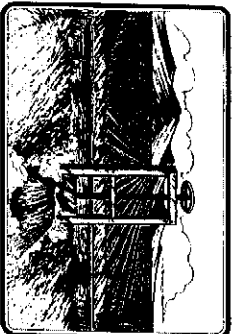


TAC recommendations to the WAC from May 28, 2013 meeting:

- Spring groundwater levels- report to the WAC, recommend Farm Bureau representative, Larry Domenighini, present this item to the Glenn County Farm Bureau.
- Recommendation that the WAC/TAC begin outreach and education program in cooperation with the Glenn County Farm Bureau. Should begin with providing information to the growers/landowners to engage growers/landowners in groundwater issues and management.

## Reclamation District No. 1004



June 11, 2013

Ms. Lisa Hunter, Water Resources Coordinator  
County of Glenn  
Department of Agriculture  
P.O. Box 351  
Willows, CA 95988

**Subject: Reclamation District No. 1004 Proposed 2013 Water Transfer**

Dear Ms. Hunter:

Thank you for your letter identifying the results of your review and comment to Reclamation District No. 1004's (District) Proposal for its 2013 Water Transfer. We appreciate the efforts from you and the Glenn County Technical Advisory Committee to expedite a review of the Proposal and provide comments for the proposed water transfer, which is scheduled to begin July 1, 2013. As you have discussed with Darren Cordova of MBK Engineers, the purpose of this letter is to provide the information requested of the District, as identified below.

As indicated in your letter, there are two items requested of the District: (1) record quantities of groundwater pumped at the groundwater wells participating in the District's proposed 2013 Water Transfer on a weekly basis and provide those quantities to your office, and (2) contact the Glenn County Water Advisory Committee for any disputes in Glenn County relative to the District's proposed 2013 Water Transfer. In accordance with your request relative to quantities of groundwater pumped, these quantities will be measured weekly for the groundwater wells located within Glenn County and reported to your office by November 1, 2013. In regard to a dispute involving groundwater pumped for the District's proposed 2013 Water Transfer, the District included a draft Groundwater Mitigation Plan with its Proposal to identify actions that will be undertaken by the District to respond to claims of significant adverse impacts. In the event of a dispute regarding a claimed impact, the District will contact the Glenn County Water Advisory Committee.

We believe this letter includes the information requested by your letter, and thus, the District plans to proceed with its proposed 2013 Water Transfer. Following your review of this letter, please call if you have any questions or require additional information.

Sincerely,



Jack Baber

DC/bl

cc: Dustin Cooper, Legal Counsel for Reclamation District No. 1004  
Darren Cordova, MBK Engineers

# Glenn County WAC

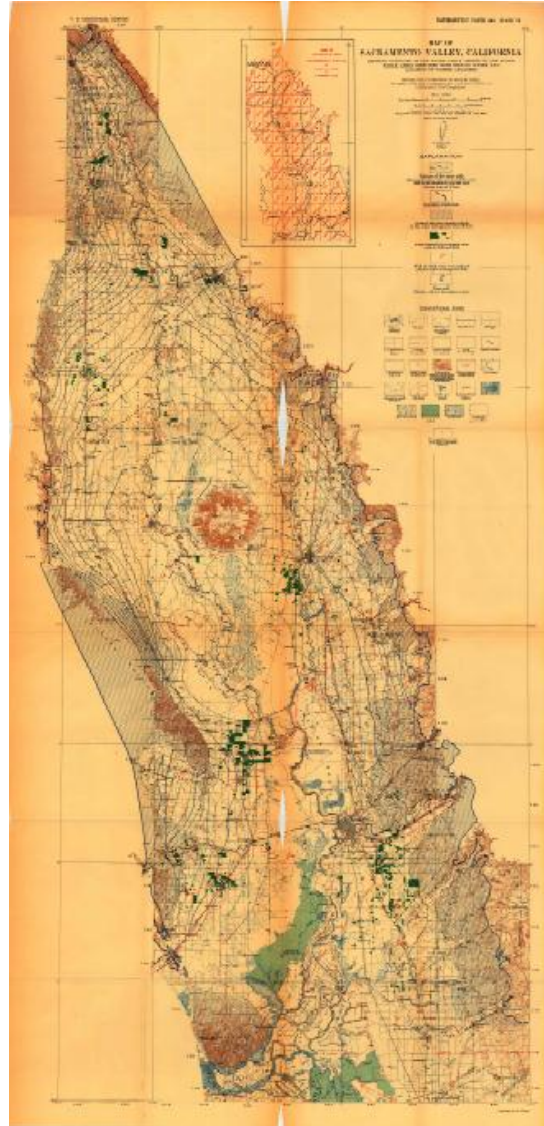
June 11, 2013

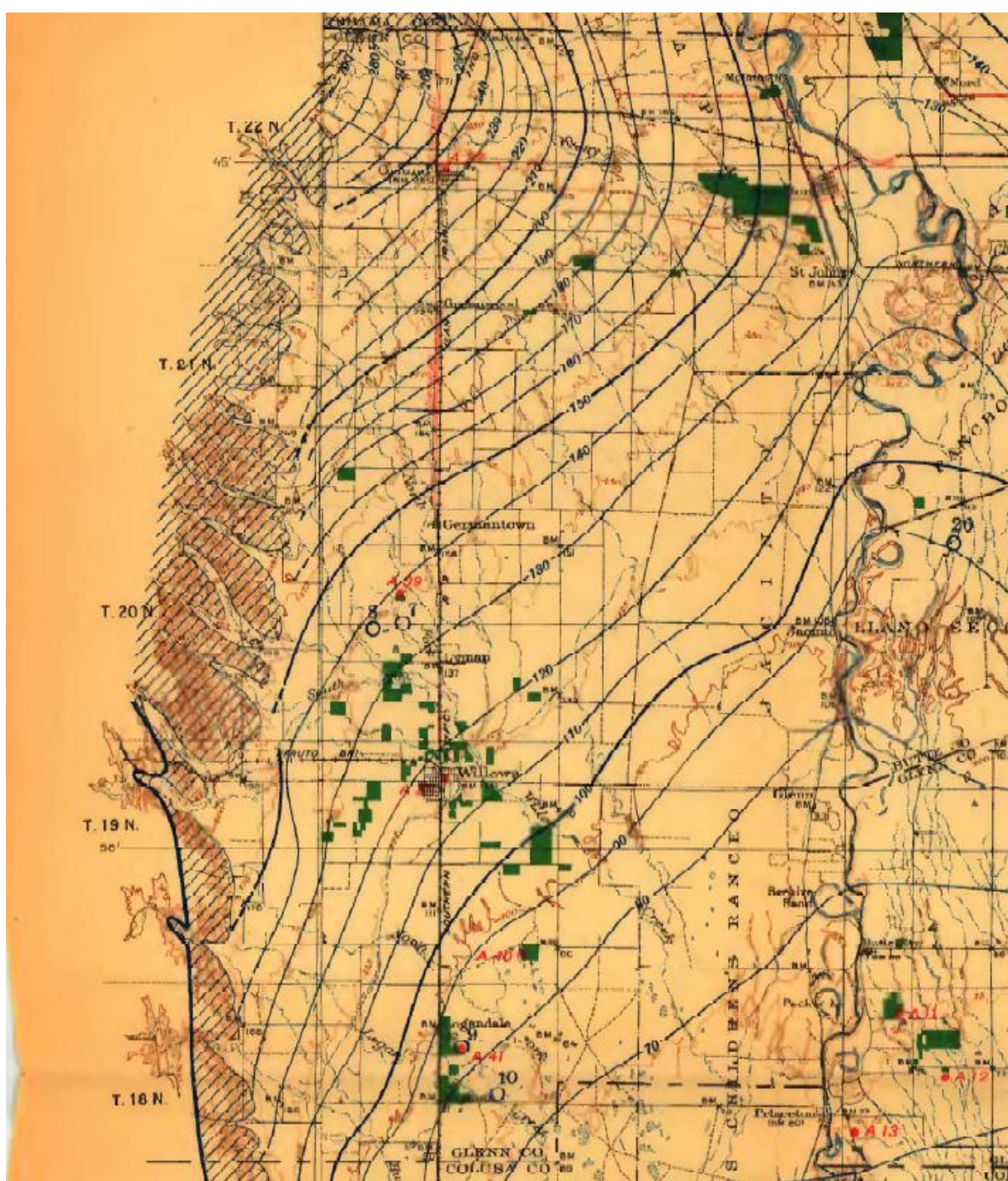
# Western Glenn County Groundwater Level Declines

- Changes in Groundwater Flow
- Changes in Groundwater Levels
- Water Well Development

# Change in Groundwater Flow

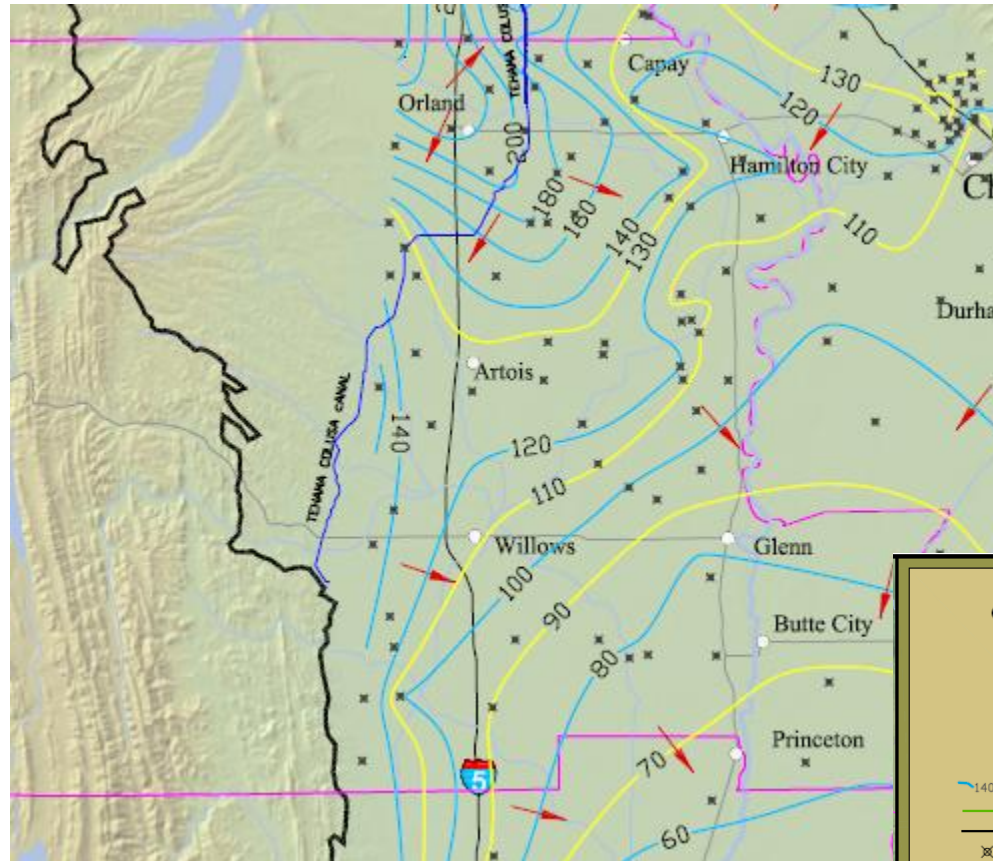
# USGS Groundwater Contours Autumn 1913







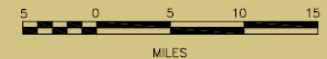
# DWR Groundwater Contours Summer 2006



## SACRAMENTO VALLEY GROUNDWATER ELEVATION MAP FOR SUMMER 2006 BY

State of California  
THE RESOURCES AGENCY  
DEPARTMENT OF WATER RESOURCES  
Northern District

- 140 LINE OF EQUAL GROUNDWATER SURFACE ELEVATION
- REDDING GROUNDWATER BASIN BOUNDARY
- SACRAMENTO VALLEY GROUNDWATER BASIN BOUNDARY
- MONITORED WELL
- DIRECTION OF FLOW
- COUNTY BOUNDARY



### NOTES:

1. Groundwater contours represent groundwater level measurements taken by the Department of Water Resources and Local Cooperators during August 2006 for Shasta, Tehama, Glenn, Butte and Colusa Counties and from July through September for Sutter County.
2. Groundwater elevations are based on national geodetic vertical datum 1988 (NGVD 88).
3. Groundwater contours are based on groundwater level measurements taken from wells constructed within the middle portion of the aquifer system (100 to 400 feet deep). This portion of the aquifer supplies approximately 70% of all domestic, agricultural and municipal wells.



# Groundwater Contours

1913



2012





# Groundwater Contours

1913

2012

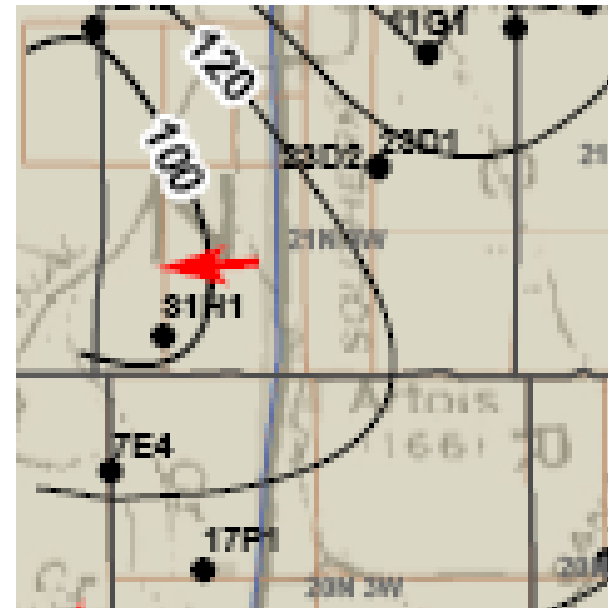


# Groundwater Contours

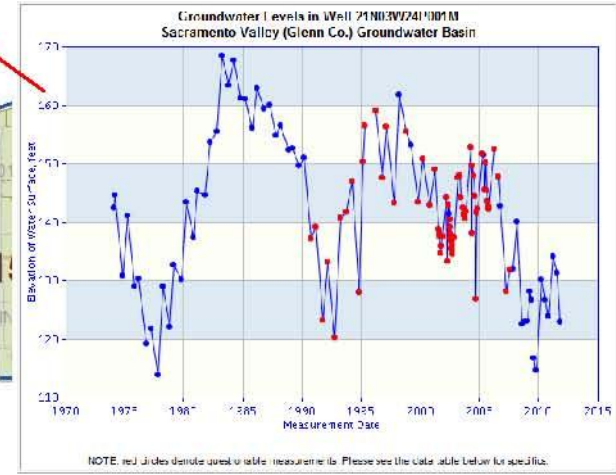
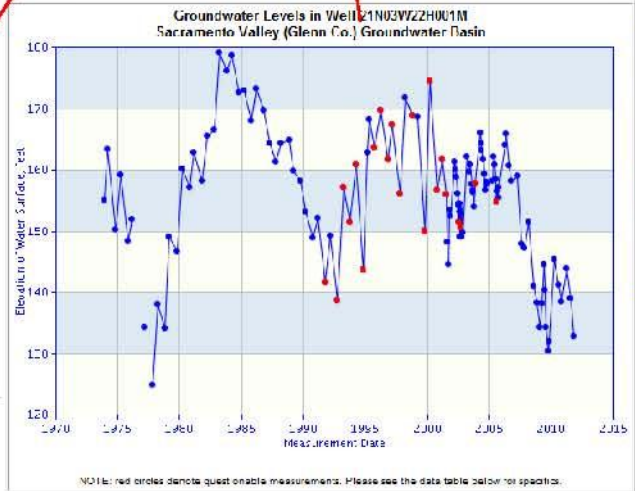
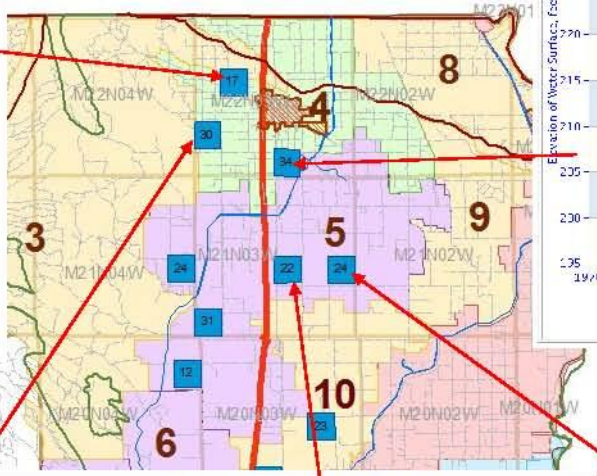
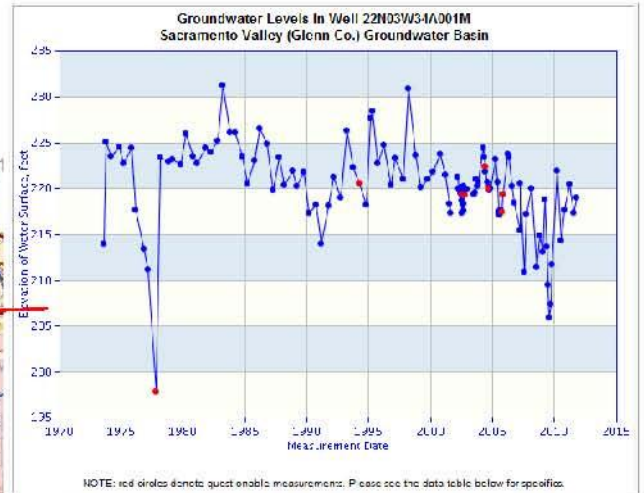
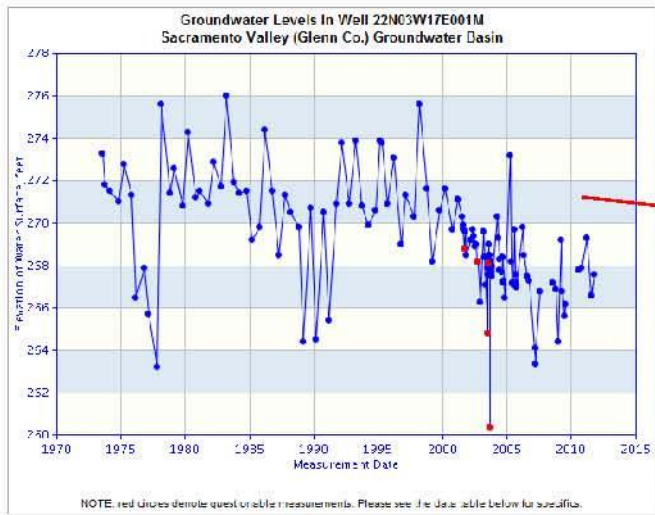
1913



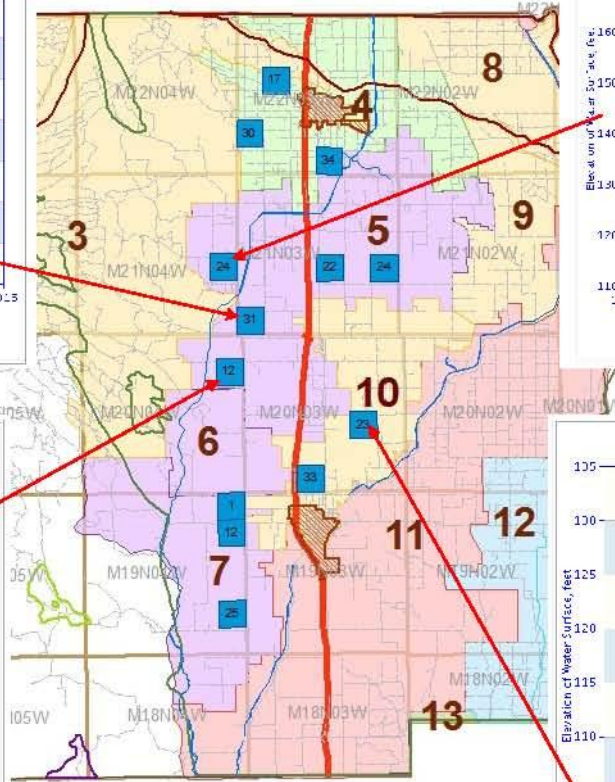
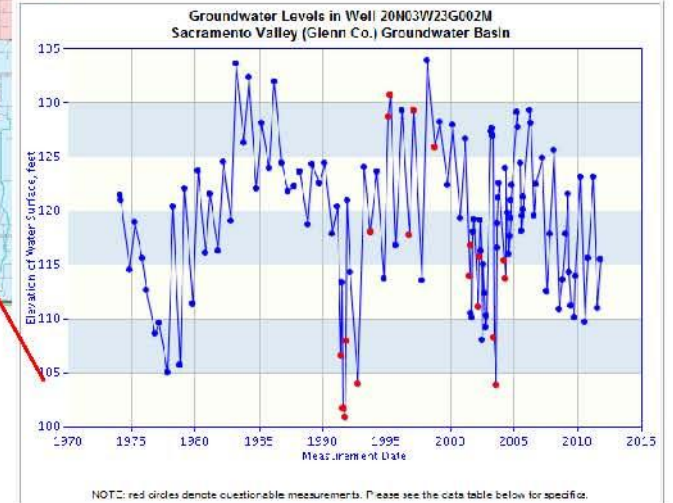
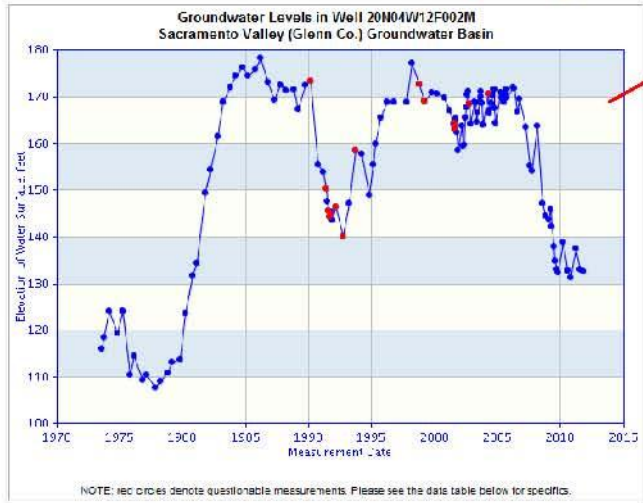
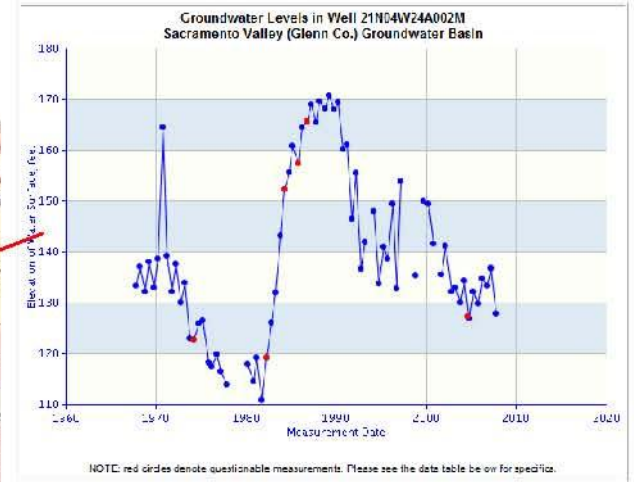
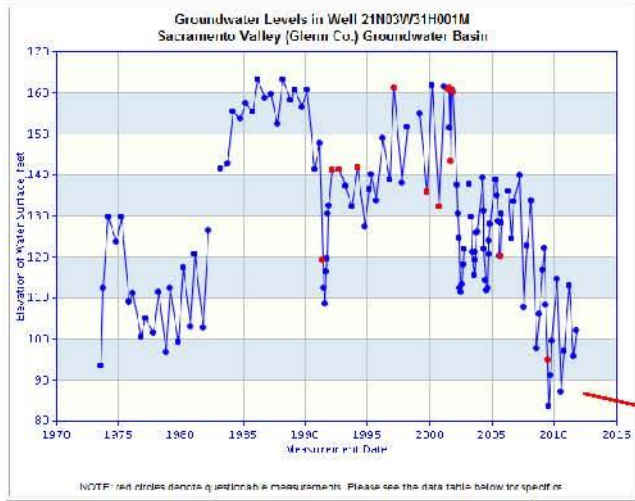
2012



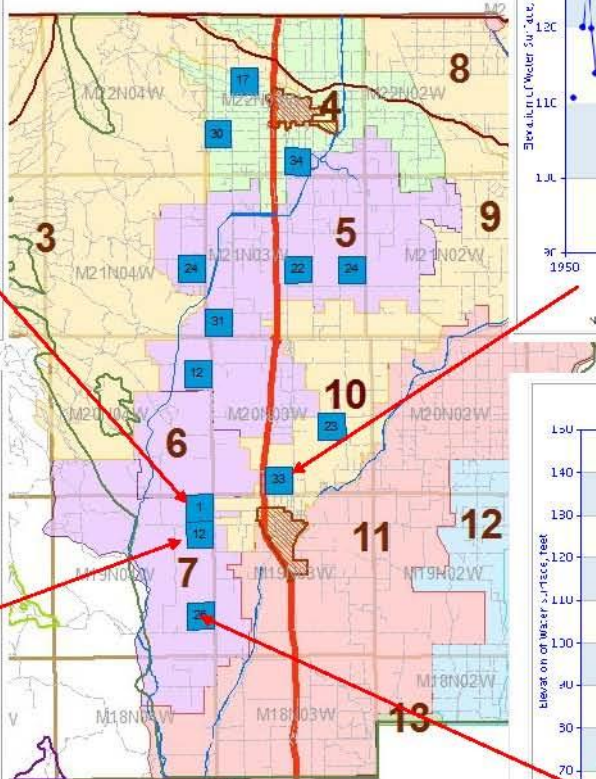
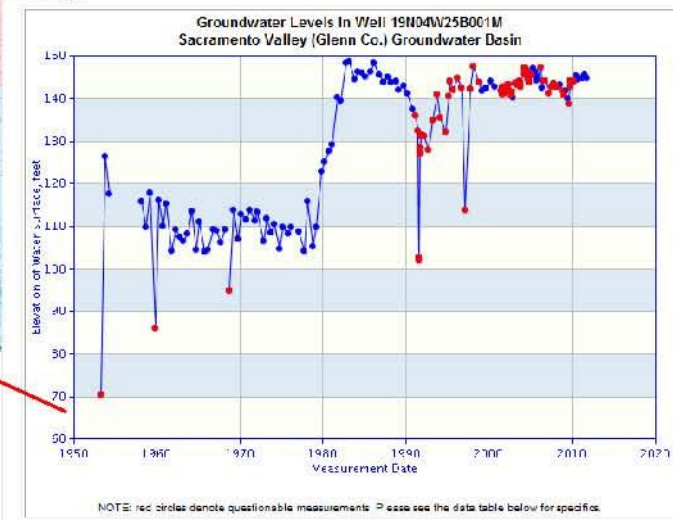
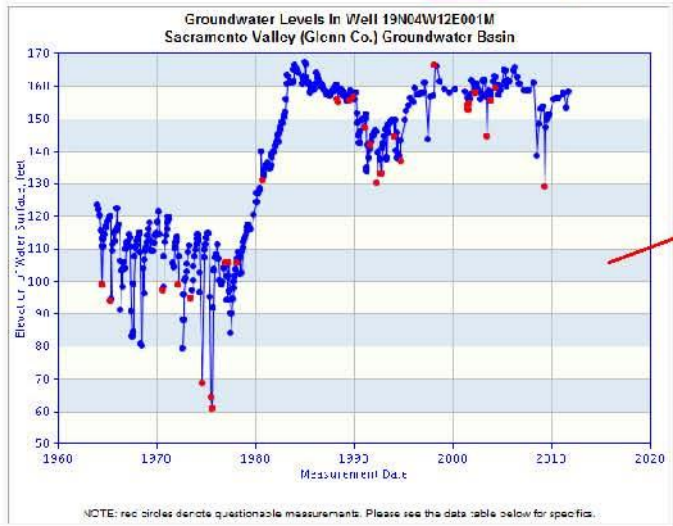
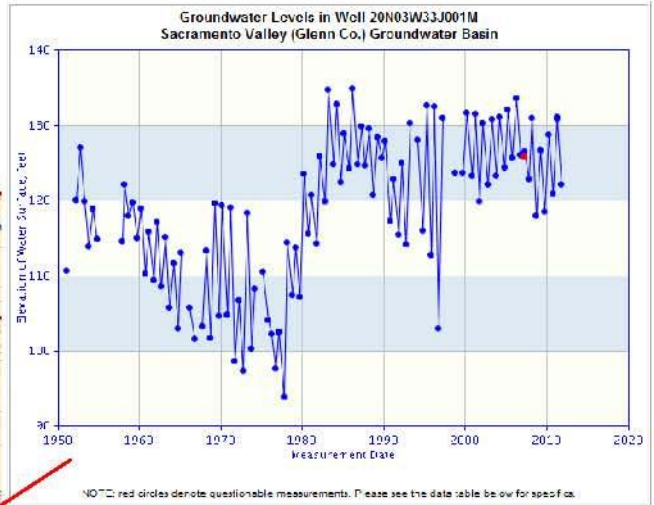
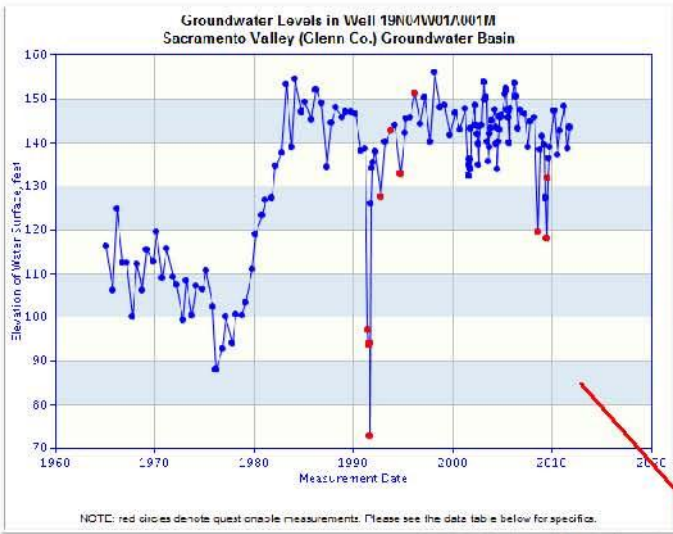
# Change in Groundwater Levels





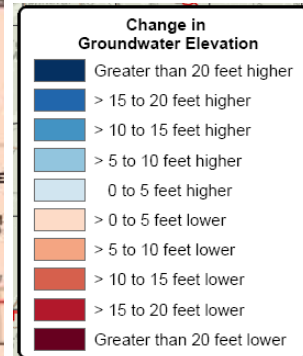
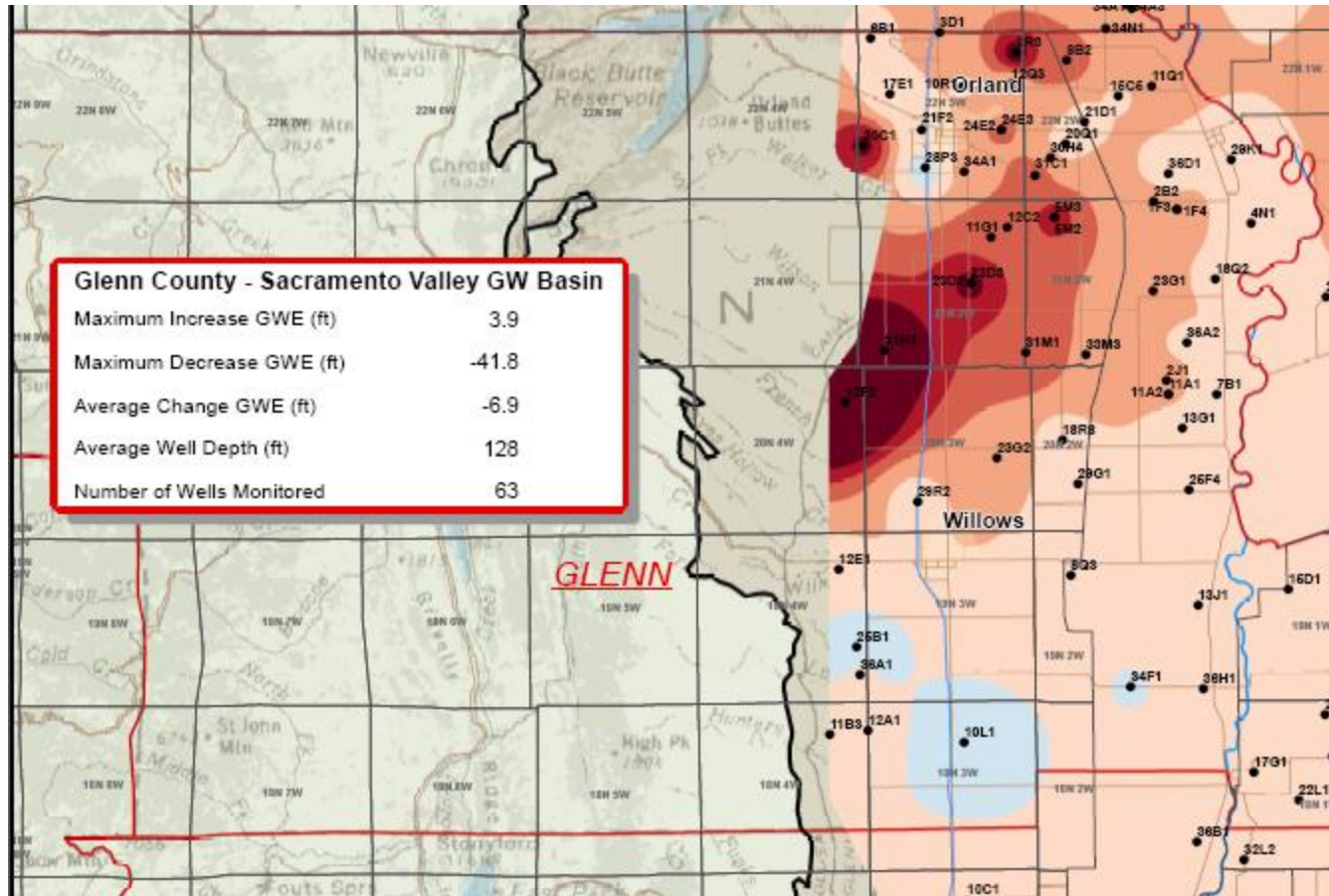






# DWR Change Map

## Fall 2004 to Fall 2012 (Shallow)



STATE OF CALIFORNIA  
 THE RESOURCES AGENCY  
DEPARTMENT OF WATER RESOURCES  
 NORTHERN REGION OFFICE  
 2440 Main Street  
 Red Bluff, California 96080  
 (530) 529-7300

**NORTHERN SACRAMENTO VALLEY  
 CHANGE IN GROUNDWATER ELEVATION MAP  
 FALL 2004 TO FALL 2012  
 SHALLOW AQUIFER ZONE**  
 (Wells generally less than 200 ft bgs)

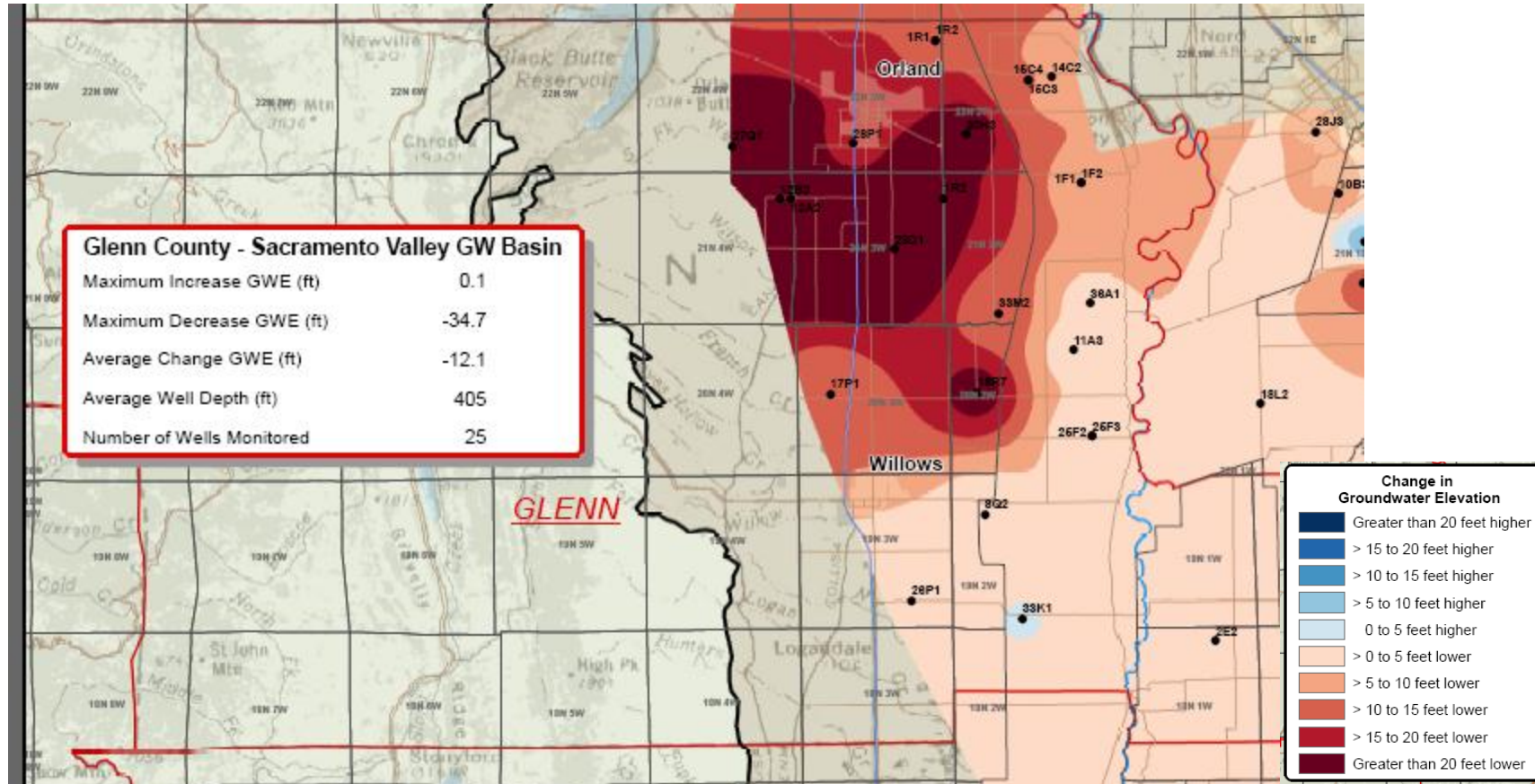
**PLATE 3S-B**  
 Date: January 2013  
 BY: G. Gordon





# DWR Change Map

## Fall 2004 to Fall 2012 (Intermediate)



STATE OF CALIFORNIA  
 THE RESOURCES AGENCY  
 DEPARTMENT OF WATER RESOURCES  
 NORTHERN REGION OFFICE  
 2440 Main Street  
 Red Bluff, California 98080  
 (530) 529-7300

**NORTHERN SACRAMENTO VALLEY  
 CHANGE IN GROUNDWATER ELEVATION MAP  
 FALL 2004 TO FALL 2012  
 INTERMEDIATE AQUIFER ZONE**  
 (Wells generally greater than 200 ft and less than 600 ft bgs)

**PLATE 31-B**

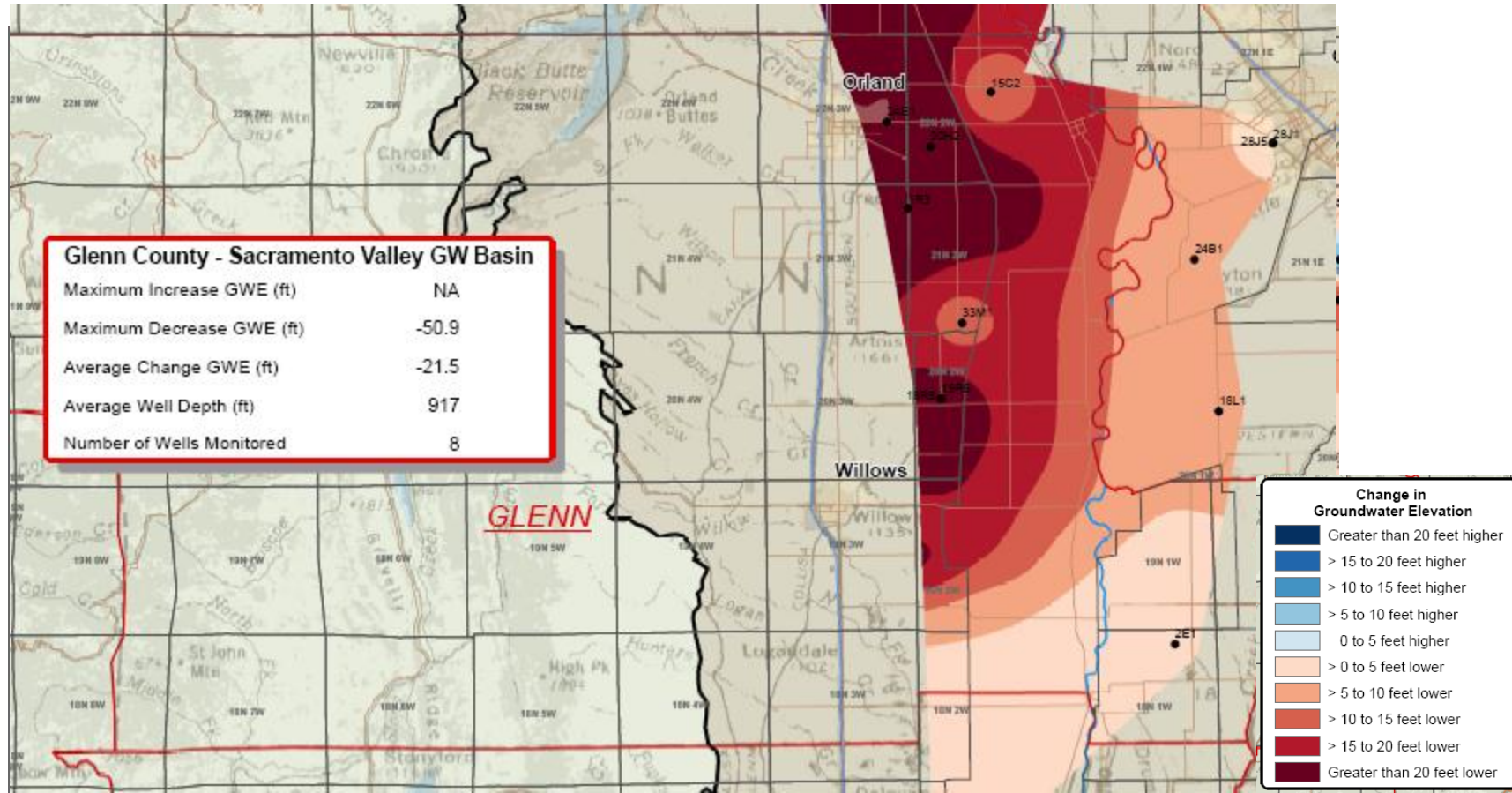
Date: January 2013

BY: G. Gordon



# DWR Change Map

## Fall 2004 to Fall 2012 (Deep)



STATE OF CALIFORNIA  
THE RESOURCES AGENCY  
DEPARTMENT OF WATER RESOURCES  
NORTHERN REGION OFFICE  
2440 Main Street  
Red Bluff, California 96080  
(530) 529-7300

**NORTHERN SACRAMENTO VALLEY  
CHANGE IN GROUNDWATER ELEVATION MAP  
FALL 2004 TO FALL 2012  
DEEP AQUIFER ZONE**  
(Wells generally greater than 600 ft bgs)

**PLATE 3D-B**

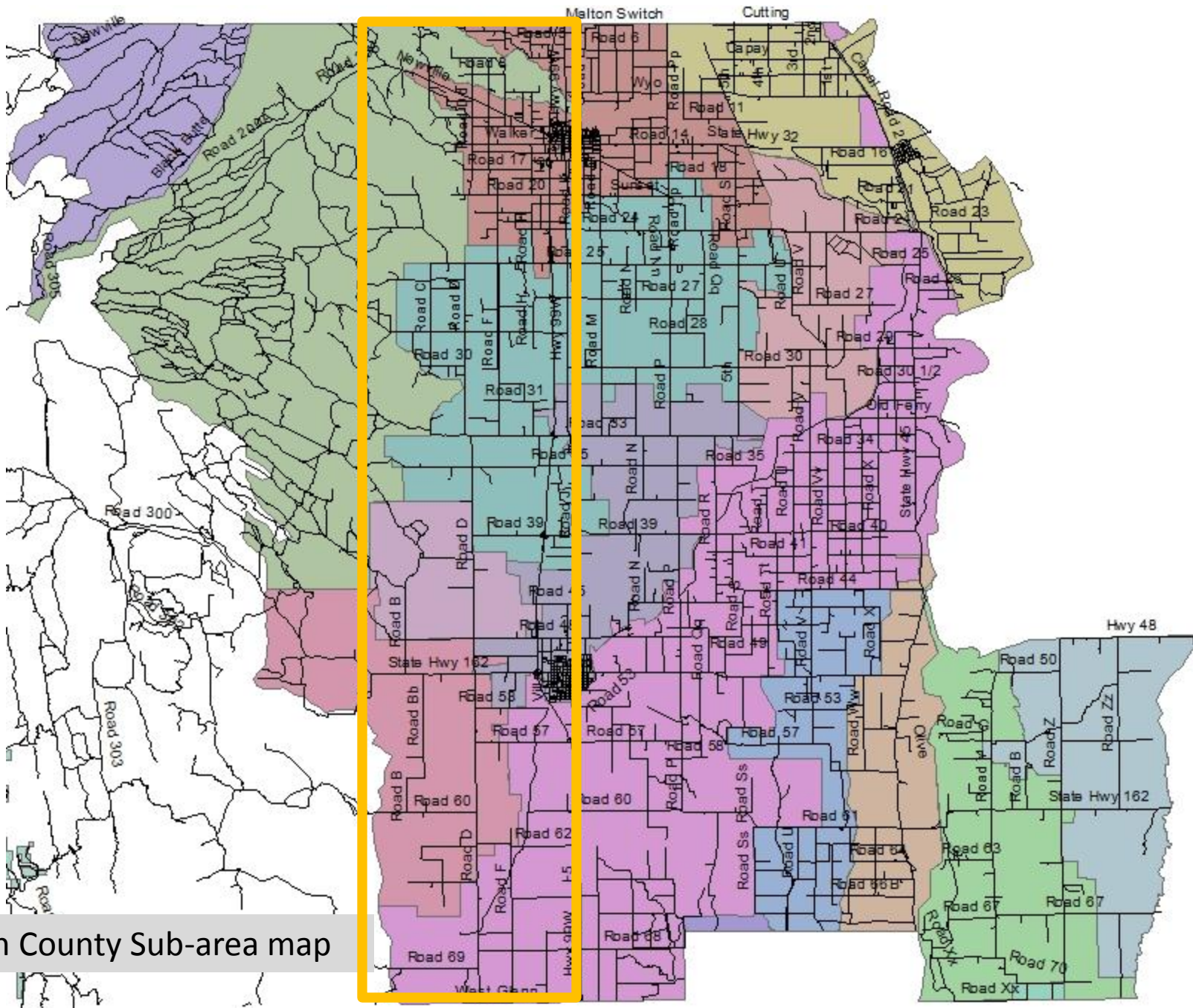
Date: January 2013

By: G. Gordon



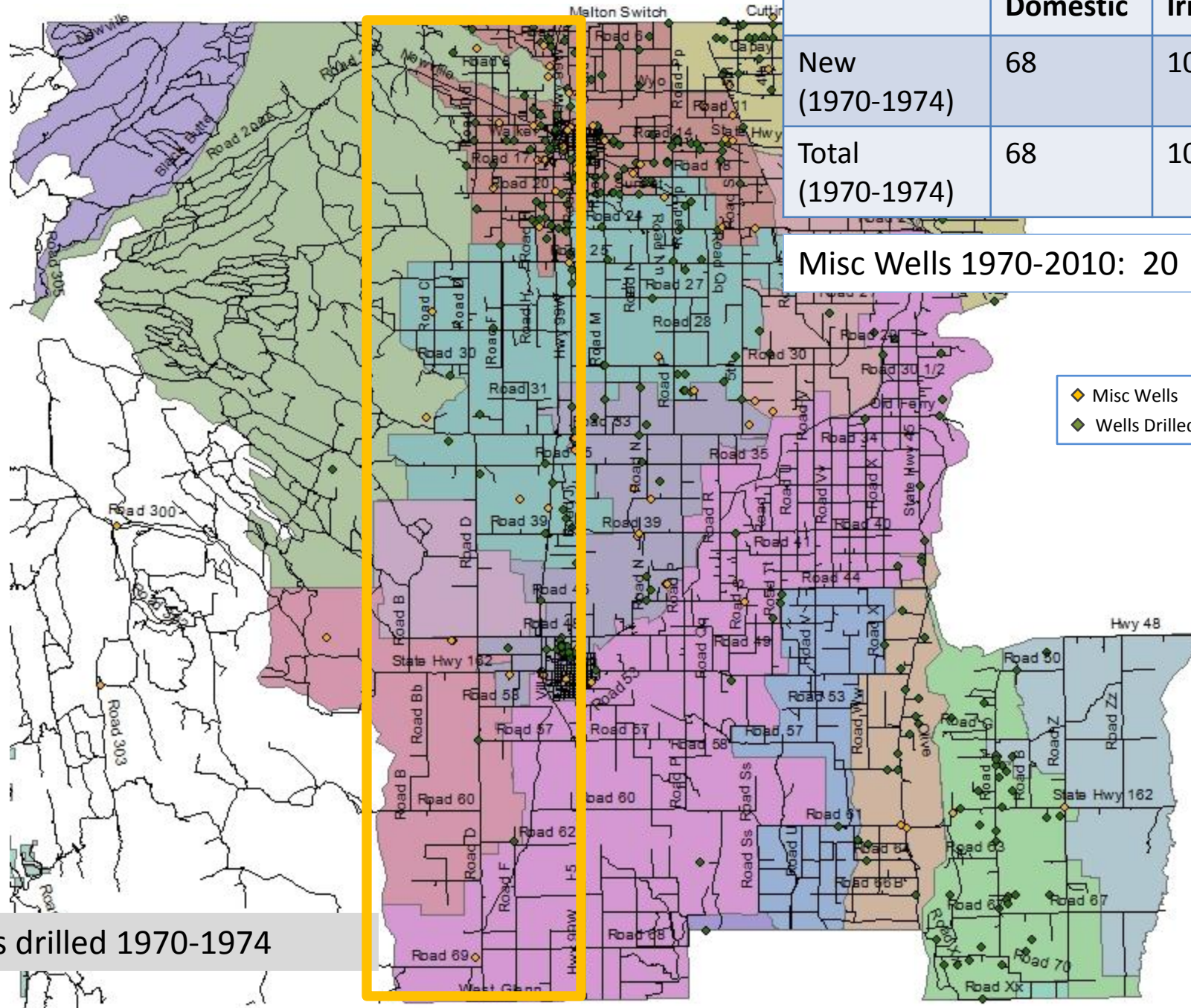
# Water Well Increases from 1970 to 2010





Glenn County Sub-area map





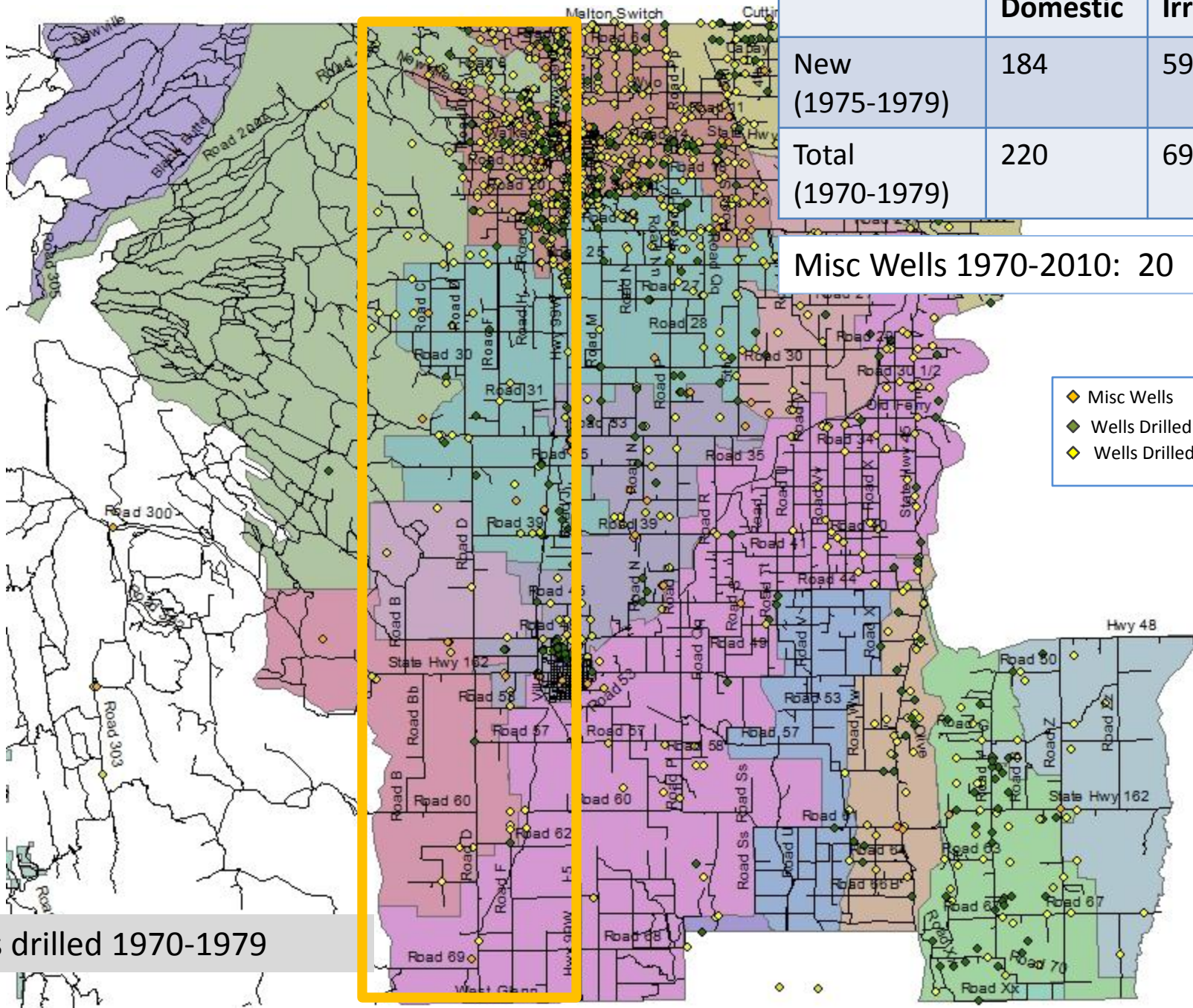
Wells drilled 1970-1974



	Domestic	Irrigation
New (1975-1979)	184	59
Total (1970-1979)	220	69

Misc Wells 1970-2010: 20

- ◆ Misc Wells
- ◆ Wells Drilled 1970-1974
- ◆ Wells Drilled 1975-1979



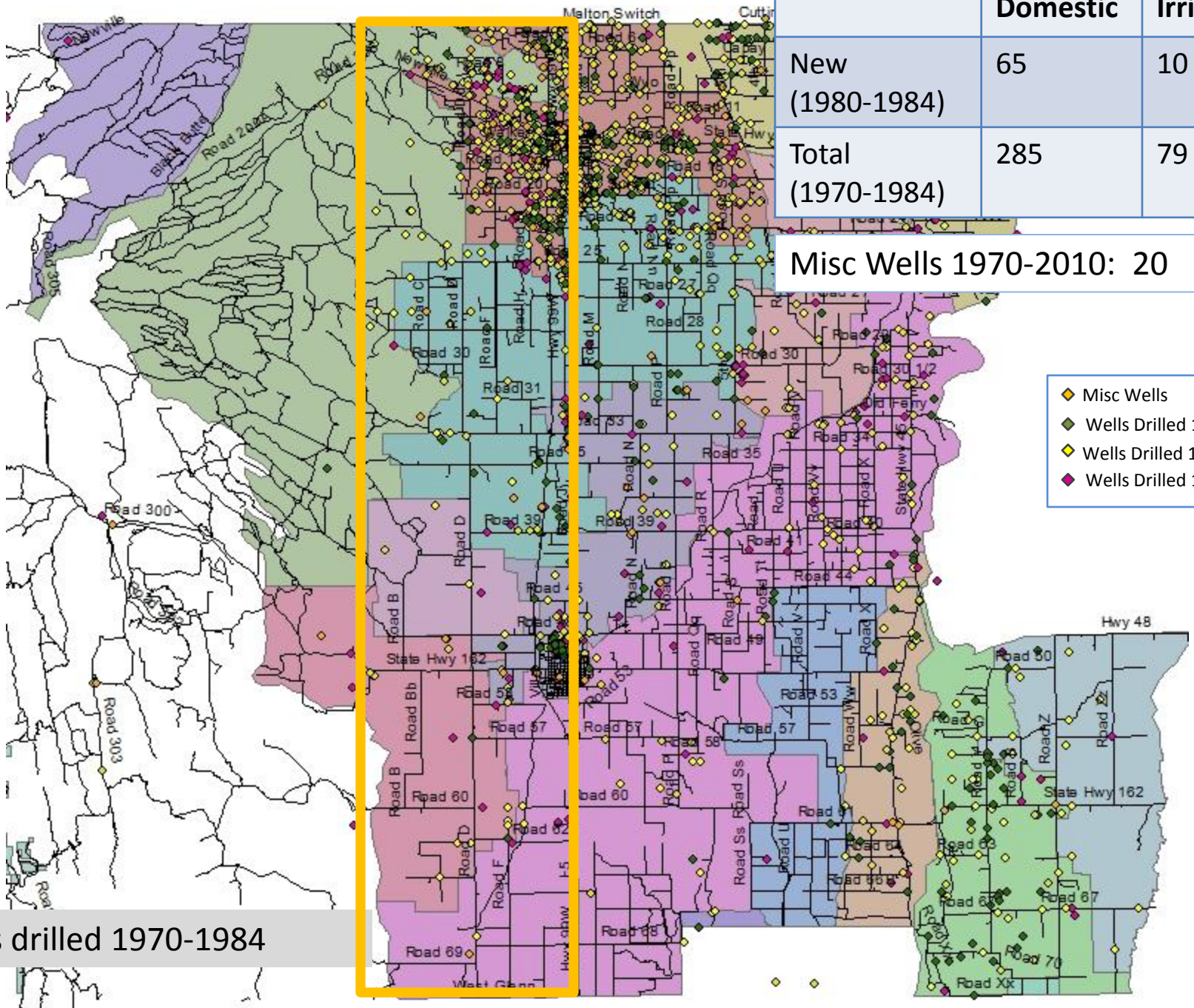
Wells drilled 1970-1979



	Domestic	Irrigation
New (1980-1984)	65	10
Total (1970-1984)	285	79

Misc Wells 1970-2010: 20

- ◆ Misc Wells
- ◆ Wells Drilled 1970-1974
- ◆ Wells Drilled 1975-1979
- ◆ Wells Drilled 1980-1984



Wells drilled 1970-1984

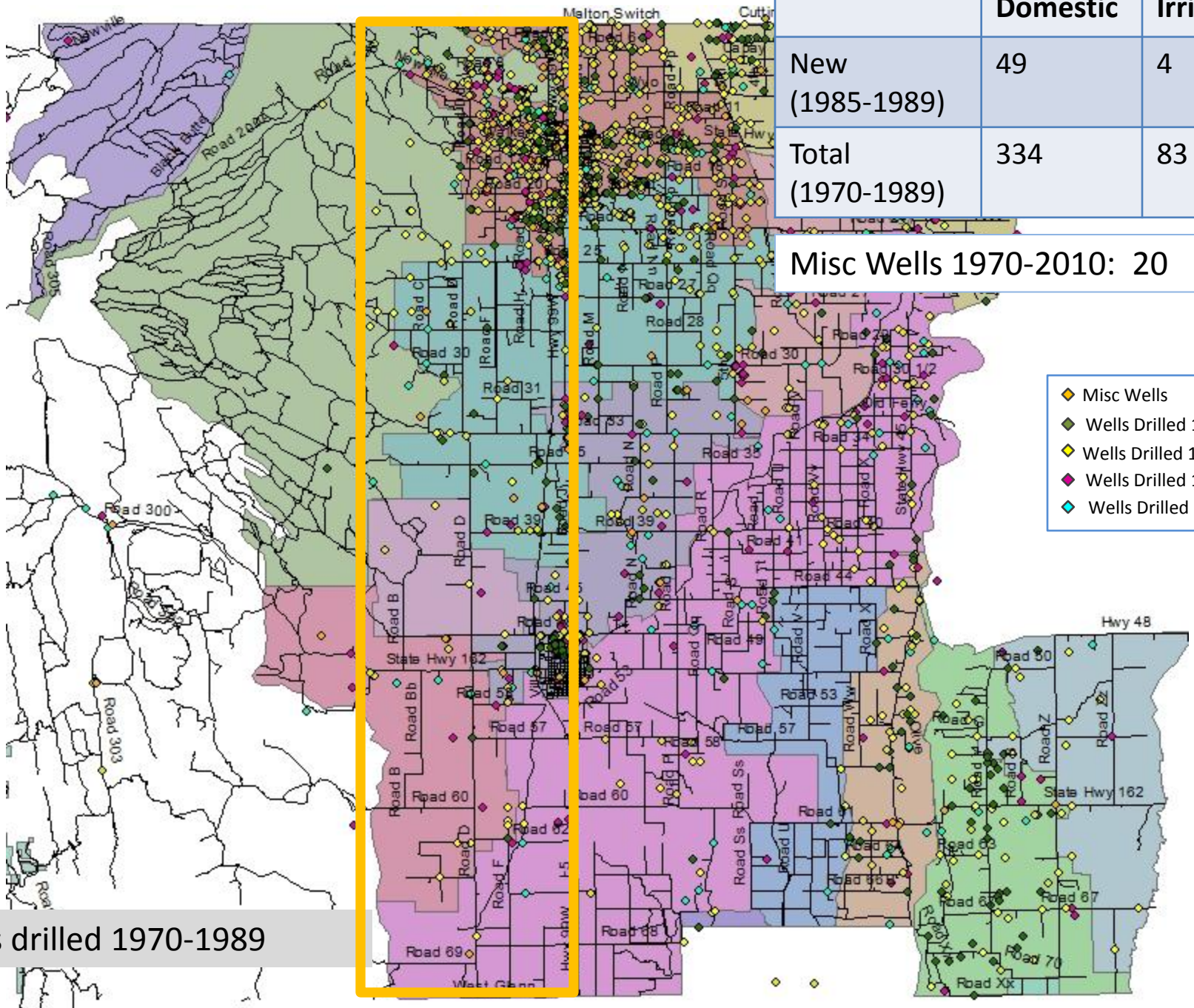


	Domestic	Irrigation
New (1985-1989)	49	4
Total (1970-1989)	334	83

Misc Wells 1970-2010: 20

- ◆ Misc Wells
- ◆ Wells Drilled 1970-1974
- ◆ Wells Drilled 1975-1979
- ◆ Wells Drilled 1980-1984
- ◆ Wells Drilled 1985-1989

Wells drilled 1970-1989



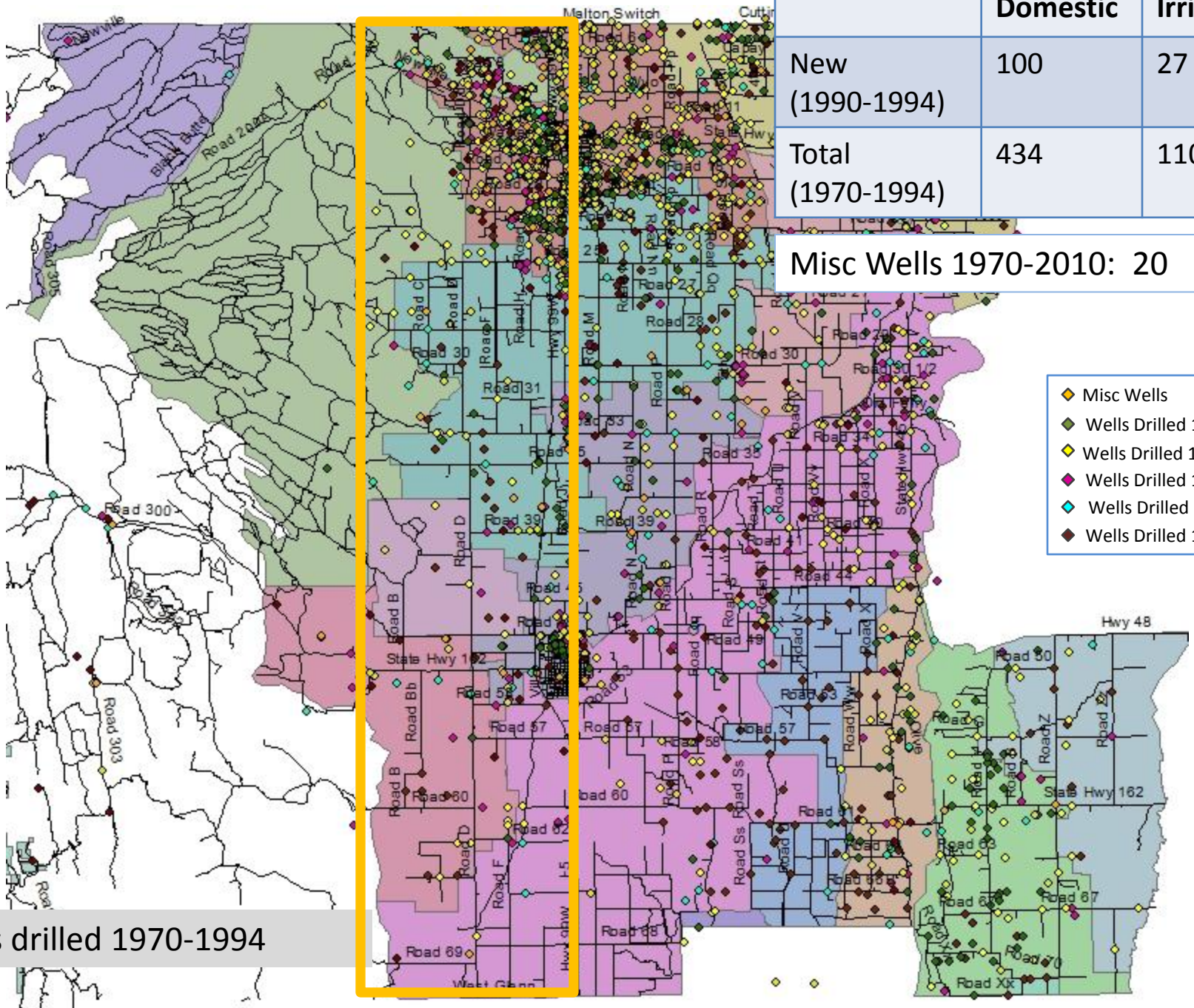


	Domestic	Irrigation
New (1990-1994)	100	27
Total (1970-1994)	434	110

Misc Wells 1970-2010: 20

- ◆ Misc Wells
- ◆ Wells Drilled 1970-1974
- ◆ Wells Drilled 1975-1979
- ◆ Wells Drilled 1980-1984
- ◆ Wells Drilled 1985-1989
- ◆ Wells Drilled 1990-1994

Wells drilled 1970-1994



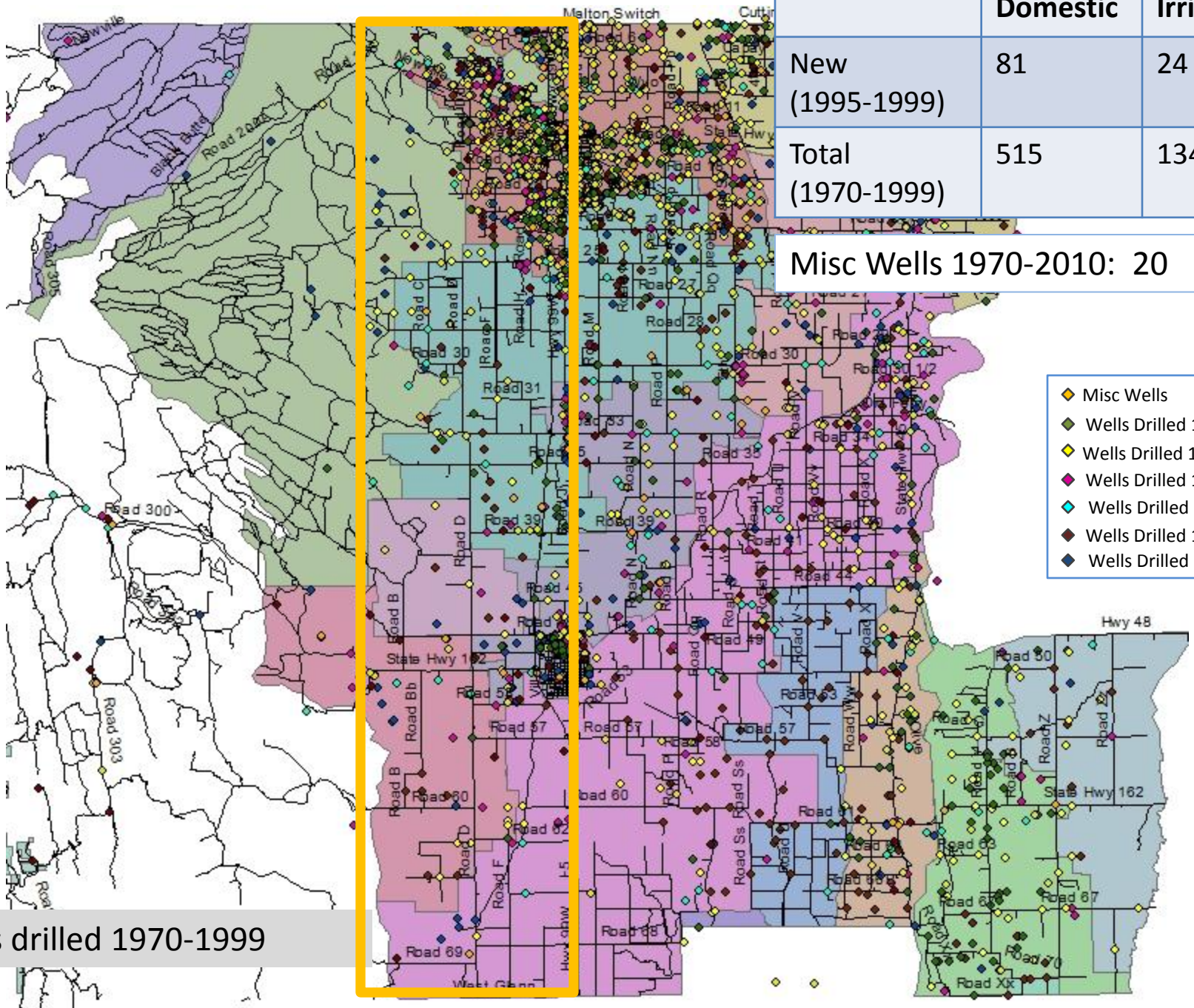


	Domestic	Irrigation
New (1995-1999)	81	24
Total (1970-1999)	515	134

Misc Wells 1970-2010: 20

- ◆ Misc Wells
- ◆ Wells Drilled 1970-1974
- ◆ Wells Drilled 1975-1979
- ◆ Wells Drilled 1980-1984
- ◆ Wells Drilled 1985-1989
- ◆ Wells Drilled 1990-1994
- ◆ Wells Drilled 1995-1999

Wells drilled 1970-1999

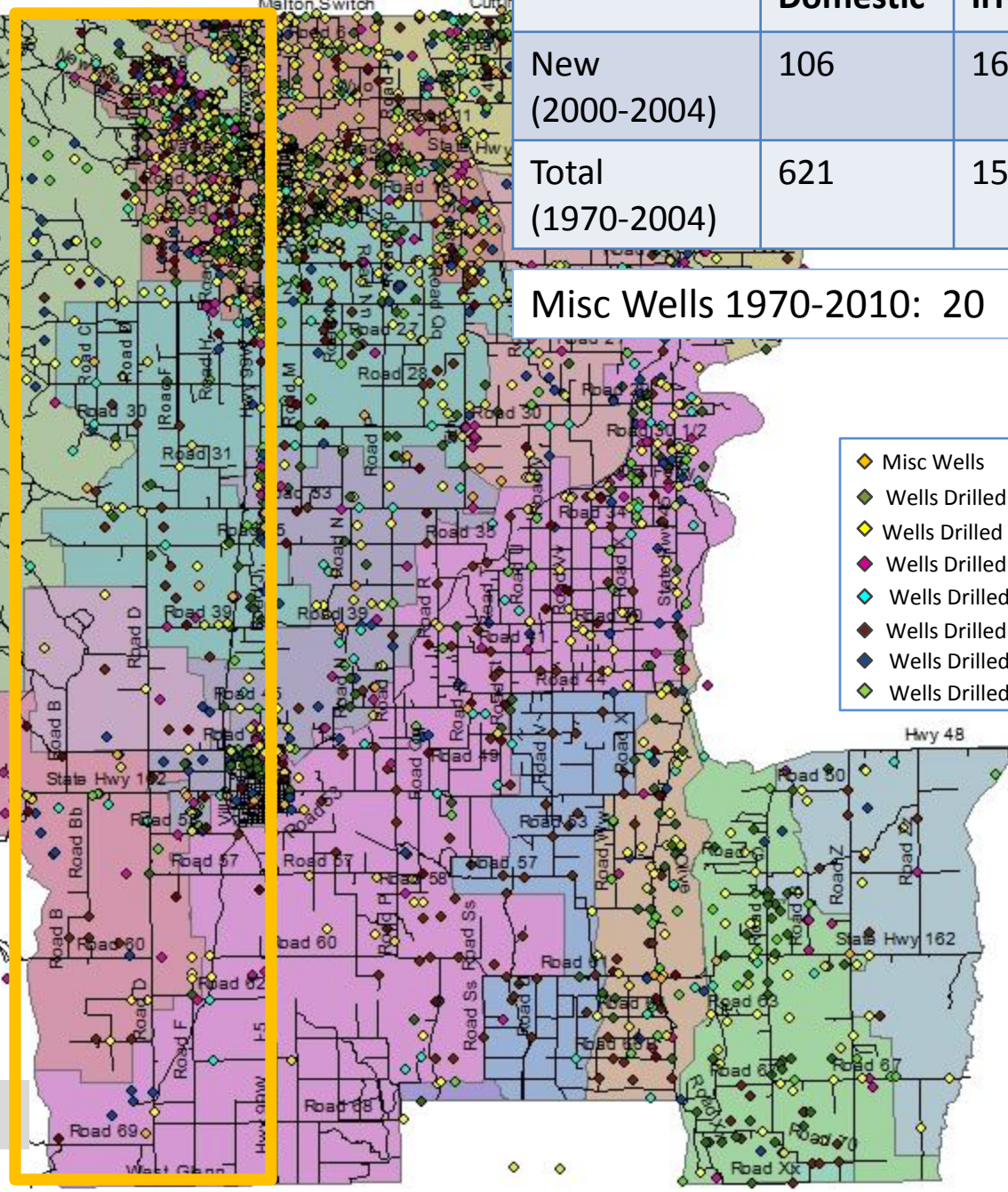




	Domestic	Irrigation
New (2000-2004)	106	16
Total (1970-2004)	621	150

Misc Wells 1970-2010: 20

- ◆ Misc Wells
- ◆ Wells Drilled 1970-1974
- ◆ Wells Drilled 1975-1979
- ◆ Wells Drilled 1980-1984
- ◆ Wells Drilled 1985-1989
- ◆ Wells Drilled 1990-1994
- ◆ Wells Drilled 1995-1999
- ◆ Wells Drilled 2000-2004



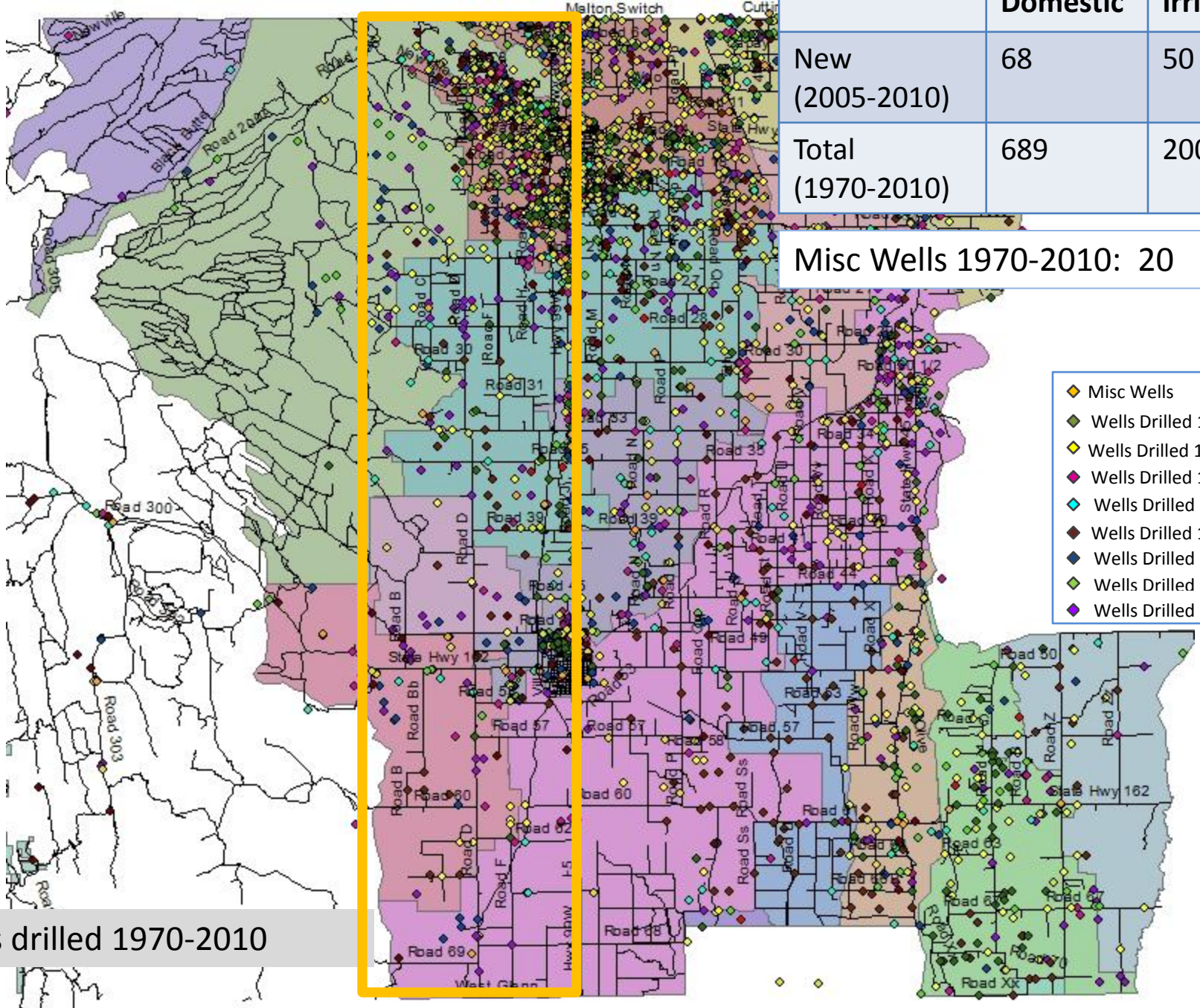
Wells drilled 1970-2004



	Domestic	Irrigation
New (2005-2010)	68	50
Total (1970-2010)	689	200

Misc Wells 1970-2010: 20

- ◆ Misc Wells
- ◆ Wells Drilled 1970-1974
- ◆ Wells Drilled 1975-1979
- ◆ Wells Drilled 1980-1984
- ◆ Wells Drilled 1985-1989
- ◆ Wells Drilled 1990-1994
- ◆ Wells Drilled 1995-1999
- ◆ Wells Drilled 2000-2004
- ◆ Wells Drilled 2005-2010



Wells drilled 1970-2010

## Lisa Hunter

---

**From:** Allan Fulton <aefulton@ucanr.edu>  
**Sent:** Thursday, June 06, 2013 9:12 AM  
**To:** Leigh McDaniel; Lester Messina  
**Cc:** Lisa Hunter; Thad Bettner  
**Subject:** Groundwater conditions on west side of Glenn County

Hi Leigh and Lester,

I have been thinking more about the TAC discussion about groundwater conditions on the west side of Glenn County and possible educational steps that could be taken to help address some of the challenges. By the way, the problem of greater reliance on groundwater and less use of surface water is prevalent on the west side of Tehama County too and I would suspect Colusa County. Although it is not quite as expansive and not hitting quite as intensely, yet.

One possible education step might be to work with at least one willing grower and possibly two or three to actually develop the full costs of pumping groundwater along the west side. I am aware of a grower in Tehama County who would be willing to anonymously share the capital and operational costs of their deep turbine wells located west of Corning as a source of data to conduct the analysis. Maybe we could locate one or two more willing operators to broaden our sample size, geography, and data base. Their deep turbine wells are new (2-5 years old) and as deep as 750 feet. They also farm within Corning Water District and use their full annual allocation of surface water to grow almonds and walnuts with microsprinkler and drip irrigation. They admittedly don't fully understand the cost comparison of their two water sources. Possibly, I could work with Sam Sandoval from UCD and maybe another UCD Ag Economist (Karen Klonskey) to conduct the full analysis. I would be willing to approach them about this to sound out their availability. I thought an economic exercise like this might be useful to develop the issues, provide information for outreach, and encourage thought and attention to it. It of course, would depend on the what the actual results suggest. I don't think this would be a terribly expensive first step and place to begin taking action and I think it might be accomplished over this irrigation season or definitely by the end of the year.

After the analysis were completed, the outcomes might also provide some insight as to how to develop incentives to balance the use of groundwater and surface water. For example, based upon the short discussion I have had with this one grower, when they run the deep turbines they are operating 200 to 250 hp electric motors and when they are using district water they are only operating 40 to 50 horsepower booster pumps. This is a potential of 200 hp savings per hour of operation which equates to about 150 kw per hour of electrical demand. If this these pumps are in operation 24 hours per day at least 6 days a week and most likely 7 days per week for at least 135 days (4.5 months) a year, this equates to about 500,000 kw per year savings in electric power per well and pumping plant. Plus, I think these should be fairly conservative estimates. If some new work and economic analysis of actual costs of irrigating with groundwater reveal anything close to these off the cuff estimates, there might be a chance to approach PGE about ways to work with them and the water districts to address the question of incentives to encourage use of surface water and balance it better with reliance on groundwater. I would guess that PGE would like to encourage the use of the surface water with lower hp demand by operating the booster pumps opposed to deep turbines.

By the way, I'd be remiss if I didn't mention that Thad Bettner leaned over and suggested this potential concept as we discussed the matter in the TAC meeting. That is part of reason it has remained on my mind. Give this some thought and let me know if you would like to talk about this more.

Allan Fulton  
UC Irrigation and Water Resources Farm Advisor  
Tehama, Glenn, Colusa, and Shasta Counties