Sierra Valley Technical Advisory Committee Meeting Summary: April 12, 2021

Project Website: www.sierravalleygmd.org/sierra-valley-groundwater-sustainability-plan
Data Portal: https://sierra-valley.gladata.com

ACTION ITEMS

ACTION ITEM: TAC members to submit comments on Chapter 2 and 3, for Groundwater Quality and Subsidence, by April 30th.

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Welcome, Introductions, Agenda Review

The sixth meeting of the Technical Advisory Committee (TAC) for the Sierra Valley (SV) Groundwater Sustainability Plan (GSP) was a virtual meeting, with a satellite location in Beckwourth for in-person participation. The meeting agenda was reviewed, followed by introductions. The topics for this meeting covered:

- Project updates including Public Workshops
- First Draft of GSP text for Groundwater Quality and Subsidence
- Continued discussion on Groundwater Levels
- Modeling and the Sierra Valley Water Budget

There were 20 meeting participants: 12 TAC members (10 online, 2 in-person), 2 ex-officio members (online), 1 planning committee member (online), and 6 technical team members (5 online, 1 in-person).

Project Updates

PUBLIC WORKSHOPS

Judie Talbot, GSP outreach facilitator, reported that a small subcommittee has been meeting to plan the public workshops. The subcommittee members are Greg Hinds, Lucy Blake, Tracy Schohr and the Planning Committee team. Two dates will be offered in May, to provide options for participation. The content will be the same for each workshop:

- Saturday, May 8 from 10 a.m. – 12 p.m. in Loyalton at the Events Center (105 Beckwith)
- Monday, May 10 from 6 – 8 p.m., at Sierra Christian Church in Beckwourth (81059 Hwy 70)

Flyers and a press release are being prepared. TAC members are requested to help share information with their organizations and the larger community.

MAY TAC MEETING

The May 10, 2021 Sierra Valley TAC meeting will be conducted as an in-person meeting with a webinar option via Zoom. The meeting space at Sierra Valley Church will be reconfigured to allow for greater social distancing, with both sections of the church available for seating.

First Draft of GSP Text for Groundwater Quality and Subsidence

Laura Foglia, LWA Project Manager, explained that the First Draft of Chapters 2 and 3 are posted to the meeting page at https://www.sierravalleygmd.org/2021-04-12-tac-meeting. The respective Comment Logs are also provided. Each Chapter provides line numbers to make review easier. Comments and edits should be submitted to Laura Foglia and Betsy Elzufon by April 30th.

Currently the text contained in Chapters 2 and 3 relate only to Groundwater Quality and Subsidence. Laura noted that each chapter begins with a reviewer's note, highlighted in yellow. Referring to the Comment Log, the Excel spreadsheet contains columns for reviewers to indicate the line number or figure number and the relevant comment. A summary of comments

ACTION ITEM: TAC members to submit comments on Chapter 2 and 3, for Groundwater Quality and Subsidence, by April 30th

Continued Discussion on Groundwater Levels

Rich Pauloo, LWA Hydrogeologist, reviewed the purpose of the Groundwater Sustainability Plan (GSP) with a focus on major groundwater users. He noted that a proposed approach for Sustainable Groundwater Management has not yet been developed for Groundwater Levels, Groundwater Storage or Interconnected Surface Water. These elements are closely related, which allows groundwater levels to serve as a proxy for groundwater storage, interconnected surface water and groundwater dependent ecosystems.

Referring back to the November 2020 TAC meeting, Rich highlighted the qualities and characteristics of Sierra Valley that people would like to see continued into the future – and those that should be avoided:

<u>Maintain</u>

- Viable agriculture, at or above current levels
- The quiet, rural nature of the
- The presence of wildlife
- Wetlands and habitat for migratory and local birds

<u>Prevent</u>

- Degradation of water quality
- Drying out of wetlands and streams
- Impacts to domestic well users
- Development such as industrial farming, airport expansion, housing clusters

SGMA also sets goals for sustainability, in terms of what a GSP should achieve:

- Protect all beneficial users and uses of Sierra Valley groundwater, including (in no particular order) domestic, agricultural, municipal and ecosystem uses and users.
- Prevent *undesirable results* to beneficial uses and users through *Sustainable Management Criteria* that align groundwater demand and supply by 2042 (or sooner)

SUSTAINABLE MANAGEMENT CRITERIA (SMC)

Rich provided two examples of SMCs:

- For inter-connected surface water, total fall flow could serve as an SMC. A hypothetical graph showed how fall flows could be modeled to represent: levels if no pumping or diversion occurred; levels with current pumping and diversion continuing into the future; and levels associated with implementation of projects and management actions.
- For groundwater levels, groundwater elevations would serve as the SMC. The SMC is comprised of three elements:

  The *Measurable Objective* (MO) represents the goal for what basin conditions should be by the end of the implementation period in 2042.

  NOTE: SGMA specifies that 2015 groundwater conditions serve as the Measurable Objective to be attained by 2042 (and maintained thereafter). This is due to 2015 marking the end of a multi-year drought, with groundwater conditions improving in 2016 and 2017 with increased precipitation.

  The *Minimum Threshold* (MT) represents the point where Undesirable Results occur. Undesirable Results are locally defined and tie back to the conditions that people would like to prevent in Sierra Valley.

  The *Action Trigger* is a value that occurs somewhere between the Measurable Objective (goal) and the Minimum Threshold ("passing grade"). It is value that indicates additional attention or action may be needed to avoid reaching or dropping below the minimum threshold.

GROUNDWATER LEVEL TRENDS

Most groundwater elevations in Sierra Valley are decreasing across all well depths and locations. The decreases range from very minimal up to 1.5 feet per year. This represents a basin in persistent groundwater decline. The declines are most pronounced east of the Grizzly Fault where agricultural pumping occurs. A long-term decline in groundwater elevations can be seen, even across the seasonal variation in groundwater levels. Since 2000, some areas have experienced 25 feet of decline in groundwater levels.

Modeling suggests that up to 2% - 4% of domestic wells could encounter inadequate supply if groundwater levels returned to those seen during Fall 2015. Developing a contingency plan to avoid or mitigate those types of possible outcomes would help strategies or options that might be needed.

PROPOSED APPROACH

The Technical Team presented a "straw" proposal for the groundwater level SMC:

- Set the Management Objective to the groundwater level that occurred in Fall of 2015.
- Set a Minimum Threshold equal to the projected average 10-year decline in groundwater levels. (Monitoring would need to see if Undesired Results occur, which would inform adjustments to the Minimum Threshold value.)

NOTE: Groundwater levels in Sierra Valley are currently above those recorded in 2015. However, climate trends (such as recurring drought) could result in water elevations dropping below 2015 levels during the implementation period (through 2042). Establishing a Minimum Threshold, lower than 2015 groundwater levels, creates some flexibility for resource management while installing projects for demand reduction and supply augmentation.

As an analogy, the Measurable Objective can be compared to a passing grade for a student. While a student would hope to have passing grades throughout the school year, that doesn't always happen. A student can fail a test and still pass the class. Similarly, during the implementation period, conditions might drop down below the Measurable Objective while projects and management actions are put in place to achieve and maintain the MO.

MODELING, WATER BUDGET and SUSTAINABLE YIELD

In closing, Rich remarked that the groundwater model will help assess the projected impact of specific management actions.

Also, modeling by Bachand and Carlton estimated that – on average – 8,500 acre-feet of groundwater is pumped each year in Sierra Valley. This compares to a long-term average sustainable yield of 6,000 acre-feet of annual groundwater pumping. These numbers will be refined further with the groundwater model currently being developed.

Discussion: Comments, Questions and Answers

TAC members were asked to identify possible Undesirable Results for different groundwater users or uses, supplementing the ideas generated at the November 2020 TAC meeting.

Comment: From the bird perspective, surface water, pools and ponds are critical in the summer. Drying up of seasonable ponds would be undesirable

Comment: Regarding domestic supply, curtailment beyond normal conservation would be undesirable. This would cause supply to be excessively limited and could also affect fire response.

Comment: In terms of public health, an undesirable result would be domestic going dry or needing to be deepened.

Comment: For agricultural production, an undesirable result would be existing agricultural operations no longer being viable due to the lack of groundwater or prohibitive pumping costs (associated with groundwater pumping that commences before June).

Comment: An undesirable result would be loss of wildlife habitat if agricultural irrigation ceases.

Comment: An undesirable result would be reduction of surface water quality and wetland habitat.

It was noted that multi-benefit supply projects would be desirable to support both agriculture and ecosystems. There is also a benefit to producing hay within the basin.

Modeling and Sierra Valley Water Budget

Laura Foglia noted that the presentation on modeling will also inform the discussion on groundwater levels, as there will be projections relating to climate and how that might affect demand and pumping.

Gus Tolley, DBS&A Hydrogeologist, explained that he would be sharing preliminary model results. Modeling is inherently an iterative process, with cycles of generating results that get compared to observations – which lead to refinements. The numbers in today's presentation are still very early.

Models are useful in storing many different types of information, for example: geology, hydrology, climate, land use, monitoring data and expert judgement. The goal is to accurately represent the groundwater system. Other benefits of models include: mass balancing (accounting for all water in some way), allowing spatial and temporal analysis of the basin, making predictions on future conditions, and evaluating potential implementation projects and management actions.

Models are simplifications of reality; models can do better or worse jobs in accurately representing the hydrologic system. The water budget involves three subsystems: soil, surface water and the aquifer – all of which interact with each other. The dynamics between these three subsystems are represented by three different models:

- Upper Watershed Model – PRMS (Precipitation-Runoff Modeling System), which calculates streamflow entering Sierra Valley
- Soil-Water Budget Model – SWBM, which represents recharge and pumping within the valley
- Groundwater-Surface Water Model – MODFLOW (Modular Flow Model), which simulates groundwater levels and streamflow within the valley

Ultimately each model is tracking inputs and outputs to determine the change in storage for the different areas and systems (e.g., upper watershed, valley floor, groundwater, surface water, soil).

PRECIPITATION-RUNOFF MODELING SYSTEM (PRMS)

Gus provided an overview of the PRMS model. He noted that this model really only has one input: precipitation. The outputs represent how water is discharged out of the upper watershed: evapotranspiration, runoff and upper watershed recharge. The change in water levels within the upper watershed represents the change in storage. For the Sierra Valley Hydrologic Model, the most important PRMS output is runoff, which represents the amount of surface water feeding into the Sierra Valley. A series of graphs, imposed onto a map of the Sierra Valley basin, showed the relative contributions of surface water into the valley from different streams. Another important output is the amount of upper watershed recharge, a portion of which will eventually make its way down to recharge the aquifer in the valley.

The model results are compared to existing data, to see how well the model represents conditions in the valley. The two existing data sets include: DWR estimates for natural inflows from Frenchman Lake and Lake Davis; and the USGS Basin Characterization Model (BCM). The results generated by the PRMS model generally compare pretty well with these two data sets.

The challenge in trying to calibrate the models to data records is that there is there are not many monitoring points in the basin, and the ones that do exist have significant temporal gaps.

SOIL-WATER BUDGET MODEL (SWBM) RESULTS

The SWBM model simulates the water budgets for 3.627 fields (shown as polygons) within Sierra Valley. The results draw from information on the Data Portal. The information has been updated for type of vegetation/crop, irrigation type, and water sources for irrigation. Other key inputs include irrigation periods, irrigation efficiencies, and irrigation threshold (e.g. the soil-water content in a field).

Gus discussed a graph that showed how initial SWBM results (red line) overstated groundwater pumping levels compared to the observed pumping levels (black line). To better reflect the actual levels of groundwater pumping, the root depths of vegetation were increased (thereby reducing the amount of pumping needed to satisfy crop requirements. The modified results (blue line) more closely reflect the observed pumping levels. However, the modeling results underreport the pumping that occurred during the drought. More pumping data is needed for 2016 through 2020 to determine if further adjustments are needed.

Modeling results are then formatted in a table creating a water budget showing: land cover, precipitation, evapotranspiration, deficiency (additional water needed for crop beyond precipitation), amount of irrigation applied, and recharge to the aquifer. Bar chart graphs show annual and monthly water budgets for average, dry and wet years. The model allows water budgets to be analyzed in different ways: temporally (e.g. annual v. monthly) and spatially.

For example, net recharge for the entire basin appears to offset pumping withdrawals. However, net recharge on the western side of the basin is significantly greater than net recharge on the east side of the basin. In the eastern side, recharge is less than the level of pumping. The technical team would like feedback on whether the model results are reflecting what people expected to see or are there results that seem off.

NEXT STEPS

The remaining tasks for finishing the Sierra Valley Integrated Hydrologic Model are:

- Completing a 3D hydrogeologic model of the subsurface
- Using PRMS and SWBM results to run MODFLOW
- Comparing model results with observations (model calibration)
- Simulate the effects of climate change
- Simulate projects and management actions

Discussion: Comments, Questions and Answers

Question: How will the PRMS and SWBM results feed into the MODFLOW model?

Response: The groundwater pumping levels, simulated by SWBM, will be applied to specific wells in MODFLOW. Also, the SWBM recharge rates will feed into MODFLOW and be applied on a monthly basis. From the PRMS model, some level of recharge to the upper watershed will seep down into the valley aquifer (mountain-front recharge).

Question: What is it that the MODFLOW model will provide?

Response: MODFLOW results will include groundwater elevations and streamflow within the valley. That will require defining the surface water network for the valley floor. As a point of clarification, stream channels and unlined diversion channels are treated the same way – since they behave in the same for, in terms of transporting surface water and contributing to recharge.

Additional detail: The model will simulate groundwater levels for each grid cells in MODFLOW (every 328 feet), which can then be compared to observations at measurement points. This gets back to the monitoring network being developed for Sierra Valley basin. Each well in the network could contribute multiple data points (e.g., a well could provide information on both groundwater elevation and groundwater quality). Data will be allocated to the different models as appropriate.

Question: How user-friendly are these models for future updates of the GSP?

Response: While these are not simple models, the information can be updated relatively easily be a modeler.

Question: Does the question of uncertainty come into play (e.g., level of error) with modeling results? If so, how?

Response: A lot of time can go into an uncertainty analysis. The technical team will be conducting a sensitivity analysis during model calibrations. This will involve using software to slightly change parameters, to see which one alter monitor results the most.

Question: In terms of next, what is the sense of timeline for when different modeling results might be available?

Response: The goal is to present preliminary MODFLOW results at the June TAC meeting. Once the 3D subsurface model is complete, the technical team will have all the major components for MODFLOW.

Question: What is the question relating to increased used of groundwater pumping during the drought?

Response: The increase in groundwater pumping seen during the last drought is significant. This level of increase is typically associated with irrigators switching from surface water to groundwater – beyond the additional groundwater normally used by irrigators during a drought, when water is earlier in the season.

Comment: Another factor that might contribute to higher than expected groundwater pumping is that, during a drought, irrigators can never catch up. It's a matter of constantly applying water to offset dry, hot, windy conditions. It's a matter of pumping more or not at all

Comment: There's only about three ranchers who use surface water.

Clarification: Typically, there is about 4,000 acre-feet of additional groundwater pumping in a dry year, compared to a wet year. However, in 2014-2015, the increase is groundwater pumping goes above and beyond what is expected (almost double). This is an additional 4,000 of increased pumping. Either additional pumps were coming on line, or there was a big switch from surface water to groundwater, or that meters were recalibrated and the 2014 data is more accurate. It's not clear what is causing the observed pumping values.

Comment: The west side of the valley receives about 30 to 35 inches of rain, while the east side gets maybe 10 inches. However, the soils are better on the east side. The difference in precipitation levels might also be a factor in the different levels of recharge. The pivots provide the greatest efficiency for irrigating the best soils.

Response: The water budget tables do show that center pivot irrigation is more efficient than flood irrigation or wheel line irrigation. Also, the irrigation efficiency value (greater than one) is the result of combining irrigation efficiency values with the depletion in soil moisture (where plants are using the water within the soil that represents stored precipitation).

Look Ahead for Upcoming TAC Meeting and Public Workshops

May 10th TAC Meeting

Laura Foglia explained that Interconnected Surface Water will be presented in May, which is associated with ecosystem uses and users. Also, hopefully TAC members will have some comments on the modeling and water budget assumptions and results. A big open point is the amount of applied water and quantity of groundwater pumped. The model results will be very important for setting the Sustainable Management Criteria (SMCs). A shared understanding of the model and results will increase the accuracy of the model.

Laura noted that the SMCs and Minimum Thresholds – for groundwater levels, interconnected surface water and groundwater storage – will need to work with each other and with the model. The model will then make it possible to consider how climate change and management actions might impact Minimum Thresholds and conditions for the five Sustainability Indicators (groundwater quality, subsidence, interconnected surface water, groundwater levels and groundwater storage).

June 14th TAC Meeting

At the June meeting, TAC members will start to address implementation projects and management actions. This will leverage initial brainstorming results from the public workshop, allowing TAC members to supplement and refine the range of management actions.

Public Workshops

Judie invited and encouraged TAC members to help announce the public workshops, and to attend and participate in either the May 8th or May 10th workshop. A second public workshop will be occurring in mid-summer. The third and final workshop will take place in early fall, likely September, to provide a public comment opportunity on the Third Draft of the GSP.

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Participants

TAC MEMBERS

X = attendance

	Organization, Name		Organization, Name
X	Agricultural Commissioner, Plumas County Willo Viera	X	Sierra County Environmental Health Elizabeth Morgan
	City of Loyalton Joy Markum	X	Sierra Valley Groundwater Mgmt. District Einen Grandi and Dwight Cerasola (alternate)
X	Feather River Land Trust Ken Roby	X	Sierra Valley Resource Conservation District Rick Roberti
X	Feather River Trout Unlimited William Copren	X	Sierraville Public Utility District Tom Archer and Paul Rose (alternate)
	Hinds Engineering Greg Hinds	X	UC Cooperative Extension Tracy Schohr
	Integrated Environmental Restoration Svcs. Michael Hogan	X	Upper Feather River IRWM Uma Hinman
X	Plumas Audubon Jill Slocum		USFS – Plumas National Forest Joe Hoffman
X	Plumas County Tracey Ferguson	X	USFS – Tahoe National Forest Rachel Hutchinson
X	Sierra Brooks Water System Tom Rowson		

EX-OFFICIO MEMBERS

X	CA Department of Water Resources Debbie Spangler		CA Department of Fish and Wildlife Bridgett Gibbons

TECHNICAL TEAM & PLANNING COMMITTEE

X Laura Foglia, LWA Project Manager
X Rich Pauloo, LWA Hydrogeologist
X Gus Tolley, DBS&A Hydrogeologist
X Betsy Elzufon, LWA Asst. Project Mgr. (admin)
X Kristi Jamason, Planning Committee
X Dwight Smith, Planning Committee
X Judie Talbot, Outreach Facilitator