DEPARTMENT OF WATER RESOURCES Northern Region Office

GROUNDWATER CONDITIONS IN THE NORTHERN SACRAMENTO VALLEY







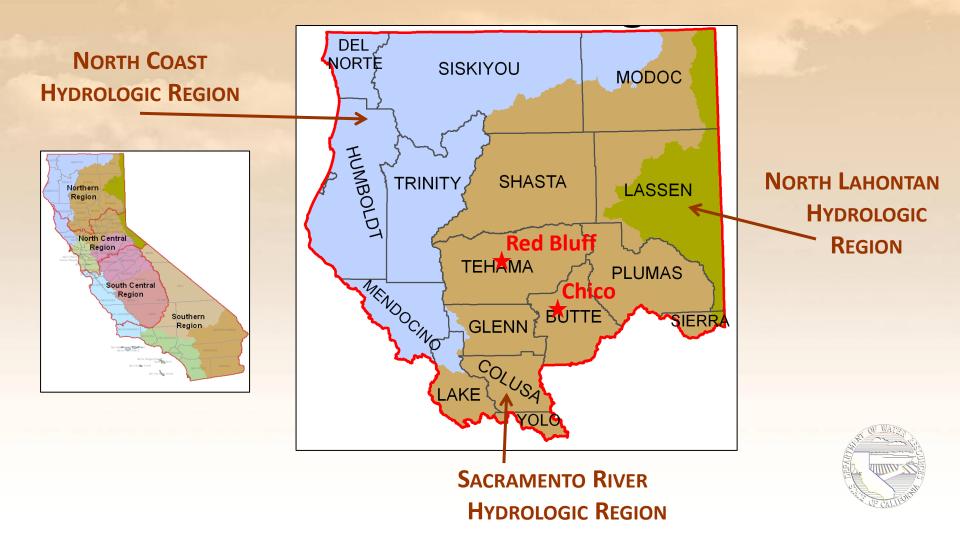
LOCAL MANAGEMENT OF WATER RESOURCES IN THE NORTHERN SACRAMENTO VALLEY MEETING DECEMBER 16, 2011



KELLY STATON, SENIOR ENGINEERING GEOLOGIST, GROUNDWATER AND GEOLOGIC INVESTIGATIONS SECTION, DWR NORTHERN REGION

DEPARTMENT OF WATER RESOURCES DIVISION OF INTEGRATED REGIONAL WATER MANAGEMENT

NORTHERN 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



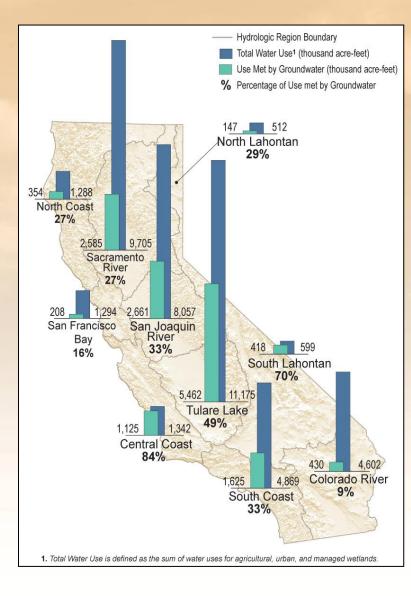
WATER USE IN CALIFORNIA AND THE NORTHERN SACRAMENTO VALLEY



HYDROGEOLOGIC CONDITIONS

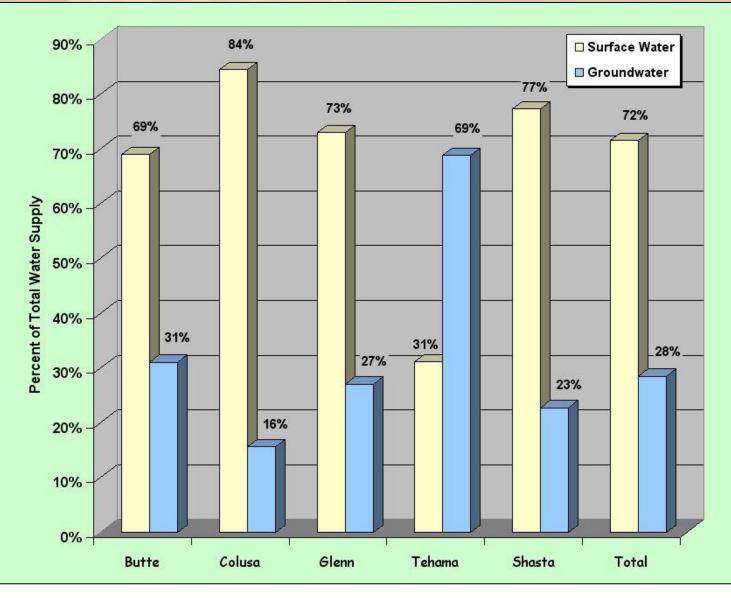
GROUNDWATER USE IN CALIFORNIA

- 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



SOURCE: DWR BULLETIN 118 UPDATE 2003 HTTP://WWW.WATER.CA.GOV/GROUNDWATER/BULLETIN118/UPDATE2003.CFM

SACRAMENTO VALLEY - WATER SUPPLY BY SOURCE



SOURCE: DWR NRO 2005 LAND & WATER USE DATA



Hydrologic Conditions

PRECIPITATION

•RUN-OFF

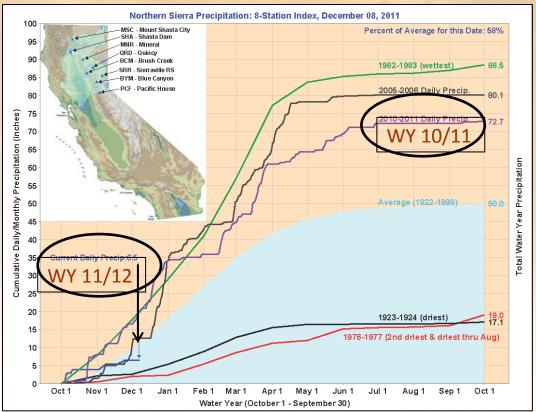
•Reservoir Storage



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	
		9.3	70%
	6.5	(Avg to date)	(Avg to date)

Driest Water Years		Wettest W	ater 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

PRECIPITATION: SACRAMENTO RIVER HYDROLOGIC REGION

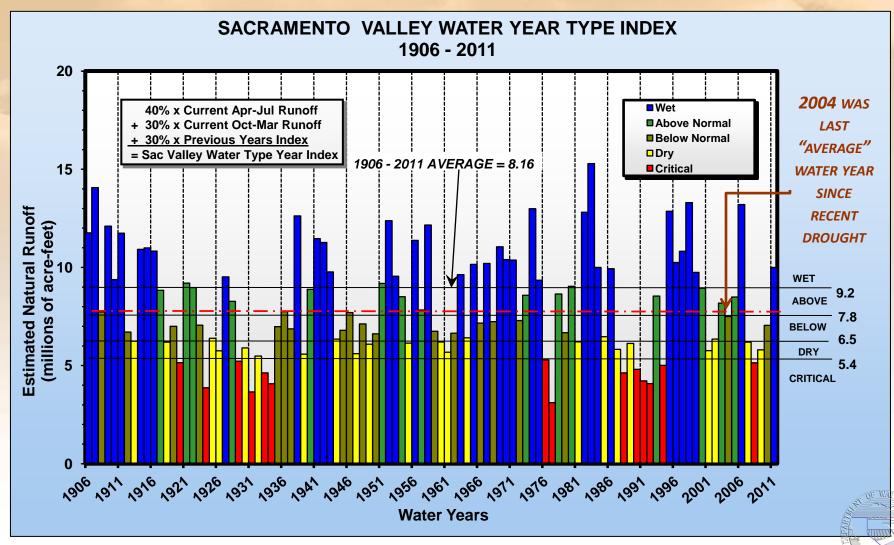


SOURCE: DWR'S CALIFORNIA DATA EXCHANGE CENTER HTTP://CDEC.WATER.CA.GOV

HYDROLOGIC CONDITIONS

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

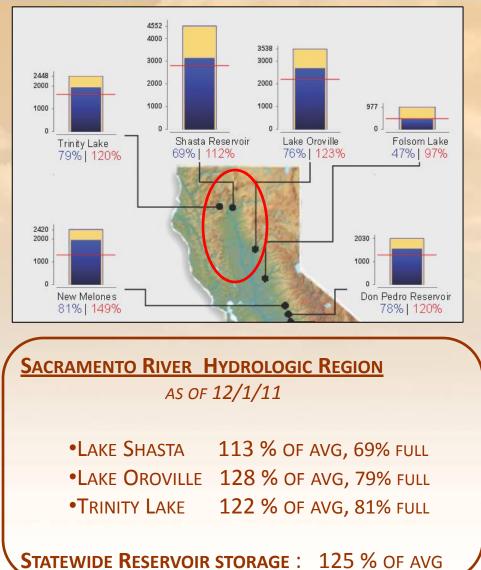
SACRAMENTO HYDROLOGIC REGION - 77% OF AVERAGE (AS OF DEC. 1, 2011)

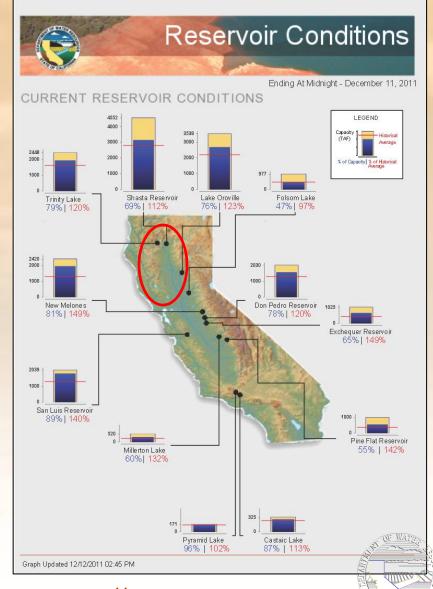


SOURCE: DWR'S CALIFORNIA DATA EXCHANGE CENTER HTTP://CDEC.WATER.CA.GOV

HYDROLOGIC CONDITIONS

RESERVOIR STORAGE – WATER YEAR 11/12

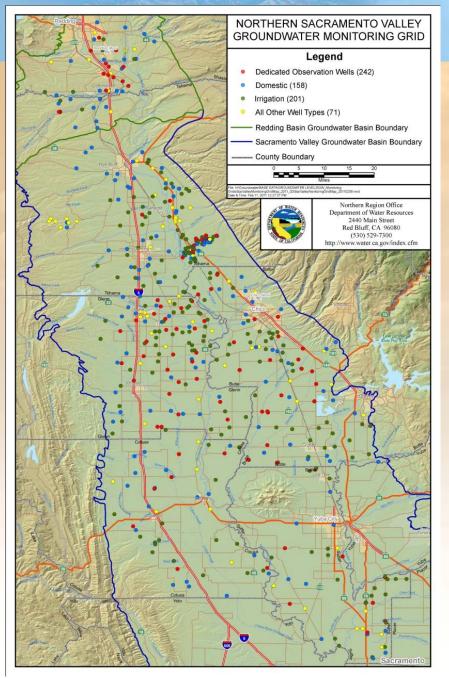




SOURCE: DWR'S CALIFORNIA DATA EXCHANGE CENTER HTTP://CDEC.WATER.CA.GOV

GROUNDWATER MONITORING





SACRAMENTO VALLEY GROUNDWATER MEASUREMENT GRID

+/- 700 wells are measured in the Spring, Summer, and Fall in the <u>Northern Sacramento Valley</u>

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

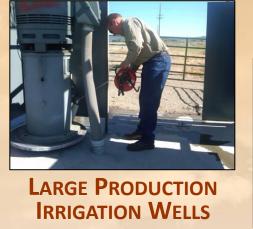


MEASURING GROUNDWATER LEVELS



OBSERVATION WELLS WITH DATALOGGERS





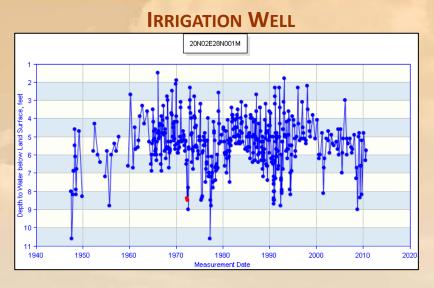
IRRIGATION WELLS



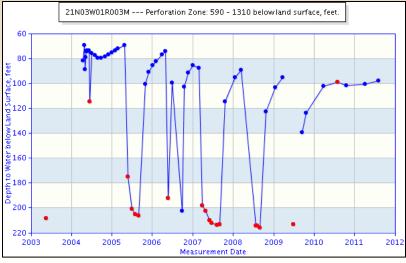
WHAT CAN AFFECT GROUNDWATER LEVELS REGIONALLY AND LOCALLY?

- 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

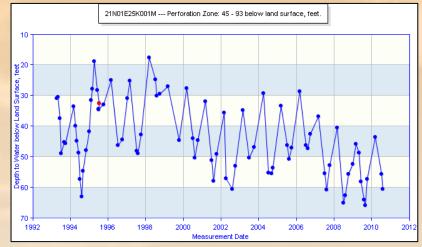
GROUNDWATER HYDROGRAPHS



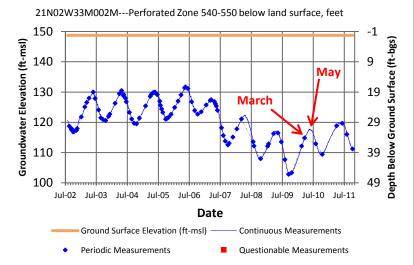
IRRIGATION WELL - PUMPING



DOMESTIC WELL



OBSERVATION WELL

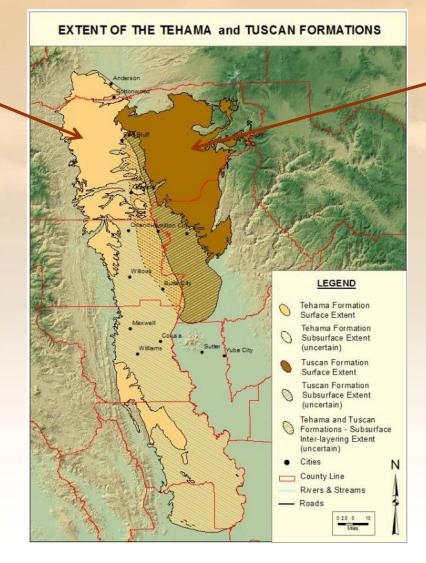


CA STATEWIDE GROUNDWATER ELEVATION MONITORING WEBSITE : (HTTP://WWW.CASGEM/WATER.CA.GOV/)

MAJOR WATER-PRODUCING AQUIFERS IN THE NORTHERN SACRAMENTO VALLEY











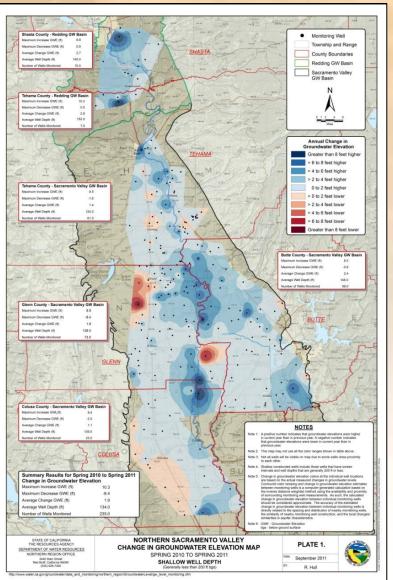


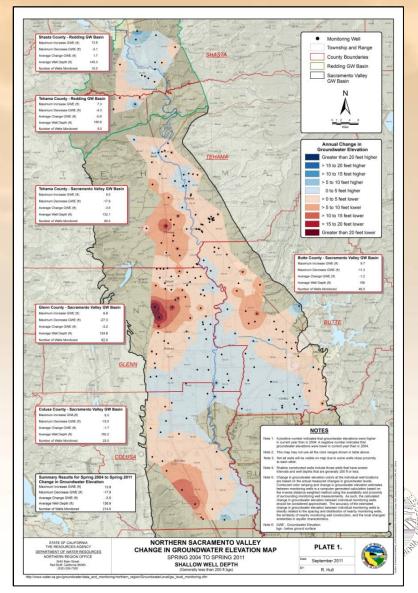


WELL DEPTHS LESS THAN 200 FT

Spring 2010 to Spring 2011

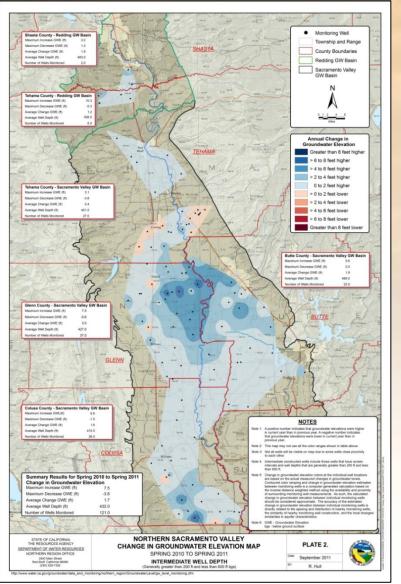




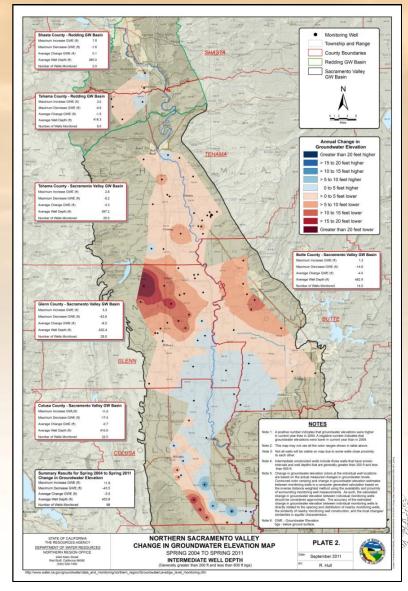


WELL DEPTHS: 200 TO 600 FT

Spring 2010 to Spring 2011

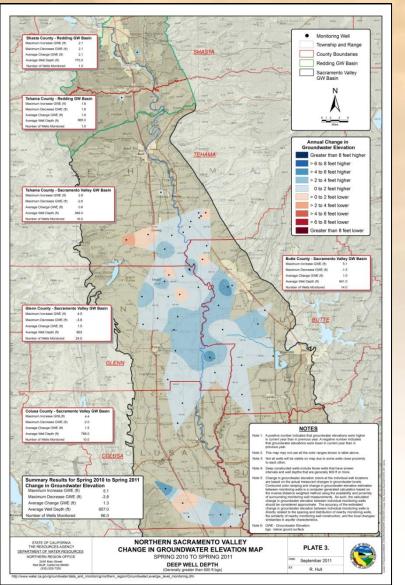


Spring 2004 to Spring 2011

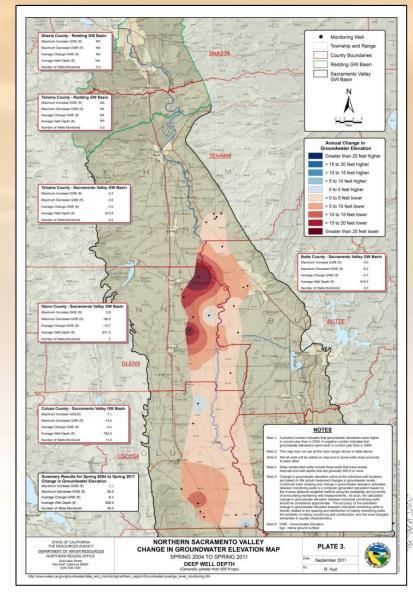


Well Depths: Greater than 600 ft

Spring 2010 to Spring 2011



Spring 2004 to Spring 2011



AVERAGE GROUNDWATER LEVEL CHANGE (FEET)

(ALL WELL DEPTHS)

SACRAMENTO VALLEY GROUNDWATER BASIN

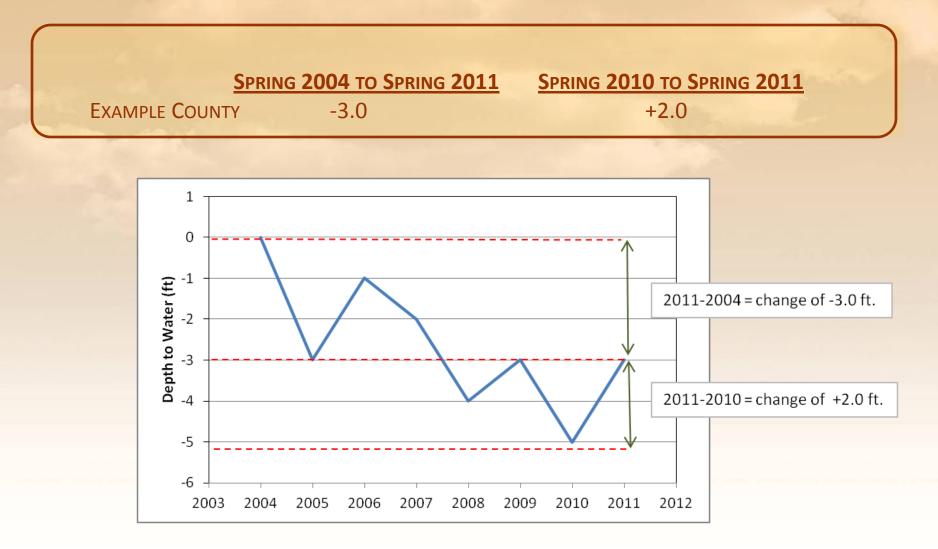
	SPRING 2004 TO SPRING 2011	SPRING 2010 TO SPRING 2011
BUTTE COUNTY	-2.1	+2.1
Colusa County	-1.6	+1.3
GLENN COUNTY	-4.9	-2.1
TEHAMA COUNTY	-3.4	+1.0
Average	-3.3	+1.7

REDDING GROUNDWATER BASIN

	SPRING 2004 TO SPRING 2011	SPRING 2010 TO SPRING 2011
Tehama County	-1.2	+2.0
SHASTA COUNTY	+1.6	+2.5
Average	+0.5	+2.3

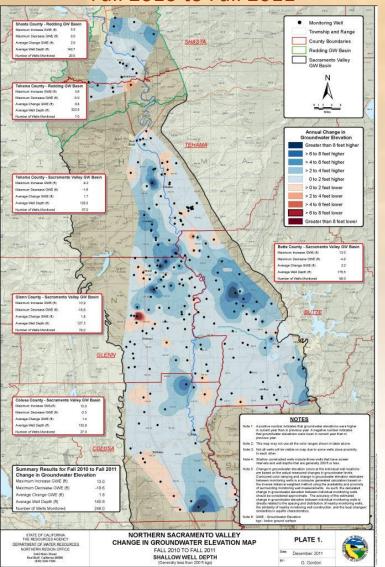
AVERAGE GROUNDWATER LEVEL CHANGE (FEET)

EXAMPLE

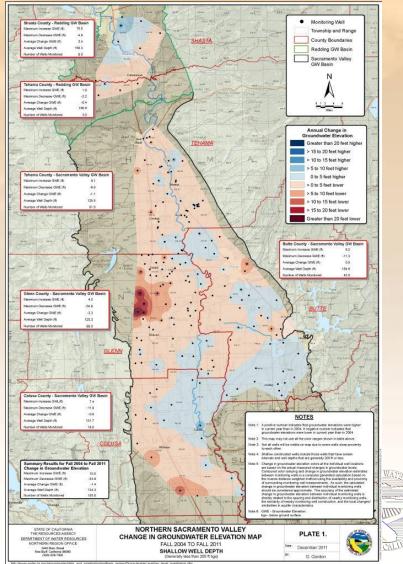


CHANGE IN GROUNDWATER ELEVATION Well Depths Less than 200 ft

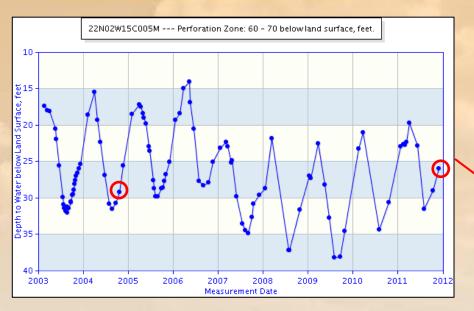
Fall 2010 to Fall 2011

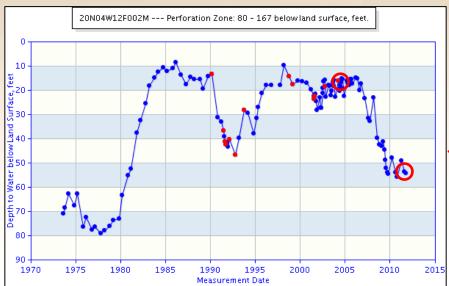


Fall 2004 to Fall 2011



CHANGE IN GROUNDWATER ELEVATION Well Depths Less than 200 ft



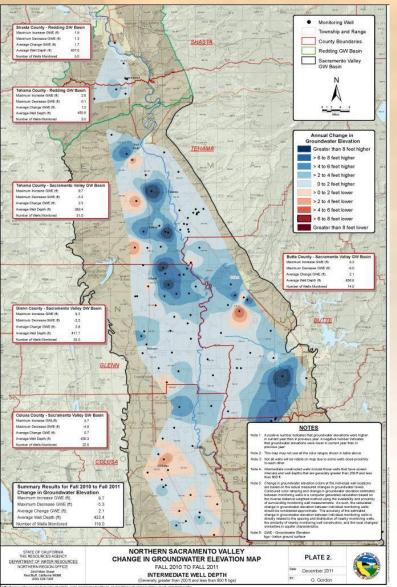


Fall 2004 to Fall 2011 Monitoring Well ase GWE (# Township and Range - CINE IN -49 County Boundaries SHASTA werage Change GWE (ft) 24 150.3 case Viel Depth /ft) Redding GW Basin they of Wells More Sacramento Valley ase GVIE (8 comun Decrease GWE (ft mage Change GWE (R) werage Wed Depth (t) 100.0 Annual Change in TEHAMA Greater than 20 feet high > 15 to 20 feet higher 10 to 15 feet highe > 5 to 10 feet higher hama Col 0 to 5 feet higher > 0 to 5 feet lower 6.9 erage Change GWE (ft > 5 to 10 feet lower wage Well Depth (%) > 10 to 15 feet lower mber of Wells Mo > 15 to 20 feet lower Greater than 20 feet low e County - Sa crease OWE (1 -----11.3 erage Change GWE (1) 0.5 age Well Depth (ft) 154.6 r of Wells Mor Glenn County - Sac an Gint (t 4.0 portun Decrease GME its -34.9 werage Change GWE (ft) -3.3 125.3 erage Well Depth (ft) GLEN sa County - S um increase GML/t se GME ift wrege Change GWE (fb) -0.9 NOTES verage Weil Depth (ft) Not all walls will be Summary Results for Fall 2004 to Fall 201 Change in Groundwater Ele se GWE il raige Change GWE (# 134.3 rage Viel Depth (ft) STATE OF CALIFORNIA THE RESOURCES AGENCY NORTHERN SACRAMENTO VALLEY PLATE 1. CHANGE IN GROUNDWATER ELEVATION MAP DEPARTMENT OF WATER RESOURCES NORTHERN REGION OFFICE -FALL 2004 TO FALL 2011 Date: December 2011 2440 Main Street Red Bluff, California 96080 (530: 529-7300 SHALLOW WELL DEPTH

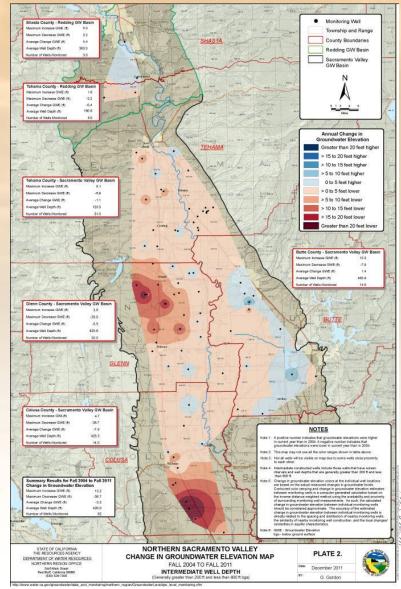
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Well Depths: 200 to 600 ft

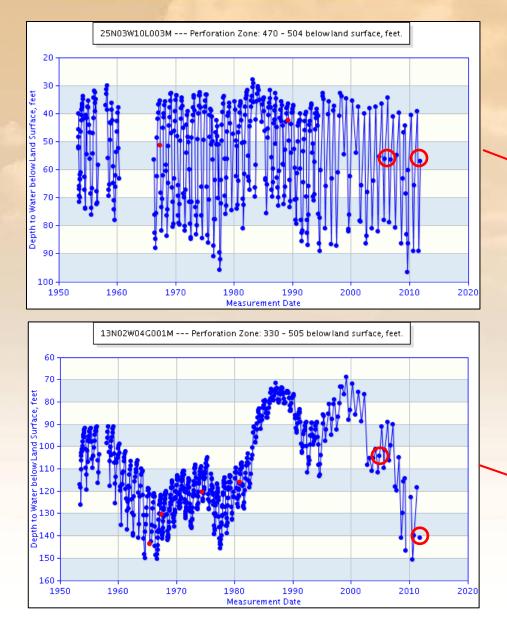
Fall 2010 to Fall 2011



Fall 2004 to Fall 2011



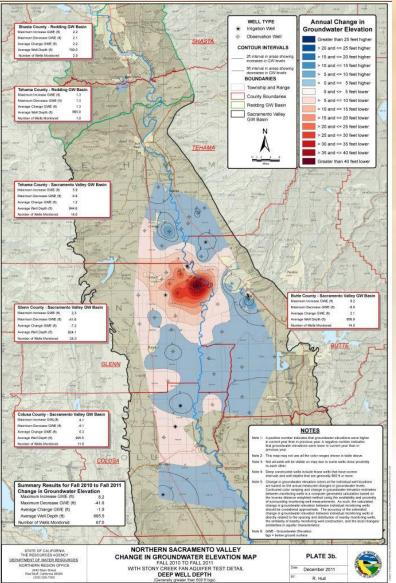
Well Depths: 200 to 600 ft



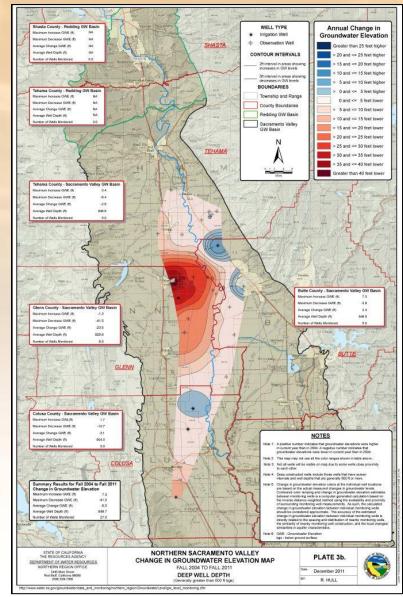
Fall 2004 to Fall 2011 Monitoring Well Township and Range age Charge GWE In SHASTA County Boundaries enane Meil Deoth (ff) 363.0 Redding GW Basin Sacramento Valley GIM Basin hama County - Redo dmum Decrease GVE (t) -22 erage Change GWE (1) -0.4 erage Well Depth (#) 160.6 umber of Wells Mo Annual Change in undwater Elevation TEHAMA eater than 20 feet high 15 to 20 feet higher 0 to 15 feet higher 5 to 10 feet higher 0 to 5 feet higher num Increase GWE (ft) > 0 to 5 feet lower inur Decrease GWE If erage Change GWE (1) > 5 to 10 feet lower erace Weil Death (ft) > 10 to 15 feet lower > 15 to 20 feet lower Greater than 20 feet lowe lutte County - Sac llev GW Ba animum December (INE (B)) verage Charge GWE (t) 14 erace Weil Depth (ft) 463.9 enn County ey GW one final of 3.6 uimum Decrease GWE (ft 29.9 erase Change GWE (t) -5.5 420.6 nape Well Depth (# GLENN isa County - Sad dinum Decrease GWE (# -36.7 NOTES verage Change GV/E (#) -7.9 rage Well Depth (* es that g s map may not use all the color rang COLU ulte for Fall 2004 to ase GWE (ft -3.7 GME - Groundwater Elevation bps - below ground surface NORTHERN SACRAMENTO VALLEY STATE OF CALIFORNIA THE RESOURCES AGENCY PLATE 2. CHANGE IN GROUNDWATER ELEVATION MAP DEPARTMENT OF WATER RESOURCES **ORTHERN REGION OFFICE** FALL 2004 TO FALL 2011 December 201 INTERMEDIATE WELL DEPTH d Bluft California 960 (\$30) 529-7300 G. Gordo erally greater than 20

Well Depths: Greater than 600 ft

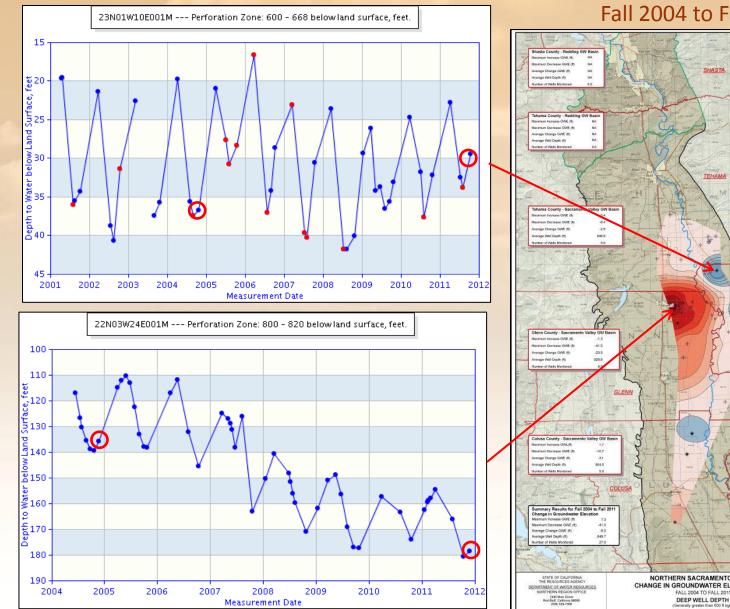
Fall 2010 to Fall 2011



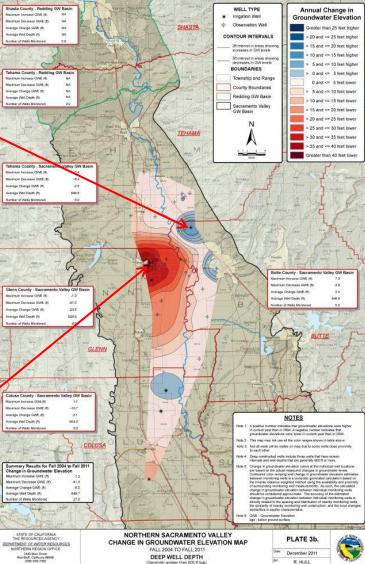
Fall 2004 to Fall 2011



Well Depths: Greater than 600 ft



Fall 2004 to Fall 2011



AVERAGE GROUNDWATER LEVEL CHANGE (FEET)

(ALL WELL DEPTHS)

SACRAMENTO VALLEY GROUNDWATER BASIN

	FALL 2004 TO FALL 2011	FALL 2010 TO FALL 2011
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

	FALL 2004 TO FALL 2011	Fall 2010 to Fall 2011
Tehama County	-0.5	+1.0
Shasta County	+2.9	+2.0
Average	+1.4	+1.7

SUMMARY

SACRAMENTO VALLEY HYDROLOGIC REGION

- **PRECIPITATION:**
- RUN-OFF:
- **RESERVOIR STORAGE:**
 - LAKE SHASTA
 - LAKE OROVILLE
 - TRINITY LAKE

70 % OF AVG 77 % OF AVG

112 % OF AVG 123 % OF AVG

- E 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



CONSTRUCTED FROM 1962 TO AUG 1964

ANTELOPE AREA GROUNDWATER

Total Wells 973

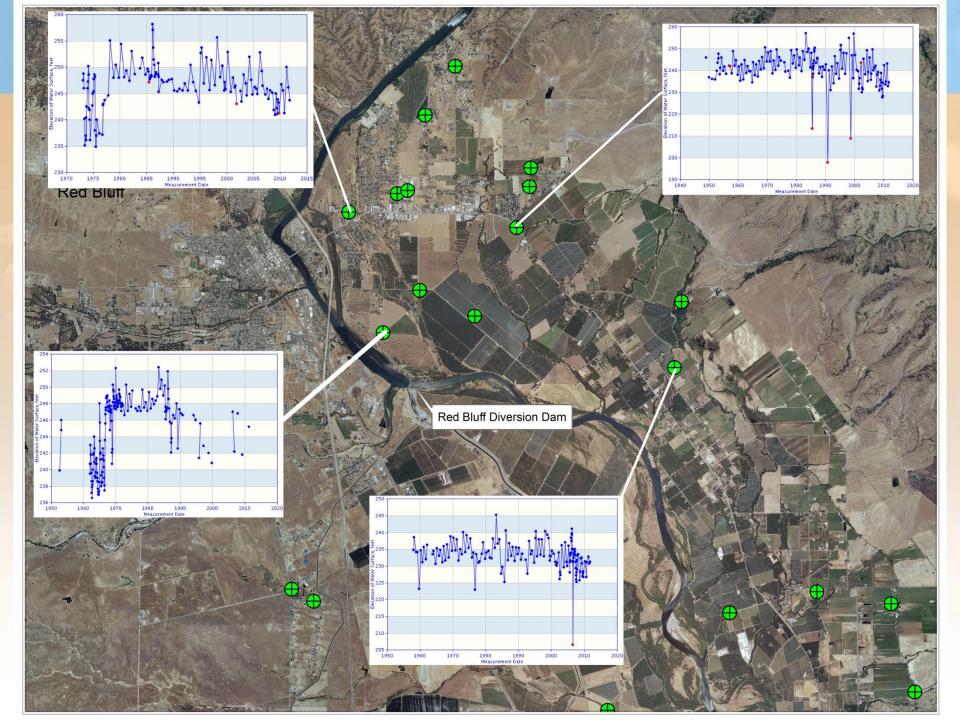
Domestic 655

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

Agricultural 65

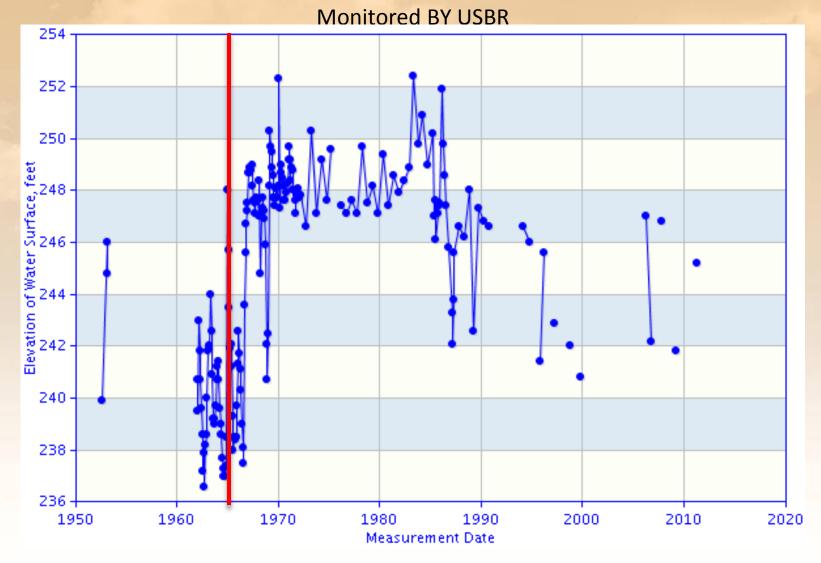
Ave Depth 229 ft
Range (48-760)
Ave Age 38 years
Range (2-84 yrs)





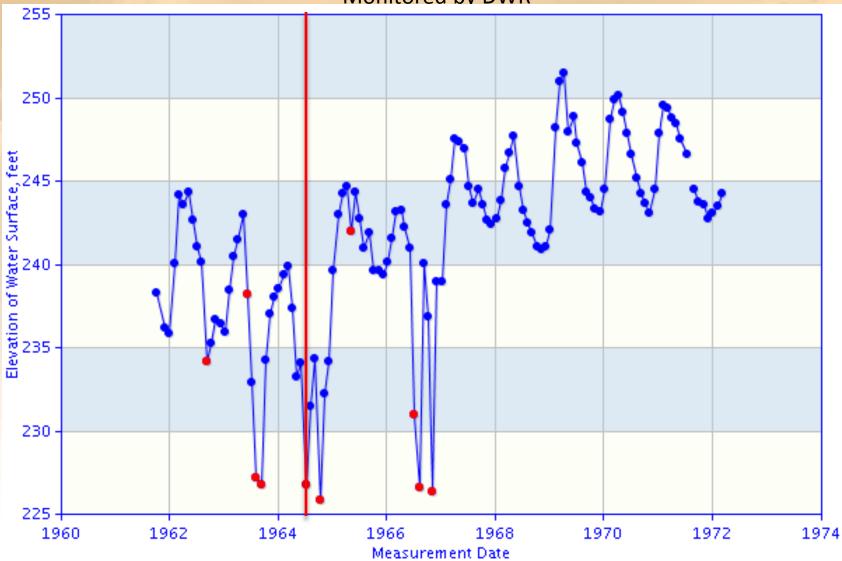
27N03W28L001M

Observation Well Near Sale Lane



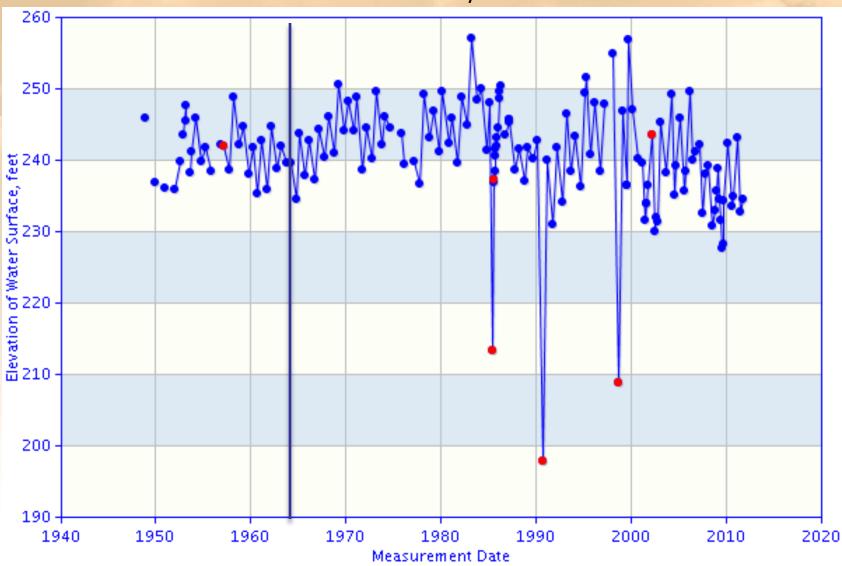
27N03W15M001M

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





Thank you

Department of Water Resources Northern Region Office Kelly Staton Senior Engineering Geologist 2440 Main St. Red Bluff, CA 96080 530-529-7344 <u>staton@water.ca.gov</u> <u>http://www.water.ca.gov</u> <u>Groundwater Level Change Maps:</u> http://www.water.ca.gov/groundwa

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http://www.water.ca.gov/groundwater/data_and_mon_ itoring/northern_region/GroundwaterLevel/gw_level_ monitoring.cfm

