

Efforts to Incorporate Science-based Knowledge into Local Groundwater Management

Lester Messina

Glenn County

Department of Agriculture

December 16, 2011

The Team



Science - systematic knowledge of the physical or material world gained through **observation** and experimentation

Groundwater Management

Basic Elements of Groundwater Management:

- 1) Managing acceptable levels of depletion of groundwater in storage
- 2) Preventing and limiting groundwater quality degradation
- 3) Managing and preventing land subsidence

Basin Management Objectives (BMOs) or Trigger Levels

- Objectives can be numeric or narrative

Groundwater Management

Steps Required to Successfully Implement Groundwater Management:

- 1) Define Monitoring Parameters and Collection of Data
- 2) Evaluation of Collected Data
- 3) Public Input
- 4) Adaptive Management
- 5) Enforcement and Conflict Resolution
- 6) Cooperation Across All Boundaries

Background: Glenn County

- June 2001- Adopted BMOs for groundwater level
- 17 sub-areas
 - each with their own method of determining “compliance”
 - Based on 55 wells with history of monitoring by DWR.
- Fall 2001-Installation of multi-completion dedicated monitoring wells began
 - County - AB 303 grants
 - data gaps
 - areas sensitive to groundwater use
 - Irrigation districts – programmatic research

Background: GLENN COUNTY

To-date:

- Groundwater Level
 - 26 dedicated wells monitoring
 - 85 discreet zones
 - Continuous data loggers
 - Questionable Measurements Eliminated
- Land Subsidence:
 - 3 extensometers for monitoring local land subsidence.
 - GPS Benchmarks Established for the entire Sacramento Valley
- Water Quality:
 - Efforts Continue to Create Baselines
 - Cooperator in other regional efforts (i.e. GAMA program)

Background: Butte and Tehama Counties

- Butte County 17 sub-areas and 53 “BMOs wells”
 - 25 dedicated wells monitoring
 - 66 discreet zones
 - Continuous data loggers
 - Questionable Measurements Eliminated
 - 5 extensometers for monitoring local land subsidence.
- Tehama County 12 sub-areas with 47 “Key Wells”
 - 13 dedicated wells monitoring
 - 43 discreet zones
 - Continuous data loggers
 - Questionable Measurements Eliminated

Four County MOU Basin Management Objectives Information Center

Butte County Glenn County Colusa County Tehama County Kennedy/Jenks Consultants

DOCUMENTS GROUNDWATER REPORTS

MAP CONTENT

Focus: 4 County

BASE MAP LAYERS

Base Image: Contrast: 40%
Topography as: Color/Shade

Base Map Overlay

GROUNDWATER LAYERS

Monitoring Wells Label Popup

DATA STATIONS

Live Data Stations

MAP TOOLS AND NAVIGATION

Scale: 1" = 917119 in
Zoom To Area of Interest:

COORDINATE READOUT

Distance: NAD83, CalZone II, Feet
0 ft, 0 mi
X,Y: 6480487, 2407863

FUNCTION DISPLAY

Group Details

Well Symbology Options:
Color based on:
BMO Key Wells vs. Other Wells

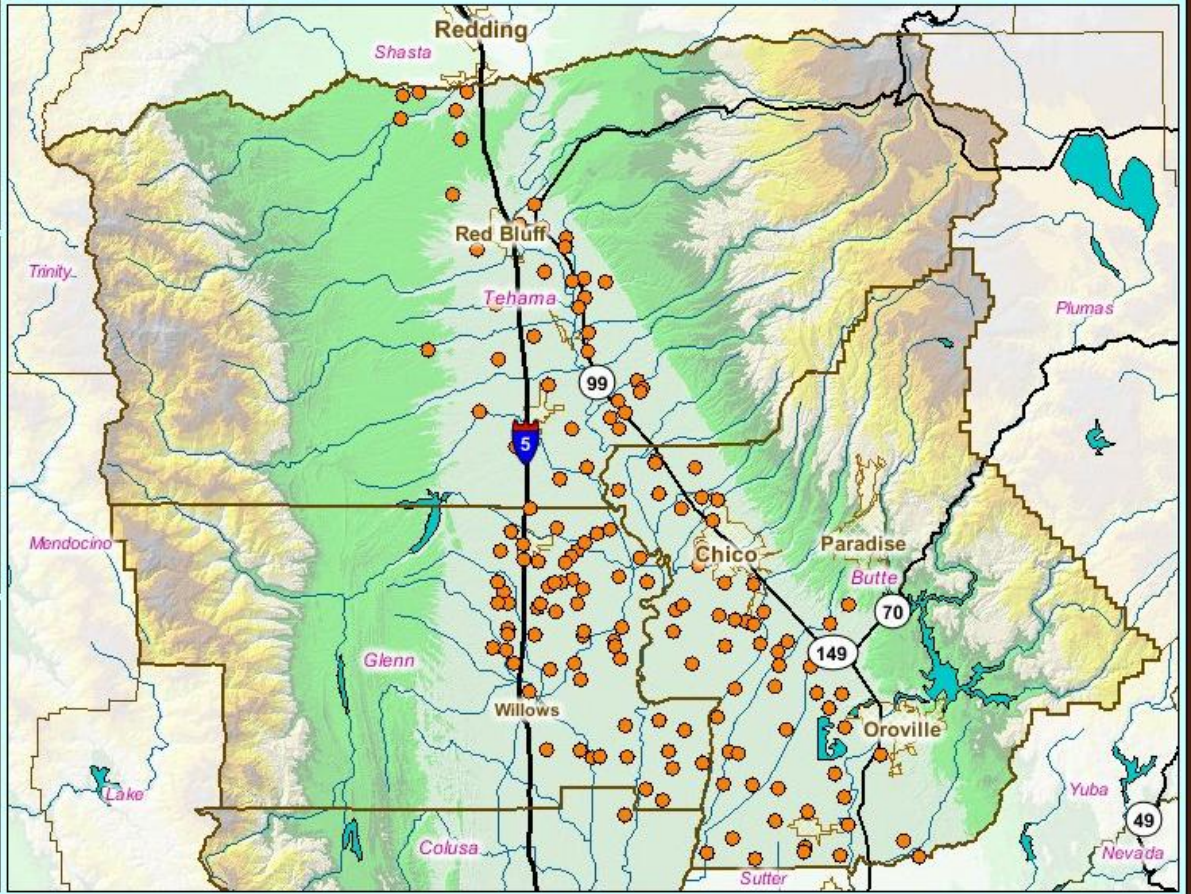
Legend:

- BMO Key wells
- Other wells

Zoom To Well:
Select Well:

LOCATION MAP

Click to pan



Glenn County Case for Science-based Knowledge

- 2009 - TAC reviews continued exceedances of established BMOs in two areas of the County
- Evaluated land and water use changes within a Five Mile radius of two pivotal wells
- Observations
 - decline in surface water availability,
 - decline in surface water use,
 - increase in micro sprinkler/drip use,
 - increased permanent crop development,
 - increase in irrigation well construction

5 Mile Radius

Legend

◆ Groundwater Wells

□ Buffer of 23G

□ Buffer of 18B

— Roads

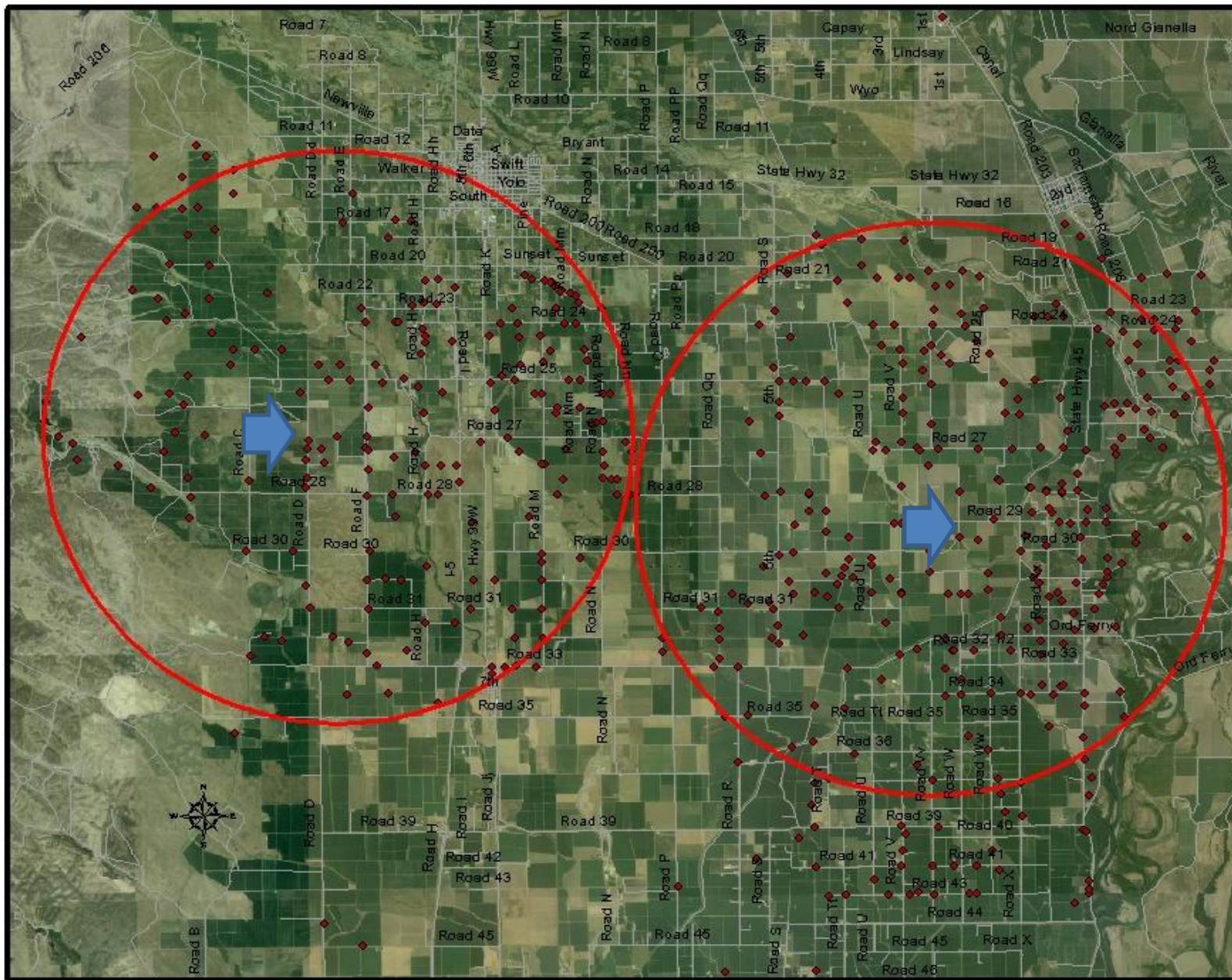
Naip 2004 Images

RGB

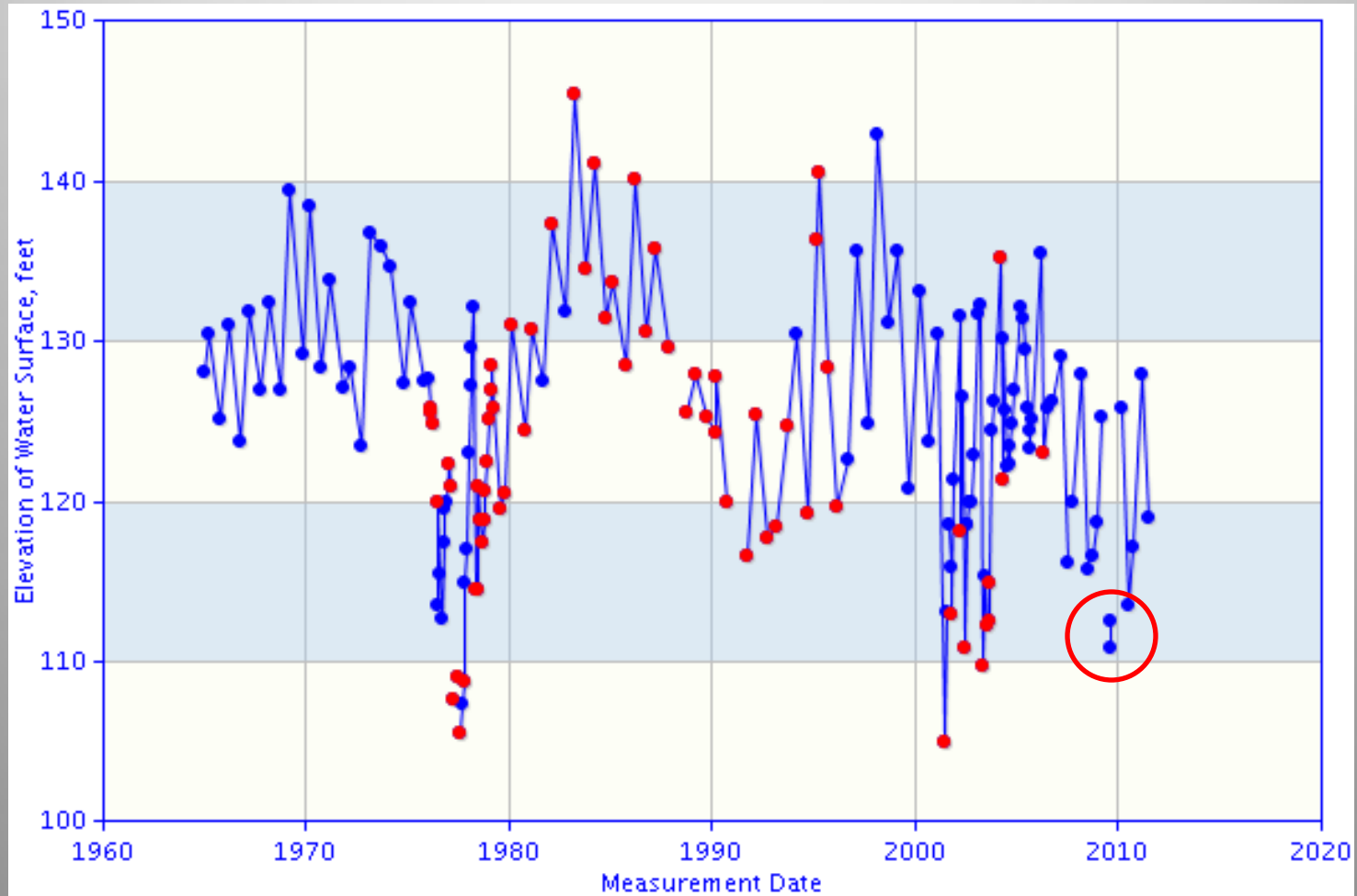
Red: Band_1

Green: Band_2

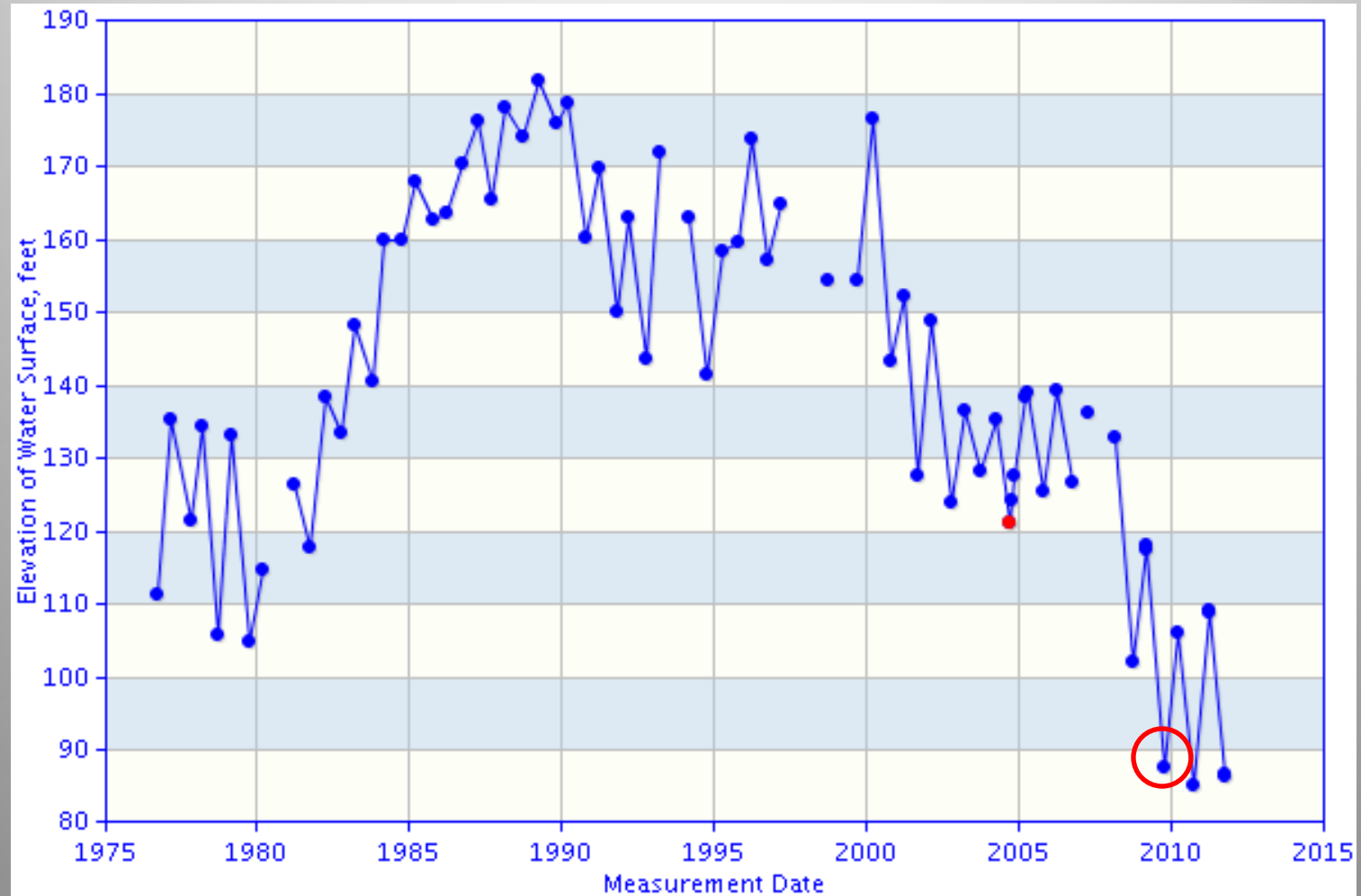
Blue: Band_3

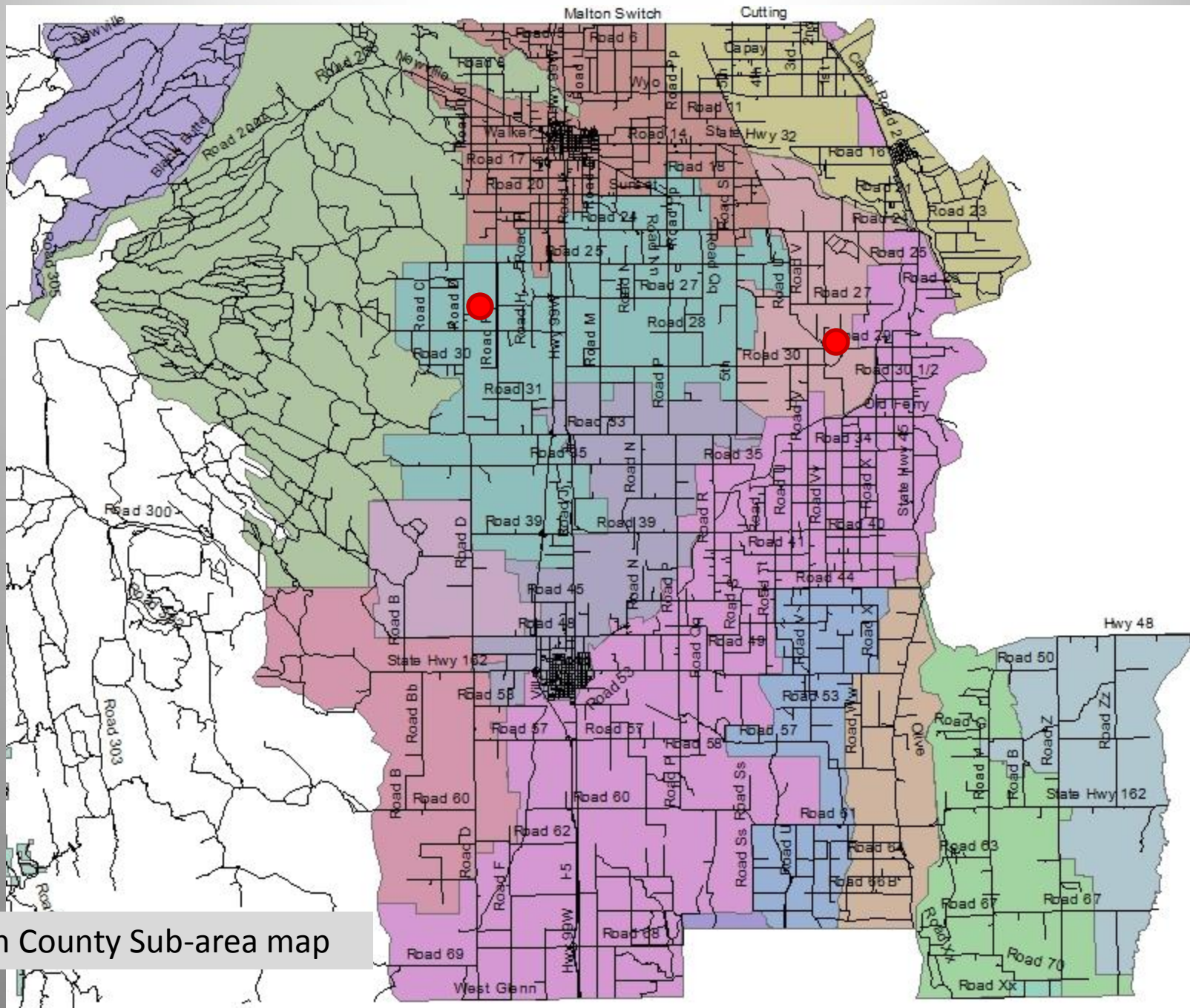


Reevaluate during wetter hydrologic cycle to see response

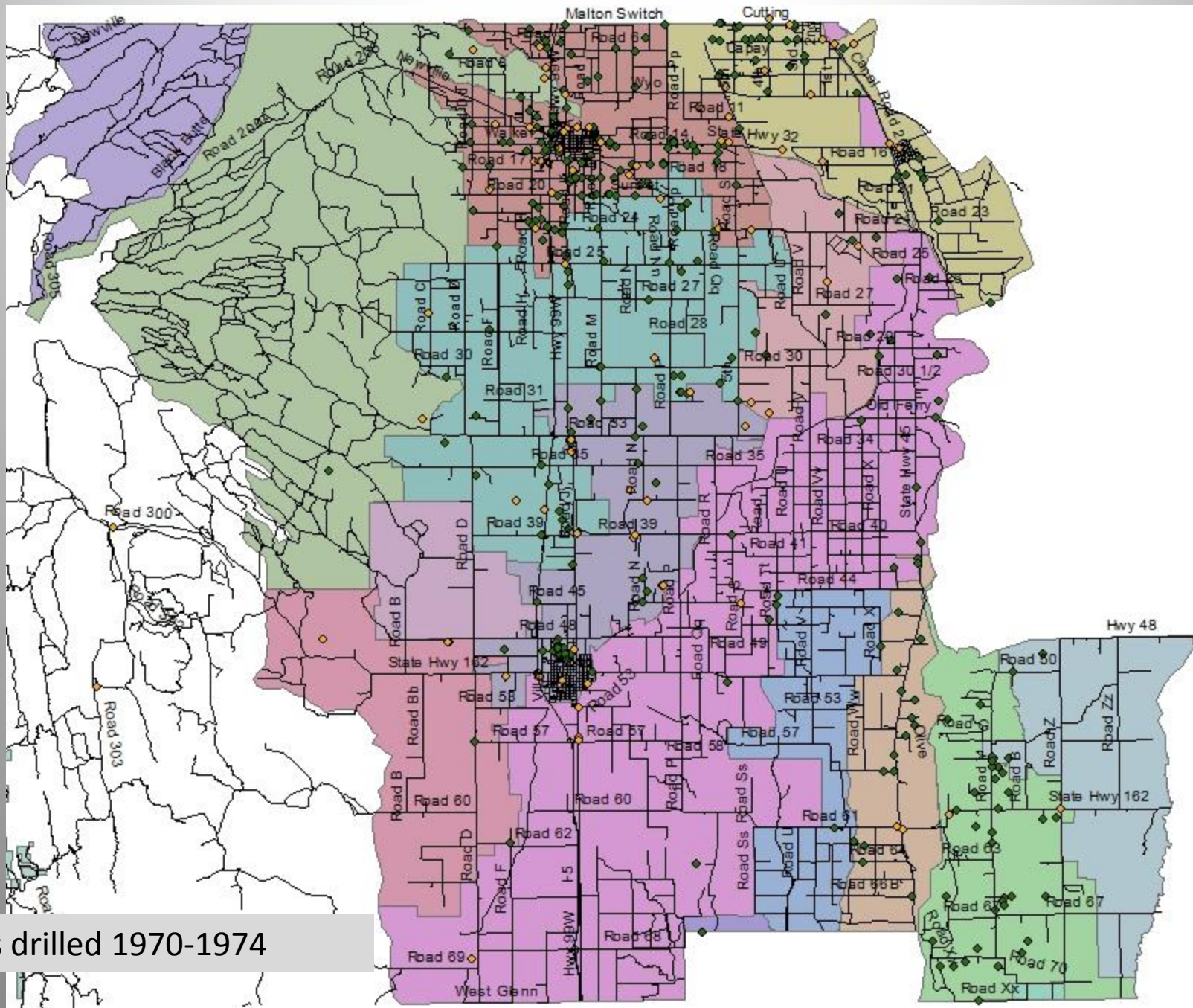


Reevaluate during wetter hydrologic cycle to see response

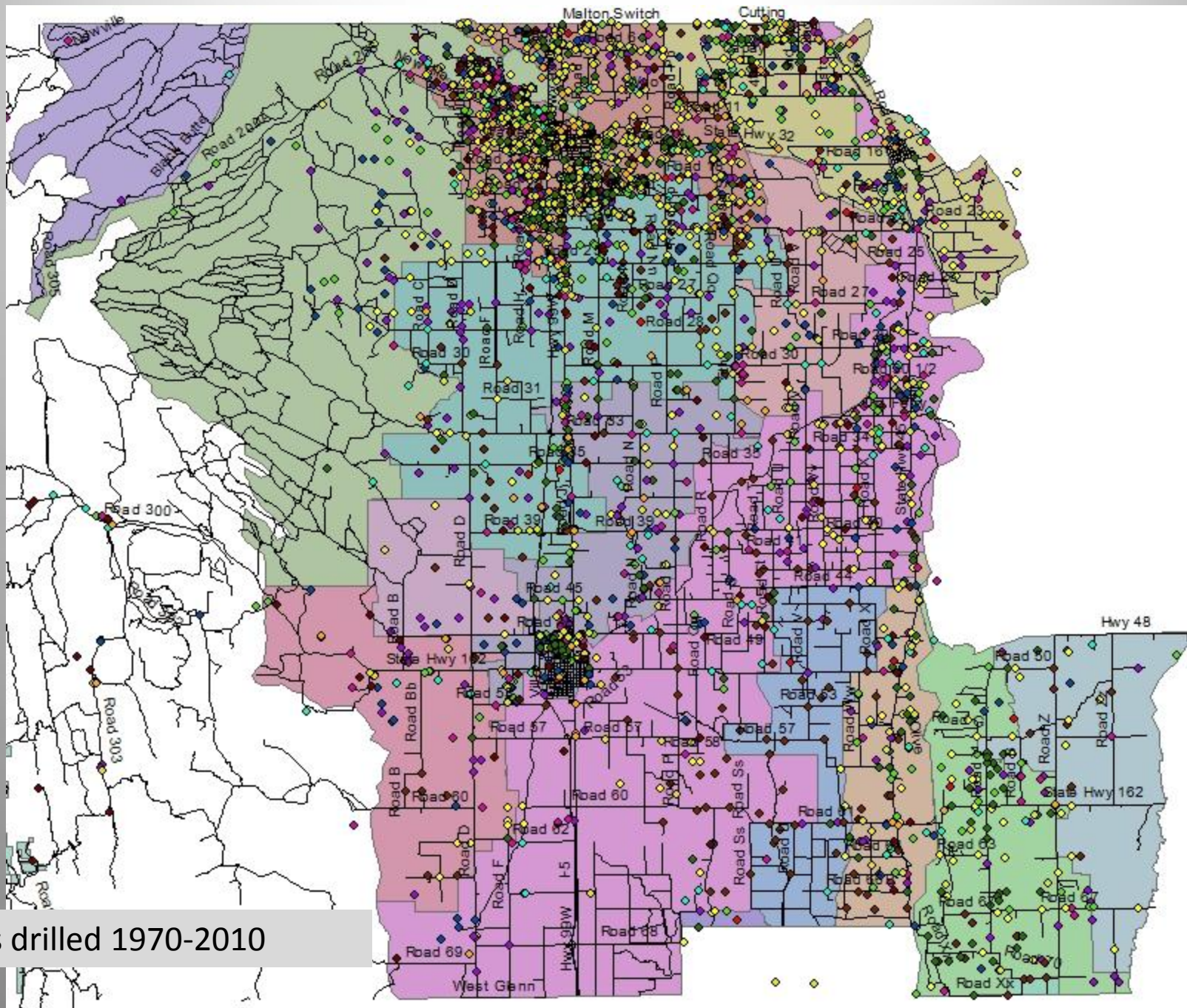




Glenn County Sub-area map



Wells drilled 1970-1974



Wells drilled 1970-2010

NORTHERN SACRAMENTO VALLEY CHANGE IN GROUNDWATER ELEVATION MAP

SUMMER 2004 TO SUMMER 2011

INTERMEDIATE WELL DEPTH

(Generally greater than 200 ft and less than 600 ft bgs)



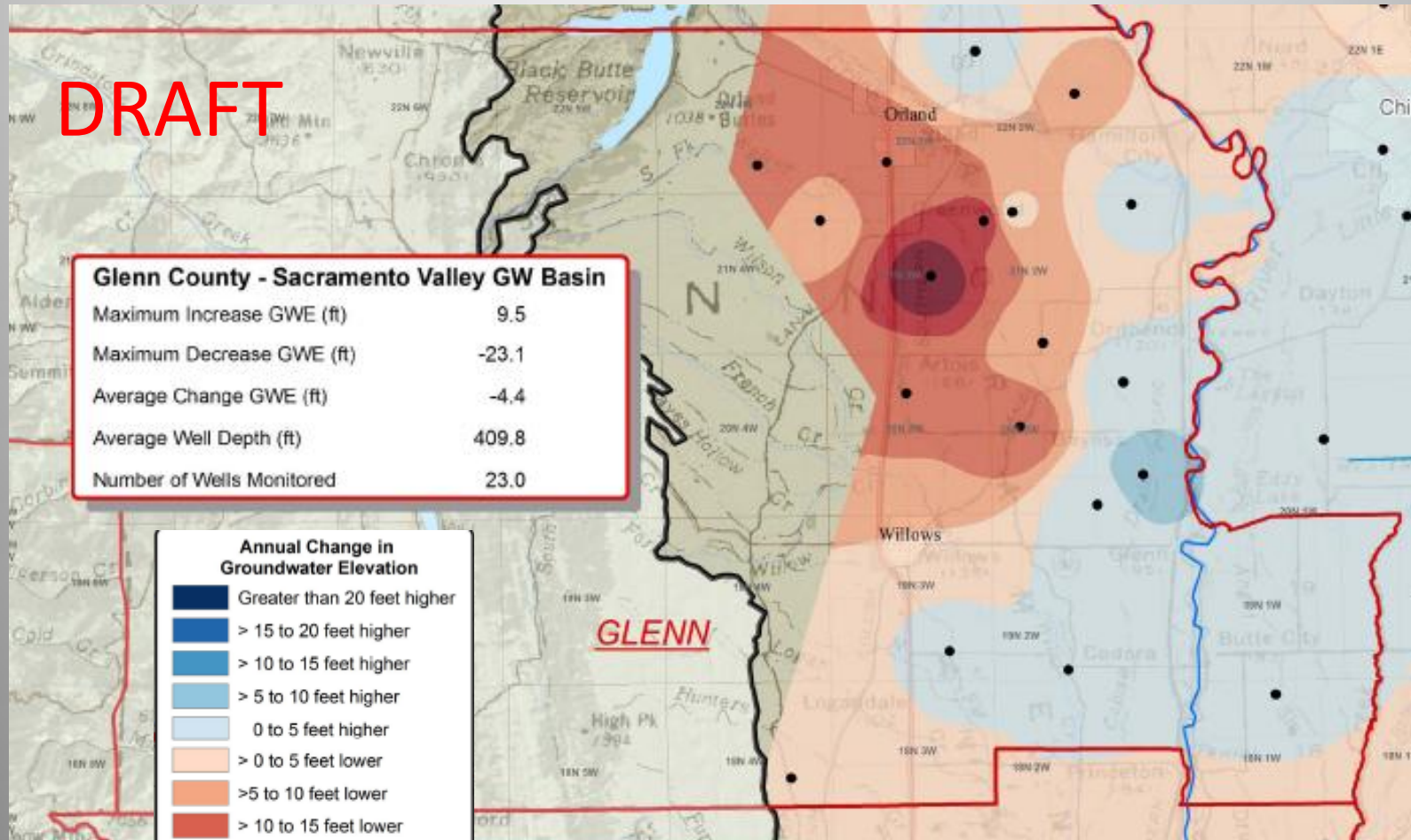
DRAFT

Glenn County - Sacramento Valley GW Basin

Maximum Increase GWE (ft)	9.5
Maximum Decrease GWE (ft)	-23.1
Average Change GWE (ft)	-4.4
Average Well Depth (ft)	409.8
Number of Wells Monitored	23.0

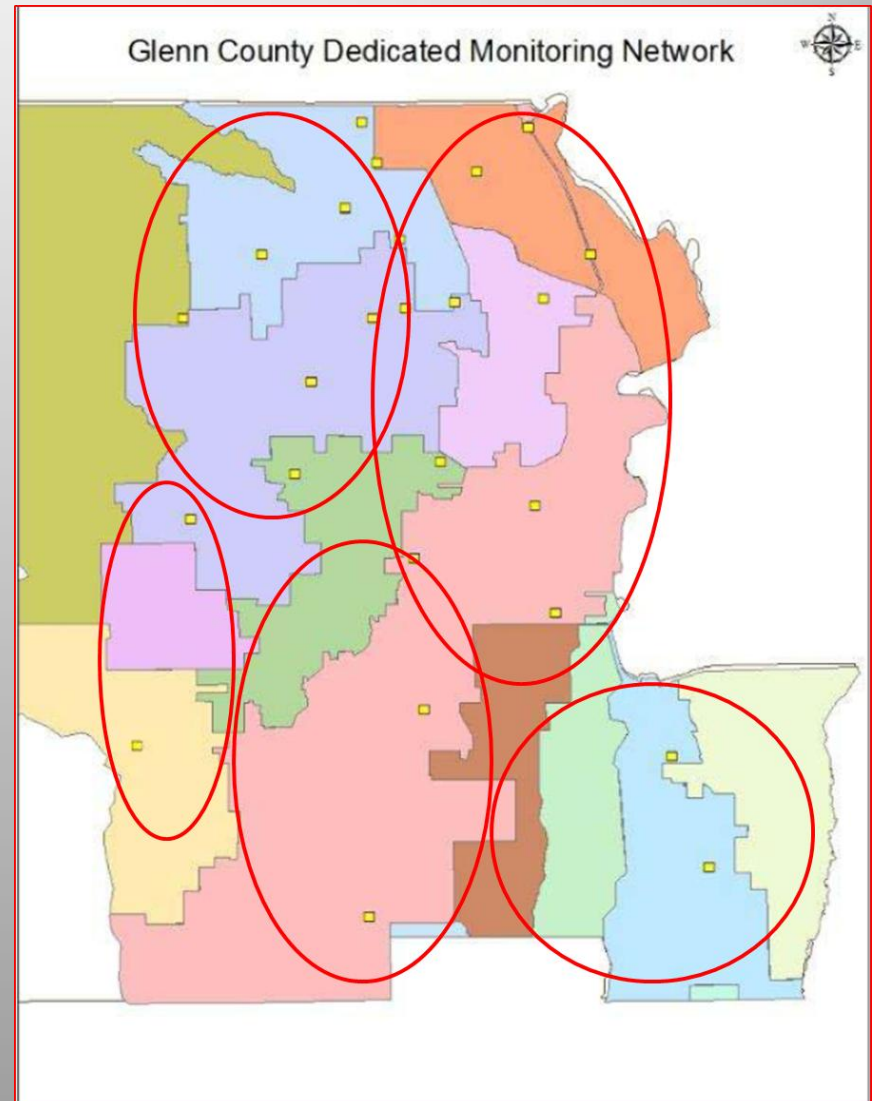
Annual Change in Groundwater Elevation

	Greater than 20 feet higher
	> 15 to 20 feet higher
	> 10 to 15 feet higher
	> 5 to 10 feet higher
	0 to 5 feet higher
	> 0 to 5 feet lower
	> 5 to 10 feet lower
	> 10 to 15 feet lower
	> 15 to 20 feet lower
	Greater than 20 feet lower

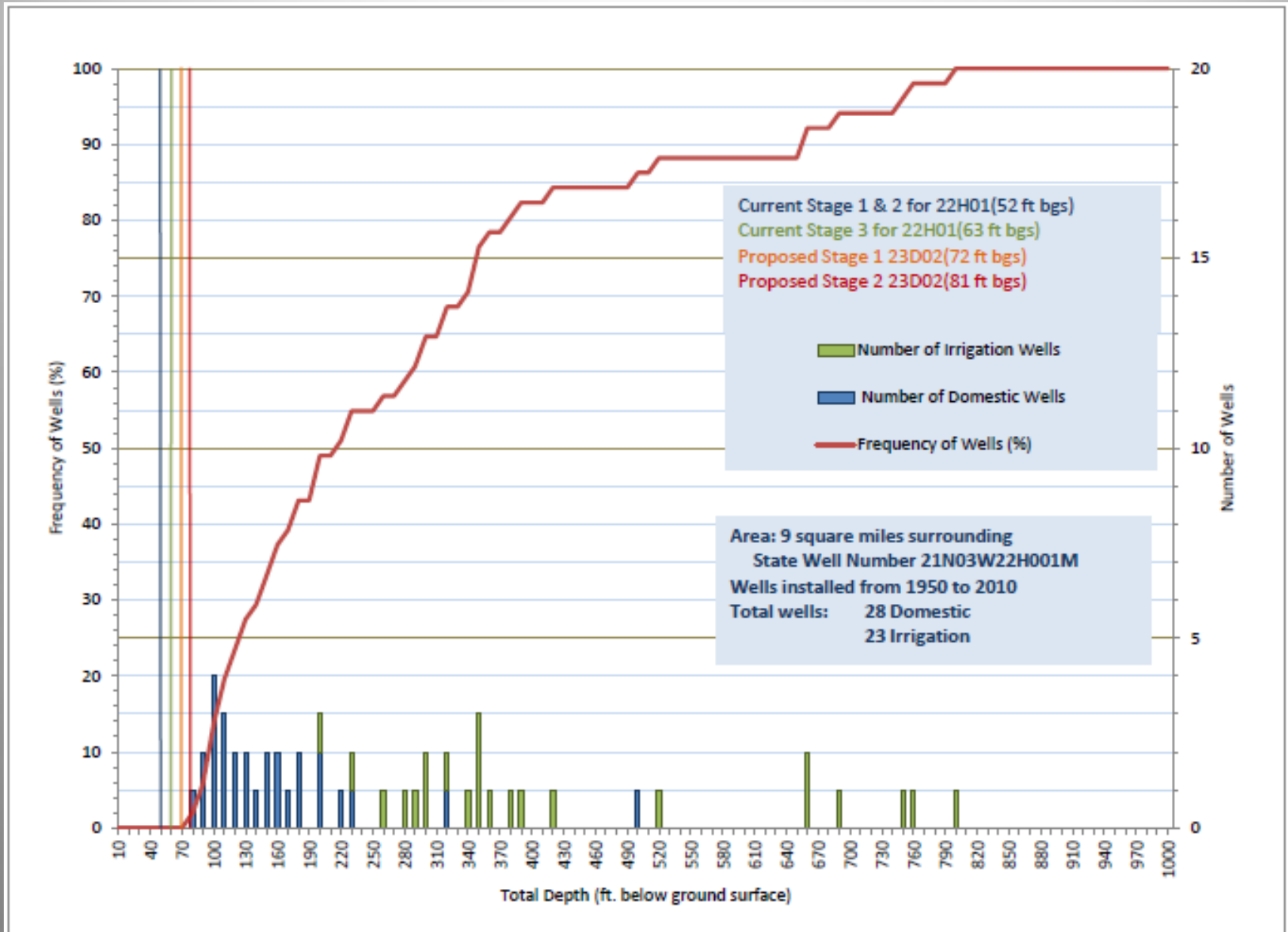


Re-evaluate Historical Measurements for BMOs to include more data as it becomes available.

- Use Dedicated Wells for BMOs
- BMOs may now cross political boundaries
- Refine BMOs with modeling
- Consider other factors
 - Well density
 - Well depths
 - Crops
 - Well use



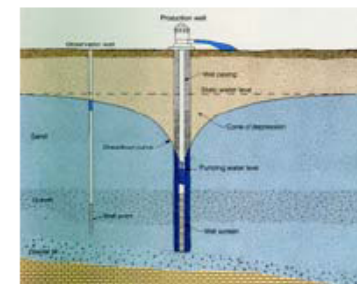
Example: Compare Well Infrastructure to BMOs



The University of California prohibits discrimination against or harassment of any person employed by or seeking employment with the University on the basis of race, color, nation origin, religion, sex, physical or mental disability, medical condition (cancer-related or genetic characteristics), ancestry, marital status, age, sexual orientation, citizenship, or status as a covered veteran (special disabled veteran, Vietnam-era veteran or any other veteran who served on active duty during a war or in a campaign or expedition for which a campaign badge has been authorized). University Policy is intended to be consistent with the provision of applicable State and Federal laws. Inquiries regarding the University's nondiscrimination policies may be directed to the Affirmative Action/Staff Personnel Services Director, University of California, Agriculture and Natural resources, 1111 Franklin, 6th Floor, Oakland, CA 94607-5200, Phone (510) 987-0096.



October 2011



ACQUIRING A BETTER UNDERSTANDING OF THE GROUNDWATER WELL INFRASTRUCTURE ON THE VALLEY FLOOR OF TEHAMA COUNTY AND NEIGHBORING COUNTIES

Allan Fulton
UCCE Farm Advisor
Tehama, Glenn, Colusa, and Shasta Counties

***This Outreach is funded by the Tehama County Flood
Control and Water Conservation District (TCFCWCD) and the
Glenn County Water Advisory Committee.***



Well Depth Distribution – Possible Benefits to Groundwater Management

- Evaluate current countywide groundwater monitoring networks
- Identify monitoring deficiencies
- Improve current and future groundwater monitoring networks.
- Identify opportunities for groundwater management programs – Recharge, etc...

Well Depth Distribution – Possible Benefits to Groundwater Management

- Risk assessment tool for policy makers
- Help private well owners with decisions:
 - well location
 - depth of a new well
 - how deep to set the pump bowls
 - Influence design and construction of new wells to achieve less interference with pre-existing wells
- Possibly address potential Legislation on quantifying groundwater pumping and water use efficiency.

Tools for Groundwater Management

- Planning
- Information Gathering (monitoring)
- More Planning
- Monitoring & Modeling
- Continuous Planning



4 Paul Gosselin Coop Extension

121611.ppt