City of Ridgecrest | Kern County | Inyo County | San Bernardino County | Indian Wells Valley Water District

INDIAN WELLS VALLEY GROUNDWATER AUTHORITY TECHNICAL ADVISORY COMMITTEE

Indian Wells Valley Water District 500 W. Ridgecrest Blvd. Ridgecrest, CA 93555

A G E N D A

Thursday, January 3rd, 2019, Time 1:00 p.m.

In compliance with the Americans with Disabilities Act, if you are a disabled person and you need a disability-related modification or accommodation to participate in this meeting, please contact Lauren Duffy at (760) 384-5511. Requests must be made as early as possible and at least one full business day before the start of the meeting. Documents and material relating to an open session agenda items that are provided to the IWVGA TAC Committee prior to a regular meeting will be available for public inspection and copying at Indian Wells Valley Water District, 500 W. Ridgecrest Blvd, Ridgecrest, CA 93555, or online at https://iwvga.org/.

Statements from the Public

The public will be allowed to address the Committee during Public Comments about subjects within the jurisdiction of the IWVGA Technical Advisory Committee and that are NOT on the agenda. No action may be taken on off-agenda items unless authorized by law. Questions posed to the Committee may be answered after the meeting or at future meeting. Dialog or extended discussion between the public and the Committee or staff will be limited in accordance with the Brown Act. The Public Comments portion of the meeting shall be limited to three (3) minutes per speaker. Each person is limited to one comment during Public Comments. Legal representatives are available for information regarding the Brown Act and will be present for comments if needed.

All remarks and questions should be addressed to the Committee as a whole and not to any individual member or staff. There will be time after each action item on the agenda to receive comments from the public. Again each speaker will be limited to three (3) minutes. Speakers should be brief and limit their comments to the specific subject being discussed. Persons will be limited to one comment per person unless directed by the Chair.

1. **CALL TO ORDER**
   a. Roll Call of TAC Members Attending

2. **PUBLIC COMMENTS**
   This time is reserved for the public to address the Committee about matters NOT on the agenda. No action will be taken on non-agenda items unless authorized by law. Comments are limited to three minutes per person.

3. **WATER RESOURCES MANAGER'S DISCUSSION OF DRAFT GSP SECTIONS (WORK IN PROGRESS)**
   a. Plan Area and Basin Setting:
      i) Hydrogeologic Conceptual Model
      ii) Baseline Model Results
   b. Sustainable Management Criteria:
      i) Impacts to Shallow Wells
   c. Projects and Management Actions: Sustainable Management Actions Modeling Scenarios
   d. Sustainable Management Criteria:
      i) Monitoring Network and Data Gap Status Report
      ii) Monitoring Wells/TSS Update
   e. Introduction: Chapter Review (Chapter 1)

f. Projects and Management Actions: Alternative Water Study Tech Memo
g. Implementation: Navy-Coso Royalties Fund – Project Priority List

4. FUTURE AGENDA ITEMS (FEBRUARY TAC)

a. Plan Area and Basin Setting
    i) Hydrogeologic Conceptual Model
    ii) Transport Run Model Results
b. Projects and Management Actions:
    i) Management Action Model Run Results
    ii) Additional Sustainable Management Actions Modeling Scenarios
c. Sustainable Management Criteria
    i) Sustainable Management Criteria: Undesirable Results, Minimum Thresholds, Measurable Objectives, Interim Milestones
    ii) Monitoring Network and Data Gap Status Report
    iii) Stream Gages
    iv) Weather Stations

5. FUTURE TAC MEETING DATES

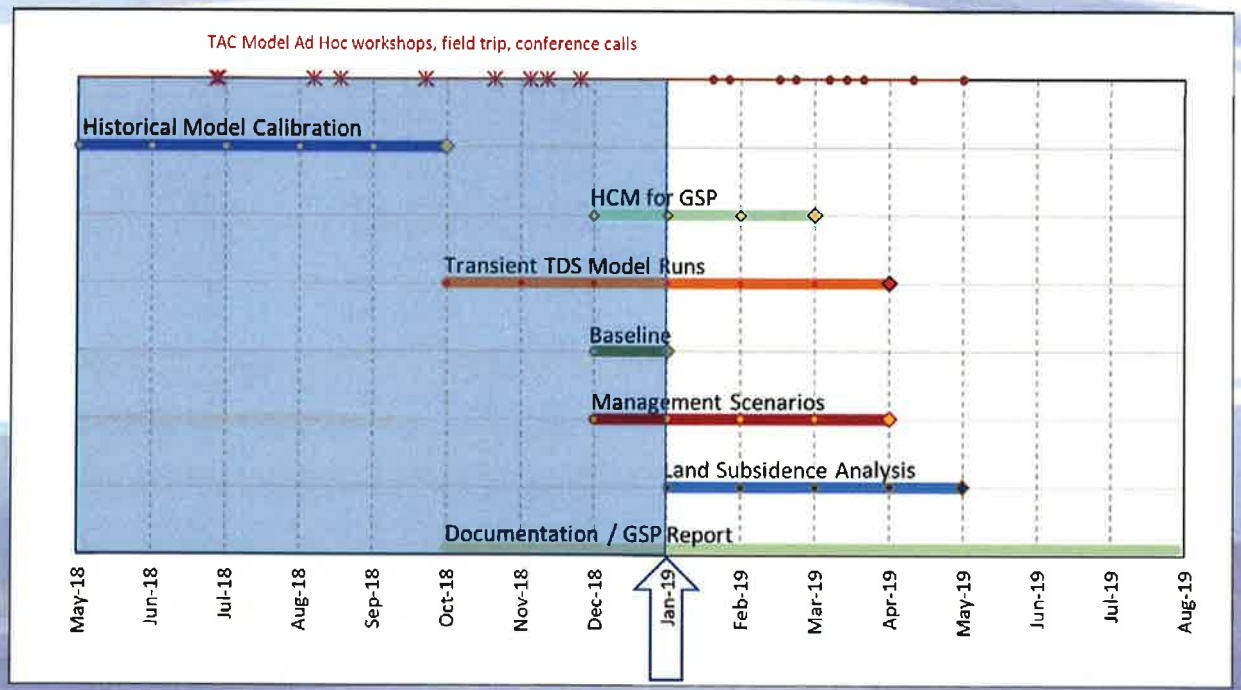
a. Next three month planned dates:
    i) February 7th, March 7th, April 4th

6. WATER RESOURCES MANAGER/COMMITTEE MEMBER ANNOUNCEMENTS OR COMMENTS

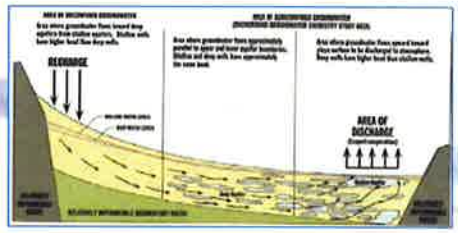
a. WRM
b. TAC

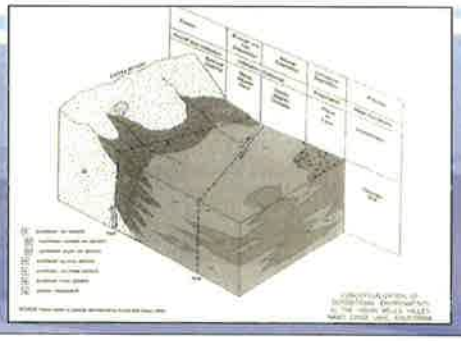
7. ADJOURN

Modeling Timeline and GSP Report Sections



Hydrogeologic Conceptual Model





Baseline Pumping

FUTURE BASELINE (No Action) PUMPING 2020-2070

Owner	Estimated # of Wells	Est. Recent Pumping	Est 2016 Pumping	Estimated Baseline Pumping (AFY) 2020	2040	2070
Meadowbrook Dairy	10	9,640 2	6,387 2	12,303	12,303	12,303
Mohave Pistachio	8	3,655 1	3,040 1	6,054	6,891	6,891
Large Ag Subtotal	**18**			**18,357**	**19,194**	**19,194**
Simmons Farm	1	982 2	918 2	931	931	931
Quist Farms	7	750 2	516 4	674	685	685
Sierra Shadows	3	missing	missing	765	765	765
Amberglow	1	missing	missing	62	62	62
Terese Farms	2	missing	missing	310	410	410
Hickle	2	missing	missing	85	85	85
Blubaugh	1	missing	missing	1	1	1
Bellino	1	missing	missing	50	50	50
McGee	2	missing	missing	400	400	400
Other Small Ag	unk	732 3	1,260 3	0	0	0
Small Ag Subtotal	**20**			**3,278**	**3,389**	**3,389**
Kern County	1	missing	missing	18	18	18
City of Ridgecrest	5	388 2	373 2	407	407	407
Other Irrig, Dust Subtotal	**6**			**425**	**425**	**425**
IWVWD	11	7,704 2	6,412 1	6,518	7,346	8,791
Inyokern CSD (265)	2	110 2	102 2	191	191	191
Mutuals (491)	38	comb /	comb /	354	354	354
DOM (832)	832	2,120 2	1,100 2	832	832	832
MUN, DOM Subtotal	**883**			**7,894**	**8,723**	**10,167**
Searles Valley Minerals	5	2,576 2	2,377 2	2,907	2,907	2,907
Navy	6	1,633 1	1,595 1	2,041	2,041	2,041
TOTAL	**938**	*cannot calculate due to missing data*		**34,902**	**36,679**	**38,123**

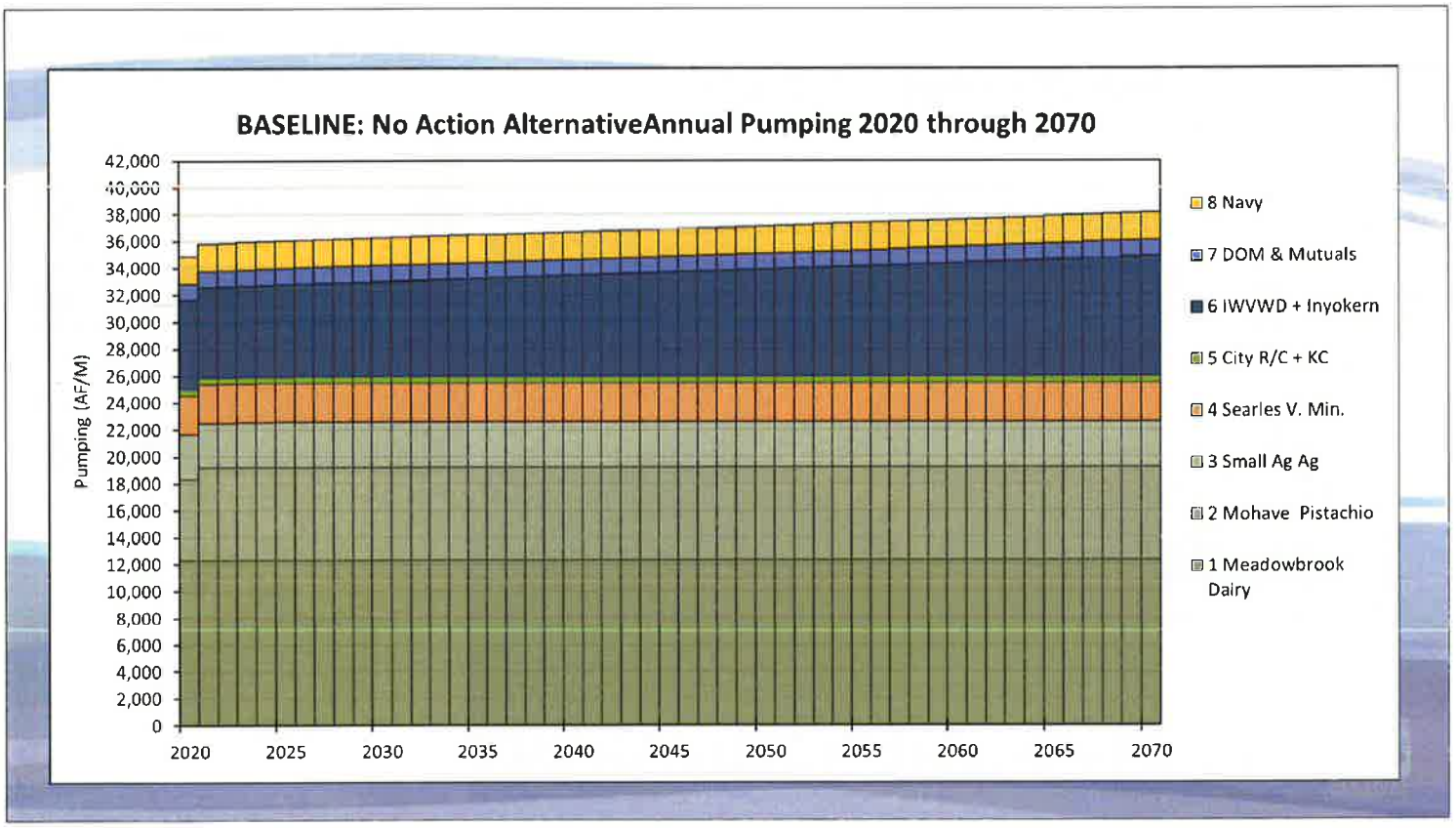
historical data source

1 data received from pumper

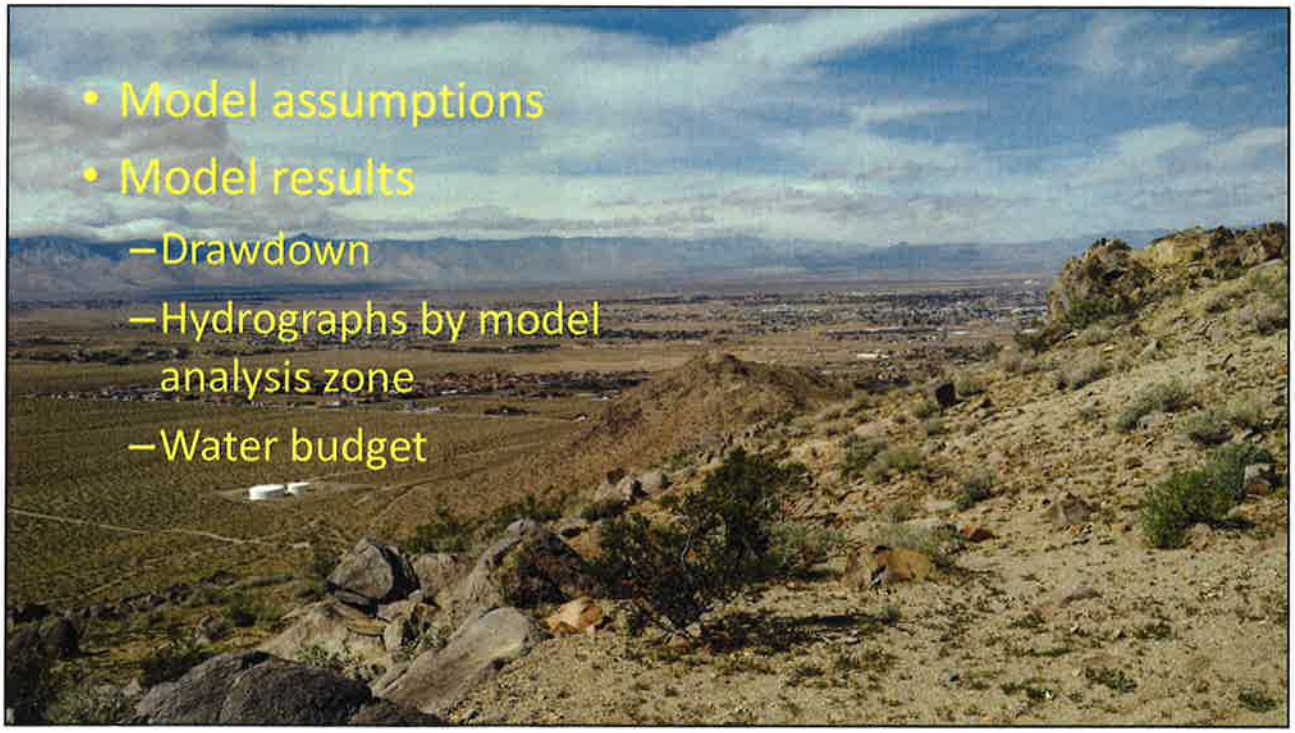
2 data from IWVCGWMG 1975-2017 pumping table; most recent years up to ten if available

3 data from IWVCGWMG 1975-2017 pumping table, difference of 'Orchards' and Mohave Pistachios

4 2017 estimated pumping available from pumper

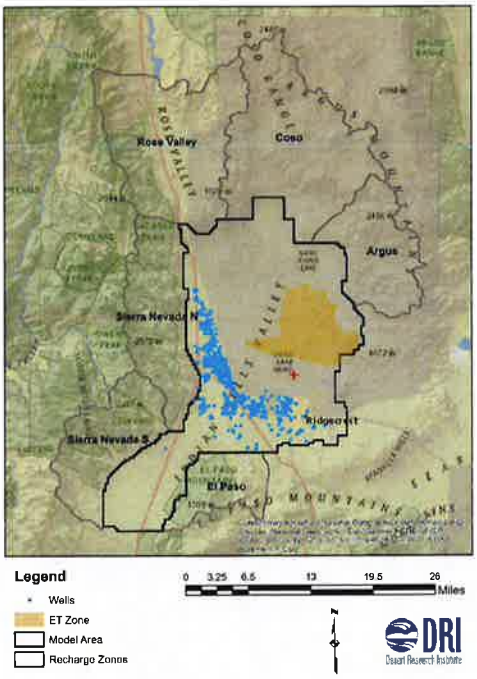



Indian Wells Valley
Baseline Groundwater Model Results
January 3, 2019
DRI
Desert Research Institute

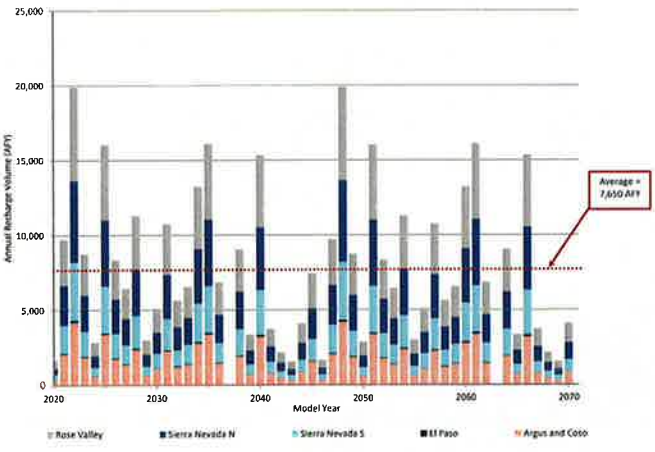

• Model assumptions
• Model results
– Drawdown
– Hydrographs by model analysis zone
– Water budget

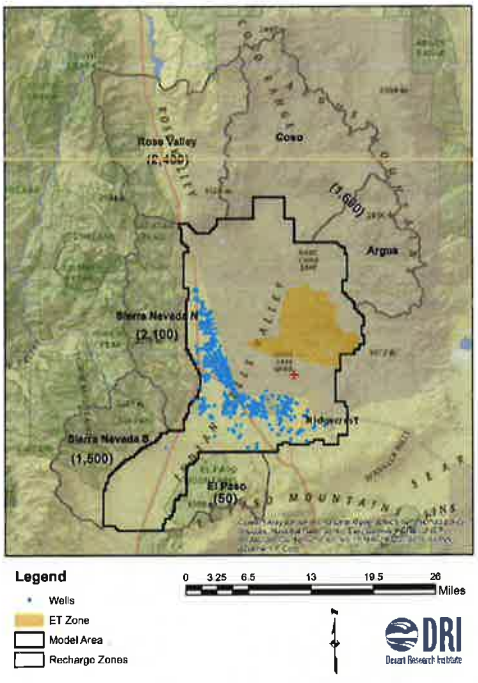
Model Assumptions

- Simulation period: 2017 – 2070
- Monthly time steps
- Water level initial condition from historical model
- Variable recharge
- Baseline pumping

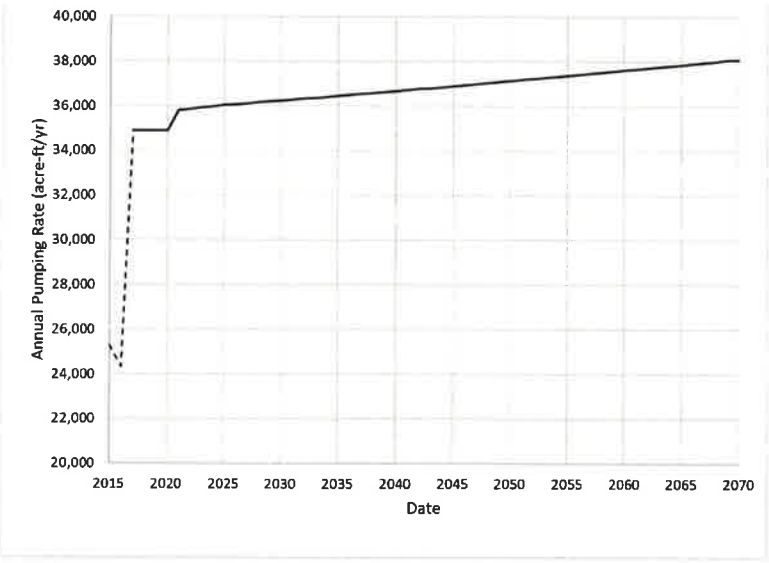


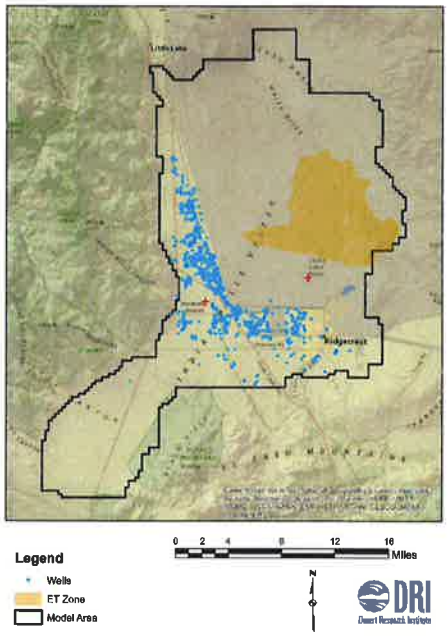
Recharge



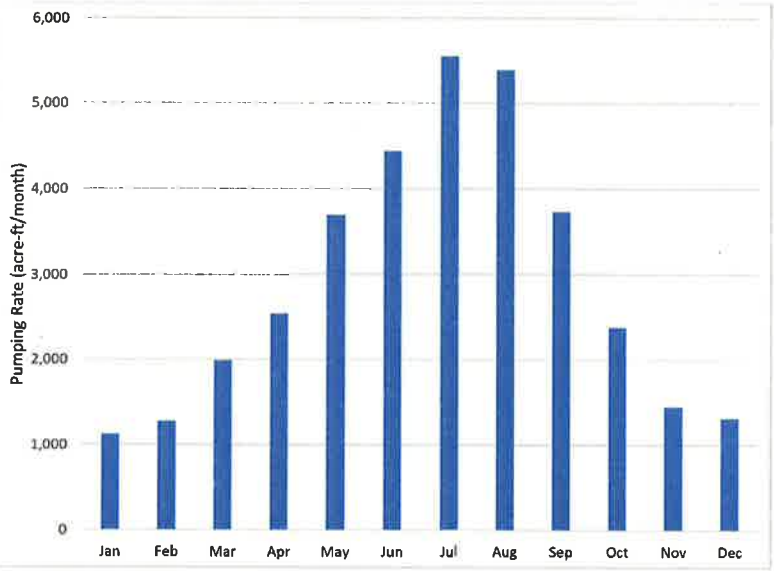


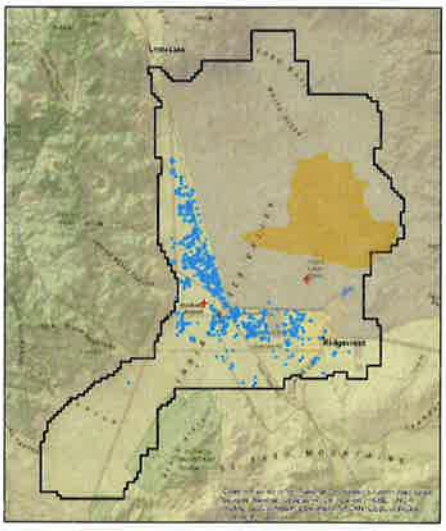
Simulated Pumping





Simulated Pumping





2020-2070 Average Water Budget

INPUTS

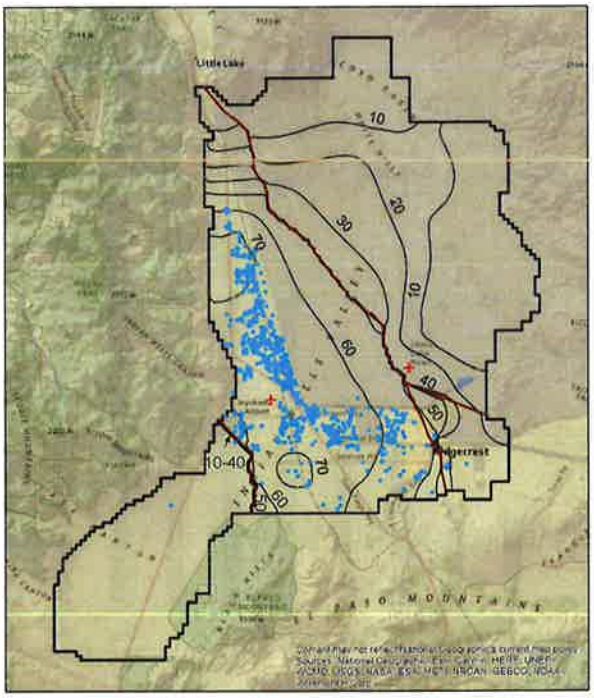
	(acre-ft/year)
Recharge	7,650
Storage	30,880
Total:	38,530

OUTPUTS

	(acre-ft/year)
Pumping	36,880
ET	1,610
Flow to Salt Wells Valley	40
Total:	38,530

Drawdown Results

- Drawdown from 2020 to 2070

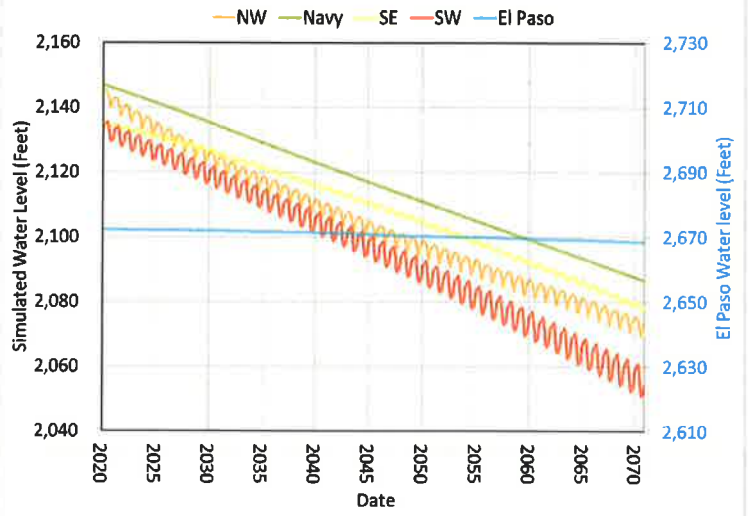


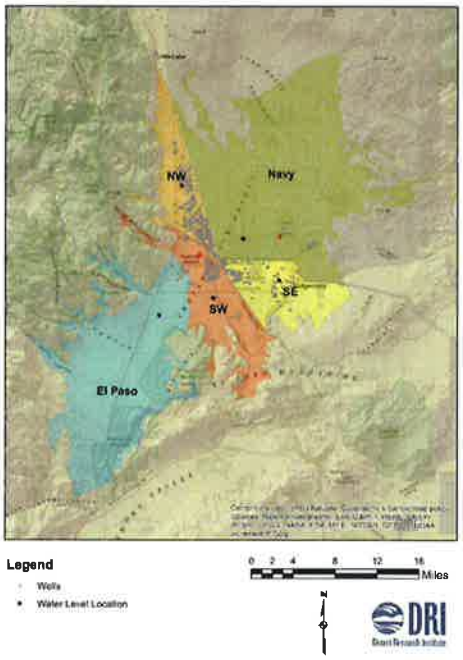
Legend
- Wells
- Geologic Faults
- Drawdown (2020-2070) ft
- Model Area

0 1.5 3 6 9 12 Miles

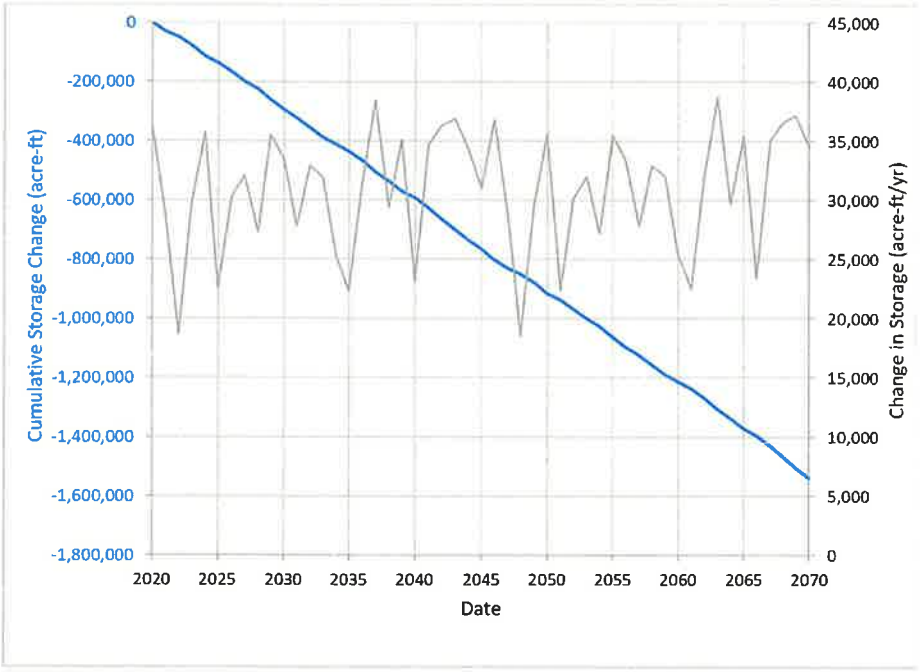
DRI Desert Research Institute

Simulated Water Levels by Model Analysis Zones

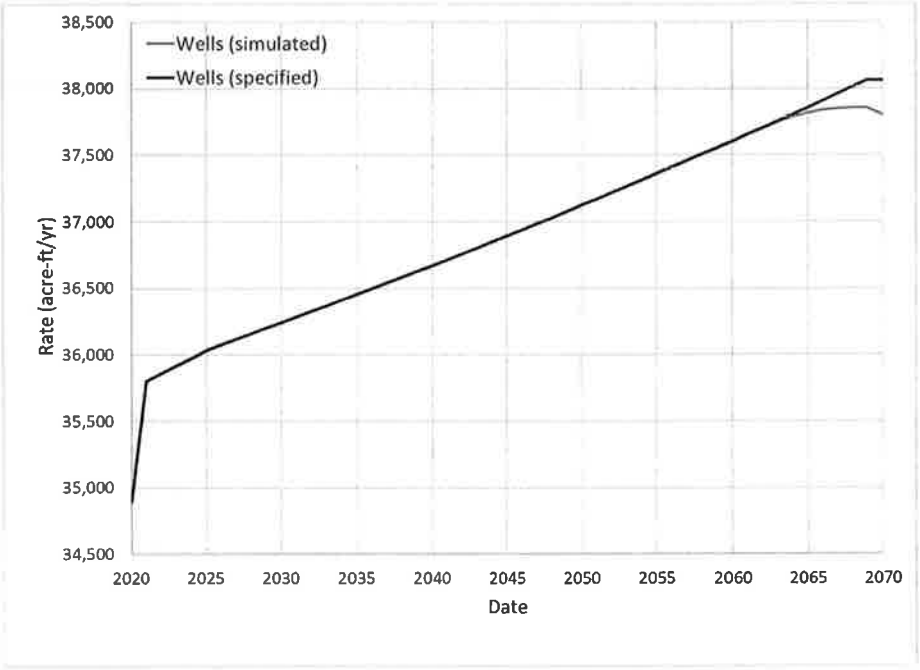




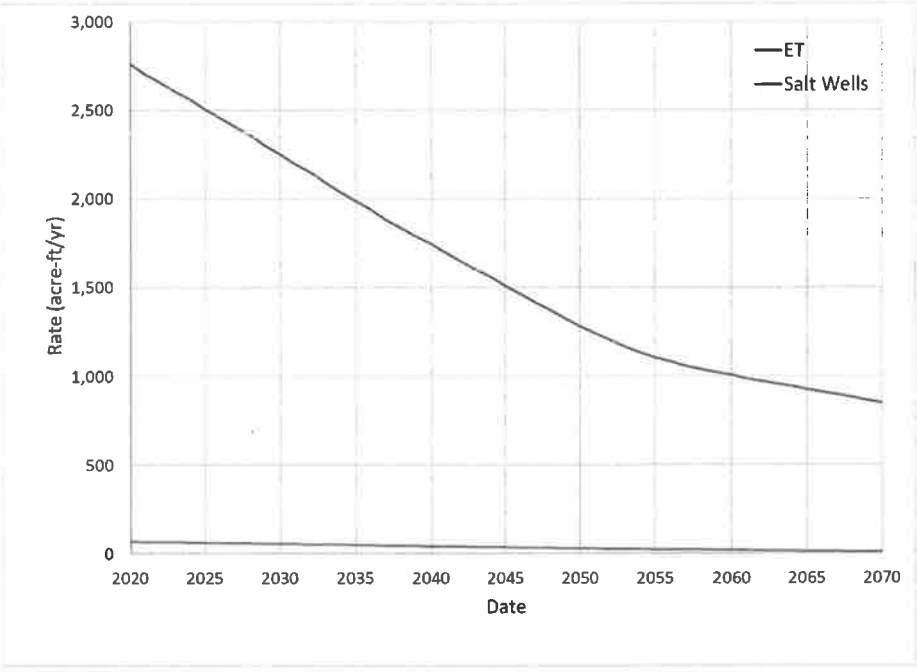
Change in Groundwater Storage

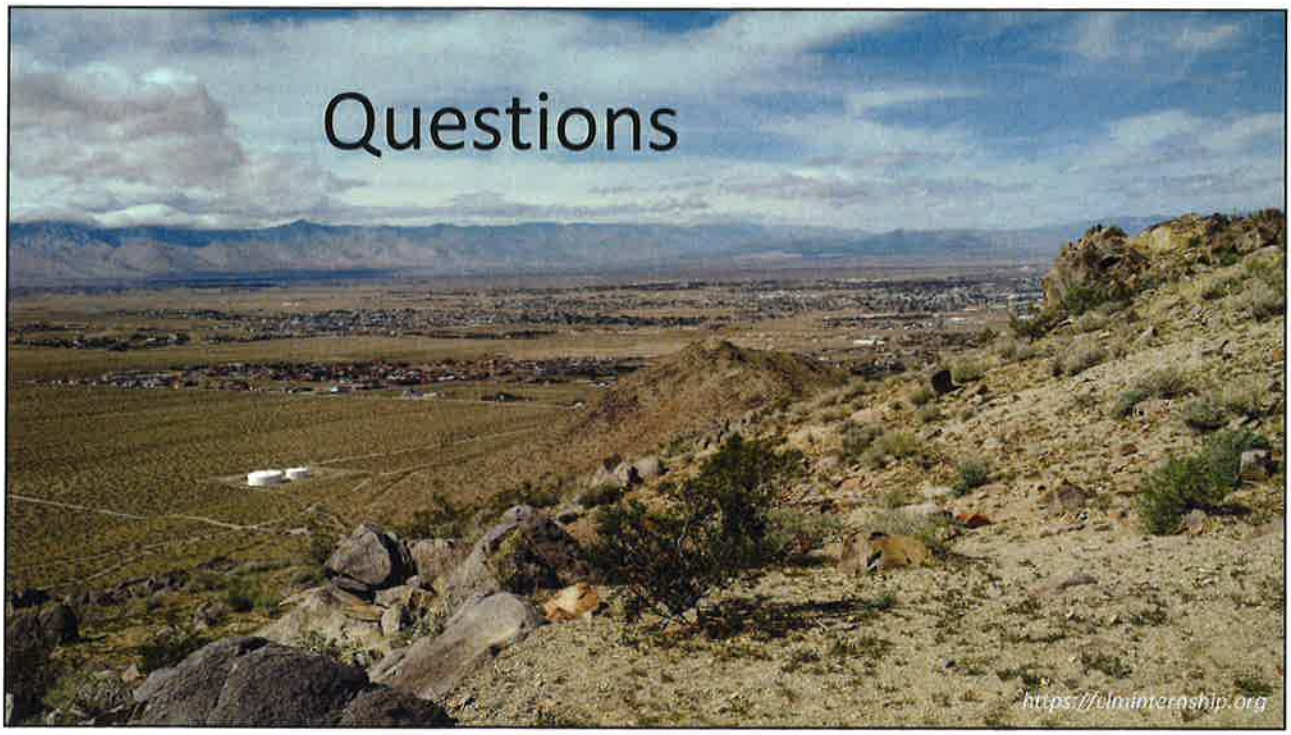


Simulated Outputs (Wells)



Simulated ET & Flow to Salt Wells




Questions
https://ulmintership.org

(Agenda item 3bi) Estimated Shallow Well Impact Analysis

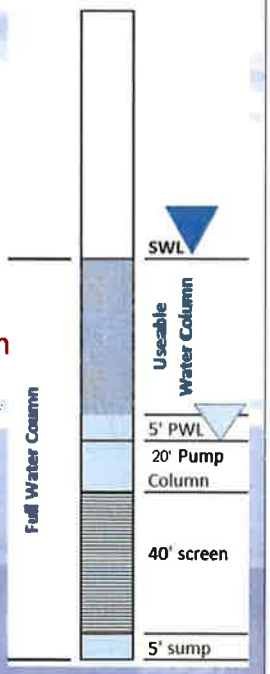
Updated Methodology

1. Adjustments to *Useable Water Column in a Well* to account for a minimum of 20' of water column above screen for pump coverage
2. Comparison of Measured Data from 31 DOM wells in KCWA Monitoring Program
3. Updated Analysis with 832 Domestic Wells
   - 377 DOM wells from Kern County Health Department Well Permits
   - 455 other private wells estimated from model well coverage

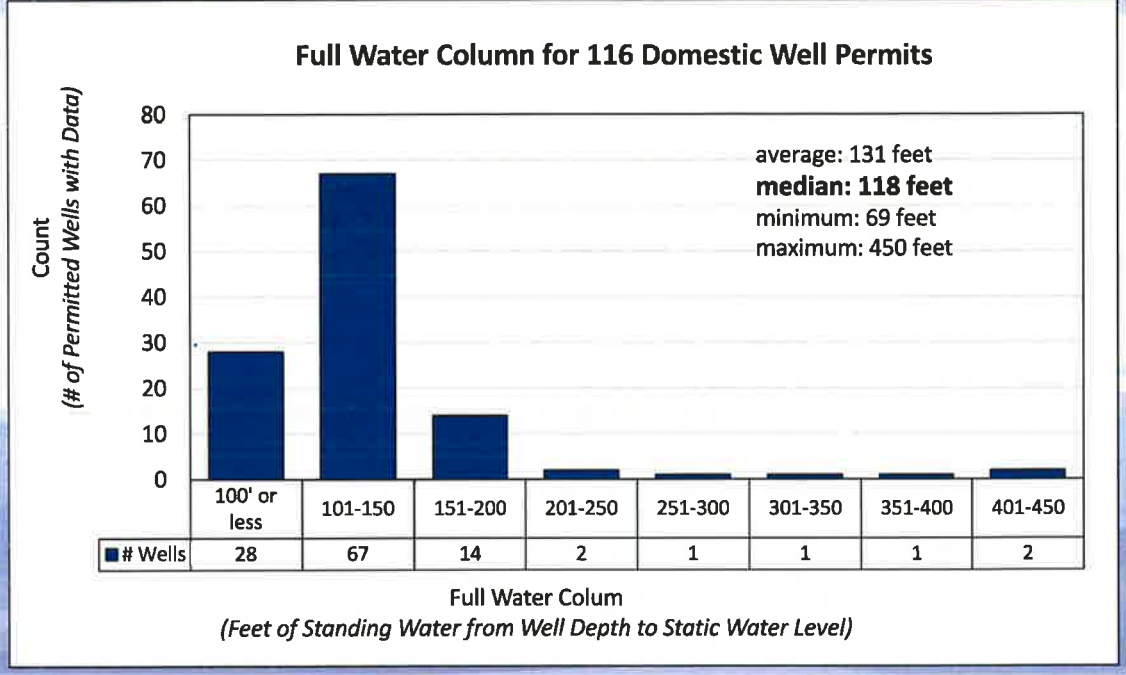
(Agenda item 3bi) Shallow Well Impact Analysis

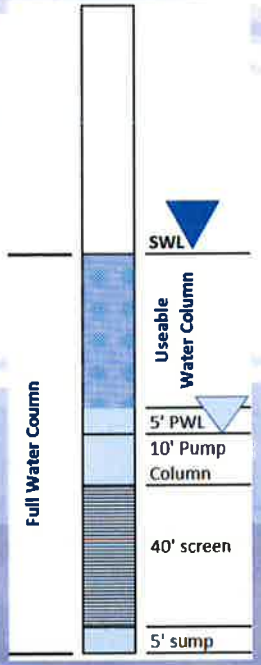
Methodology (useable water column within a well)

1. Determine initial Water Column when Well Drilled
   - 116 permitted wells w Total Depth (TD) of Well listed
   - 112 permitted wells with Static Water Level (SWL) listed
2. Estimate Well Construction:
   - 5' sump + 40' screen + 20' pump column + 5' PWL = 70' minimum water column
3. Estimate Usable Water Column at time of initial construction
   - TD – SWL – 70' = useable water column
4. Estimate # years until impacted by aquifer drawdown
   - Useable Water Column (feet) / rate of drawdown per year (feet/year) = # years left of well operation

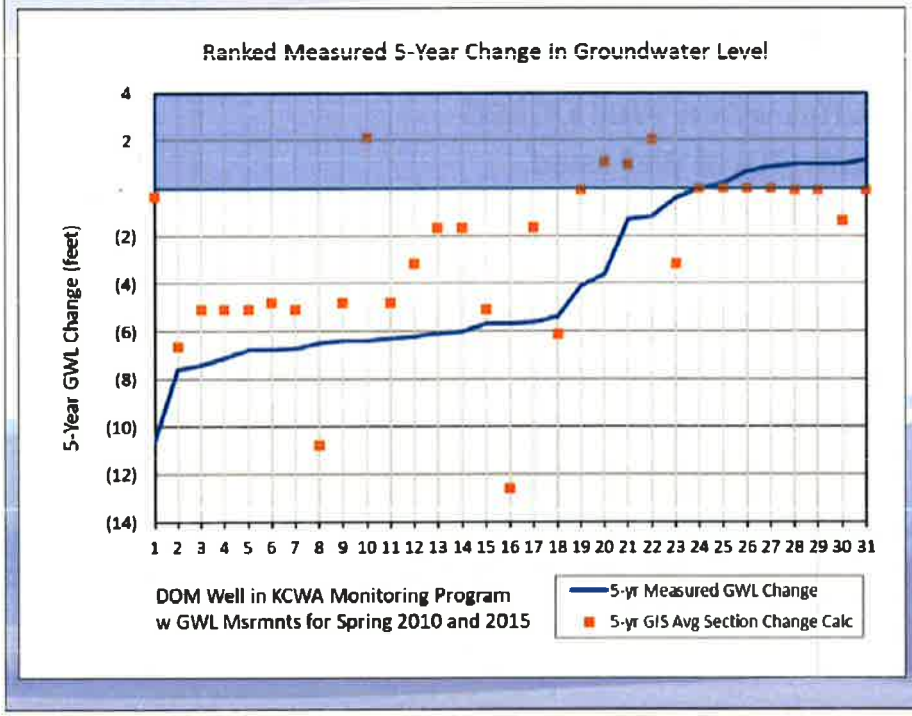


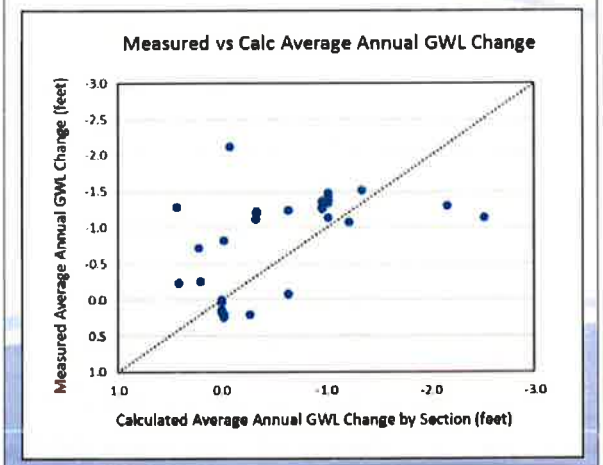
Median Depth 118 Feet;
Estimated 48 feet of Useable Water Column for New Well





5-Year Measured vs GIS Average GWL Change by Section





938 Production Wells:

66 Larger Production
40 Mutual and CSD
832 Domestic/Private

Groundwater Elevation Change 2010 to 2015 (feet)

- 0.0 - 0.5 ft/yr
- 0.5 - 1.0 ft/yr
- 1.0 - 1.5 ft/yr
- 1.5 - 2.0 ft/yr
- 2.0 - 2.5 ft/yr
- 2.5 - 3.0 ft/yr
- No loss of gw in storage

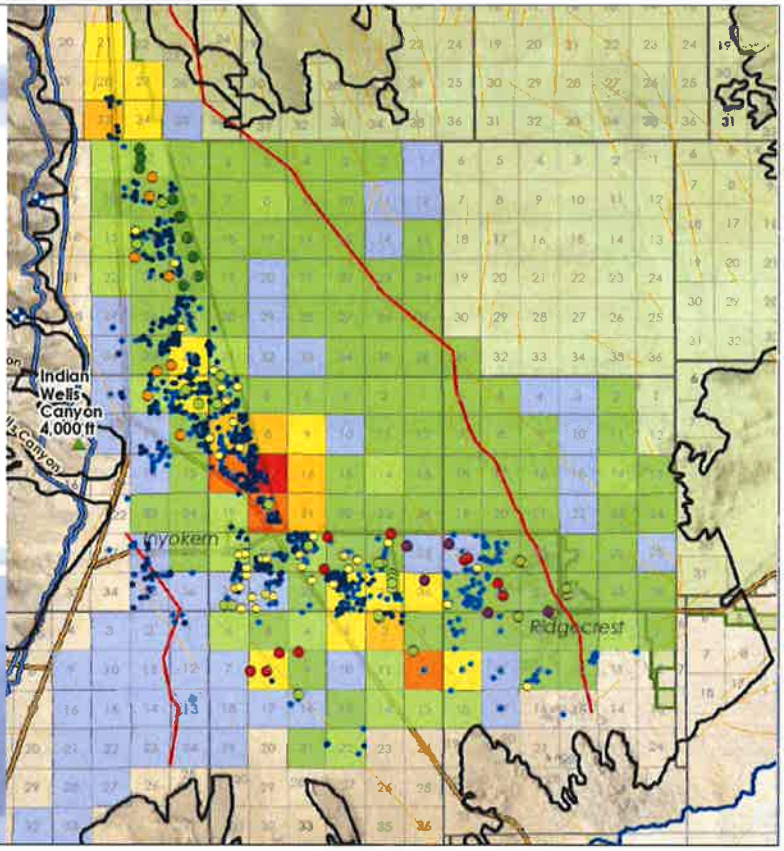
Production Wells

- Large Ag Alfalfa
- Large Ag Pistachio
- Small Ag
- Parks/Dust
- Searles Valley Minerals
- IWVWD
- CSD & Mutuals

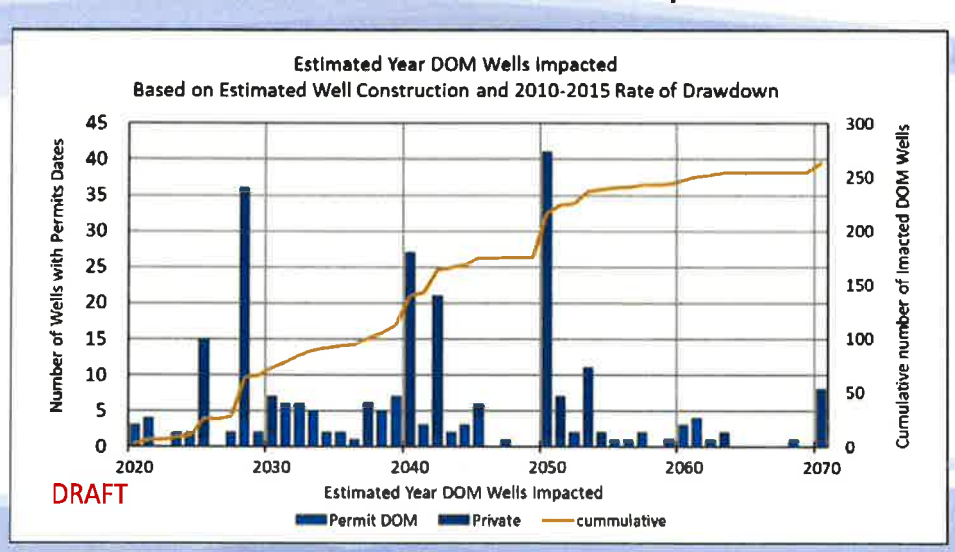
Estimated Domestic Well Loc

- Permit Database
- Other Private

Note: Navy production well locations are not shown



Estimate shallow wells that will be impacted



Wells Impacted Prior to 2019:
> 44

Cumulative # Impacted Wells	
2030	73
2040	140
2070	263

- 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

Future Recommendations

- Have 58 domestic wells in the KCWA Monitoring Program analyzed for well construction, depth, screen interval where available.
- Evaluate groundwater contour interpretation using numerical model.
- Field verification of domestic well location, history, and current depth.
- Further analysis of Kern County permit database to assess well replacement and deepening.
- Outreach to domestic well owners to verify well location, drilling, deepening, and additional pump maintenance; prioritizing wells in sections with pumping depressions.

From: Don Decker
To: Jean Moran
Subject: two items of clarification for 11/2/18 TAC agenda items
Date: Thursday, December 13, 2018 1:14:41 AM

12/12/18 DD

Jean, here are comments for you concerning two agenda items of the 12/6/18 TAC meeting and lingering concerns I have.

1) **agenda item 3.a.** This comment is coming from me as a PhD physicist with long experimental and theoretical experience and pertains to the use of data and interpretations from the BWSG. I understand and agree with your decision to remove certain TDS data coming from the BWSG from your existing carefully vetted well data set. I am also certain that other data and analysis from this same source must be fully examined before any attempt is made to utilize the same as input into the DRI flow model. There is obviously no budget to accomplish such an examination/validation. The late receipt of any of this material makes the assimilation in any GSA models nearly impossible in any case.

2) **agenda item 3.b.i)** Please reread my Report dated 11/2/18. The following is a further amplification of the same material in the 11/2 Report. The pump inlet coverage required for proper function of a given well is directly related to two factors 1) the expected life of the installed pump and motor and 2) the rate of decline of the water level in a given well. For typical domestic well installations in the IWV Basin, new pump/motor life typically ranges from 10 to 15 + years with a lot of variability. If we cover a pump inlet with only say 10' of water in an area where the rate of decline is 1.5 '/yr we can expect to uncover the pump inlet in only 6.7 years, an unacceptably short time. Even if the rate of decline is only 1'/yr we are only at the bottom end (10') of the typical lifetime. The AWWA 60' of nominal freeboard is clearly based on the assumption of only minimal decline in water levels. Of course, it is often possible to drill deeper and so obtain a well with greater freeboard but it is not commonly done here in the IWV or elsewhere. On North Brown Rd, wells located over the black organic clay typically only have about 100' of higher quality water.

To summarize: The proper pump coverage really should be based on the rate of decline of the water level in the well in question. This aspect is almost never considered carefully in the field. The driller often does not have an accurate value and in this Basin often will more or less guess at 1' to 1.5'/yr. A pump coverage of 15 to 20 feet is very often chosen. Since we have somewhere in the 30 to 40' of usable freeboard, two to four cycles of pump/motor replacement will likely occur before the well itself ultimately fails from declining water level. Each of the replacement cycles is designed to give the well owner the full life of the pump/motor. The final cycle will be the same as the earlier settings assuming there is enough remaining water. You can see how 10' of coverage is not adequate for the great majority of well locations in the IWV Basin.

This is why I indicated 20' of coverage in my Report and qualified same with the words"not very conservative". Even using a minimum pump coverage of 15' will result in a shocking rate of well failure. It is hard to estimate from field observation what the current failure rate is since the Basin wells are spread over such a large area. There are times when more than one driller is active at the same time. It should be possible to examine the KC Health Dept domestic well permits and discover how many are for redrilling or replacement

and the permit date. **Assuming that permits are pulled and recorded properly, such an evaluation would provide a check on the model predicted failure rate.** As old wells are repaired (deepened) or redrilled, the time to failure clock is obviously reset for that well. As the model goes forward in time it is necessary to take this into account. Since well failure from declining water levels is an on going phenomena this will be difficult to model. The KC health Department data could be invaluable if one can be convinced that it is complete.

A final comment on agenda item 3.b.i). The approach of averaging rates of decline over a section is probably going to work for many sections. There clearly are serious discrepancies in rates shown on the color coded map that Stetson did distribute at the meeting. It will be useful to compare to the existing KCWA elevation change map (out of date but still useful for comparison). To obtain rates of elevation change in a given section all that is required is to identify wells in a given section from the KCWA or other data base and compare elevation measurements across time. One then averages rates from the well set in the chosen section. If the deviations are too large a smaller area, perhaps a half section, for example, will be selected and then analyzed. There is no need to try to somehow interpolate between contour lines of elevation.

Here are two further observations for you. 1) In an area with high rates of decline of 5'/yr (SW IWV Basin) a domestic well constructed to AWWA standards will fail with the original pump/motor still in place. This condition effectively defines a "death zone" for shallow wells. 2) Many of the IWVWD production wells in the SW have lifetime limits from declining water levels not unlike the shallower domestic wells. The shallow well issues simply scale up to the circumstances of the deeper well with its much greater pumping drawdown (high pumping rates and low hydraulic conductivity) and the relatively high rates of water level declines . These well lifetime limitations are further compounded with the two new SW WD wells that are (or will be) equipped to deliver at 2200 gal/min compared to the old standard of 1200 gal/min.

A final comment: I remain concerned about the relatively high residuals the present flow model exhibits in the SW. I fully realize the difficulties present when the rates of water level declines are as large as they are. At some point I suspect that we are going to have to reduce the assumed El Paso recharge substantially. It is this very area though that the setting of minimum thresholds is going to be most critical and at the same time likely the most difficult. I also remain concerned that the organic clay zone underlying much of N Brown Rd is all but invisible in the model as it stands. This clay zone of poor water is going to play a major role as pumping at a new much higher rate proceeds in the area. I think these two areas (NW and SW) must receive the emphasis of what new exploratory wells can be drilled by Seabee or other support. **I also will offer the suggestion again of relatively inexpensive shallow seismic survey/tomographic analysis as a most appropriate method to explore the clay zone.** SkyTem promised a lot but since it cannot on its own even detect the top of the saturated zone it is of dubious value.

All for now, Don Decker

Modeling/Management Scenarios

IWVGA TAC - January 3, 2019

Agenda Items 3.c

Schedule for Scenarios

- All modeling runs completed by March TAC meeting
- January Tasks:
  - DRI to Complete Scenario 1 to present at February Meeting
- February TAC Meeting Tasks:
  - Evaluate results of first management scenario
  - Discuss/Determine three additional management scenarios

2

Scenario 1 Objectives

- Compare shallow well impacts with pumping ramp down to baseline model and previous shallow well impact analysis
- Evaluate water level recovery
- Evaluate imported water storage and recovery project

3

Scenario 1 – Option A

- Annual Recharge: 7,650 AFY
- Recycled Water: 700 AFY injected by 2025 (additional available for direct use)
- Imported Water Storage Recovery Project
  - 15,000 AFY recharged in El Paso region beginning in year 2031
- Initial Pumping: Approximately 27,000 AFY
  - Based on 2010-2014 Average Annual Pumping with modifications to include previously unreported pumping
  - 5 years prior to SGMA

4

Scenario 1 – Option A (cont.)

- Pumping Rates
  - Proportional Ramp Down (20 year period to target of 7,650 AFY by year 2040)
    - Searles Valley Minerals
    - Water District
    - Inyokern CSD
    - Commercial
    - Most Agriculture
    - Other Non-De Minimis
  - "Cliff" Pumping (consistent pumping for initial period, then immediate stop)
    - Selected Agriculture (Tree Crops) - consistent initial pumping rate for approximately 13 years; then 0 AFY
      - Total of approximately 10,000 AFY
  - No Ramp Down
    - Navy
    - De-Minimis

5

Scenario 1 – Option B

- Annual Recharge: 7,650 AFY
- Recycled Water: 700 AFY injected by 2025 (additional available for direct use)
- Imported Water Storage Recovery Project
  - 15,000 AFY recharged in El Paso region beginning in year 2031
- Initial Pumping: Approximately 27,000 AFY
  - Based on 2010-2014 Average Annual Pumping with modifications to include previously unreported pumping
  - 5 years prior to SGMA

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Scenario 1 – Option B (cont.)

- Pumping Rates
  - Proportional Ramp Down (10 year period beginning 2031 to target of 7,650 AFY by year 2040)
    - Searles Valley Minerals
    - Water District
    - Inyokern CSD
    - Commercial
    - Most Agriculture
    - Other Non-De Minimis
  - "Cliff" Pumping (consistent pumping for initial period, then immediate stop)
    - Selected Agriculture (Tree Crops) - consistent initial pumping rate for approximately 16 years; then 0 AFY
      - Total of approximately 10,000 AFY
  - No Ramp Down
    - Navy
    - De-Minimis

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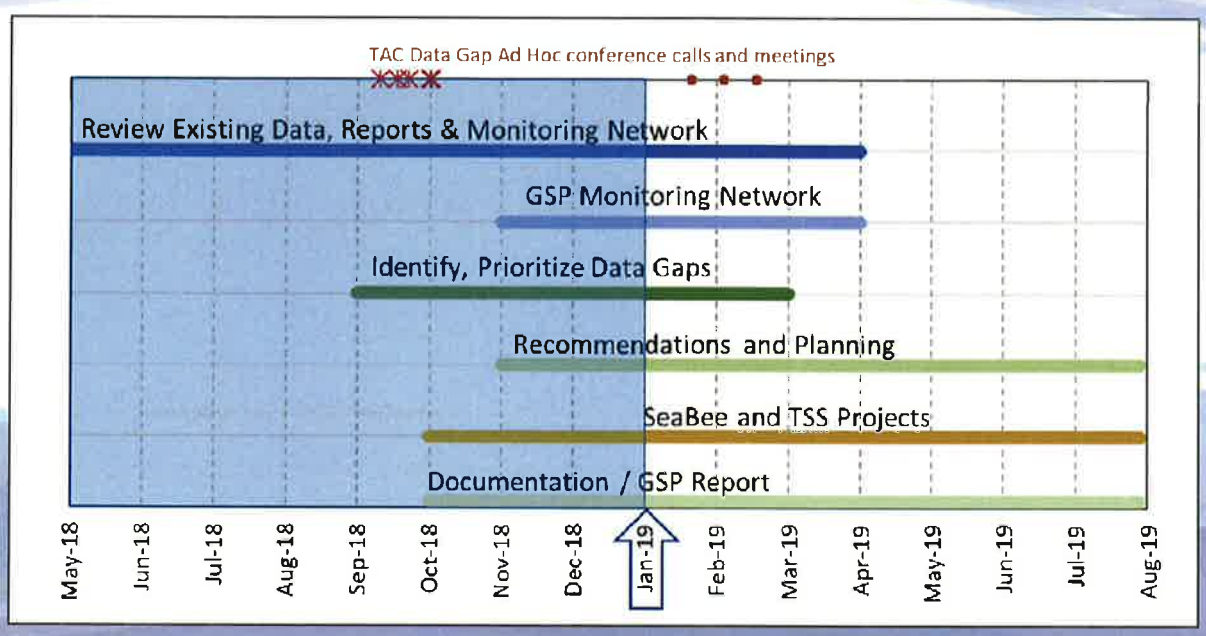
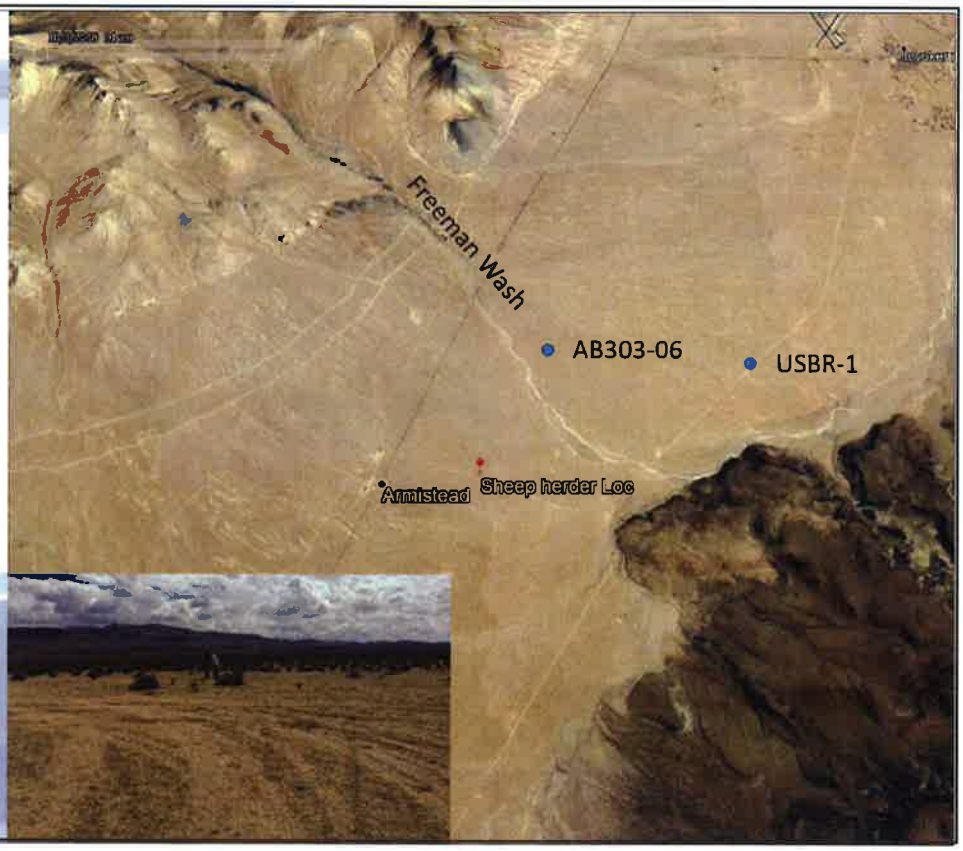
Monitoring Network and Data Gap Status



TSS Update

Processing 1st TSS Proposal with DWR

- IWVWD in-kind services to write TSS Proposal
- Jan 17 Board Mtg request approval for WRM to proceed coordinating TSS proposal with DWR
- Have Data Gap Ad Hoc prioritize additional drilling locations
- Submit 1st Draft Proposal to DWR (end of January)
- Report Status Update at February TAC



IWVGA TAC: January 3, 2019

Agenda Item 3g

Navy-COSO Funding: Potential Priority Projects

1. Assess and Mitigate Impacts to Shallow Wells
2. Planning, Design, Permitting, and Construction of Imported Water Facility
3. Comprehensive IWV Groundwater Monitoring Well Installation and Reporting Program.
4. Water Storage and Recovery Pilot Project
5. Planning, Design, Permitting, and Construction of Brackish Water Project
6. IWV Water Conservation Program for Municipal, Agriculture, Navy (Executive Order E013834) and Industrial Use
7. Planning, Design, Permitting, and Construction of Recycled Water Facility and Beneficial Use Project
8. Tui Chubb Relocation
9. Verification of Well Database
10. Water Quality Sampling/Water Treatment Program
11. Land Subsidence Study and Monitoring
12. Exploratory well drilling to understand subsurface flow into/out of IWV basin (Rose Valley, Little Lake, Fremont Valley)
13. China Lake and IWV Groundwater Dependent Ecosystems Study and Protection Plan
14. China Lake North and South Range water reliability and sustainability studies. Baseline monitoring program.
15. IWV Well Operational Efficiency Study (Energy)

New Additional Project: Solar Energy/Energy Grid Improvement Project