

Deliverable 4: Estimating Annual Change in Groundwater Storage

California Water Plan, Update 2013
Groundwater Content Enhancement
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Introduction

Deliverable 4 - Goals and Objectives

- Estimate and report Spring to Spring changes in groundwater storage using groundwater level data
 - Transparent
 - Repeatable
 - A Statewide Process
- Does Not...
 - Replace / supersede other methods
 - Compile or report results from other efforts

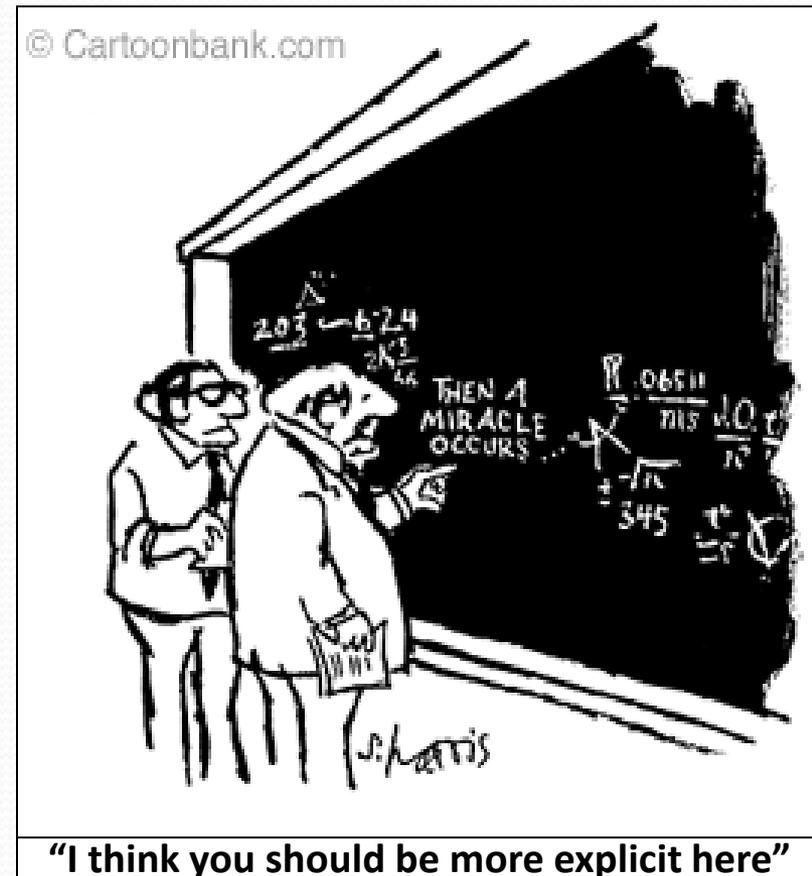
Considerations

- Water Level Data Availability
 - Focused on Central Valley for now
- Begin in 2005, for trend comparisons
- Results are preliminary and subject to peer review
- GW storage coefficients
 - Used to estimate change in groundwater volume
 - Assume “unconfined” aquifer conditions (S_y)

Considerations (cont.)

- GW storage coefficients (cont.)
 - Historically $S_y = 0.07$ was used *
 - Recent models have higher S_y values
 - CVHM: S_y is around 0.17 (mean)
 - C2VSIM: S_y is around 0.19 (mean)
 - Deliverable 4 provides a range:
 - Min $S_y = 0.07$
 - Max $S_y = 0.17$
 - Other values may be used as more is understood

*For more details, see *DWR B118-6 Appendix A (1978)* and *USGS 1401-D (1989)*.

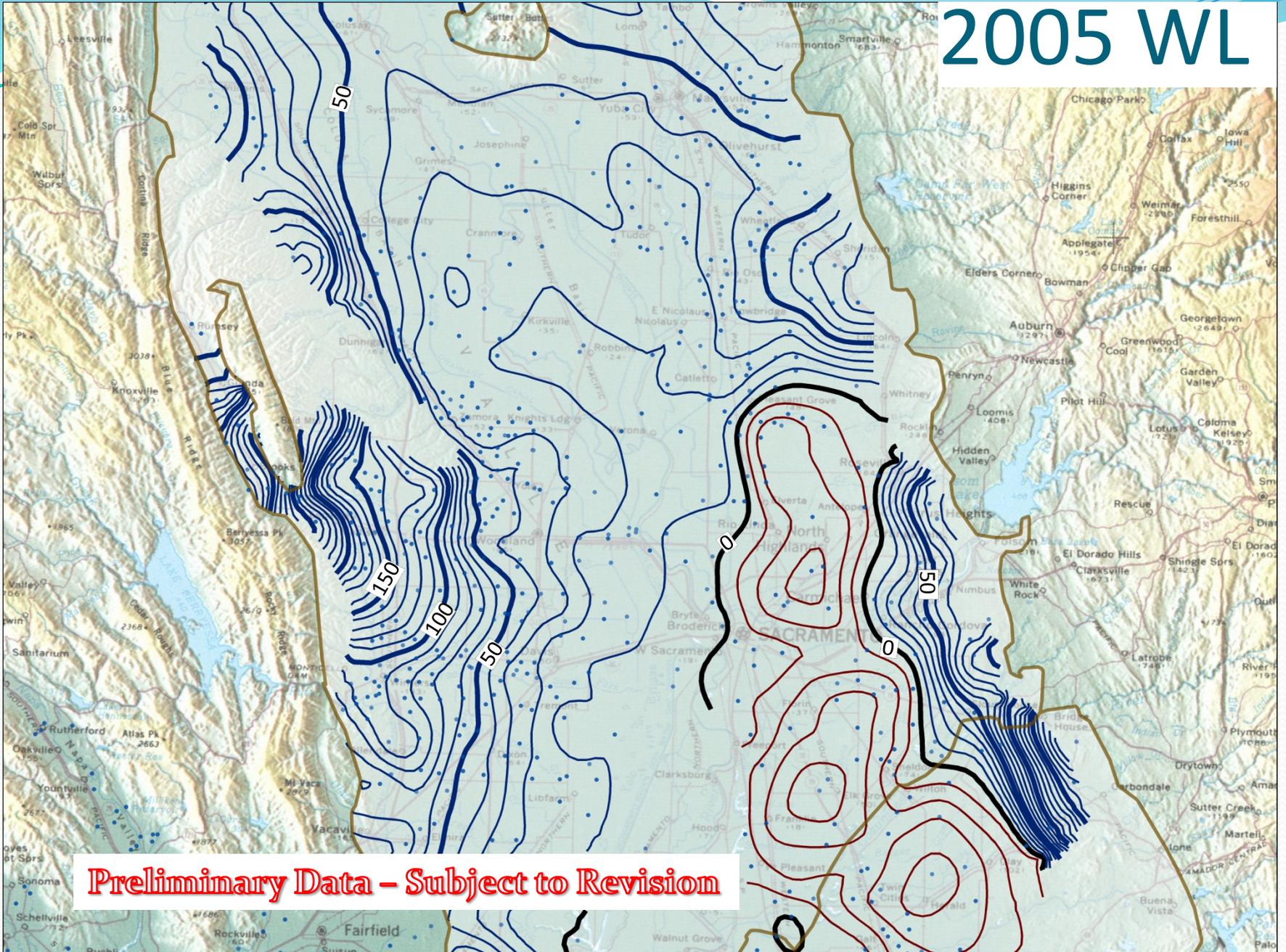




Methods Review

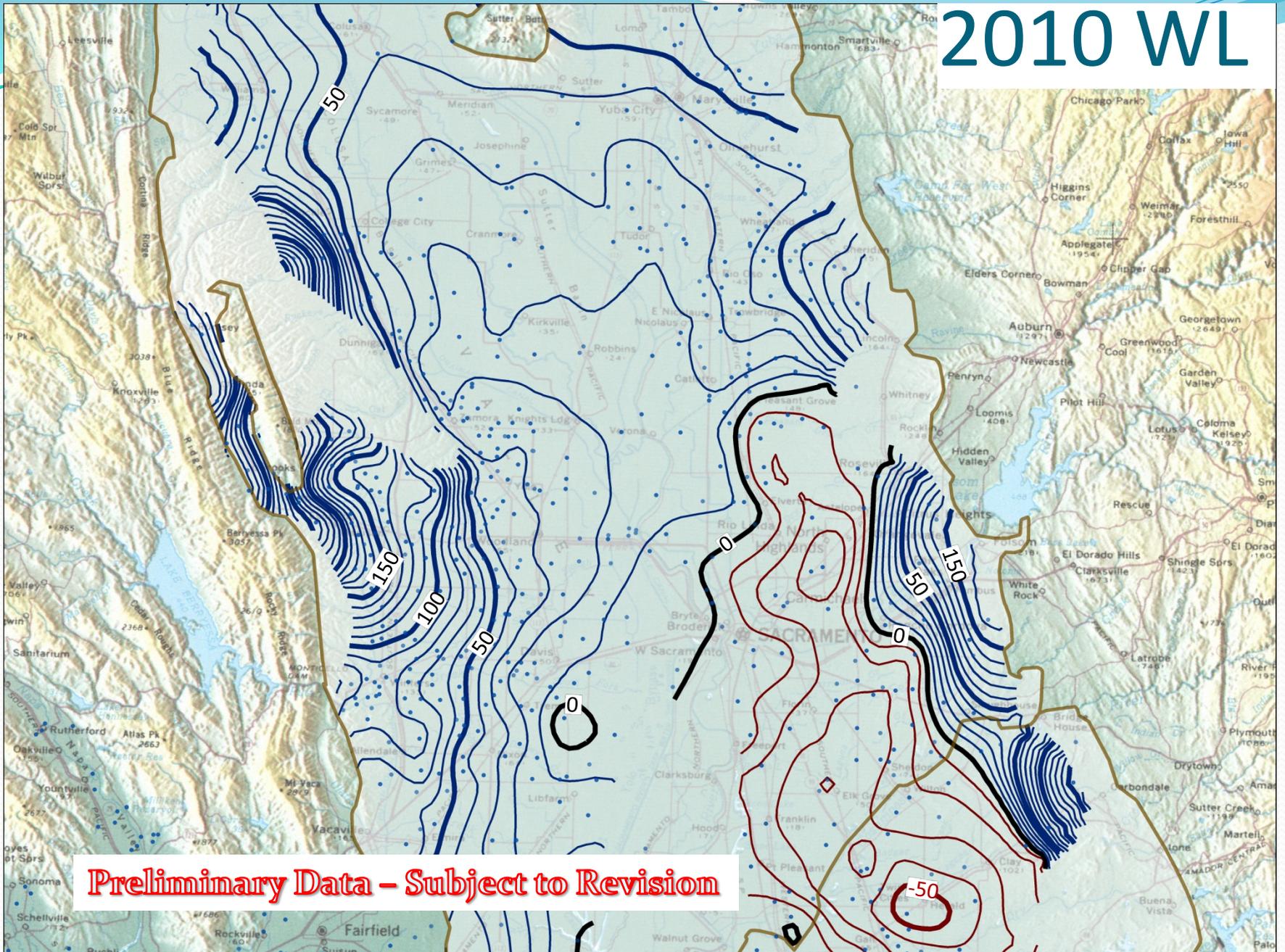
- Collect, query and filter groundwater level data
- Develop groundwater elevation surfaces
- Compare WL surfaces
 - determine the distance (“space”) between surfaces
- Estimate change in GW storage
 - Summarized by “reporting areas”
 - Apply storage coefficient(s) to estimate change in GW storage

2005 WL



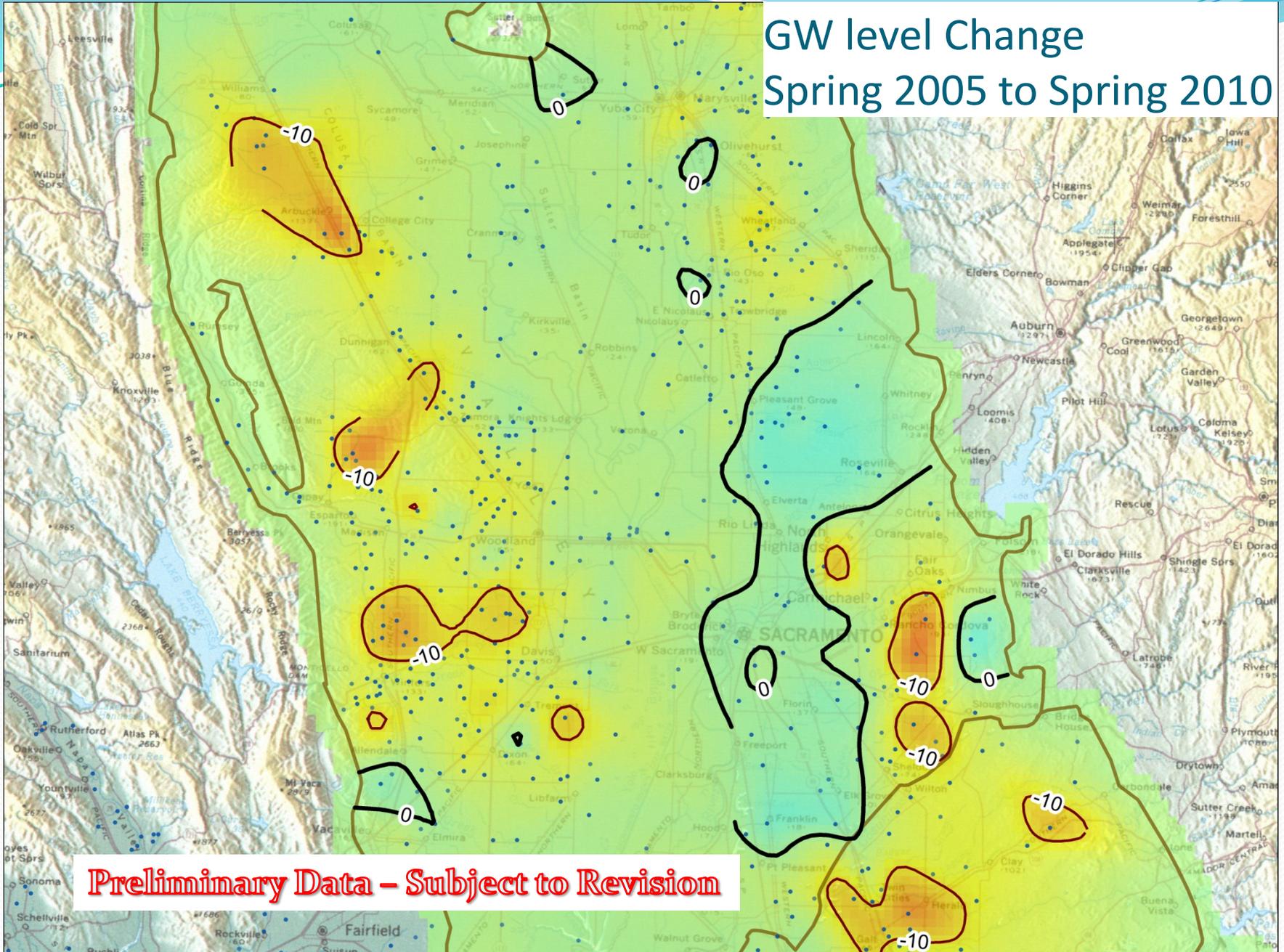
Preliminary Data - Subject to Revision

2010 WL



Preliminary Data - Subject to Revision

GW level Change Spring 2005 to Spring 2010



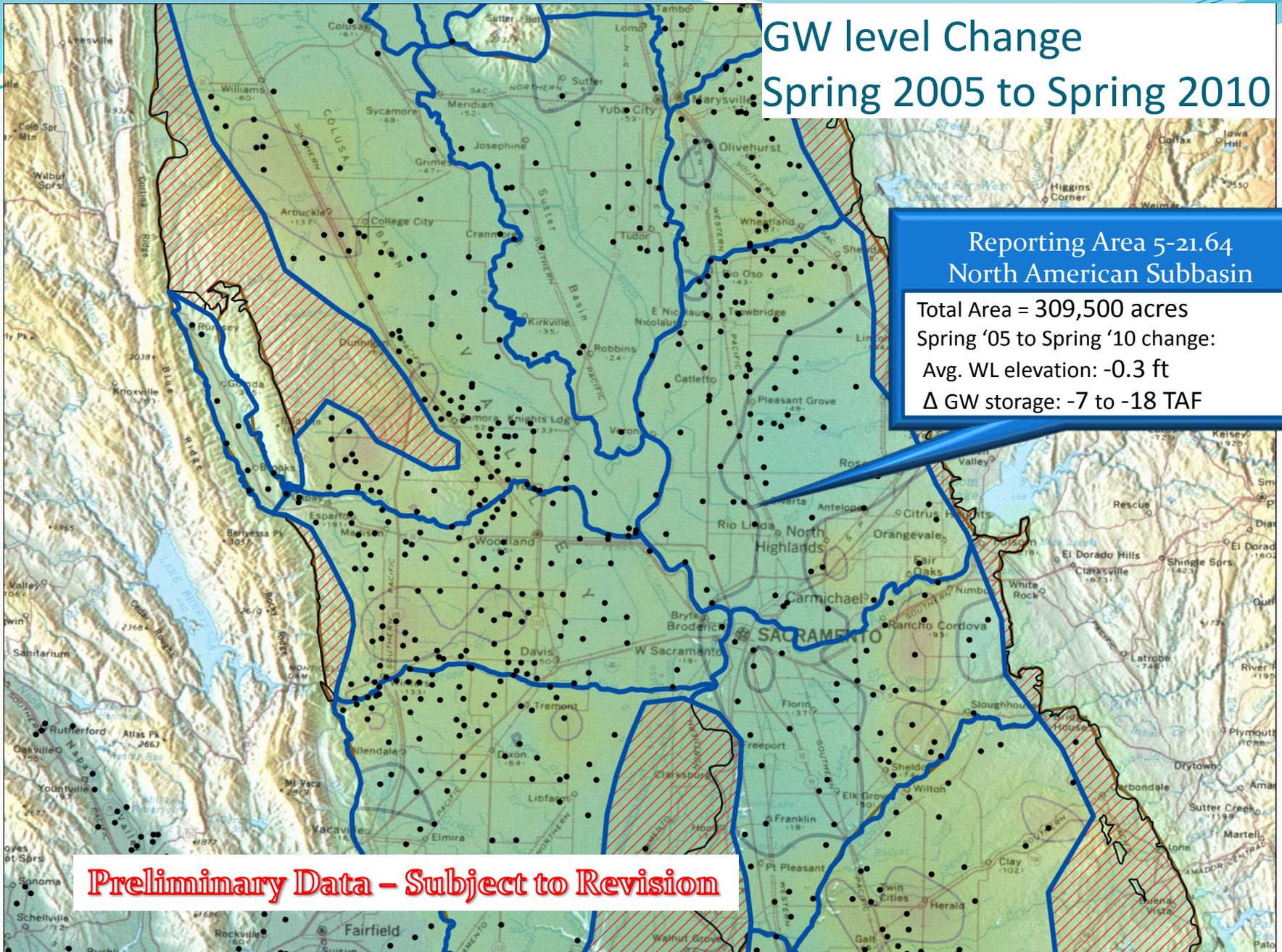
Preliminary Data - Subject to Revision

GW level Change Spring 2005 to Spring 2010

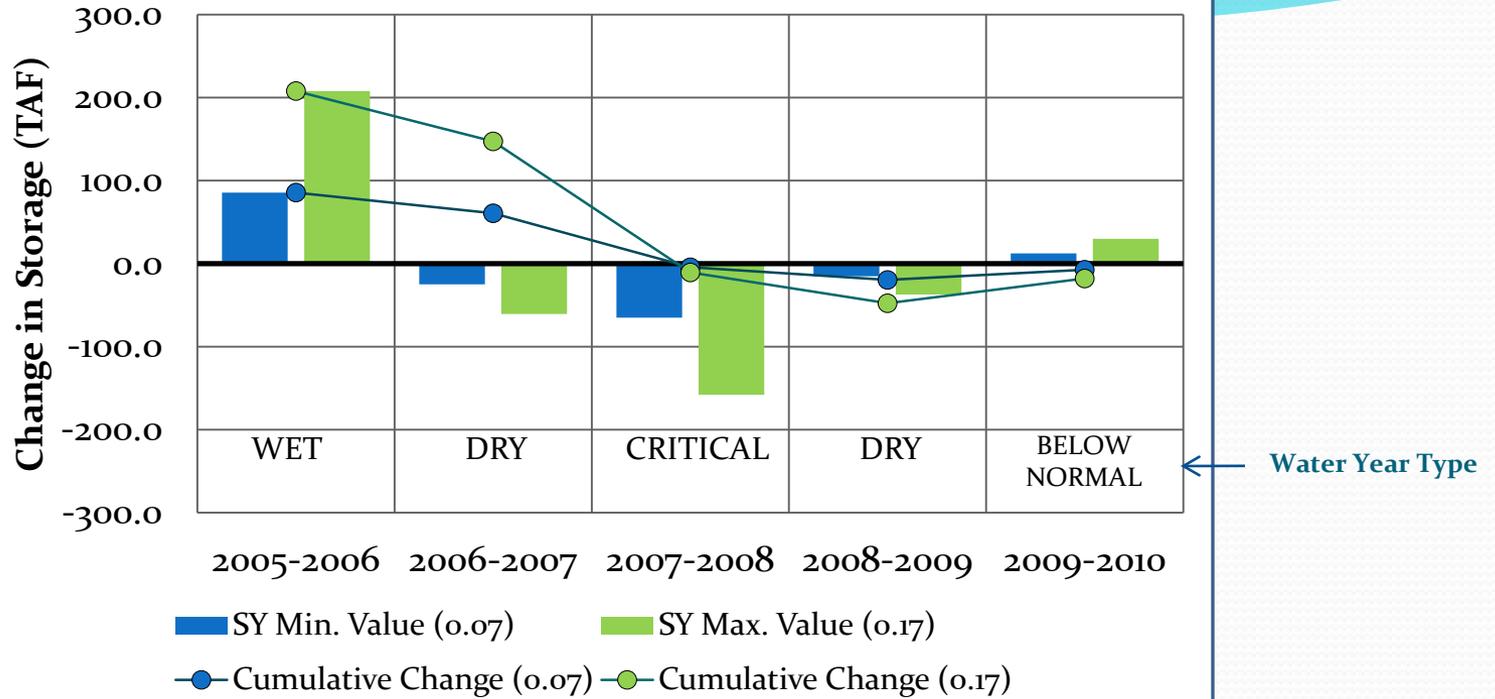
Reporting Area 5-21.64
North American Subbasin

Total Area = 309,500 acres
Spring '05 to Spring '10 change:
Avg. WL elevation: -0.3 ft
 Δ GW storage: -7 to -18 TAF

Preliminary Data - Subject to Revision



Sacramento Valley 5-21.64: North American Subbasin



Sacramento Valley 5-21.64: North American Subbasin

Reporting Area (Acres): 309,500

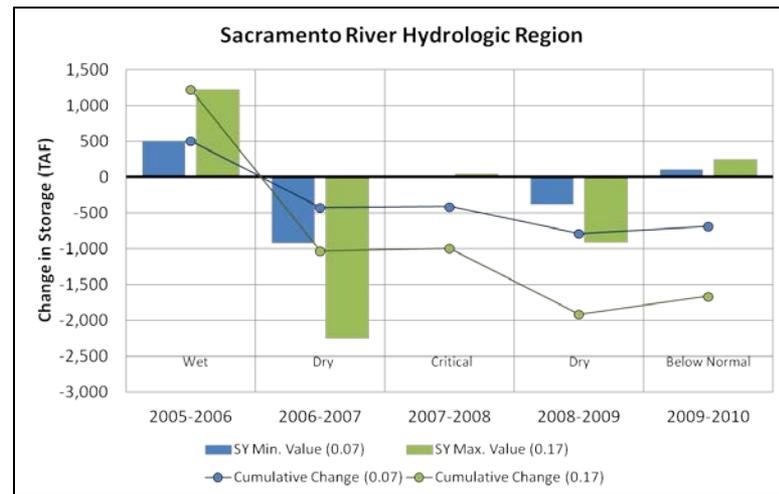
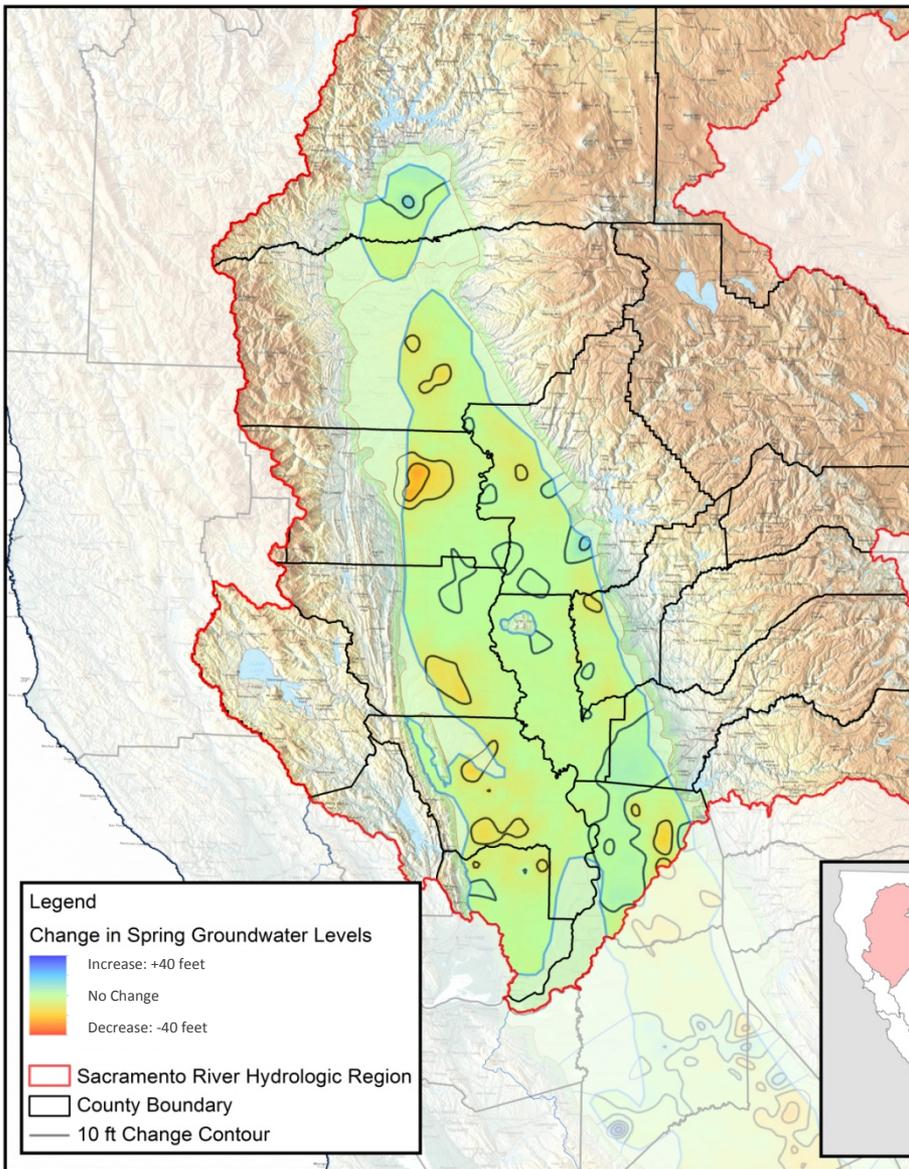
Non-Reporting Area (Acres): 30,783

| Period Spring - Spring | Average Change in GW Elevation (feet) | Estimated Change in Storage in TAF | |
|---------------------------|---|------------------------------------|-----------------------------------|
| | | Assuming Specific Yield = 0.07 | Assuming Specific Yield = 0.17 |
| 2005-2006 | 4.0 | 85.6 | 207.8 |
| 2006-2007 | -1.2 | -25.0 | -60.6 |
| 2007-2008 | -3.0 | -65.0 | -157.9 |
| 2008-2009 | -0.7 | -15.3 | -37.1 |
| 2009-2010 | 0.6 | 12.3 | 29.8 |
| 2005-2010 (total) | -0.3 | -7.4 | -17.9 |

Note: GW elevation and change in storage estimates are calculated within reporting area only.

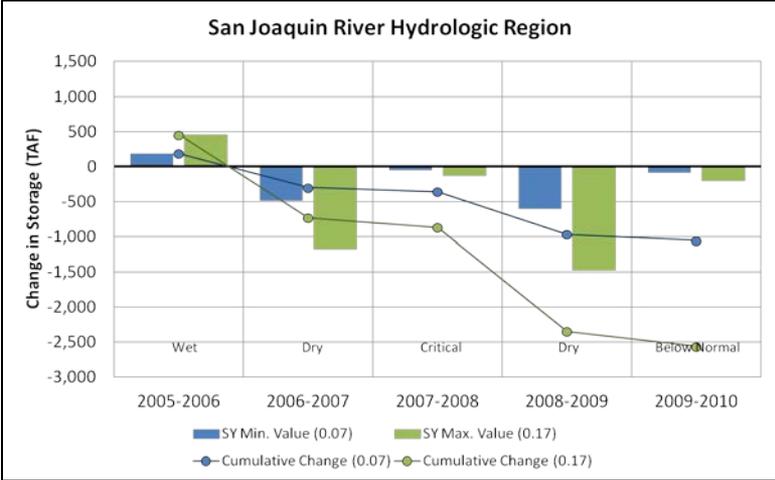
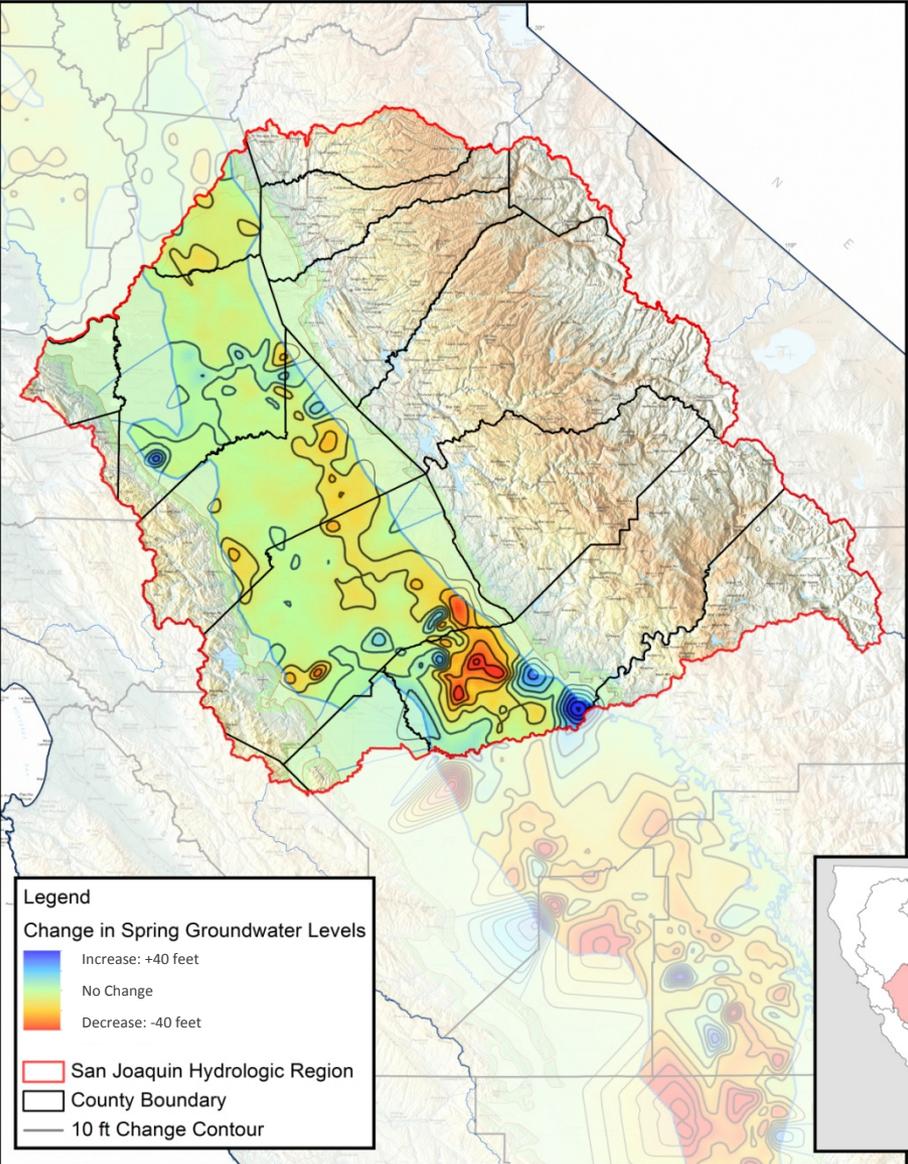


Sacramento River Hydrologic Region



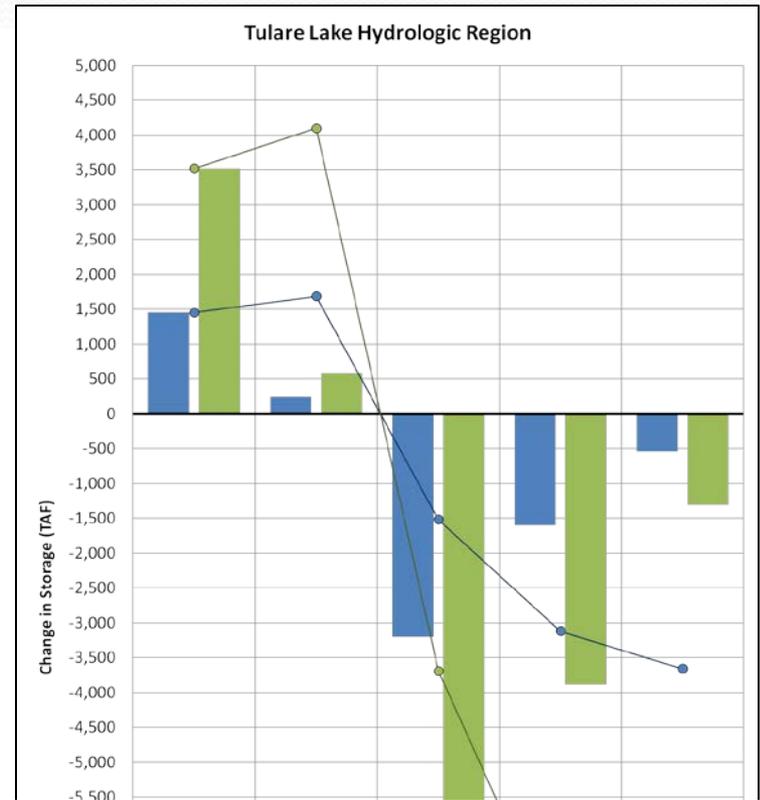
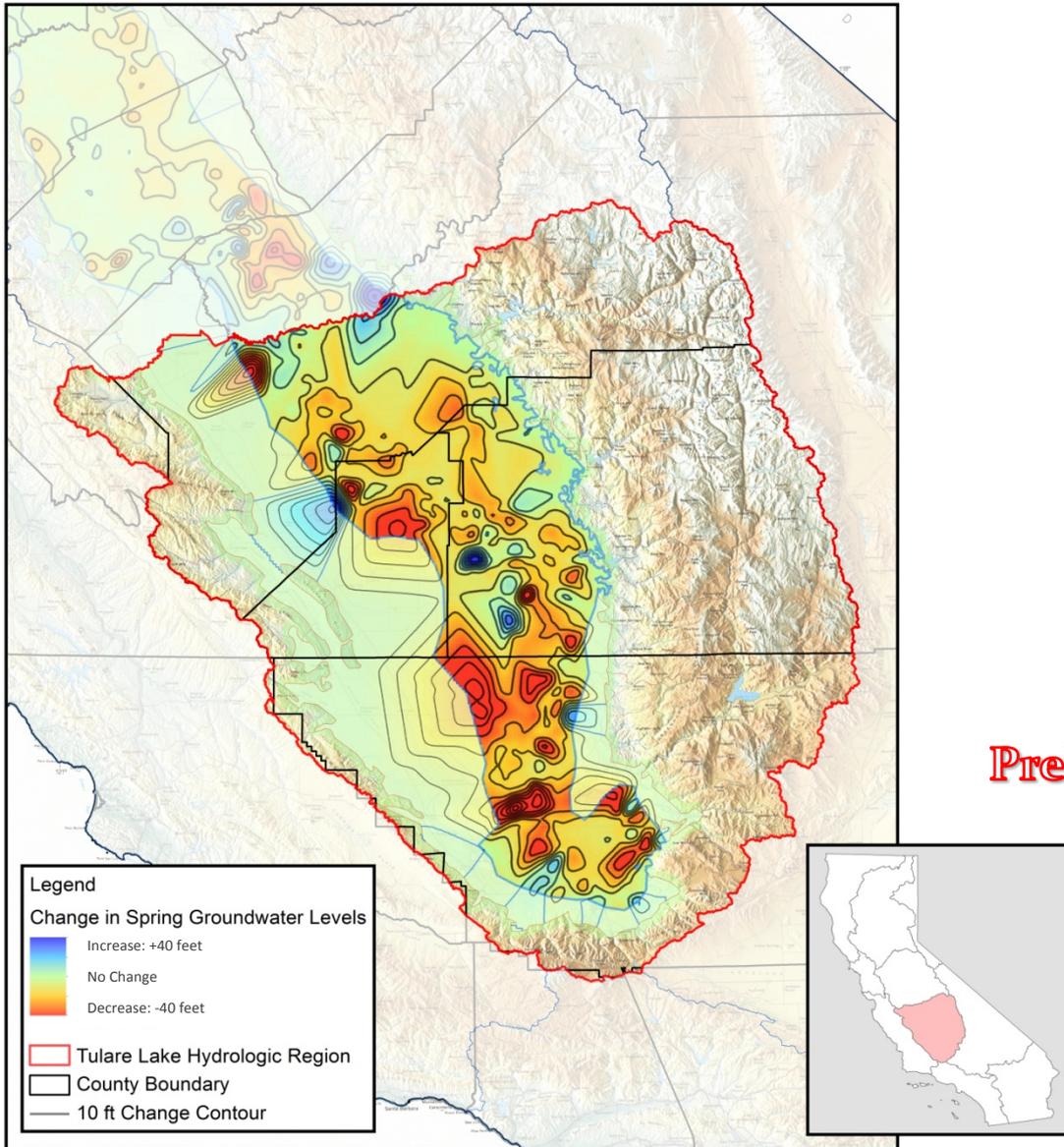
Preliminary Data - Subject to Revision

San Joaquin River Hydrologic Region

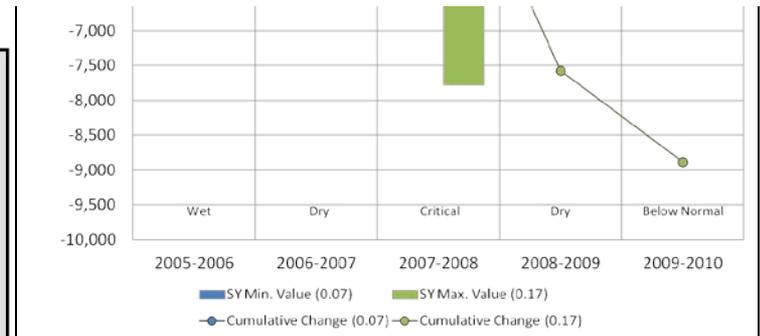


Preliminary Data - Subject to Revision

Tulare Lake Hydrologic Region



Preliminary Data - Subject to Revision



Observations

- Change in storage estimates reflect that 2005 to 2010 was drier than normal
 - Net decrease in water levels and GW storage
 - Roughly agrees with water year type index
 - wet, dry, critical, dry, below normal
 - Individual years may not correlate as well
- Changes in northern Central Valley are less than southern Central Valley

Next Steps

- Refine change in GW storage estimates
 - GW level data and storage coefficients
- Evaluate results
 - Internal Review
 - Peer review
 - Compare with other methods
 - C2VSIM and CVHM
 - Local Agencies
- Finish Deliverable 4 Tech Memo
 - describes the process in detail

Questions?

