

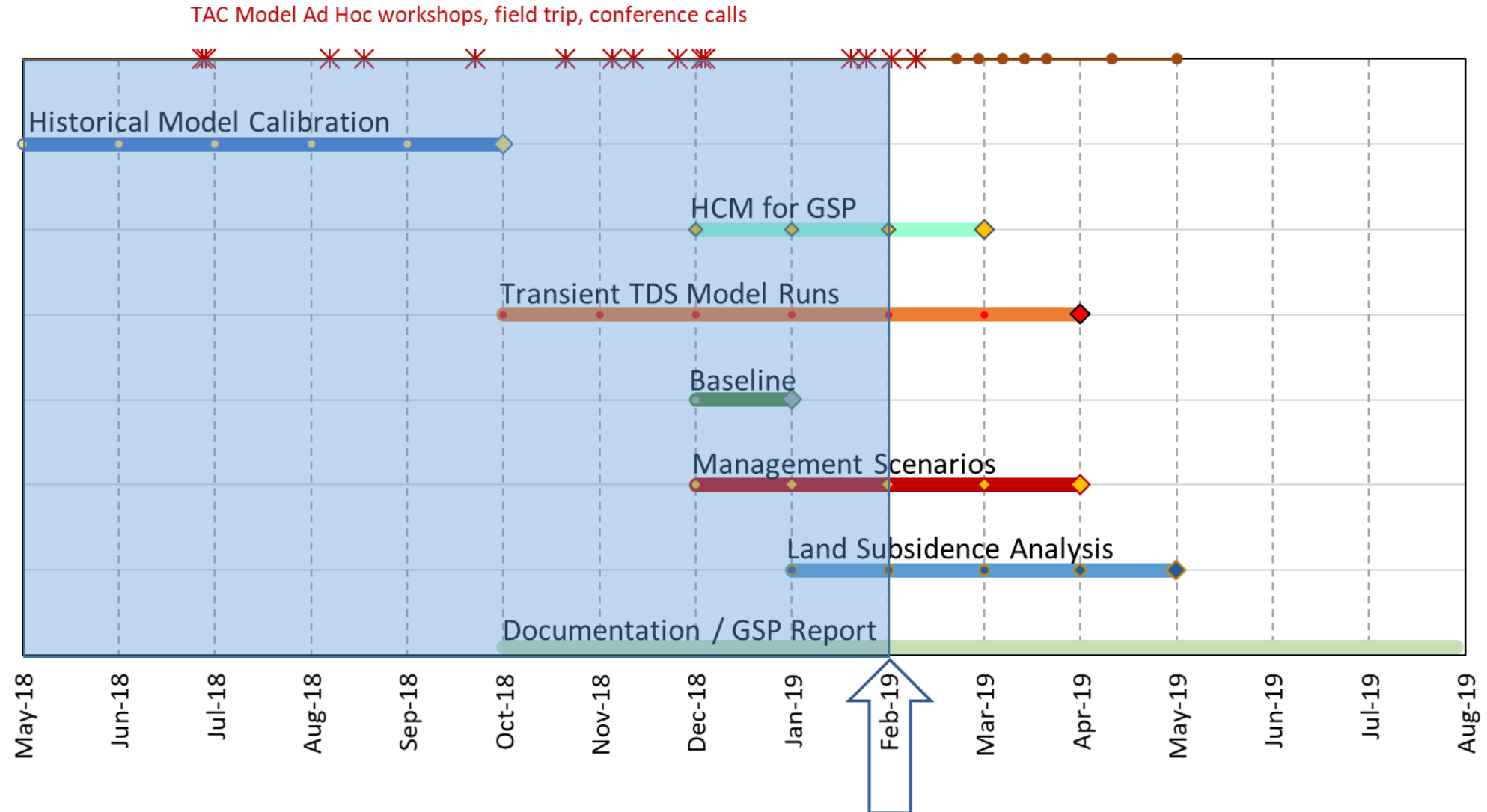
# Indian Wells Valley Groundwater Model Review and Schedule

February 21, 2019  
IWV-GA Board Meeting

# Outline

- Schedule/Model Overview
- Model Update and 1922-2016 Historical Calibration
- Predictive Simulation with Pumping Reduced to Basin Recharge
- 2020-2070 Baseline (No Action) Model Run
- TDS Baseline (No Action) Model Run
- Management Scenario #1 Model Run (Draft)
- Next Steps

# Modeling Timeline and GSP Report Sections

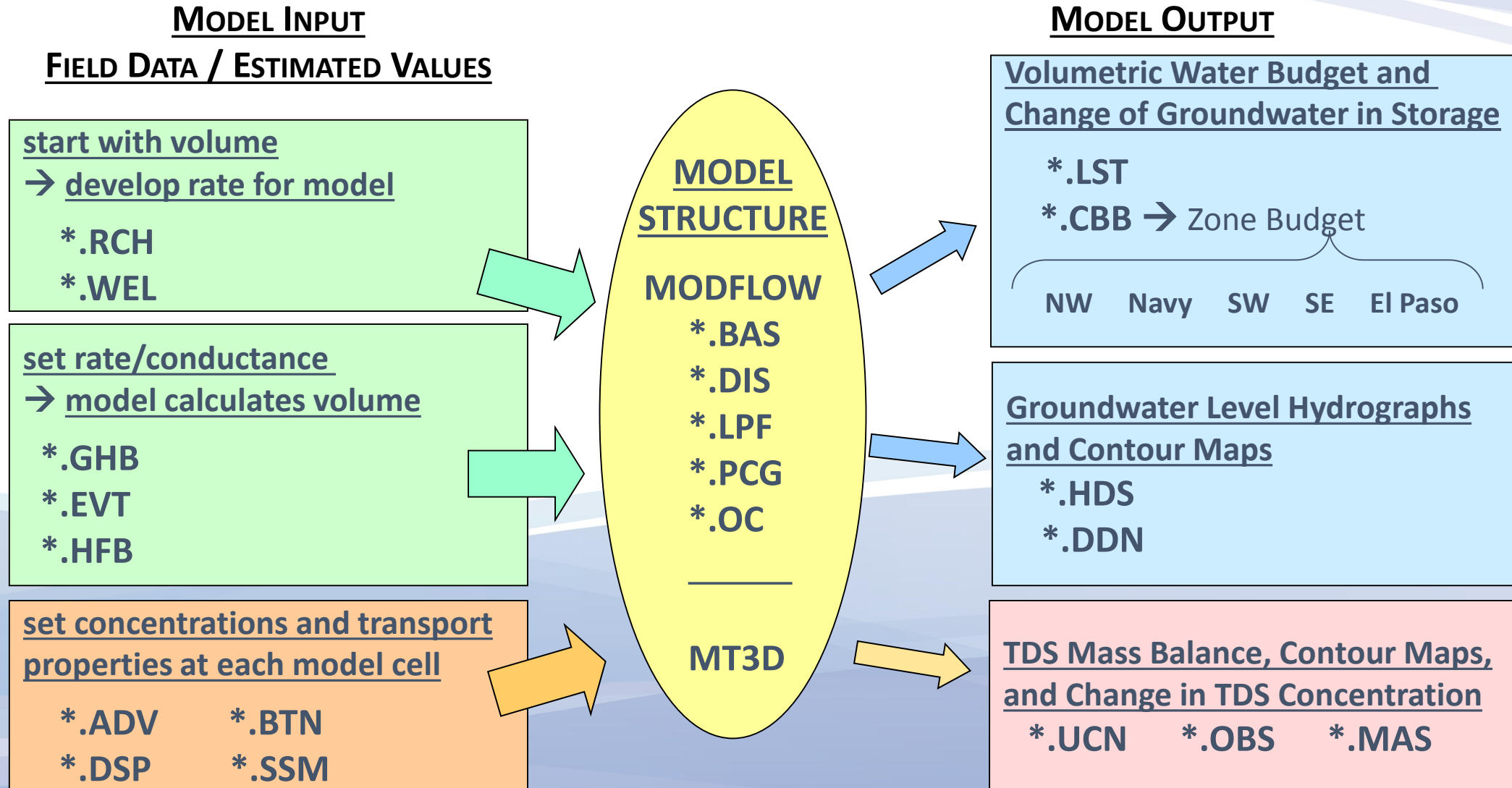


# IWV Groundwater Model

- 3-Dimensional Numerical MODFLOW Model (flow), coupled with MT3D Model (transport)
- Simulates:
  - Conceptual model – occurrence and movement of water
  - Water budget components
  - Groundwater levels
  - Changes of groundwater in storage
- Calibrated to Historical Measured Data
- Used to Perform Predictive Model Scenarios



# How a Regional Model Works



# Conceptual Model and Water Budget Components

## Inflow

Subsurface Flow from Rose Valley

Mountain Front Recharge

[ Imported Water ]

[ Recycled Water ]

## Outflow

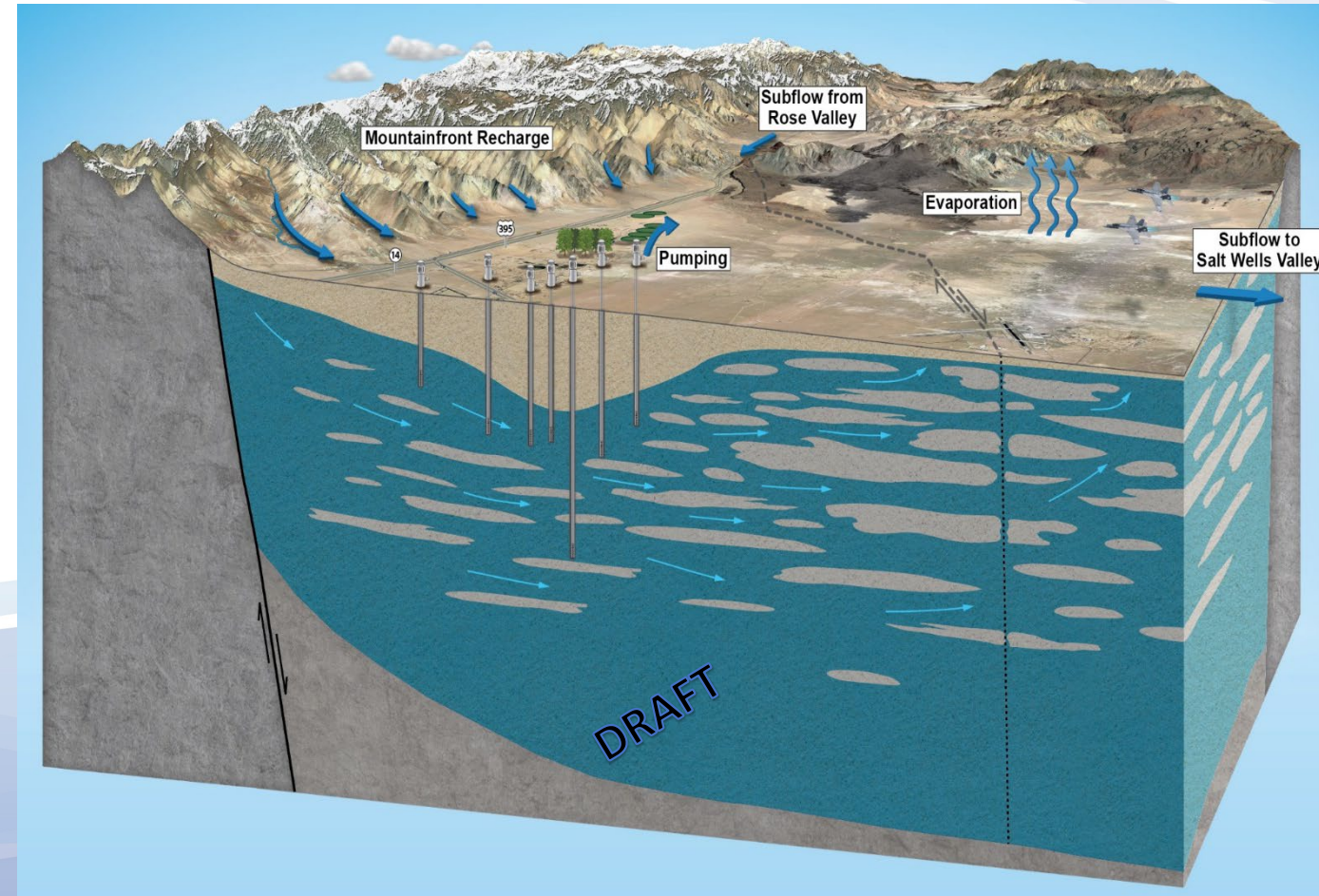
Subsurface Flow to Salt Wells Valley

Playa Evaporation / Evapotranspiration

Groundwater Pumping

[ Brackish Water Desalination ]

*Change of Water in Storage*



# Model Update and 1922-2016 Historical Calibration (Contributed by Navy)

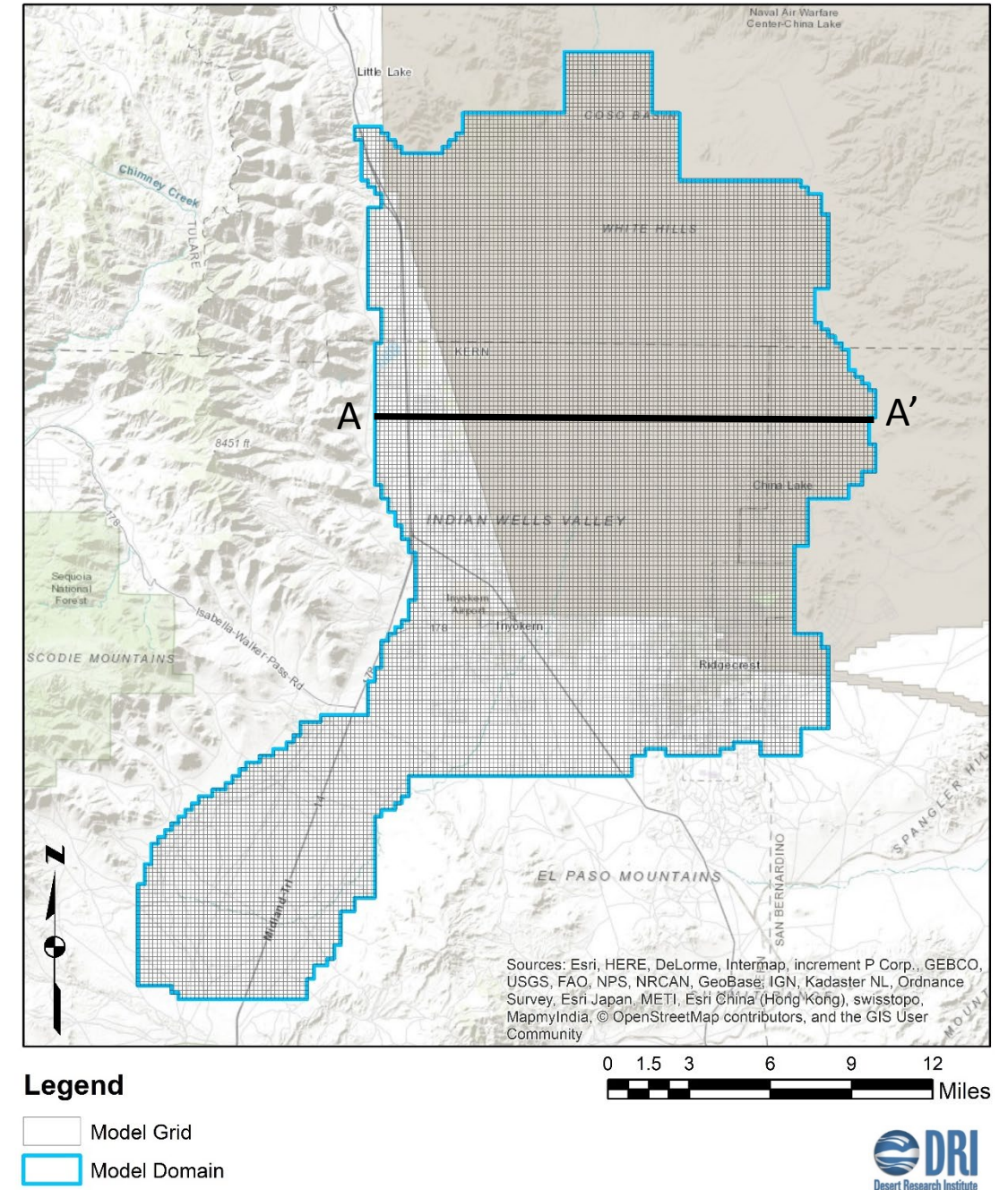
# Navy's 2016 IWV Model Update and Recalibration

- To support GSP development and meet SGMA requirements:
  - Incorporate variable hydrologic conditions and seasonal fluxes
  - Calibrate model to groundwater levels and water budget components
  - Develop two future planning horizons: 2040 and 2070
- The calibrated numerical model provides tools necessary for:
  - Assessing historical groundwater conditions
  - Estimating the groundwater aquifer's hydrologic water budget
  - Identifying data gaps
  - Assessing groundwater level and quality trends
  - Determining sustainability criteria and measurable objectives
  - Evaluating groundwater management actions strategies

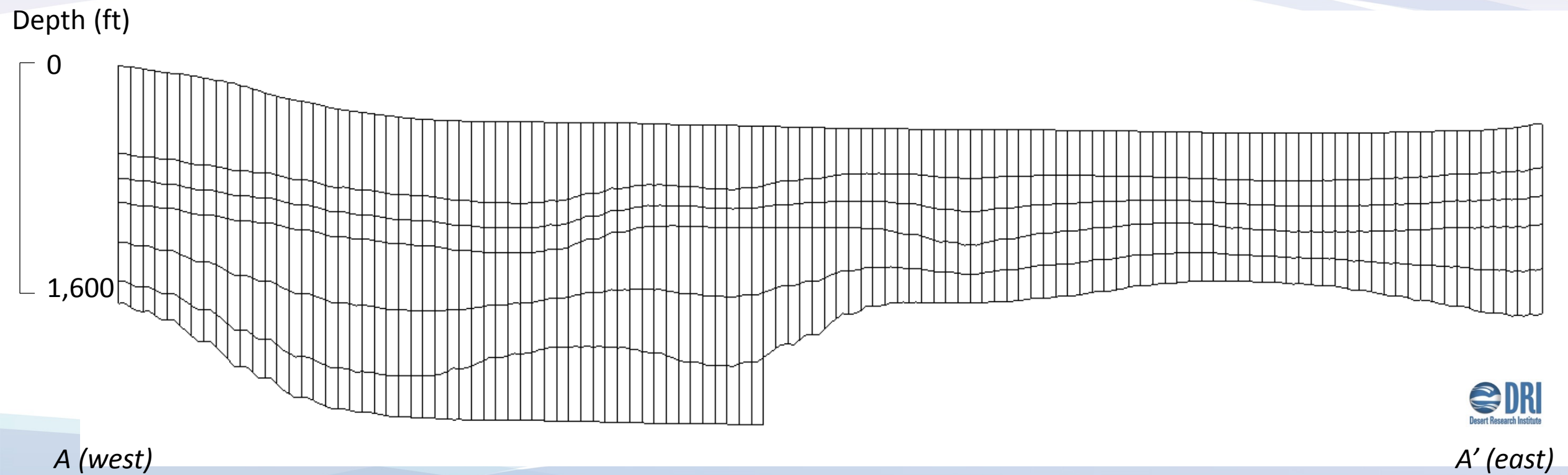


# Flow Model

- MODFLOW
- 800 ft cell size (14.7 acres)
- 6 layers
- Steady-state model: Pre-1920
- Transient model: 1922 - 2016



# Model Layering



# Historical Model Calibration (1922-201)

## Model Calibration Process

- Estimated Water Budget
- Calibrate hydraulic conductivity (K, feet/day) to 1920 steady state conditions
  - Measured Groundwater Levels
  - Aquifer Pumping Tests
- Calibrate storage (S, cuft/cuft) to 1922-2016 transient conditions
  - Measured Groundwater Levels
  - Aquifer Pumping Tests with additional monitoring well measurements
- Calibrate fault parameters (K, feet/day)
  - Measured Groundwater Levels
- Calibrate playa evapotranspiration
  - Measured and Estimate Evapotranspiration Rates/Volumes

## Calibration

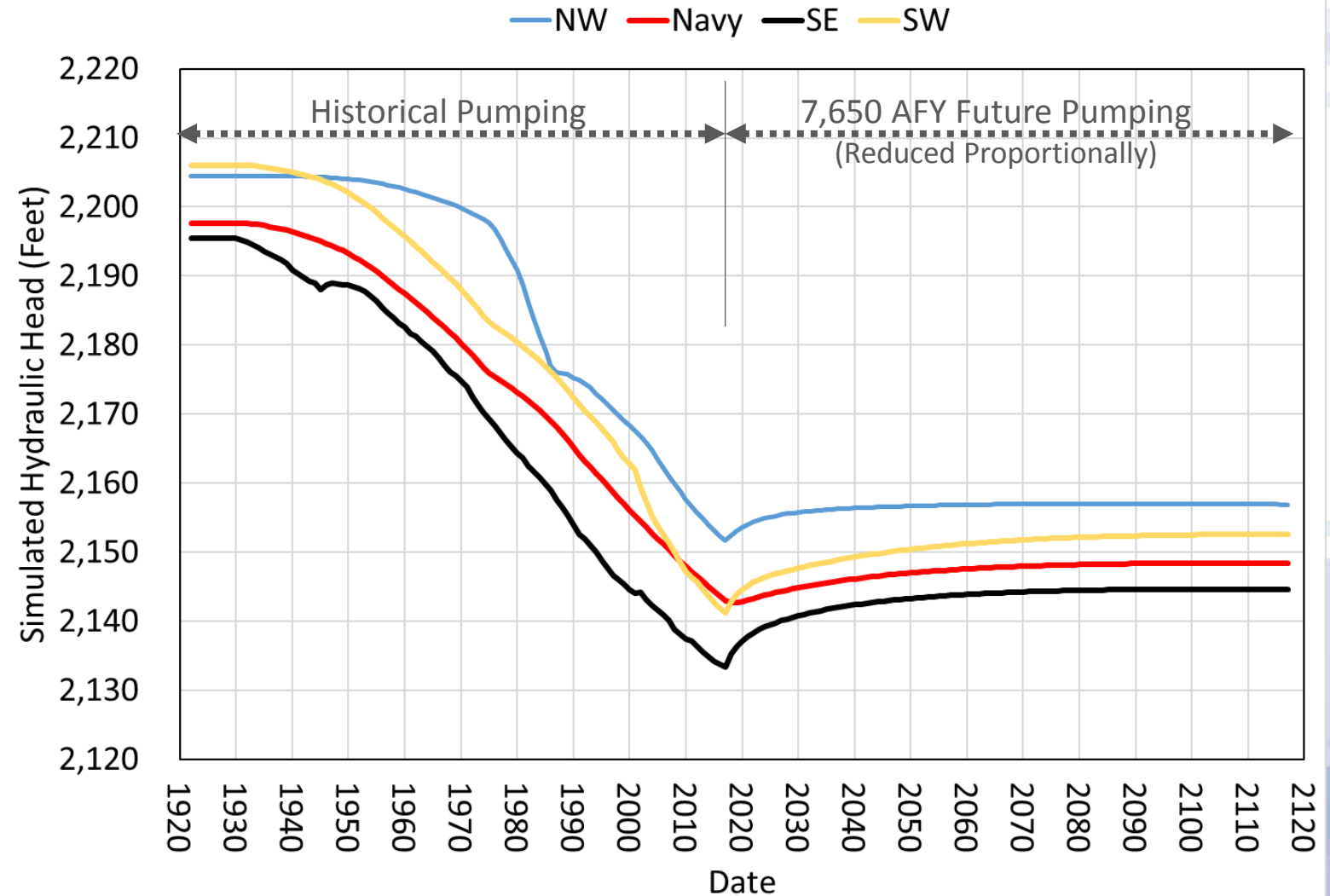
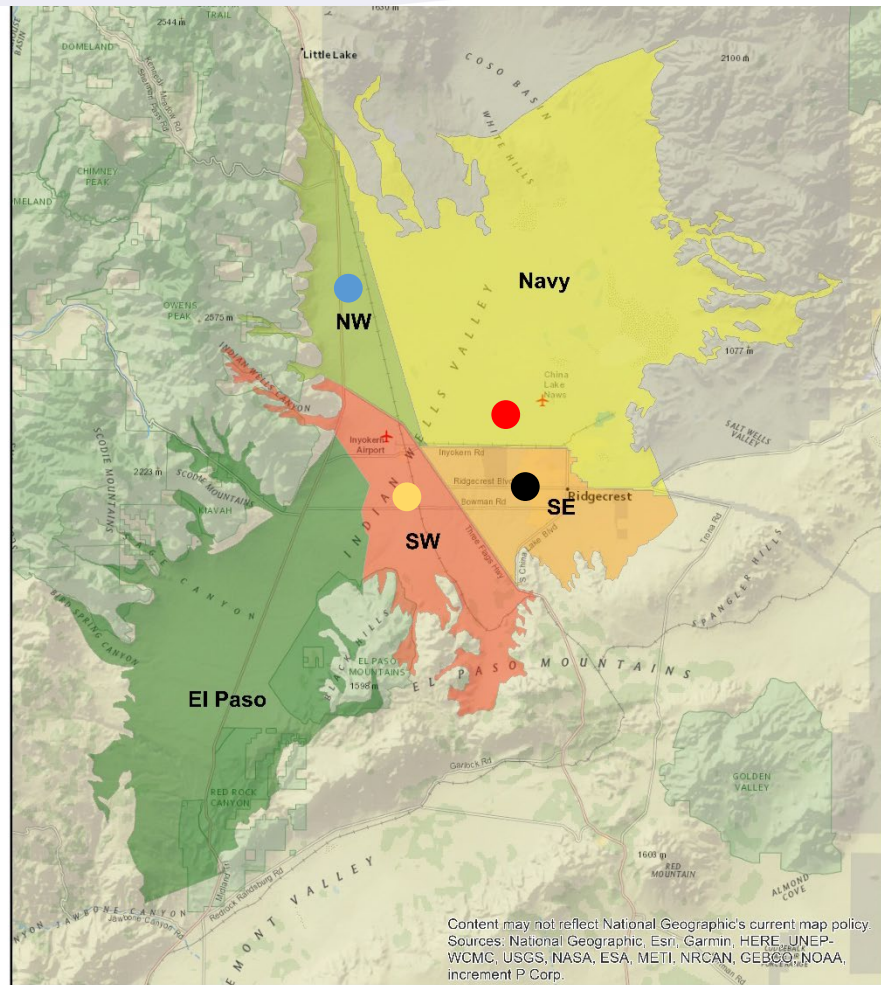
	1922-2016 (95 years)	2011-2015 (5 years)
	AF/Y	AF/Y
<b><u>Inflow</u></b>		
Recharge	7,650	7,650
Recycled Water	--	--
Imported Water	--	--
TOTAL:	7,650	7,650
<b><u>Outflow</u></b>		
Pumping	15,240	27,740
Evapotranspiration	6,580	4,850
Flow to Salt Wells	60	50
TOTAL:	21,880	32,640
Change in Storage	-14,230	-24,990

# Continue Historical Model Run

- 1922-2016 Historical Pumping
- 2017-2120 Future Pumping (7,650 AFY)



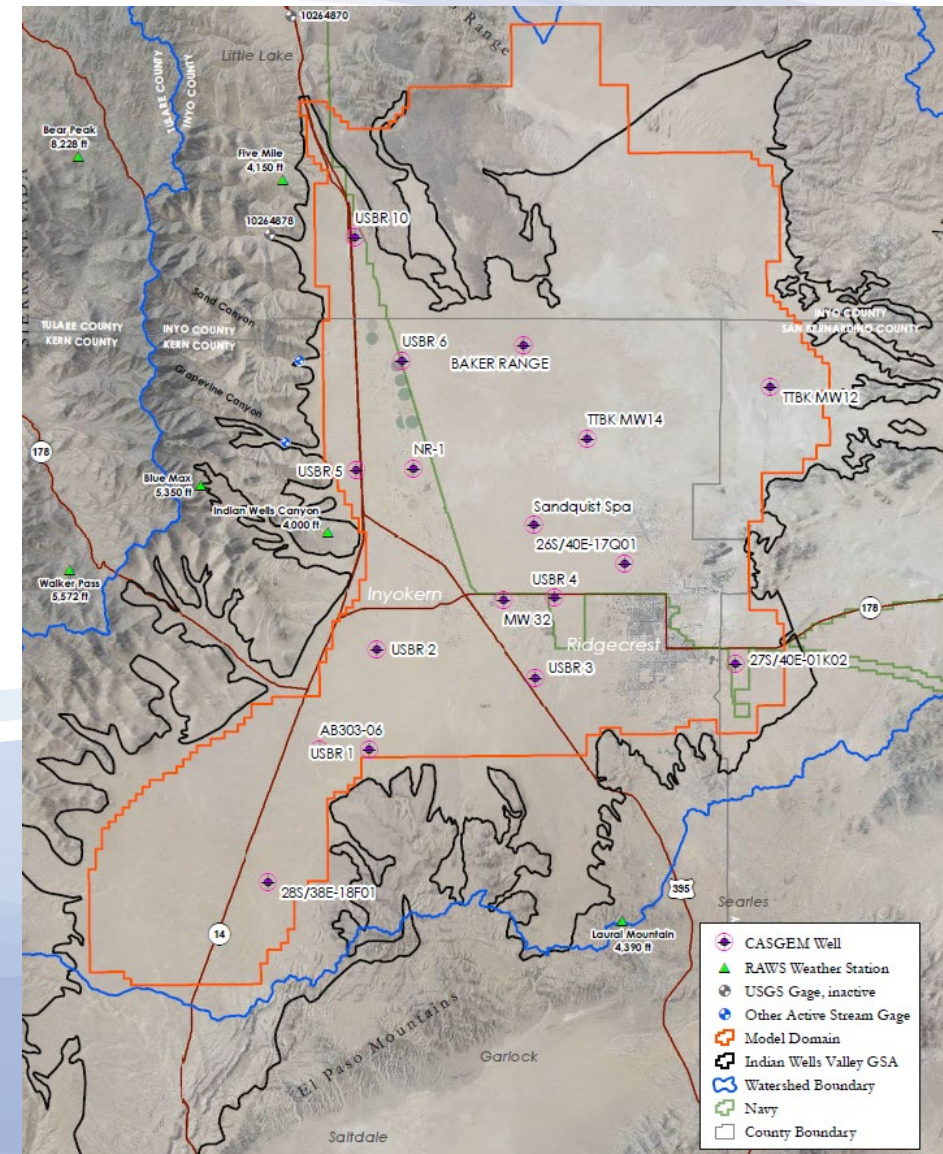
# Predictive Simulation with Pumping Reduced to Basin Recharge



# 2020-2070 Baseline (No Action) Model Run

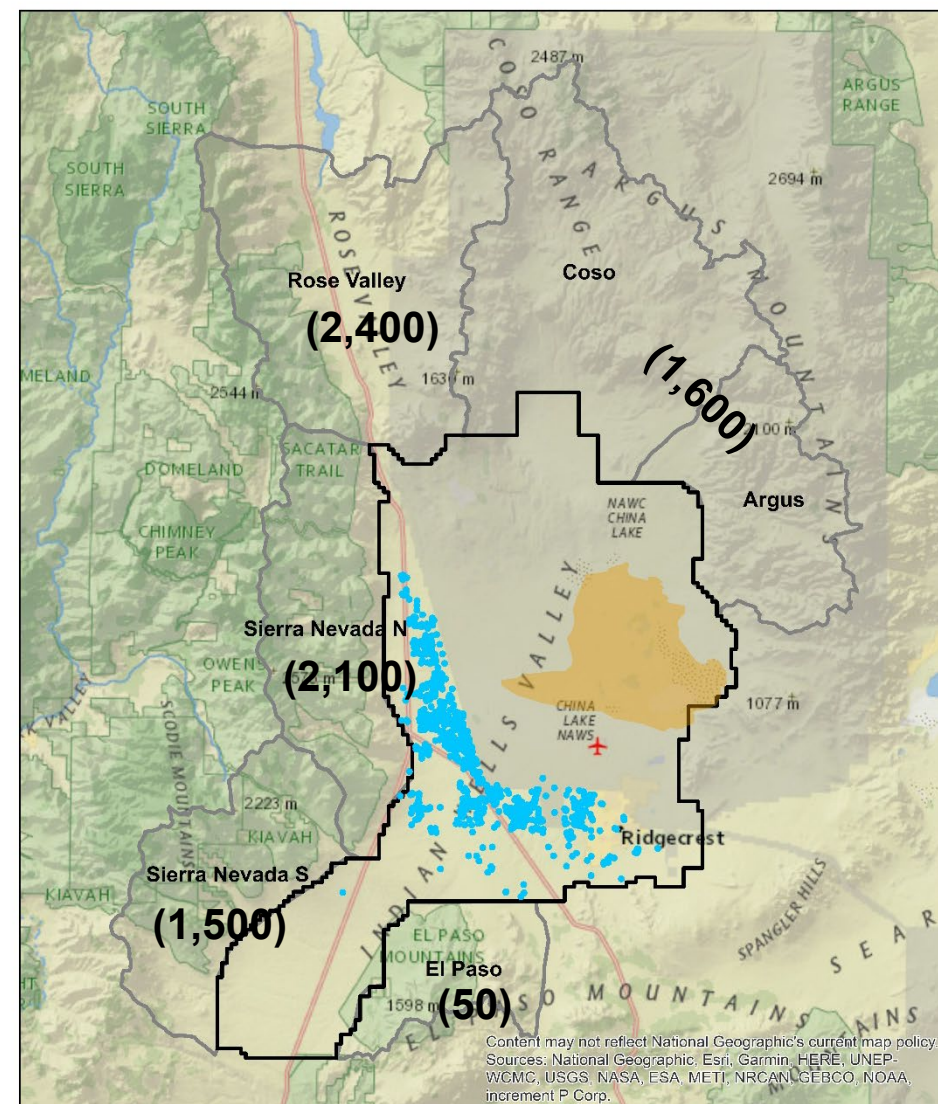
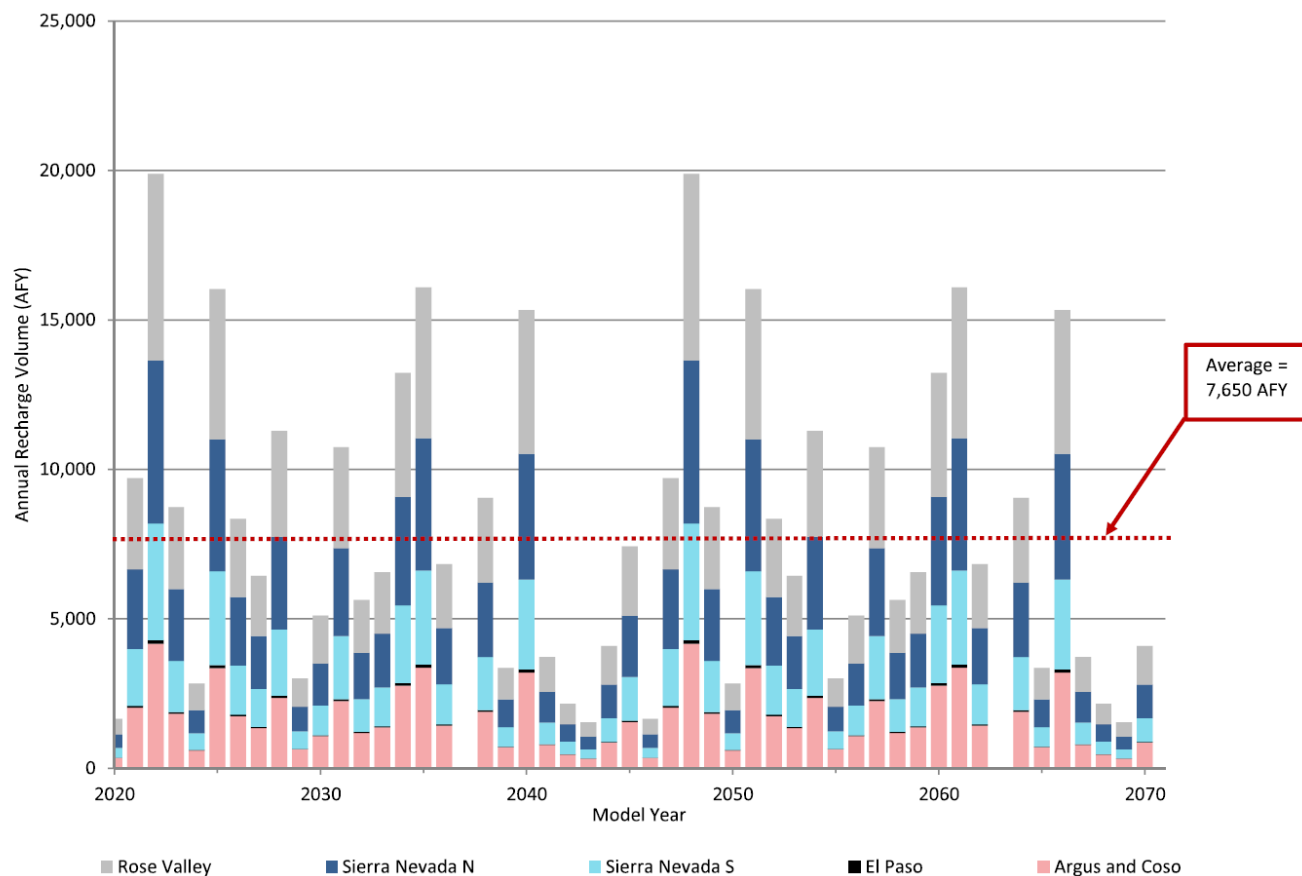
# Baseline (No Action) Assumptions

- Recharge
  - Balanced Hydrology 2020 through 2070
  - Mountain Front Recharge
  - Subsurface Flow from Rose Valley
- Pumping Assumptions
  - Current Management Practices
  - Projected out through 2070
- Baseline Model Output
  - Water Budget Terms:
    - by IWW Basin & Management Sub-Areas
  - Groundwater Indicator Wells (CASGEM)



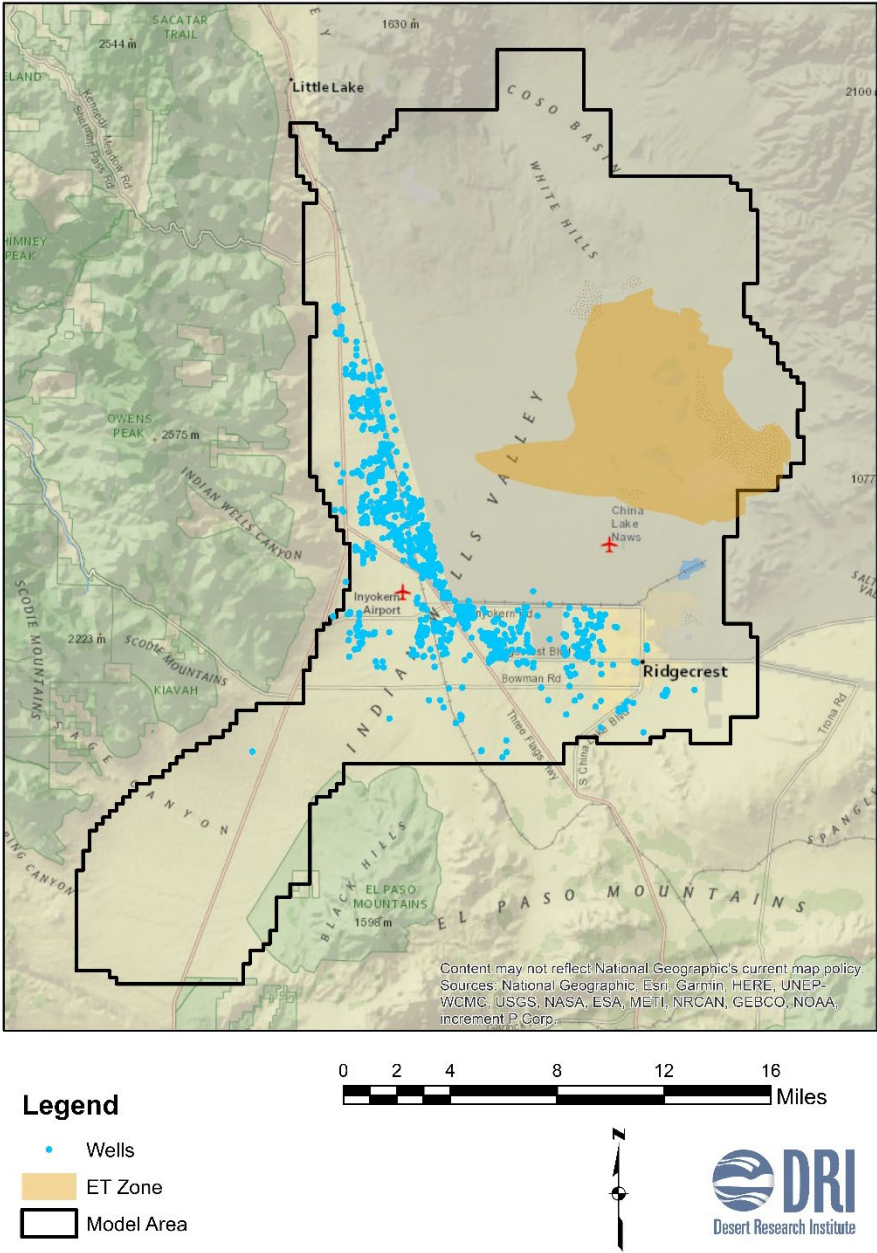
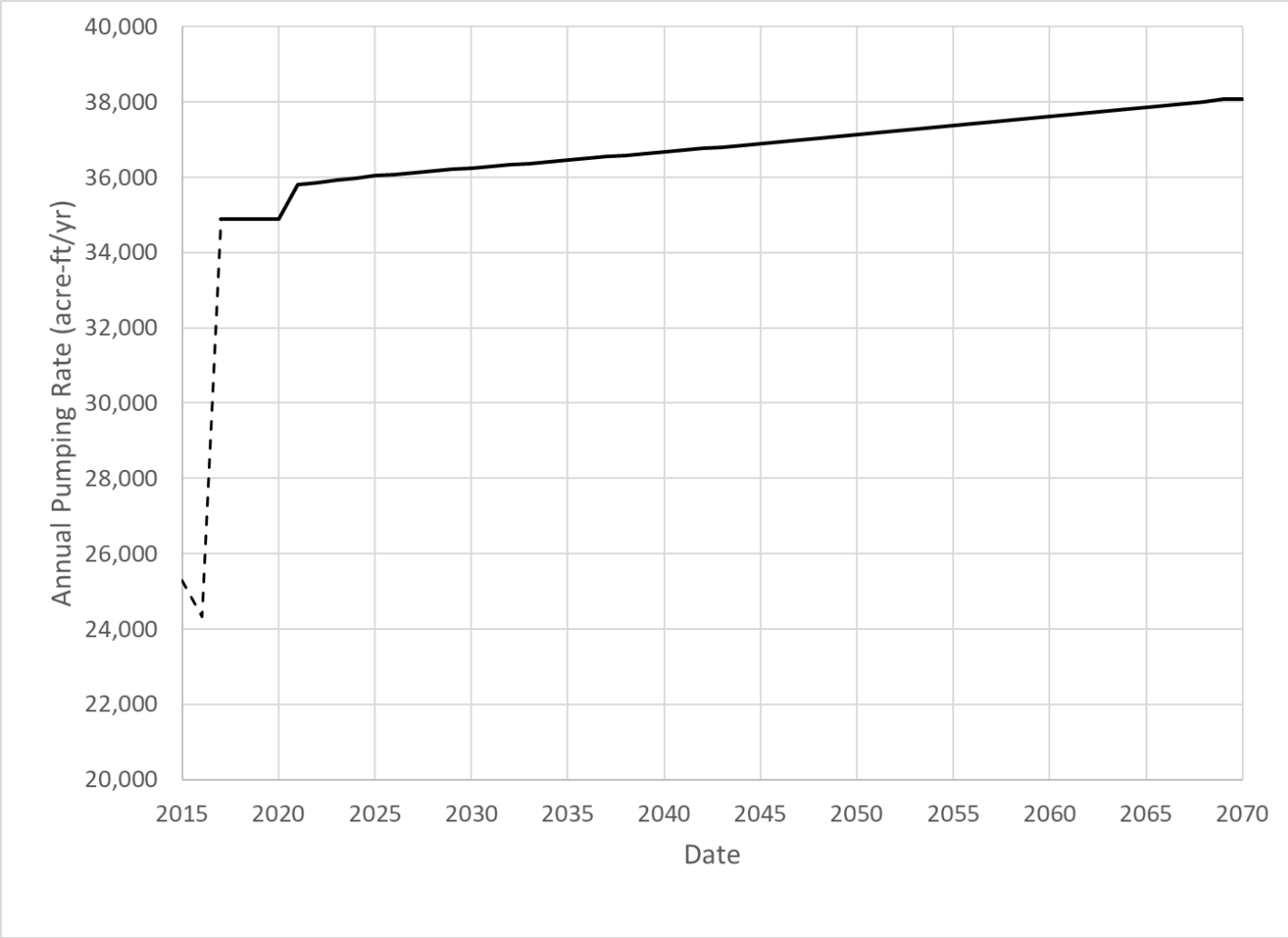


# Simulated Recharge (Average = 7,650 AFY)



# Simulated Pumping

(51-year Average = 36,880 AFY)



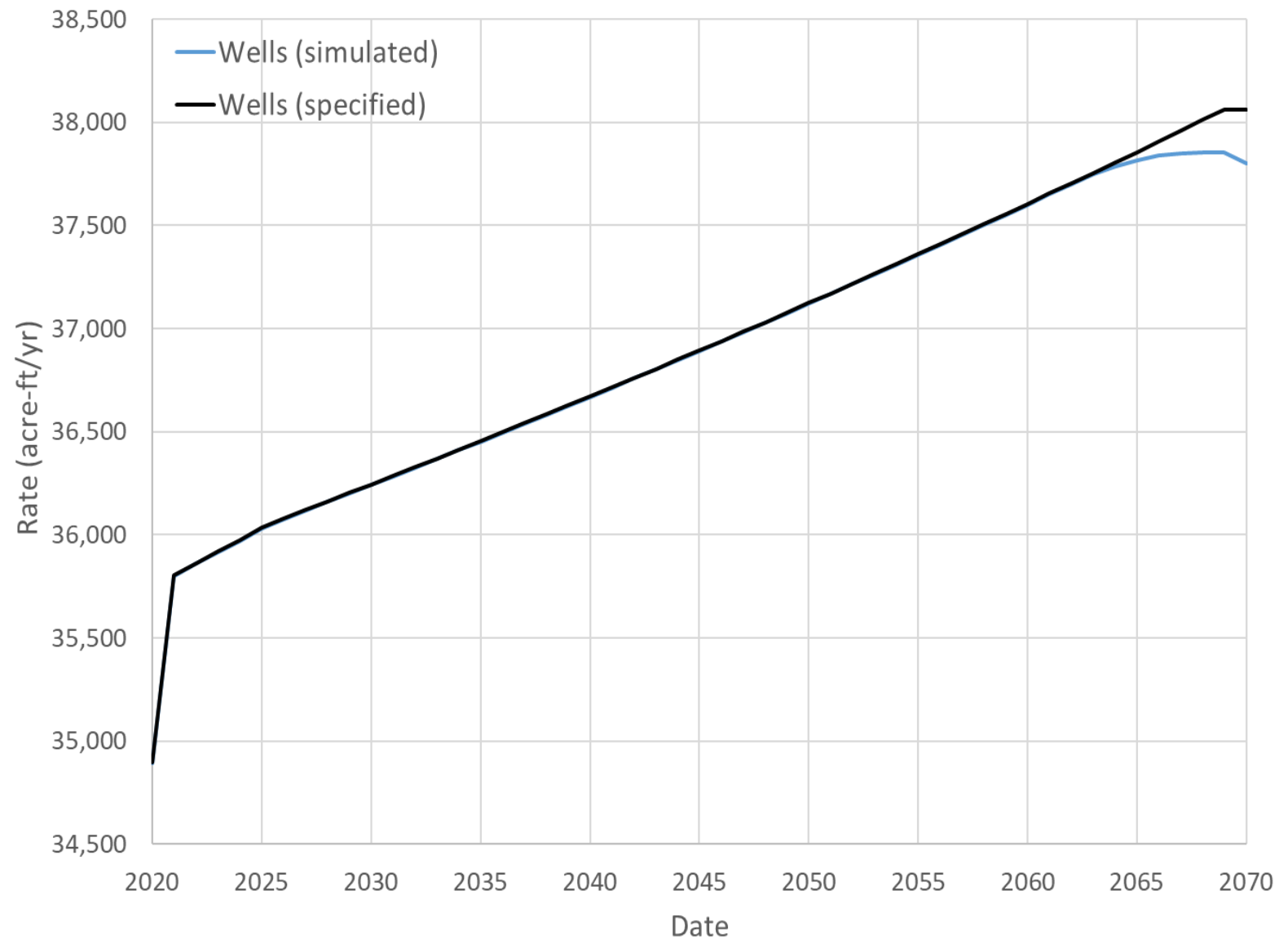
# Simulated and Specified Pumping Results

Baseline pumping simulated input by the model (50-yr average 36,880 AFY)

Ability to pump groundwater from storage (lowering of water table) using existing wells.

Screen intervals simulated using full model layer thickness

Does not account for potable vs saline groundwater



*Graph from DRI Jan 3, 2019 TAC Presentation IWV Baseline Model Run*



# Water Budget (average AF/Y)

	<u>Calibration</u>		<u>Baseline</u>
	1922-2016 (95 years)	2011-2015 (5 years)	2020-2070 (51 years)
<u>Inflow</u>	AF/Y	AF/Y	AF/Y
Recharge (subsurface, mountain block)	7,650	7,650	7,650
Recycled Water	--	--	--
Imported Water	--	--	--
TOTAL:	7,650	7,650	7,650
<u>Outflow</u>			
Pumping	15,240	27,740	36,880
Evapotranspiration (ET)	6,580	4,850	1,610
Flow to Salt Wells	60	50	40
TOTAL:	21,880	32,640	38,530
<u>Change of Groundwater in Storage</u>	-14,230	-24,990	-30,880

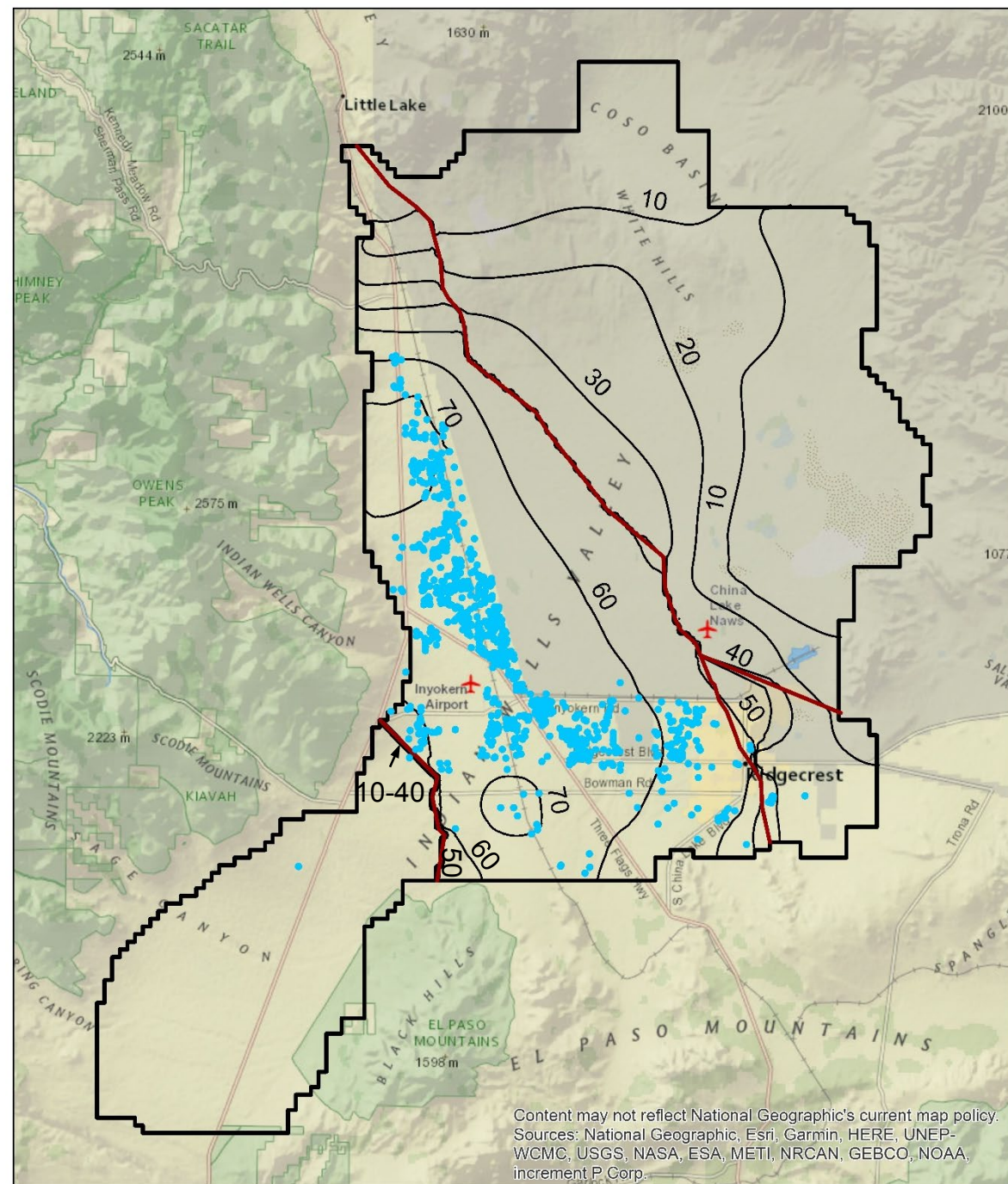
# Drawdown Results

- Drawdown from 2020 to 2070

## Legend

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

0 1.5 3 6 9 12 Miles





# TDS Baseline (No Action) Model Run

# TDS Conceptual Model (mg/L)

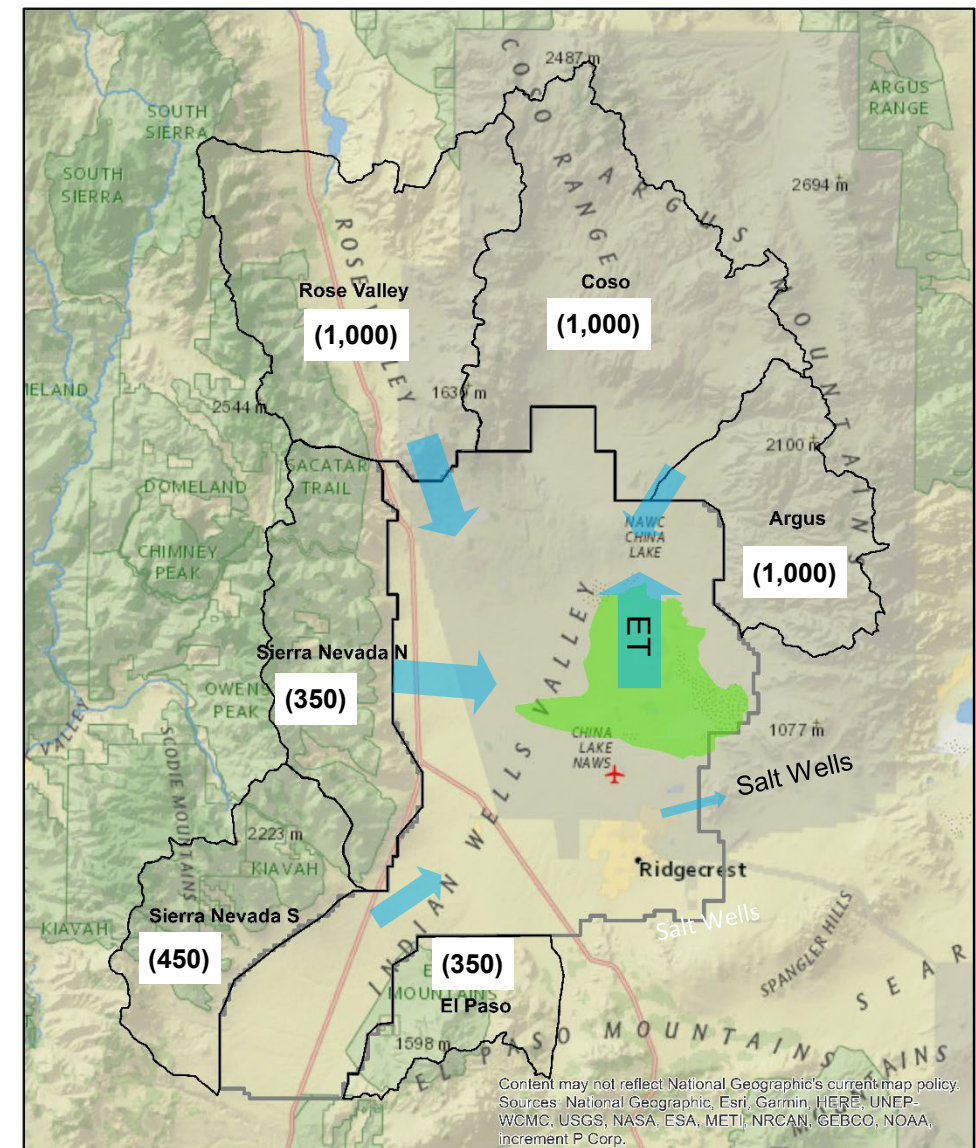
- Sources:

- Solutes in recharge
- Dissolution of minerals in basin
- Mixing with saltier groundwater
  - Remnant evaporative brines
  - Geothermal fluids

- Concentration by evaporation

- Sinks:

- Solutes in discharge to Searles Valley
- Precipitation of minerals



## Legend

ET Zone

Recharge Zones

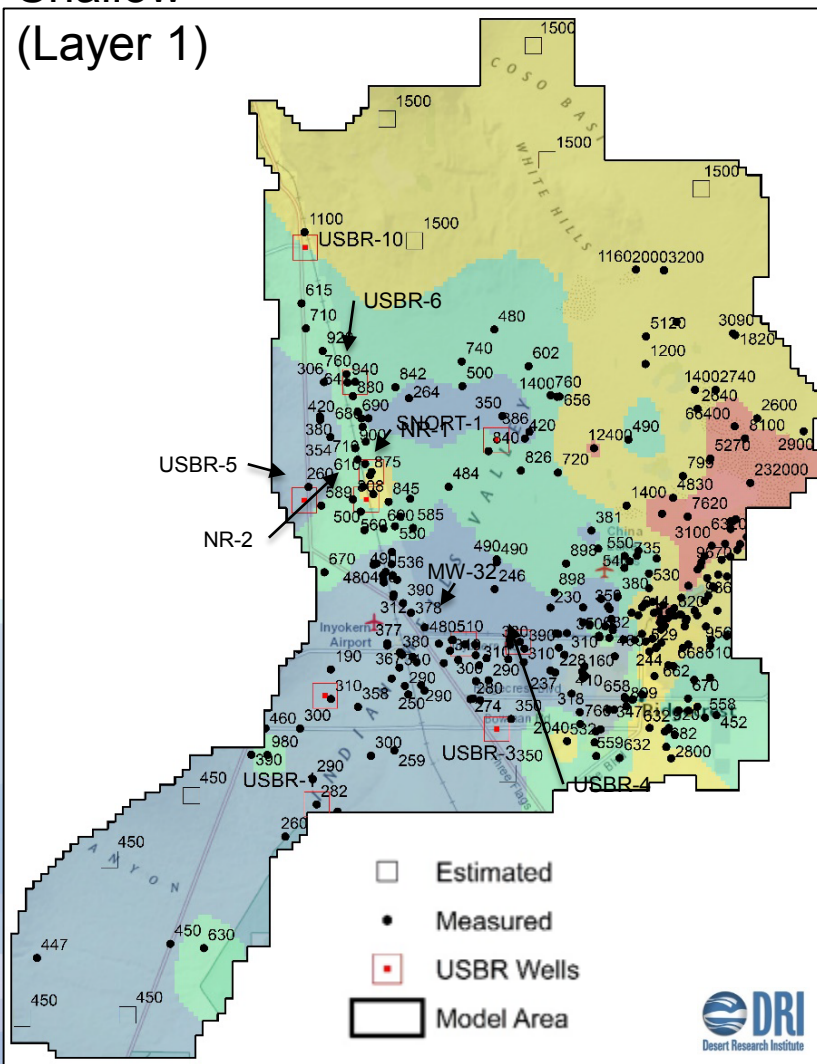
Model Area

Flow Direction

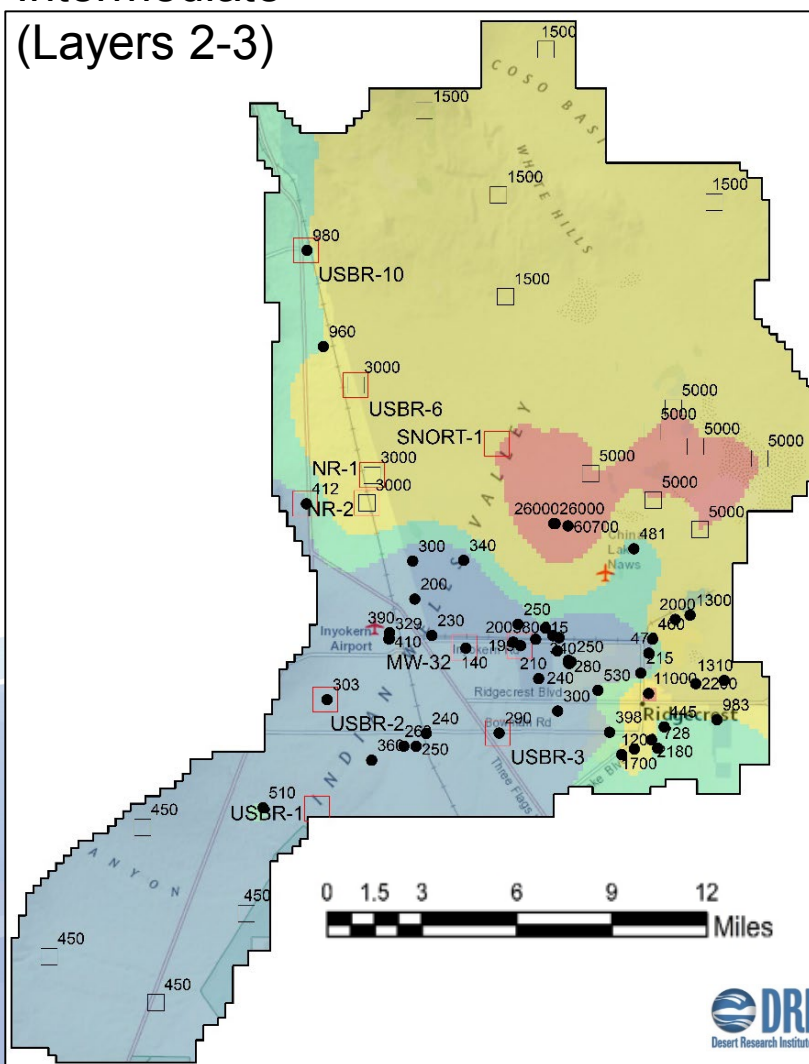
(1,000) Recharge TDS Conc. (mg/L)

# TDS Baseline Initial Conditions

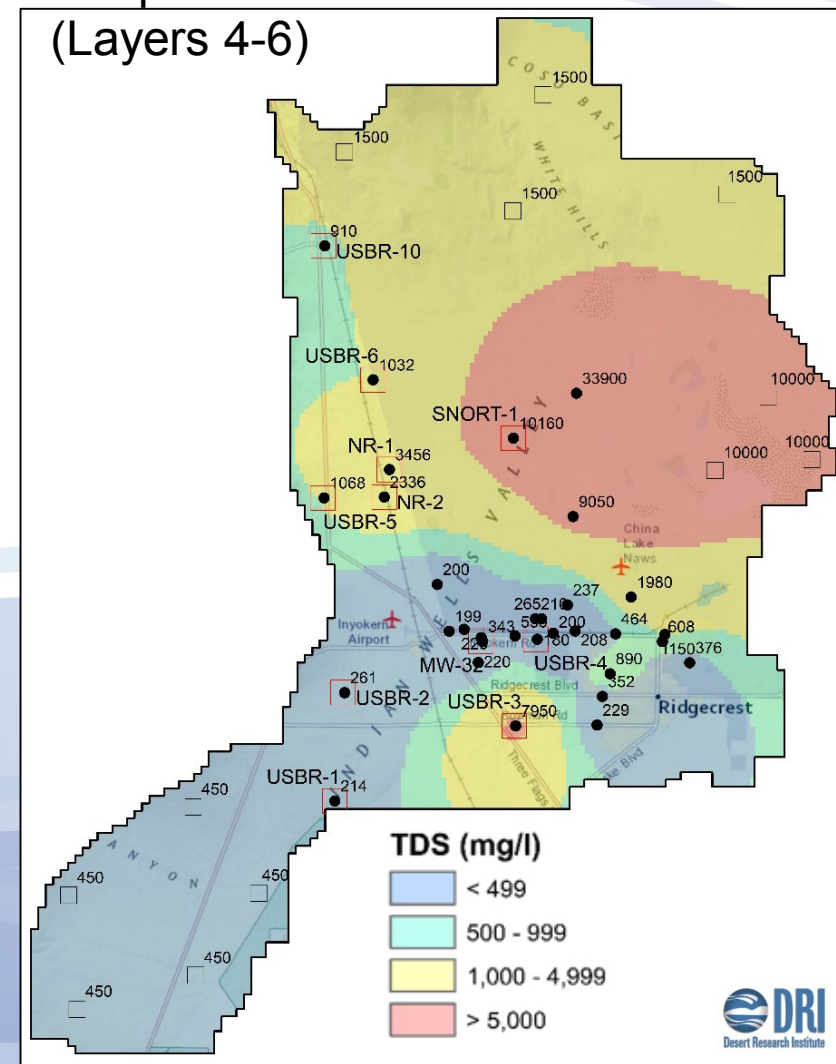
Shallow  
(Layer 1)



Intermediate  
(Layers 2-3)

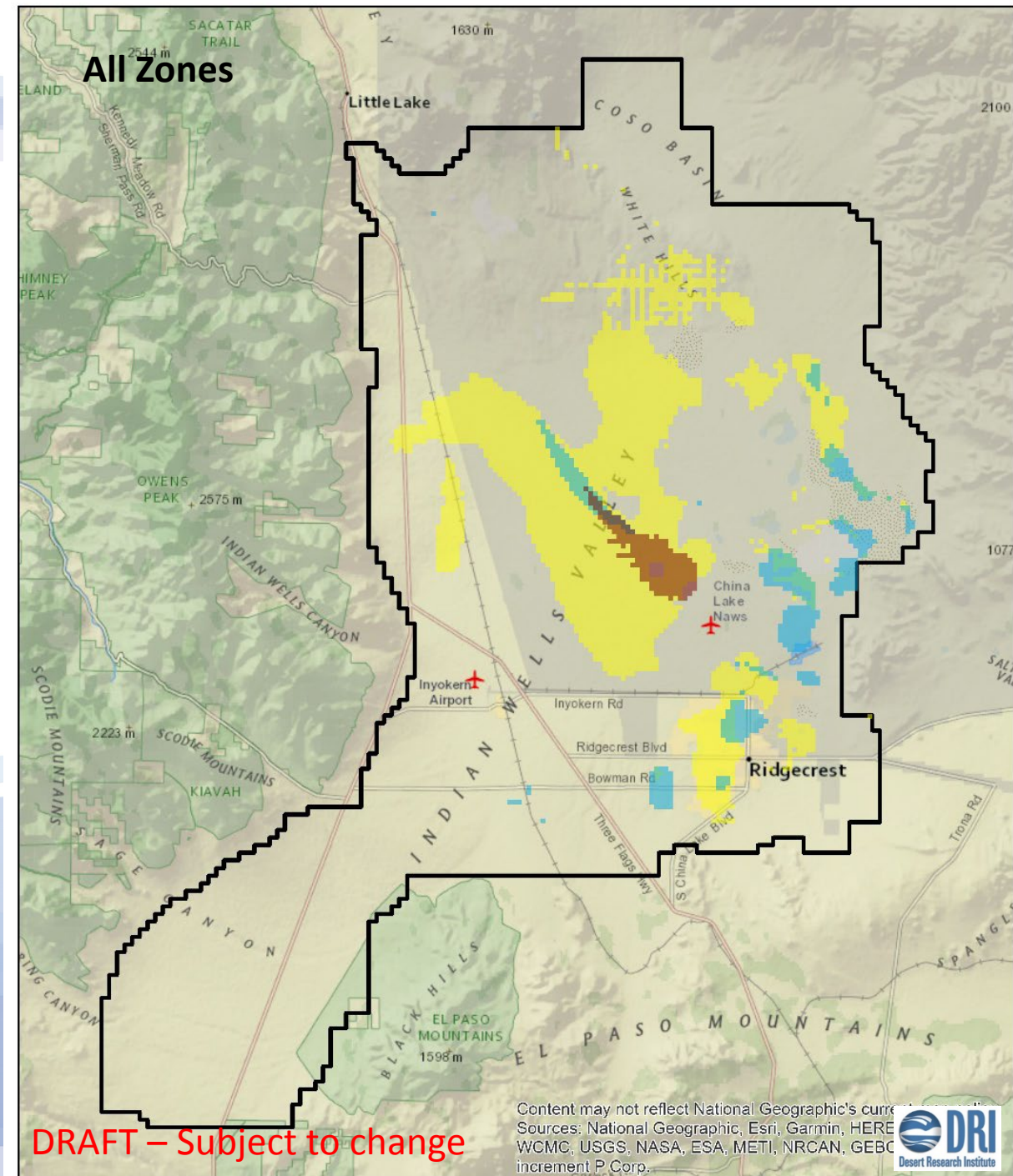
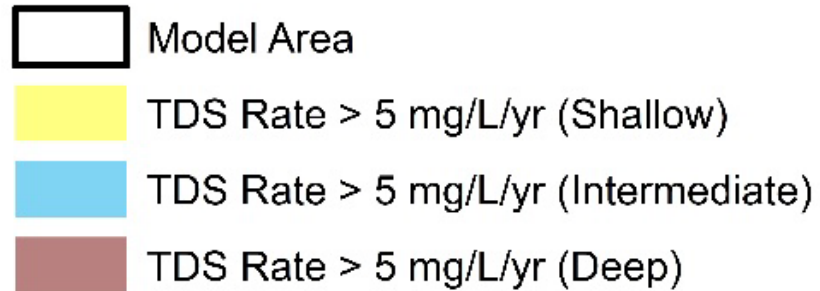


Deep  
(Layers 4-6)





# Simulated TDS Trends (2020 – 2070)



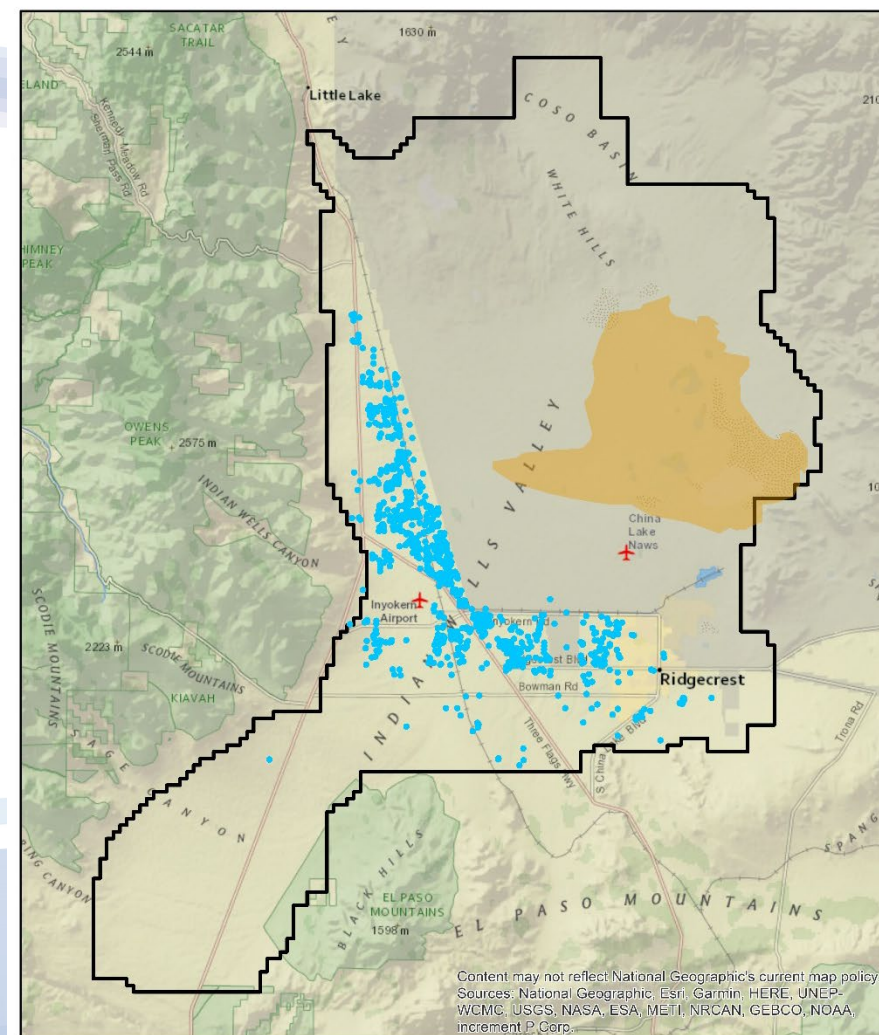
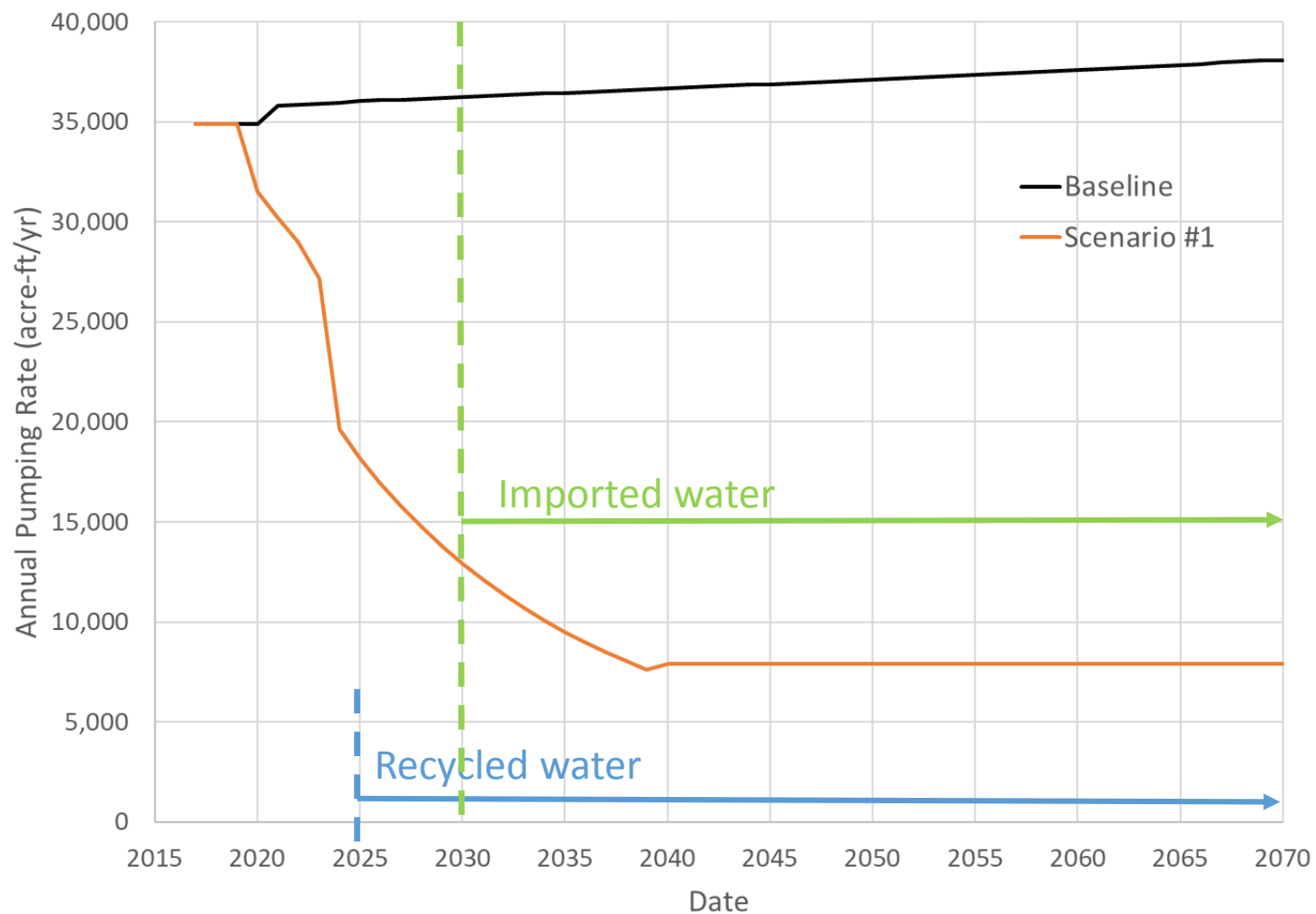
# Sustainable Management Actions Model Scenarios

# Management Scenario #1 Model Run (Draft)

- SGMA Management Period Requirements:
  - Sustainable in 20 years (year 2040)
  - Sustainable through 50-year planning horizon (year 2070)
- Simulation analysis: 2020 – 2070
- Seasonal (monthly) time steps
- Variable hydrologic conditions for recharge
- Scenario #1 conditions
  - Reduced pumping: Ramp Down, Cliff, Leasing
  - Imported water use (storage and recovery project)
  - Recycled water use (injection)



# Simulated Pumping



## Legend

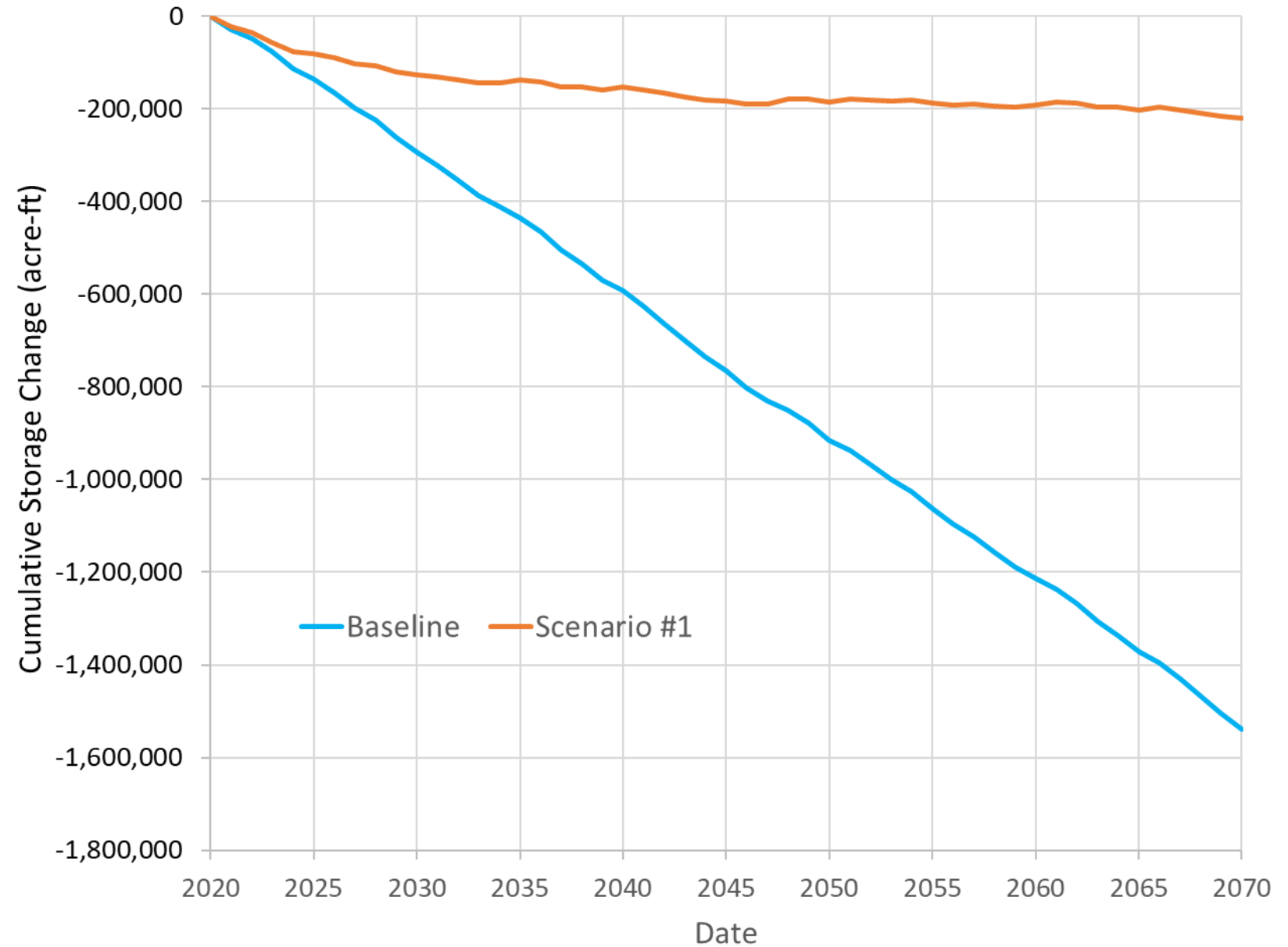
- Wells
- ET Zone
- Model Area

0 2 4 8 12 16 Miles



STETSON  
ENGINEERS INC.

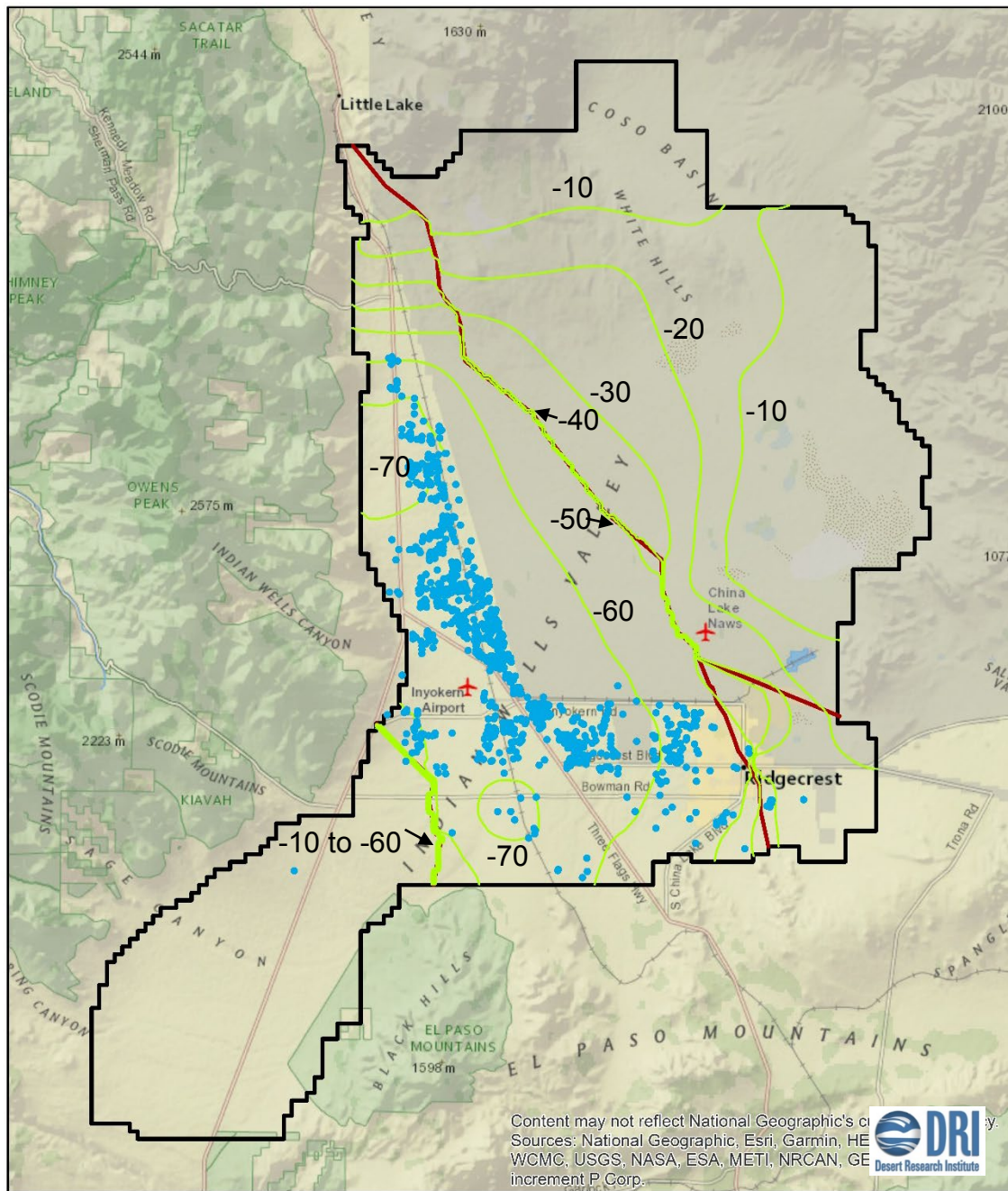
# Change in Groundwater Storage





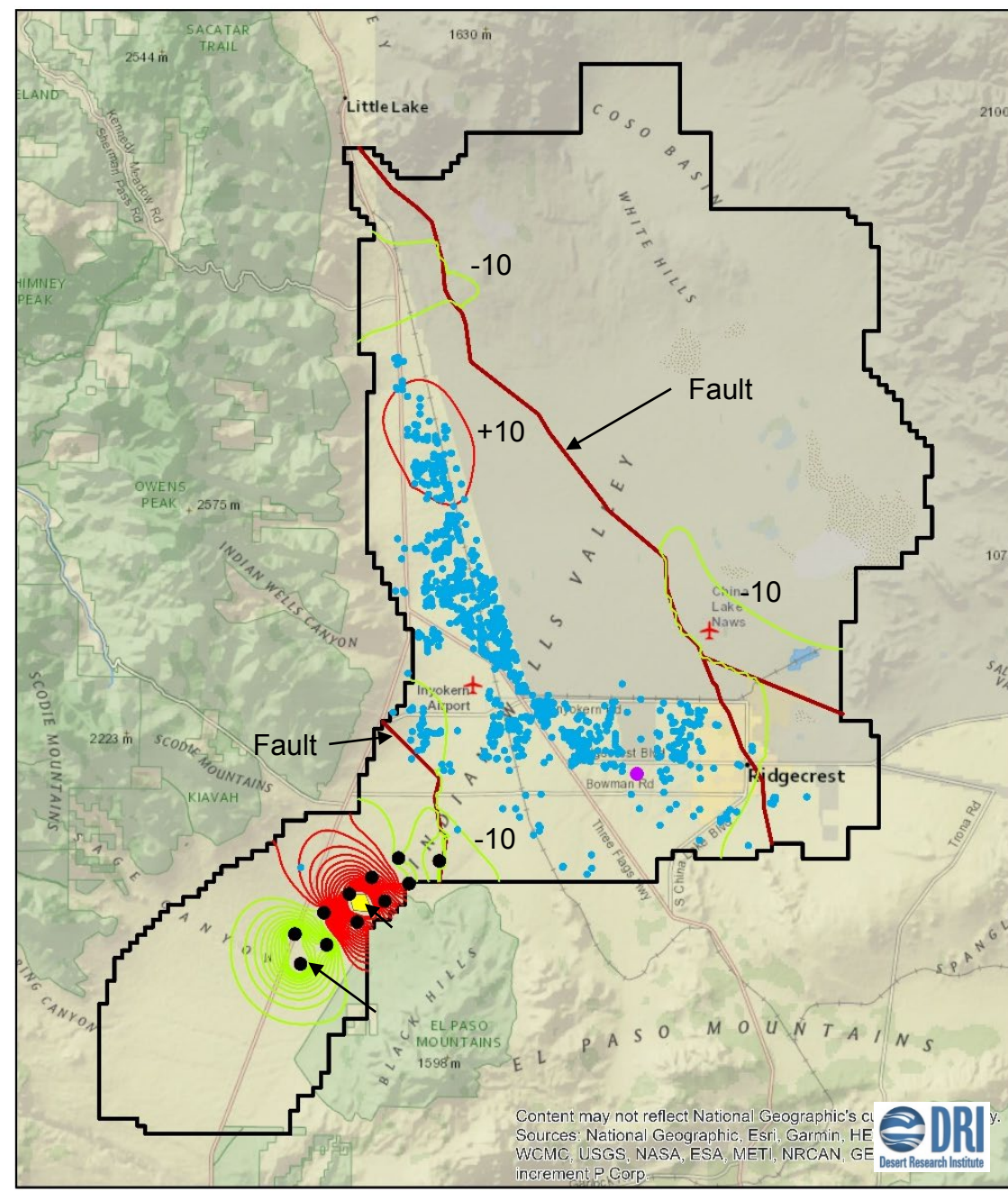
# Water Level Change (2020-2070)

— Rising



Baseline

DRAFT – Subject to change



Scenario #1

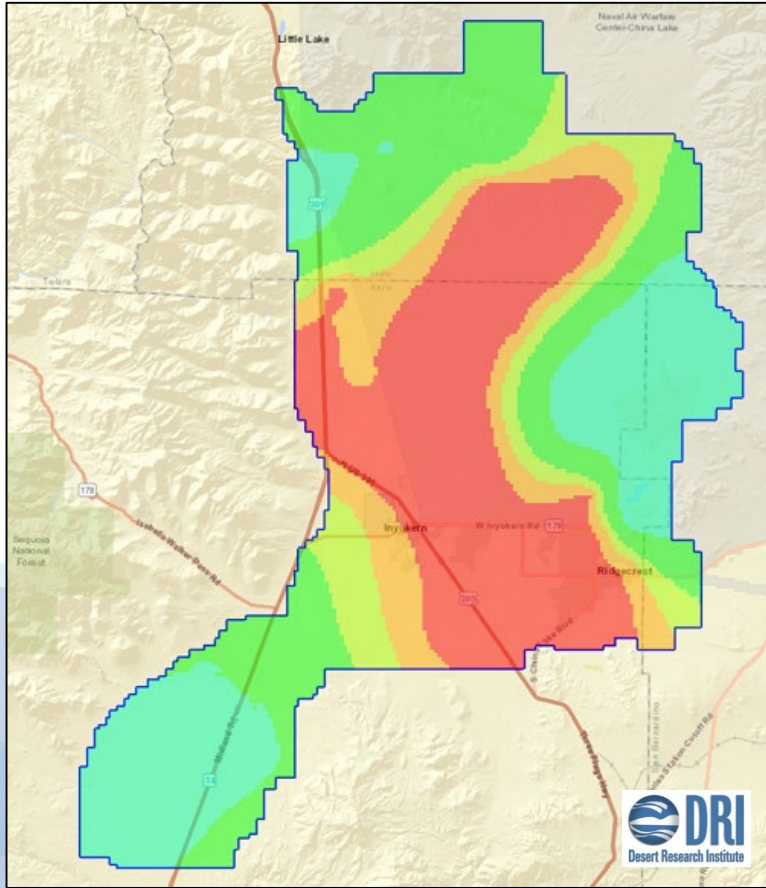
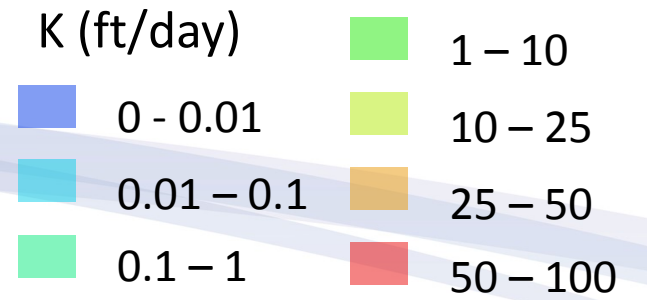
# Next Modeling Steps

- Work with TAC to develop Sustainable Management Alternatives
  - Model Ad Hoc Group
  - Full TAC meetings
- Complete three more model scenarios (DRI and TAC)
- Model documentation and GSP Sections (DRI and WRM)
- Note: brackish water model runs are being conducted coincident with the sustainable management alternative model runs (DRI with WRM coordination)

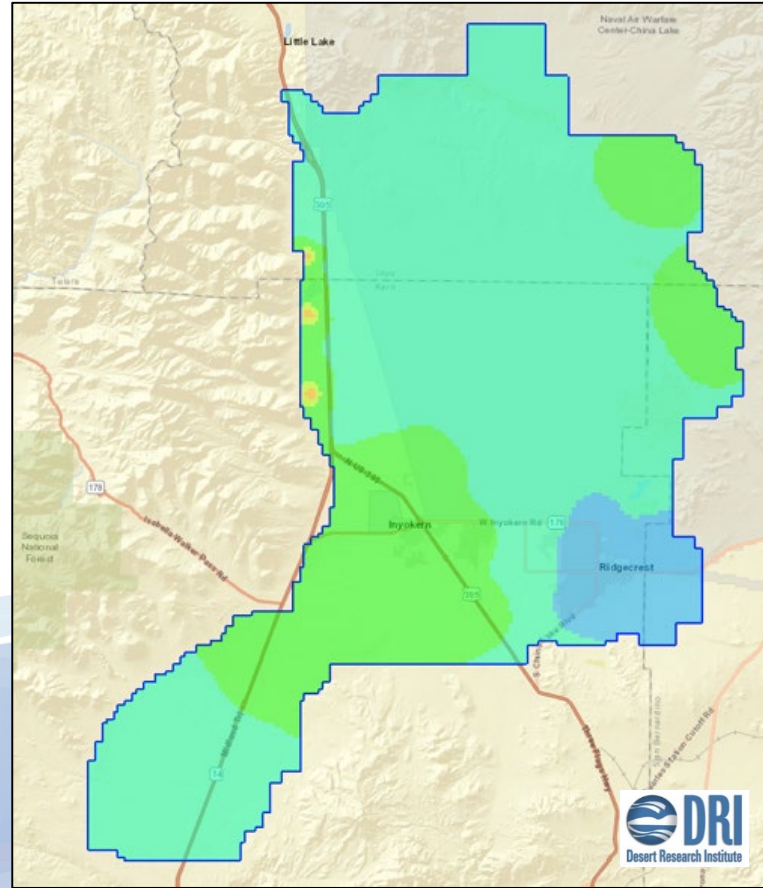




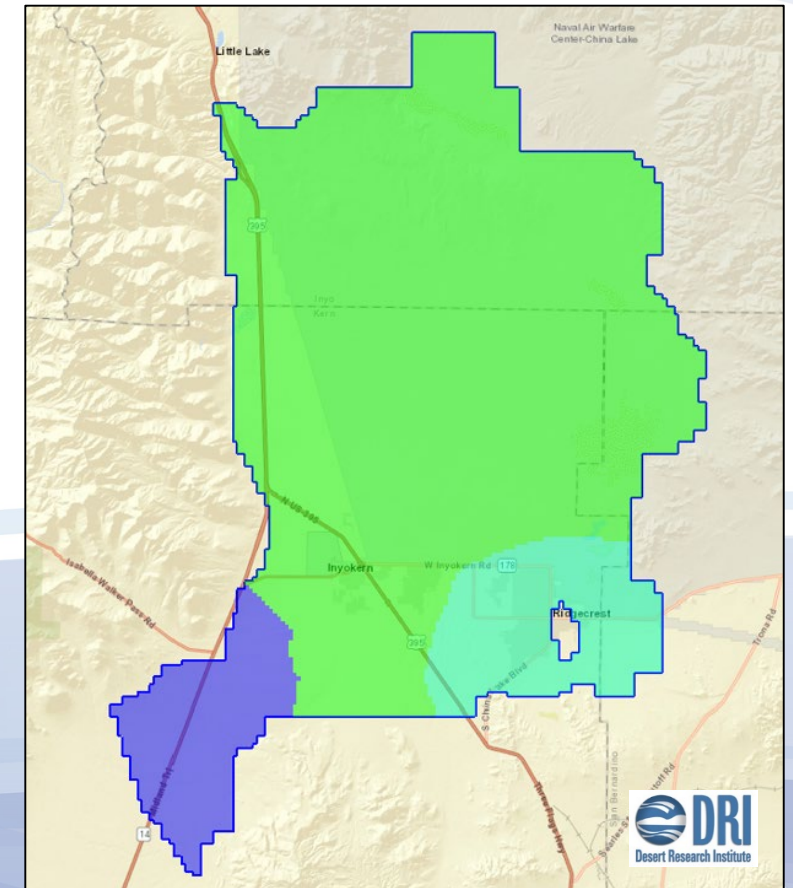
# Calibrated Hydraulic Conductivity



Layer 1



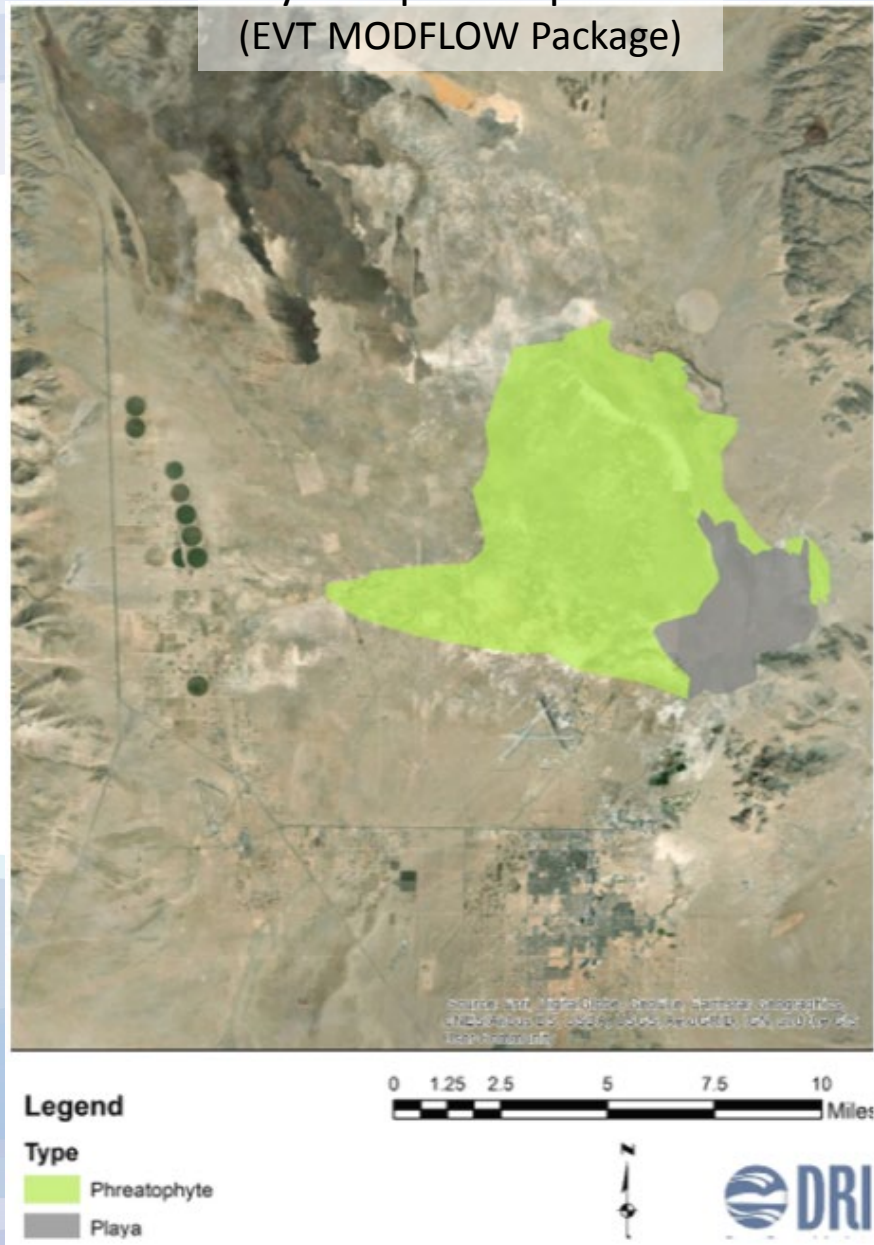
Layers 2 and 3



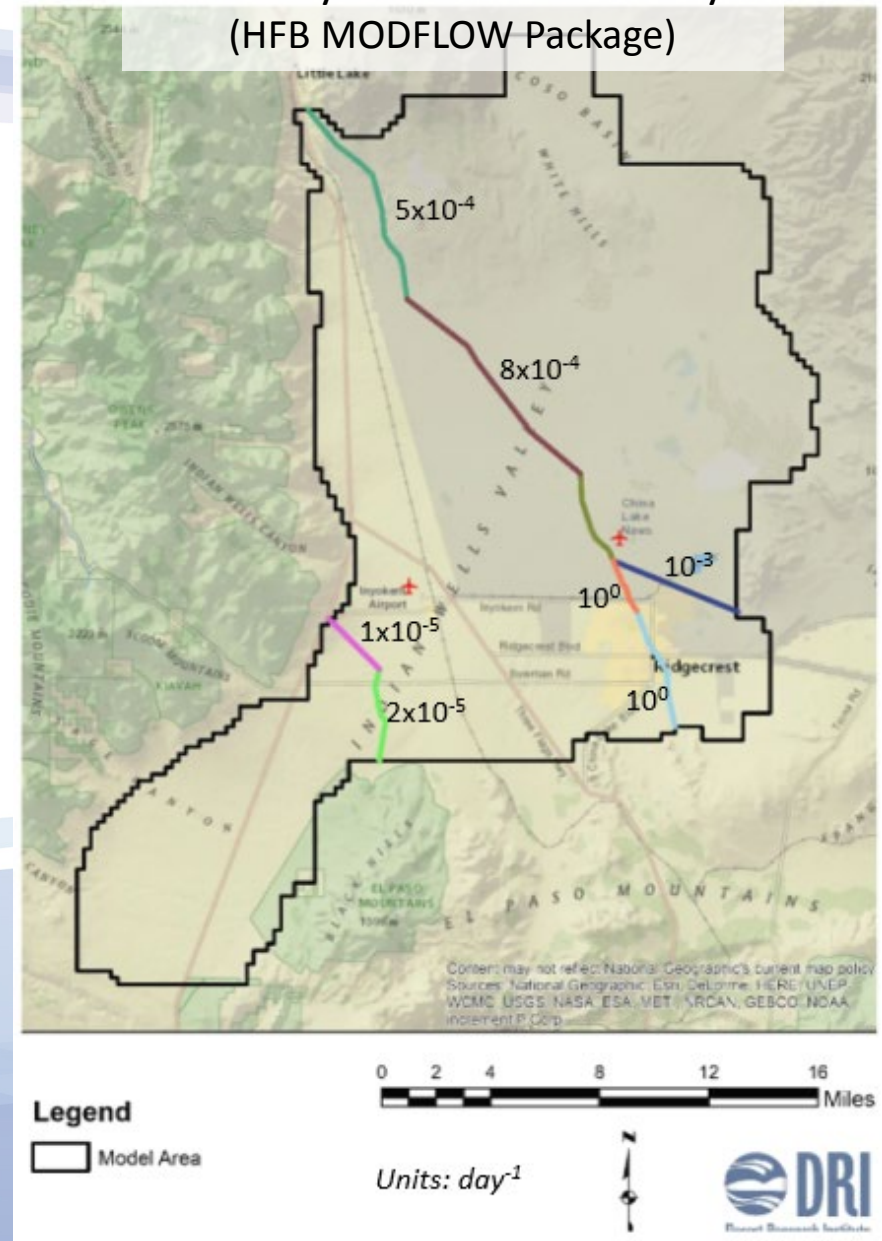
Layers 4, 5 and 6



## Playa Evapotranspiration (EVT MODFLOW Package)



## Fault Hydraulic Conductivity (HFB MODFLOW Package)

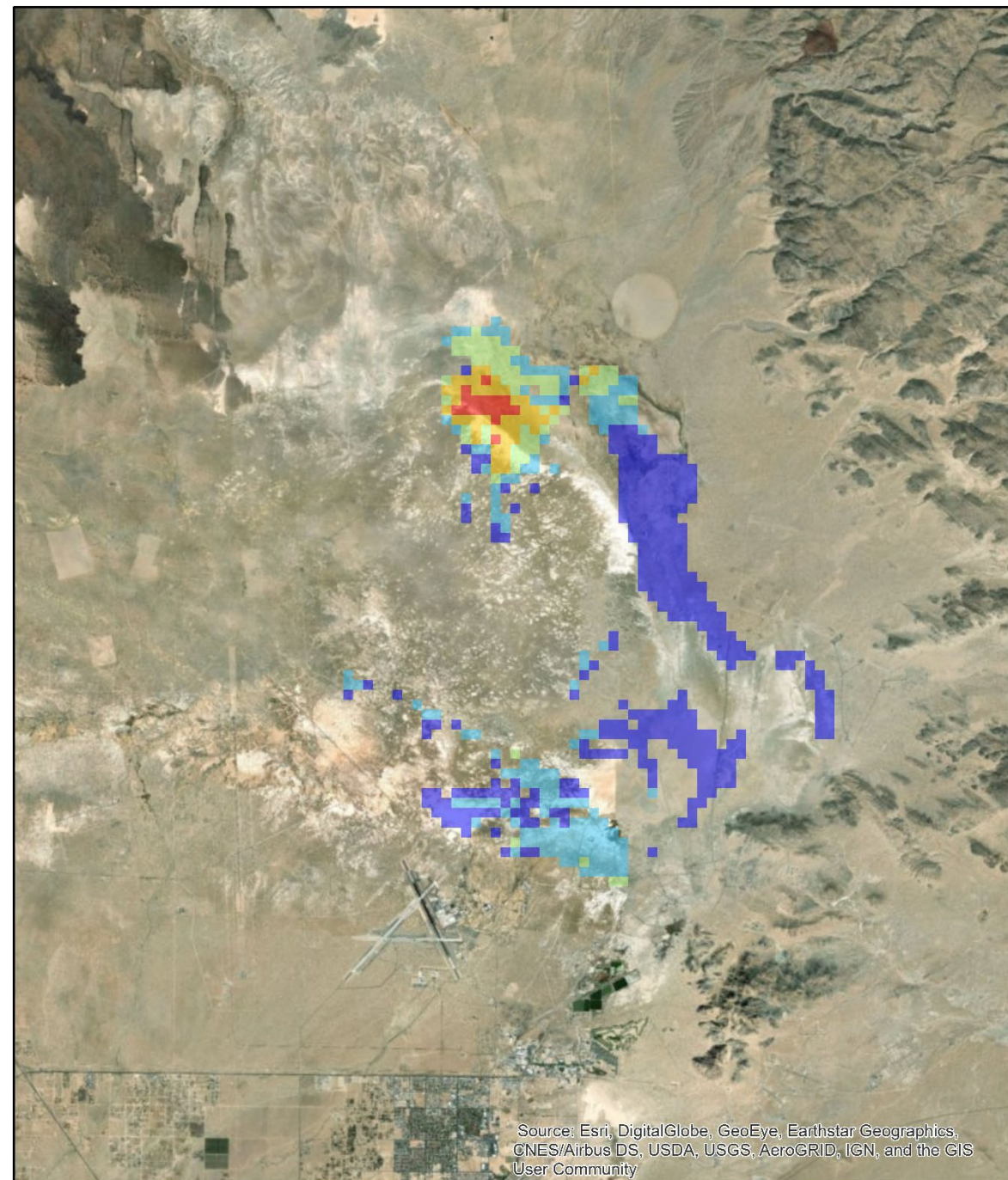
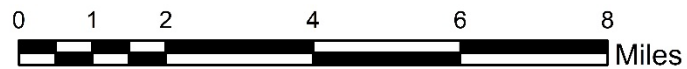
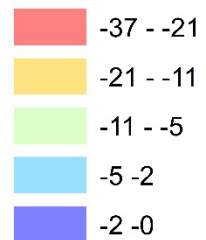




# ET Changes (2020 to 2070)

## Legend

### ET Change (AFY)



INDIAN WELLS VALLEY GROUNDWATER AUTHORITY  
GROUNDWATER SUSTAINABILTIY PLAN (GSP) DEVELOPMENT  
POAM SCHEDULE - DRAFT (February 15, 2019)

ID	Task Name	Task Responsibility	Predecessors	Budgeted Cost	Actual Costs	Remaining Costs	Start	Finish	Budget % Use	% Complete	<div><div>2017</div><div>2018</div><div>2019</div><div>Q1</div><div>Q2</div><div>Q3</div><div>Q4</div><div>Q1</div><div>Q2</div><div>Q3</div><div>Q4</div><div>Q1</div><div>Q2</div><div>Q3</div><div>Q4</div><div>Q1</div></div>											
0	POAM billing data as of 12/31/18			\$4,820,801	\$2,215,906	\$2,604,894	Thu 1/1/15	Mon 12/30/19	46%	41%	<div><div></div></div>											
1	W ater Resources Manager Starts W ork - August 2017	-		\$0.00	\$0.00	\$0.00	Thu 8/17/17	Thu 8/17/17		100%	<div><div></div><div>8/17</div></div>											
2	Task 1.0 Initial GSP Support Studies	-		\$167,600.00	\$167,600.00	\$0.00	Fri 1/1/16	Fri 3/29/19	100%	93%	<div><div></div></div>											
11	Task 2.0 Proposition 1 SGMA GSP Development Grant	-		\$102,880.00	\$89,951.00	\$12,929.00	Fri 9/8/17	Fri 9/28/18	87%	100%	<div><div></div></div>											
17	Task 3.0 Data Management System	-		\$371,105.00	\$131,565.00	\$239,540.00	Thu 8/3/17	Mon 12/2/19	35%	65%	<div><div></div></div>											
28	Task 4.0 GSP Development and Submittal	-		\$2,505,700.00	\$1,131,622.00	\$1,374,078.00	Thu 1/1/15	Mon 12/30/19	45%	46%	<div><div></div></div>											
29	Task 4.1 Prepare/Submit Notification of GSP Preparation to DW R and Local Agencies and Post on W ebsite	-	1	\$0.00	\$0.00	\$0.00	Tue 10/17/17	Tue 10/17/17		100%	<div><div></div><div>10/17</div></div>											
30	Task 4.2 Conceptual and Numerical Basin Modeling	-		\$1,046,900.00	\$820,742.00	\$226,158.00	Thu 1/1/15	Wed 5/15/19	78%	43%	<div><div></div></div>											
31	Hydrogeologic Conceptual Model			\$31,300.00	\$21,307.00	\$9,993.00	Wed 10/18/17	Thu 4/4/19	68%	90%	<div><div></div></div>											
36	Numerical Groundwater Model	-		\$1,015,600.00	\$799,435.00	\$216,165.00	Thu 1/1/15	Wed 5/15/19	79%	90%	<div><div></div></div>											
53	Task 4.3 Data Gap Evaluation	-		\$1,056,200.00	\$95,380.00	\$960,820.00	Wed 8/16/17	Mon 12/2/19	9%	64%	<div><div></div></div>											
82	Task 4.4 Imported Water Study	-		\$175,000.00	\$118,678.00	\$56,322.00	Fri 12/15/17	Thu 3/7/19	68%	93%	<div><div></div></div>											
89	Task 4.5 Recycled Water Study	-		\$61,000.00	\$60,984.00	\$16.00	Fri 12/15/17	Thu 2/7/19	100%	100%	<div><div></div></div>											
97	Task 4.6 Prepare Draft GSP Chapters	-		\$135,300.00	\$33,527.00	\$101,773.00	Tue 9/4/18	Fri 6/28/19	25%	50%	<div><div></div></div>											
107	Task 4.7 GSP Report Preparation: Develop Draft and Final GSP	-		\$31,300.00	\$2,311.00	\$28,989.00	Fri 6/28/19	Mon 8/26/19	7%	0%	<div><div></div></div>											
112	Task 4.8 Public Hearing and Adoption of Plan	-		\$0.00	\$0.00	\$0.00	Mon 8/26/19	Mon 12/30/19		0%	<div><div></div></div>											
118	Task 5.0 SDAC Projects	-		\$646,000.00	\$31,401.00	\$614,599.00	Mon 10/9/17	Fri 12/27/19	5%	57%	<div><div></div></div>											
121	Task 6.0 IWVGA Project Management and Administrative Tasks	-		\$416,766.00	\$254,536.08	\$162,229.92	Tue 8/1/17	Fri 12/27/19	59%	61%	<div><div></div></div>											
132	Task 7.0 Legal Services	IW VGA		\$200,000.00	\$0.00	\$200,000.00	Tue 8/1/17	Fri 12/27/19		61%	<div><div></div></div>											
133	Task 8.0 Stakeholder/Authority Coordination	-		\$289,250.00	\$285,561.00	\$3,689.00	Tue 8/1/17	Fri 12/27/19	99%	61%	<div><div></div></div>											
139	Task 9.0 Groundwater Pumping Fee Support	Stetson		\$121,500.00	\$123,670.00	(\$2,170.00)	Tue 8/1/17	Fri 12/27/19	102%	61%	<div><div></div></div>											

Project: POAM billing data as of 12/31/18  
Date: Tue 2/19/19

Task	<div></div>	Rolled Up Milestone	<div></div>	Inactive Milestone	<div></div>	Start-only	<div></div>	Baseline	<div></div>
Critical Task	<div></div>	Rolled Up Progress	<div></div>	Inactive Summary	<div></div>	Finish-only	<div></div>	Baseline Milestone	<div></div>
Milestone	<div></div>	Split	<div></div>	Manual Task	<div></div>	External Tasks	<div></div>	Baseline Summary	<div></div>
Summary	<div></div>	External Tasks	<div></div>	Duration-only	<div></div>	External Milestone	<div></div>	Progress	<div></div>
Rolled Up Task	<div></div>	Project Summary	<div></div>	Manual Summary Rollup	<div></div>	Critical	<div></div>	Deadline	<div></div>
Rolled Up Critical Task	<div></div>	Group By Summary	<div></div>	Manual Summary	<div></div>	Critical Split	<div></div>		

INDIAN WELLS VALLEY GROUNDWATER AUTHORITY  
GROUNDWATER SUSTAINABILITY PLAN (GSP) DEVELOPMENT  
POAM SCHEDULE - DRAFT (February 15, 2019)

ID	Task Name	Task Responsibility	Predecessors	Budgeted Cost	Actual Costs	Remaining Costs	Start	Finish	Budget % Use	% Complete	<div><div>2017</div><div>2018</div><div>2019</div><div>Q1Q2Q3Q4Q1Q2Q3Q4Q1Q2Q3Q4Q1</div></div>												
0	POAM billing data as of 12/31/18			\$4,820,801	\$2,215,906	\$2,604,894	Thu 1/1/15	Mon 12/30/19	46%	41%													
1	W ater Resources Manager Starts W ork - August 2017	-		\$0.00	\$0.00	\$0.00	Thu 8/17/17	Thu 8/17/17		100%													
2	Task 1.0 Initial GSP Support Studies	-		\$167,600.00	\$167,600.00	\$0.00	Fri 1/1/16	Fri 3/29/19	100%	93%													
3	USGS Recharge Study - Grant Funded	USGS / Kern County		\$87,600.00	\$87,600.00	\$0.00	Mon 6/5/17	Mon 10/1/18	100%	100%													
4	Brackish Groundwater Resources FS- Brackish Groundwater Study Group Funded	IW VW D / Others		\$0.00	\$0.00	\$0.00	Mon 5/1/17	Fri 3/29/19		89%													
5	Aerial Electro-Magnetic Geophysics Survey- Government and Local Funding	IW VW D / Others		\$0.00	\$0.00	\$0.00	Tue 11/14/17	Thu 3/7/19		54%													
6	W ell Database Groundwater Truthing Study	IW VW D / Others		\$0.00	\$0.00	\$0.00	W ed 8/23/17	W ed 12/20/17		100%													
7	Salt and Nutrient Management Plan	IWVWD / Others		\$80,000.00	\$80,000.00	\$0.00	Fri 1/1/16	Fri 12/29/17	100%	100%													
8	Loading Analysis (Existing)	IW VW D / Ridgecrest		\$30,000.00	\$30,000.00	\$0.00	Fri 1/1/16	Fri 12/29/17	100%	100%													
9	Mixing Model Development (Existing)	IW VW D / Ridgecrest	8SS	\$30,000.00	\$30,000.00	\$0.00	Fri 1/1/16	Fri 12/29/17	100%	100%													
10	Reporting and Coordination	IW VW D / Ridgecrest	8SS,9SS	\$20,000.00	\$20,000.00	\$0.00	Fri 1/1/16	Fri 12/29/17	100%	100%													
11	Task 2.0 Proposition 1 SGMA GSP Development Grant	-		\$102,880.00	\$89,951.00	\$12,929.00	Fri 9/8/17	Fri 9/28/18	87%	100%													
12	Release final PSP	DW R		\$0.00	\$0.00	\$0.00	Fri 9/8/17	Fri 9/8/17		100%													
13	Prepare Project Application	Stetson	1	\$62,880.00	\$62,834.00	\$46.00	Fri 9/8/17	Mon 11/13/17	100%	100%													
14	Submit Project Application	Stetson	13	\$0.00	\$0.00	\$0.00	Tue 11/14/17	Tue 11/14/17		100%													
15	DW R Grant Agreement Coordination	IW VGA / Stetson		\$10,000.00	\$10,000.00	\$0.00	Tue 11/14/17	Fri 9/28/18	100%	100%													
16	DW R Grant Reporting/Coordination	IW VGA / Stetson	15	\$30,000.00	\$17,117.00	\$12,883.00	Thu 8/2/18	Fri 9/28/18	57%	100%													
17	Task 3.0 Data Management System	-		\$371,105.00	\$131,565.00	\$239,540.00	Thu 8/3/17	Mon 12/2/19	35%	65%													
18	Task 3.1 Data Management System Development	-		\$48,605.00	\$48,605.00	\$0.00	Wed 8/23/17	Wed 1/31/18	100%	100%													
19	Develop a W eb-Based GeoDatabase (DMS)	Stetson	1	\$48,605.00	\$48,605.00	\$0.00	W ed 8/23/17	W ed 1/31/18	100%	100%													
20	Task 3.2 Data Compilation and Analysis	-		\$322,500.00	\$82,960.00	\$239,540.00	Thu 8/3/17	Mon 12/2/19	26%	61%													
21	Develop Monitoring Protocols for the GSP	Stetson		\$30,900.00	\$14,260.00	\$16,640.00	Thu 3/1/18	Thu 11/1/18	46%	100%													
22	Populate Data with Historical Data	Stetson		\$54,200.00	\$54,200.00	\$0.00	Fri 12/15/17	W ed 8/15/18	100%	100%													
23	Install Transducers and Telemetry Equipment	Stetson		\$179,000.00	\$0.00	\$179,000.00	Thu 11/1/18	Fri 6/28/19		50%													
24	Integrate GSP Goals and Objectives – Adaptive Management	Stetson		\$43,900.00	\$0.00	\$43,900.00	Mon 4/1/19	Thu 5/9/19		0%													
25	Monitoring Program - Kern County W ater Agency and Navy Funded	KCW A / Navy		\$0.00	\$0.00	\$0.00	Thu 8/3/17	Mon 12/2/19		62%													
26	Ramboll Coordination	Stetson		\$10,000.00	\$10,000.00	\$0.00	Tue 9/3/19	Mon 12/2/19	100%	0%													
27	CASGEM Coordination			\$4,500.00	\$4,500.00	\$0.00	Tue 11/14/17	W ed 1/31/18	100%	100%													
28	Task 4.0 GSP Development and Submittal	-		\$2,505,700.00	\$1,131,622.00	\$1,374,078.00	Thu 1/1/15	Mon 12/30/19	45%	46%													
29	Task 4.1 Prepare/Submit Notification of GSP Preparation to DW R and Local Agencies and Post on W ebsite	-	1	\$0.00	\$0.00	\$0.00	Tue 10/17/17	Tue 10/17/17		100%													
30	Task 4.2 Conceptual and Numerical Basin Modeling	-		\$1,046,900.00	\$820,742.00	\$226,158.00	Thu 1/1/15	Wed 5/15/19	78%	43%													
31	Hydrogeologic Conceptual Model			\$31,300.00	\$21,307.00	\$9,993.00	Wed 10/18/17	Thu 4/4/19	68%	90%													
32	Prepare/Review Hydrogeologic Conceptual Model	Stetson	29	\$31,300.00	\$21,307.00	\$9,993.00	W ed 10/18/17	Tue 6/19/18	68%	100%													
33	Discussion of Hydrogeologic Conceptual Model	TAC	32	\$0.00	\$0.00	\$0.00	Fri 6/29/18	Thu 3/7/19		79%													
34	Discussion of W ater Budget	TAC		\$0.00	\$0.00	\$0.00	Thu 2/1/18	Thu 11/1/18		100%													

Project: POAM billing data as of 12/31/18  
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Task	<div></div>	Rolled Up Milestone	<div></div>	Inactive Milestone	<div></div>	Start-only	<div></div>	Baseline	<div></div>
Critical Task	<div></div>	Rolled Up Progress	<div></div>	Inactive Summary	<div></div>	Finish-only	<div></div>	Baseline Milestone	<div></div>
Milestone	<div></div>	Split	<div></div>	Manual Task	<div></div>	External Tasks	<div></div>	Baseline Summary	<div></div>
Summary	<div></div>	External Tasks	<div></div>	Duration-only	<div></div>	External Milestone	<div></div>	Progress	<div></div>
Rolled Up Task	<div></div>	Project Summary	<div></div>	Manual Summary Rollup	<div></div>	Critical	<div></div>	Deadline	<div></div>
Rolled Up Critical Task	<div></div>	Group By Summary	<div></div>	Manual Summary	<div></div>	Critical Split	<div></div>		



INDIAN WELLS VALLEY GROUNDWATER AUTHORITY  
GROUNDWATER SUSTAINABILTIY PLAN (GSP) DEVELOPMENT  
POAM SCHEDULE - DRAFT (February 15, 2019)

ID	Task Name	Task Responsibility	Predecessors	Budgeted Cost	Actual Costs	Remaining Costs	Start	Finish	Budget % Use	% Complete	2017				2018				2019				
											Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
35	Discussion and Recommendation of Outreach for Hydrogeologic Conceptual Model	PAC	33	\$0.00	\$0.00	\$0.00	Fri 3/8/19	Thu 4/4/19		0%													
36	Numerical Groundwater Model	-		\$1,015,600.00	\$799,435.00	\$216,165.00	Thu 1/1/15	Wed 5/15/19	79%	90%													
37	Model Develoment	Navy		\$620,600.00	\$620,600.00	\$0.00	Thu 1/1/15	W ed 8/16/17	100%	100%													
38	Review and Evaluation of Existing Groundwater Model	Stetson	37	\$31,400.00	\$31,400.00	\$0.00	Thu 8/17/17	Fri 12/29/17	100%	100%													
39	Model: Historical Model Calibration	DRI / Stetson	38	\$78,100.00	\$78,100.00	\$0.00	Thu 5/10/18	W ed 10/31/18	100%	100%													
40	Historical and Baseline Recharge and Pumping W orkshop	TAC		\$0.00	\$0.00	\$0.00	Thu 6/28/18	Thu 6/28/18		100%													
41	Calibration W orkshop	TAC		\$0.00	\$0.00	\$0.00	W ed 8/29/18	W ed 8/29/18		100%													
42	Discussion and Recommendation of Model Calibration	TAC	41	\$0.00	\$0.00	\$0.00	Thu 9/6/18	Thu 10/4/18		100%													
43	Complete Basin Model Calibration	Stetson	39,42	\$0.00	\$0.00	\$0.00	Thu 11/1/18	Thu 11/1/18		100%													
44	Model: Transport/TDS Modeling	DRI / Stetson		\$51,700.00	\$20,735.00	\$30,965.00	Tue 10/9/18	Thu 4/4/19	40%	67%													
45	Discussion and Recommendation of 4 Modeling Scenarios	TAC	85,94,34FS-23 days	\$0.00	\$0.00	\$0.00	Thu 10/4/18	Thu 2/7/19		81%													
46	Model: Baseline	DRI / Stetson	38,43,29	\$48,600.00	\$48,600.00	\$0.00	Fri 12/7/18	Thu 1/3/19	100%	100%													
47	Discussion of Sustainable Management Criteria	TAC		\$0.00	\$0.00	\$0.00	Thu 7/12/18	W ed 4/3/19		78%													
48	Model: Management Actions	DRI / Stetson	46,43,45FS-25 day	\$103,700.00	\$0.00	\$103,700.00	Fri 1/4/19	Thu 3/7/19		33%													
49	Discussion of Baseline and Management Action Modeling Results	DRI/TAC/PAC	48SS+24 days,46	\$0.00	\$0.00	\$0.00	Thu 2/7/19	W ed 4/3/19		25%													
50	Recommendation of Management Actions for GSP and Outreach	TAC/PAC	49,48	\$0.00	\$0.00	\$0.00	Thu 4/4/19	Thu 4/4/19		0%													
51	Land Subsidence Consideration	DRI / Stetson		\$0.00	\$0.00	\$0.00	Thu 1/31/19	Tue 4/30/19		30%													
52	Draft Model Documentation	DRI / Stetson		\$81,500.00	\$0.00	\$81,500.00	Mon 7/9/18	W ed 5/15/19		61%													
53	Task 4.3 Data Gap Evaluation	-		\$1,056,200.00	\$95,380.00	\$960,820.00	Wed 8/16/17	Mon 12/2/19	9%	64%													
54	Review Existing Monitoring Network and Recommend Monitoring Network	Stetson		\$42,400.00	\$31,564.00	\$10,836.00	W ed 8/16/17	Thu 4/4/19	74%	90%													
55	Identification of Data Gaps	Stetson		\$24,300.00	\$24,300.00	\$0.00	Mon 4/2/18	Thu 3/7/19	100%	91%													
56	Monitoring Wells	-		\$548,000.00	\$10,194.00	\$537,806.00	Thu 3/8/18	Mon 12/2/19	2%	51%													
57	Site Evaluation	Stetson		\$13,700.00	\$10,194.00	\$3,506.00	Mon 7/16/18	Mon 12/3/18	74%	100%													
58	Discussion of Location Siting	TAC		\$0.00	\$0.00	\$0.00	Thu 3/8/18	Thu 12/6/18		100%													
59	Work Plan and Well Construction	-		\$534,300.00	\$0.00	\$534,300.00	Thu 4/5/18	Mon 12/2/19		50%													
60	Permitting and W ork Plan	Stetson		\$98,900.00	\$0.00	\$98,900.00	Thu 4/5/18	Thu 3/7/19		85%													
61	Installation of Monitoring W ells 2018	Navy/Stetson/Searles		\$186,700.00	\$0.00	\$186,700.00	Fri 11/23/18	Fri 12/28/18		100%													
62	Installation of Monitoring W ells 2019	Navy/Stetson/Searles	61	\$186,700.00	\$0.00	\$186,700.00	Mon 12/31/18	Mon 12/2/19		5%													
63	Collection of Monitoring W ell Data	-		\$62,000.00	\$0.00	\$62,000.00	Thu 12/20/18	Mon 12/2/19		5%													
64	Stream Gages	-		\$91,800.00	\$7,356.00	\$84,444.00	Tue 9/4/18	Thu 4/4/19	8%	71%													
65	Hydrologic Analysis	Stetson		\$16,100.00	\$6,697.00	\$9,403.00	Tue 9/4/18	Tue 11/6/18	42%	100%													
66	Discussion of Location Siting	TAC		\$0.00	\$0.00	\$0.00	Tue 9/4/18	Thu 12/6/18		100%													
67	Design and Location Siting	Stetson		\$29,900.00	\$0.00	\$29,900.00	Thu 11/1/18	Thu 2/7/19		100%													
68	Equipment Purchase, Installation, and Testing	Stetson	67	\$45,800.00	\$659.00	\$45,141.00	Thu 2/7/19	Thu 4/4/19	1%	0%													
69	Weather Stations	-		\$68,700.00	\$3,658.00	\$65,042.00	Thu 9/6/18	Thu 4/4/19	5%	71%													
70	Discussion of Location Siting	TAC		\$0.00	\$0.00	\$0.00	Thu 9/6/18	Tue 12/18/18		100%													

Project: POAM billing data as of 12/31/18  
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Task

Critical Task

Milestone

Summary

Rolled Up Task

Rolled Up Critical Task

Rolled Up Milestone

Rolled Up Progress

Split

External Tasks

Project Summary

Group By Summary

Inactive Milestone

Inactive Summary

Manual Task

Duration-only

Manual Summary Rollup

Manual Summary

Start-only

Finish-only

External Tasks

External Milestone

Critical

Critical Split

Baseline

Baseline Milestone

Baseline Summary

Progress

Deadline

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INDIAN WELLS VALLEY GROUNDWATER AUTHORITY  
GROUNDWATER SUSTAINABILTIY PLAN (GSP) DEVELOPMENT  
POAM SCHEDULE - DRAFT (February 15, 2019)

ID	Task Name	Task Responsibility	Predecessors	Budgeted Cost	Actual Costs	Remaining Costs	Start	Finish	Budget % Use	% Complete	2017				2018				2019			
											Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
71	Design and Location Siting	Stetson		\$16,300.00	\$2,968.00	\$13,332.00	Thu 10/4/18	Thu 2/7/19	18%	100%												
72	Equipment Purchase	Stetson	71	\$29,700.00	\$690.00	\$29,010.00	Thu 2/7/19	Thu 3/7/19	2%	30%												
73	Installation and Testing	Stetson	72	\$22,700.00	\$0.00	\$22,700.00	Thu 3/7/19	Thu 4/4/19		0%												
74	Water Quality and Stable Isotope Sampling and Analysis	-		\$108,700.00	\$17,365.00	\$91,335.00	Thu 10/4/18	Thu 5/30/19	16%	50%												
75	Discussion of Sampling	TAC		\$0.00	\$0.00	\$0.00	Thu 10/4/18	Thu 11/1/18		100%												
76	Surface and Groundwater Sampling	Stetson	75	\$81,500.00	\$17,365.00	\$64,135.00	Thu 2/7/19	Mon 3/11/19	21%	30%												
77	Geochemical Reaction and Transport Analysis	DRI	76	\$27,200.00	\$0.00	\$27,200.00	Mon 3/11/19	Thu 5/30/19		0%												
78	Aquifer Tests	-		\$172,300.00	\$943.00	\$171,357.00	Thu 10/4/18	Thu 8/1/19	1%	44%												
79	Discussion of Test Locations	TAC		\$0.00	\$0.00	\$0.00	Thu 10/4/18	Mon 11/5/18		100%												
80	Prepare Aquifer Test W ork Plan	Stetson		\$36,100.00	\$943.00	\$35,157.00	Thu 10/4/18	Thu 3/7/19	3%	80%												
81	Perform Aquifer Testing	Stetson	80	\$136,200.00	\$0.00	\$136,200.00	Thu 3/7/19	Thu 8/1/19		0%												
82	Task 4.4 Imported Water Study	-		\$175,000.00	\$118,678.00	\$56,322.00	Fri 12/15/17	Thu 3/7/19	68%	93%												
83	Evaluate Potential Imported W ater Supply Sources	Stetson		\$75,000.00	\$75,000.00	\$0.00	Fri 12/15/17	Thu 7/12/18	100%	100%												
84	Evaluate W ater Banking Alternatives and Extraction Schedule	Stetson	83FF	\$25,000.00	\$25,000.00	\$0.00	Mon 1/1/18	Thu 7/12/18	100%	100%												
85	Discussion and Recommendation of Imported W ater Feasibility	TAC	86FF	\$0.00	\$0.00	\$0.00	Thu 3/22/18	Thu 9/6/18		100%												
86	Evaluate Infrastructure Requirements	Stetson		\$25,000.00	\$18,678.00	\$6,322.00	Tue 5/1/18	Thu 8/2/18	75%	100%												
87	Prepare Technical Memorandum	Stetson	85,83,84	\$50,000.00	\$0.00	\$50,000.00	Thu 9/6/18	Thu 3/7/19		83%												
88	Discussion and Recommendation of Imported W ater Policy and Outreach			\$0.00	\$0.00	\$0.00	Mon 10/1/18	Thu 2/7/19		100%												
89	Task 4.5 Recycled Water Study	-		\$61,000.00	\$60,984.00	\$16.00	Fri 12/15/17	Thu 2/7/19	100%	100%												
90	Existing Supply and Demand Analysis	Stetson		\$6,600.00	\$6,600.00	\$0.00	Fri 12/15/17	Tue 1/30/18	100%	100%												
91	Identify Existing Recycled W ater Infrastructure and Users	Stetson	90	\$6,000.00	\$6,000.00	\$0.00	W ed 1/31/18	W ed 2/28/18	100%	100%												
92	Review Regulatory and Institutional Requirements	Stetson	90	\$3,400.00	\$3,400.00	\$0.00	W ed 1/31/18	W ed 2/28/18	100%	100%												
93	Identify and Evaluate Potential Recycled W ater Users	Stetson / IW VGA	91,92	\$20,000.00	\$20,000.00	\$0.00	Thu 3/1/18	Tue 5/1/18	100%	100%												
94	Discussion and Recommendation of Recycled W ater Feasibility	TAC	90,91,93FF	\$0.00	\$0.00	\$0.00	Thu 3/1/18	Thu 7/12/18		100%												
95	Prepare Technical Memorandum	Stetson	93	\$25,000.00	\$24,984.00	\$16.00	W ed 5/2/18	Fri 7/20/18	100%	100%												
96	Discussion and Recommendation of Recycled W ater Policy and Outreach	PAC		\$0.00	\$0.00	\$0.00	Mon 10/1/18	Thu 2/7/19		100%												
97	Task 4.6 Prepare Draft GSP Chapters	-		\$135,300.00	\$33,527.00	\$101,773.00	Tue 9/4/18	Fri 6/28/19	25%	50%												
98	GSP Report Preparation: Prepare Introduction Chapter	Stetson		\$1,200.00	\$1,057.00	\$143.00	Tue 9/4/18	Fri 12/14/18	88%	100%												
99	Prepare Plan Area and Basin Setting Chapter	Stetson	10,33FS-66 days	\$16,200.00	\$11,863.00	\$4,337.00	Thu 11/8/18	Thu 3/7/19	73%	75%												
100	Prepare Projects and Management Actions to Achieve Sustainability Goal Chapter	Stetson	85,94,50,44	\$50,000.00	\$13,659.00	\$36,341.00	Thu 4/4/19	Fri 6/28/19	27%	0%												
101	Prepare Sustainable Management Criteria Chapter	Stetson	47,50	\$30,000.00	\$6,348.00	\$23,652.00	Thu 4/4/19	Fri 6/28/19	21%	0%												
102	Plan Implementation			\$35,000.00	\$600.00	\$34,400.00	Fri 12/7/18	Fri 6/28/19	2%	30%												
103	Discussion and Recommendation of Plan Implementation	TAC/PAC		\$0.00	\$0.00	\$0.00	Fri 12/7/18	Thu 6/6/19		33%												

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Task		Rolled Up Milestone		Inactive Milestone		Start-only		Baseline	
Critical Task		Rolled Up Progress		Inactive Summary		Finish-only		Baseline Milestone	
Milestone		Split		Manual Task		External Tasks		Baseline Summary	
Summary		External Tasks		Duration-only		External Milestone		Progress	
Rolled Up Task		Project Summary		Manual Summary Rollup		Critical		Deadline	
Rolled Up Critical Task		Group By Summary		Manual Summary		Critical Split			

INDIAN WELLS VALLEY GROUNDWATER AUTHORITY  
GROUNDWATER SUSTAINABILITY PLAN (GSP) DEVELOPMENT  
POAM SCHEDULE - DRAFT (February 15, 2019)

ID	Task Name	Task Responsibility	Predecessors	Budgeted Cost	Actual Costs	Remaining Costs	Start	Finish	Budget % Use	% Complete	2017				2018				2019			
											Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
104	GSP Report Preparation: Prepare Plan Implementation Chapter	Stetson	103FS-23 days,50	\$35,000.00	\$600.00	\$34,400.00	Tue 5/7/19	Fri 6/28/19	2%	0%												
105	GSP Report Preparation: Prepare References and Technical Studies Chapter	Stetson		\$2,000.00	\$0.00	\$2,000.00	Mon 6/3/19	Fri 6/28/19		0%												
106	GSP Report Preparation: Prepare Executive Summary Chapter	Stetson		\$900.00	\$0.00	\$900.00	Mon 6/3/19	Fri 6/28/19		0%												
107	Task 4.7 GSP Report Preparation: Develop Draft and Final GSP	-		\$31,300.00	\$2,311.00	\$28,989.00	Fri 6/28/19	Mon 8/26/19	7%	0%												
108	Prepare Review Draft GSP Report	Stetson	9,100,101,104,105	\$31,300.00	\$2,311.00	\$28,989.00	Fri 6/28/19	Wed 7/31/19	7%	0%												
109	Submit Review Draft GSP Report to IW VGA Board, TAC, and PAC	Stetson	108	\$0.00	\$0.00	\$0.00	Thu 8/1/19	Thu 8/1/19		0%												
110	Review Draft Comment Period	IW VGA/TAC/PAC	109	\$0.00	\$0.00	\$0.00	Fri 8/2/19	Thu 8/15/19		0%												
111	Prepare Final Draft GSP Report	Stetson	110	\$0.00	\$0.00	\$0.00	Fri 8/16/19	Mon 8/26/19		0%												
112	Task 4.8 Public Hearing and Adoption of Plan	-		\$0.00	\$0.00	\$0.00	Mon 8/26/19	Mon 12/30/19		0%												
113	Submit 90-Day Notice of Public Hearing	IW VGA	111	\$0.00	\$0.00	\$0.00	Mon 8/26/19	Mon 8/26/19		0%												
114	Public Hearing	IW VGA	113FS+65 days	\$0.00	\$0.00	\$0.00	Mon 11/25/19	Mon 11/25/19		0%												
115	Prepare Final GSP Report (Incorporate Public Input)	Stetson	114	\$0.00	\$0.00	\$0.00	Tue 11/26/19	Wed 12/18/19		0%												
116	IW VGA Approval	IW VGA	115	\$0.00	\$0.00	\$0.00	Thu 12/19/19	Fri 12/27/19		0%												
117	Submit Final GSP to DW R		116	\$0.00	\$0.00	\$0.00	Mon 12/30/19	Mon 12/30/19		0%												
118	Task 5.0 SDAC Projects	-		\$646,000.00	\$31,401.00	\$614,599.00	Mon 10/9/17	Fri 12/27/19	5%	57%												
119	Water Conservation and Rebate Program	IW VGA/Stetson		\$206,000.00	\$14,318.00	\$191,682.00	Mon 10/9/17	Fri 12/27/19	7%	57%												
120	Water Audit, Leak Detection, and Leak Repair Program	IW VGA/Stetson		\$440,000.00	\$17,083.00	\$422,917.00	Mon 10/9/17	Fri 12/27/19	4%	57%												
121	Task 6.0 IWVGA Project Management and Administrative Tasks	-		\$416,766.00	\$254,536.08	\$162,229.92	Tue 8/1/17	Fri 12/27/19	59%	61%												
122	Consultant Management and GSP Development	IW VGA		\$24,500.00	\$14,875.00	\$9,625.00	Tue 8/1/17	Fri 12/27/19	61%	61%												
123	Financial Management	IW VGA		\$8,500.00	\$5,161.00	\$3,339.00	Tue 8/1/17	Fri 12/27/19	61%	61%												
124	Budget Development and Administration	IW VGA		\$12,500.00	\$7,589.00	\$4,911.00	Tue 8/1/17	Fri 12/27/19	61%	61%												
125	Schedule/Budget Management	Stetson		\$52,000.00	\$26,405.00	\$25,595.00	Tue 8/1/17	Fri 12/27/19	51%	61%												
126	General Project Management	Stetson		\$74,800.00	\$52,616.00	\$22,184.00	Tue 8/1/17	Fri 12/27/19	70%	61%												
127	Travel	IW VGA		\$6,000.00	\$3,642.86	\$2,357.14	Tue 8/1/17	Fri 12/27/19	61%	61%												
128	Insurance	IW VGA		\$15,000.00	\$8,571.43	\$6,428.57	Tue 8/1/17	Fri 12/27/19	61%	61%												
129	Conferences/Training	IW VGA		\$3,000.00	\$1,821.43	\$1,178.57	Tue 8/1/17	Fri 12/27/19	61%	61%												
130	Miscellaneous	IW VGA		\$10,000.00	\$6,071.43	\$3,928.57	Tue 8/1/17	Fri 12/27/19	61%	61%												
131	City of Ridgecrest Services	Ridgecrest		\$210,466.00	\$127,782.93	\$82,683.07	Tue 8/1/17	Fri 12/27/19	61%	61%												
132	Task 7.0 Legal Services	IW VGA		\$200,000.00	\$0.00	\$200,000.00	Tue 8/1/17	Fri 12/27/19		61%												
133	Task 8.0 Stakeholder/Authority Coordination	-		\$289,250.00	\$285,561.00	\$3,689.00	Tue 8/1/17	Fri 12/27/19	99%	61%												
134	IW VGA/TAC/PAC Coordination	Stetson		\$144,250.00	\$231,685.00	(\$87,435.00)	Tue 8/1/17	Fri 12/27/19	161%	61%												
135	GSA Board Meetings	IW VGA		\$42,000.00	\$25,500.00	\$16,500.00	Tue 8/1/17	Fri 12/27/19	61%	61%												
136	PAC/TAC Meetings	IW VGA		\$19,000.00	\$11,536.00	\$7,464.00	Tue 8/1/17	Fri 12/27/19	61%	61%												
137	Community Outreach	IW VGA		\$21,000.00	\$12,750.00	\$8,250.00	Tue 8/1/17	Fri 12/27/19	61%	61%												
138	Stakeholder Coordination	Stetson		\$63,000.00	\$4,090.00	\$58,910.00	Tue 8/1/17	Fri 12/27/19	6%	61%												
139	Task 9.0 Groundwater Pumping Fee Support	Stetson		\$121,500.00	\$123,670.00	(\$2,170.00)	Tue 8/1/17	Fri 12/27/19	102%	61%												

Project: POAM billing data as of 12/31/18  
Date: Tue 2/19/19

Task		Rolled Up Milestone		Inactive Milestone		Start-only		Baseline	
Critical Task		Rolled Up Progress		Inactive Summary		Finish-only		Baseline Milestone	
Milestone		Split		Manual Task		External Tasks		Baseline Summary	
Summary		External Tasks		Duration-only		External Milestone		Progress	
Rolled Up Task		Project Summary		Manual Summary Rollup		Critical		Deadline	
Rolled Up Critical Task		Group By Summary		Manual Summary		Critical Split			

# IWVGA Board Meeting February 21, 2019

## ► Prop 1 Status/Schedule

- DWR Prop 1 Kick-Off Meeting: 12/18/2018
- Current Status: DWR reviewing Invoice/Progress Report submittal
  - Draft Prop 1 Invoice Package submitted to DWR for preliminary review on 01/11/19
  - Initial comments on submittal addressed and invoice package resubmitted
  - Waiting for additional comments and/or final approval before final (signed) invoice and progress report can be submitted

# IWVGA Board Meeting February 21, 2019

## ► Pumping Fee Status

- Registration Status (as of 02/15/18)
  - 46 registered accounts
  - 24 accounts not registered (believed to be non de-minimis based on criteria)
  - Registration forms sent to newly identified non-de minimis users
  - Water District has cross referenced aerial photos with our databased of well owners
  - Potentially more non de-minimis users will be identified through continued identification and registration efforts
- Total Payment Received to Date: ~\$196,000



# Inyo-Mono Integrated Regional Water Management Program

HOLLY ALPERT, PH.D.

DIRECTOR

FEBRUARY 21, 2019



INTEGRATED REGIONAL WATER MANAGEMENT PROGRAM

# What is integrated regional water management planning?

- ▶ Stakeholder-driven process to consider water management and planning at a regional scale
- ▶ Goal is to build capacity and increase regional self-sufficiency with respect to water resources

# What is IRWMP?

## DWR IRWM Program

- Started in 2002 with Prop. 50
- Encourage regions to self-form based on natural boundaries
  - Currently 48 IRWM regions
- Continued in 2006 with Prop. 84
  - \$1 billion for IRWM
- Region Acceptance Process
- Grant funding: planning, DAC, implementation
- Now Prop. 1 (2014)
  - \$510 million for IRWM
  - DACI Grant
  - Implementation



# Inyo-Mono IRWM Program

- ▶ Started in 2008 with handful of stakeholders
- ▶ Over \$4.7 million in grants
- ▶ 16 projects
- ▶ Over 100 stakeholder and outreach meetings
- ▶ 40 signatories to MOU
- ▶ Eight regional objectives
  - ▶ Water supply, water quality, ecosystem health, infrastructure, climate variability, disadvantaged communities & tribes, stormwater/flood management, groundwater & surface water management





# Inyo-Mono IRWM Region



- ▶ All of Inyo & Mono Counties, plus Indian Wells Valley and parts of SB County
- ▶ 11% of state's land area
- ▶ 65 groundwater basins
- ▶ Population ~ 60,000



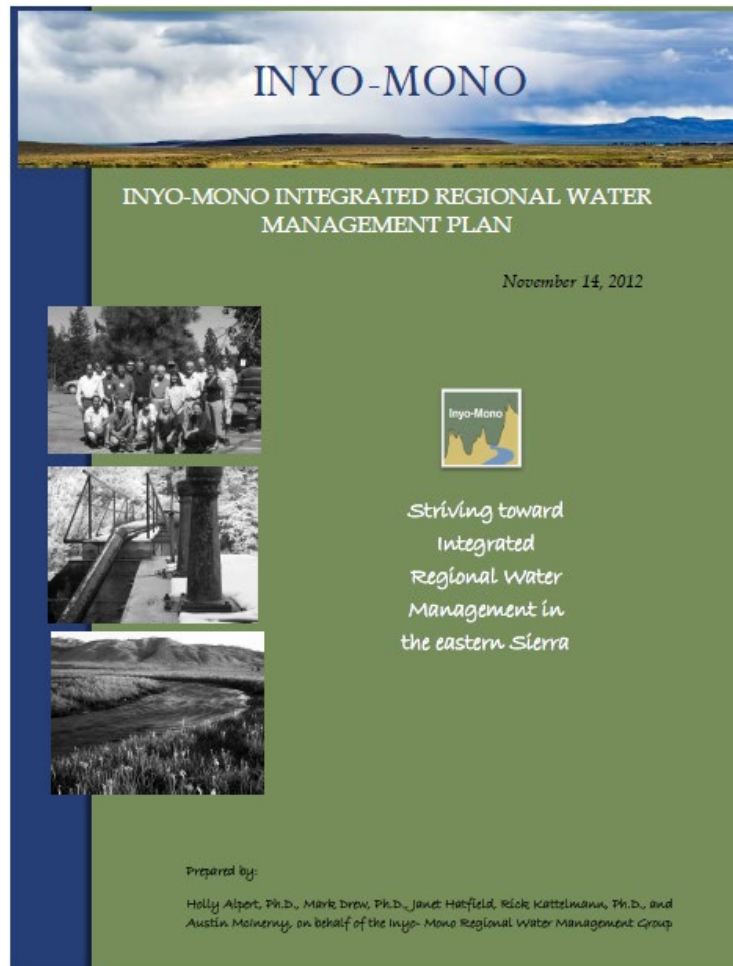
# Inyo-Mono RWMG (Regional Water Management Group)





# RWMG Members

- Amargosa Conservancy
- Amargosa Opera House and Hotel
- Big Pine Community Services District
- Big Pine Paiute Tribe
- Birchim Community Services District
- Bishop Paiute Tribe
- Bridgeport Indian Colony
- Bridgeport Public Utilities District
- Bureau of Land Management
- California Trout
- Central Sierra Resource Conservation and Development Council
- City of Bishop
- Crystal Crag Water & Development Association
- Desert Mountain RC&D
- Eastern Kern County RCD
- Eastern Sierra Audubon Society
- Eastern Sierra Community Services District
- Eastern Sierra Land Trust
- Eastern Sierra Unified School District
- Fort Independence Amalgamated Reservation
- Indian Wells Valley Cooperative Groundwater Management Group
- Indian Wells Valley Water District
- Inyo County
- June Lake Public Utilities District
- Lone Pine Paiute-Shoshone Reservation
- Lundy Mutual Water Company
- Mammoth Community Water District
- Mono County
- Mono County RCD
- Mono Lake Committee
- Owens Valley Committee
- Owens Valley Groundwater Authority
- Owens Valley Indian Water Commission
- Round Valley Joint Elementary School
- Sierra Club
- Town of Mammoth Lakes
- U.S. Forest Service
- Wheeler Crest CSD
- WRAMP Foundation



# What we do: Planning



OAK CREEK WATERSHED  
STREAM STABILITY ASSESSMENT AND RESTORATION  
RECOMMENDATIONS REPORT



North Fork Oak Creek riparian vegetation regrowth

INYO NATIONAL FOREST  
Prepared by USFS Hydrologist Craig Oehrli  
August 2015



# What we do: Projects



# What we do: Working with people







## Emphasis on Disadvantaged Communities (DACs) and tribes

DAC: 80% OF STATEWIDE  
MEDIAN HOUSEHOLD  
INCOME

## Prop. 1 DAC Involvement Grant

- ▶ Objective: increase engagement of DACs in IRWM process
- ▶ \$466,000
- ▶ Three years
- ▶ Outreach
- ▶ Water conservation education
- ▶ Needs assessment
- ▶ Technical Assistance
- ▶ Trainings
- ▶ Project Development
- ▶ SGMA support



## What we've learned so far...

- ▶ Integrated, collaborative processes take a long time
- ▶ It's more about people than the water issues
- ▶ Important to be on-site and get to know the community
- ▶ Repeated outreach
- ▶ Maintain open, transparent process
- ▶ People are willing to be altruistic, particularly towards tribes and DACs
- ▶ Basic water issues need to be addressed first
- ▶ Keep trying to raise voice in Sacramento

# Questions?

THANK YOU

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