Shallow Well Impact Results

Agenda Item 10b

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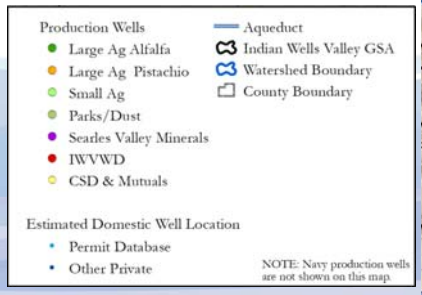
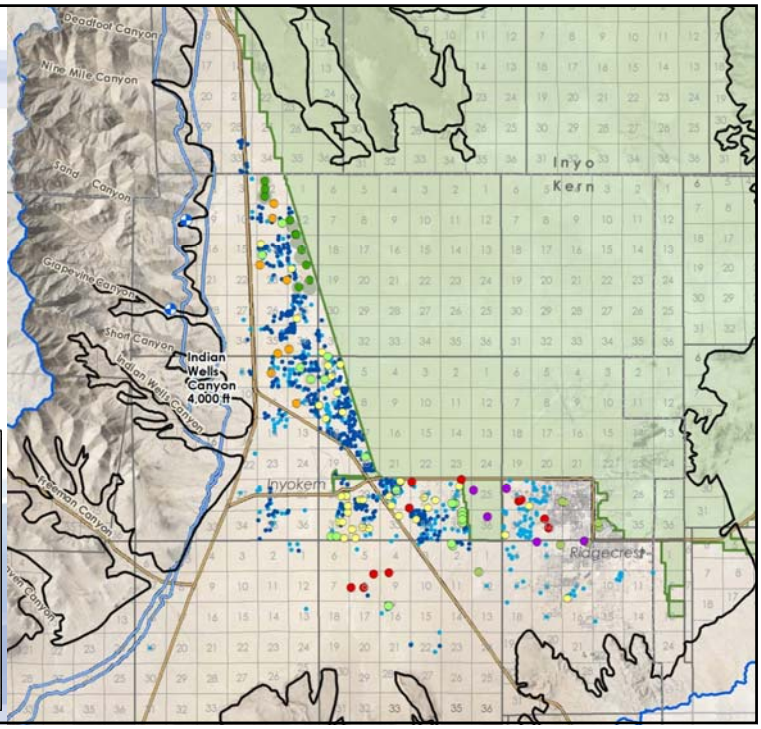
Production Well Location Map

66 Larger Production Wells
40 Mutual and CSD Wells
832 Domestic/Private Wells
938 Production Wells Total

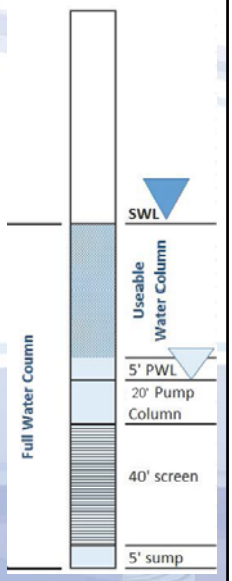
Approximately 872 of Production Wells are Shallow Wells (1,588 residences)



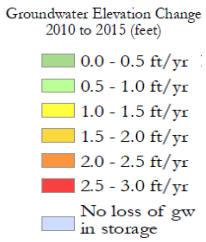


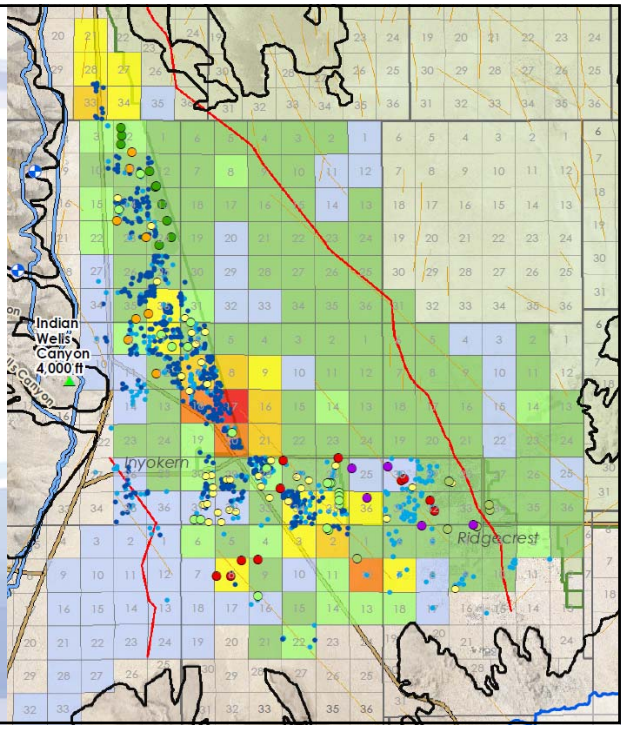
Methodology (useable water column within a well)

1. Establish Construction Dates for Each Shallow Well
   - 377 with earliest permit date
   - 495 randomized construction dates
2. Determine initial Water Column when Well Drilled
   - 118 feet (median of permitted wells)
3. Estimate Well Construction:
   - 5' sump + 40' screen + 20' pump column + 5' PWL = 70' minimum water column
4. Estimate Usable Water Column at time of initial construction
   - TD – SWL – 70' = useable water column (assumed 48 feet historically)
5. Estimate # years until impacted by aquifer drawdown
   - Useable Water Column (feet) / rate of drawdown per year (feet/year) = # years left of well operation

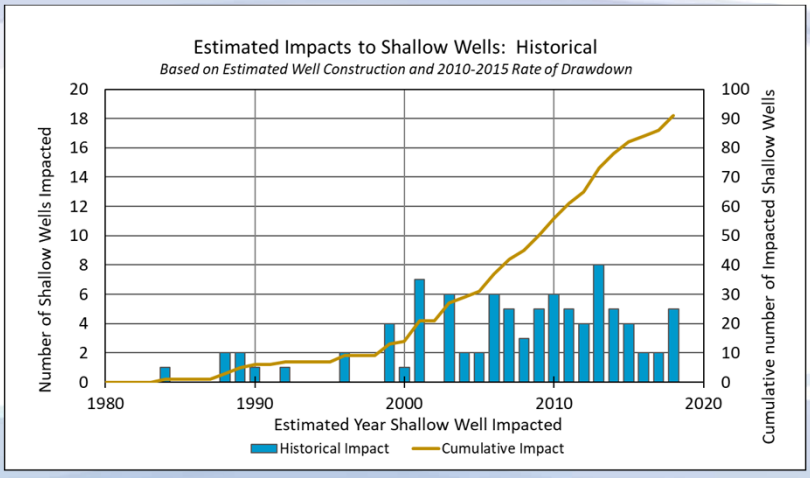


Historical Rate of Drawdown 2010 to 2015





Estimated Historical Impact to Shallow Wells



Wells Impacted Prior to 2019: 91

Cumulative # Impacted Wells

2000	14
2010	56
2019	91

- Assumptions:
  1. 118 feet of total water column (median) when drilled
  2. Date drilled is earliest permit date for 377 wells (KCHD)
  3. Average rate of drawdown from 2010 to 2015 is representative since well drilled

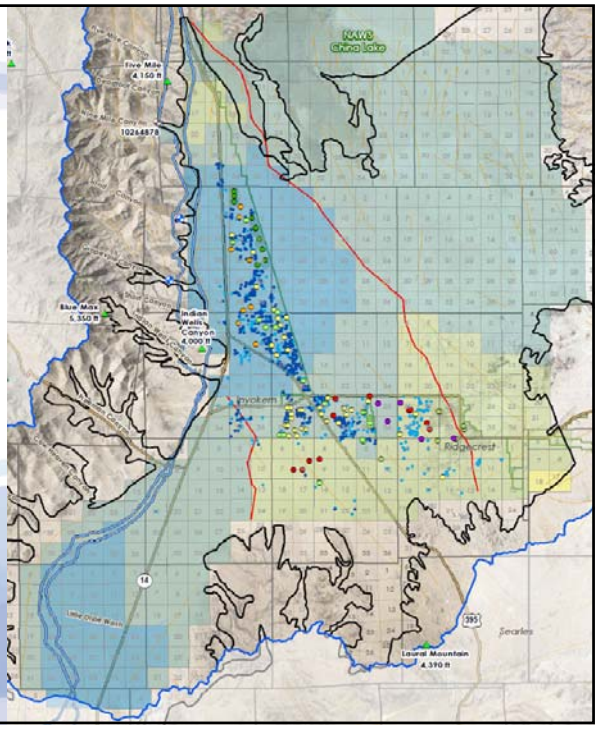
Scenario #4
50-Year Predicted DDN Water Buyout

2020-2021 28,551 AFY Pumping
2021 Leased Water Available
2021-2027 Ramp Down from 21,006 AFY
2027-2070 12,000 AFY Pumping

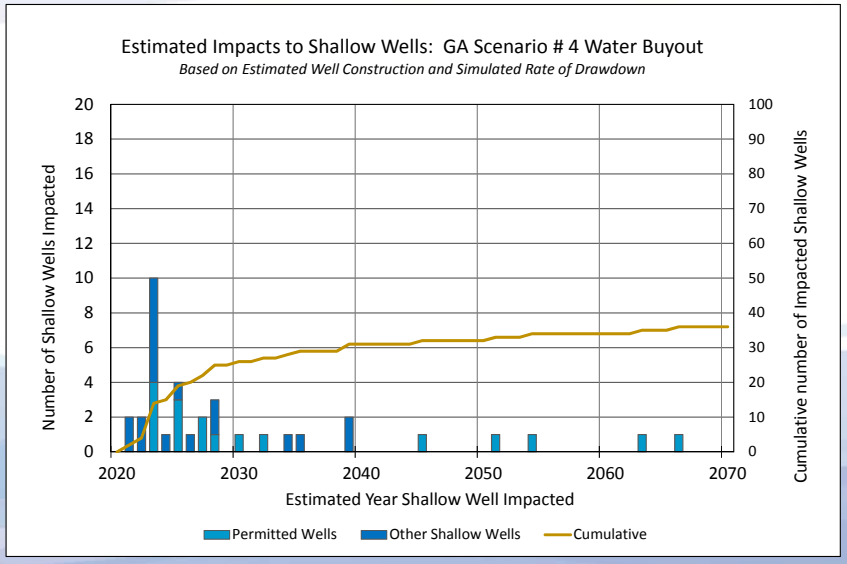
2025 352 AFY Recycled Water Recharge
2035 4,350 AFY Imported Water Recharge

Simulated Predicted Groundwater Level Change 2020 to 2070

- No DDN
- 0 to -10 feet
- -10 to -20 feet
- -20 to -30 feet
- -30 to -40 feet
- -40 to -50 feet
- More than -50 feet



Estimated Management Scenario #4 Impact to Shallow Wells



Wells Impacted Prior to 2040: 31

Cumulative # Impacted Wells

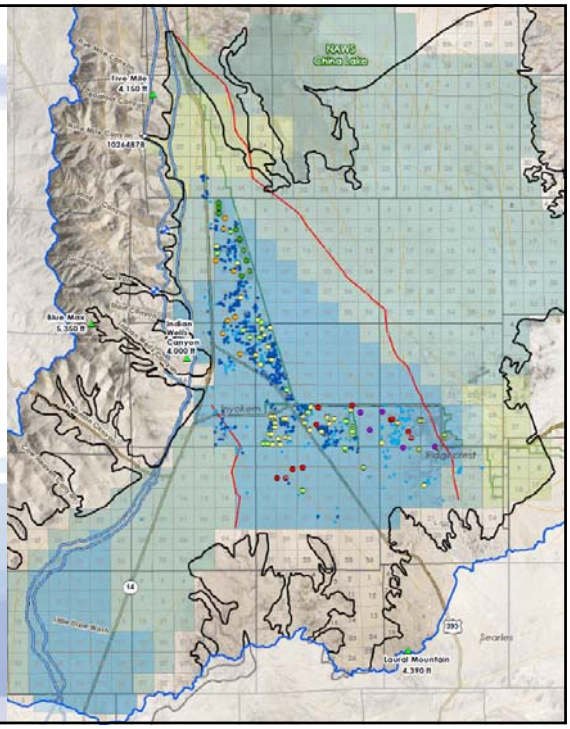
2025	19
2030	26
2040	31
2050	36

Assumption: well is deepened by 100 feet when re-drilled.

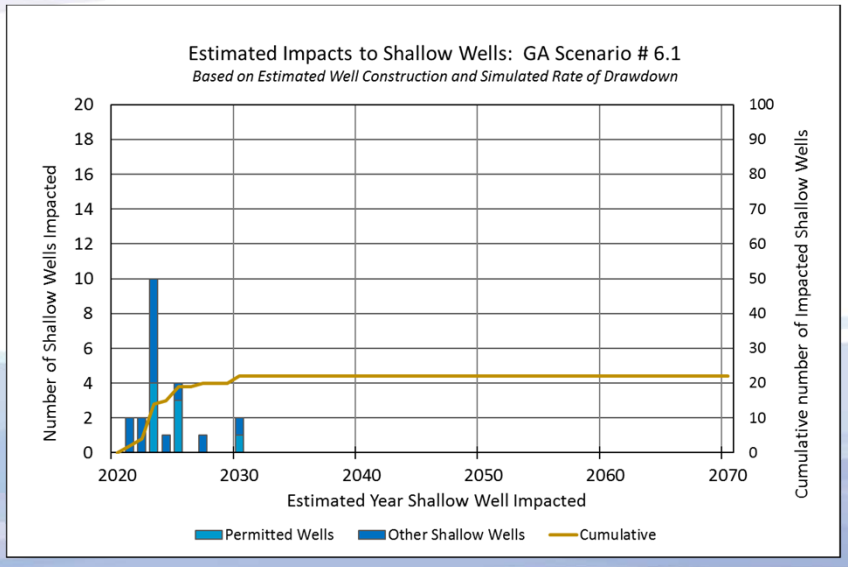
Scenario #6.1
Modified Water Buyout w/ ET offset
50-Year Predicted DDN

Simulated Predicted Groundwater Level Change 2020 to 2070

- No DDN
- 0 to -10 feet
- -10 to -20 feet
- -20 to -30 feet
- -30 to -40 feet
- -40 to -50 feet
- More than -50 feet



Estimated Management Scenario #6.1 Impact to Shallow Wells



Wells Impacted Prior to 2040: 22

Cumulative # Impacted Wells

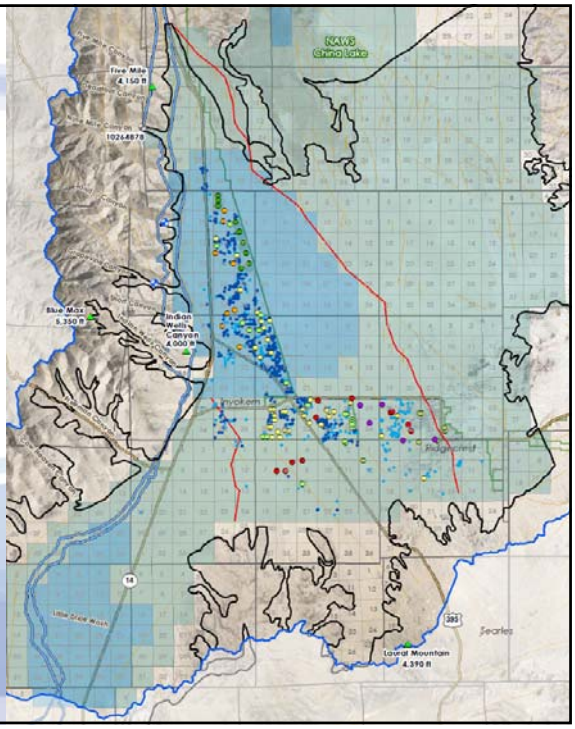
2025	19
2030	22
2040	22
2050	22

Assumption: well is deepened by 100 feet when re-drilled.

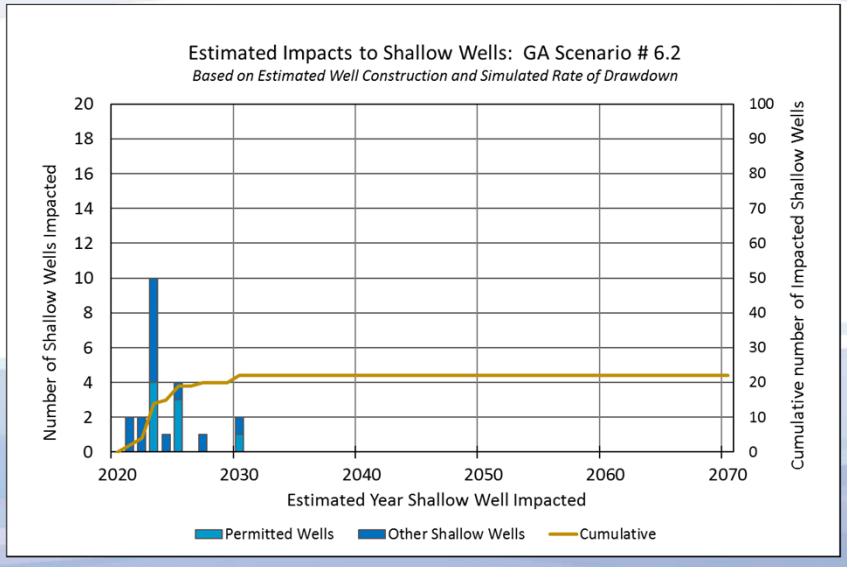
Scenario #6.2 Modified Water Buyout 50-Year Predicted DDN

Simulated Predicted Groundwater Level Change 2020 to 2070

- No DDN
- 0 to -10 feet
- -10 to -20 feet
- -20 to -30 feet
- -30 to -40 feet
- -40 to -50 feet
- More than -50 feet



Estimated Management Scenario #6.2 Impact to Shallow Wells



Wells Impacted Prior to 2040: 22

Cumulative # Impacted Wells

2025	19
2030	22
2040	22
2050	22

Assumption: well is deepened by 100 feet when re-drilled.

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Summary Table

	GA#3	GA#4	GA#5	GA#6.1	GA#6.2
Cumulative Well Impact					
2025	21	19	12	19	19
2030	50	26	13	22	22
2040	72	31	13	22	22
2070	73	36	15	22	22

Note: Historically (194-2018), an estimated 91 shallow wells were impacted.

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