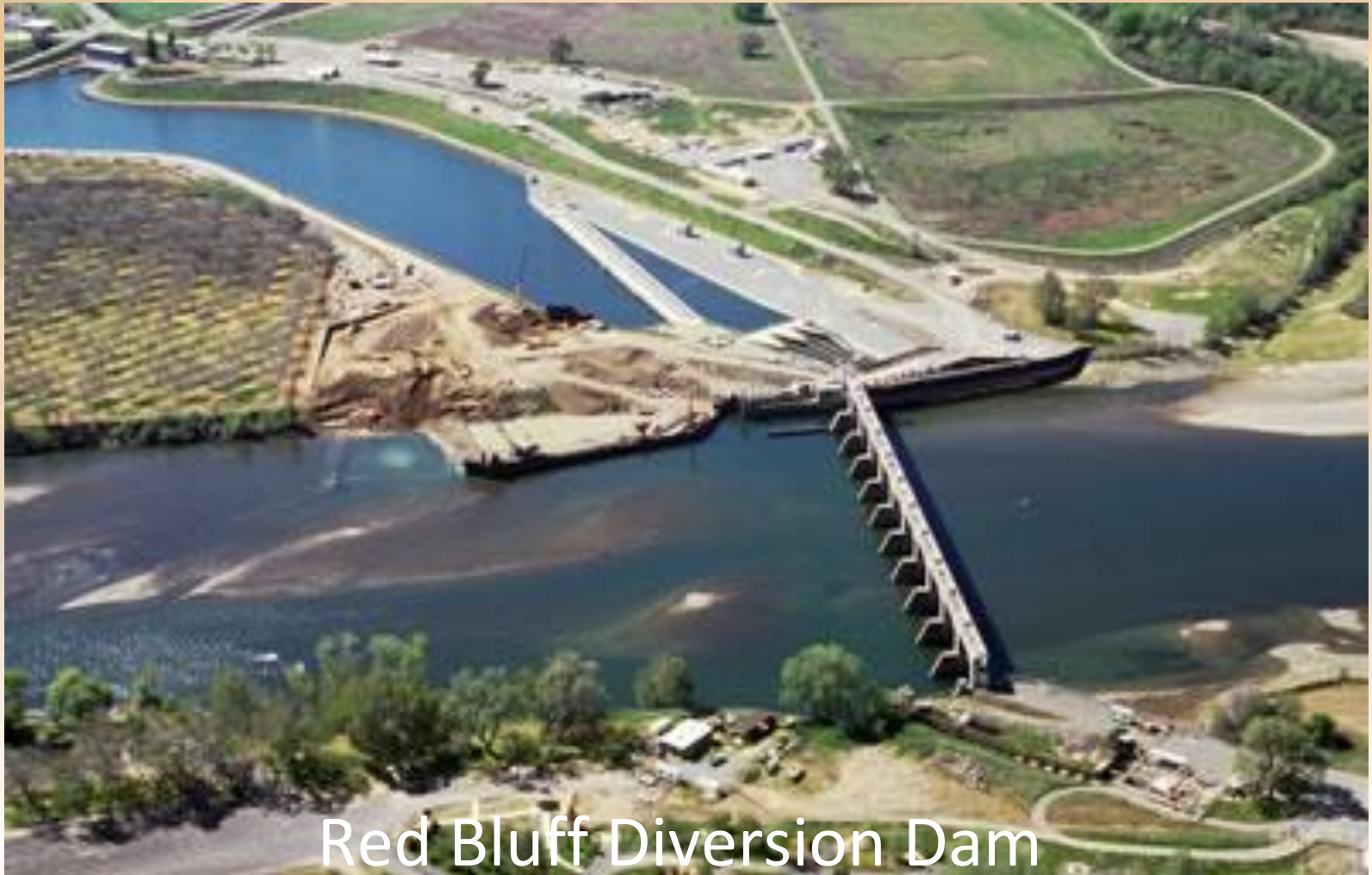
# SUMMARY

## SACRAMENTO VALLEY HYDROLOGIC REGION

- PRECIPITATION: 70 % OF AVG
- RUN-OFF: 77 % OF AVG
- RESERVOIR STORAGE:
  - LAKE SHASTA 112 % OF AVG
  - LAKE OROVILLE 123 % OF AVG
  - TRINITY LAKE 120 % OF AVG
- AVERAGE GROUNDWATER LEVEL CHANGE:
  - SPRING 2004-2011 -3.3 FEET
  - SPRING 2010-2011 +1.7 FEET
  - FALL 2004-2011 -2.8 FEET
  - FALL 2010-2011 +1.3 FEET
- RED BLUFF DIVERSION DAM SUMMARY



# ANTELOPE AREA GROUNDWATER



Red Bluff Diversion Dam

**CONSTRUCTED FROM 1962 TO AUG 1964**

# ANTELOPE AREA GROUNDWATER

•Total Wells 973

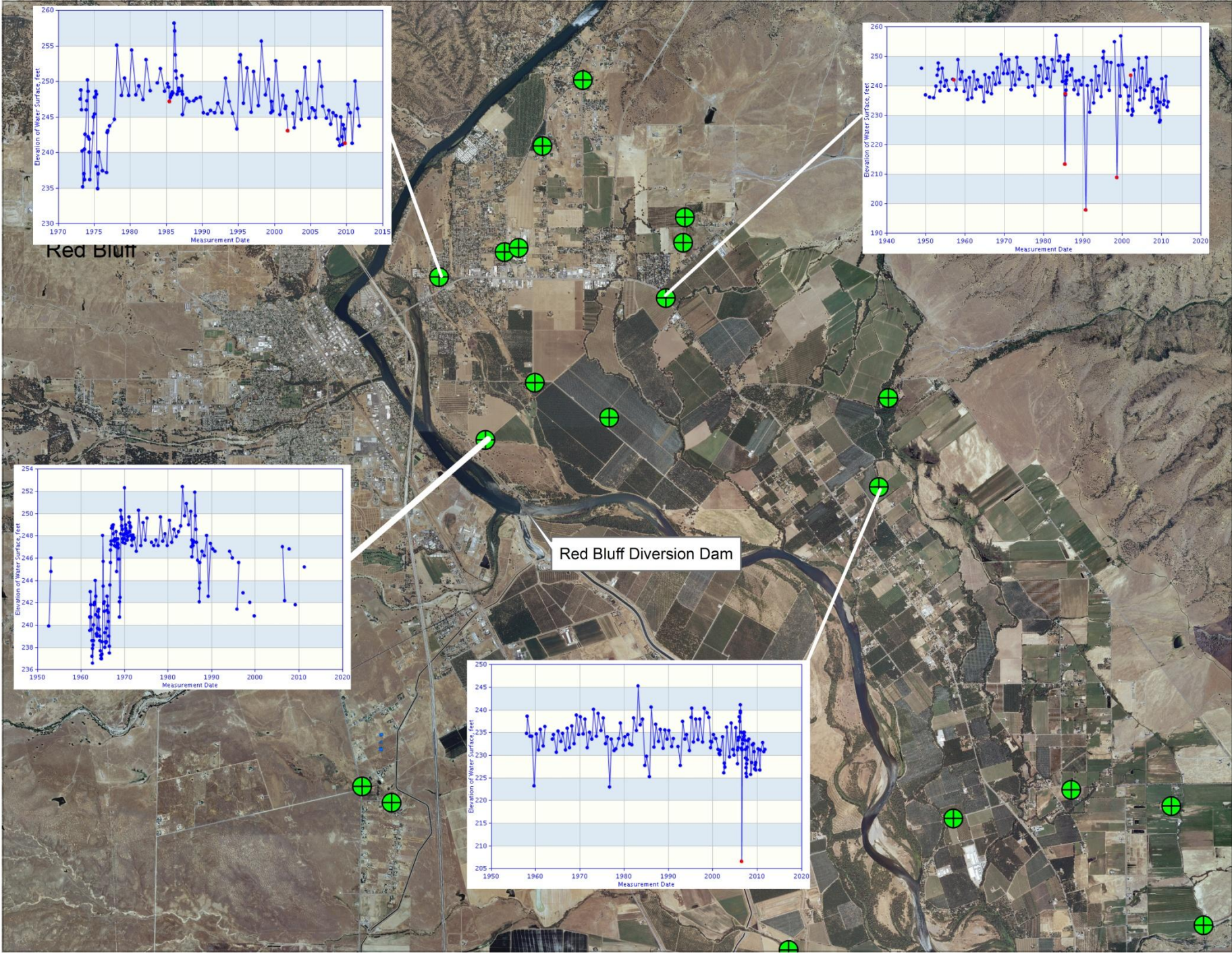
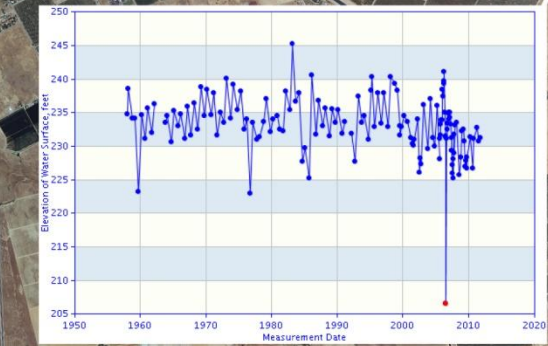
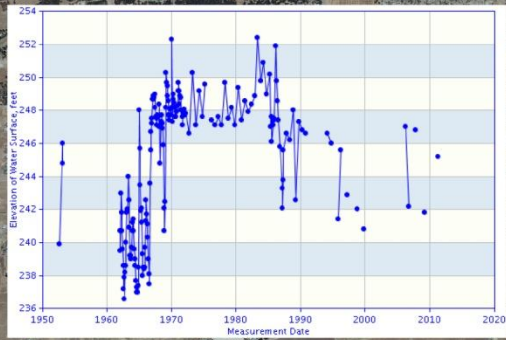
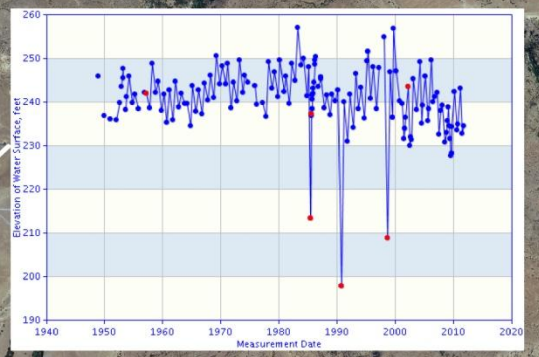
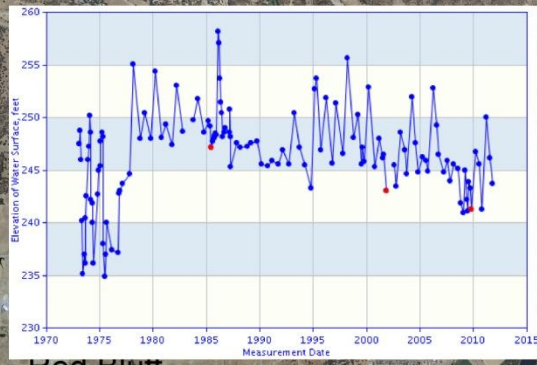
## Domestic 655

- Ave Depth 108 ft
  - Range(30-450)
- Ave Age 28 yrs
  - Range (1-70 yrs)

## Agricultural 65

- Ave Depth 229 ft
  - Range (48-760)
- Ave Age 38 years
  - Range (2-84 yrs)





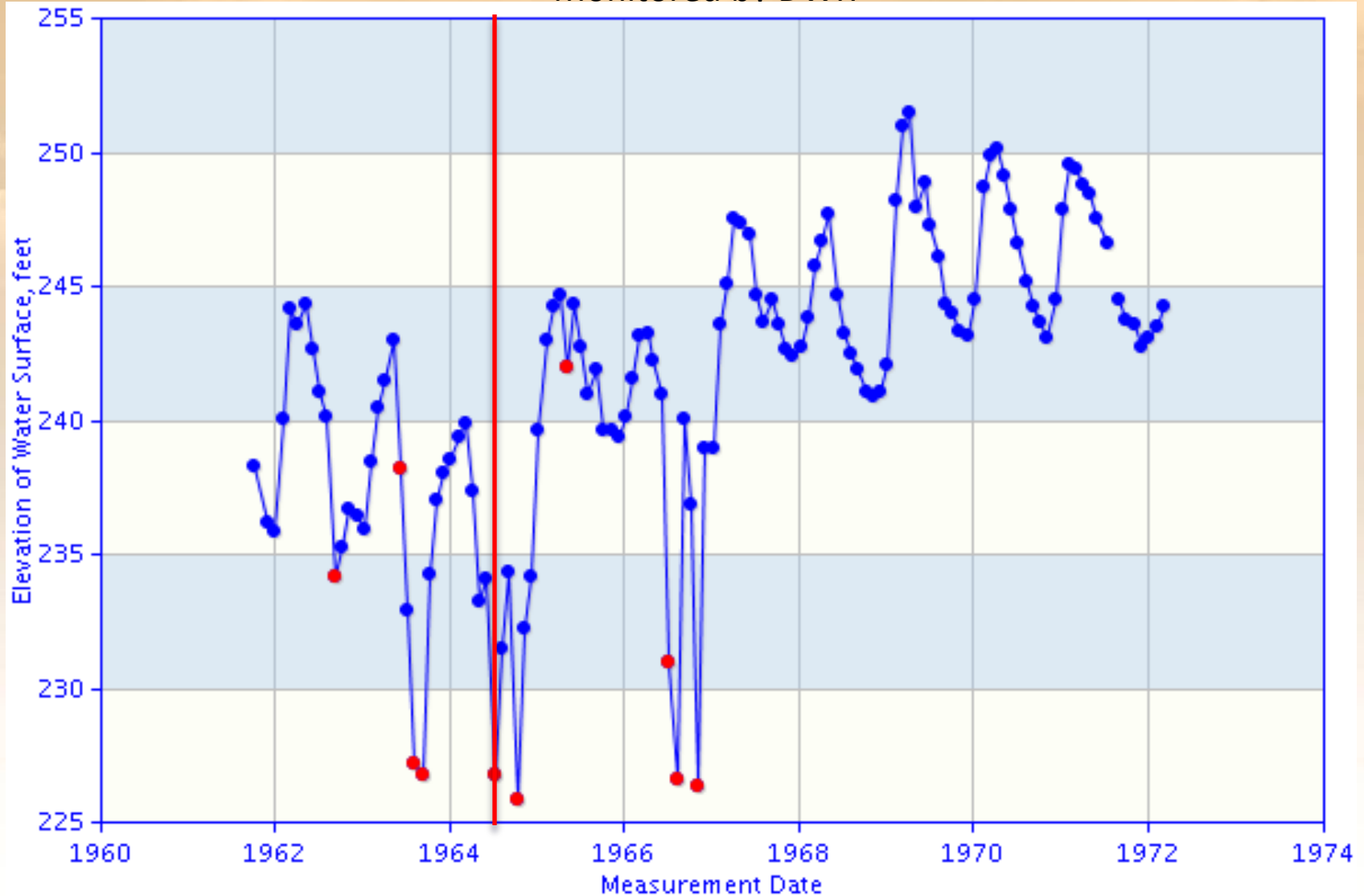




# 27N03W15M001M

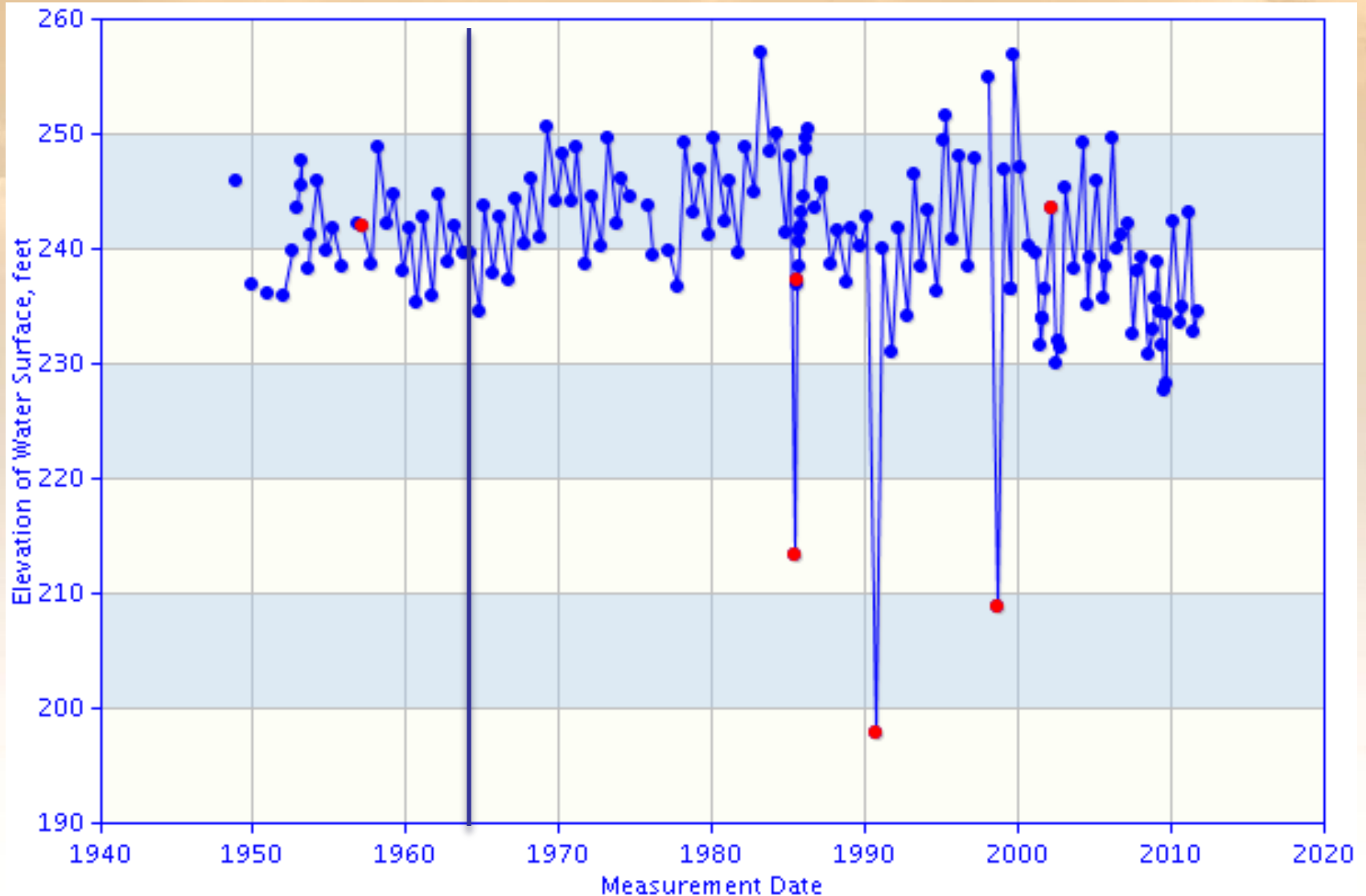
Domestic Well (North of Antelope Blvd East of Fairgrounds)

Monitored by DWR



# 27N03W23D001M

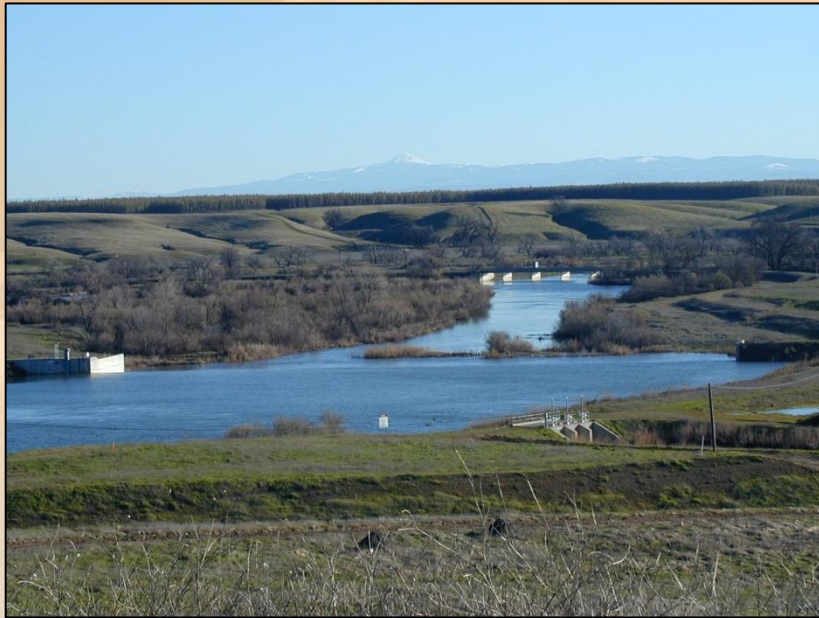
Agricultural Well (Near Intersection of Hogsback Rd and Hwy 99E)  
Monitored by DWR



# ANTELOPE AREA CONCLUSIONS

- Groundwater Levels increased 5 to 8 feet after the diversion dam was installed.
- Water levels will drop back to historic levels now that the dam has been raised.
- Anticipated that there will be no long term change in the nitrate issues in the Antelope area.

**DEPARTMENT OF  
WATER RESOURCES**  
Northern Region Office



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[staton@water.ca.gov](mailto:staton@water.ca.gov)  
<http://www.water.ca.gov>

**Groundwater Level Change Maps:**

[http://www.water.ca.gov/groundwater/data and monitoring/northern region/GroundwaterLevel/gw level monitoring.cfm](http://www.water.ca.gov/groundwater/data_and_monitoring/northern_region/GroundwaterLevel/gw_level_monitoring.cfm)



**Thank you**

