MAY ADVISORY COMMITTEE MEETINGS Butte Valley Groundwater Advisory Committee Meeting



LARRY WALKER ASSOCIATES science | policy | solutions



Agenda

- GSP determination and possible direction on next steps
- Implementation Project Updates
 - $_{\odot}\,$ Data collection and sensor installation
- Irrigation Workshop Recap

GSP Determination and Next Steps

- **Corrective Action 1** Reconduct the assessment of overdraft conditions and describe management actions to mitigate overdraft.
 - Refine the water budget, and better understand overdraft/no overdraft
 - Provide "reasonable means" to mitigate overdraft (describe feasible management actions)
- Corrective Action 2 Further justify the SMCs set for water levels, and quantitatively describe the effects of the criteria on users of groundwater.
 - Describe the specific, <u>quantitative undesirable results</u> that are planned to be avoided
 - MTs should be set at a level where depletion of supply across the Basin may lead to undesirable results

GSP Determination and Next Steps

- Monthly meetings with DWR
- Refinement of water budget
- Review of model results and boundary conditions
- Quantitative description of undesirable results for users of groundwater

Finding 1: There is no immediate threat of water levels reaching MTs, but further long-term steady decline is not desirable nor acceptable.

Evidence: RMP Network Hydrographs



Groundwater elevation (ft amsl)

DWR Stn_ID: ; well_code: 417789N1220759W001; well_name: 45N02W04B001M; well_swn: 45N02W04B001M



DWR Stn_ID: ; well_code: 417944N1220350W001; well_name: 46N02W25R002M; well_swn: 46N02W25R002M



DWR Stn_ID: ; well_code: 418512N1219183W001; well_name: 46N01E06N001M; well_swn: 46N01E06N001M



DWR Stn_ID: ; well_code: 418544N1219958W001; well_name: 46N01W04N002M; well_swn: 46N01W04N002M



DWR Stn_ID: ; well_code: 418661N1219587W001; well_name: 47N01W34Q001M; well_swn: 47N01W34Q001M



DWR Stn_ID: ; well_code: 418948N1220832W001; well_name: 47N02W27C001M; well_swn: 47N02W27C001M 4240 \circ Groundwater elevation (ft amsl) 20 Feet below ground surface 4200 40 00 4160 100 4120 1960 1980 2000 2020 2040 Ground Surface (4239 ft amsl) Water Year Type Measurable Objective (Upper) (4216 ft amsl) Critical Measurable Objective (Lower) (4193 ft amsl) Dry Trigger – Soft Landing (4170 ft amsl) Below Normal Above Normal Minimum Threshold (4155 ft amsl) Wet Linear Interpolation Intercept: 4193 ft amsl, Slope: -1.1538 Feet/Year

DWR Stn_ID: ; well_code: 419021N1219431W001; well_name: 47N01W23H002M; well_swn: 47N01W23H002M





DWR Stn_ID: ; well_code: 419519N1219958W001; well_name: 47N01W04D002M; well_swn: 47N01W04D002M



DWR Stn_ID: ; well_code: 419520N1219959W001; well_name: 47N01W04D001M; well_swn: 47N01W04D001M



DWR Stn_ID: ; well_code: 419662N1219633W001; well_name: 48N01W34B001M; well_swn: 48N01W34B001M



DWR Stn_ID: ; well_code: 419755N1219785W001; well_name: 48N01W28J001M; well_swn: 48N01W28J001M



Butte Valley TSS Well (Jan 1 2024 – April 30 2024)



Well IDs, south to north: 47N01W27D001M, 47N01W27D002M, 47N01W27D004M

Finding 2: To support water levels in Butte Valley above the MT (in the 4100s' range), sufficient subsurface outflow toward **Tulelake/Lost River is needed (water levels in** the low 4000s' range) => affects sustainable yield in Butte Valley.

Evidence: Conceptual Model, BVIHM

Simplified Conceptual Model

sustainable yield = recharge - necessary outflow to NE (Lower Klamath Wildlife/Tulelake/Lost River)



Groundwater Model Update Butte Valley Integrated Hydrologic Model (BVIHM)





Figure 1.39: Spatial distribution of long-term average recharge (left, red: highest amounts of recharge, dark blue: lowest amounts of recharge) and location of areas with groundwater pumping (right). Black outline: BVIHM simulation domain boundary.

Groundwater Model - Accuracy Acre-Feet 200 Volume Observed Heads vs. Simulated Heads of Butte Valley 11-Layer Transient Model of 1990-2023 4240 1300 20 Groundwater elevation (ft amsl) 4220 1290 - Observed] (m) 4200 Simulated Head (m) 1520 1520 1 05 Residual [Simulated 4180 1977/78 Drought 4160 2012/16 Drdught 1987/92 Drought 2001 Drought 1260 1960 1980 2000 2020 -20 Measurement date 1250 1250 1260 1270 1280 1290 1300 Observed Head (m)

Figure 2.2: Groundwater elevation measurements over time in five wells, one located in each hydrogeologic zone.

Simulated Cumulative Water Volume of Storage

Overall Model Performance



BVIHM: Where are we heading, worst case?

- 2011-2023 driest megadrought climate, repeated through mid-21st century
- 2011-2023 pumping, repeated



BVIHM: Unimpaired scenario (super-drought)

- 2011-2023 driest megadrought climate, repeated through mid-21st century
- no pumping after 2023



BVIHM: Sustainable Yield Future Scenario

- 2011-2023 driest megadrought climate, repeated through mid-21st century
- 50% of 2011-2023 pumping, repeated



BVIHM: Where are we heading, not so worst case?

- 2000-2023
 megadrought
 climate, repeated
 through mid-21st
 century
- 2000-2023 pumping repeated



BVIHM: Unimpaired scenario (mega-drought)

- 2000-2023
 megadrought
 climate, repeated
 through mid-21st
 century
- No pumping after 2023



BVIHM: 50% pump reduction (mega-drought)

- 2000-2023
 megadrought
 climate, repeated
 through mid-21st
 century
- 50% of 2000-2023 pumping, repeated



BVIHM: Sustainable Yield (mega-drought)

- 2000-2023
 megadrought
 climate, repeated
 through mid-21st
 century
- 2023 pumping fixed all years thereafter (65,000 acft, which is the average for 1990-2014)



Finding 3: Revised sustainable yield of 65,000 acft is a reasonable target (same as 1990-2014 average, similar to reported pumping of the 1970s)

Evidence: BVIHM

Model Update: Simulate Applied Groundwater in Bullet-118 Butte Valley, CA, 1990-2023

Simulate Applied Groundwater in the Bullet-118 Butte Valley, CA, 1990-2023								
Water Year	Pumping (ac-ft)	Water Year	Pumping (ac-ft)	Water Year	Pumping (ac-ft)			
1990	55,990	2001	67,059	2012	74,464			
1991	58,563	2002	72,904	2013	86,338			
1992	60,079	2003	65,689	2014	74,332			
1993	51,851	2004	69,236	2015	63,969			
1994	56,836	2005	64,810	2016	74,991			
1995	56,676	2006	70,371	2017	78,074			
1996	64,641	2007	68,753	2018	73,007			
1997	67,982	2008	58,657	2019	71,977			
1998	62,548	2009	60,781	2020	74,496			
1999	67,218	2010	56,341	2021	74,729			
2000	68,704	2011	57,689	2022	66,468			
				2023	65,982			



Finding 4: Water level will stabilize before 2042, unless climate remains ultra-dry (would require revision of sustainable yield)

Evidence: future water level monitoring

Core Action - Option 1

- Revise minimum thresholds to be at lowest historic levels during baseline reference period 1990-2014 (similar to many approved GSPs)
- Eliminates need to provide additional details on a well mitigation program (water levels will stay above baseline period levels)
- Will require stepwise lowering of everyone's pumping output, in 10% increments until water levels are above MT (back to 1990-2014 levels)
 => may eventually require 50%+ pumping reduction, pending climate and given uncertainty about recent watershed recharge
- Low likelihood of approval by advisory committee, GSA board due to impact on economic livelihood of the basin

Core Action Option 2

- Keep minimum thresholds and extended minimum thresholds as defined in 2022 GSP
- Requires a strong well mitigation program to avoid significant undesirable results
 - Create public water supply system in Macdoel with a supply well that has a top of the screen at depths of 400' or more (replacing domestic wells)
 - Create public water supply system in Mt Hebron with a supply well that has a top of the screen at depths of 400' or more (replacing domestic wells)
 - Expand public water supply system in Dorris (replacing domestic wells on the border of the city).
 - Provide emergency well deepening program for domestic well outages outside these public water supply systems
- Sustainable yield of 65,000 acft (about 10% less than 2011-2023)
 - O Improve irrigation efficiency
 - O Improve metering of groundwater pumping, implement assessment of ET, update BVIHM and evaluation of sustainable yield

Core Action Option 3

- No or very limited well mitigation program
- No or very limited monitoring and management of groundwater use
- Fail GSP revision
- Proceed into Chapter 11
- Management under SWRCB:
 - Costly fee schedule for all water supply wells except domestic wells
 - Public metering of all water supply wells
 - Focus on reduction of pumping to bring water levels to pre-2015 elevation, avoid well outages
 - Pumping reductions may be in the range of 10% to 50%+ pending climate & future water level trends

Tech-Team Assessment of Most Likely to Succeed: Core Action 2

- Follows the intent of the original GSP
- Keeps basin in no-overdraft conditions
- Avoids significant undesirable results through strengthened well mitigation program
- Provides GSA operational flexibility for managing groundwater pumping, adjusting sustainable yield in response to climate variation, at 5 year-increments
- Will likely allow groundwater use at 65,000 acft (5% above reported groundwater use of the 1970s; equal to 1990-2014 and to 2022-2023; 10% less than the average 2011-2023)
 - Can be achieved through irrigation efficiency improvements at reasonable economic cost to agricultural sector
 - Improve metering of groundwater pumping, implement assessment of ET, update BVIHM and evaluation of sustainable yield
- Cost of providing well mitigation program is fraction of economic impact if agricultural production were reduced by one-quarter, one-third, one-half, or more

Five-Year Action Plan under Option 2

- Plan for public supply systems to replace most shallow domestic wells (well depth at least 400 ft bgs, top of screen) => build future resiliency
- Plan for well deepening outside public supply systems to depths of at least 200 ft bgs (top of screen) => build future resiliency
- Set sustainable yield at 65,000 acft for the next 5 years:
 - Monitor baseline and improvements
 - → should lead to some foreseeable stabilization of water levels, soft landing prior to 2042
- Plan for
 - 10% improvements on efficiency,
 - $_{\odot}$ or 10% demand reduction
 - $_{\circ}$ Or combination of both

Implementation Project Update

Timeline – Implementation Projects

- Formation of work groups in August AC Meetings
- Work groups approve draft project scope and schedule
- Final grant awards expected in September

2023 Q4

2024 Q2

- October AC Meetings- review of final funding awards
- Detailed scope and schedule for funded projects provided to Advisory Committee

- February AC Meetings- updates from project work groups, updates depend on individual project schedules
- 2024 Q1 SGMA Compliance- Annual Report for WY 2023

• May AC Meetings- Update on implementation projects

Timeline through Fall 2024

- GSP determination/corrective actions, submission due July 16 2024
- Summer sample collection
- Continue expansion of the monitoring network and monitoring design plan
- Installation of 4 new domestic wells through the City of Dorris Project (Drought Emergency)
- Continue development of well inventory and approach to the fee study
- August AC Meetings

- Preliminary Database Management System (DMS)
- Model scenario results with different management actions
- October AC Meetings

2024 Q4

• Continued data collection

In Progress	Added to Backlog
Complete	Blocked

Implementation Grant Progress Through May 2024

#	Component	Notes	Status
1	SGMA Compliance and GSP Updates		
1.1	GSP Revisions	Due January 2027	In Progress
1.2	Reporting (Data and Annual Report)	Annual Reports due April 1 of each year (submitted AR 2023)	In Progress
1.3	Model Updates and Scenario Evaluation		In Progress
1.4	Data Gaps and Monitoring Expansion and DMS		In Progress
2	Fee Study and Economic Analysis		
2.1	Evaluation of Fee/Rate Options and Schedule Development		Not Started
2.2	Parcel scale groundwater use estimate		In Progress
2.3	Economic Analysis and Water Market Analysis		Not Started
3	Well Inventory		
3.1	Database Development and Well Risk Assessment		In Progress
3.2	Monitoring Well Construction or Well Instrumentation		Not Started
4	Monitoring Network		
4.1	Upper watershed monitoring	Locate snow monitoring stations, secure permissions	In Progress
4.2	Voluntary well metering	ID wells to instrument, goal of 40 wells.	Not Started
4.3	Monitoring network expansion	Water quality wells, install two stream gauges	In Progress
4.4	Improve GDE Analysis	Review GDEs identified in GSP. Collect monitoring data	Not Started

Sensor Installation and Data Collection

- Installed flow station near Meiss Lake on Prather Creek
- Installed shallow groundwater monitoring well telemetry in Macdoel
- Conducted a geophysics study in SE Butte Valley looking at lava tubes
- Conducted a geophysics study around the Butte Valley groundwater recharge sink
- Surveyed potential locations of future groundwater model calibration sites along Butte Creek
- Continued stage/flow measurements of new flow stations
- Beginning monthly depth to water measurements at key groundwater wells

Sensor Installation Data Collection

- Geophysics to study groundwater movement through fractured basalt (lava tube?) and a major groundwater recharge site near Butte Creek.
- Installed new sensors in Macdoel to monitor shallow wells in the Macdoel area.



Irrigation Efficiency Workshop - Recap

- "Workshop on Efficient Water Management for Forage Crops"
- Conducted Thursday March 14th
- Field visits with irrigation specialist May 21, 22, 23
- Link to survey: <u>https://us11.list-</u> manage.com/survey?u=2516c89941f49355f514cefb8&id=3435a2de67& attribution=false



Thank You