Overview: BWD SDAC Grant Tasks 2 and 3

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Tasks

- Per the Grant, our Focus is on the Severely Disadvantaged Community (SDAC)

- The Borrego Water District (BWD) is the primary provider of drinking water to the SDAC. Therefore BWD's ability to reliably provide safe drinking water is critical to the SDAC.

Tasks

- **Work is being done by multiple companies: 5 Tasks**

1.1 Community Characteristics Baseline Data Gathering
1.2a SDAC Engagement for GSP Planning
1.3b SDAC Engagement for GSP Implementation
Task 2: SDAC Impact & Vulnerability Analysis
2.1 Baseline Data Compilation on Water Use
2.2 Water Supply Impact / SDAC Vulnerability Analysis/GSP Impacts
Task 3: Decision Management Analysis
3.1 Water Supply Uncertainties (Monte Carlo Model)
3.2 BWD Cost and Rate Structure Uncertainty and Impact Analysis
3.3 SDAC Specific Impact Analysis
3.4 SGMA/Environmental/ Societal/Government Impacts
Task 4: Well Metering
4.1 Well Meter Installation and Calibration Report
Task 5: Water Vulnerability / New Well Site Feasibility
5.1 Well Ranking System
5.2 BWD Water Model Update and Calibration
5.3 Well Test Drilling (begin drilling 12/1/18)

Tasks

- Task 1 (LeSar Development Corp.): SDAC Engagement

Community-specific outreach, surveys, and research. Information to be used in ENSI’s Task 2 to understand potential impacts and vulnerabilities of the SDAC relative to economic and social changes that will occur with groundwater use reductions.

Also examining the overall community structure and economics, again to better understand how the SDAC may be impacted.

Tasks

- Task 2 (ENSI): SDAC Impact and Vulnerability Analysis

Baseline Data Compilation

Summarize SDAC Engagement Information

Groundwater Quantity and Water Level Data

=> Specific to BWD operations

Groundwater Quality Data Review

=> Q: Can trends be reliably identified?

=> Q: Will water treatment be needed (when/where)?

BWD Infrastructure and Costs

Tasks

- Task 2 (ENSI): SDAC Impact and Vulnerability Analysis

Water Supply Impact/ SDAC Vulnerability

ID Key SDAC Concerns

BWD Infrastructure

=> Key question: How will BWD adapt?

=> ID Infrastructure changes related to GSP

(linked to Project Management Actions)

Example: new wells and pipelines, non-potable distribution

Tasks

- Task 3 (ENSI): Decision Management Analysis

<u>Water Supply Uncertainties</u>

How will the aquifer respond to pumping reductions?

=> Range of expected overdraft (quantity/ water levels)

=> Effect of varying reduction periods (vs. 20-yr SGMA)

How will BWD operations be affected?

=> Reduced well production, water quality impacts

=> Requirements under new role as co-GSA lead with County

=> Impact of low probability events (with low expectation of occurrence) that have major consequences.

Examples: rapid change in water quality requiring water treatment, or unexpected regulatory changes

Tasks

- Task 3 (ENSI): Decision Management Analysis

Water Supply Uncertainties

Uncertainty can range from low to high.

When uncertainty is low to moderate, Risk can generally be quantified in terms of probabilities.

When uncertainty is high Risks may not be able to be reliably quantified (i.e. just don’t know, may know more in the future, or need options & contingencies ready)

In either case decisions need to be made.

Tasks

- Task 3 (ENSI): Decision Management Analysis

Water Supply Uncertainties: Impact Analyses

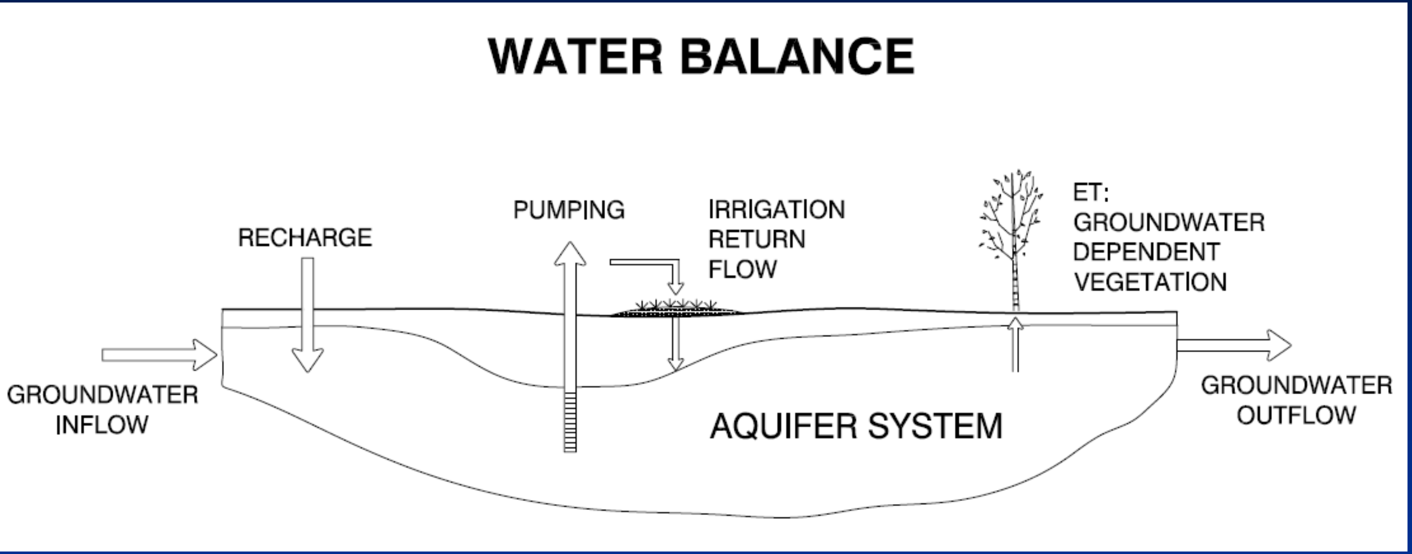
BWD-specific Costs, Options, and Impacts

SDAC-specific Impacts

'Bigger Picture' Community-Wide Impacts

…SDAC analyses are based on community feedback

Overdraft Analysis Methodology



INFLOWS:	RECHARGE (SURROUNDING WATERSHED INFLOW)
	LATERAL GROUNDWATER
	IRRIGATION RETURN FLOWS
OUTFLOWS:	PUMPING
	LATERAL GROUNDWATER
	EVAPORATION - NATIVE PLANTS

Overdraft Analysis Methodology

Current Pumping Rate Target is 5700 AFY

- 4,300 AFY as recharge, primarily inflow from tributary watersheds (e.g. Coyote Creek)
- 1,400 AFY as groundwater inflow

Put all of the inflow and outflow values into the water budget and calculate overdraft over time. A 20-yr period used in this example.

- Include a pumping rate: 22,044 AFY that reduces to 5,700 AFY over 20 years
- Include irrigation return flow: 10% of total pumping (USGS model)
- Include groundwater outflow: 525 AFY (USGS Model)
- Include native plant GW use: 400 AFY (USGS Model)

NOTE: This is a working draft example. All of these parameters are subject to further review, evaluation, and confirmation. Should this methodology be employed during GSP implementation ongoing parameter review will be necessary per the GSP update and management process.

Overdraft Analysis Methodology

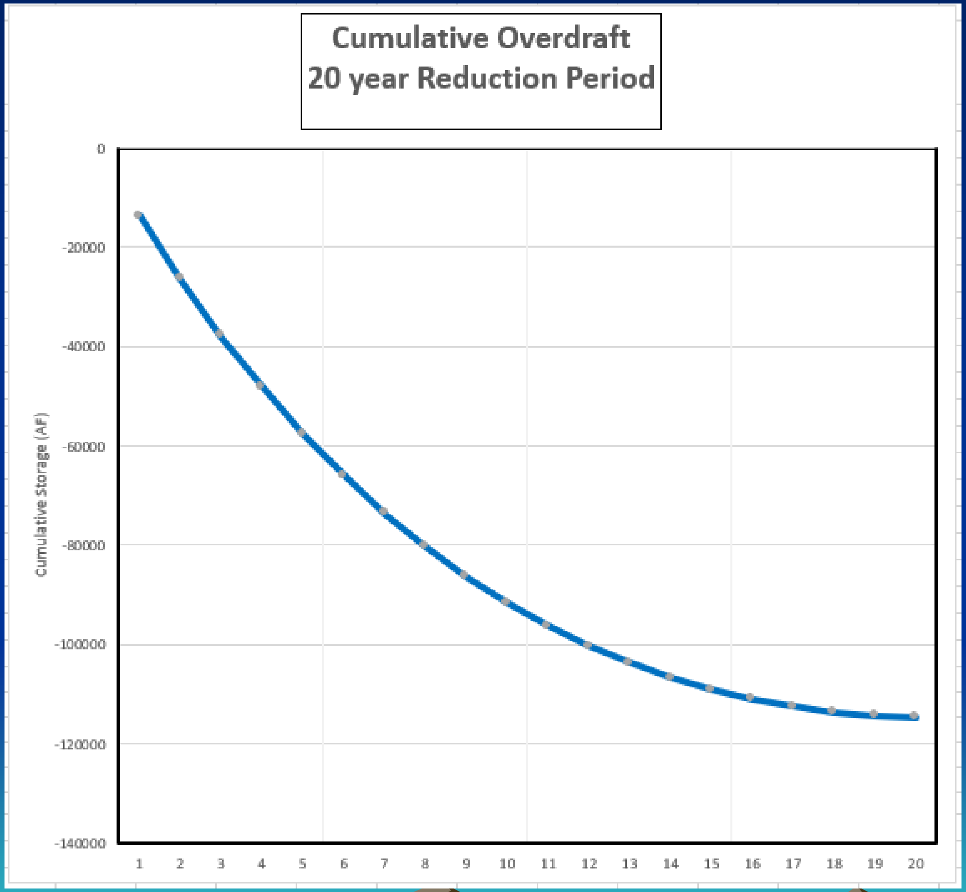
Result of Calculations: ~115,000 AF after 20 years

	INFLOW (AFY)			OUTFLOW (AFY)				INFLOW-OUTFLOW (AFY)	
	GW-in	Natural Recharge	Irrigation Return	GW_out	ET	Q_total			Change in Storage
year	(GW BC)	1975_95	10%			22044	yr	10%	
1	1400	4300	2060	525	400	20603	1	-13767	-13767
2	1400	4300	1926	525	400	19255	2	-26322	-12555
3	1400	4300	1800	525	400	17996	3	-37744	-11422
4	1400	4300	1682	525	400	16819	4	-48106	-10363
5	1400	4300	1572	525	400	15720	5	-57479	-9373
6	1400	4300	1469	525	400	14692	6	-65926	-8448
7	1400	4300	1373	525	400	13731	7	-73509	-7583
8	1400	4300	1283	525	400	12833	8	-80284	-6775
9	1400	4300	1199	525	400	11994	9	-86304	-6020
10	1400	4300	1121	525	400	11210	10	-91618	-5314
11	1400	4300	1048	525	400	10477	11	-96272	-4654
12	1400	4300	979	525	400	9792	12	-100309	-4037
13	1400	4300	915	525	400	9151	13	-103770	-3461
14	1400	4300	855	525	400	8553	14	-106693	-2923
15	1400	4300	799	525	400	7994	15	-109112	-2419
16	1400	4300	747	525	400	7471	16	-111061	-1949
17	1400	4300	698	525	400	6982	17	-112570	-1509
18	1400	4300	653	525	400	6526	18	-113669	-1098
19	1400	4300	610	525	400	6099	19	-114383	-714
20	1400	4300	570	525	400	5700	20	-114738	-355
	avg:	4300	1168						-114738

Overdraft Analysis Methodology

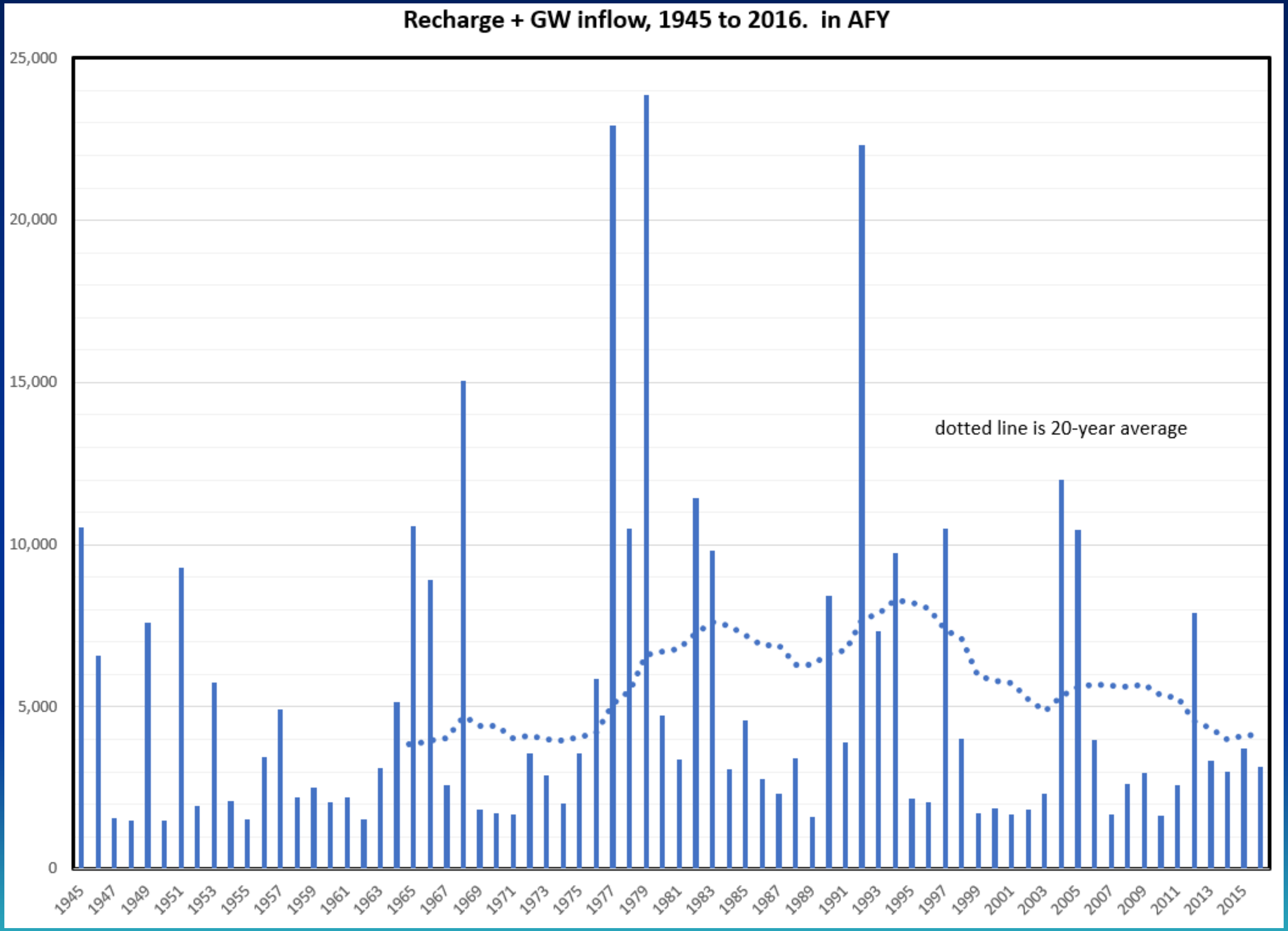
~ 115,000 AF of overdraft

(adds to ~520,000 AF [1945-2016, per Dudek Model update])



Overdraft Analysis Methodology

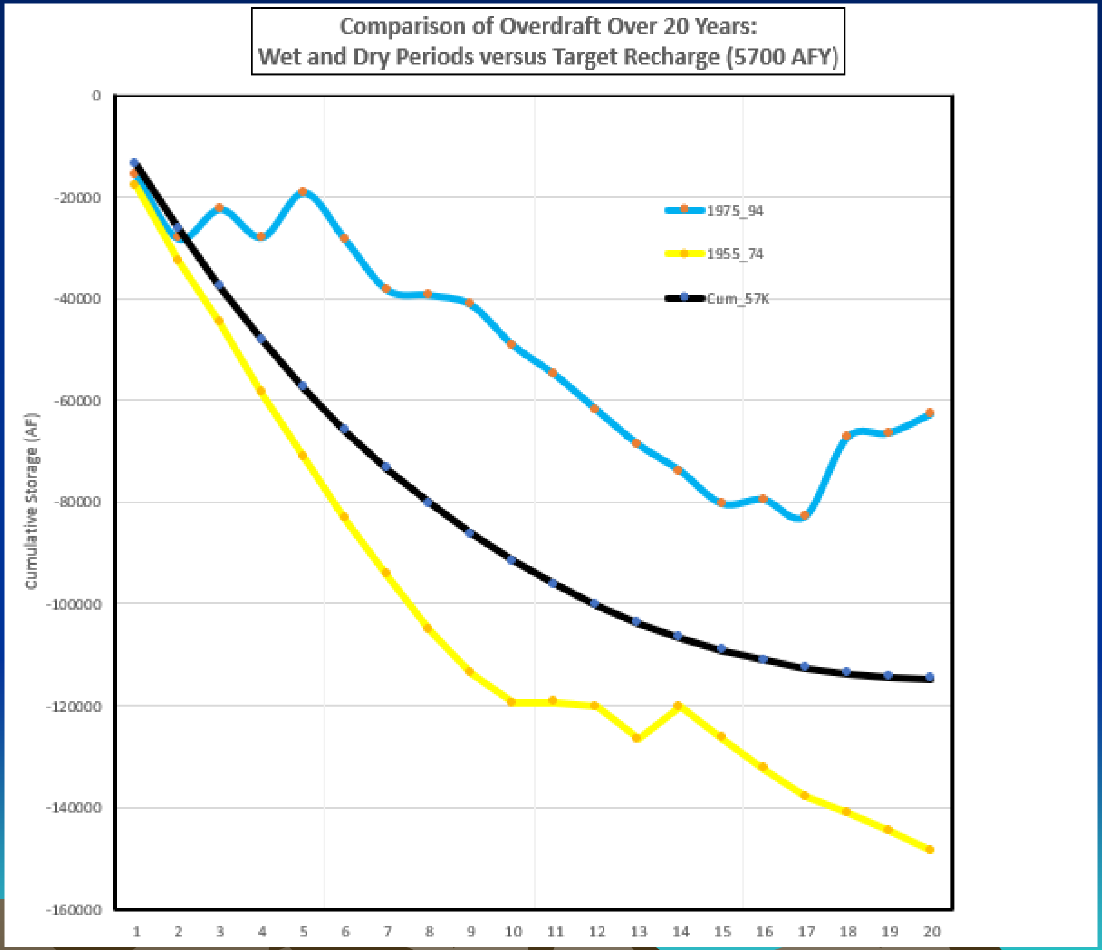
Recharge Varies Over Time (Values from the USGS Model Update)



Overdraft Analysis Methodology

Compare vs. historically 'wet' (1975 to 1994) and 'dry' (1944 to 1974) periods

(Ranges from 63,000 to 149,000 AF…. vs. 115,000 AF)



Overdraft Analysis Methodology

Uses historical recharge values, and assigns ranges to the other water balance values derived from the USGS Groundwater Model. Here randomly use values to calculate overdraft in what is termed a Monte Carlo Simulation

Inflow

- Recharge: Randomly Pick 20-year periods from 1945 to 2016
- GW Inflow: 1,400 AFY. Vary +/- 10%   [1260 to 1540]
- Irrigation Return Flow: 10% of Total Pumping. Vary from 5 to 15%

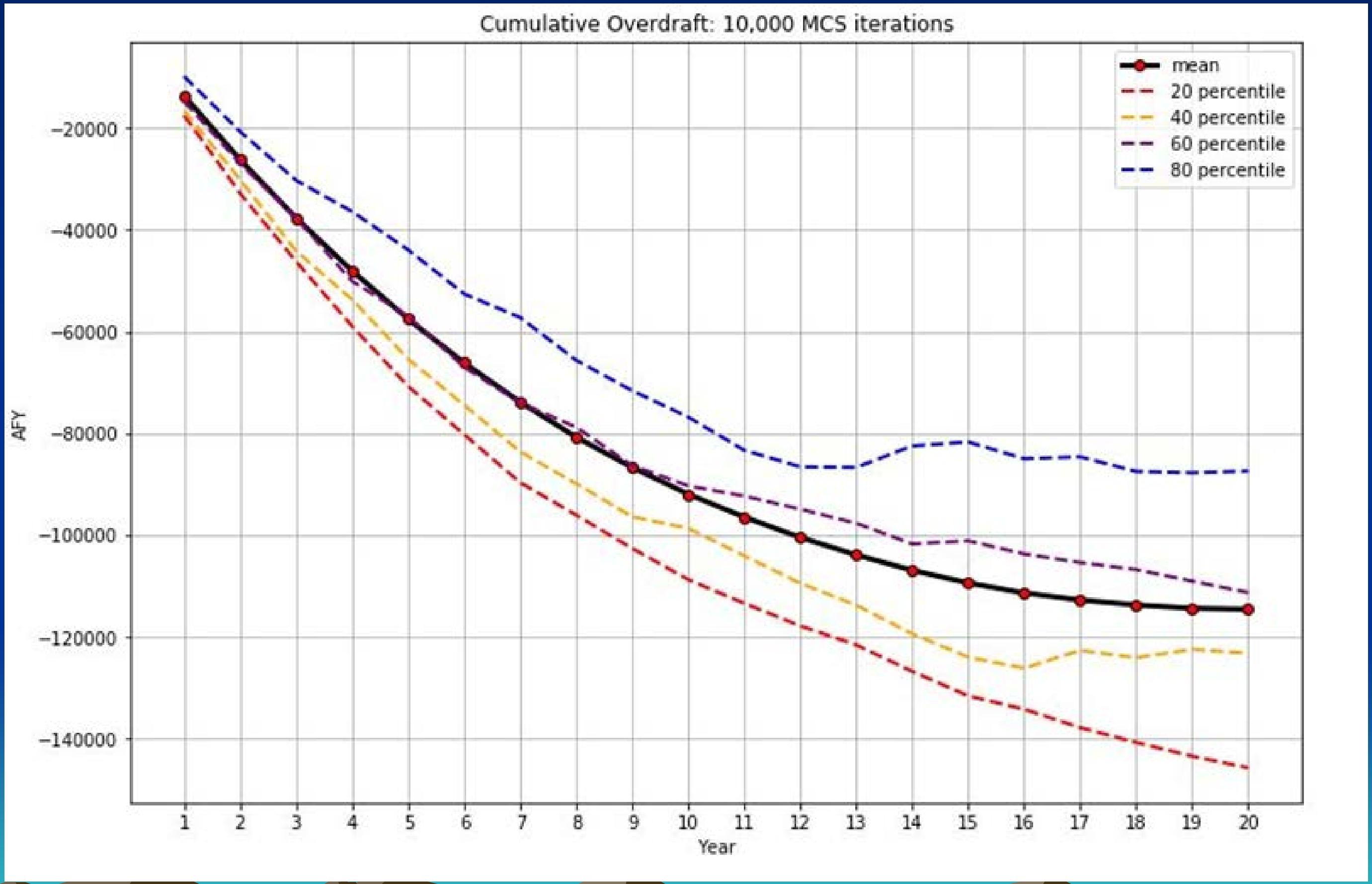
Outflow

- Pumping: Steady Annual Reduction (~6.5% per year)
- GW Outflow: 525 AFY. Vary +/- 10%   [473 to 578]
- Native Plant ET: 400 AFY. Vary +/- 25%   [300 to 500]

Overdraft = Outflows – Inflows

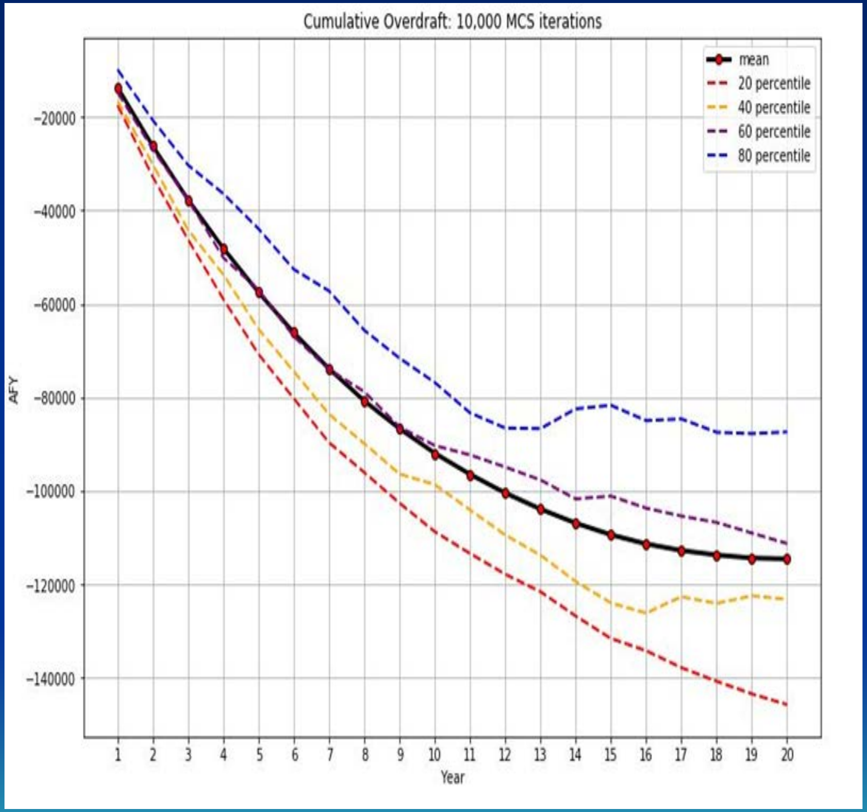
Overdraft Analysis Methodology

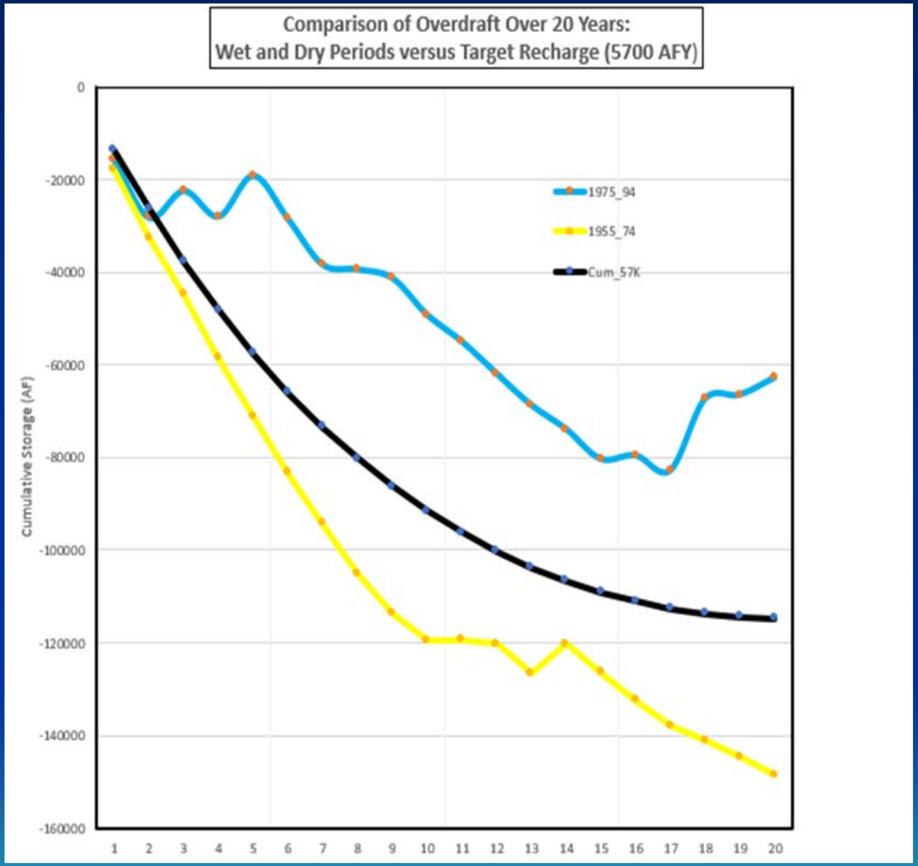
Randomly pick parameter values, run 10,000 20-year simulations, get a range of results that can be described statistically



Overdraft Analysis Methodology

Comparison of MCS Simulations with the ‘wet’ and ‘dry’ periods





Overdraft Analysis Methodology

Summary

- Provides a structure that recognizes all of the water balance components
- Extracts Results from USGS Model to support ‘big picture’ analysis.
- Recognizes that the model results are not ‘exact’ and can be used to develop statistically-based analyses.
- Can be used to assess differing pumping rate reductions over time, potential range of outcomes, or to track progress towards addressing critical overdraft.

Questions?

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