

# Foster Meadow – Middle Fork Cosumnes River

## Cosumnes River Watershed

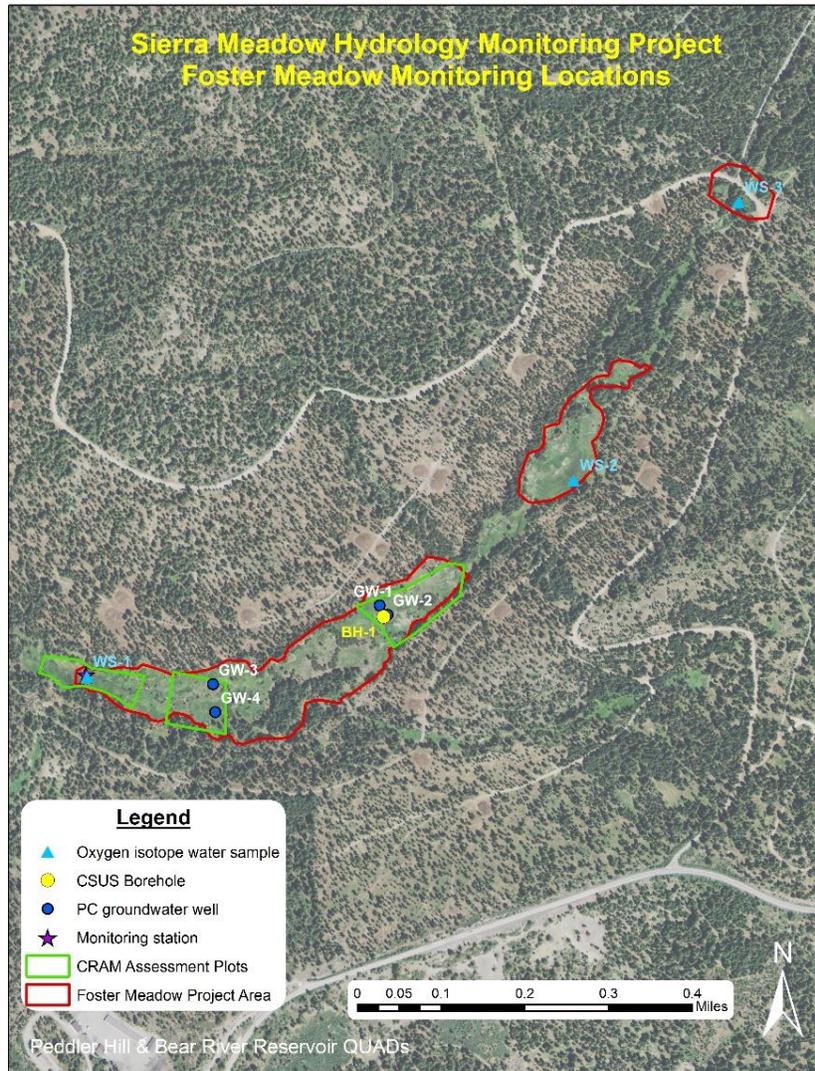
*Excerpt from 2021 Sierra Meadows Hydrology Monitoring Annual Report*

### Foster Meadow – Middle Fork Cosumnes River

Foster Meadow, a recently restored meadow, is in the headwaters of the Middle Fork Cosumnes River at a mean elevation of 6,800 ft. Drainage area above the monitoring station is approximately 1.7 square miles and receives 55.1” mean annual precipitation, primarily from snow (USGS StreamStats, 2018). Foster Meadow was identified and prioritized as a restoration project by the Amador Ranger District (ARD) of the El Dorado National Forest (ENF) collaboratively with the Amador Calaveras Consensus Group (ACCG). The 27-acre Foster Meadow Project area was delineated by several degraded reaches separated by reaches that were still functional. In addition, a culvert upstream of the meadow was a barrier to aquatic organism passage. Project construction, treating both the meadow and improving aquatic organism passage, was completed in late summer/early fall of 2020. Data collection for 2021 is summarized in Table 6 and Figure 25 and represents the first year of post-restoration data collection.

**Table 6.** Summary of Foster Meadow 2021 Field Season Data Collection.

Description	Site visit dates	Data collected by	Comments
Stream Flow Measurement	5/22, 6/18, 9/23, 10/23	Plumas Corporation	SMS equipment left in over 2020-21 winter.
Groundwater wells			
CSUS Piezometers			
Temperature (Air, Water)			
Electrical conductivity (Stream)			
Oxygen isotopes (plus EC & Temp)			



**Figure 25.** Map showing locations of data collection in Foster Meadow (Cosumnes River watershed). See Appendix D for a full-page version of this map.

**Geologic Characterization:**

Foster Meadow lies within the Sierra Nevada geomorphic province with outcrops of Permian to Neogene granodiorite and quartz monzonite to the north of the meadow that are in contact with Neogene andesite and rhyolite deposits south of the meadow. The stream channels within this meadow are sinuous and have a variety of landforms. These stream channels have sand and gravel to cobble beds with some small gravel bars, a few cut banks and some areas with stabilizing vegetation. There is also a small area near the lower end of the meadow that is bedrock controlled.

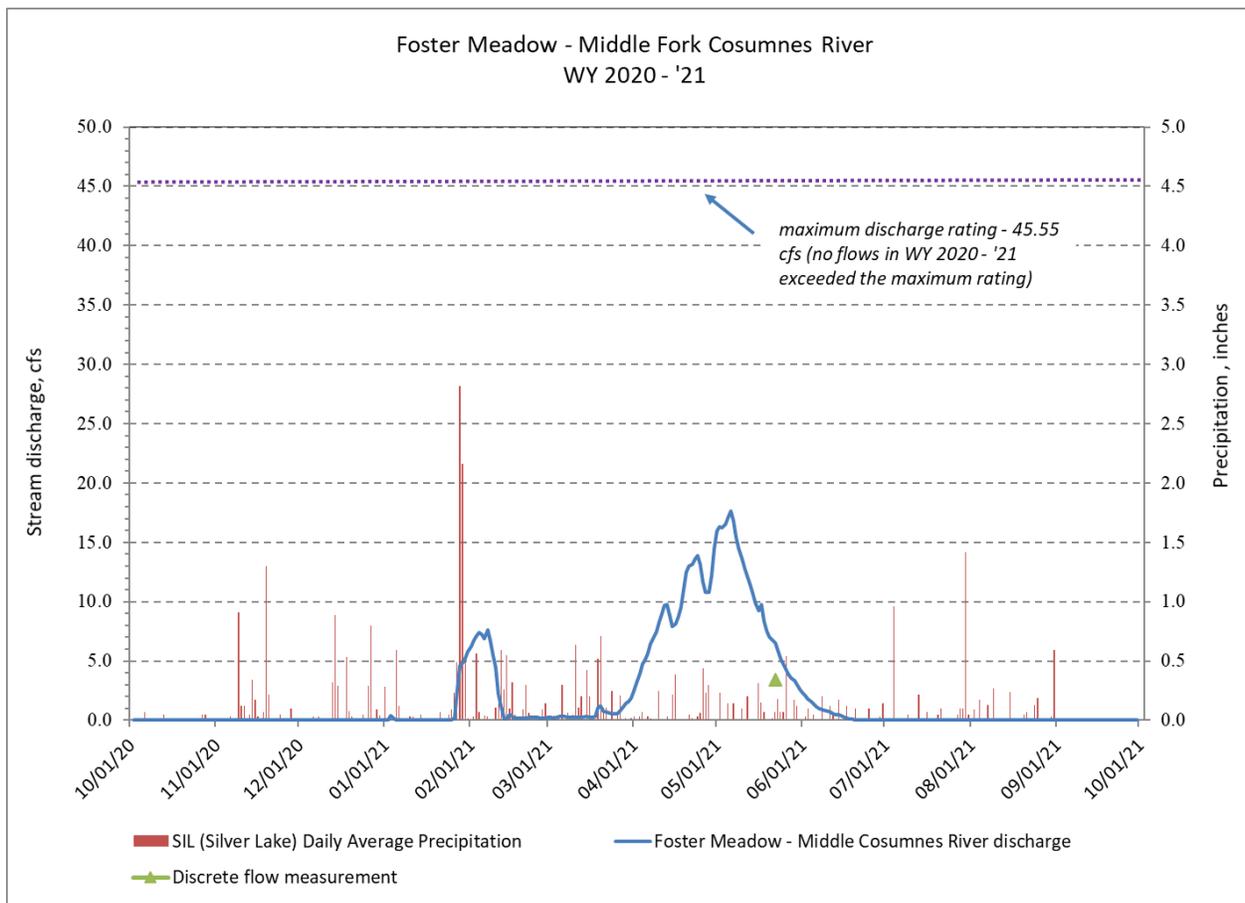
Seismic data collection at Foster Meadow was conducted in 2017 with a total of five surveys completed. The survey data collected yielded good results with reasonable energy wave times for mountain meadows. However, site conditions prevented collection of enough quality data to calculate potential groundwater volume. The seismic survey data reduction worksheets can be found in Appendix D of the

2018 and 2019 Annual Reports (Appendix D, [Sierra Hydrology Monitoring Program - Plumas Corporation](#)).

**Hydrology:**

*Stream Flow*

The first site visit of the 2021 field season was May 22<sup>nd</sup>. Stream flow was manually measured monthly for the period May 22<sup>nd</sup> to October 23<sup>rd</sup> with the exception of July and August when wildfire activity (Caldor Fire) resulted in road/forest closures that prevented access to the meadow. The data were used to calibrate and verify the continuously recorded transducer data. Measured stream flows ranged from a visible, but unmeasurable amount (September 2021) to 3.40 cfs (May 2021), with a majority of the measured flows less than 0.5 cfs. Flows less than 0.5 cfs fall in the range where data accuracy is compromised by the accuracy of the measurement equipment. A stage-discharge relationship was generated, though it needs to be interpreted with the understanding that the very low flows are difficult to accurately quantify and there has only been one high flow measurement that was collected by skiing into the site during spring runoff. Daily average stream flows from the transducer data were plotted against precipitation data collected at the Silver Lake weather station within 12.5 miles of the Foster Meadow SMS (Figure 26). As was observed at Dry Meadow, the surface flows are more influenced by climatic fluctuations rather than the recent restoration work.



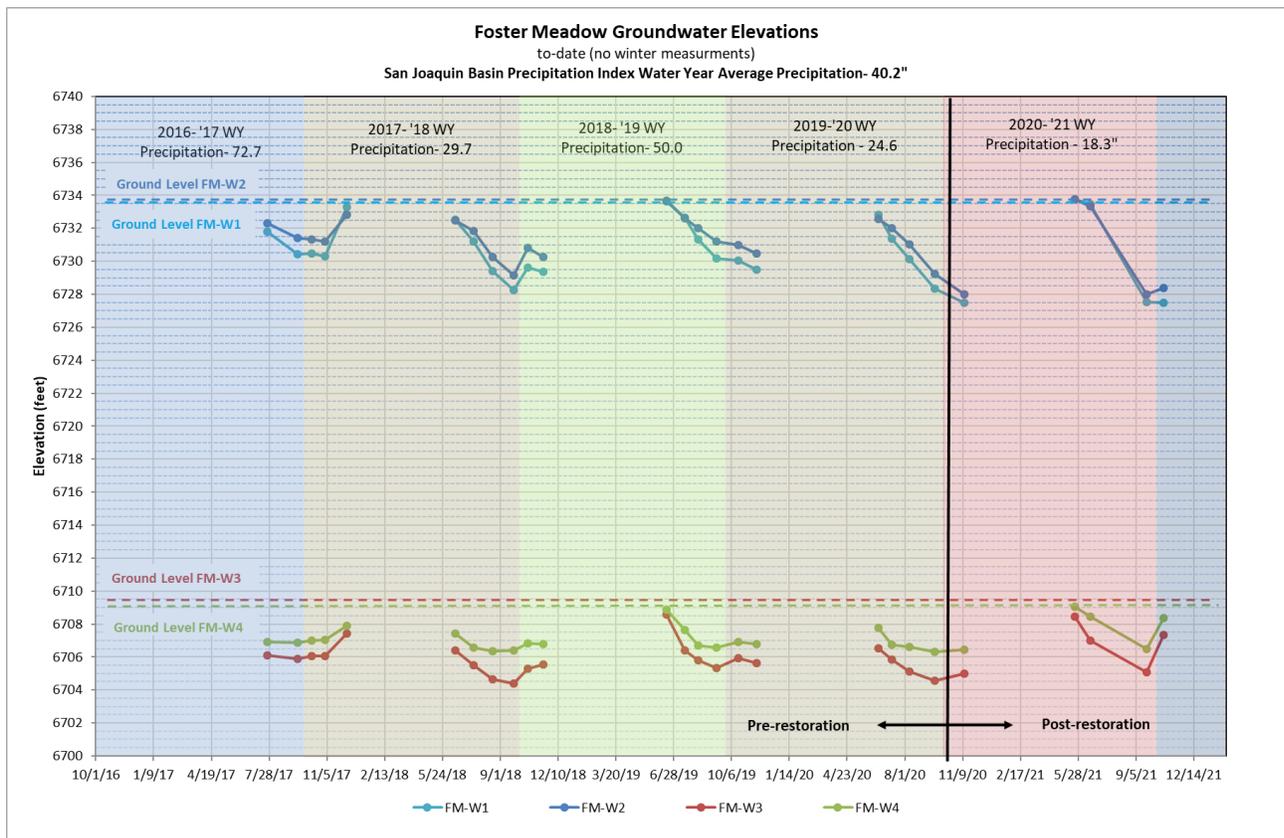
**Figure 26.** Daily averaged stream flow data for the Middle Fork Cosumnes River at Foster Meadow (Source: SMS Level TROLL® 500 transducer) and daily precipitation data from Silver Lake weather station. SIL, operated by US

Bureau of Reclamation, is located approximately 12.5 air miles northeast of Foster Meadow SMS, at 7,100 ft elevation (Source: CDEC).

### Groundwater

Foster Meadow has a total of five groundwater wells and piezometers located in two transects along the main channel of the meadow (Figures 25). The four groundwater wells, plus one CSUS piezometer were measured for groundwater levels during the Plumas Corporation monthly monitoring visits.

Groundwater elevations for all the wells and one piezometer show that for the 6-month monitoring period (May – October), groundwater levels were within one foot or less of the meadow surface (Figure 27; piezometer data not graphed because it is located within 20’ of FS-W2). The groundwater levels show a similar pattern seen in other degraded Sierra Meadows where groundwater levels show year-to-year response to climatic changes, but that pattern appears to be changing to reflect the effects of the 2020 restoration. This positive response is suggested by the higher groundwater table in early summer despite 2021 being a drier-than-normal water year and the relatively rapid response, particularly of wells FM-W3 and FM-W4 in late fall following plant senescence and precipitation events.



**Figure 27.** Groundwater levels for Foster Meadow wells. Gaps in data are during the winter months when site is inaccessible. The single piezometer, FM\_B\_1(data not shown), is within 25’ of FM-W2.

### Oxygen Isotopes

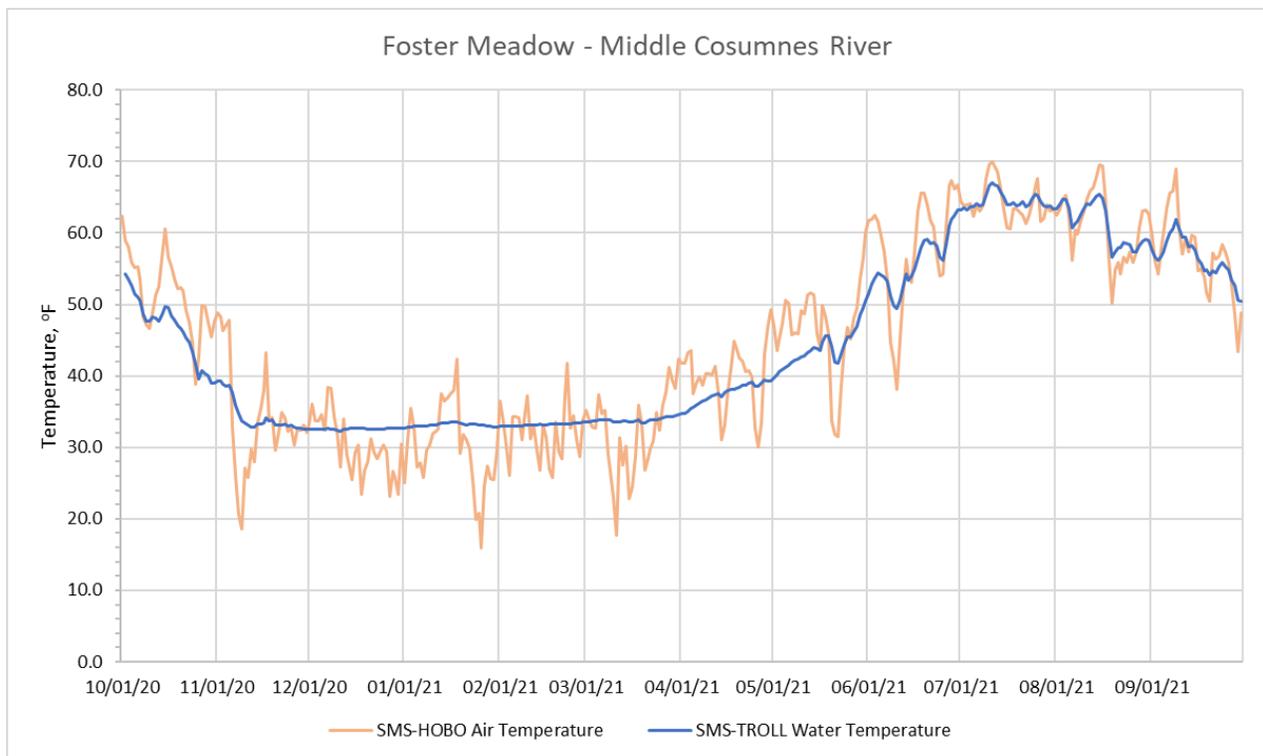
Water samples (24) were collected monthly (when enough water was available) in 2021 for oxygen isotopic analysis. Samples collected in 2021 consisted of surface water from three locations where streams enter and exit the meadow and three groundwater wells (Appendix D, Tables 1 and 1a). Due to Covid-19 restrictions placed on the CSUS staff and students, downed machine time and resultant sample analysis backlogs, water samples collected in 2020 and 2021 field seasons have only begun to be analyzed; samples are safely stored at CSUS and will be analyzed as soon as possible. An addendum to the discussion of oxygen isotope data in the 2019 Annual Report is included in Appendix I of this report.

### Electrical Conductivity (EC)

Electrical conductivity was measured at each surface water location where an oxygen isotope sample was taken during the monthly site visits; this included the stream gage site, a tributary channel in a fen located above the main meadow and at the top of the fen where the main channel flow exists a culvert. EC ranged from 40 uS to 70 uS at the SMS and 30 US to 70 uS at the upstream surface water locations. No surface water was present at sample location WS-2 on the October 23<sup>rd</sup> site visit.

### Temperature

Water temperature was measured at the gage pool by the Level TROLL® 500 transducer and recorded every 15 minutes, from October 1, 2020 through September 30, 2021. An Onset HOBO® sensor was hung in a nearby fir tree and recorded air temperature every 90 minutes over the same time period. Daily average water and air temperature data are shown in Figure 28. No Plotwatcher wildlife camera was deployed at the Foster Meadow SMS due to lack of a suitable mounting tree and concerns about vandalism.



**Figure 28.** Daily average water temperature data (Source: SMS Level TROLL® 500 transducer) and daily average air temperature data calculated from HOBO® data logger at SMS site.

***Cited references included in the complete “2021 Sierra Meadows Hydrology Monitoring Annual Report”***