Sierra Valley Technical Advisory Committee Meeting Summary: March 8, 2021

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

ACTION ITEMS

ACTION ITEM: Convene a small group to discuss GDEs and connected surface water. (Jill Slocum and Ken Roby are interested in working on this.)

ACTION ITEM: When talking to growers about modeling inputs, ask them about their impression of the proposed approach for subsidence.

ACTION ITEM: Check on status of gage on Little Last Chance Creek below Frenchman Reservoir.

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Welcome, Introductions, Agenda Review

The fifth 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 and reminders regarding remote meeting practices. The topics for this meeting covered:

- Project updates and long-term schedule
- Proposed approach for Sustainable Management Criteria (SMCs) and Monitoring Network for Subsidence in the GSP
- Initial Discussion on Groundwater Levels

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

GSP APPROACH

Judie Talbot, GSP outreach facilitator, reminded participants that the GSP will address five sustainability indicators:

- Groundwater Quality
- Subsidence
- Groundwater Levels
- Groundwater-Surface Water Interactions (GDEs and Interconnected Surface Water)
- Groundwater Storage.

A three-step process will be used to work through each Sustainability Indicator:

1. Introduction, including historic and current conditions in the Basin
2. Proposed Approach, for how the Sustained Indicator could be approached in the GSP
3. Draft Text provided for review, discussion, and inclusion in the GSP

SURFACE WATER DATA

Dave Shaw, geomorphologist and hydrologist, Balance Hydrogeologic, presented information on the surface water data that the technical team has accessed for developing the hydrologic model. He began with definitions for some key ***terminology***.

- Monitoring of stream conditions may be continuous (ongoing) or instantaneous (at a particular point in time). Continuous stream monitoring is called "gaging." Instantaneous monitoring will yield a "reading" or "measurement."
- Stage refers to the water level of a stream; it is commonly compared to a measuring stick in the water, but may also be reported as an elevation.
- Streamflow refers to the rate of flow in a stream, or the stream discharge. Streamflow readings must be taken manually, to determine flow. After the instantaneous reading is collected, the streamflow can then be taken on a continuous basis. [Specifically, streamflow measurements must be made manually at a range of stages in order to develop a stage-streamflow relationship, which is then applied to a continuous record of stage to develop a continuous record of flow.] Alternately, a series of instantaneous readings can be taken at different stages to develop a continuous streamflow record.
- Information can be collected in an open channel or by using a flume.

Datasets: For the Sierra Valley Basin, the following data is available on surface water coming into the valley.

- Continuous streamflow gaging in the basin historically occurred in different creeks, at points just before they enter the valley floor. Most of this gaging ended by 1983. Two exceptions are 1) the Little Truckee diversion ditch into Cold Stream and 2) the Middle Fork of the Feather River where water leaves the basin boundary. Continuous streamflow gaging of the Little Truckee diversion and continuous streamflow gaging of the Middle Fork of the Feather River has been conducted by USGS since 2007.
- Current instantaneous streamflow measurements are provided by the Sierra Valley water master. Some streams had measurements beginning in 2007; the most recent monitoring efforts, on Staverville Creek started in 2019. These measurements are obtained perhaps weekly during the irrigation season. While the flow can be determined, total number of acre feet cannot be established.

<u>Comment</u>: There should also be monitoring for Little Last Chance Creek. Like the Little Truckee diversion, it is an irrigation system managed by DWR.

<u>Response</u>: It was gaged at one point. There may also be an ongoing stage and storage record for Frenchman Reservoir, but the downstream gage was discontinued**.**

ACTION ITEM: Check on status of stream gaging on Little Last Chance Creek.

Question: The Middle Fork gaging station has telemetry which produces online data. Is the Little Truckee diversion the same?

Response: The Little Truckee gaging station does not have telemetry and does not have real-time results. That data is available afterwards from DWR or the Sierra Valley Mutual Water Company which operates the Orr ditch. Also, the Cold Stream gage is a collection of periodic instantaneous measurements which are used to create a continuous record.

Decree Maps provide the best available source of information on how water moves across the valley, indicating the number of irrigated acres and the locations of diversions and ditches. The technical team is working on digitizing these paper maps. Information will also include the number of acre feet of water allocated at each diversion point – and to what areas of the fields. It shows what water diversions are allowing, without saying what the actual practices are. This is the best information currently available.

Comment: Some areas are entitled to water, but there is no mechanism to provide the water. Some parcels that are not primary may not actually receive water.

Response: Aerial imagery is being used to help identify which areas are or are not being irrigated. Also, growers are helping to refine actively irrigated parcels. The model does take into account the amount of water that is available, which prevents the model from over-allocating water – although the model may have inaccuracies regarding which wells provide water to agricultural fields. The technical team is speaking with growers to ground-truth the data.

Next Steps: The technical team welcomes any information on other surface water data that may be available. This foundation of data will inform the next steps on data gaps and the monitoring approach.

GROUNDWATER QUALITY MONITORING PROPOSAL

As mentioned at previous TAC meetings, there are significant data gaps around groundwater quality for the Sierra Valley basin.

Tracey Ferguson, Planning Director, Plumas County reported on a proposal from Tracy Schohr, University of California Cooperative Extension (UCCE) and the Upper Feather River Watershed Coalition to add to the baseline information on groundwater quality in the basin. The proposal is to expand on the Coalition's planned nitrate plus nitrite sampling in 5 wells, by adding another five wells, for 10 wells total testing for nitrate and nitrite. The proposal also includes testing 15 wells (domestic and irrigation) for arsenic, boron and Total Dissolved Solids, to fill in the data gaps for the GSP work.

Data collection would start in April 2021, with wells distributed across the valley. The proposal is going before the Board of the Sierra Valley Groundwater Management District at the March 15, 2021 meeting, for consideration and approval of funding through the existing DWR GSP grant agreement with the District. Basic Laboratory in Chico would conduct the testing.

DATA PORTAL TUTORIAL and MODEL INPUTS with FEEDBACK REQUEST

Prior to the February 8, 2021 TAC meeting, Gus Tolley presented an overview of the data portal. To support stakeholders in using the interactive website, a tutorial is available with descriptions of how to access the website and key features – including the toolbar and map layers. The tutorial is online at: https://www.sierravalleygmd.org/files/5e5a52671/3-2-21+Data+Portal+Tutorial.pdf.

There is a second document focusing on aspects of the data portal related to the Sierra Valley hydrologic model: Data Portal Model Inputs at https://www.sierravalleygmd.org/files/c3c235fc3/3-2-21+Date+Portola+Model+Inputs+v2.pdf. The first page highlights the map layers associated with the model, while the second page details the feedback that the technical team is seeking. Feedback received by March 19th is especially helpful for informing model development.

Gus explained that the data portal is being updated and that some images have been simplified. A legend has been added as well, which appears with the respective map layers. Also, the “Filter by Other” includes a layer for groundwater quality.

SURVEY RESULTS: MEETING FORMAT

Judie noted that barring unforeseen circumstances, there will always be a virtual option for TAC meetings and an in-person option.

A few respondents also suggested moving TAC meeting times to the evening as days get longer and agricultural production get underway.

Proposed Approach for Subsidence

Laura Foglia, LWA Project Manager, described the approach that the technical team is suggesting for criteria and monitoring relating to subsidence (one of the Sustainability Indicators). As a reminder, Chapter 2 of the GSP will cover groundwater conditions in Sierra Valley; Chapter 3 will address Sustainable Management Criteria (SMCs).

1. A description of ground elevation surveys and findings will be provided in Chapter 2
2. Setting Sustainable Management Criteria (SMCs) for subsidence.
3. A discussion of the monitoring network to measure ground level elevations.

TAC input on the overall approach will inform the next step of beginning to write sections of the GSP.

GROUND ELEVATION DATA

Information on ground elevation comes from ground surveys and satellite (InSAR). These studies show subsidence in some areas of approximately 0.3-0.5 ft/year. Laura Foglia characterized this rate as more than negligible and needing to be fully considered in Chapters 2 and 3 of the GSP. Several studies indicate an area of subsidence occuring in the north-central to north-eastern sections of the basin.

- Caltrans surveys between 2012 and 2016 showed two of their monuments, located in the northeastern (Highway 70) and eastern (Highway 49) sections of the valley were no longer holding for vertical elevation, experiencing 1.9 feet of subsidence and 0.3 foot of subsidence respectively during that time period.
- InSAR data, collected between 2015 and 2019, also showed subsidence in the same area as reported by Caltrans. Subsidence during this time period is up to 1.2 feet.

PROPOSED MONITORING NETWORK

It is recommended that future subsidence monitoring be comprised of:

- DWR-provided TRE Altamira InSAR data (available through at least 2025)
- Installation of additional monuments (number to be determined) in critical area(s) (to be determined) with periodic ground elevation surveys

One option for obtaining additional detail, if needed, would be to install extensometers; however, these are rather expensive.

SUSTAINABLE MANAGEMENT CRITERIA (SMC)

While monitoring efforts continue to collect additional data on subsidence levels, it is proposed to use groundwater elevations as a proxy for subsidence. As a result, the Minimum Threshold (MT) would be a function of groundwater levels. In future GSP updates, the subsidence SMC would become increasingly tied to ground elevation surveys and InSAR data.

For example, stabilizing groundwater levels will help with subsidence. There is quite a bit of science about the relationships between groundwater levels, geology types and subsidence. Combining the data sources for subsidence will help identify trends and the relationship of ground elevation and declining water levels. Ground surveys will also help verify InSAR results.

Discussion

Comment: With groundwater levels fluctuating more than subsidence, it will be interesting to see what the relationship is between the two factors.

Question: With seasonal fluctuations in groundwater levels, it looks like subsidence is occurring during pumping periods and then rebounding with pumping ceases. Is that right?
Response: This area is experiencing elastic subsidence, where the soil is not fully compacted. This allows some recovery of ground elevation.

Comment: If there is collapse of subsurface soils that can currently accept water, that would be an issue.

Comment: If the surface is subsiding up to 0.5 foot/year, that could cause 10 feet of subsidence in the next 20 years. We need to be paying attention to this now; it's a red flag.

Comment: Subsidence of up to 10 feet would be a problem for growers with collection and ponding of water. In the critical area, there is about 60 feet of sand over a clay layer. We need to see what the actual trends are.

Comment: The DWR data portal has monthly measurements of ground elevations. The link is: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#landsub (Choose Land Subsidence on the left and then scroll down to the TRE Altamira InSAR Dataset)

Question: Based on what is known about geology in the basin, are there some areas that are more susceptible to subsidence?
Response: Looking at well logs, there were wells with several hundred feet of clays and clay layers. Generally, there are quite a few areas that have the potential to be susceptible to subsidence.

The hydrologic model will help provide a better understanding of where these areas are located. The subsidence so far seems to coincide with the clay layers. Both geology and extended drawdown of water levels are needed to create subsidence.

Comment: Be sure that we have an understanding of what is happening and where. Also, we may want to take active steps to adaptively manage and help address subsidence and stabilizing of groundwater levels.

Response: Five years represents when the GSP as a whole will be updated. However, the GSAs will submit report data every year. GSAs will also take action as needed. An example of an SMC for water levels would be: if, in one year, more than "x" number of wells are not meeting the Minimum Threshold (MT) requirements – then action will be taken. Part of the plan is to determine actions if needed. Also, GSPs can be updated more frequently than 5 years.

Comment: Are there options to be proactive? For example, some growers might try changing crops to see if it is possible to reduce groundwater declines.

Response: This will be discussed as we move into identifying management actions. Every year the thresholds will be reviewed and a range of management actions need to be ready for the GSAs to implement if required.

Response: The models can help simulate changes from management actions, to see what options might be viable. This will allow people to consider different scenarios.

Comment: Growers have constraints around changing crops: given the soils and weather, many crops are not suited to the basin. Growers have also invested in their current agricultural equipment.

Comment: Subsidence can significantly lag behind changes in groundwater levels.

Response: That is one consideration for using groundwater levels as a proxy for subsidence. The goal in measuring both conditions is to try and identify correlations.

Response: The dynamics between groundwater levels and subsidence can be tricky. Levels of subsidence are a factor of groundwater levels, duration of lowered groundwater levels, and basin geology. For example, a large drop in groundwater levels may not cause subsidence if the groundwater levels quickly rebound (e.g., if groundwater levels only drop for a week or two).

Check-in

Each TAC member was asked for their impression of the proposed approach. The responses addressed:

- The need to engage more growers to hear their perspective
- Additional studies on what is happening with subsidence would give us a better baseline
- Agree with the initial approach. In determining Minimum Thresholds (MT), how and at what point do we make determinations as to when actions are needed.
- Better information is need before decisions are made. Information is also needed on groundwater-surface interactions.
- The outline of the approach is fine. It may be challenging.
- Using groundwater levels as a proxy, in combination with monuments, is a good way to go.
- Is the InSAR data good science? Is there a +/- factor associated with crop height? (The data has been both continued and reviewed. Ground-truthing with monuments will help verify that information.)

- Don't see any problems with the approach. Getting more information is vital to know the extent of the problem.
- Within the critical area, it's not clear yet how many additional monuments may be needed.
- The combination of InSAR and ground surveys are a great combination to gathering more information. We need to understand the scope of the problem.

ACTION ITEM: When talking to growers about modeling inputs, ask them about their impression of the proposed approach for subsidence.

Groundwater Levels

Rich Pauloo, a hydrogeologist with LWA, recapped that subsidence is associated with declines in groundwater levels – especially where there are clay soils that can compact. The likelihood of subsidence depends on geology and where declines in groundwater levels occur. He noted that the groundwater elevations in the basin have a fairly long history and are relevant for several sustainability indicators: subsidence, groundwater storage, groundwater levels and inter-connected surface water. Groundwater elevations also have implications for wells (domestic and agricultural) and groundwater dependent ecosystems (GDEs). While we will never fully understand the system, it's vital to understand it well enough to make informed decisions about monitoring networks, sustainable management criteria and management actions.

The goal of the Sustainable Groundwater Management Act (SGMA) is the adoption of sustainable approaches to groundwater management across the state. Unsustainable approaches result in continued depletion of groundwater supplies, while sustainable management allows for the recovery and stabilization of groundwater supplies over time. The trends in groundwater elevation levels reflect variations in pumping level, type of water year (dry, wet, normal), and whether the groundwater system is confined or unconfined.

GROUNDWATER LEVELS

Groundwater elevation trends in the Sierra Valley basin, generally, have been declining since 1960. Looking at the first hydrograph, Rich noted that the map on the left indicates the well location and the graph on the right shows the trend in groundwater levels. It was noted that the gray band represents the confidence level that the red line reflects the actual average of the points on the graph. Also, a dashed vertical line marks the SGMA baseline year of 2015 when groundwater levels were impacted by the drought.

On average, the basin has a groundwater level decline of about one foot per year. Across the basin, there are examples of wells that show either declining, stable or increasing groundwater levels. Examples were provided for each type of trend in groundwater levels.

It was noted that quite a few wells, used for historical monitoring of groundwater elevation, do not have measurements after 2000. Since 2000, hydrographs were shown to indicate the current trends in groundwater levels, as measured according to feet above sea level. A different type of mapping approach shows groundwater levels as distance below ground surface level. (i.e., how far down you have to go to reach saturated groundwater.)

For most of the basin, groundwater is mapped as shallow – or located relatively close to the surface. These areas also contain perennial streams. In the northeast area of the basin the map shows a cone of depression, where groundwater is found 120 feet beneath the surface. The map contours were calculated using fall measurements for groundwater elevations from 2000 – 2019.

Different wells were then selected, to incorporate historical data showing trends in groundwater levels since 1980. Again, examples were provided for wells with declining, stable, and increasing groundwater levels. Across the valley, the depth to groundwater varies from about 10 feet to 120 feet.

Since groundwater levels determine the direction of groundwater flow, it's important to map out the groundwater elevations reflected in the hydrographs. Using District and CASGEM data, Rich showed the seasonal changes in groundwater levels for 2006-2009. (See the animated slides in the meeting recording at: https://www.youtube.com/watch?v=CgaIDBCuKR0, at time point 1:52:00 through 1:54:30.) These represent "four-year running means" to help average data points across several years. It provides a regional average of how the groundwater levels are fluctuating with recharge and pumping periods.

The difference in groundwater levels, across points, creates a gradient – much like the contour lines of a topographic map. These gradients are affected by recharge, pumping, faults and geology. The level of the gradient (e.g., steep or flat) will indicate how much water is moving along the gradient. There is more flow in an area with a steeper gradient.

Discussion: Comments, Questions and Answers

Comment: In many areas, where the maps and hydrographs show greater depth to groundwater, it's possible to dig down and find water at shallower depths (like 6 inches). There is a difference in groundwater levels and where pumping occurs.

Response: Groundwater depths are collected from different heads across the aquifer. Water at shallow levels does not necessarily represent the saturated aquifer shown in the maps and hydrographs.

Comment: The levels where pumping occurs have definitely gone down.

Response: There is not one uniform aquifer level. There are different levels which are simplified in the model. The data here represents the principle (or production) aquifer, or the area where pumping occurs.

Question: It's important to differentiate what might be expected to see in real-life, versus modeling data. Graveled wells provide different information from monitoring wells.

Response: This is a first cut at analyzing groundwater data which will be refined as more data comes in.

A zoom poll was conducted, asking: 1) whether participants were concerned about long-term declining trends in groundwater levels and 2) what beneficial uses/users of groundwater may be impacted by declining groundwater levels.

- All participants reported that they were concerned about long-term declines in groundwater levels.

- Participants responded that significant and unreasonable impacts include domestic and agricultural wells going dry, adverse impacts to GDEs and inter-connected surface waters, and increased pumping costs.

ACTION ITEM: Convene a small group to discuss GDEs and connected surface water. (Jill Slocum and Ken Roby are interested in working on this.)

GROUNDWATER LEVELS and WELLS

Rich Pauloo then described examples of how agricultural and domestic wells might be protected from significant and unreasonable impacts. Sustainable management criteria can be established to help quantify where groundwater levels are or are not contributing to significant and unreasonable outcomes.

Looking at the number of total wells drilled in the Sierra Valley basin, many wells (both domestic and agricultural) are no longer active. Wells are retired for a number of reasons – usually for structural reasons such as degraded casings or plugged screens.

As might be expected, domestic wells are shallower and agricultural wells are deeper. A graph shows the depth of domestic and agricultural wells, with a line defining the 25th and 75th percentiles. Shallower domestic wells might be at risk for going dry if groundwater levels decline. Shallower wells tend to be older – and more likely to be closer to retirement.

Average well depths are increasing over time. In 1980, average domestic well depth was about 100 feet and by 2020 the average domestic well depth is about 250 feet. Similarly, average agricultural well depth was about 450 feet; by 2020 the average agricultural well depth is approximately 650 feet.

Sustainable Management Criteria

Rich provided examples of how some other basins have approached: 1) defining undesirable results, or those that are significant and unreasonable; 2) identifying a measurable objective; and 3) setting a minimum threshold.

One strategy for determining whether results are undesirable is to look at the number of (and costs associated with) wells going dry due to declining groundwater levels. Another undesirable result might be excessive pumping costs to reach deeper groundwater levels. (A cost-benefit analysis would also look at the economic benefits associated with agricultural values realized from greater groundwater use.) A minimum threshold might then be set at the point where unreasonable results occur.

It was noted that there were no reports of wells going dry during the low groundwater levels in 2015, which occurred as a result of the drought. Subsequently, keeping groundwater elevations at or above 2015 levels would protect wells from undesirable results due to dewatering. The lowest groundwater levels were about 10 feet lower than current groundwater levels.

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Participants

TAC MEMBERS

X = attendance

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

EX-OFFICIO MEMBERS

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

TECHNICAL TEAM & PLANNING COMMITTEE

X Laura Foglia, LWA Project Manager

X Rich Pauloo, LWA Hydrogeologist

X Dave Shaw, Balance Hydrogeologic

X Betsy Elzufon, LWA Asst. Project Mgr. (admin)

X Judie Talbot, Outreach Facilitator

X Gus Tolley, DBS&A Hydrogeologist

X Kristi Jamason, Planning Committee