

**PERAZZO MEADOWS RESTORATION
HYDROLOGIC MONITORING DATA
REPORT: PERAZZO MEADOWS, SIERRA
COUNTY, CALIFORNIA**

WATER YEAR 2018

Report prepared for:
Truckee River Watershed Council

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**Perazzo Meadows Restoration Hydrologic Monitoring Data Report
Sierra County, California, Water Year 2018**

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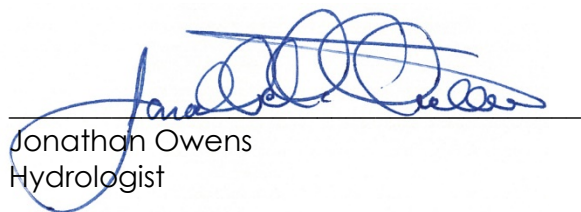


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1. PROJECT PURPOSE AND INTRODUCTION

The Truckee River Watershed Council (TRWC) requested that Balance Hydrologics, Inc. (Balance) monitor streamflow and groundwater conditions at multiple locations at Perazzo Meadows in Sierra County, California. The purpose of the monitoring program is to evaluate pre- and post-restoration hydrologic conditions in the Upper Little Truckee River watershed as part of the Perazzo Meadows Restoration project. Monitoring streamflow, groundwater levels, and their interactions are important for the following reasons:

- Streamflow is the principal attribute affecting aquatic habitat and fish populations;
- Little is known about shallow groundwater fluctuations and the amount of groundwater that can be retained in restored meadows;
- Limited documentation is available regarding the effect of meadow restoration on downstream peak flows and mid-to-late-summer baseflow;
- Observed conditions and restoration performance criteria need to be placed in context of long-term variability in order to make reliable comparisons to other systems and other years; and
- A continuous record of streamflow and groundwater levels allows for an evaluation of the restoration program and geomorphic and vegetation changes for which the project was designed.

This report summarizes streamflow at six different locations upstream and downstream of Upper, Middle and Lower Perazzo Meadows and groundwater conditions in each meadow for water year 2018 (WY2018)¹, the eighth year of a multi-year hydrology monitoring program. This data report includes:

- A brief description of what measurements were made, and where;
- A summary of the measurements;
- Groundwater levels at 23 piezometers placed in select areas of the meadows;

¹Most hydrologic and geomorphic monitoring occurs for a period defined as a water year, which begins on October 1 and ends on September 30 of the named year. Water year 2018 (WY2018) began on October 1, 2017 and concluded on September 30, 2018.

- A comparison of groundwater level fluctuations in restored meadows to groundwater levels prior to restoration;
- Daily, monthly, and annual streamflow values for the six gaging stations during WY2018; and
- A comparison of annual peaks and daily mean streamflow at measured inflows to and outflows from Perazzo Meadows.

1.1 Acknowledgments

Funding for the data collection and synthesis presented in this report is from the California Department of Fish and Wildlife and the U.S Forest Service (USFS)-Tahoe National Forest, awarded to the TRWC. Work was carried out in coordination with the TRWC and the USFS, and individuals from those organizations were instrumental in helping to develop the monitoring program. Beth Christman of the TRWC conducted field monitoring and data collection activities as part of this program.

2. SITE DESCRIPTION

2.1 Perazzo Meadows

Perazzo Meadows is located in the Little Truckee Watershed, part of the Truckee River Watershed, about 15 miles northwest of the Town of Truckee in Sierra County, California. The Meadows are accessed from Jackson Meadows Road to the north and from Henness Pass Road to the south (**Figure 1**). The watershed includes three named tributaries: the Little Truckee River (termed Lacey Creek upstream of Webber Lake), Perazzo Creek, and Cold Stream. The series of meadows is divided into an Upper, Middle, and Lower Meadow, separated by small canyons and volcanic bedrock outcrop.

These sub-alpine meadows are situated in a tectonically formed basin, now filled with glacial outwash, lacustrine deposits, and alluvial silt, sand, and gravel. The watershed reflects many of the geologic events that have shaped the Central Sierra: the hillsides north and south of the meadows consist of andesitic breccia, mudflow deposits, and welded tuff, while the headwaters of Perazzo Creek drain meta-sedimentary rocks. A veneer of glacial till and moraines are also present along the margins of the valley. Several glacial outwash terraces are present within the alluvium of the valley floor; most notably on the south side of the Middle Meadow at an elevation approximately 30 feet above the Middle Meadow. Remnant outwash terraces are also present on the northeast side of the Upper Meadow, approximately 2 to 3 feet higher than the meadow surface. The banks of Perazzo Creek and the Little Truckee River are typically composed of sand and silty sand overlying gravel and cobble, with occasional exposures of silty clay underlying the alluvial sediments.

Hydrology in the watershed is influenced by California's Mediterranean climate and the sub-alpine elevation. The watershed ranges from 6,459 feet above mean sea level (NGVD29) at the Lower Meadow to 9,148 feet at Mount Lola. Most of the annual precipitation falls as snow, with occasional summer thunderstorms, and early fall rainstorms. Atmospheric river events can drive winter storms and result in rain-on-snow events triggering mid-winter flooding. Annual peak flows tend to occur during spring snowmelt, but the periodic rain-on-snow events can often exceed snowmelt peak flow magnitudes. Perennial streams and associated wet meadows are supported by springs

emanating from the adjacent hillsides, especially on the south side of the valley, creating discharge slope wetlands.²

2.2 Pre-Project Conditions and Restoration Activities

Prior to restoration, portions of the meadows had been converted from riparian low and middle gradient meadows to dry meadows as the result of cumulative effects of historical land-uses (Swanson Hydrology and Geomorphology, 2008). The degraded system included a single channel that followed a meandering course through the meadow. High-magnitude, low-frequency floods were largely contained with the channel in most locations with limited floodplain/meadow connectivity.

During the summers of 2009 and 2010, the USFS employed a 'plug and pond' restoration approach that included filling the channel at various intervals through the meadows (plug). Material used for channel fill was excavated from the channel upstream of each plug to create a pond. The approach encouraged streamflow to spread across the valley floor and reoccupy multiple relict channels that had been abandoned.

2.3 Groundwater Monitoring

Balance and the TRWC established a groundwater monitoring program beginning in summer 2009, just prior to implementation of restoration activities in the Upper Meadow. A network of eleven shallow monitoring wells ('piezometers') was installed in the Upper and Middle Meadows, supplementing four piezometers that had been previously installed by the USFS. Piezometers were installed in the Upper Meadow on August 21, 2009, and the Middle Meadow on August 27, 2009. On September 23, 2009, several piezometers were instrumented with water-level recorders, programmed to measure and record water levels every 15 minutes. Water level recorders were installed in all piezometers in WY2015. In order to relate changes in groundwater level to water surface elevations in the channel, several staff plates were installed in the main stream channel to monitor stream stage. Piezometers and staff plates were surveyed into the same datum to relate water surfaces. Groundwater, stream stage monitoring and streamflow station locations in the Upper and Middle Meadows are shown in **Figures 2 and 3**.

Meadow and wetland terminology used herein is based on Weixelman and others' (2011) hydrogeomorphic classification system for the Sierra Nevada and Southern Cascade Ranges in California.²

Upper and Middle Meadow piezometers were designed to measure seasonal water-table fluctuations, and range in depth from 4.1 to 8.0 feet below the meadow surface. Piezometer locations were chosen to represent a range of geomorphic and hydrologic conditions, including spring-fed areas with perennial saturation (e.g. Piezometers 09-02, 09-06), upland surfaces (e.g. 09-05, FS-14, 09-11), and areas adjacent to the main channel (e.g. 09-03, 09-09), as shown in **Figures 2 and 3**.

Campbell well points were used to construct the screened interval of each piezometer, with a nominal diameter of 1¼-inches, and connected via galvanized steel couplers to 1¼-inch galvanized steel pipe. The well points were driven by hand with a fencepost pounder until refusal, presumably in gravels or perhaps clayey silt at depth. In order to evaluate potential vertical hydraulic gradients, a reflection of the upward or downward movement of shallow groundwater, the piezometers were selected with screens only in the bottom 24 inches. When present, vertical hydraulic gradients provide an indication of the shallow groundwater flow direction, either downward from the surface into the ground, or upward from the ground to the surface.

During the summer of 2011, UC Merced researchers installed several additional piezometers in Lower Perazzo Meadow (**Figure 4**) using similar methods and equipment to those described for the Upper and Middle Meadows and assisted with field measurements of groundwater levels in the Middle Meadow and streamflow at the Lower Perazzo Meadow outlet, as part of a Sierra-wide study of restoration effects on meadow hydrology. Future restoration of Lower Perazzo Meadow is currently planned for Summer 2019.

Upper and Middle Meadow piezometers were monitored by TRWC and Balance staff beginning in September 2009. In the fall of 2014, UC Merced discontinued monitoring efforts and Balance and TRWC began monitoring the Lower Meadow piezometers, utilizing the existing instruments. Monitoring consists of measuring the depth to water with an electronic water-level sounder and measuring the specific conductance and temperature of the groundwater at each piezometer. Specific conductance measures the ability of water to conduct electricity and is a field surrogate for the concentration of total dissolved salts in the water. Snow and rain have a very low specific conductance, (approaching zero) and groundwater is considerably higher; as water passes over and through the ground, salts are dissolved and the specific conductance increases. Higher specific conductance therefore indicates longer residence times in the ground, or transmittal through salt-bearing geologic formations, and can be used to distinguish groundwater sources.

The piezometers were occasionally bailed after water-level readings were taken in order to ‘flush’ the piezometer and allow the water level to equilibrate with the surrounding soil. The specific conductance and temperature measured in bailed piezometers were thus assumed to have remained representative of groundwater conditions. TRWC or Balance staff performed these activities approximately monthly during the dry season and periodically during the winter months as access permitted.

2.4 Streamflow Monitoring

The TRWC authorized Balance to establish and maintain a streamflow monitoring program beginning in summer 2009, just prior to implementation of restoration activities in the Upper Meadow. Beginning October 1, 2009, one continuous-recording streamflow gaging station was established on the Little Truckee River at the downstream end of the Middle Meadow (Station ID LTPM). Early in WY2011, Balance received authorization to establish five additional streamflow gaging stations to help evaluate inflows to the meadow, flows through the meadows and downstream of the meadows. Four gages were installed and instrumented in November 2010, and two additional gages were installed and instrumented in August 2011. All six gages were instrumented with water level and temperature recorders, programmed to measure and record readings every 15 minutes. For the purposes of this report, our results are presented as daily mean streamflow values. Locations of all six streamflow gaging stations are illustrated in **Figure 5** and summarized in **Table 1**. WY2012 was the first year in which we reported a full annual record for all six stream gages. Gaging continues through the current water year (WY2019).

Balance's standard stream-gaging practices follow procedures used by the USGS, as outlined by Carter and Davidian (1968). Balance hydrologists and USFS staff measured flow over a range of different water depths at all six stations. Based on our periodic site visits, staff plate readings, and streamflow measurements, we created an empirical stage-to-discharge relationship for each station, also referred to as a stage-discharge “rating curve.” We then used this rating curve developed for each station to convert the continuous-logging record of stage to flow. As is typically done, we applied multiple stage shifts to account for local scour and fill during the monitoring period, and the effects of leaf and debris dams during low flows. As with all open-channel gaging of natural streams, a higher degree of uncertainty remains at high flows and during periods of ice formation, despite efforts to be as precise as possible, as discussed in more detail by Rantz (1982). Because this monitoring program has been developed with the intent of evaluating flows during the spring and summer, efforts to accurately

measure winter peak flows are limited. As such all peak flows and annual runoff values are estimated. Also, the stream gages can be affected by ice during the winter. When ice affects are identified we estimate the flow values by interpolation of before and after conditions or correlation with other streamflow gages.

2.4.1 Description of the Streamflow Gaging Stations

2.4.1.1 *Perazzo Creek above Perazzo Meadows (PCAP)*

The stream gage is located on the west bank of Perazzo Creek, along a bedrock channel approximately 0.5 miles upstream from Upper Perazzo Meadow and approximately 1.4 miles upstream from the confluence with the Little Truckee River. The gaging site was selected to evaluate inflows to the Upper Meadow from Perazzo Creek. The gaging station was installed on November 17, 2010 and designated as 'PCAP' (Perazzo Creek above Perazzo). The watershed area above PCAP is approximately 6.1 square miles and receives an average of 64.6 inches of precipitation (USGS, 2017). The gage pool at PCAP was filled in with sediment and cobbles during the high flow events of WY2017 causing the gage pool to become dry in mid-summer. The sediment and cobbles were removed manually on August 10, 2017, reconnecting the gage pool to the stream channel. The gage pool filled with sediment again during WY2018 and the gage was found dry while PCAP was still flowing on July 19, 2018 at which time it was dredged and reconnected to the channel. This gage can be affected by ice during winter and spring months.

2.4.1.2 *Little Truckee River above Perazzo Meadows (LTAP)*

The stream gage is located on the south bank of the Little Truckee River, just downstream of a bedrock channel and boulder riffle, approximately 0.25 miles upstream from Upper Perazzo Meadow, at the USFS road #7-030 bridge. The gaging site was selected to evaluate inflows to the Upper Meadow from the Little Truckee River. The gaging station was installed on November 18, 2010 and designated as 'LTAP' (Little Truckee River above Perazzo Meadows). The watershed area above LTAP is approximately 15.8 square miles and includes Webber Lake and the Lacey Meadows watershed. This area receives an average of 58.7 inches of precipitation (USGS, 2017), and can be affected by ice during winter and spring months.

2.4.1.3 *Little Truckee River below Upper Perazzo Meadow (LTUM)*

The stream gage is located on the east bank of the Little Truckee River, along a boulder and cobble channel approximately 0.9 miles downstream from the confluence with

Perazzo Creek, downstream of Upper Perazzo Meadow, at the Hennes Pass Road Bridge. The gaging site was selected to evaluate outflows from the Upper Meadow, and a portion of inflow to the Middle Meadow. The gaging station was installed on November 19, 2010 and designated as 'LTUM' (Little Truckee River below Upper Perazzo Meadow). The watershed area above LTUM is approximately 25.5 square miles and includes the sub-watersheds gaged by LTAP and PCAP and an additional 3.6 square miles of intervening area. Mean annual precipitation in the contributing watershed area is approximately 58.5 inches (USGS, 2017). This gage can be affected by ice during winter and spring months. This gage was damaged by high flows during WY2017. The staff plate was dislodged and bent, and the stilling well was ripped off the gage. A new staff plate and well was installed on July 19, 2017 at the original gage location.

2.4.1.4 Cold Stream above Perazzo Meadows (CSAP)

The stream gage is located on the right (east) bank of Cold Stream, a perennial tributary to the Little Truckee River, along a step-pool reach with abundant wood, approximately 1.57 miles upstream from the confluence with the Little Truckee River. The gaging site was chosen to be well above the meadow to avoid the dynamic channel changes in the lower alluvial fan reach, and very steep and dynamic reaches immediately above the alluvial fan. The gaging station was installed on August 18, 2011. The gaging site has been designated as 'CSAP' (Cold Stream above Perazzo Meadows). The watershed area above CSAP is approximately 3.1 square miles and receives an annual average of 54.4 inches of precipitation (USGS, 2017).

2.4.1.5 Little Truckee River below Middle Perazzo Meadow (LTPM)

The stream gage is located on the north bank of the Little Truckee River at the outlet of the Middle Meadow. The gaging site was selected to evaluate outflows from the Middle Meadow, as well as a portion of inflows to the Lower Meadow. The gaging station was installed on September 25, 2009 and designated as 'LTPM' (Little Truckee at Middle Perazzo Meadow). The watershed area above LTPM is approximately 32.8 square miles and includes the sub-watersheds gaged by the four upstream gages (LTAP, PCAP, CSAP, and LTUM) and additional 4.2 square miles of intervening area. The contributing watershed receives an average of 56.3 inches of precipitation annually (USGS, 2017). The gage pool began to fill with sediment in 2017 when a secondary overflow channel on the right bank of the downstream control became the primary channel. In WY2018 a new gage was installed on the right bank of the upstream pool.

2.4.1.6 Little Truckee River at Lower Perazzo Meadow (LTLM)

The stream gage is located on the north bank of the Little Truckee River at the outlet of the Lower Meadow. The gaging site was selected to evaluate flows at the outlet of the Lower Meadow, an unrestored meadow, downstream of the Upper and Middle Meadows. The gaging station was installed on August 18, 2011 and designated as 'LTLM' (Little Truckee at Lower Perazzo Meadow). The watershed area above LTLM is approximately 34.2 square miles and includes the sub-watersheds gaged by the five upstream gages (LTAP, PCAP, CSAP, LTUM and LTPM) and additional intervening areas totaling 1.4 square miles. The watershed receives an average of 56.3 inches of precipitation. This gage can be affected by ice during winter and spring months. This gage was damaged during WY2017 when the tree that the gage was anchored to fell. The staff plate and water-level recorders were recovered from the stream bed on May 23, 2017. A new gage was installed on July 19, 2017, when snowmelt flows had receded.

2.5 Historical Streamflow Gaging

The United States Geological Survey (USGS) operated a stream gage on the Little Truckee River from June 26, 1993 to September 30, 1998 and again during parts of WY2014, WY2015 and WY2016 (USGS 10341950). Streamflow at this station is affected by the Sierra Valley Mutual Water Company diversion ditch immediately upstream. Mean annual flow for the period of record at the USGS gage ranged between 23.5 cfs and 183 cfs. Peak annual flows ranged between 300 cfs and 3,980 cfs. Peak flows are generally less affected by diversions and can be used to assist in the interpretation of peak flows reported for Perazzo Meadows. **Table 2** summarizes the USGS gage station information and data for the period of record through WY2016. This station was decommissioned on November 2, 2016.

We understand that streamflow data has been collected on the Sierra Valley Diversion Ditch and reported to the Federal Watermaster but have not evaluated that data set as part of this monitoring program.

2.6 Comparisons to Other Watersheds

The streamflow records for Perazzo Meadows are also compared to Sagehen Creek, near Truckee, California (USGS 10343500), about 7 miles to the southeast, to provide a basic check on flow magnitudes and timing of streamflow variations.

The Sagehen Creek gaging station (USGS 10343500) measures streamflow from a 10.5 square-mile watershed with a mean annual precipitation of 38 inches. The Sagehen Creek watershed is more distant from the Sierra Nevada crest with less precipitation than many of the Perazzo Meadow contributing watersheds. However, this gaging station has an uninterrupted 65-year period of record with no upstream storage or diversions; therefore, it is referenced and used as part of this monitoring program for comparison with general hydrology trends and for ice correction.

3. WY2018 HYDROLOGIC SUMMARY AND DISCUSSION

This section summarizes WY2018 annual precipitation, snowpack conditions, streamflow conditions at each gaging station and groundwater trends in each of the meadows.

3.1 Annual Precipitation

The Independence Creek weather monitoring station (SNOTEL Station 540) is operated by the Natural Resource Conservation Service (NRCS) and is located at similar elevation to (6,455 feet) and approximately 3.5 miles east of Perazzo Meadows. This station is used for daily and annual precipitation for this report as it is the closest weather monitoring station to the project site. Mean annual precipitation at this station is 32.7 inches.

Annual and long-term average snow-water equivalent (SWE) is reported from Independence Lake SNOTEL Station (NRCS SNOTEL Station 541), located 3.5 miles southeast of Perazzo Meadows at 8,338 feet elevation. The Independence Lake SNOTEL station serves as the best available reference for WY2018 snowpack conditions in the Perazzo Meadows watershed, given its similar elevation.

Cumulative precipitation during WY2018 is illustrated in **Figure 6** with the daily mean, maximum and minimum air temperatures. WY2018 was unseasonably dry for the first half of the water year (October to February) with some smaller sporadic storms. March was well above average with 15.3 inches of precipitation. The wet spring continued bringing the annual total to 42 inches by June. The summer was again unseasonably dry with little to no thunderstorm activity and only 0.4 inches of additional precipitation. Overall the late winter/early spring storms brought the yearly total to 42.4 inches of precipitation, 30% more than the long-term average.

Figure 7 illustrates SWE during WY2018 relative to the previous 7 years and the long-term average. Peak SWE in WY2018 (April 20, 2018) was 37.5 inches. Despite the late season increase in precipitation, the peak annual SWE was 6.5 inches lower than the long-term average. Snow melt-out ended thirty-one days earlier than the wet year of WY2017 and twelve days earlier than WY2016, a year with near-average snowpack.

3.2 Streamflow

In the following subsections, we describe streamflow during WY2018 at each gaging station from upstream to downstream. WY2018 was primarily a below average precipitation year until spring. The late winter/early spring storms resulted in a below

average snowpack but an increase of total precipitation above the long-term average.

3.2.1 Perazzo Creek above Upper Perazzo Meadow (PCAP)

Table 3 provides information and observations from site visits and manual measurements of flow at Station PCAP. An annual streamflow summary, including peak flows and monthly and annual statistics is provided in **Form 1**. Daily stage and flow are graphically illustrated in **Figures 8 and 9**, respectively.

Baseflow at the beginning of WY2018 varied between 0.9 cubic feet per second (cfs) and 1.8 cfs. The estimated annual peak flow of 385 cfs was recorded on April 7, 2018 at this station. Spring snowmelt runoff increased streamflow in late April with peak snowmelt runoff of 144 cfs on April 26, 2018. Streamflow remained elevated through most of June with daily mean flows over 10 cfs through June 21. Flows continued to recede through the rest of July. Baseflow between 0.1 cfs and 0.3 cfs was recorded from late July through the end of the water year.

Perazzo Creek discharged approximately 12,803 acre-feet of streamflow to the Upper Meadow, almost 3.5 times less water than was measured in WY2017, a record setting year, and about half of that in WY2016, which had an average snowpack.

3.2.2 Little Truckee River above Upper Perazzo Meadow (LTAP)

Table 4 provides information and observations from site visits and manual measurements of flow at LTAP. A streamflow summary of available data is provided in **Form 2**. Records of daily stage and flow records are graphically illustrated in **Figures 10 and 11**, respectively.

Baseflow in the beginning of WY2018 was around 1 cfs. The estimated annual peak flow of 483 cfs was recorded on April 7, 2018. Spring snowmelt runoff increased through late April with a snowmelt peak flow of 283 cfs on April 28, 2018. Daily mean flow remained above 10 cfs until June 25 and continued to slowly decrease until mid-July. Baseflow of below 1 cfs lasted from late July until the gage went dry on August 26, 2018. During a late summer site visit in the staff plate was dry but the stilling well remained in a pool. There was some inflow into the pool with no outflow. The channel downstream of the gage was completely dry. The gage and channel were completely dry at the end of water year site visit in October 2018.

In WY2018, LTAP discharged approximately 30,633 acre-feet of surface water into Upper Perazzo Meadow.

3.2.3 Little Truckee River below Upper Perazzo Meadow (LTUM)

Table 5 provides information and observations from site visits and manual measurements of flow at Station LTUM. A streamflow summary of available data is provided in **Form 3**. Records of daily stage and flow are graphically illustrated in **Figures 12 and 13**, respectively.

Baseflow at the beginning of WY2018 was recorded between 2 cfs and 4 cfs. The estimated annual peak flow of 846 cfs was recorded on April 7, 2018. Snowmelt peak flow reached 430 cfs on April 27, 2018. Elevated daily mean flows persisted above 11 cfs through the end of June 2018. Daily mean flows decreased through July and most of August and resulted in baseflows of 0.5 cfs to 0.3 cfs at the end of the water year.

Upper Perazzo Meadow discharged approximately 46,178 acre-feet of water during WY2018.

3.2.4 Cold Stream above Middle Perazzo Meadow (CSAP)

Table 6 provides information and observations from site visits and manual measurements of flow at Station CSAP. An annual streamflow summary, including peak flows and monthly and annual statistics is provided in **Form 4**. Daily stage and flow are graphically illustrated in **Figures 14 and 15**, respectively.

CSAP is the highest elevation gage in the monitoring program. During winter, most precipitation falls as snow at this station and the contributing watershed above. As such, ice-affected flows are more common; however, snowmelt runoff may persist later into the spring and summer relative to other stations. WY2018 began with daily mean baseflow of 1.6 cfs to 2.3 cfs. Besides a mid-November storm, the daily mean flows at CSAP remained between 1 cfs and 4 cfs with some slight increases through the beginning of April 2018. Rain-on-snow in April resulted in an estimated annual peak flow of 36 cfs on April 7, 2018.

Snowmelt began in late April with daily mean flows increasing above 10 cfs. An estimated peak snowmelt flow of 33 cfs was recorded on May 25, 2018. Daily mean flows remained above 20 cfs until early-June, dropping below 10 cfs in the last week of June 2018. Daily mean flows continued to decrease through July and the beginning of

August. Daily mean baseflows between 1.3 cfs and 0.9 cfs were recorded from mid-August through the end of the water year.

Cold Stream contributed approximately 3,913 acre-feet of water to Middle Perazzo Meadow, approximately 45 percent less than in WY2017.

3.2.5 Little Truckee River below Middle Perazzo Meadow (LTPM)

Table 7 provides information and observations from site visits and manual measurements of flow at Station LTPM. An annual streamflow summary, including peak flows, monthly and annual statistics is provided in **Form 5**. Daily stage and flow for Station LTPM are graphically illustrated in **Figures 16 and 17**, respectively.

WY2018 began with a baseflow above 5 cfs at this station. Daily mean flow increased after the mid-November storms. A rain-on-snow event resulted in the estimated peak flow of roughly 1,103 cfs on April 7, 2018. Snowmelt runoff increased through April with a peak flow of 439 cfs on April 27, 2017. Daily mean flows began to recede in mid-July falling below 10 cfs on July 13, 2018 and fell below 3 cfs on August 19, 2018. Baseflows remained near 2 cfs through the rest of the water year.

The total annual flow was measured to be 54,573 acre-feet at LTPM, less than half of the measured flow in WY2017 (128,697 acre-feet).

3.2.6 Little Truckee River below Lower Perazzo Meadow (LTLM)

Lower Perazzo Meadow, downstream from LTPM, has not yet been restored. Ongoing collection of baseline data prior to restoration of the meadow provides a valuable data set which will be used to compare to post-restoration conditions. **Table 8** provides information and observations from site visits and manual measurements of flow at Station LTLM. An annual streamflow summary, including peak flows, monthly and annual statistics is provided in **Form 4**. Daily mean stage and flow are graphically illustrated in **Figures 18 and 19**, respectively.

Baseflow in the beginning of WY2018 ranged between 5 cfs and 7 cfs. Daily mean flow increased with the mid-November storms. A rain-on-snow event resulted in an estimated peak flow of 1,207 cfs on April 7, 2018. Snowmelt continued in April and the peak snowmelt runoff at this station was measured to be 432 cfs on April 27, 2018. Streamflow receded through July, with daily mean streamflow dropping below 10 cfs on July 15, 2018. Baseflow at the end of WY2018 was recorded between 3 cfs and 4 cfs.

In total, the Little Truckee River at the outlet of Lower Perazzo Meadow discharged an estimated 59,416 acre-feet of water in WY2018.

3.2.7 Comparison of Streamflow and Annual Runoff

WY2018 streamflow hydrographs from all six stations are illustrated in **Figure 20** and runoff volumes for all six stations (including estimates for ungaged areas) are reported in **Table 9**. Snowmelt recession runoff is reported for all six stations on a monthly basis (May-September) in **Table 10**, and monthly streamflow is tabulated in **Figure 21**.

Based on a comparison of available streamflow data from all six stations and streamflow on Sagehen Creek, we draw the following conclusions:

- The flow records are generally consistent with regional hydrologic trends;
- Based on the methods used for field streamflow measurements, the flow records are reasonably accurate. High flows are not well calibrated and therefore peak flows and total annual flow are estimated;
- All stations with complete records exhibited similar timing for peak flows, although some variation in the timing of peak snowmelt was observed;
- Record setting WY2017 contributed to elevated baseflows at the beginning of WY2018;
- Dry conditions persisted through most of the early winter and affected streamflow levels and
- Late winter/early spring storms provided a major contribution to annual streamflow.

Perazzo Meadows streamflow has been gaged since 2009 and there are complete records for all six stations since WY2012³. **Figure 22** shows the total annual flow measured at all stations since WY2011. WY2016 offers a point of comparison to WY2018, as snowpack was slightly above average after a prolonged drought and total precipitation was slightly below average. In contrast, snowpack in WY2018 was slightly below average and total precipitation was slightly above average.

³ LTAP, LTUM and LTLN have partial data for WY2017 due to damage caused by high flows from record precipitation.

Differences in total flow volume in those years indicate that this system is dependent on snowpack and timing of snowmelt more than precipitation.

3.3 Groundwater

Groundwater levels were monitored beginning in July 2009 and through WY2018. The piezometers are located (shown in **Figures 2, 3 and 4**) to characterize groundwater response to the plug and pond restoration efforts, as well as document pre-restoration conditions in the Lower Meadow. Field observations for the period of record are presented in **Table 11**, including depth to groundwater, specific conductance, and qualitative observations. Specific conductance in groundwater is illustrated in **Figure 23**. **Figures 24 and 25** show the continuous record of depth to groundwater and streamflow into the Upper Meadow during the past 4 years, from drought (WY2015), to a near-average precipitation year following drought (WY2016), to one of the wettest years on record (WY17), to a near-average precipitation year following that wet year (WY18). **Figure 26** shows depth to groundwater in the upper section of the Middle Meadow and **Figure 27** shows depth to groundwater in the lower section of the Middle Meadow. **Figure 28** shows the depth to groundwater in the Lower Meadow for WY2016 through WY2018.

The Upper Meadow was restored in Summer 2009 and the Middle Meadow was restored in Summer 2010. Restoration of the Lower Meadow has not yet occurred but is planned in 2019. As outlined in the first annual monitoring report for this study, immediate groundwater level increases in response to restoration ranged from 0 to 6 feet in the Upper Meadow, and 0.5 to 2 feet in the Middle Meadow, depending on location (Shaw, 2010). Since that time, the late summer groundwater levels have become lower than during the immediate post-restoration period, possibly due to channel and meadow evolution or, in some cases breaching of plugs.

Specific conductance in piezometers (**Figure 23**) provides an indication of whether shallow groundwater is primarily under the influence of snowmelt and surface runoff, or if deeper groundwater is moving through the meadow at a particular location. In many areas of the meadow, no discernable pattern in specific conductance values is present. Other areas of the meadow exhibit a trend in which specific conductance starts off low in the spring (an indication of relatively fresh snowmelt) and rise over the course of the summer and fall (indicating influences of deeper groundwater that has had more contact time in the ground). The specific conductance data also highlight areas which receive support from deeper groundwater in the late summer, such as in

the southeastern portion of the Upper Meadow in the vicinity of Piezometer 09-2. Also of note, are occasional high specific conductance values in Piezometers 09-4 and 09-5, located in the western portion of the Upper Meadow, especially during the extremely wet conditions of WY2017. This may perhaps be due to excessive recharge during that time and associated flushing of deeper groundwater to the surface.

The conductance values in the Middle Meadow have less variability, with little to no consistent interannual or intra-annual trends.

In contrast, specific conductance values in the Lower Meadow have increased in variability over the last three years. This could be attributed to less retention of runoff in the Lower Meadow, combined with increased late season groundwater discharge due to upgradient aquifer recharge.

3.3.1 Groundwater Levels in the Upper Meadow

Upper Meadow groundwater level data indicate that the above average precipitation in WY2017 caused the meadow to be inundated in more areas and for a longer period than in previous years, with relatively high groundwater levels lasting through the summer and into WY2018. Most of WY2018 was relatively dry, however, and even with late season precipitation and briefly elevated groundwater levels, groundwater receded to levels at or below those during the WY2012 to WY2015 drought in some areas, highlighting the importance of snowpack in maintaining late-season groundwater conditions.

Figure 25 shows the four piezometers located at the downstream (north end) of the upper meadow and PCAP streamflow for WY2015-WY2018. Piezometer 09-5 is located at an upland terrace area, roughly 2 to 3 feet above the meadow surface and shows the largest seasonal variability and limited connection to streamflow of all the Upper Meadow monitoring locations. Groundwater levels rise to the ground surface only during the wettest conditions and regularly drop to 4 feet below the ground surface during the summer months with the well drying up.

Piezometer 09-3 is located downstream in a low gradient portion of the meadow near the confluence of the Little Truckee River and Perazzo Creek and near relict channels which were re-wetted as part of restoration efforts. Like other portions of the Upper Meadow, this area remained inundated throughout WY2017 and the beginning of WY2018. Water levels in this well dropped below ground surface in late June earlier than

in previous years, and to levels not observed since restoration was implemented. We presume that this is primarily due to geomorphic changes associated with the high flows of WY2017.

3.3.2 Groundwater Levels in the Middle Meadow

Figures 26 and 27 show depth to groundwater in the western and eastern portions of the Middle Meadow, respectively. Restoration and subsequent beaver activity caused water levels to rise in the eastern Middle Meadow (Piezometers 09-6, 09-8, and 09-9) and persist at shallow depths for several years after restoration. Groundwater levels in these areas began to fall deeper in the summer during WY2016, likely due to evolution of the channel and meadow. This seasonal decline in groundwater levels has persisted through WY2017 and WY2018, such that groundwater levels in this area now fall to within 1 foot of pre-restoration late summer water levels.

Piezometer 09-11 is located at an elevation slightly higher than much of the meadow, and as such continues to show minimal to no effects from restoration activities.

3.3.3 Groundwater Levels in the Lower Meadow

Since Balance assumed monitoring responsibilities in the Lower Meadow, depth to groundwater in all the piezometers have consistently been 3 to 6 feet below the ground surface during the summer months, except for WY2017 which was one of the wettest years on record (**Figure 28**). Lower Meadow groundwater levels are typically further below the ground surface than in the restored Upper and Middle Meadows. Winter and spring groundwater conditions are also lower in the unrestored lower meadow.

4. CONCLUSIONS

Nine years after plug and pond restoration activities in the Upper Meadow and eight years after the Middle Meadow restoration, we observed groundwater levels at Upper and Middle Perazzo Meadows to vary spatially and temporally, in some locations from the landscape and elevation position, and in other locations due to minor modifications and re-direction of surface flows. WY2018 precipitation and snowpack conditions were characterized as slightly above average and slightly below average respectively. Record precipitation from WY2017 was shown to have some extended effects on groundwater levels and early season streamflow.

Beginning in WY2015 groundwater monitoring in the Lower Meadow was included in this program and will allow for comparison to conditions after restoration (scheduled for 2019) and can serve as a control against which to compare groundwater conditions and effects of channel evolution in the Upper and Middle Meadows. With several years of data, we now have the ability to evaluate groundwater and streamflow under a range of conditions. In summary, examination of several years of recent data leads us to conclude the following:

- Carry-over from WY2017 precipitation led to slightly higher groundwater levels in the beginning of WY2018, but lower snowpack, perhaps combined with topographic changes and channel evolution, led to lower groundwater conditions in portions of the Upper and Middle Meadows and
- Upland areas in the Upper and Middle Meadows show little to no effect from restoration activities and can also serve as a control on year-to-year variation in more affected zones of the Upper and Middle Meadows.

5. LIMITATIONS

This report was prepared in general accordance with the accepted standard of practice existing in Northern California at the time the investigation was performed. No other warranties, expressed or implied, are made. It should be recognized that interpretation and evaluation of streamflow records and of subsurface conditions is a difficult and inexact art. Judgment leading to conclusions and recommendations presented above were based on existing information and personnel communications, which in total represent an incomplete picture of the site. More extensive studies, including those recommended above, can reduce some of the uncertainties associated with this study.

Balance Hydrologics has prepared this report for the Truckee River Watershed Council's exclusive use on this particular groundwater and surface water monitoring study. Analyses and information included in this report are intended for use at the watershed scale. Analyses of channels and other water bodies, rocks, earth properties, topography and/or environmental processes are generalized to be useful at the scale of a watershed, both spatially and temporally. Information and interpretations presented in this report should not be applied to specific projects or sites without the expressed written permission of the authors, nor should they be used beyond the area to which we have applied them.

This study was conducted to monitor work done by others. Our conclusions and any implied or inferred recommendations are based on a limited range of surface water and groundwater data in a region of relatively complex geology. They are limited to restoration evaluation purposes and should not be used for design or site-specific work. If readers are aware of additional data, observations, conditions, or forthcoming changes to the bases of our decisions, please contact us or the Truckee River Watershed Council at the first opportunity, such that this report may be promptly revised.

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LIST OF FORMS

Water Year: 2018
Stream: Perazzo Creek
Station: Above Perazzo Meadows (PCAP)
County: Sierra County, California

Form 1. Annual Hydrologic Record, WY2018

Station Location / Watershed Descriptors

N 39° 27' 53", W 120° 23' 16" near Truckee, California. Gage is located on west bank.
 Along USFS Road 07-030
 Land use includes timber harvesting, recreation, and open space
 Flows are unregulated
 Drainage area is 6.1 square miles.

Annual Mean Flows

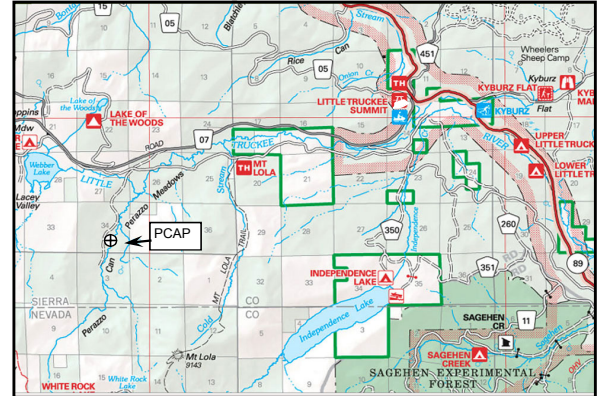
Annual mean flow for WY2018 was 17.7; WY2017 was 59.7 cfs; WY2016 was 34.4 cfs; WY2015 was 9.2 cfs; WY2014 was 7.8 cfs; WY2013 was 13.9 cfs; WY2012 was 14.0 cfs; WY2011 was 37.4 cfs.

Peak Flows (WY2018)

Date	Time	Gage Ht. (feet)	Discharge (cfs)	Date	Time	Gage Ht. (feet)	Discharge (cfs)
11-16-17	10:30	5.09	86	3-22-18	10:15	5.51	168
11-26-17	21:00	5.37	119	4-7-18	9:00	6.52	385
1-6-18	3:45	4.93	61	4-26-18	21:00	5.39	144
1-9-18	19:00	5.00	72	5-25-18	8:30	5.31	111

Extreme for period of record (WY2011-2017) is 502 cfs on January 8, 2017.

Station Location Map



Period of Record

Staff plate and water level recorder were installed on November 17, 2010.
 Gaging is sponsored by the Truckee River Watershed Council and USFS

WY 2017 Daily Mean Flow (cubic feet per second)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
1	1.8	0.9	9.2	2.9	5.7	4.2	28.4	45.8	48.8	3.4	0.3	0.1
2	1.8	0.8	8.1	3.0	5.9	4.1	31.9	47.4	51.1	2.9	0.2	0.1
3	1.8	1.3	8.4	2.8	6.1	4.1	32.6	56.5	55.9	2.7	0.2	0.1
4	1.8	1.9	8.6	3.8	6.2	4.0	32.0	74.1	55.6	2.6	0.2	0.1
5	1.8	1.5	8.1	8.1	6.2	4.0	36.3	78.9	47.0	2.2	0.2	0.1
6	1.7	1.4	7.6	31.3	6.1	3.9	122.9	92.5	40.6	2.0	0.2	0.1
7	1.6	1.3	7.1	12.8	5.9	3.9	271.6	95.2	35.9	1.9	0.2	0.1
8	1.5	1.4	6.6	26.7	5.7	3.4	125.8	106.8	31.7	1.6	0.2	0.1
9	1.3	7.5	6.1	64.1	5.9	3.4	84.8	117.5	31.9	1.4	0.1	0.1
10	1.4	4.0	5.6	34.0	5.7	3.8	79.6	99.4	25.4	1.4	0.1	0.1
11	1.4	2.8	5.1	19.0	5.5	4.1	68.8	84.1	22.8	1.3	0.1	0.1
12	1.5	2.1	4.6	13.7	5.4	4.6	57.9	67.4	24.2	1.2	0.1	0.1
13	1.3	2.4	4.1	11.6	5.3	12.7	48.0	54.4	24.0	1.2	0.1	0.1
14	0.9	3.3	4.2	10.2	5.2	20.9	45.0	56.4	22.9	1.1	0.1	0.1
15	0.9	4.6	3.9	9.0	5.0	11.8	47.7	56.1	20.3	1.0	0.1	0.1
16	0.9	60.0	3.9	8.6	4.9	9.6	46.2	52.5	18.1	1.0	0.1	0.2
17	0.8	14.8	4.0	8.4	4.9	13.3	37.3	49.8	18.7	0.8	0.1	0.2
18	0.8	10.7	4.1	9.7	4.9	12.3	31.3	55.1	15.3	0.7	0.1	0.2
19	0.9	6.3	3.6	13.3	5.0	7.9	27.1	57.1	13.5	0.7	0.1	0.2
20	2.1	8.3	4.0	12.2	5.2	6.9	25.4	56.5	12.7	0.8	0.1	0.4
21	1.6	13.7	4.1	15.3	5.4	33.4	33.0	58.3	10.9	0.8	0.1	0.3
22	1.6	13.0	4.6	8.9	5.5	124.9	50.2	65.0	9.7	0.8	0.1	0.2
23	1.4	15.4	3.3	10.3	5.7	66.9	59.7	64.0	9.0	0.7	0.1	0.2
24	1.2	16.0	3.2	7.0	5.7	33.9	68.3	66.7	8.3	0.7	0.1	0.3
25	1.1	12.4	3.3	11.2	5.1	25.7	81.7	79.6	7.6	0.6	0.1	0.4
26	1.0	44.6	3.3	10.7	4.3	26.5	103.6	49.6	6.8	0.6	0.1	0.5
27	1.0	40.1	3.0	7.8	4.8	15.8	117.9	51.9	5.8	0.5	0.1	0.5
28	0.9	17.9	3.1	7.2	5.2	16.7	88.2	63.7	5.2	0.4	0.1	0.4
29	0.9	12.8	2.9	6.5		19.1	64.1	68.9	4.7	0.4	0.1	0.5
30	0.9	10.5	2.7	6.1		21.3	51.0	64.5	4.0	0.4	0.1	0.7
31	0.9		2.9	5.8		24.3		51.4		0.3	0.1	
MEAN	1.3	11.1	4.9	13.0	5.4	17.8	66.6	67.3	22.9	1.2	0.1	0.2
MAX. DAY	2.1	60.0	9.2	64.1	6.2	124.9	271.6	117.5	55.9	3.4	0.3	0.7
MIN. DAY	0.8	0.8	2.7	2.8	4.3	3.4	25.4	45.8	4.0	0.3	0.1	0.1
cfs days	40	334	153	402	153	552	1998	2087	688	38	4	7
ac-ft	80	662	303	798	303	1094	3963	4140	1365	76	7	13

Monitor's Comments

- Data manager: Benjamin Trustman
- Daily mean values are based on 15-minute automated measurements of stage; stage shifts have been applied to account for changes in sedimentation of the gage over the course of the monitoring program.
 - Stage and flow are commonly affected by ice in the winter months; flow during these periods have been estimated from daily mean flows at USGS 10343500 (Sagehen Crk near Truckee CA).
 - Peak flows associated with snow-melt hydrographs commonly occur between April and June; multiple peaks are also common
 - Data are subject to revision, should additional measurement or observer account warrant adjustment of the new rating curve.
 - Italics represent data that has been corrected for water level recorder inconsistencies due to ice effects

Water Year		
2018 Totals:		
Mean flow	17.7	(cfs)
Max. daily flow	272	(cfs)
Min. daily flow	0.07	(cfs)
Annual total	6,455	(cfs-days)
Annual total	12,803	(ac-ft)

Balance Hydrologics, Inc. PO Box 1077, Truckee, CA 96161 phone: (530) 550-9776, Berkeley (Main Office) (510) 704-1000
www.balancehydro.com

Water Year: 2018
Stream: Little Truckee River
Station: Above Perazzo Meadows (LTAP)
County: Sierra County, California

Form 2. Annual Hydrologic Record, WY2018

Station Location / Watershed Descriptors

N 39° 28' 59", W 120° 22' 57" near Truckee, California. Gage is located on south bank approximately 130 feet upstream of USFS Road 07-030 bridge.
Land use includes timber harvesting, recreation, open space, and rural residential.
Streamflow may be affected by Webber Lake (reservoir)
Drainage area is 15.8 square miles.

Annual Mean Flows

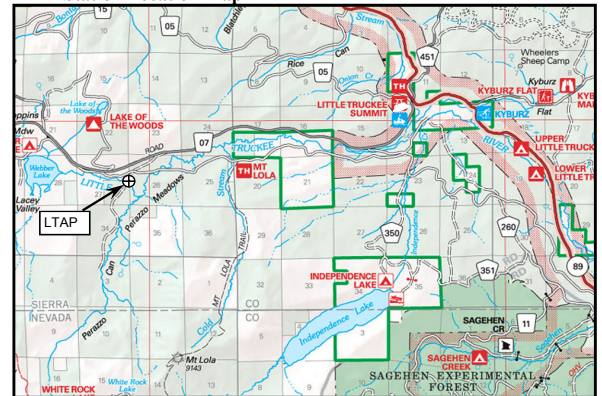
Annual mean flow for WY2018 was 42.5 cfs, WY2017 was not calculated due to incomplete record from damaged gage, WY2016 was 46.7 cfs, WY2015 was 15.3 cfs, WY2014 was 12.4 cfs, WY2013 (partial) was 24.7 cfs, WY2012 is 27.0 cfs, WY2011 (partial) is 88.5 cfs.

Peak Flows (WY2018)

Date	Time (24-hr)	Gage Ht. (feet)	Discharge (cfs)	Date	Time (24-hr)	Gage Ht. (feet)	Discharge (cfs)
11-17-17	23:30	4.12	186	4-7-18	16:15	5.75	483
11-27-17	6:15	3.93	155	4-28-18	6:45	4.07	283
1-10-18	0:00	3.94	157	5-9-18	2:00	3.89	251
3-23-18	23:00	3.91	154	5-25-18	17:45	3.60	200

Extreme for period of record (WY2011-WY2018) is 701 cfs on June 24, 2011.

Station Location Map



Period of Record

Staff plate and water level recorder were installed on November 18, 2010.
Gaging is sponsored by the Truckee River Watershed Council and USFS

WY2018 Daily Mean Flow (cubic feet per second)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
1	1.0	0.9	27.5	4.9	14.3	9	80.3	180	103.8	8.6	0.7	0.0
2	1.1	1.0	22.8	5.2	15.1	8	94	178	95.9	7.8	0.7	0.0
3	1.1	1.1	22.9	5.3	15.9	8	101	185	95.1	6.9	0.7	0.0
4	1.1	1.5	18.7	7.5	17.2	8	105	203	92.2	6.8	0.7	0.0
5	1.0	1.2	14.7	14.8	17.9	8	111	217	85.5	7.2	0.6	0.0
6	1.0	0.9	13.6	70.4	18.0	8	167	215	78.5	6.6	0.6	0.0
7	1.0	0.7	11.9	49.6	16.6	7.4	393	223	71.7	6.1	0.6	0.0
8	1.0	0.6	11.6	41.5	16.1	7.7	329	227	65.6	5.6	0.5	0.0
9	1.1	1.9	11.2	122.8	16.6	7.7	235	234	61.6	4.9	0.5	0.0
10	1.1	1.4	10.6	122.5	16.9	8.7	211	223	50.8	4.4	0.5	0.0
11	0.9	1.2	10.0	73.3	14.8	9.5	193	203	48.8	4.0	0.5	0.0
12	0.8	1.5	9.2	49.2	14.4	9.4	164	180	46.4	3.5	0.4	0.0
13	0.8	1.6	8.7	39.0	12.7	16.8	136	168	43.7	3.1	0.4	0.0
14	0.8	1.7	7.9	33.4	11.6	30.7	127	172	39.3	2.7	0.4	0.0
15	0.9	2.2	7.6	29.1	11.0	32.0	140	171	34.3	2.4	0.3	0.0
16	0.9	115.2	8.0	27.3	10.2	42.0	133	173	29.6	2.3	0.4	0.0
17	0.9	119.8	6.9	26.2	9.8	28.4	114	176	28.7	2.1	0.4	0.0
18	0.9	51.7	7.2	28.1	10	26.4	100	171	28.1	1.9	0.3	0.0
19	0.9	28.9	6.9	41.8	10	17.1	87	169	25.9	1.8	0.3	0.0
20	1.3	22.2	8.9	36.3	10	16.4	79	163	23.9	1.6	0.2	0.0
21	1.0	37.4	8.5	28.4	9	31.7	91	155	19.1	1.5	0.2	0.0
22	0.9	35.8	7.1	24.3	9	89	122	157	16.6	1.4	0.2	0.0
23	0.9	32.9	6.1	22.2	9	135	143	156	14.6	1.3	0.2	0.0
24	0.9	32.6	6.0	20.7	9	135	156	154	13.3	1.2	0.1	0.0
25	1.1	30.3	5.8	25.2	9	100.9	168	182	12.6	1.1	0.1	0.0
26	1.1	39.8	5.8	23.0	9	89.0	191	168	11.4	1.0	0.1	0.0
27	1.1	126.8	5.3	18.8	9	64.1	214	143	10.8	0.9	0.1	0.0
28	1.1	70.2	5.2	17.8	9	57.7	251	138	9.8	0.9	0.0	0.0
29	1.1	45.1	4.9	16.7		58.9	222	136	9.4	0.8	0.0	0.0
30	1.1	33.7	4.6	15.3		62.8	195	131	9.1	0.8	0.0	0.0
31	1.0		4.8	14.9		70.5		119		0.7	0.0	
MEAN	1.0	28.1	10.0	34.1	12.5	38.8	162	176	42.5	3.3	0.4	0.0
MAX. DAY	1.3	127	27.5	123	18.0	135	393	234	103.8	8.6	0.7	0.0
MIN. DAY	0.8	0.6	4.6	4.9	8.6	7.4	79.4	119	9.1	0.7	0.0	0.0
cfs days	31	842	311	1056	350	1203	4853	5470	1276	102	11	0
ac-ft	62	1670	617	2094	694	2387	9626	10850	2531	202	22	0

Monitor's Comments

- Data manager: Brian Hastings
- Daily mean values are based on 15-minute automated measurements of stage; stage shifts have been applied to account for changes in sedimentation of the gage over the course of the monitoring program.
 - Stage and flow are commonly affected by ice in the winter months.
 - Peak flows associated with snow-melt hydrographs commonly occur between April and June; multiple peaks are also common.
 - Daily mean flows may be affected by operations at Webber Lake (Reservoir).
 - Data are subject to revision, should additional measurement or observer account warrant adjustment of the rating curve.
 - Period of inferred ice-affected flows include 2/18/18 through 3/6/18; values are estimated.

Water Year 2018 Totals:		
Mean flow	42.5	(cfs)
Max. daily flow	393	(cfs)
Min. daily flow	0.00	(cfs)
Annual total	15,505	(cfs-days)
Annual total	30,754	(ac-ft)

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www.balancehydro.com

Water Year: 2018
Stream: Little Truckee River
Station: Upper Perazzo Meadows (LTUM)
County: Sierra County, California

Form 3. Annual Hydrologic Record, WY2018

Station Location / Watershed Descriptors

N 39° 29' 10", W 120° 22' 13" near Truckee, California.
 Located on east bank, approx. 40 feet downstream from Henness Pass Rd bridge. Subject to ice.
 Land use includes timber harvesting, recreation, open space, and rural residential
 Streamflow may be affected by Webber Lake (reservoir)
 Drainage area is 25.5 square miles.

Annual Mean Flows

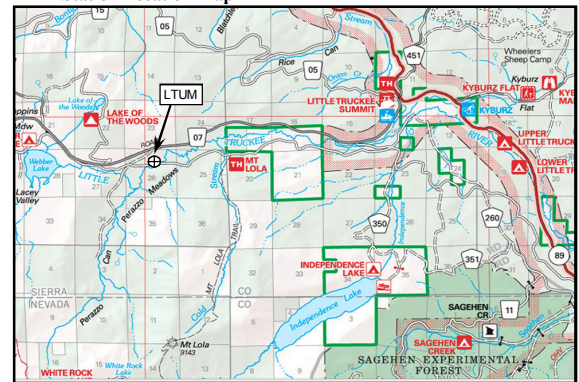
Annual mean flow for WY2018 was 63 cfs, WY2017 was not calculated due to incomplete record from damaged gage, WY2016 was 81 cfs, WY2015 was 28 cfs, WY2014 was 25 cfs, WY2013 was 54 cfs, WY2012 was 45 cfs, WY2011 (partial) is 141 cfs.

Peak Flows (WY2018)

Date	Time (24-hr)	Gage Ht. (feet)	Discharge (cfs)	Date	Time (24-hr)	Gage Ht. (feet)	Discharge (cfs)
11-16-17	18:00	7.64	400	4-7-18	11:15	9.84	846
11-27-17	0:30	7.30	315	4-27-18	1:45	7.67	430
1-10-18	0:15	7.12	269	5-9-18	1:15	7.34	347
3-22-18	16:15	7.22	294	5-25-18	12:15	7.19	278

Extreme for period of record (WY2011-WY2018) is 846 cfs on April 7, 2018

Station Location Map



Period of Record

Staff plate and water level recorder were installed on November 19, 2010.
 Gaging is sponsored by the Truckee River Watershed Council and USFS

WY2018 Daily Mean Flow (cubic feet per second)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
1	4.0	2.8	48.1	11.2	31.5	22	178	191	91.7	9.6	1.5	0.5
2	4.0	2.7	40.9	11.6	33.1	22	188	202	95.5	8.8	1.4	0.5
3	4.2	4.2	42.7	11.4	34.2	22	193	241	96.9	8.0	1.1	0.5
4	4.1	12.6	46.5	17.5	35.7	22	210	267	88.4	8.3	1.1	0.5
5	4.0	9.2	35.9	31.4	36.4	22	374	272	76.2	7.6	1.0	0.5
6	3.7	6.1	29.4	123.1	36.1	21	741	286	68.2	6.7	0.9	0.5
7	3.4	5.1	26.5	74.0	34.1	22.2	559	294	62.2	6.1	0.8	0.5
8	3.4	4.2	25.8	77.8	33.7	23.1	397	303	60.3	5.0	0.8	0.5
9	3.2	28.5	27.5	223.4	34.3	25.2	359	260	52.4	4.9	0.8	0.5
10	3.2	18.8	27.9	190.7	34.4	25.9	325	224	46.5	4.6	0.8	0.4
11	3.0	12.3	27.4	110.1	31.5	27.1	276	183	45.1	3.9	0.7	0.4
12	3.2	8.0	24.5	77.7	31.8	48.5	224	160	45.4	3.8	0.7	0.4
13	2.7	8.0	23.3	63.5	29.4	69.1	208	178	43.0	3.5	0.7	0.5
14	2.2	15.3	17.3	55.5	27.0	68.1	229	179	39.4	3.0	0.5	0.5
15	2.3	24.4	16.0	49.2	26.0	77.2	207	182	36.8	2.8	0.7	0.5
16	2.3	28.5	18.0	47.4	24.4	61.8	175	177	38.3	2.5	0.7	0.5
17	2.3	17.3	22.1	45.0	24.0	64.6	153	179	34.3	2.4	0.7	0.5
18	2.4	74.6	15.4	49.9	24	46.3	132	177	29.7	2.1	0.6	0.5
19	2.6	46.4	14.2	67.1	24	41.0	122	167	27.4	2.1	0.7	0.5
20	7.7	40.7	20.0	58.9	24	76.9	139	159	24.6	1.9	0.7	0.5
21	6.6	64.6	20.8	49.6	23	233	195	172	21.7	1.9	0.7	0.4
22	5.3	59.7	18.9	44.9	23	272	234	167	19.5	1.8	0.6	0.4
23	4.3	57.8	13.4	42.3	23	230	260	171	18.1	1.7	0.5	0.4
24	3.6	58.8	13.1	40.1	23	180	285	230	16.8	1.6	0.6	0.4
25	3.6	51.7	13.4	57.1	23	164	326	179	15.5	1.5	0.6	0.4
26	3.1	92.7	13.5	42.7	23	114	392	142	14.5	1.4	0.5	0.4
27	3.1	218.5	12.1	37.3	23	108	344	147	13.3	1.3	0.5	0.3
28	3.0	107.5	12.0	36.4	22	114	272	151	12.9	1.3	0.5	0.3
29	2.9	72.3	11.2	34.8	22	122	222	147	12.0	1.2	0.5	0.3
30	2.9	56.5	10.4	32.9	22	137	195	122	11.0	1.1	0.6	0.9
31	2.9		11.1	32.3		155.5		97.1		1.0	0.5	
MEAN	3.5	54.0	22.6	59.6	27.9	85.1	270	194	41.9	3.7	0.7	0.5
MAX. DAY	7.7	285	48	223	36	272	741	303	96.9	9.6	1.5	0.9
MIN. DAY	2.2	2.7	10.4	11.2	22.1	21.4	122	97.1	11.0	1.0	0.5	0.3
cfs days	109	1621	699	1846	837	2639	8114	6007	1257	113	23	14
ac-ft	217	3216	1387	3662	1660	5234	16094	11916	2494	225	45	28

Monitor's Comments

- Data manager: Brian Hastings
- Daily mean values are based on 15-minute automated measurements of stage; stage shifts have been applied to account for changes in sedimentation of the gage over the course of the monitoring program.
 - Daily mean stage and flow are commonly affected by ice in the winter months;
 - Peak flows associated with snow-melt hydrographs commonly occur between April and June; multiple peaks are also common
 - Daily mean flows may be affected by operations at Webber Lake (Reservoir)
 - Ice-affected flows from 2/18/18 to 3/6/18, values are estimated.

Water Year 2018 Totals:		
Mean flow	63	(cfs)
Max. daily flow	741	(cfs)
Min. daily flow	0.29	(cfs)
Annual total	23,281	(cfs-days)
Annual total	46,178	(ac-ft)

Water Year:	2018
Stream:	Cold Stream
Station:	Above Perazzo Meadows (CSAP)
County:	Sierra County, California

Form 4. Annual Hydrologic Record, WY2018

Station Location / Watershed Descriptors

N 39° 28' 23", W 120° 20' 30" near Independence Lake, California. Gage is located on east bank .
 Gage accessed from Cold Stream Meadow Road, approx. 500 ft downstream of Lola Trail footbridge
 Land use includes timber harvesting, recreation, and open space
 No known regulation or diversions affect flow
 Drainage area is 3.1 square miles.

Mean Flow

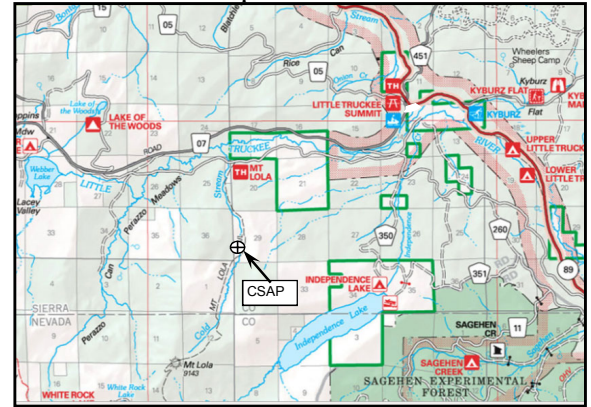
Mean daily flow for WY2018 is 5.4 cfs; WY2017 was 12.0 cfs; WY2016 was 8.1 cfs; WY2015 was 2.7 cfs;
 WY 2014 was 2.8 cfs; WY 2013 was 4.2 cfs; WY 2012 was 5.4 cfs

Peak Flows

Date	Time (24-hr)	Gage Ht. (feet)	Discharge (cfs)	Date	Time (24-hr)	Gage Ht. (feet)	Discharge (cfs)
11-16-17	7:00	4.49	21	5-19-18	17:30	4.58	29
4-7-18	14:00	4.70	36	5-25-18	7:45	4.66	33
4-27-18	16:30	4.43	21	5-30-18	16:45	4.62	31
5-9-18	17:15	4.58	29	6-4-18	17:00	4.59	29

Extreme for period of record, (Aug. 2011-Sept. 2017) is 311 cfs on 1/8/2017

Station Location Map



Period of Record

Staff plate and water level recorder were installed August 18, 2011.
 Gaging sponsored by the Truckee River Watershed Council and USFS.

WY 2018 Daily Mean Flow (cubic feet per second)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
1	2.3	1.8	2.2	1.3	1.5	1.4	2.5	12.0	21.4	7.2	1.8	1.1
2	2.2	1.6	2.0	1.4	1.5	1.3	2.8	12.0	21.7	6.8	1.8	1.1
3	2.1	1.6	1.9	1.3	1.6	1.3	3.0	12.8	23.4	6.5	1.7	1.1
4	2.1	1.6	1.8	1.3	1.6	1.3	3.0	14.7	25.2	5.8	1.7	1.1
5	2.1	1.6	1.8	1.6	1.6	1.3	3.1	15.9	24.3	4.9	1.6	1.1
6	2.1	1.7	1.7	2.8	1.6	1.3	6.1	18.1	22.9	4.7	1.6	1.1
7	2.1	1.6	1.7	2.4	1.5	1.3	21.1	19.8	21.2	4.6	1.6	1.1
8	1.9	1.6	1.7	2.6	1.6	1.2	19.2	22.2	20.2	4.4	1.6	1.1
9	1.8	2.2	1.7	3.9	1.6	1.2	15.2	24.0	19.4	4.0	1.5	1.1
10	1.9	1.8	1.7	2.9	1.6	1.3	13.3	23.3	18.2	4.1	1.5	1.0
11	1.8	1.8	1.8	2.3	1.6	1.3	12.2	21.0	18.0	4.1	1.5	1.0
12	1.8	1.6	1.8	2.1	1.6	1.3	11.4	18.7	18.3	3.8	1.4	1.0
13	1.8	1.6	1.8	2.0	1.6	1.9	10.2	18.1	18.7	3.7	1.4	1.0
14	1.7	1.7	1.6	2.0	1.5	1.7	9.8	19.4	18.6	3.6	1.4	1.0
15	1.9	1.9	1.5	1.9	1.5	1.6	9.4	19.4	18.0	3.5	1.3	1.0
16	1.9	11.5	1.4	1.7	1.5	1.6	8.7	18.4	17.5	3.4	1.3	1.0
17	1.8	3.9	1.6	1.8	1.5	1.6	7.6	18.7	16.7	3.2	1.3	1.0
18	1.9	3.3	1.5	1.9	1.5	1.6	6.9	20.3	14.7	3.1	1.3	1.0
19	1.8	2.2	1.4	3.1	1.5	1.5	6.4	22.3	14.1	2.9	1.3	1.0
20	2.0	2.5	1.4	1.9	1.4	1.5	6.3	22.4	13.9	2.8	1.3	1.0
21	2.0	3.3	1.5	1.7	1.4	2.4	6.9	22.4	13.2	2.6	1.3	1.0
22	2.2	3.0	1.5	1.6	1.4	3.0	9.2	23.5	12.6	2.6	1.2	0.9
23	2.1	3.5	1.3	1.8	1.4	2.0	10.8	23.7	12.2	2.6	1.2	1.0
24	1.9	3.3	1.4	1.5	1.4	2.0	12.1	25.4	11.8	2.4	1.2	1.0
25	2.1	2.9	1.4	1.6	1.4	1.9	13.6	27.6	11.2	2.3	1.2	1.0
26	2.0	3.8	1.4	1.5	1.4	1.8	16.0	23.0	10.7	2.3	1.2	1.0
27	1.9	3.8	1.3	1.5	1.4	1.8	17.8	22.7	9.8	2.2	1.1	1.0
28	1.9	2.9	1.4	1.7	1.4	1.9	16.3	23.9	8.9	2.2	1.2	1.0
29	1.9	2.5	1.4	1.7	1.7	2.1	14.3	26.0	8.4	2.1	1.1	0.9
30	1.9	2.4	1.3	1.6	1.6	2.2	12.8	27.1	7.6	2.0	1.1	0.9
31	1.8		1.4	1.6		2.3		23.7		1.9	1.1	
MEAN	2.0	2.7	1.6	1.9	1.5	1.7	10.3	20.7	16.4	3.6	1.4	1.0
MAX. DAY	2.3	11.5	2.2	3.9	1.6	3.0	21.1	27.6	25.2	7.2	1.8	1.1
MIN. DAY	1.7	1.6	1.3	1.3	1.4	1.2	2.5	12.0	7.6	1.9	1.1	0.9
cfs days	61	81	49	60	42	52	308	642	492	112	43	30
ac-ft	120	160	98	119	83	103	611	1274	977	223	85	60

Monitor's Comments

- Data manager: Jonathan Owens
- Mean daily values are based on 15-minute measurements of stage; several stage shifts are applied to account for changes in the hydraulic control at the gage (changes in sediment and woody debris) over the course of the monitoring program.
 - Mean daily stage and flow are commonly affected by ice in the winter months; periods have been adjusted to correct for ice.
 - Italicized font indicates an estimated flow (when affected by ice).
 - Values with more than 2 significant digits are the result of electronic calculations, and do not represent increased precision.
 - Data are subject to revision, should additional measurements or observer accounts warrant adjustment of the rating curve.

Water Year 2018 Totals:

Mean flow	5.4	(cfs)
Max. daily flow	28	(cfs)
Min. daily flow	0.9	(cfs)
Annual total	1,973	(cfs-days)
Annual total	3,913	(ac-ft)

Balance Hydrologics, Inc. PO Box 1077, Truckee, CA 96161 phone: (530) 550-9776, Berkeley (Main Office) (510) 704-1000
www.balancehydro.com

Water Year:	2018
Stream:	Little Truckee River
Station:	Middle Perazzo Meadow Outlet (LTPM)
County:	Sierra County, California

Form 5. Annual Hydrologic Record, WY2018

Station Location / Watershed Descriptors

N 39° 29' 42", W 120° 20' 7" near Truckee, California. Gage is located on north bank in downstream-most pond, part of the USFS plug and pond restoration project.
Land use includes timber harvesting, recreation, open space, and rural residential
Flows may be affected by Webber Lake (reservoir)
Drainage area is 32.8 square miles.

Annual Mean Flows

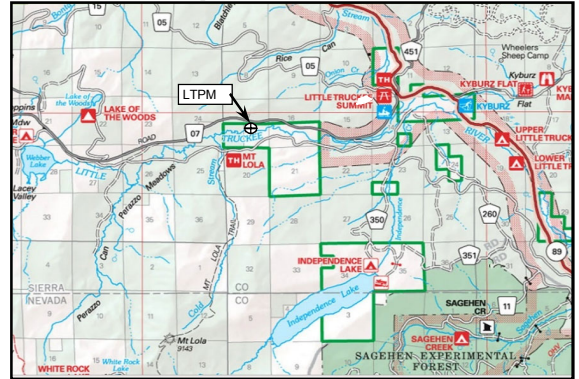
Annual mean flow for WY2018 was 75.4 cfs; WY2017 was 178 cfs; WY2016 was 91.8 cfs; WY2015 was 33.1 cfs; WY2014 was 25.3 cfs; WY2013 was 66.5 cfs; WY2012 was 56.5 cfs; WY2011 was 161.6 cfs.

Peak Flows (WY2018)

Date	Time (24-hr)	Gage Ht. (feet)	Discharge (cfs)	Date	Time (24-hr)	Gage Ht. (feet)	Discharge (cfs)
11-16-17	18:30	2.14	397	4-27-18	0:15	2.21	439
11-27-17	4:15	1.87	291	5-10-18	0:30	2.04	360
1-9-18	21:15	1.76	248	5-25-18	14:30	1.97	328
3-23-18	12:15	2.01	347				
4-7-18	14:00	3.93	1103				

Extreme for period of record (WY2010-WY2017) is 2,039 cfs on January 8, 2017

Station Location Map



Period of Record

Staff plate #1 installed Sep 23, 2010. Datalogger installed on Oct 1, 2009.

Staff plate #2 installed Sep 28, 2010.

Staff plate #3 installed Jun 8, 2011. (Staff plates 1 and 2 are no longer used)

Gaging is sponsored by the Truckee River Watershed Council and USFS

WY2018 Daily Mean Flow (cubic feet per second)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
1	5.9	4.2	54.5	16.5	34.3	19.7	180.4	205.4	149.3	23.6	4.1	2.6
2	5.8	4.1	46.0	16.3	36.6	33.6	203.4	197.9	141.3	21.3	3.9	2.5
3	5.8	5.2	47.6	16.2	37.9	51.6	213.9	205.7	146.4	20.4	4.1	2.4
4	5.7	12.0	41.5	26.7	39.4	45.2	216.4	240.2	153.3	18.9	4.1	2.3
5	5.6	10.3	37.1	31.0	40.1	42.8	232.4	271.4	146.5	17.6	4.0	2.3
6	5.4	7.0	34.5	110.0	40.4	37.0	393.0	274.8	129.7	16.5	3.8	2.3
7	5.1	6.0	31.5	79.4	38.3	31.8	904.4	295.5	116.6	15.3	3.5	2.3
8	5.5	5.5	30.2	68.8	37.9	32.2	648.3	307.5	109.6	13.8	3.5	2.2
9	5.0	28.3	29.1	198.9	38.1	34.7	446.5	333.1	107.0	12.4	3.4	2.2
10	4.9	21.6	27.3	186.8	39.0	36.2	401.0	308.7	97.0	11.7	3.3	2.2
11	4.9	13.2	26.9	112.7	34.9	38.0	362.0	275.0	86.8	10.9	3.3	2.2
12	4.9	9.2	26.7	82.3	35.5	40.2	303.7	232.5	82.5	10.0	3.2	2.1
13	4.8	9.0	24.6	68.2	32.5	62.2	254.1	204.6	84.1	9.5	3.0	2.2
14	4.9	15.5	23.6	60.2	29.7	82.0	233.2	223.9	81.1	9.5	3.0	2.4
15	4.6	24.0	22.7	53.6	29.7	79.3	251.6	222.8	75.8	8.9	3.1	2.5
16	4.5	273.4	22.0	52.1	27.9	74.4	234.1	229.6	72.5	8.1	3.0	2.6
17	4.4	190.4	21.0	49.6	27.4	77.2	204.2	224.4	70.6	7.7	3.0	2.6
18	4.3	86.1	20.3	52.9	28.9	66.9	180.5	226.9	66.7	7.2	3.0	2.6
19	4.5	55.3	19.7	69.9	33.8	57.1	158.9	229.0	60.4	6.6	2.9	2.6
20	7.9	47.0	19.2	63.5	32.4	52.7	147.7	219.6	55.1	6.1	2.9	2.7
21	8.4	70.3	18.8	52.2	29.3	87.8	161.1	209.2	49.1	5.8	2.8	2.6
22	6.8	66.8	18.3	47.6	27.6	228.2	211.5	220.7	44.7	5.8	2.9	2.4
23	6.0	63.5	17.8	45.3	31.8	285.2	249.7	216.3	41.6	5.9	2.9	2.4
24	5.4	65.3	17.8	39.8	27.6	229.0	273.3	226.8	38.4	5.6	2.7	2.6
25	5.1	59.6	17.8	46.2	26.2	178.5	299.0	290.8	36.4	5.1	2.6	2.6
26	4.8	82.1	17.5	47.0	27.1	159.1	346.0	236.4	33.1	4.8	2.5	2.5
27	4.7	222.6	17.5	40.5	32.4	133.4	408.3	192.0	31.4	4.7	2.3	2.5
28	4.5	117.1	17.1	39.4	28.3	126.8	359.0	198.0	29.8	4.6	2.5	2.5
29	4.3	80.7	17.1	37.1		133.2	279.0	204.1	27.7	4.3	2.5	2.4
30	4.4	63.2	16.8	35.0		141.7	231.1	205.6	25.9	4.3	2.4	2.5
31	4.4		16.8	35.0		160.0		183.1		4.3	2.5	
MEAN	5.2	57.3	25.8	60.7	33.0	92.2	300	236	79.7	10.0	3.1	2.4
MAX. DAY	8.4	273	54.5	198.9	40.4	285	904	333	153	23.6	4.1	2.7
MIN. DAY	4.3	4.1	16.8	16.2	26.2	19.7	148	183	25.9	4.3	2.3	2.1
cfs days	163	1718	799	1881	925	2858	8988	7312	2390	311	97	73
ac-ft	323	3408	1585	3731	1834	5668	17827	14502	4742	617	192	144

Monitor's Comments

Data manager: Peter Kulchawik

- Daily mean values are based on 15-minute automated measurements of stage; stage shifts have been applied to account for changes in bed conditions or ice build-up at the gage over the course of the monitoring program.
- Stage and flow are commonly affected by ice in the winter months.
- Peak flows associated with snow-melt hydrographs commonly occur between April and June; multiple peaks are also common
- Daily mean flows may be affected by operations at Webber Lake (Reservoir)
- Data are subject to revision, should additional measurement or observer account warrant adjustment of the new rating curve.
- Italics represent data that has been corrected for water level recorder inconsistencies due to ice effects

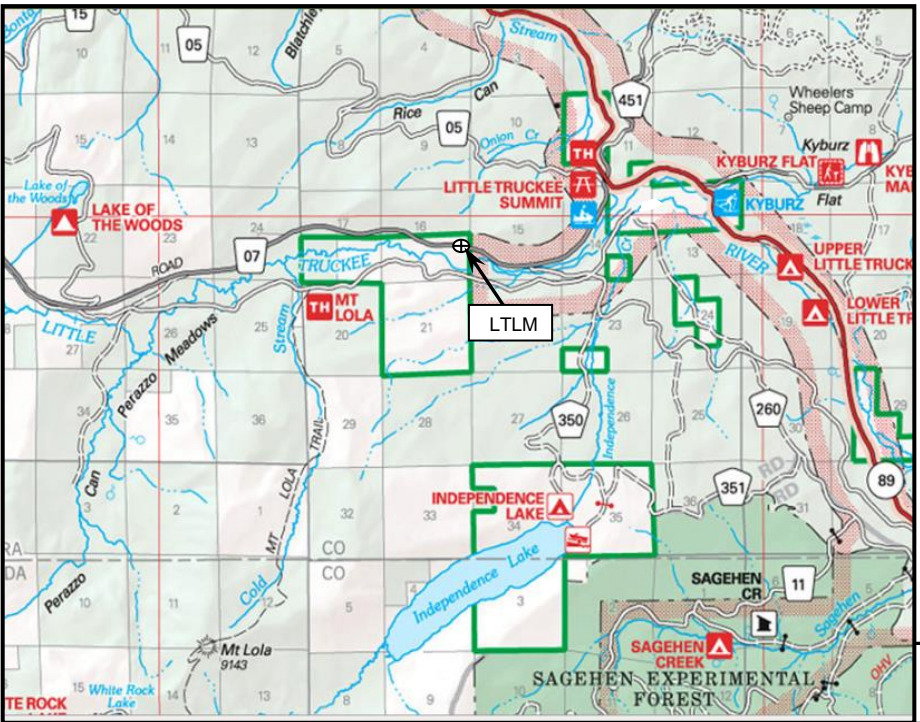
Water Year 2018 Totals:

Mean flow	75.4	(cfs)
Max. daily flow	904	(cfs)
Min. daily flow	2.1	(cfs)
Annual total	27,513	(cfs-days)
Annual total	54,573	(ac-ft)

Water Year:	2018
Stream:	Little Truckee River
Station:	Lower Perazzo Meadow outlet (LTLM)
County:	Nevada County, California

Form 6. Annual Hydrologic Record, WY 2018

Station Location Map



Station Location / Watershed Descriptors
N 39° 29' 39", W 120° 19' 07" near Independence Lake, California. Gage is located on north bank
Gage is accessed from USFS Road 07 (Hennes Pass Road) or Jackson Meadows Rd.
Land use includes timber harvesting, recreation, rural residential, and open space
Flow may be affected by Webber Lake (reservoir)
Drainage area is 34.2 square miles.

Mean Flow
Annual mean flow for WY2018 was 82; WY 2017 was 193 cfs; WY 2016 was 100 cfs; WY 2015 was 33 cfs; mean flow for WY 2014 was 31 cfs; mean flow for WY 2013 was 63 cfs; mean flow for WY 2012 was 50 cfs.

Peak Flows (WY 2018)							
Date	Time (24-hr)	Gage Ht. (feet)	Discharge (cfs)	Date	Time (24-hr)	Gage Ht. (feet)	Discharge (cfs)
11-16-17	17:45	3.21	394	4-7-18	15:15	5.45	1,207
11-27-17	4:45	2.86	296	4-27-18	1:30	3.33	432
1-10-18	2:30	2.67	248	5-9-18	1:30	3.14	373
3-23-18	13:15	3.03	342	5-25-18	14:45	2.90	308
Extreme for period of record (Aug. 2011 to Sept 2017): 2,319 cfs on 1/9/2017							

WY 2018 Daily Mean Flow (cubic feet per second)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
1	6.7	7.2	65.1	20.9	44.5	34.3	183.9	225.4	148.5	25.5	4.6	4.2
2	7.0	6.8	56.6	20.1	46.5	72.5	207.0	216.8	137.7	23.5	4.5	4.0
3	7.1	9.7	59.8	20.1	48.0	113.8	216.0	221.0	139.6	22.7	4.8	3.8
4	7.1	18.9	62.0	28.6	49.1	84.0	219.4	250.2	146.1	20.9	5.0	3.7
5	6.7	18.1	56.9	40.9	49.5	71.7	235.2	283.8	141.0	19.1	5.2	3.8
6	6.1	13.6	54.4	128.4	50.0	50.9	380.9	285.0	126.1	18.5	5.2	3.7
7	5.3	12.8	51.9	98.4	47.6	39.1	980.6	306.0	114.9	17.0	4.8	3.7
8	5.6	11.2	49.5	79.6	46.6	37.1	682.6	313.3	105.6	15.7	4.6	3.6
9	5.6	35.5	47.2	208.5	46.8	39.8	442.3	338.3	101.1	14.1	4.4	3.7
10	5.4	30.3	44.9	204.0	47.7	41.5	398.9	312.5	94.8	13.7	4.2	3.7
11	5.1	21.0	41.5	130.0	45.8	43.5	367.3	266.1	84.0	12.8	4.1	3.6
12	5.6	16.1	38.3	97.2	47.9	45.9	317.2	230.4	79.3	11.3	4.0	3.4
13	5.3	15.1	36.2	81.4	46.0	70.9	268.8	202.9	79.0	10.9	3.8	3.7
14	5.9	22.7	34.0	72.0	45.4	92.1	245.9	218.0	77.0	10.6	3.9	4.0
15	5.8	32.3	30.4	64.1	43.8	91.2	265.5	218.7	72.5	9.5	3.8	4.0
16	5.7	281.3	31.7	61.6	37.3	80.5	256.3	227.4	71.3	9.0	3.9	4.0
17	5.5	211.9	30.4	59.0	35.5	82.7	225.2	222.3	76.2	8.4	3.9	4.1
18	5.7	101.7	29.4	61.2	38.6	108.4	204.0	220.1	69.9	7.9	3.9	4.0
19	5.6	66.7	29.1	84.0	49.5	71.4	183.4	222.5	65.1	7.1	3.8	4.0
20	11.0	54.1	28.5	77.4	59.4	67.5	168.6	211.9	56.9	7.0	3.8	3.9
21	12.1	75.3	32.3	74.9	51.9	96.4	178.1	204.0	52.8	6.5	3.9	3.6
22	9.7	73.1	29.4	61.0	45.2	238.8	225.8	213.5	46.4	6.5	4.0	3.3
23	8.3	69.7	26.7	64.6	54.4	307.9	264.4	207.9	42.4	6.7	4.0	3.3
24	7.1	71.3	25.0	52.6	53.1	259.0	286.8	218.5	39.3	6.4	3.8	3.7
25	7.1	65.3	24.1	63.8	53.4	201.3	310.0	279.3	36.3	6.1	4.1	3.6
26	6.8	84.2	23.3	68.6	49.5	184.3	349.5	235.4	34.4	5.6	4.1	3.4
27	6.9	232.9	23.3	56.0	58.0	148.5	399.2	189.5	32.3	5.4	3.7	3.2
28	6.8	133.0	22.5	55.6	55.6	136.9	365.2	190.9	30.8	5.4	4.0	3.1
29	6.5	94.4	22.5	54.9		142.0	294.3	194.7	30.2	5.3	3.9	3.0
30	7.0	75.1	21.7	54.8		149.8	252.3	197.9	28.5	5.0	3.9	3.1
31	7.5		21.7	47.2		164.2		180.1		4.8	4.3	
MEAN	6.8	65.4	37.1	73.9	48.1	109	312	236	78.7	11.3	4.2	3.7
MAX. DAY	12.1	281	65.1	209	59.4	308	981	338	148	25.5	5.2	4.2
MIN. DAY	5.1	6.8	21.7	20.1	35.5	34.3	169	180	28.5	4.8	3.7	3.0
cfs days	210	1961	1150	2292	1346	3368	9375	7304	2360	349	130	110
ac-ft	416	3890	2282	4545	2671	6681	18595	14488	4681	692	258	218

Monitor's Comments
Data manager: Peter Kulchawik
1. A continuous record of water level was recorded during the water year.
2. Stage shifts have been applied to account for changes in sedimentation and blockage by sticks, leaves, or other debris.
3. Adjustments and estimates were applied to periods heavily affected by ice; shown in italics.
4. Mean daily values are based on 15-minute measurements.
5. Italics represent data that has been corrected for water level recorder inconsistencies due to ice effects
6. Missing data for periods 2/8-2/9/2017 and 7/11-7/18/2017 due to gage damage during high flows in WY2017

Water Year 2018 Totals:		
Mean flow	82	(cfs)
Max. daily flow	981	(cfs)
Min. daily flow	3.0	(cfs)
Annual total	29,955	(cfs-days)
Annual total	59,416	(ac-ft)

Balance Hydrologics, Inc. PO Box 1077, Truckee, CA 96161 phone: (530) 550-9776, Berkeley (Main Office) (510) 704-1000

www.balancehydro.com

LIST OF TABLES

Table 1. Streamflow gaging station summary (WY2018), Perazzo Meadows, Little Truckee River Watershed, Sierra County, California

Gage	Gage Code	Location	Elevation	Drainage Area	Instrumentation	Period of Record	Extremes for Period of Record	Peak Discharge for Current Water Year	Remarks
		NAD27	ft above MSL	(mi ²)				(cfs)	
Perrazo Creek above Perazzo Meadow	PCAP	N39° 27' 53", W120° 23' 16"	6,627	6.1	Type C staff plate + Continuous water-level recorder	November 17, 2010 to current water year	502 cfs January 8, 2017 268 cfs, December 2, 2012	385	Located in bedrock reach with numerous seeps entering channel at baseflow.
Little Truckee above Perazzo Meadow	LTAP	N39° 28' 59", W120° 22' 57"	6,583	15.8	Type C staff plate + Continuous water-level recorder	November 18, 2010 to current water year	694 cfs, April 26, 2012	483	Located on south bank, approximately 130 feet upstream from USFS road 7-030 bridge; subject to ice; damaged and repaired in WY2017
Little Truckee below Upper Perazzo Meadow outlet	LTUM	N39° 29' 10", W120° 22' 13"	6,534	25.5	Type C staff plate + Continuous water-level recorder	November 19, 2010 to current water year	846 cfs, April 7, 2018	846	Located on east bank, approx. 40 feet downstream from Henness Pass Rd bridge; subject to ice; damaged and repaired in WY2017
Cold Stream above Perazzo Meadow	CSAP	N39° 28' 23", W120° 20' 30"	7,221	3.1	Type C staff plate + Continuous water-level recorder	August 18, 2011 to current water year	311 cfs January 8, 2017	36	Highest elevation station, subject to longer periods of ice and snow; typically has a delayed snowmelt peak flow; staff plate adjusted in June 2016
Little Truckee below Middle Perazzo Meadow outlet	LTPM	N39° 29' 42", W120° 20' 7"	6,463	32.8	Type C staff plate + Continuous water-level recorder	October 2009 to current water year	2,039 January 9, 2017	1,104	Gage relocated on September 28, 2010 and June 8, 2011 and June 6, 2018. Current location is on right bank of large pool upstream of riffle and right side secondary channel
Little Truckee below Lower Perazzo Meadow outlet	LTLM	N39° 29' 39", W120° 19' 07"	6,459	34.2	Type C staff plate + Continuous water-level recorder	August 18, 2011 to current water year	2,319 January 9, 2017	1,207	Located below Lower Meadow, north bank; damaged and repaired in WY2017

Notes:

1. Webber Lake is located on the Little Truckee River above Perazzo Meadows. The Webber Lake outlet includes a rectangular weir with fish screens. Periodic cleaning, installation, and removal of fish screens may affect flows at downstream locations.
2. LTAP and LTUM gages suffered severe damage during WY2017 high flows and had to be repaired or replaced. It is likely these stations experienced their highest respective flows during the gaging project during WY2017.
3. Extreme flows for period of record and peak discharge are estimated values based on the stage to discharge "rating curve" and are not manually measured values.

**Table 2. Historical gaging summary, Little Truckee River below Diversion Dam, near Sierraville, California
USGS station #10341950, Water Years 1993 to 1998 and 2013 to 2016**

Water Year	Annual Mean Flow	Maximum Daily Flow	Minimum Daily Flow	Peak Flow	Peak Stage	Date
	(cfs)	(cfs)	(cfs)	(cfs)	(ft)	
1993 (partial)	--	--	--	350	5.86	1993-06-26
1994	23.5	227	1.5	300	5.86	1994-04-19
1995	183.2	1,290	2.2	1,630	8.14	1995-06-27
1996	113.4	1,700	2.3	1,880	9.78	1996-05-16
1997	122.1	2,400	2.1	3,980	12.50	1997-01-02
1998	106.4	602	1.8	697	6.02	1998-06-16
2013	110.0	781	2.04	1,140	4.98	2012-12-02
2014 (partial)	--	181	2.5	235	2.8	2014-02-09
2015 (partial)	--	--	--	778	4.52	2015-02-09
2016 (partial)	--	513	3	581	4.43	2016-03-06

Notes:

1. Gaging station was located N 39 29' 29", W120 19' 39", approximately 1.3 miles downstream of Balance gaging station LTLM at 6,380 feet elevation with a drainage area of 36.1 square miles.
2. Little Truckee Diversion Dam is an active diversion, operated by the Sierra Valley Mutual Water Company
3. WY1993 partial: June 17 -September 30, 1993; WY2014 partial: Oct 1- July 13, 2014 (for daily mean values); WY 2015 and WY2016 incomplete data; Station discontinued in in July 2016; Data from USGS is provisional
4. This station was re-established by the USGS in the Fall of 2012 and discontinued on August 1, 2016 due to lack of funding.

Table 3. Field Observer Log
Perazzo Creek above Perazzo Meadow (PCAP), WY2018

Site Conditions				Streamflow			Water Quality Observations				High-Water Marks		Remarks
Date/Time (observer time)	Observer	Stage	Hydrograph	Measured Discharge	Instrument Used	Estimated Accuracy	Water Temperature	Field Specific Conductance	Adjusted Specific Conductance	Additional sampling?	Estimated stage at staff plate	Inferred dates?	
(mm/dd/yr)		(feet)	(R/F/S/B)	(cfs)	(AA/PY/MMB)	(e/g/f/p)	(deg C)	(µmhos/cm)	(at 25 deg C)	(Qbed, etc.)	(feet)	(mm/dd/yr)	
2017-10-13 12:37	bt	3.99	B	1.1	MMB	g	8.4	52	76	--	--	--	Gage pool still has est. 4 inches of water; second flow channel near left bank out of gage pool is dry; about 85% of leaves have fallen off of willows; water clear
2018-05-31 13:31	bt	4.86±0.03	S	43.9	MMB	g	7.9	18	26	--	7.5-8.0	4-7-18	Water clear; gage pool is full and not channelized; elevated flow from snowmelt
2018-07-19 11:56	bt	3.98	B	0.9	MMB	g	19.7	61	68	--	--	--	Gage was dry upon arrival; removed sediment and gravel to reconnect the pool to the gage; water is clear; gage pool is holding steady after flow measurement
2018-09-21 12:32	bt	3.85	B	0.3	PY	f	12.6	82	107	--	--	--	Velocity too low at standard measurement station for flow measurement; measured flow upstream at pour point in rocks and cobbles; difficult to measure flow as cross section was not ideal; water clear with a layer of green algae on the stream bed; vegetation in meadows and path were dry; cows grazing at parking area
2018-10-15 9:26	bt	3.96	B	--	--	--	2.6	67	116	--	--	--	Level loggers stuck in sediment and needed some force to remove; low flow; leaves fallen off of trees; gage pool still wet with 2-2.5 inches of water depth; downloaded and restarted level loggers at 9:45 and 10:00 respectively to sync time

Observer Key: (bt) is Ben Trustman

Stage: Water level observed at outside staff plate

Hydrograph: Describes stream stage as rising (R), falling (F), steady (S), baseflow (B), or uncertain (U)

Instrument: If measured, typically made using a standard (AA) or pygmy (PY) bucket-wheel ("Price-type") or (MMB) Marsh-McBirney current meter. If estimated, from rating curve (R) or visual (V).

Estimated measurement accuracy: Excellent (E) = +/- 2%; Good (G) = +/- 5%; Fair (F) = +/- 9%; Poor (P) = > 10%

High-water mark (HWM): Measured or estimated at location of the staff plate

Specific conductance: Measured in micromhos/cm in field; then adjusted to 25degC by equation $(1.8813774452 - [0.050433063928 * \text{field temp}] + [0.00058561144042 * \text{field temp}^2]) * \text{Field specific conductance}$

Additional Sampling: Qbed = Bedload, Qss = Suspended sediment, Nutr = nutrients; other symbols as appropriate

Table 4. Field Observer Log
Little Truckee River above Perazzo Meadows (LTAP), WY2018

Site Conditions				Streamflow			High-Water Marks		Water Quality Observations			Remarks
Date/Time (observer time)	Observer	Stage	Hydrograph	Measured Streamflow	Instrument Used	Estimated Accuracy	Estimated stage at staff plate	Inferred dates?	Water Temperature	Field Specific Conductance	Adjusted Specific Conductance	
(mm-dd-yr, hr:mm)		(feet)	(R/F/S/B)	(cfs)	(AA/PY/MMB)	(e/g/f/p)	(feet)	(mm/dd/yr)	(deg C)	(μmhos/cm)	(at 25 deg C)	
2017-10-13 11:25	bt	2.00	B	0.59	MMB	f	--	--	6.4	22	35	Low velocity; water clear; leaves falling off trees; low flow in upper reach
2018-04-26 9:55	bt, jj	3.90	S	178	MMB	g	6.5±0.5	4/7 or 3/22	5.6	17	28	Top of staff plate bent over from high flows or vandalism; gage is stable; water clear; willows on right bank in water; willows and trees just starting to bud
2018-05-31 14:45	bt	3.08	S	117	MMB	g	--	--	12.2	22	30	Data loggers were stuck in well with mid-sized rocks/sediment; removed well at 15:25 and replaced at 15:29 with no stage change; water clear; lots of algae on the well and rocks by gage
2018-07-19 12:47	bt	2.00	B	0.98	MMB	f/p	--	--	21.6	40	43	Baseflow; very low velocity; water clear; lots of fish 2-6" in gage pool and channel before bridge
2018-09-21 13:19	bt	staff plate dry	B	--	--	--	--	--	10.7	39	54	No flow downstream of gage; channel completely dry; <0.01 flow into gage pool which is a 20 ft x 7 ft and 1.5 ft deep pool full of fish; staff plate is dry but bottom of stilling well is still in water; no flow out of pool
2018-10-15 9:59	bt	dry	B	--	--	--	--	--	--	--	--	Gage completely dry; small pool 5ft x 2ft x 0.4ft; upstream flow is a trickle and ends before gage pool; restarted one data logger to sync with time at 10:30

Observer Key: (bt) is Ben Trustman, (jj) is Jack Jacquet

Stage: Water level observed at outside staff plate

Hydrograph: Describes stream stage as rising (R), falling (F), steady (S), or baseflow (B)

Instrument: If measured, typically made using a Marsh McBurney (MMB), standard (AA), pygmy (PY) bucket-wheel ("Price-type") current meter, or an Acoustic Doppler Current Profiler (ADCP) at high flows. If estimated, from rating curve (R) or visual (V).

Estimated measurement accuracy: Excellent (E) = +/- 2%; Good (G) = +/- 5%; Fair (F) = +/- 9%; Poor (P) = > 10%

High-water mark (HWM): Measured or estimated at location of the staff plate

Specific conductance: Measured in micromhos/cm in field; then adjusted to 25degC by equation $(1.8813774452 - [0.050433063928 * \text{field temp}] + [0.00058561144042 * \text{field temp}^2]) * \text{Field specific conductance}$

Measured discharge reflects flow out of pool. During the fall surface flows were observed entering the pool but not exiting.

Table 5. Field Observer Log
Little Truckee River below Upper Perazzo Meadow (LTUM), WY2018

Site Conditions				Streamflow			Water Quality Observations			High-Water Marks		Remarks
Date/Time (observer time)	Observer	Stage	Hydrograph	Measured Discharge	Instrument Used	Estimated Accuracy	Water Temperature	Field Specific Conductance	Adjusted Specific Conductance	Estimated stage at staff plate	Inferred dates?	
(mm/dd/yr)		(feet)	(R/F/S/B)	(cfs)	(AA/PY/MMB)	(e/g/t/p)	(deg C)	(µmhos/cm)	(at 25 deg C)	(feet)	(mm/dd/yr)	
2017-10-13 13:44	bt	5.00	B	2.31	MMB	f	9.4	47	66	--	--	Hard to measure flow; lots of cobbles and not enough velocity on right side of channel downstream; water clear; baseflow conditions; most of the willows have lost their leaves; grasses still green near channel; all other veg in area is dry
2018-01-15 11:05	bt	5.94	B	49.2	MMB	g/e	2.9	19	33	--	--	Water clear; moderate increase in flow compared to October baseflows
2018-04-26 11:11	bt,jj	7.18±0.04	S	294	ADCP	g	8.5	21	30	--	--	High flow from snow melt; tried to wade but left edge too swift; ADCP measurement at gage results seemed too high; post processing found error in transducer depth setting on ADCP; corrected and QA/QC done with QRev
2018-05-03 13:30	bt,jj	6.65	S	181	ADCP	g	11.4	25	34	--	--	Flow lower than 4/26; cold temperatures for the last week; good ADCP measurement below the downstream riffle (around bend); manual measurement at same location; snow melted out on road from LTAP
2018-05-10 13:26	bt, bkh	7.00±0.05	S	--	--	--	--	--	--	9.0	4-7-18	Downloaded data loggers and estimated high water marks
2018-05-23 15:00	bt	6.60±0.05	S	--	--	--	--	--	--	--	--	Downloaded baro logger
2018-06-06 10:31	bt, jj	6.16	S	72.5	PY	g	11.5	23	31	--	--	Water clear; grasses verdant; willows completely leaved out; drop of 0.5 feet in 1.5 weeks
2018-07-19 10:40	bt	4.98	B	2.27	MMB	g/e	19.8	58	64	--	--	Water is slightly brown; some algae on stream bed with slippery rocks; vegetation is green and abundant; fingerlings in the gage pool
2018-09-21 11:22	bt	4.69	B	0.35	PY	p	12.4	58	77	--	--	Difficult to measure flow; extremely low velocity in channel-would not rotate the pygmy meter; measured at the spill point downstream before the bend; cross section-large cobbles interspersed throughout; water clear with lots of algae on bed of channel where velocity was zero
2018-10-15 16:05	bt	4.81	B	0.60	MMB	g/f	10.7	62	85	--	--	Water slightly murky; small fingerling fish in gage pool; some algae on streambed; low flow

Observer Key: (bt) is Ben Trustman, (jj) is Jack Jacquet, (bkh) is Brian Hastings

Stage: Water level observed at outside staff plate

Hydrograph: Describes stream stage as rising (R), falling (F), steady (S), baseflow (B), or uncertain (U)

Instrument: If measured, typically made using a Marsh-McBurney (MMB), standard (AA), pygmy (PY) bucket-wheel ("Price-type") or Acoustic Doppler Current Profiler (ADCP); If estimated, from rating curve (R) or visual (V).

Estimated measurement accuracy: Excellent (E) = +/- 2%; Good (G) = +/- 5%; Fair (F) = +/- 9%; Poor (P) estimated percent accuracy given

High-water mark (HWM): Measured or estimated at location of the staff plate

Specific conductance: Measured in micromhos/cm in field; then adjusted to 25degC by equation $(1.8813774452 - [0.050433063928 * \text{field temp}] + [0.00058561144042 * \text{field temp}^2]) * \text{Field specific conductance}$

Additional Sampling: Qbed = Bedload, Qss = Suspended sediment, Nutr = nutrients; other symbols as appropriate

Temporary stage data was recorded prior to repairing the station

**Table 6. Field Observer Log:
Cold Stream above Middle Perazzo Meadows (CSAP), WY2018**

Site Conditions				Streamflow			Water Quality Observations			High-Water Marks		Remarks
Date/Time (observer time)	Observer(s)	Stage	Hydrograph	Measured Discharge	Instrument Used	Estimated Accuracy	Water Temperature	Field Specific Conductance	Adjusted Specific Conductance	Estimated stage at staff plate	Inferred dates?	
(mm/dd/yr)		(feet)	(R/F/S/B)	(cfs)	(AA/PY/ MMB)	(e/g/f/p)	(deg C)	(µmhos/cm)	(at 25 deg C)	(feet)	(mm/dd/yr)	
2017-10-13 16:00	bt	3.89	B	1.72	MMB	f	5.8	34	53	...	...	Left-side overflow channel still active; water clear; vegetation dying off, leaves have turned color; night time temperatures have been cold with some ice evident on a log downstream
2018-05-31 10:50	bt	4.48	F	26.49	MMB	g/f	5.3	23	37	...	...	Elevated stage from snowmelt; left side channel is flowing and connected to main channel; no velocity behind the upstream rock that creates the left side channel; water is clear; gage intact with no significant changes over winter
2018-07-19 8:52	bt	3.95	B	3.19	MMB	g	8.0	31	46	...	...	Baseflow; some algae on the staff plate but the stream bed and water were clear; vegetation is green and lots of wild flowers; side channel on left looks steady and the size has not increased; gage intact and solid
2018-09-21 9:41	bt	3.79	B	1.00	PY	f	4.5	38	62	...	...	Secondary channel on left bank inactive; baseflow; water clear; some ponding in left bank channel but no visible flow; plants beginning to turn color; no rain in over 30 days
2018-10-15 14:22	bt	3.78	B	0.87	MMB	g/f	5.4	41	65	...	...	Side channel on left bank has water but little to no flow; water clear; no algae on the streambed; some mud on tip of logger when removed from well; plants dying and leaves falling off of deciduous trees

Observer Key: (bt) is Ben Trustman-from Balance Hydrologics;

Stage: Water level observed at outside staff plate

Hydrograph: Describes stream stage as rising (R), falling (F), steady (S), baseflow (B), or uncertain (U)

Instrument: If measured, typically made using a standard (AA) or pygmy (PY) bucket-wheel ("Price-type") current meter, (MMB) Marsh-McBirney style by Hach. If estimated, from rating curve (R) or visual (V).

Estimated measurement accuracy: Excellent (E) = +/- 2%; Good (G) = +/- 5%; Fair (F) = +/- 9%; Poor (P) = > 10%

High-water mark (HWM): Measured or estimated at location of the staff plate

Specific conductance: Measured in micromhos/cm in field; can be adjusted to 25 deg.C by equation $(1.8813774452 - [0.050433063928 * \text{field temp}] + [0.00058561144042 * \text{field temp}^2]) * \text{Field specific conductance}$

Table 7. Field Observer Log
Little Truckee River below Middle Perazzo Meadow (LTPM), WY2018

Site Conditions					Streamflow			Water Quality Observations					High-Water Marks		Remarks
Date/Time (observer time)	Observer	Stage	Stage (new gage)	Hydrograph	Measured Discharge	Instrument Used	Estimated Accuracy	Water Temperature	Field Specific Conductance	Adjusted Specific Conductance	Additional sampling?	Estimated stage at staff plate	Inferred dates?		
(mm/dd/yr)		(feet)	(feet)	(R/F/U/B)	(cfs)	(AA/PY/MMB)	(e/g/r/p)	(deg C)	(µmhos/cm)	(at 25 deg C)	(Qbed, etc.)	(feet)	(mm/dd/yr)		
10-13-17 10:00	bt	0.37	--	B	5.35	MMB	g	4.4	57	93	--	--	--	Water slightly murky; lots of vegetation in the gage pool; the sand bar has almost cut off the gage pool from upstream flow; second channel right bank (right side of riffle) is still active; grasses are still very green; willows have lost about 30% of their leaves; some ice in gage pool	
1-15-18 13:10	bt	1.03	--	B	--	--	--	--	--	--	--	--	--	Installed a tag line across channel 175 feet downstream of gage 60 ft past riffle; water was waist high crossing the channel; water clear with some ice on edges and patches of snow on banks	
4-26-18 14:00	bt, jj	1.94	--	U	329.05	ADCP	g	11.7	25	34	--	4.4-4.6	2018-04-07	ADCP measurements taken downstream of riffle; tag line had grass debris from high flows and was roughly 3 feet above water surface; able to wade across riffle due to secondary channel that has scoured and now very deep-taking a majority of the flow that way; sand bar is increasing in the gage pool-need to monitor during low flow to see if gage gets cut off from flow	
5-10-18 11:45	bt, bkh	1.88	--	U	284.62	MMB	f	9.6	24	35	--	--	--	Pool filled with sediment blown out - (sediment from plug upstream?); secondary channel past island widening and deepening; many downed trees	
5-22-18 14:12	bt,ds	1.64	--	U	--	--	--	--	--	--	--	--	--	Brief visit to assess the sediment deposit and channel; plan to install new gage across from current gage on south side of channel	
6-6-18 13:07	bt, jj	1.33	3.39	F	114.60	PY	g	18.1	33	38	--	--	--	Installed new gage across pool from old gage; old gage pool affected by sediment deposition and is expected to be cut off from main pool as flows decrease; water clear; temperature in old gage pool high possibly due to lack of flow and mixing	
7-19-18 13:50	bt	0.39	2.45	B	5.67	MMB	g	23.1	77	80	--	--	--	Water slightly murky; baseflow; old gage pool has water but is cut off upstream from main channel by sand bar; new gage is in deep pool; lots of fish in gage pool (2-6")	
9-21-18 13:40	bt	0.18	2.24	B	2.0 (est)	--	p	--	--	--	--	--	--	Flow measurement unsuccessful due to low velocities; velocities at top of riffle too slow and inconsistent for pygmy meter; riffle too rocky to find usable cross section; long stringy algae in channel by high flow tagline prohibiting use of pygmy meter; old gage pool is still full but cut off from main channel at upstream end; old gage pool full of algae and veg growth; new gage pool is deep and clear of any vegetation	
10-15-18 10:41	bt	0.24	2.28	B	3.67	MMB	f	6.6	61	94	--	--	--	Low flow; water is slightly murky; less algae in downstream section from previous visit; water cold; thin layer of ice on top of old gage pool; old gage pool still cut off from main channel by the sand bar est. 30ft upstream on bank	

Observer Key: (pk) is Peter Kulchawik, (bt) is Ben Trustman, (jj) is Jack Jacquet, (ds) is Dave Sha

Stage: Water level observed at outside staff plate

Hydrograph: Describes stream stage as rising (R), falling (F), uncertain (U), or baseflow (E)

Instrument: If measured, typically made using a Marsh-McBirney (MMB), standard (AA) or pygmy (PY) bucket-wheel ("Price-type") current meter. If estimated, from rating curve (R) or visual (

Estimated measurement accuracy: Excellent (E) = +/- 2%, Good (G) = +/- 5%, Fair (F) = +/- 9%, Poor (P) = > 10%

High-water mark (HWM): Measured or estimated at location of the staff plate

Specific conductance: Measured in micromhos/cm in field, then adjusted to 25degC by equation $(1.8813774452 - [0.050433063928 * \text{field temp}] + [0.00058561144042 * \text{field temp}^2]) * \text{Field specific conductance}$

Additional Sampling: Qbed = Bedload, Qss = Suspended sediment, Nutr = nutrients, other symbols as appropriate

Table 8. Field Observer Log
Little Truckee River below Lower Perazzo Meadow (LTLM),
WY2018

Site Conditions				Streamflow			Water Quality Observations				High-Water Marks		Remarks
Date/Time (observer time)	Observer	Stage (new)	Hydrograph	Measured Discharge	Instrument Used	Estimated Accuracy	Water Temperature	Field Specific Conductance	Adjusted Specific Conductance	Additional sampling?	Estimated stage at staff plate	Inferred dates?	
(mm/dd/yr)		(feet)	(R/F/S/B)	(cfs)	(AA/PY/MMB)	(e/g/f/p)	(deg C)	(µmhos/cm)	(at 25 deg C)	(Qbed, etc.)	(feet)	(mm/dd/yr)	
2017-10-13 8:36	bt	1.08	B	7.25	MMB	g	3.1	47	80	--	--	--	Very cold; frost on grasses and ice on edge of channel in shallows areas; grasses are green but willow leaves have changed color and leaves are beginning to fall; water is clear with lots of algae on streambed and rocks.
2018-01-15 13:33	bt	1.67	B	59.73	MMB	g/e	3.5	23	39	--	--	--	Water clear; some grasses on the right bank side of channel effecting the 0.6 velocity; installed a tag line 25 feet downstream of gage to use with ADCP for high flow measurements
2018-03-27 10:40	bkh	2.24	F	--	--	--	--	--	--	--	3.6	2018-03-22	Snow on ground. HWMs approximate; difficult to discern due to presence of snow.
2018-04-26 15:52	bt,jj	2.90±0.02	S	309.74	MMB	g	11.3	25	34	--	5.1	4/7 or 3/22	Water clear; snowmelt runoff ; elevated flow; tag line was broken by debris
2018-05-10 10:13	bt, bkh	2.85	S	290.43	MMB	g	7.4	23	35	--	--	--	Melted out along road and lower watershed; still ≥ 50% of SWE at Independence Lake SNOTEL; elevated snowmelt runoff; willows budding and leaves forming
2018-06-06 15:00	bt,jj	2.02	S	111.672	MMB	g/e	15.2	32	40	--	--	--	Water clear; grasses green and verdant; willows leaved out
2018-07-19 14:53	bt	1.06	B	6.74	MMB	g	25.7	77	76	--	--	--	Water slightly murky; long stringy algae on stream bed and in grasses on right bank; small fish (2-4") in channel
2018-09-21 14:38	bt	0.95	B	<2 cfs (est)	--	p	17.3	84	98	--	--	--	Velocity too low for pygmy meter; water clear with some algae
2018-10-15 12:18	bt	0.97	B	3.05	MMB	g	8	66.6	97.2	--	--	--	Baseflow; water is slightly murky; some algae on streambed; all leaves have changed color and are falling

Observer Key: (bt) is Ben Trustman, (pk) is Peter Kulchawik, (jj) is Jack Jaquet, (bkh) is Brian Hastings

Stage: Water level observed at outside staff plate

Hydrograph: Describes stream stage as rising (R), falling (F), steady (S), baseflow (B), or uncertain (U)

Instrument: If measured, typically made using a Marsh-McBirney (MMB), standard (AA), pygmy (PY) bucket-wheel ("Price-type") or Acoustic Doppler Current Profiler (ADCP) current meter. If estimated, from rating curve (R) or visual (V).

Estimated measurement accuracy: Excellent (E) = +/- 2%; Good (G) = +/- 5%; Fair (F) = +/- 9%; Poor (P) = > 10%

High-water mark (HWM): Measured or estimated at location of the staff plate

Specific conductance: Measured in micromhos/cm in field; then adjusted to 25degC by equation $(1.8813774452 - [0.050433063928 * \text{field temp}] + [0.00058561144042 * \text{field temp}^2]) * \text{Field specific conductance}$

Additional Sampling: Qbed = Bedload, Qss = Suspended sediment, Nutr = nutrients; other symbols as appropriate

Table 9. Estimated Annual Runoff, Perazzo Meadows, Little Truckee River Watershed, Sierra County, California, WY2018

Gaging Station	Gage ID	Drainage Area	Measured Runoff	Estimated Runoff	Unit Runoff	Unit Runoff	Remarks
		(mi ²)	(acre-feet)	(acre-feet)	(acre-feet/square mile)	(cfs/square mile)	
Perrazo Creek above Upper Perazzo Meadow	PCAP	6.1	12,803	--	2,099	2.9	Unregulated perennial tributary to the Upper Perazzo Meadow
Little Truckee above Upper Perazzo Meadow	LTAP	15.8	30,754	--	1,946	2.7	Streamflow is regulated by Webber Lake (reservoir); tributary to the Upper Perazzo Meadow; Gage damaged during WY2017 and did not have a complete record in that year
<i>Remaining ungaged contributing area above LTUM</i>	--	3.6	--	2,621	728	--	This area includes lower Perazzo Creek canyon (~70%) and portions of the Upper Perazzo Meadow (~30%); lower estimated unit-runoff may be associated with lower snowpack in the meadow or lower elevations
Little Truckee, below Upper Perazzo Meadow	LTUM	25.5	46,178		--	--	Outlet from Upper Perazzo Meadow
Cold Stream, above Middle Perazzo Meadows	CSAP	3.1	3,913	--	1,262	1.7	Unregulated perennial tributary to the Middle Perazzo Meadow
<i>Remaining ungaged contributing area above LTPM</i>	--	4.2	--	4,482	1,067	--	Lower Cold Stream canyon and one unnamed tributaries
Little Truckee, below Middle Perazzo Meadow	LTPM	32.8	54,573	--	1,664	2.3	Outlet from Middle Perazzo Meadow
<i>Remaining ungaged contributing area</i>	--	1.4	--	4,843	3,459	--	See above
Little Truckee, below Lower Perazzo Meadow	LTLM	34.2	59,416	--	1,737	2.4	Outlet to the Lower Perazzo Meadow (unrestored as of 2014)

Notes:

1. Webber Lake Reservoir is located on the Little Truckee River above LTAP gaging station;
2. Estimated values in *italics* indicate calculated values computed from other data.

All data is provisional and subject to change

Table 10. Snowmelt recession runoff, Perazzo Meadows, Little Truckee River Watershed, Sierra County, California, May through September 2018

Gaging Station	Gage ID	Drainage Area	Monthly Runoff					Remarks
			May	June	July	August	September	
		(mi ²)	(acre-feet)	(acre-feet)	(acre-feet)	(acre-feet)	(acre-feet)	
Perrazo Creek above Upper Perazzo Meadow	PCAP	6.1	4,140	1,365	76	7	13	Maintained flow through summer
Little Truckee above Upper Perazzo Meadow	LTAP	15.8	10,850	2,531	202	22	0	Went dry in late August
Little Truckee, below Upper Perazzo Meadow	LTUM	25.5	11,916	2,494	225	45	28	Includes an ungaged area of 3.6 square miles
Cold Stream, above Middle Perazzo Meadows	CSAP	3.1	1,274	977	223	85	60	Maintained flow through summer
Little Truckee, below Middle Perazzo Meadow	LTPM	32.8	14,502	4,742	617	192	144	Includes an ungaged area of 4.2 square miles
Little Truckee, below Lower Perazzo Meadow	LTLM	34.2	14,488	4,681	692	258	218	Includes an ungaged area of 1.4 square miles

Notes:

1. New gage installed at LTPM in June 2018

Table 11. Field observer log: Groundwater monitoring observations, Water Years 2010 to 2018 Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations				Remarks
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer 09-1 - Head of Upper Meadow									
Total Depth	5.34 ft bgs								
Depth to bottom =	8.30 ft btoc								
Total Stickup =	2.96 ft above gs								
Elevation =	6567.5 ft								
8-21-09 0:00	ds,bc	6.75	3.79	6563.7	--	--	--	--	Piezometer installed; DTW does not necessarily reflect static water level
2009-09-23 17:16	ds	7.1	4.14	6563.3	8.8	66	97	--	Stratified: 122uS at top (82@9.4°C)
2009-10-23 9:43	bc	4.64	1.68	6565.8	7.9	73	108	n	Labelled top of casing
2009-12-04 12:39	bc	4.60	1.64	6565.8	4.3	62	102	n	Water clear, no odor
2010-05-21 16:00	ds,rw	3.04	0.08	6567.4	2.8	31	55		DTSW=2.83 (several inches deep and flowing), SCTsw=20@2.9°C, 35@25°C
2010-07-19 13:45	bc	3.64	0.68	6566.8	11.0	47	65	n	Ground is wet
2010-08-23 16:40	bc	4.78	1.82	6565.7	12.5	68	90	y	Water clear
2010-09-28 15:40	bc	4.98	2.02	6565.5	11.0	90	124	n	Water clear, no odor
2010-11-02 9:50	ds	3.89	0.93	6566.6	6.1	75	116	n	Not stratified; flowing water in depression just NW of piezo; main channel is now SE of piezo, ponds and plugs in original channel; sfc water SCT = 50@25°C; downloaded datalogger
2011-07-08 7:41	ds, bc	2.71	-0.25	6567.7	3.2	16	27	n	Top section of pipe buried and unable to recover LL. Filled with s and g, 1" of water on surface
2011-08-11 10:40	bc	--	--	--	--	--	--	--	Silted in, no standing water, ground dry
2011-09-12 11:25	bc	--	--	--	--	--	--	--	Silted in
2011-10-09 0:00	bc	--	--	--	--	--	--	--	Silted in
2011-11-03 0:00	ds	--	--	--	--	--	--	--	Unable to locate
2011-12-05 0:00	bc	--	--	--	--	--	--	--	Silted in
2012-05-18 0:00	bc, ds	--	--	--	--	--	--	--	Silted in
2012-06-15 0:00	bc	--	--	--	--	--	--	--	Silted in
2012-07-17 0:00	bc	--	--	--	--	--	--	--	Silted in
2012-08-14 0:00	bc	--	--	--	--	--	--	--	Silted in
2014-05-02 0:00	bc, ds	--	--	--	--	--	--	--	Silted in
2014-07-29 0:00	bc	--	--	--	--	--	--	--	Silted in
2014-09-11 0:00	bc	--	--	--	--	--	--	--	Silted in
2014-10-30 0:00	bc, ds	--	--	--	--	--	--	--	Silted in
2015-04-17 0:00	bc	--	--	--	--	--	--	--	Silted in
2015-05-22 0:00	bc, ds	--	--	--	--	--	--	--	Silted in
2015-06-26 10:30	bc	3.67	--	--	9.9	102	144	n	
2015-08-14 9:25	bc	4.16	--	--	12.2	100	132	y	
2015-10-14 15:28	bt, ds	3.99	1.03	6566.5	10.5	88	121	y	Very muddy until no more water; restarted logger at 15:45; changed name and project on logger; retied logger so it was suspended; reinstalled spring 2015
2016-05-27 14:30	ds,bc	2.48	-0.48	6568.0	8.1	45	67	y	Stratified at depth; C 41 @5.0°C SC 67 @25°C
2016-07-29 15:00	bc	3.83	0.87	6566.6	10.0	71	99	y	No stratification
2016-10-12 15:10	ds,bc	4.16	1.20	6566.3	9.7	73	102	y	
2017-07-11 12:04	bt	3.00	0.04	6567.4	13.4	41	53	y	No stratification; string was broken but was able to recover and replace; ground dry but veg was very green; evidence of high flows from sediment in willows next to well; 1.5 bails clear water

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions			Water Quality Observations					Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
2017-08-11 13:30	bc	3.94	0.98	6566.5	10.5	44	62	y	
2017-09-22 14:05	bc	4.08	1.12	6566.4	11.3	59	80	y	
2017-10-24 11:28	bt	4.09	1.13	6566.4	10.0	56	79	y	Took 3 tries to download logger; leaves have fallen off of willows; grass is dry; 1 (3/4) bail and 4(1/2) bails clean
2018-05-23 9:18	bt	2.78	-0.18	6567.7	7.3	50	74	y	Stratified at depth T 4.6°C, C 55, SC 90; soil wet from rain; sediment in nearby willows suggests substantial flow at some point-possibly WY17; 5 1/4 bails clear
2018-07-03 9:45	bc	4.06	1.10	6566.4	9.9	42	59	y	No stratification
2018-08-16 10:55	bc	4.59	1.63	6565.9	12.3	65	87	y	
2018-10-19 13:50	bt	4.41	1.45	6566.0	12.6	37	49	y	Stratified at depth: T 10.9°C, C 70.6, SC 96.7; water slightly dirty; grass dry and soil dry; evidence of cattle and grazing near well

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions				Water Quality Observations				Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation i, NGVD/NAVD	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer 09-2 - East side of Upper Meadow									
Total Depth		4.24 ft bgs							
Depth to bottom =		6.00 ft btoc							
Total Stickup =		1.76 ft above gs							
Elevation =		6556.8 ft							
2009-08-21 0:00	ds, bc	4.34	2.58	6554.3	--	--	--	--	Piezometer installed; DTW does necessarily reflect static water level
2009-09-23 15:51	ds	4.02	2.26	6554.6	8.0	105	157	--	Wp230
2009-10-23 10:03	bc	2.43	0.67	6556.2	5.8	107	168	n	
2009-12-04 11:45	bc	2.26	0.50	6556.3	2.8	112	194	n	Water clear, no odor
2010-05-21 13:30	ds, rw	2.06	0.30	6556.5	4.4	24	40	--	
2010-06-12 14:10	bc	2.26	0.50	6556.3	6.9	33	50	--	
2010-07-19 12:15	bc	2.72	0.96	6555.9	8.3	53	74	n	
2010-08-23 15:00	bc	2.97	1.21	6555.6	6.6	98	150	y	Water clear, no odor
2010-09-28 16:05	bc	2.68	0.92	6555.9	6.3	114	176	n	Water clear, no odor
2010-11-02 10:20	ds	2.31	0.55	6556.3	3.9	110	184	n	Gradual increase in SC with depth, SC=225 at bottom of piezo
2011-07-08 10:06	ds, bc	2.22	0.46	6556.4	7.1	118	177	y	Water clear, turbid at bottom, no odor, SCT (top) = 44.1@10.2°C, 62.3@25°C
2011-08-11 10:50	bc	2.48	0.72	6556.1	8.3	154	227	n	No stratification, water clear
2011-09-12 11:30	bc	2.36	0.60	6556.2	8.0	137	203	y	No stratification
2011-10-09 11:35	bc	2.13	0.37	6556.5	6.6	133	206	y	Water clear
2011-11-03 11:00	ds	2.29	0.53	6556.3	4.0	142	237	y	Dry at surface
2011-12-05 11:20	bc	2.04	0.28	6556.6	1.7	154		n	
2012-05-18 10:25	ds, bc	2.13	0.37	6556.5	5.1	92	148	n	No stratification
2012-06-15 11:00	bc	2.41	0.65	6556.2	4.7	133	217	y	Water clear. SCT (depth) 174.6@3.2°C, 301.2@25°C
2012-07-17 0:00	bc	--	--	--	--	--	--	--	Couldn't get cap off.
2012-08-14 0:00	bc	--	--	--	--	--	--	--	Couldn't get cap off.
2012-09-17 12:30	bc	3.43	1.67	6555.2	7.3	124	188	y	Slightly muddy
2012-10-18 0:00	ds	2.67	0.91	6555.9	5.0	121	196	n	Ground is dry, slight strat. SC @ 25°C = 210 at depth
2013-05-24 13:40	ds, bc	2.29	0.53	6556.3	6.6	135	210	n	Stratified: SC @ 25 = 250 at depth, 5.5°C
2013-06-20 12:30	bc	2.51	0.75	6556.1	4.9	131	213	y	Stratified: SC = 53@8.1°C, 250@25°C at depth
2013-07-24 11:00	bc	2.82	1.06	6555.8	9.6	162	229	n	No stratification
2013-08-30 11:55	bc	3.02	1.26	6555.6	5.7	139	221	y	Stratified: SC = 149@4.5°C, 247@25°C
2013-09-18 12:45	ds	2.95	1.19	6555.7	8.4	150	218	n	No stratification
2014-05-02 14:00	bc, ds	2.25	0.49	6556.4	-0.8	40		y	Stratified: SC = 153@1.2°C, 297@25°C
2014-07-29 11:35	bc	3.23	1.47	6555.4	4.6	165	269	y	Not stratified
2014-09-11 11:30	bc	3.63	1.87	6555.0	4.2	151	252	y	Clear not stratified
2014-10-30 14:45	bc, ds	2.28	0.52	6556.3	0.9	92	169	y	Stratified: 137.8 @ 1.1°C , 252 @ 25°C
2015-04-17 12:35	bc	2.18	0.42	6556.4	3.4	39	67	y	SCT (@depth) 132.7@3.1°C, 227.5@25°C
2015-05-22 13:55	bc, ds	2.08	0.32	6556.5	5.6	96	154	y	SCT (@depth) 197@4.6°C, 320@25°C
2015-06-26 9:35	bc	2.68	0.92	6555.9	8.1	181	266	n	
2015-08-14 10:00	bc	2.96	1.20	6555.6	8.7	155	225	y	No strat
2015-10-14 13:21	bt, ds	2.5	0.74	6556.1	7.4	137	200	y	Dry fields; no stratification; saturated swale between FS-13 and 09-2
2016-05-27 15:30	ds, bc	2.12	0.36	6556.5	6.1	58	91	y	Stratified at depth; C 123 @ 5.0°C SC 199 @ 25°C
2016-07-29 13:45	bc	2.92	1.16	6555.7	7.7	143	209	y	

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations				Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?		
2016-10-12 13:30	ds,bc	2.26	0.50	6556.3	6.2	125	200	y		
2017-07-11 13:18	bt	2.71	0.95	6555.9	11.2	46	63	y	Stratified at depth, T7.1°C, C 154.5, SC 232.6; lots of inundation in the meadow; ground spongy; grass lush at well; 2.75 bails clear water clear	
2017-08-11 12:20	bc	2.85	1.09	6555.8	10.6	127	175	y		
2017-09-24 13:00	bc	3.42	1.66	6555.2	7.2	131	198	y		
2017-10-24 12:48	bt	2.26	0.50	6556.3	5.4	155	237	y	Stratified at depth: T 5.4°C, C 188.9, SC 299.8; grass is dry; soil is damp; restarted the logger at 13:15; diagnostic check OK Battery at 3.49V	
2018-05-23 10:29	bt	2.13	0.37	6556.5	7.7	41	61	y	Stratified at depth: T 3.7°C, C 214, SC 357.3; 5 bails clear water; meadow saturated in places; many small channels are active	
2018-07-03 10:25	bc	3.01	1.25	6555.6	8.2	212	311	y	No stratification	
2018-08-16 11:30	bc	4.13	2.37	6554.5	9.8	110	156	y		
2018-10-20 11:11	bt	2.67	0.91	6555.9	7.5	106	158	y	4 bails clean water; restarted logger in continuous mode; grass dry; soil damp	

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions				Water Quality Observations				Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation ±, NGVD/NAVD	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer 09-3 - Lower Upper Meadow, near confluence Upper Truckee / Perazzo Cr									
Total Depth		8.00 ft bgs	New Well	1-15-18					
Depth to bottom =		10.10 ft btoc	7.25	ft btoc					
Total Stickup =		2.10 ft above gs	1.34	ft above gs					
Ground Elevation =		6544.2 ft							
2009-08-21 0:00	ds, bc	8.33	6.23	6538.0	--	--	--	--	Piezometer installed; DTW does necessarily reflect static water level
2009-09-23 12:50	--	--	--	--	--	--	--	--	Piezo is filled with sediment to depth 3.52 below toc; adjacent to constr. Access road
2009-10-23 11:25	bc	1.7	-0.40	6544.6	7.5	77	117	n	Water ponded on ground surface
2009-12-04 11:04	bc	--	--	--	--	--	--	--	Water ponded on surface and frozen solid
2010-05-21 14:30	ds, rw	0.93	-1.17	6545.4	2.1	83	142	n	Water flowing at sfc, SCT(sw) = 18@3°C, 31@25°C; depth to SW = 1.16
2010-06-12 15:30	bc	--	--	--	--	--	--	--	Unable to access due to high water
2010-07-19 10:40	bc	1.15	-0.95	6545.2	12.7	101	132	n	Water ponded at sfc
2010-08-23 14:00	bc	1.49	-0.61	6544.8	12.2	102	136	y	Water ponded at sfc; water clear, no odor
2010-09-28 15:00	bc	1.89	-0.21	6544.4	10.3	122	170	n	Water ponded at sfc; water clear, no odor
2010-11-02 12:48	ds	1.59	-0.51	6544.7	40.7	114	182	n	Water ponded at sfc, slightly lower elevation (by 0.10') than groundwater implying downward hydraulic gradient; sfc water SC=64@25°C
2011-07-08 13:13	ds, bc	0.38	-1.73	6545.9	4.5	74	122	--	Depth to SW = .53', SCT (top) = 58.5@11°C, 80.1@25°C
2011-08-11 10:15	bc	1.57	-0.53	6544.7	9.2	169	243	n	Depth to SW = 1.5, water clear, SCT (top) = 107.4@10.7°C, 144.7@25°C
2011-09-12 0:00	bc	--	--	--	--	--	--	--	Couldn't find, water on surface 1-4" deep, grasses really tall
2011-10-09 13:00	bc	1.31	-0.79	6545.0	8.0	100	146	y	Water clear, depth to SW = 1.31
2012-11-03 13:30	ds	1.63	-0.47	6544.7	5.0	133	212	n	SCT (sfc) 73@25°C, 42@3.1°C
2011-12-05 12:46	bc	1.30	-0.80	6545.0	0.8	120		n	
2012-05-18 12:25	ds, bc	0.37	-1.74	6545.9	10.4	59	82	n	No stratification, SCT (sfc) 23@10.5°C, 32.9@25°C. Depth to surface 6.75", water higher in well than in streams water surface. No cap
2012-06-15 10:10	bc	0.91	-1.19	6545.4	10.1	63	88	y	In standing water, water clear.
2012-07-17 0:00	bc	--	--	--	--	--	--	--	Couldn't locate, carex waist high, water ponded on surface
2012-08-14 12:00	bc	1.74	-0.36	6544.6	10.3	94	131	y	Muddy, no strat
2012-09-17 11:45	bc	2.69	0.59	6543.6	7.9	112	166	y	Muddy, well almost dry
2012-10-18 0:00	ds	2.96	0.86	6543.3	6.7	108	168		Meadow is driest I have seen since initial visit, pre-restoration. Water ponded in ponds. Little Truckee Q = 0
2013-05-24 12:45	ds, bc	0.60	-1.50	6545.7	7.9	41	60	n	No stratification; water level is ~2' higher on meadow than in well.
2013-06-20 11:25	bc	0.90	-1.20	6545.4	9.5	47	66	y	Minor stratification: SC=53@8.1°C, 78@25°C
2013-07-24 12:00	bc	--	-0.80	--	--	--	--	--	Could not locate, sedges waist high; standing water on ground
2013-08-30 12:00	bc	--	0.10	--	--	--	--	--	Could not locate, ground is moist, but no standing water
2013-09-18 13:45	ds	--	1.50	--	--	--	--	--	Could not locate; DTW value is estimated based on nearby water ponded in channels
2014-05-02 14:00	bs, ds	0.78	-1.32	6545.5	7.0	46	68	y	No stratification; surface water @ approx. 1ft
2014-07-29 0:00	--	--	--	--	--	--	--	--	Could not locate
2014-09-11 10:45	bc	2.13	0.03	6544.2	5.6	151	252	y	Very muddy; not stratified
2014-10-30 13:37	bc, ds	1.86	-0.24	6544.4	0.9	117	215	y	No strat, surface water SC=65.2 @3.1°C
2015-04-17 11:50	bc	1.35	-0.75	6545.0	6.3	66	101	y	In standing water
2015-05-22 16:00	bc, ds	1.49	-0.61	6544.8	5.6	96	154	y	Water higher on surface than in the well; SCT (@depth) 194@6.8°C, 298@25°C

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations				Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft. bgs)	Water Surface Elevation t. NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?		
2015-10-14 16:13	bt, ds	2	-0.10	6544.3	8.5	145	212	y	Not stratified; muddy and silted in; restarted logger at 16:30; grass over well and hard to find; some water on road and ground saturated but over all dry around	
2016-06-01 13:00	bt	0.53	-1.57	6545.8	10.5	103	144	n	Pond completely inundated; DTW is at water level; well is barely above water; marked with a t-post for easier location; slate mode and restarted logger at 13:30; stratified-C 218 @6.0°C SC 342.7@ 25°C	
2016-07-29 13:00	bc	1.81	-0.29	6544.5	13.2	194	252	y	Unable to download logger-would not connect	
2016-10-12 12:10	ds,bc	2.68	0.58	6543.6	7.4	47	70	y		
2017-07-11 15:34	bt	0.41	-1.69	6545.9	16.5	57	68	n	Well was leaning and damaged; completely inundated with 6 inches of water and visible flow at well; pipe was damaged at the top and had to be bent with pliers	
2017-08-11 11:40	bc	0.55	-1.55	6545.8	14.3	76	95	y	Clear; no strat	
2017-09-24 12:10	bc	1.44	-0.66	6544.9	9.7	97	138	y	Hard to bail because of bent well	
2017-10-24 14:31	bt	1.15	-0.95	6545.2	9.4	93	132	n	Ground inundated and spongy; lots of ducks on nearby pond; grass green; diagnostics check Batt level 3.44V; restarted logger 14:45; re-enforced logger with extra string	
2018-01-15 10:30	bt	3	1.66	6542.5	3.9	57	95	n	Installed new well; Total length of new well is 7.28 ft with 2.7 ft of screen; New stickup is 1.34 ft; meadow was inundated and water surface was 0.83 ft btoc; removed water level recorder from old well at 10:08 and downloaded; re-inserted water level recorder in new well at 10:26	
2018-05-23 13:13	bt	0.62	-0.72	6544.9	5.1	33	53	n	Well inundated with ≈8 inches of water; DTW at water surface; adjacent channel flowing and meadow completely inundated	
2018-07-03 9:20	bc	1.69	0.35	6543.9	11.7	46	61	y	No stratification	
2018-08-16 10:24	bc	2.62	1.28	6542.9	12.9	74	97	y		
2018-10-19 14:16	bt	2.62	1.28	6542.9	10.2	88	122	y	Stratified at depth: T 8.1°C, C 235, SC 344; 4.5 bails with last 0.5 dirty; meadow dry; soil damp; grasses dry; active channels just south of well; restarted logger in continuous mode	

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions				Water Quality Observations				Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft. bgs)	Water Surface Elevation i. NGVD/NAVD	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer 09-4 - North Side lower upper meadow, adjacent to volcanic bedrock outcrop and relict channels									
Total Depth		7.34 ft bgs							
Depth to bottom =		10.10 ft btoc							
Total Stickup =		2.76 ft above gs							
Elevation =		6546.2 ft							
2009-08-21 0:00	ds,bc	6.92	4.16	6542.0	--	--	--	--	Piezometer installed; DTW does necessarily reflect static water level
2009-09-23 14:59	ds	7.43	4.67	6541.5	8.7	69	101	--	Wp228; installed levellogger
2009-10-23 12:02	bc	3.18	0.42	6545.7	7.1	99	150	--	
2009-12-04 10:32	bc	3.18	0.42	6545.7	1.7	68	122	--	
2010-05-21 17:25	ds, rw	2.23	-0.53	6546.7	3.7	56	95	--	SCTsfc=23@4.9°C, 38@25°C
2010-06-12 16:00	bc	--	--	--	--	--	--	--	Unable to access due to deep water and channels at well
2010-07-19 13:15	bc	2.85	0.09	6546.1	11.6	67	90	n	Ground saturated but no standing water
2010-08-23 17:15	bc				12.0	65	87	y	Water clear, no odor
2010-09-28 16:50	bc	3.26	0.50	6545.7	9.4	79	113	n	Water clear, no odor
2010-11-02 12:10	ds	2.65	-0.11	6546.3	6.8	64	99	n	Not stratified; surface water is 76@25°C
2011-07-08 12:05	ds, bc	1.79	-0.97	6547.1	4.2	58	96	y	Water clear, depth to SW = 1.78. SCT (top) = 54@7.4°C, 81.1@25°C
2011-08-11 12:20	bc	2.90	0.14	6546.0	9.0	121	175	n	Ground wet, but no standing water, SCT (top) 99.9@12.7°C, 130.3@25°C
2011-09-12 12:50	bc	3.03	0.27	6545.9	10.3	85	119	y	No stratification
2011-10-09 12:20	bc	2.87	0.11	6546.1	8.0	98	146	y	Water clear, no strat
2011-11-03 12:50	ds	3.05	0.29	6545.9	6.7	107	165	n	Saturated just below SFC, LL time 1250 PC time 1247
2011-12-05 12:00	bc	3.09	0.33	6545.8	2.1	111	196	y	
2012-05-18 11:10	ds, bc	1.98	-0.78	6546.9	6.2	55	85	n	DTS 1.98'. SCT (depth) 140@1.3°C, SCT (sfc) 21.6@5.8°C
2012-06-15 11:40	bc	2.62	-0.14	6546.3	8.5	68	100	y	No stratification, water clear, surface water at ground level
2012-07-17 12:40	bc	3.38	0.62	6545.5	11.9	122	163	y	Water slightly muddy. SCT (depth) 142.2@8.7°C, 200.4@25°C
2012-08-14 13:15	bc	3.98	1.22	6544.9	10.7	180	251	y	SCT (depth) 173.6@7.7°C, 258.3@25°C
2012-09-17 13:05	bc	5.44	2.68	6543.5	8.4	125	183	y	Slightly muddy. Stream dry, island pools.
2012-10-18 16:15	ds	5.57	2.81	6543.4	5.8	152	238	n	LL time = 1632, PC time = 16:31. data downloaded.
2013-05-24 14:15	ds, bc	2.61	-0.15	6546.3	9.8	58	82	n	Stratified; SC = 255 @ 25°C, 4.9°C at bottom of well.
2013-06-20 13:15	bc	3.08	0.32	6545.8	8.6	65	94	y	Not stratified
2013-07-24 11:45	bc	3.07	0.31	6545.9	14.0	127	158	n	Stratified; SC = 162@10.3°C; 226@25°C at bottom of well
2013-08-30 12:35	bc	3.98	1.22	6544.9	7.9	117	174	y	No stratification
2013-09-18 13:20	ds	4.17	1.41	6544.8	10.5	208	287	n	Minor stratification: SC=215@8.6°C, 312@25°C at bottom of well
2014-05-02 15:45	bc, ds	0.78	-1.98	6548.1	7.2	71	110	--	Stratified: SC=156@0.3°C, 291@25°C
2014-07-29 12:25	bc	2.86	0.10	6546.1	7.9	149	218	y	Clear
2014-09-11 12:10	bc	3.7	0.94	6545.2	4.9	163	263	y	Clear; stratified: 206 @ 4.4°C, 340.1@25°C
2014-10-30 15:50	bc, ds	2.69	-0.07	6546.2	1.2	170	310	y	Stratified: sc=200 @ 2.2°C , 357@ 25°C
2015-04-17 13:15	bc	2.44	-0.32	6546.5	7.1	53	80	y	Clear. SCT (@ depth) 223.5@5.5°C, 356.9@25°C
2015-05-22 15:15	bc, ds	2.4	-0.36	6546.5	7.7	166	251	y	SCT (@ depth) 245@6.6°C, 376@25°C
2015-06-26 10:00	bc	3.17	0.41	6545.8	10.5	167	233	n	No strat
2015-08-14 10:40	bc	3.57	0.81	6545.4	10.0	157	221	y	
2015-10-14 14:32	bt, ds	3.39	0.63	6545.5	8.7	149	215	y	Stratified 239@8.0°C, 354 @25°C bailed clear and recovered quickly; channel half full no observed flow

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations				Remarks
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
2016-06-01 11:49	bt	1.84	-0.92	6547.1	11.1	29	40	n	Completely in a pool ≈ 1.25 ft deep; channels surrounding the pool are deep and active (waist deep)
2016-07-29 14:30	bc	3.2	0.44	6545.7	11.0	45	61	y	Stratified 38.5@8.1°C, 56.8 @25°C
2016-10-12 14:25	ds,bc	3.69	0.93	6545.2	6.3	136	211	y	
2017-07-11 14:30	bt	2.42	-0.34	6546.5	9.0	30	43	y	Well inundated with 2-4 inches of water; all channels are full around well; 10 bails clear water
2017-08-11 13:00	bc	2.62	-0.14	6546.3	13.0	107	140	y	Stratification at depth T 10.2°C, C 218.9, SC 303.8@25°C
2017-09-22 13:35	bc	2.78	0.02	6546.1	7.7	171	254	y	
2017-10-24 13:49	bt	3.17	0.41	6545.8	7.7	165	245	y	Grass is dry; no stratification; soil is damp; 7.5 bails clear; diagnostics all check OK Battery level is 3.57V
2018-05-23 12:00	bt	2.07	-0.69	6546.9	7.8	36	53	y	Stratified at depth: T 4.6°C, C 150.5, SC 245.4; 15 bails clear; well inundated in ≈4 inches of water; adjacent channel flowing
2018-07-03 11:05	bc	3.47	0.71	6545.5	10.4	124	207	y	Stratified at depth: T 8.2°C, C 144.2, SC 211.2
2018-08-16 12:10	bc	4.42	1.66	6544.5	9.7	150	214	y	
2018-10-20 12:22	bt	4	1.24	6544.9	8.3	87	125	y	Stratified at depth: T 7.0°C, C 202, SC 304; 10 bails clear water; grass dry

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions				Water Quality Observations				Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer 09-5 - North side, lower upper meadow, upland terrace									
Total Depth		5.26 ft bgs		New Stickup	5-23-18				
Depth to bottom =		10.01 ft btoc							
Total Stickup =		4.75 ft above gs	0.79	ft above gs					
Elevation =		6553.8 ft							
2009-08-21 0:00	ds,bc	dry	--	--	--	--	--	--	Piezometer installed
2009-09-23 14:46	ds	9.78	5.03	6548.8	11.2	145	197	y	Wp227; very little water in bottom of well.
2009-10-23 12:12	bc	9.65	4.90	6548.9	9.3	362	517	n	Murky brown color, water level near bottom of well
2009-12-04 10:18	bc	8.91	4.16	6549.6	6.8	298	459	n	Water clear, no odor; capped
2010-06-12 15:45	bc	4.77	0.02	6553.8	9.2	174	250	n	
2010-07-19 13:05	bc	5.80	1.05	6552.7	10.6	171	237	n	
2010-08-23 17:00	bc	7.87	3.12	6550.7	10.1	194	270	y	Water clear, no odor
2010-09-28 16:40	bc	8.62	3.87	6549.9	9.9	280	393	n	Water clear, no odor
2010-11-02 11:58	ds	6.18	1.43	6552.4	7.3	96	145	n	Stratified: 374@25°C at depth
2011-07-08 11:48	ds, bc	4.85	0.10	6553.7	7.1	154	233	y	Water clear, SCT (top) = 127.1@15.4°C, 155.7@25°C
2011-08-11 12:05	bc	5.71	0.96	6552.8	8.6	112	163	n	SCT (top) = 128.3@12.3°C, 169@25°C
2011-09-12 12:40	bc	7.31	2.56	6551.2	10.1	112	158	y	Water clear, no stratification
2011-10-09 12:10	bc	8.23	3.48	6550.3	9.0	756	1080	y	Water clear, no stratification
2011-11-03 12:20	ds	8.33	3.58	6550.2	7.9	1092	1620	n	Ground is dry, stratified, SCT (top) 250@25°C
2011-12-05 11:50	bc	7.98	3.23	6550.6	5.6	124	197	n	
2012-05-18 11:35	ds, bc	4.91	0.16	6553.6	8.2	105	154	n	
2012-06-15 11:50	bc	5.41	0.66	6553.1	8.4	105	152	y	Water clear, no stratification
2012-07-17 13:00	bc	7.50	2.75	6551.0	7.7	98	147	y	A little clear, no strat
2012-08-14 13:25	bc	8.71	3.96	6549.8	7.5	101	152	y	Water muddy, no strat
2012-09-17 13:15	bc	9.47	4.72	6549.1	7.5	127	187	y	Muddy
2012-10-18 0:00	ds	9.75	5.00	6548.8	6.7	107	165	n	
2013-05-24 14:25	ds, bc	5.44	0.69	6553.1	9.4	71	101	n	
2013-06-20 13:30	bc	6.82	2.07	6551.7	7.5	70	104	y	No stratification
2013-07-24 11:50	bc	8.22	3.47	6550.3	10.4	75	105	n	No stratification
2013-08-30 12:45	bc	9.26	4.51	6549.3	6.6	119	184	y	
2013-09-18 13:35	ds	9.51	4.76	6549.0	10.5	127	178	n	
2014-05-02 16:05	bc, ds	4.94	0.19	6553.6	3.0	154	264	--	Stratified: 142.6 @ 1.9°C, 255@25°C
2014-07-29 12:35	bc	8.91	4.16	6549.6	5.0	149	241	y	Clear, no strat
2014-09-11 12:25	bc	9.39	4.64	6549.1	6.0	151	238	y	Clear, no strat
2014-10-30 16:10	bc, ds	9.24	4.49	6549.3	3.7	155	266	y	No strat
2015-04-17 13:30	bc	5.36	0.61	6553.2	5.8	100	157	NR	
2015-05-22 15:30	bc, ds	5.98	1.23	6552.6	7.3	139	209	y	No strat
2015-06-26 10:10	bc	7.39	2.64	6551.1	--	--	--	--	
2015-08-14 10:55	bc	8.8	4.05	6549.7	--	--	--	n	
2015-10-14 14:54	bt, ds	9.38	4.63	6549.2	NR	--	--	n	No reading until removed logger; no SC
2016-06-01 11:21	bt	4.82	0.07	6553.7	14.7	109	135	y	Not stratified but also hard to get SC probe too deep; re-started logger at 11:15 because it is in slate mode; ground is saturated with some ponding starting 50 yds from the road; bailed and water clear

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations				Remarks
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (µS/cm)	Bailed?	
2016-07-29 14:40	bc	7.76	3.01	6550.8	11.1	117	160	y	
2016-10-12 14:45	ds,bc	dry	--	--	--	--	--	--	
2017-07-11 14:08	bt	5.26	0.51	6553.3	15.5	68	83	y	Stratified at depth, T 11.0°C, C 126.8, SC 171.6@°C; soil is slightly damp; grasses shorter with some tall grass in mix; 4.5 bails of clear water
2017-08-11 13:10	bc	7.1	2.35	6551.4	13.6	107	136	y	Clear; not stratification
2017-09-22 13:45	bc	8.68	3.93	6549.9	10.8	195	269	n	Could not get bailor in well deep enough
2017-10-24 14:06	bt	8.79	4.04	6549.7	10.6	204	278	n	Grasses and soil are dry; restarted logger at 14:30
2018-05-23 11:22	bt	5	0.25	6553.5	9.7	54	77	y	Well broken at coupler roughly 8 inches above ground surface; DTW measurement made standing well up where it was broken so could be slightly off; stratified at depth: T 6.4°C, C 113.2, SC 174.6; replaced string with estimated measurement of length below broken section and attached below coupling; 4.5 bails clear
2018-07-03 11:15	bc	2.7	1.91	6551.9	10.7	109	149	y	No stratification
2018-08-16 12:25	bc	dry	--	--	--	--	--	--	
2018-10-20 11:50	bt	dry	--	--	--	--	--	--	Restarted logger in continuous mode; grass is dry; soil damp

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations				Remarks
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C)	Bailed?	
Piezometer 09-6 - S Side Middle Meadow, just east of willow line, upstream of Cold Creek fan									
Total Depth		5.35 ft bgs							
Depth to bottom =		8.60 ft btoc							
Total Stickup =		3.25 ft above gs							
Elevation =		6492.6 ft							
2009-08-27 0:00	ds, tb	4.23	0.98	6491.7	--	--	--	--	Piezometer installed; water level not static, but fairly stable
2009-09-23 10:35	ds	4.01	0.76	6553.0	9.3	95	137	y	Replaced SCT meter battery just prior to measurement; installed levellogger after bailing well
2009-10-01 9:30	ds, bc	4.00	0.75	6553.0	7.3	82	124	n	Downloaded levellogger
2009-10-23 12:58	bc	3.69	0.44	6553.3	6.4	82	127	n	Water clear, no odor
2009-12-04 13:56	bc	3.83	0.58	6553.2	2.8	79	137	n	Water clear, no odor
2010-06-11 15:00	ds	3.28	0.03	6553.8	4.6	98	160	n	Stratified; SCT at water table = 94.4@9.3°C, 135@25°C; downloaded DL; saturated at sfc
2010-07-19 9:24	bc	3.47	0.22	6553.6	10.4	116	161	n	
2010-08-23 12:35	bc	4.21	0.96	6552.8	8.3	100	148	y	Water clear, no odor; cap replaced with loose oversized cap
2010-09-28 13:45	bc	3.71	0.46	6553.3	6.4	86	133	n	Water clear, no odor
2010-11-02 13:43	ds	3.41	0.16	6553.6	5.2	83	131	n	Stratified: 88@25°C in upper portion of well; water ponded in nearby depressions, evidence of surface flow in willows; downloaded datalogger
2011-07-08 13:50	ds, bc	2.72	-0.53	6554.3	4.8	93	150	y	Depth to sw=2.72, SCT (top) = 90.4@12.5°C, 118@25°C
2011-08-11 9:02	bc	3.25	0.00	6553.8	9.6	83	117	n	No stratification, water clear
2011-09-12 9:30	bc	3.61	0.36	6553.4	8.6	112	163	y	Water clear, SCT (top) = 95.4@8.6°C, 126.5@25°C
2011-10-09 13:40	bc	3.32	0.07	6553.7	7.0	108	165	y	No stratification
2011-11-03 14:00	ds	3.44	0.19	6553.6	6.3	103	160		Minimal stratification
2011-12-05 13:35	bc	3.45	0.20	6553.6	2.8	89	154	n	
2012-05-18 12:55	ds, bc	2.82	-0.43	6554.2	9.5	117	165	n	In standing water. SCT (depth) 120@1.6°C
2012-06-06 11:28	merced	3.02	-0.23	6554.0	--	--	--	--	
2012-06-15 9:00	bc	3.20	-0.05	6553.8	6.2	103	161	y	Water slightly muddy. SCT (depth) 139.4@4.7°C, 226.9@25°C
2012-07-17 10:30	bc	3.63	0.38	6553.4	7.5	128	193	y	No stratification
2012-08-14 13:50	bc	3.60	0.35	6553.4	7.5	138	211	y	No strat, water clear
2012-09-17 10:55	bc	3.29	0.04	6553.7	6.9	101	155	y	No strat, water slightly muddy
2012-10-18 12:58	ds	3.24	-0.01	6553.8	6.9	113	177	n	Downloaded
2013-05-24 11:35	ds, bc	2.98	-0.27	6554.1	7.7	97	146	n	Stratified; SCT = 220@25°C, 137@5.4°C at depth
2013-06-20 10:10	bc	3.07	-0.18	6554.0	7.1	91	138	y	Wet at surface, bailed water is slightly muddy; stratified: 110@5.9°C, 173@25°C
2013-07-24 12:45	bc	3.10	-0.15	6553.9	12.5	103	136	n	No stratification
2013-08-30 10:05	bc	3.17	-0.08	6553.9	6.2	108	168	y	Water clear; stratified: SC = 162@5.4°C, 259@25°C
2013-09-18 14:05	ds	3.20	-0.05	6553.8	9.4	142	203	n	No stratification; downloaded
2014-05-02 12:45	bc, ds	2.91	-0.34	6554.1	5.1	79	127	y	Stratified; SC = 171 @ 0.5°C, 317@ 25°C
2014-07-29 13:25	bc	3.40	0.15	6553.6	6.5	167	258	y	No strat; clear
2014-09-11 9:25	bc	3.27	0.02	6553.8	3.8	120	202	y	No strat; clear
2014-10-30 12:00	bc, ds	3.14	-0.11	6553.9	1.4	105	190	y	Clear; stratification: C = 112 @ 1.0°C , SC = 205 @ 25°C ; ground moist
2015-04-17 10:40	bc	3.01	-0.24	6554.0	4.9	120	195	y	Clear, no strat
2015-05-22 11:40	bc, ds	2.93	-0.32	6554.1	7.3	139	209	y	No strat
2015-06-26 11:00	bc	3.42	0.17	6553.6	10.8	118	159	n	

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations				Remarks
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
2015-08-14 11:30	bc	3.52	0.27	6553.5	9.4	119	166	y	
2015-10-21 10:41	bt	3.37	0.12	6553.7	6.8	103	155	y	No stratification; bailed clear water; marsh very wet and sloppy with ponding and saturated mud
2016-05-27 12:42	ds,bc	2.69	-0.56	6554.3	10.4	111	153	n	4" of standing water; stratified at depth; C 100 @ 7.2°C
2016-07-29 15:46	bc	3.82	0.57	6553.2	8.8	96	138	y	
2016-10-07 12:17	bt	3.52	0.27	6553.5	5.8	82	130	y	Grass very green knee to waist high; soggy under foot walking to well; willows starting to lose leaves; lots of waterfowl
2017-07-13 13:58	bt	2.94	-0.31	6554.1	14.2	66	82	y	Meadow inundated with water; very muddy and spongy; no stratification; 10 bails clear; grass waist high
2017-08-11 14:00	bc	3.49	0.24	6553.5	11.1	133	179	y	No stratification
2017-09-22 13:30	bc	3.16	-0.09	6553.9	7.1	91	138	y	
2017-10-25 12:08	bt	3.26	0.01	6553.8	7.7	93	138	y	Grass is drying out; soil inundated <1 inch of water; 10 bails clear water; diagnostics check battery 3.43V
2018-05-23 13:48	bt	2.87	-0.38	6554.2	10.8	45	61	y	Stratified at depth: T 4.4°C, C 127, SC 208; well inundated in ≈6-8 inches of water; 10 bails clear
2018-07-03 11:50	bc	3.1	-0.15	6553.9	11.5	129	172	y	
2018-08-16 13:05	bc	2.99	-0.26	6554.0	14.0	136	171	y	
2018-10-19 12:18	bt	2.96	-0.29	6554.1	8.7	136	196	y	No stratification; meadow inundated with 2-6 inches of water; 10 bails clear water; restarted logger to sync time

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions				Water Quality Observations				Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation ft, NGVD/NAVD	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer 09-7 - S Side lower middle meadow									
Total Depth		6.26 ft bgs							
Depth to bottom =		10.00 ft btoc							
Total Stickup =		3.74 ft above gs							
Elevation =		6472.7 ft							
2009-08-27 0:00	ds, tb	7.19	3.45	6469.3	11.2	101	139	--	Coupler driven onto pipe, could not remove, no cap installed
2009-09-23 11:16	ds	7.01	3.27	6469.5	9.7	102	72	y	SC rises slightly after purging, ~10uS; water slightly turbid after bailing
2009-10-01 11:55	ds,bc	6.97	3.23	6469.5	9.5	81	115	--	Downloaded levellogger; measurement from top of inside casing, not coupling
2009-10-23 14:30	bc	6.50	2.76	6470.0	8.1	73	107	--	Water clear in color, no odor
2009-12-05 10:44	bc	6.38	2.64	6470.1	4.5	68	113	n	Water clear, no odor; no cap installed; bird droppings
2010-06-11 16:00	ds	4.23	0.49	6472.3	8.5	95	142	n	Temperature stratified, 4.1degC at bottom of well; downloaded DL
2010-07-19 8:13	bc	5.96	2.22	6470.5	8.3	96	142	n	No cap
2010-08-23 11:20	bc	6.59	2.85	6469.9	8.9	92	133	y	Water clear, no odor, replaced cap
2010-09-28 0:00	--	--	--	--	--	--	--	--	Unable to located piezo
2010-11-03 16:23	ds	--	--	--	6.6	119	183	--	Well stickup is broken off, replaced; downloaded and removed datalogger to avoid damage.
2011-07-08 16:47	ds, bc	--	--	--	7.2	453	691	--	SCT (top) 66.5@25
2011-08-11 7:55	bc	4.26	0.52	6472.2	10.9	359	489	n	Water clear, SCT (top) = 263.7@12.1, 328.5@25
2011-09-12 8:45	bc	4.05	0.31	6472.4	11.6	110	148	y	No stratification, slightly muddy water
2011-10-09 15:30	bc	3.74	0.00	6472.7	9.2	100	143	y	Water clear
2011-11-03 16:00	ds	3.98	0.24	6472.5	5.4	93	149	--	Did not download UC Merced LL, Stickup = 3.5'
2011-12-05 10:00	bc	3.99	0.25	6472.5	2.7	94	163	n	
2012-05-18 15:15	ds, bc	--	--	--	7.9	126	187	n	Levellogger embedded in mud. Removed but is now resting on top of mud.
2012-06-06 12:22	merced	3.48	--	--	--	--	--	--	
2012-06-15 8:10	bc	3.78	0.04	6472.7	8.0	135	200	y	Water muddy, no stratification
2012-07-17 9:45	bc	4.66	0.92	6471.8	7.2	106	161	y	Muddy, no strat
2012-08-14 15:40	bc	4.57	0.83	6471.9	8.2	111	164	y	Very muddy
2012-09-17 10:15	bc	4.22	0.48	6472.3	7.9	102	154	y	Water clear, no strat
2012-10-18 14:06	ds	4.08	0.34	6472.4	5.6	89	140	n	Downloaded
2013-05-24 10:35	ds, bc	3.55	-0.19	6472.9	5.8	86	135	n	Minimal stratification but 4.8 degC at bottom of well
2013-06-20 9:25	bc	4.09	0.35	6472.4	5.2	82	131	y	Water clear, with a little turbidity at bottom, no stratification
2013-07-24 9:00	bc	4.52	0.78	6472.0	10.4	99	138	n	No stratification
2013-08-30 9:25	bc	4.23	0.49	6472.3	6.0	89	140	y	Water clear, no strat
2013-09-18 11:15	ds	4.25	0.51	6472.2	9.2	82	119	n	Not stratified; downloaded levellogger
2014-05-02 11:00	bc, ds	3.54	-0.20	6472.9	1.6	na		y	Not stratified
2014-07-29 9:40	bc	4.88	1.14	6471.6	6.4	85	132	y	No strat; muddy
2014-09-11 8:40	bc	4.81	1.07	6471.7	4.5	69	114	y	Muddy, no strat
2014-10-30 11:00	bc, ds	4.12	0.38	6472.4	1.3	71	128	y	No strat
2015-04-17 10:00	bc	3.79	0.05	6472.7	2.6	81	142	y	No strat, muddy near bottom, mostly clear
2015-05-22 10:45	bc, ds	3.43	-0.31	6473.1	5.7	73	116	y	No strat, clear, little bit muddy about halfway through bailing.
2015-06-26 8:25	bc	4.51	0.77	6472.0	9.3	82	117	n	
2015-08-14 8:20	bc	4.36	0.62	6472.1	10.1	80	111	y	

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations				Remarks
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
2015-10-14 11:24	bt,ds	4.25	0.51	6472.2	9.1	70	100	y	No strat; ponding to the SSE; soils dry and moist "Dave-I have seen it a lot dryer at this point in the season-reflecting a wet summer."; !! Reset data logger to measure in ft not cm next visit!!!!
2016-05-27 11:25	ds,bc	3.35	-0.39	6473.1	10.1	113	153	y	Stratified at depth; C 100 @7.2 degC; clear water not odor; possibly silting in
2016-07-29 12:15	bc	4.99	1.25	6471.5	10.0	101	142	y	No stratification
2016-10-07 11:16	bt	4.74	1.00	6471.7	7.0	62	94	y	Grasses at well are dry because it is at a high point; grasses in lower areas around pools and channels are very green
2017-07-11 10:59	bt	3.46	-0.28	6473.0	13.0	112	147	y	No stratification; ground saturated with 1 plus inches of water; all channels active on walk from 09-10
2017-08-11 16:45	bc	4.53	0.79	6472.0	10.4	96	133	y	Clear; no stratification
2017-09-24 11:30	bc	4.25	0.51	6472.2	8.0	67	99	y	
2017-10-24 10:29	bt	4.14	0.40	6472.3	6.5	64	99	y	Grass dry; soil damp; 9.5 bails clear water; logger in cm but leaving it to continue monitoring; diagnostic check battery 3.57V
2018-05-22 15:25	bt,ds	3.42	-0.32	6473.1	8.8	107	156	y	No stratification-only temp; soil saturated; installed backup string; 10 bails clear
2018-07-03 8:40	bc	4.37	0.63	6472.1	8.6	89	130	y	No stratification; water slightly muddy in last bail
2018-08-16 9:35	bc	4.92	1.18	6471.6	9.3	76	109	y	Water slightly muddy
2018-10-20 9:40	bt	4.52	0.78	6472.0	5.7	64	102	y	No stratification; 8 bails of clear water; grass is dry; soils damp; meadow has some inundation and saturated soils

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations			Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation i, NGVD/NAVD	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer 09-8 - Upper end middle meadow, north side									
Total Depth		4.80 ft bgs							
Depth to bottom =		9.75 ft btoc							
Total Stickup =		4.95 ft above gs							
Elevation =		6497.4 ft							
2009-08-27 0:00	ds,tb	8.53	3.58	6493.8	--	--	--	--	Piezometer installed; not static, fairly steady
2009-09-23 16:05	ds	8.42	3.47	6493.9	10.6	115	160	y	Wp238; no stratification
2009-10-01 9:01	ds,bc	8.41	3.46	6493.9	10.4	97	135	n	
2009-10-23 13:20	bc	7.96	3.01	6494.4	9.4	104	149	n	Water clear; no odor
2009-12-04 13:29	bc	7.82	2.87	6494.5	6.6	93	144	n	Water clear no odor; capped
2010-06-12 16:30	bc	5.14	0.19	6497.2	9.7	149	209	n	
2010-07-19 9:45	bc	7.52	2.57	6494.8	9.4	117	167	n	
2010-08-23 13:00	bc	7.03	2.08	6495.3	10.7	101	140	y	Water muddy at bottom, next to active construction
2010-09-28 14:15	bc	5.50	0.55	6496.8	10.2	98	134	n	Water clear, no odor
2010-11-02 14:54	ds	4.97	0.02	6497.4	8.6	140	206		Not stratified; no evidence of overland flow at this location
2011-07-08 14:30	ds, bc	4.69	-0.26	6497.6	6.0	104	163	y	SCT (top) = 62.4@12.6°C, 80.6@25°C
2011-08-11 9:20	bc	5.46	0.51	6496.9	9.6	136	192	n	SCT (top) = 64.1@10.8°C, 84.8@25°C
2011-09-12 10:10	bc	5.81	0.86	6496.5	11.0	155	211	y	Water clear, no stratification
2011-10-09 14:05	bc	5.41	0.46	6496.9	9.1	161	232	n	Couldn't get bailer in deep enough to bail.
2011-11-03 14:28	ds	5.95	1.00	6496.4	7.0	127	193	n	Meadow dry, UC Merced levellogger pulled and replaced but not downloaded
2011-12-05 13:45	bc	5.95	1.00	6496.4	3.8	137	231	n	
2012-04-24 0:00	ds	4.54	-0.41	6497.8	10.8	158	210	--	SCT (depth) 113@1.6°C SCT (sfc) 53.4@ 15.9°C, 64.7@25°C; new cap installed with levellogger
2012-04-24 0:00	ds	4.50	-0.45	6497.8	--	--	--	--	
2012-05-18 13:30	ds, bc	4.71	-0.24	6497.6	6.2	124	194	--	No stratification
2012-06-06 13:27	merced	4.89	-0.06	6497.4	--	--	--	--	
2012-06-15 9:25	bc	5.23	0.28	6497.1	7.2	136	205	y	Slightly muddy, SCT (depth) 127.8@4.9°C, 208.6@25°C
2012-07-17 10:55	bc	6.47	1.52	6495.9	7.3	133	200	y	Water clear, no strat
2012-08-14 14:10	bc	6.80	1.85	6495.5	8.8	127	182	y	No stratification
2012-09-17 11:15	bc	6.62	1.67	6495.7	8.5	135	196	y	Water clear, no strat
2012-10-18 12:20	ds	6.64	1.69	6495.7	7.1	135	206	n	Downloaded
2013-05-24 11:55	ds, bc	5.29	0.34	6497.0	7.2	53	80	n	Stratified: SC = 106.8@6.2°C, 166@25°C at depth
2013-06-20 10:35	bc	5.95	1.00	6496.4	6.9	105	161	y	Stratified: SC = 112@5.6°C, 179@25°C at depth
2013-07-24 13:15	bc	6.79	1.84	6495.5	10.3	142	196	n	
2013-08-30 10:35	bc	6.74	1.79	6495.6	7.9	145	216	y	Water muddy, no stratification
2014-05-02 12:15	bc, ds	5.04	0.09	6497.3	4.9	111	183	y	Stratified: SC 122 @ 1.1°C, 223 @ 25°C
2014-07-29 14:05	bc	6.99	2.04	6495.3	7.3	122	180	y	No strat; slightly muddy
2014-09-11 5:55	bc	7	2.05	6495.3	6.0	122	191	y	No strat; slightly muddy
2014-10-30 12:40	bc, ds	6.36	1.41	6496.0	2.8	130	225	y	No strat
2015-04-17 11:12	bc	5.49	0.54	6496.8	3.1	100	171	y	No strat
2015-05-22 12:21	bc, ds	5.27	0.32	6497.1	5.9	104	164	y	Extra rise in pipe from pvc fitting, 0.15 stick up.
2015-06-26 11:20	bc	6.56	1.61	6495.8	9.2	108	156	n	
2015-08-14 12:00	bc	6.87	1.92	6495.5	10.6	117	162	y	

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations				Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?		
2015-10-21 11:30	bt	6.48	1.53	6495.8	9.1	112	161	y	Hard to get SC probe down well	
2016-05-27 13:30	bt	4.79	-0.16	6497.5	11.8	77	105	y	Temp stratified at depth; C 70 @9.1°C SC 102 @ 25°C	
2016-07-29 16:20	bc	7.21	2.26	6495.1	10.7	121	166	y		
2016-10-07 12:59	bt	7.02	2.07	6495.3	8.6	92	135	y	Grasses dry but soil damp; restarted logger to measure in hourly time step	
2017-07-13 14:45	bt	5.39	0.44	6496.9	12.1	86	113	y	No stratification; hard to get bailer down well; 3 bails clear; grass knee high and soil wet	
2017-08-11 14:30	bc	6.48	1.53	6495.8	11.8	136	182	y		
2017-09-22 13:55	bc	6.21	1.26	6496.1	9.3	127	182	y	Water clear	
2017-10-25 12:45	bt	6.29	1.34	6496.0	9.0	128	185	n	Grass dry; soil damp; diagnostic check battery 3.51V could not get bailor down the well	
2018-05-23 14:22	bt	4.67	-0.28	6497.7	12.8	77	97	y	Stratified at depth: T 5.6°C, C 109.4, SC 172.7; soil saturated with slight ponding at well <1 inch of water; 10 bails clear	
2018-07-03 12:20	bc	6.36	1.41	6496.0	10.1	122	170	y		
2018-08-16 13:30	bc	7.3	2.35	6495.0	11.1	130	177	y		
2018-10-19 12:57	bt	6.75	1.80	6495.6	9.5	133	187	y	No stratification; grass dry; 5.5 bails clear water	

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations			Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer 09-9 - Upper end middle meadow, north side near lone double pine in meadow									
Total Depth		4.34 ft bgs							
Depth to bottom =		5.97 ft btoc							
Total Stickup =		1.63 ft above gs							
Elevation =		6493.2 ft							
2009-08-29 0:00	ds,tb	4.04	2.42	6490.8	13.6	90	116	n	Piezometer installed; water level not static
2009-09-23 18:00	ds	--	--	--	11.7	162	216	--	Stratified: 147uS at top (111@12.3°C); installed levellogger
2009-10-01 8:48	ds,bc	3.87	2.25	6491.0	11.1	88	123	n	Changed levellogger id to "09-9"; downloaded data
2009-10-23 13:12	bc	3.36	1.74	6491.5	9.4	102	145	n	Water clear, no odor
2009-12-04 13:22	bc	3.20	1.58	6491.7	4.7	88	143	n	Water clear, no odor
2010-06-11 14:07	ds		-1.63		9.4	76	108	n	
2010-07-19 9:40	bc	3.50	1.88	6491.4	11.8	121	162	n	
2010-08-23 13:15	bc	4.47	2.85	6490.4	12.4	94	124	y	Water clear, no odor
2010-09-27 11:00	ds	2.29	0.67	6492.6	10.7	103	142	n	Downloaded levellogger
2010-09-28 14:10	bc	2.38	0.76	6492.5	11.2	101	137	n	Water clear, no odor
2010-11-02 14:27	ds	1.92	0.30	6492.9	7.1	100	150	n	Not stratified, downloaded datalogger, HWM is 0.55' above ground surface
2011-07-08 14:14	ds, bc	1.07	-0.56	6493.8	7.8	76	113	--	Depth to SW same as in well. SCT (top) = 69@10.5°C, 95.1@25°C
2011-08-11 9:15	bc	1.86	0.24	6493.0	12.1	126	167	n	Water clear, SCT (top) 144.4@12.7°C, 185.6@25°C
2011-09-12 9:50	bc	2.11	0.49	6492.8	12.6	182	238	y	No stratification
2011-10-09 13:55	bc	2.08	0.46	6492.8	9.3	190	270	y	Water clear
2011-11-03 14:20	ds	2.19	0.57	6492.7	7.1	173	262	--	No stratification, meadow surface dry
2011-12-05 13:15	bc	2.12	0.50	6492.7	2.7	144	250	n	
2012-04-24 12:57	ds	0.94	-0.69	6493.9	3.4	112	192	n	SCT (depth) 102@0.6°C, SCT (sfc water) 21.4@4.3°C, 35@25, downloaded levellogger. Depth to surface water 11.25"
2012-05-18 13:20	ds, bc	1.04	-0.59	6493.8	7.7	131	195	n	SCT (sfc) 27@11.3°C, 36@25°C. in flowing water, no stratification, datalogger downloaded
2012-06-06 13:22	merced	1.38	-0.25	6493.5	--	--	--	--	
2012-06-15 9:15	bc	1.81	0.19	6493.1	10.5	147	203	y	No stratification
2012-07-17 10:40	bc	2.48	0.86	6492.4	11.8	206	276	y	Water clear, SCT(depth) 204.9@10.1°C, 285.4@25°C
2012-08-14 14:05	bc	2.58	0.96	6492.3	12.1	214	283	y	Water clear
2012-09-17 11:05	bc	2.45	0.83	6492.4	10.2	192	267	y	No strat, water slightly muddy
2012-10-18 11:50	ds	2.32	0.70	6492.5	7.3	161	242	n	Cap is off and missing, SCT at 25°C = 234 at bottom, downloaded
2013-05-24 11:50	ds, bc	1.76	0.14	6493.1	9.2	141	202	n	No stratification
2013-06-20 10:20	bc	2.20	0.58	6492.7	9.1	178	256	y	No stratification
2013-07-24 13:00	bc	2.58	0.96	6492.3	13.4	179	230	n	No stratification
2013-08-30 10:20	bc	2.35	0.73	6492.5	8.8	164	238	y	No stratification
2013-09-18 14:30	ds	2.54	0.92	6492.3	11.3	168	227	n	No stratification
2014-05-02 12:00	bc, ds	1.58	-0.04	6493.3	3.8	60	100	y	No stratification
2014-07-29 13:50	bc	2.63	1.01	6492.2	8.6	206	301	y	No stratification
2014-09-11 10:05	bc	2.32	0.70	6492.5	6.0	158	247	y	No stratification, clear
2014-10-30 12:25	bc, ds	2.08	0.46	6492.8	0.3	143	267	y	Stratification: sc= 153 @ 2.1°C , 272@25°C
2015-04-17 11:00	bc	1.99	0.37	6492.9	3.3	114	194	y	SCT @depth 104.9@3.4°C 187.0@25°C
2015-05-22 12:05	bc, ds	1.81	0.19	6493.1	6.7	116	178	y	SCT @depth 122@5.2°C 196@25°C

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations				Remarks
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft. bgs)	Water Surface Elevation ft. NGVD/NAVD	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
2015-06-26 11:10	bc	2.57	0.95	6492.3	10.8	144	193	n	
2015-08-14 11:45	bc	2.53	0.91	6492.3	11.9	149	198	y	
2015-10-21 11:05	bt	2.27	0.65	6492.6	8.1	149	221	y	SCT @ depth 147@8.0°C, 217@25°C; soil moist but grasses dry; bailed clear
2016-05-27 13:15	ds,bc	1.23	-0.40	6493.6	10.4	38	53	n	Stratified at depth; C 36 @8.5°C SC 54 @ 25°C
2016-07-29 16:05	bc	2.97	1.35	6491.9	11.2	151	202	y	
2016-10-07 12:39	bt	2.64	1.02	6492.2	7.1	160	242	y	Grasses dry but soil wet; some ice in areas near pools from overnight freezing temps; not stratified
2017-07-13 14:28	bt	2.25	0.63	6492.6	13.3	45	56	y	Stratified at depth, T 11.0°C, C 143.3, SC 195.0@25°C; grasses knee high; soil damp; 8.5 bails clear
2017-08-11 14:15	bc	2.84	1.22	6492.0	13.0	144	187	y	
2017-09-22 13:45	bc	2.02	0.40	6492.8	8.4	136	199	y	Water clear
2017-10-25 12:29	bt	2.57	0.95	6492.3	8.7	66	95	y	Stratified at depth: T 6.5°C, C 135.3, SC 207.1@°C; 10 bails clear water; grass dry; soil wet; diagnostic check battery 3.48V
2018-05-23 14:07	bt	1.4	-0.23	6493.5	11.2	124	167	y	Stratified at depth: T 7.2°C, 135.9, SC 204.5; soil saturated with ≈1 inch of water ponded at well; 15 bails clear
2018-07-03 12:05	bc	2.92	1.30	6491.9	11.9	124	165	y	No stratification
2018-08-16 13:15	bc	3.66	2.04	6491.2	13.2	136	175	y	
2018-10-19 12:40	bt	2.95	1.33	6491.9	8.1	116	171	y	Stratified at depth: T 7.4°C, C 187.6, SC 280.6; 10 bails clear water

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions				Water Quality Observations				Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation i, NGVD/NAVD	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer 09-10 - Lower Middle Meadow, N side Middle Meadow									
Total Depth		6.70 ft bgs							
Depth to bottom =		10.01 ft btoc							
Total Stickup =		3.31 ft above gs							
Elevation =		6477.1 ft							
2009-08-29 0:00	ds,tb	5.76	2.45	6474.7	13.2	127	165	n	Piezometer installed; water level not static
2009-09-23 12:35	ds	5.21	1.90	6475.2	9.0	120	174	y	
2009-10-01 11:04	ds,bc	5.11	1.80	6475.3	9.2	103	148	y	
2009-10-23 14:47	bc	4.38	1.07	6476.1	7.4	102	154	n	Water clear, no odor
2009-12-05 10:13	bc	4.40	1.09	6476.1	2.6	91	158	n	Water clear, no odor
2010-06-11 13:35	ds	3.85	0.54	6476.6	9.5	102	144	n	Temp stratified; 5.3°C at depth
2010-07-19 8:30	bc	5.00	1.69	6475.5	11.4	101	136	n	
2010-08-23 10:55	bc	5.80	2.49	6474.7	10.4	91	126	y	Water clear, no odor
2010-09-28 12:00	bc	--	--	--	--	--	--	--	Destroyed by cows
2010-11-03 16:00	ds	--	0.55	6476.6	7.9	75	111	n	Well is destroyed, DTW reading is in remnant hole, was able to replace stickup, but well is filled with gravel; need to replace.
2011-07-08 16:20	ds, bc	--	--	--	15.6	25	30	n	Knocked over by cows, water .75' deep at well, SCT is of SW
2011-08-11 8:30	bc	--	--	--	--	--	--	n	Ground damp, no standing water
2011-09-12 8:20	bc	2.88	-0.43	6477.6	10.7	83	114	y	Water clear, brown at bottom, no stratification
2011-10-09 15:10	bc	2.88	-0.43	6477.6	7.9	87	129	y	water clear
2012-11-03 15:00	ds	2.93	-0.38	6477.5	6.2	77	120	--	SCT (sfc) 160@25°C, UC Merced LL pulled but not downloaded, could not get LL back to bottom due to silt/mud
2011-12-05 10:17	bc	2.78	-0.53	6477.7	2.0	90	160	n	
2012-05-18 14:55	ds, bc	2.03	-1.28	6478.4	8.7	105	154	--	SCT (depth) 97.8@6.5°C, 151.6@25°C
2012-06-06 14:05	merced	2.66	-0.65	6477.8	--	--	--	--	
2012-06-15 7:50	bc	2.82	-0.49	6477.6	10.4	146	203	y	A little muddy, no odor, no strat
2012-07-17 9:25	bc	2.99	-0.32	6477.5	9.7	133	188	y	Water clear, no strat
2012-08-14 15:20	bc	2.55	-0.76	6477.9	9.6	150	212	y	Slightly muddy, no strat
2012-09-17 9:55	bc	2.86	-0.45	6477.6	7.6	122	182	y	Water clear. SCT at depth = 115.9@7°C, 177@25°C
2012-10-18 11:13	ds	2.95	-0.36	6477.5	4.8	126	207	n	SCT at bottom = 172@25°C. Downloaded
2013-05-24 10:20	ds, bc	2.72	-0.59	6477.7	8.1	128	188	n	No stratification
2013-06-20 9:00	bc	2.91	-0.40	6477.5	5.9	117	184	y	Water clear with some muddy water at very bottom; no stratification
2013-07-24 8:40	ds	3.08	-0.23	6477.4	11.0	136	186	n	No stratification
2013-08-30 9:05	bc	2.99	-0.32	6477.5	6.2	117	182	y	Water clear, no stratification
2014-05-02 10:40	bc, ds	2.57	-0.74	6477.9	2.0	122	217	y	No stratification
2014-07-29 9:20	bc	3.09	-0.22	6477.4	7.3	146	220	y	No stratification; clear then slightly muddy
2014-09-11 8:15	bc	3.05	-0.26	6477.4	4.2	142	236	y	No stratification; clear
2014-10-30 10:35	bc, ds	2.88	-0.43	6477.6	0.8	110	203	y	No stratification; clear then muddy at bottom
2015-04-17 9:40	bc	2.8	-0.51	6477.7	3.3	117	198	y	No strat
2015-05-22 12:05	bc, ds	2.72	-0.59	6477.7	5.2	105	170	y	No strat, no odor, clear
2015-06-26 8:05	bc	2.99	-0.32	6477.5	10.4	120	167	n	
2015-08-14 8:00	bc	2.97	-0.34	6477.5	10.7	134	184	y	Clear

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations				Remarks
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation ft, NGVD/NAVD	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
2015-10-14 10:57	bt,ds	2.78	-0.53	6477.7	9.2	116	166	y	No stratification; some spring fed swales flowing from north between 9-10 and 9-11; ponding in nearby depressions; soil saturated; logger data in meters-change next visit
2016-05-27 10:45	ds,bc	2.2	-1.11	6478.3	12.3	131	173	y	Stratified at depth: C 122 @8.7°C SC 177 @ 25°C; level in well same as ponded water on surface
2016-07-29 11:45	bc	3	-0.31	6477.5	11.0	127	176	y	
2016-10-07 10:46	bt	2.95	-0.36	6477.5	5.2	114	182	y	Some small channels still active and soggy spots in meadow between 09-11 and 09-10; not stratified
2017-07-11 10:20	bt	2.58	-0.73	6477.9	14.2	138	174	y	T-posts knocked down and cap with logger was off and on the ground next to well (logger outside of well); fixed t-posts; no stratification; vegetation was waist high and ground saturated; looked at downloaded record and pt changed on 1/9/17; attached a back up string because wire is degraded
2017-08-11 10:25	bc	2.76	-0.55	6477.7	12.1	48	156	y	Clear ; no stratification
2017-09-24 11:10	bc	2.76	-0.55	6477.7	8.3	107	157	y	
2017-10-24 10:01	bt	2.8	-0.51	6477.7	6.5	88		y	No stratification; grass is still green; ground wet spongy; diagnostic check battery 3.38V
2018-05-22 14:57	bt,ds	2.51	-0.80	6477.9	11.7	140	190	y	Stratified at depth: T 5.4°C, C 148, SC 233; soil saturated with heavy grasses; 10 bails slightly colored
2018-07-03 8:15	bc	2.83	-0.48	6477.6	9.3	118	168	y	No stratification
2018-08-16 9:05	bc	2.97	-0.34	6477.5	10.8	129	177	y	No stratification
2018-10-20 8:37	bt	3.03	-0.28	6477.4	4.1	95	158	y	No stratification; logger would not connect until warmed up; logger was stuck in well-possibly frozen; initial view of data shows faulty readings in beginning of October 2018; logger removed

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations			Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft. bgs)	Water Surface Elevation i, NGVD/NAVD	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer 09-11 - N Side lower middle meadow, just N USFS boundary									
Total Depth		7.17 ft bgs							
Depth to bottom =		10.00 ft btoc							
Total Stickup =		2.83 ft above gs							
Elevation =		6474.7 ft							
2009-08-29 0:00	ds,tb	9.88	7.05	6467.7	11.9	199	267	--	Piezometer installed, water level not static, still rising
2009-09-23 12:00	ds	5.16	2.33	6472.4	10.8	111	151	y	
2009-10-01 11:26	ds,bc	5.01	2.18	6472.5	10.5	116	160	--	No stratification
2009-10-23 15:03	bc	3.98	1.15	6473.6	8.7	103	150	n	Water clear, no odor
2009-12-05 10:28	bc	3.23	0.40	6474.3	2.6	81	141	n	
2010-06-11 12:52	ds	2.38	-0.45	6475.2	19.5	140	157	n	Water ponded in depressions; downloaded DL; red-tail hawk; stratified: 131@4.9°C; 211@25°C at depth; depth to SW from TOC = 2.65, suggests upward vertical hydraulic gradient
2010-07-19 7:50	bc	3.92	1.09	6473.6	12.8	178	137	n	
2010-08-23 10:35	bc	5.15	2.32	6472.4	11.6	148	198	y	Water clear, 'oily' odor
2010-09-28 12:10	bc	4.85	2.02	6472.7	9.6	157	223	n	Water clear, no odor
2010-11-03 15:15	ds	2.92	0.09	6474.6	9.1	154	223	n	Ground is moist; no evidence of overland flow; water is flowing swale ~400' N of piezo, SC=164@25°C, appears to be spring fed from base of N hillside alluvial fan
2011-07-08 15:51	ds, bc	2.30	-0.53	6475.2	20.3	185	203	y	Depth to SW = 2.62. No stratification
2011-08-11 7:30	bc	3.59	0.76	6474.0	12.4	135	180	n	No stratification
2011-09-12 8:00	bc	4.38	1.55	6473.2	11.9	118	157	y	Water clear, no stratification
2011-10-09 14:50	bc	3.23	0.40	6474.3	10.3	113	157	y	
2011-11-03 15:30	ds	3.14	0.31	6474.4	6.7	99	151	--	No stratification
2011-12-05 10:30	bc	2.99	0.16	6474.6	3.2	80	136	n	
2012-05-18 14:40	ds, bc	2.40	-0.43	6475.1	8.4	83	121	n	No stratification, datalogger downloaded
2012-06-06 13:56	merced	2.49	-0.34	6475.1	--	--	--	--	
2012-06-15 7:35	bc	2.98	0.15	6474.6	7.6	90	134	y	Water clear, no odor, no strat
2012-07-17 9:10	bc	4.46	1.63	6473.1	8.6	100	146	y	Water clear, no strat
2012-08-14 15:05	bc	4.97	2.14	6472.6	8.7	109	159	y	Water clear, no strat
2012-09-17 9:40	bc	4.75	1.92	6472.8	8.6	122	176	y	Water clear, no strat
2012-10-18 10:50	ds	4.25	1.42	6473.3	7.1	128	196	n	Downloaded
2013-05-24 10:05	ds, bc	2.57	-0.26	6475.0	7.5	91	136	n	stratified: SC = 86@5.4°C, 137@25°C at depth
2013-06-20 8:40	bc	3.81	0.98	6473.7	7.3	87	131	y	
2013-07-24 8:20	bc	4.84	2.01	6472.7	11.3	131	177	n	Minor temperature stratification: 9.3°C at depth
2013-08-30 8:45	bc	4.90	2.07	6472.6	7.5	121	181	y	Not stratified
2013-09-18 10:30	ds	4.79	1.96	6472.8	10.5	141	195	n	9.4°C at bottom, no SCT stratification; downloaded levellogger
2014-05-02 10:20	bc, ds	2.73	-0.10	6474.8	1.8	98	176	y	Not stratified
2014-07-29 9:00	bc	5.17	2.34	6472.4	6.9	146	221	y	Clear; Stratified: 135 @ 5.0°C , 217.8 @25°C
2014-09-11 8:00	bc	5.24	2.41	6472.3	6.0	146	229	y	Clear, not stratified
2014-10-30 10:10	bc, ds	3.96	1.13	6473.6	2.4	124	218	y	Clear; Stratified: 128 @ 3.7°C , 218 @25°C
2015-04-17 9:20	bc	2.98	0.15	6474.6	4.7	95	154	y	Clear. SCT @depth 116.5@4.7°C 190.7@25°C
2015-05-22 9:50	bc, ds	2.5	-0.33	6475.0	5.2	105	170	y	No strat, clear, no odor

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations				Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?		
2015-06-26 7:50	bc	4.33	1.50	6473.2	10.6	141	195	n		
2015-08-14 7:45	bc	4.78	1.95	6472.8	11.5	154	208	y	Clear	
2015-10-14 10:36	bt,ds	4.28	1.45	6473.3	10.1	164	229	y	No stratification, clear	
2016-05-27 10:15	ds,bc	2.21	-0.62	6475.3	16.7	136	162	y	No stratification; in standing water; nearby staff plate needs to be replaced	
2016-07-29 11:25	bc	4.91	2.08	6472.6	12.1	158	206	y	No stratification	
2016-10-07 10:21	bt	4.82	1.51	6475.6	9.3	131	187	y	Lots of waterfowl in pools; grasses in meadow very dry and soil dry near well; not stratified	
2017-07-11 9:53	bt	3.11	-0.20	6477.3	13.6	106	135	y	No stratification; meadow is green and ground is saturated; lots of water in channels; 7.5 bails clear water	
2017-08-11 10:10	bc	3.96	0.65	6476.5	14.4	134	168	y	Clear; no stratification	
2017-09-24 10:50	bc	3.97	0.66	6476.5	10.4	117	162	y	Water clear	
2017-10-24 9:32	bt	3.11	-0.20	6477.3	8.8	119	171	y	No stratification; grass is dry; soil damp; 9 bails clear water; diagnostics check battery 3.475V	
2018-05-22 14:34	bt,ds	2.25	-1.06	6478.2	18.2	121	138	y	Stratified at depth: T 5.1°C, C 136, SC 216; ground saturated; lots of active channels in meadow area; 10 bails clear	
2018-07-03 8:00	bc	3.38	0.07	6477.1	10.3	123	171	y	Stratified at depth: T 8.2°C, C 129.2, SC 190	
2018-08-16 8:47	bc	5.18	1.87	6475.3	11.4	139	188	y	No Stratification	
2018-10-20 8:11	bt	4.35	1.04	6476.1	5.9	118	187	y	No stratification; 6 bails of clear water; grass and meadow dry	

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations				Remarks
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer FS-12 - West (left) side Upper Meadow									
Total Depth		4.43 ft bgs							
Depth to bottom =		8.10 ft btoc							
Total Stickup1 =		3.67 ft above gs							
Total Stickup2 =		3.58 ft above gs							
Elevation =		6553.8 ft							
2009-07-19 0:00	ds	7.14	3.47	6550.3	9.5	102	145	n	
2009-09-23 16:19	ds	5.3	1.63	6552.1	9.9	90	122	n	Stratified: 49 uS/cm at top (37@10.8°C)
2009-10-23 10:22	bc	6.98	--	--	7.6	85	127	n	Stinky; well seems disturbed and data point is an outlier, omitted from the record
2009-12-04 12:18	bc	5.60	1.93	6551.8	4.7	36	59	n	Water clear, no odor
2010-05-21 15:30	ds, rw	7.77	4.10	6549.7	--	--	--	--	SCT reading Lerr
2010-06-12 0:00	bc	--	--	--	--	--	--	--	Unable to remove cap
2010-07-19 11:55	bc	--	--	--	--	--	--	--	Unable to remove cap
2010-08-23 15:35	bc	4.54	0.96	6552.8	12.2	59	78	y	Water light brown; cut cap off well, new stickup = 43" (see 'Total Stickup2)
2010-09-28 15:50	bc	4.32	0.74	6553.0	9.7	64	90	n	Water clear, no odor
2010-11-02 11:17	ds	3.96	0.38	6553.4	6.5	62	40	--	Stratified: 112@25°C in bottom 1-2" of well; 78@25°C in adjacent pond
2011-07-08 11:10	ds, bc	6.18	2.60	6551.2	3.6	47	79	y	Water slightly turbid. Depth to SW = 41". SCT (top) = 19.1@3.8°C, 31.9@25°C
2011-08-11 11:20	bc	3.65	0.07	6553.7	10.4	35	47	n	Ground wet, but no standing water, no stratification
2011-09-12 12:20	bc	4.06	0.48	6553.3	10.5	41	57	y	No stratification
2011-10-09 11:15	bc	3.97	0.39	6553.4	8.0	42	63	y	Water clear, no strat
2011-11-03 11:20	ds	4.01	0.43	6553.3	5.2	41	66		
2011-12-05 11:05	bc	4.30	0.72	6553.1	3.3	37	64	n	
2012-05-18 10:05	ds, bc	7.87	4.29	6549.5	4.3	22	36	n	No stratification, water ponded in depression at sfc
2012-06-15 10:40	bc	4.25	0.67	6553.1	10.8	45	61	y	Water clear, no strat
2012-07-17 11:50	bc	4.59	1.01	6552.8	12.2	48	64	y	Water clear, no strat
2012-08-14 12:25	bc	4.60	1.02	6552.8	13.8	75	95	y	Slightly muddy, SCT (depth) 65.4@11°C, 89.8@25°C
2012-09-17 12:10	bc	4.63	1.05	6552.7	11.0	69	95	y	Water clear
2012-10-18 12:00	ds	4.57	0.99	6552.8	8.0	71	105	n	Not stratified
2013-05-24 13:30	ds, bc	7.88	4.30	6549.5	8.5	30	44	n	Not stratified
2013-06-20 12:00	bc	4.32	0.74	6553.0	10.8	41	56	y	Water clear, not stratified
2013-07-24 10:40	bc	4.50	0.92	6552.9	16.1	61	73	n	No stratification
2013-08-30 11:35	bc	4.60	1.02	6552.8	9.9	67	94	y	Water clear, no strat
2013-09-18 12:15	ds	4.61	1.03	6552.7	12.3	71	94	n	Not stratified
2014-05-02 14:20	bc, ds	4.01	0.43	6553.3	2.5	33	58	y	Not stratified
2014-07-29 11:15	bc	4.75	1.17	6552.6	10.3	69	97	y	Not stratified, clear
2014-09-11 11:10	bc	4.62	1.04	6552.7	9.4	82	118	y	Not stratified, clear
2014-10-30 14:10	bc, ds	4.43	0.85	6552.9	4.1	67	113	y	
2015-04-17 12:10	bc	4.45	0.87	6552.9	4.5	42	70	y	No strat, a little bit muddy.
2015-05-22 13:15	bc, ds	4.3	0.72	6553.1	7.4	31	47	y	
2015-06-26 9:20	bc	4.5	0.92	6552.9	13.0	62	81	n	
2015-08-14 9:40	bc	4.68	1.10	6552.7	13.2	81	105	y	No strat
2015-10-14 12:32	bt, ds	4.65	1.07	6552.7	10.7	82	112	y	No stratification; sandy in well; pond stagnant and turbid; willows have no leaves

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations				Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?		
2016-05-27 15:00	ds,bc	4.06	0.48	6553.3	7.1	36	54	y	Logger in slate mode stopped 12/20/15; restarted at 15:30	

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations				Remarks
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (µS/cm)	Bailed?	
2016-07-29 13:25	bc	4.69	1.11	6552.7	13.1	63	81	y	No stratification
2016-10-12 13:00	ds,bc	4.62	1.04	6552.7	8.4	63	93	y	Clear
2017-07-11 12:39	bt	3.94	0.36	6553.4	11.9	28	38	y	No stratification; well inundated with 1-2 inches of water; vegetation very green; 2.5 bails clear water
2017-08-11 12:00	bc	4.37	0.79	6553.0	14.1	59	74	y	Clear; no stratification
2017-09-24 12:40	bc	4.39	0.81	6553.0	10.0	58	81	y	Water clear
2017-10-24 12:07	bt	4.01	0.43	6553.3	9.5	46	65	y	Grass dry; meadow inundated with ~1 inch of water; 10 bails clear; slate mode restarted logger at 12:30
2018-05-23 9:49	bt	3.52	-0.06	6553.8	5.4	33	52	y	No stratification; well inundated with ~4 inches of water with ~0.05 of flow around it; lots of active channels in the area; 10 bails clear
2018-07-03 10:05	bc	3.83	0.25	6553.5	15.6	42	52	y	No stratification
2018-08-16 11:15	bc	4.7	1.12	6552.7	16.0	91	109	y	
2018-10-20 10:38	bt	4.3	0.72	6553.1	7.4	44	66	y	10 bails of clear water; grass is drying out; soil is wet; restarted logger now in continuous mode

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations			Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft. bgs)	Water Surface Elevation ft. NGVD/NAVD	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer FS-13 - East (right) side Upper Meadow									
Total Depth		4.10 ft bgs							
Depth to bottom =		7.35 ft btoc							
Total Stickup =		3.25 ft above gs							
Elevation =		6555.2 ft							
2009-07-19 0:00	ds	5.69	2.44	6552.8	8.4	102	145	n	Stratified: 75 uS/cm at top of water table
2009-09-23 16:04	ds	4.88	1.63	6553.6	8.2	104	152	y	Stratified: 62 uS/cm at top of water table; installed levellogger programmed for 09-03
2009-10-23 10:14	bc	3.09	-0.16	6555.4	6.5	41	63	n	Labeled well; standing water at base of well
2009-12-04 12:09	bc	--	--	--	--	--	--	--	Frozen
2010-05-21 14:20	ds, rw	7.49	4.24	6551.0	4.4	24	39		1" water on sfc, SCTsfc same as piezo; checked measurement several times.
2010-06-12 14:40	bc	3.59	0.34	6554.9	7.0	26	38	n	Water ponded on sfc
2010-06-16 12:30	ds	2.53	-0.72	6556.0	--	--	--	n	Water flowing at sfc; downloaded LL
2010-07-19 11:55	bc	2.66	-0.59	6555.8	11.7	30	46	n	Water ponded on sfc
2010-08-23 15:45	bc	3.54	0.29	6555.0	15.4	177	216	y	Ground wet, no standing water; water brown, no odor
2010-09-28 15:55	bc	3.48	0.23	6555.0	10.8	151	207	n	Water clear, no odor
2010-11-02 11:00	ds	3.00	-0.25	6555.5	4.1	40	67	y	Conductance same as sfc water ponded at base of well 0-3" deep; downloaded datalogger
2011-07-08 10:45	ds, bc	6.86	3.61	6551.6	4.2	17	28	y	Water clear, turbid at bottom, cut off stuck cap, in 3-4" standing water and needs cap.
2011-08-11 11:30	bc	2.65	-0.60	6555.8	11.3	27	37	n	SCT (top) = 18.1@4.9°C, 29.3@25°C
2011-09-12 12:15	bc	2.85	-0.40	6555.6	14.7	50	63		Depth to SW = 2.65', no stratification
2011-10-09 11:25	bc	2.75	-0.50	6555.7	8.6	44	63	y	Ground wet, no stratification
2011-11-03 11:10	ds	2.78	-0.47	6555.7	2.4	38	67	y	Water slightly muddy, depth to SW = 2.75'
2011-12-05 11:15	bc	2.64	-0.61	6555.9	--	--	--	--	File downloaded, cap missing
2012-05-18 10:10	ds, bc	2.45	-0.80	6556.0	3.8	21	36	n	Frozen depth to ice
2012-06-15 10:45	bc	2.61	-0.64	6555.9	9.6	30	43	y	Depth to surface 29.375", water flowing on surface, datalogger downloaded
2012-07-17 11:55	bc	3.34	0.09	6555.2	12.5	137	180	y	In standing water. 2.48' to surface water
2012-08-14 12:35	bc	3.41	0.16	6555.1	12.5	143	189	y	Water clear, no strat
2012-09-17 12:20	bc	3.54	0.29	6555.0	10.4	152	208	y	Light brown, no strat
2012-10-18 0:00	ds	3.39	0.14	6555.1	7.8	141	208	--	Slightly muddy
2013-05-24 13:30	ds, bc	2.59	-0.66	6555.9	7.0	22	34	n	Not stratified, downloaded
2013-06-20 12:10	bc	2.73	-0.52	6555.8	10.1	35	48	y	Not stratified
2013-07-24 10:45	bc	3.34	0.09	6555.2	12.9	146	190	n	Water muddy, not stratified, ponded at surface
2013-08-30 11:45	bc	3.45	0.20	6555.0	7.3	131	198	y	Not stratified
2013-09-18 12:20	ds	3.47	0.22	6555.0	9.6	136	193	n	Not stratified
2014-05-02 14:25	bc, ds	2.58	-0.67	6555.9	5.4	26	41	y	Slightly stratified at bottom: SC=154@5.8°C, 218@25°C; downloaded logger
2014-07-29 11:25	bc	3.52	0.27	6555.0	8.1	118	174	y	Not stratified
2014-09-11 11:20	bc	3.67	0.42	6554.8	5.4	116	185	y	Slightly muddy
2014-10-30 14:30	bc, ds	3.26	0.01	6555.2	2.2	115	204	y	Slightly muddy
2015-04-17 12:20	bc	2.74	-0.51	6555.8	8.8	29	41	y	Stratified: sc= 152 @ 3.4°C , 261 @ 25°C
2015-05-22 13:35	bc, ds	2.22	-1.03	6556.3	7.9	29	43	y	In standing water.
2015-06-26 9:25	bc	3.35	0.10	6555.1	15.4	55	67	n	Muddy; visual depth measurement.

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations				Remarks
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
2015-08-14 9:50	bc	3.55	0.30	6554.9	11.0	140	191	y	No Strat; clear
2015-10-14 12:50	bt, ds	3.42	0.17	6555.1	9.1	145	208	y	No stratification cap; channel inlet to pond between FS-12 and FS-13 red with iron bacteria interaction by the plug zone
2016-05-27 13:30	ds,bc	2.14	-1.11	6556.4	9.6	26	37	y	No stratification
2016-07-29 13:35	bc	3.53	0.28	6555.0	12.9	124	163	y	
2016-10-12 13:10	ds,bc	3.94	0.69	6554.6	7.5	120	177	y	
2017-07-11 12:56	bt	2.54	-0.71	6556.0	11.7	23	31	y	Well inundated with 5-6 inches of water with visible flow; 3.5 bails dirty water
2017-08-11 12:10	bc	3.06	-0.19	6555.4	13.7	68	87	y	Muddy colored water in bail
2017-09-24 12:45	bc	3.33	0.08	6555.2	8.9	42	62	y	Water slightly dirty
2017-10-24 12:30	bt	3.21	-0.04	6555.3	6.9	76	117	y	Stratified at depth: T 6.1°C, C 118.5, SC 184.8@25°C; ground saturated; grasses drying; leaves have fallen off of willows; 2(1/5) bails of dirty water; no odor
2018-05-23 10:09	bt	2.55	-0.70	6555.9	6.4	20	31	y	No stratification; well inundated with ≈2-3 inches of water; meadow channels active; 11 bails clear
2018-07-03 10:15	bc	3.32	0.07	6555.2	11.8	107	143	y	No stratification; water muddy
2018-08-16 11:20	bc	3.71	0.46	6554.8	11.1	79	108	y	No stratification; 10.75 bails partially dirty water; grass dry; soil wet
2018-10-20 10:56	bt	3.32	0.07	6555.2	7.5	108	161	y	

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions				Water Quality Observations				Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft. bgs)	Water Surface Elevation (ft. NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer FS-14 - West (left) side Upper Meadow, upstream bedrock reach, on upland terrace									
Total Depth		5.28 ft bgs							
Depth to bottom =		8.08 ft btoc							
Total Stickup =		2.80 ft above gs							
Elevation =		6553.8 ft							
2009-07-19 0:00	ds	7.64	4.84	6549.0	9.5	471	671	n	
2009-09-23 16:33	ds	7.05	4.25	6549.6	9.6	413	580	y	Stratified: 412 uS at bottom (413@9.6°C); smells bad, like feces or rotting flesh; no levellogger installed
2009-10-23 10:37	bc	4.50	--	--	8.3	41	60	n	Water clear, no odor; data point is an outlier, omitted from the record
2009-12-04 11:21	bc	7.93	5.13	6548.7	4.5	63	104	n	Water clear, no odor, no cap
2010-06-12 15:00	bc	7.02	4.22	6549.6	6.5	23	36	--	No cap
2010-07-19 11:40	bc	4.33	1.53	6552.3	10.7	36	50	n	No cap
2010-08-23 15:15	bc	4.7	1.90	6551.9	11.8	59	79	y	Water clear, no odor, replaced cap
2010-09-28 16:25	bc	4.68	1.88	6552.0	10.8	72	99	n	Water clear, no odor
2010-11-02 10:45	ds	4.31	1.51	6552.3	7.6	68	102	--	Terrace is now surrounded by remnant channels with flowing sw; terrace sfc appears to be 2-4' higher than meadow/floodplain; this piezo probably better reflects changes from surface flow and restoration activities than other gw-influenced areas.
2011-07-08 10:25	ds, bc	3.89	1.09	6552.7	6.2	113	177	y	Water clear, needs pvc cap. SCT (top) = 54@10.2°C, 75@25°C
2011-08-11 11:05	bc	4.17	1.37	6552.5	8.1	50	73	n	SCT (top)= 52.3@9.2°C, 74.8@25°C
2011-09-12 11:45	bc	4.38	1.58	6552.3	9.3	70	100	y	A little sediment in water (light tan), no stratification
2011-10-09 11:50	bc	4.25	1.45	6552.4	8.7	81	118	y	Water clear
2011-11-03 11:35	ds	4.38	1.58	6552.3	6.1	40	62	y	Beaver dam u/s, stratified 8" below sfc, SCT (depth) 86.6@6.9°C, 132@25°C
2011-12-05 11:30	bc	4.42	1.62	6552.2	4.0	75	125	n	
2012-05-18 10:40	ds, bc	4.02	1.22	6552.6	2.4	73	128	n	Dry ground, missing cap
2012-06-15 11:15	bc	4.32	1.52	6552.3	5.6	71	114	y	Do strat, water clear/slightly muddy
2012-07-17 12:20	bc	4.89	2.09	6551.7	6.2	65	102	y	Water clear, no strat
2012-08-14 12:55	bc	5.09	2.29	6551.5	7.5	80	122	y	Water clear, no strat
2012-09-17 12:45	bc	5.32	2.52	6551.3	7.7	65	97	y	Water clear
2012-10-18 0:00	ds	5.05	2.25	6551.6	6.4	65	100	n	Minimal strat, SCT at bottom = 110@25°C
2013-05-24 13:30	ds	4.45	1.65	6552.2	8.4	72	106	n	Stratification: 107@6°C, 168@25°C at depth
2013-06-20 12:40	bc	4.69	1.89	6551.9	6.6	90	138	y	No stratification
2013-07-24 11:10	bc	4.96	2.16	6551.7	10.6	97	133	n	No stratification
2013-08-30 12:10	bc	5.12	2.32	6551.5	6.4	79	122	y	Water clear, no strat
2013-09-18 13:00	ds	5.25	2.45	6551.4	9.8	68	95	n	Not stratified; willows have dropped leaves
2014-05-02 14:55	bc, ds	4.06	1.26	6552.6	1.8	49	89	y	Stratified, 62.4@ 0.3°C, 116@25°C
2014-07-29 11:50	bc	5.13	2.33	6551.5	6.4	89	138	y	Clear to slightly muddy; no strat
2014-09-11 11:50	bc	5.37	2.57	6551.3	6.6	85	131	y	Muddy; no stratification
2014-10-30 15:05	bc, ds	4.77	1.97	6551.9	3.6	96	162	y	No strat
2015-04-17 12:50	bc	4.32	1.52	6552.3	5.6	80	127	y	Clear, no strat
2015-05-22 14:30	bc, ds	4.17	1.37	6552.5	8.3	36	53	y	SCT @depth: 81@7.2°C, 124@25°C
2015-06-26 9:42	bc	4.79	1.99	6551.8	10.4	101	139	n	
2015-08-14 10:15	bc	5.06	2.26	6551.6	11.4	101	137	y	No strat; clear

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations				Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?		
2015-10-14 13:49	bt, ds	4.87	2.07	6551.8	9.7	81	115	y	Turbid after first few bails; restarted logger at 14:15	
2016-05-27 14:15	ds,bc	3.89	1.09	6552.7	7.2	45	68	y	Muddy water	
2016-07-29 14:00	bc	4.86	2.06	6551.8	9.5	98	139	y		
2016-10-12 13:50	ds,bc	4.86	2.06	6551.8	8.5	91	132	y		
2017-07-11 13:37	bt	4.53	1.73	6552.1	11.9	75	100	y	Ground dry and grass short; 2 bails of clean water and 1.25 bails of dirty water	
2017-08-11 12:40	bc	4.83	2.03	6551.8	12.0	100	134	y	Clear	
2017-09-24 13:10	bc	4.84	2.04	6551.8	9.7	96	136	y	Water clear	
2017-10-24 13:10	bt	4.82	2.02	6551.8	8.7	94	130	y	No stratification; grass dry; soil dry; 10 bails clear water; slate mode restarted logger 13:30	
2018-05-23 10:48	bt	4.2	1.40	6552.4	7.6	69	103	y	Stratified at depth: t 4.7°C, C 83.3, SC 135.6; soil damp from recent rain; adjacent channel full and flowing; 10 bails slightly dirty	
2018-07-03 10:40	bc	4.95	2.15	6551.7	9.4	101	144	y		
2018-08-16 11:45	bc	5.52	2.72	6551.1	11.3	103	139	y		
2018-10-20 11:28	bt	5.05	2.25	6551.6	9.3	78	110	y	No stratification; 5 bails clear water; restarted logger in continuous mode	

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions				Water Quality Observations				Remarks
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?
Piezometer FS-15 - Upper Meadow, Immediately downstream of bedrock reach								
Total Depth		5.52 ft bgs						
Depth to bottom =		7.72 ft btoc						
Total Stickup =		2.20 ft above gs						
Elevation =		6548.3 ft						
2009-07-19 0:00	ds							Not measured (locking cap)
2009-09-23 15:20	ds	7.58	5.38	6542.9	--	--	--	Wp229 unable to get SC reading due to mud at bottom; equipped with FS water level recorder
2009-10-23 11:04	bc	4.04	1.84	6546.5	9.6	54	79	Water clear, no odor; added label
2009-12-04 10:47	bc	3.88	1.68	6546.6	6.7	53	83	Water clear, no odor;
2010-06-12 15:15	bc	3.74	1.54	6546.8	4.7	43	70	n
2010-07-19 11:07	bc	3.93	1.73	6546.6	9.9	53	74	n
2010-08-23 14:30	bc	4.13	1.33	6547.0	14.6	59	73	y
2010-09-28 15:10	bc	4.05	1.25	6547.0	12.7	63	83	n
2011-07-08 12:35	ds, bc	3.46	0.66	6547.6	5.8	44	70	y
2011-08-11 12:45	bc	3.58	0.78	6547.5	9.2	57	82	n
2011-09-12 13:00	bc	4.08	1.28	6547.0	11.4	62	84	y
2011-10-09 12:30	bc	3.39	0.59	6547.7	11.7	50	67	y
2011-11-03 13:00	ds	3.9	1.10	6547.2	9.1	50	71	n
2011-12-05 12:10	bc	3.92	1.12	6547.2	6.1	44	69	n
2012-05-18 10:50	ds, bc	3.4	0.60	6547.7	3.0	58	101	n
2012-06-15 11:30	bc	3.74	0.94	6547.4	5.5	69	110	y
2012-07-17 12:30	bc	4.56	1.76	6546.5	9.5	92	130	y
2012-08-14 13:05	bc	5.02	2.22	6546.1	10.8	105	146	y
2012-09-17 13:00	bc	5.61	2.81	6545.5	11.3	92	125	y
2012-10-18 0:00	ds	5.03	2.99	6545.3	10.6	84	115	n
2013-05-24 14:05	ds, bc	3.91	1.87	6546.4	8.2	65	96	n
2013-06-20 13:00	bc	4.08	2.04	6546.3	10.7	65	89	y
2013-07-24 11:30	bc	4.54	2.50	6545.8	14.8	103	127	n
2013-08-30 12:25	bc	5.07	3.03	6545.3	12.4	107	135	y
2013-09-18 13:20	ds	4.92	2.88	6545.4	15.3	103	126	n
2014-05-02 15:20	bc, ds	3.71	1.67	6546.6	1.4	67	121	y
2014-07-29 12:15	bc	4.58	2.54	6545.8	11.4	108	147	y
2014-09-11 12:00	bc	5.2	3.16	6545.1	10.9	114	153	y
2014-10-30 15:30	bc, ds	3.86	1.82	6546.5	6.4	72	111	y
2015-04-17 15:00	bc	3.89	1.85	6546.5	6.3	69	107	y
2015-05-22 14:50	bc, ds	3.66	1.62	6546.7	9.4	73	104	y
2015-06-26 9:50	bc	4.48	2.44	6545.9	13.9	107	136	n
2015-08-14 10:30	bc	4.74	2.70	6545.6	16.3	125	150	y
2015-10-14 14:13	bt, ds	4.4	2.36	6545.9	13.1	119	151	y
2016-05-27 16:40	ds,bc	3.67	1.63	6546.7	5.9	71	112	y
2016-07-29 14:20	bc	4.52	2.48	6545.8	13.8	111	140	y

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations				Remarks
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (µS/cm)	Bailed?	
2016-10-12 14:05	ds,bc	4.3	2.26	6546.0	12.4	96	127	y	
2017-07-11 14:51	bt	4.24	2.20	6546.1	12.8	82	107	y	Ground is dry and grasses are short; string is frayed and was reinforced with second string; 9.75 bails of dirty water
2017-08-11 12:50	bc	4.64	2.60	6545.7	14.7	97	120	y	Muddy water in bail
2017-09-24 13:25	bc	4.03	1.99	6546.3	13.9	90	114	y	Loose dirt by well possible gopher activity
2017-10-24 13:31	bt	4.02	1.98	6546.3	12.6	70	92	y	Grass dry; soil damp; 7(3/4) bails dirty water with no odor; slate mode restarted logger at 13:45
2018-05-23 12:21	bt	3.8	1.76	6546.5	7.9	80	118	y	Stratified at depth: T 5.7°C, C 93.7, SC 147.1; soil damp; well is located at a high point with short grasses; 10 bails dirty
2018-07-03 10:55	bc	4.87	2.83	6545.5	10.6	103	143	y	
2018-08-16 12:00	bc	6.03	3.99	6544.3	--	--		y	Could not get SCT measurement; could be dry
2018-10-20 12:07	bt	5.52	3.48	6544.8	12.6	119	154	y	No stratification; 1/8 bail dirty water; restarted logger in continuous mode; grass dry; soil dry

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions				Water Quality Observations				Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer LP-P1 - Lower Meadow, on upland meadow south of Little Truckee River near Henness Pass Road									PVC well pipe and cap
Total Depth		<i>ft bgs</i>							
Depth to bottom =		<i>ft btoc</i>							
Total Stickup =		<i>1.50 ft above gs</i>							
Elevation =		<i>6445.0 ft</i>							
2015-04-01 16:40	bkh, kb	NR	NR	NR	NR	NR	NR	n	
2015-04-03 11:19	kb	3.75	2.25	6442.8	-3.7	56	116	n	
2015-05-05 11:11	kb	4.21	2.71	6442.3	3.4	140	241	n	
2015-10-21 14:13	bt	6.08	4.58	6440.4	8.0	123	182	y	
2016-06-01 14:10	bt	3.35	1.85	6443.2	12.2	77	102	y	
2016-07-29 18:05	bc	6.26	4.76	6440.2	9.2	99	142	--	
2016-10-12 11:05	ds,bc	5.89	4.39	6440.6	8.0	104	153	--	
2017-07-13 12:53	bt	3.58	2.08	6442.9	15.6	66	80	y	Stratified at depth, T 8.9°C, C 142.9, SC 203.5; some ponding near well cluster both towards road and meadow; pockets with 6 inches of water inundation; 4 (1/2) bails clear
2017-08-11 15:10	bc	4.17	2.67	6442.3	13.2	117	151	y	clear
2017-09-22 12:55	bc	3.68	2.18	6442.8	9.1	125	179	y	
2017-10-25 9:36	bt	3.80	2.30	6442.7	7.2	156	236	y	Grass partially dry; other veg dry and dead; 4(1/2) bails clear
2018-05-22 10:06	bt,ds	3.36	1.86	6443.1	9.5	88	125	y	Stratified at depth: T 3.2°C, C 182, SC 311; saturated soils; water ponded in adjacent channels; sporadic rain for last two weeks and overnight; 7.5 bails-3 through 7.5 were dirty with dark color
2018-07-03 13:50	bc	4.18	2.68	6442.3	8.3	229	336	y	Water slightly muddy
2018-08-16 15:30	bc	5.94	4.44	6440.6	9.6	219	310	y	
2018-10-19 9:53	bt	4.76	3.26	6441.7	8.1	228	339	y	No stratification; grass dry; no ponding in meadow; 5.5 bails with last bail slightly dirty

**Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California**

Site Conditions					Water Quality Observations				Remarks
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer LP-P2 - Lower Meadow, on upland meadow south of Little Truckee River near Henness Pass Road									PVC well pipe and threaded PVC cap.
Total Depth		<i>ft bgs</i>							
Depth to bottom =		<i>ft btoc</i>							
Total Stickup =		<i>1.00 ft above gs</i>							<i>APPROXIMATE TOTAL STICKUP</i>
Elevation =		<i>6447.0 ft</i>							<i>APPROXIMATE ELEVATION;</i>
2015-04-03 10:56	kb	1.50	0.50	6446.5	-3.4	119	246	n	DTW indeterminant; Solinst tape #s are worn off. 1.5 feet BTOC is an approximation. SCT meter needs recalibration--reading only negative temp values.
2015-05-05 11:23	kb	1.93	0.93	6446.1	4.1	148	249	n	
2015-10-21 14:22	bt	3.68	2.68	6444.3	7.7	125	189	y	SC@depth 152@7.5 229@25; turbid
2016-06-01 14:14	bt	0.93	-0.07	6447.1	11.2	80	108	y	Stratified SC@depth 147.1 @6.6 degC, 226.7 @25 degC; logger was in slate mode and stopped at 4/1/16; restarted logger at 14:30 in continuous mode; ground saturated with some inundation and ponding in the meadow on the north side; bailed water clean
2016-10-12 11:05	ds,bc	3.47	2.47	6444.5	8.2	149	211	y	
2017-07-13 13:06	bt	1.10	0.10	6446.9	13.7	67	85	y	Stratified at depth, T 9.1°C, C 127.8, SC 183.1; 2.5 bails clear; see notes for LP_P1 for other info as this is in a cluster of wells
2017-08-11 15:10	bc	1.68	0.68	6446.3	11.6	153	206	y	clear
2017-09-22 12:55	bc	1.21	0.21	6446.8	9.0	183	263	y	
2017-10-25 9:47	bt	1.33	0.33	6446.7	5.4	166	264	y	3(2/3) bails; diagnostic check battery 3.414V
2018-05-22 10:13	bt,ds	0.89	-0.11	6447.1	5.0	72	120	y	Stratified at depth: T 2.9°C, C 183, SC, 315; 4-5 bails water slightly grey; see above notes about surrounding conditions
2018-07-03 13:50	bc	1.73	0.73	6446.3	7.9	205	305	y	
2018-08-16 15:30	bc	3.67	2.67	6444.3	8.7	168	245	y	
2018-10-19 10:05	bt	2.30	1.30	6445.7	6.6	221	339	y	No stratification; 2 bails slightly dirty

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions				Water Quality Observations				Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer LP-W1 - Lower Meadow, on upland meadow south of Little Truckee River near Henness Pass Road									Galvanized well pipe and cap; bring Monkey wrench in Winter.
Total Depth		ft bgs							APPROXIMATE TOTAL STICKUP APPROXIMATE ELEVATION; Gray-black water and metal wire cord. SCT meter needs recalibration--reading only negative temp values.
Depth to bottom =		ft btoc							
Total Stickup =		1.50 ft above gs							
Elevation =		6445.0 ft							
2015-04-03 11:31	kb	2.41	0.91	6444.1	-3.8	87	182	n	
2015-05-05 10:50	kb	2.90	1.40	6443.6	4.9	113	186	n	
2015-10-21 14:04	bt	4.84	3.34	6441.7	8.5	130	191	y	1 full bailer and (2) 1/4 full clear; cap on tight needed pipe wrench
2016-06-01 14:29	bt	2.16	0.66	6444.3	11.6	106	149	y	Stratified SC@ depth 106.2@7.6°C, 158.7 @25°C; logger was in slate mode and stopped on 4/2/16; restarted at 14:45 in continuous mode; bailed water clear
2016-07-29 18:05	bc	5.08	3.58	6441.4	9.1	118	171	y	
2016-10-12 11:05	ds,bc	4.71	3.21	6441.8	7.7	122	183	y	
2017-07-13 13:17	bt	2.36	0.86	6444.1	13.8	128	163	y	4.5 bails clear; see notes for LP_P1 as this well is in a cluster of wells
2017-09-22 12:45	bc	2.47	0.97	6444.0	8.3	154	226	y	
2017-10-25 9:57	bt	2.64	1.14	6443.9	6.1	135	210	y	10 bails clear water; diagnostic check battery 3.485V
2018-05-22 10:19	bt,ds	2.13	0.63	6444.4	6.0	162	255	y	Stratified at depth: T 3.0°C only see above notes about surrounding conditions
2018-07-03 13:45	bc	2.95	1.45	6443.6	8.3	161	237	y	
2018-08-16 15:35	bc	4.92	3.42	6441.6	8.8	128	186	y	
2018-10-19 10:13	bt	3.55	2.05	6443.0	5.5	68	107	y	Stratified at depth: T 5.9°C; C 138, SC 216.6; 12 bails clear water

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions					Water Quality Observations				Remarks
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer LP-W3 - Lower Meadow, on upland meadow south of Little Truckee River near Henness Pass Road.									Galvanized well pipe and cap; bring Monkey wrench in Winter.
Total Depth		<i>ft bgs</i>							
Depth to bottom =		<i>ft btoc</i>							
Total Stickup =		<i>1.50 ft above gs</i>							
Elevation =		<i>6445.0 ft</i>							
2015-04-03 11:51	kb	4.18	2.68	6442.3	-1.2	82	159	n	
2015-05-05 11:33	kb	4.57	3.07	6441.9	5.8	100	160	n	
2015-10-21 13:35	bt	6.09	4.59	6440.4	9.1	126	181	y	
2016-06-01 14:52	bt	3.26	1.76	6443.2	9.2	90	129	y	No stratification; bailer 2/3 full turbid
2016-07-29 16:00	bc	6.19	4.69	6440.3	8.4	90	139	y	Stratified SC@depth 86.2@ 6.5°C, 133.7 @25°C; logger in slate mode stopped at 4/2/16; restarted in continuous mode at 15:15
2016-10-12 10:45	ds,bc	5.71	4.21	6440.8	7.8	135	208	y	
2017-07-13 13:30	bt	3.96	2.46	6442.5	12.3	50	65	y	Stratified at depth, T 7.3°C, C 89.3, SC 134.6@25°C; 4.5 bails of dirty water; grass shorter than well cluster; ground damp
2017-08-11 15:15	bc	4.77	3.27	6441.7	9.4	99	141	y	
2017-09-22 12:41	bc	4.41	2.91	6442.1	8.9	117	170	y	
2017-10-25 10:10	bt	4.41	2.91	6442.1	7.5	95	143	y	Grass dry; soil dry; 5(2/3) bails slightly brown; diagnostic check battery 3.50V
2018-05-22 10:36	bt,ds	3.36	1.86	6443.1	6.9	17	25	y	Stratified at depth: T 3.8°C, C 150, SC 250; ground moist; water level in nearby channel ≈1.5 feet below ground surface; 12 bails clear; wire was pulled up in top and frayed and adjusted logger estimated in Jan 2018; replaced wire with new string length of 9.3 feet from top to bottom of sensor
2018-07-03 13:35	bc	4.91	3.41	6441.6	9.7	116	164	y	Water slightly muddy
2018-08-16 15:20	bc	5.83	4.33	6440.7	11.5	131	176	y	Water is muddy
2018-10-19 10:28	bt	5.04	3.54	6441.5	8.0	128	190	y	No stratification; grass dry; soil dry

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions				Water Quality Observations				Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation i, NGVD/NAVD	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer LP-W6 - Lower Meadow, on upland meadow north of Little Truckee River near Jackson Meadows Road									Galvanized well pipe with PVC cap; bring Monkey wrench in Winter.
Total Depth		<i>ft bgs</i>							
Depth to bottom =		<i>ft btoc</i>							
Total Stickup =		<i>1.50 ft above gs</i>							
Elevation =		<i>6445.0 ft</i>							
2015-04-03 13:27	kb	4.36	2.86	6442.1	-1.7	88	172	n	
2015-05-05 12:03	kb	4.78	3.28	6441.7	5.2	97	159	n	
2015-10-21 13:17	bt	6.41	4.91	6440.1	8.4	71	104	y	
2016-06-01 16:14	bt	3.55	2.05	6443.0	8.9	129	185	y	
2016-07-29 17:50	bc	6.43	4.93	6440.1	8.8	113	166	y	
2016-10-12 10:30	ds,bc	6.40	4.90	6440.1	8.4	70	102	y	
2017-07-13 10:53	bt	4.51	3.01	6442.0	14.1	133	168	y	
2017-09-22 12:25	bc	5.64	4.14	6440.9	8.7	114	166	y	
2017-10-25 10:29	bt	4.71	3.21	6441.8	8.3	127	185	y	
2018-05-22 11:34	bt,ds	2.74	1.24	6443.8	7.3	201	302	y	
2018-07-03 13:25	bc	5.19	3.69	6441.3	10.0	110	170	y	
2018-08-16 15:10	bc	6.18	4.68	6440.3	10.3	131	182	y	
2018-10-19 10:44	bt	5.91	4.41	6440.6	9.0	134	193	y	
									APPROXIMATE TOTAL STICKUP
									APPROXIMATE ELEVATION;
									SCT meter needs recalibration--reading only negative temp values.
									1/2 bailer with turbid water
									Stratified SC@depth 124.6@6.9°C, 190.1@ 25°C; logger in slate mode and stopped
									4/2/16; restarted logger in continuous mode at 16:30; bailed clear water
									Replace wire with string
									No stratification; ground damp and grasses lush; 4 full bails 2 (1/2) bails clear
									Grass dry; soil damp; 8 bails clear; diagnostic check battery 3.44V
									One bail before SCT measurement; stratified at depth: T 4.1°C, C 125, SC 208; two
									seeps adjacent hill; soil moist
									No stratification
									No stratification; grass is dry; 5.5 bails slightly dirty water

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions				Water Quality Observations				Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation i, NGVD/NAVD	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer LP-W5 - middle Lower Meadow, on upland meadow north of Little Truckee River									Galvanized well pipe and cap; bring Monkey wrench in Winter.
Total Depth		<i>ft bgs</i>	New Well	8-17-17					
Depth to bottom =		<i>ft btoc</i>							
Total Stickup =		<i>1.50 ft above gs</i>	1.80	<i>ft above gs</i>					APPROXIMATE TOTAL STICKUP
Elevation =		<i>6445.0 ft</i>							APPROXIMATE ELEVATION;
2015-04-03 13:58	kb	5.70	4.20	6440.8	-1.1	104	202	n	VERY rusty water and wire cord; Levellogger covered in rusty silt. SCT meter needs recalibration--reading only negative temp values.
2015-05-05 12:19	kb	5.97	4.47	6440.5	1.6	21	37	n	DRY WELL! Moist, rusty mud at the bottom.
2015-10-21 12:57	bt	7.51	6.01	6439.0	8.8	136	198	y	1/2 bailer very turbid; very dry around well
2016-06-01 16:30	bt	3.97	2.47	6442.5	10.0	165	231	y	Stratified SC@ depth 137.3 @8.8°C, 198.4 @25°C; logger in slate mode and stopped 4/2/16; restarted at 16:45; ground moist with some mud spots in meadow; river too deep and swift to cross; bailed clear water
2016-07-29 17:40	bc	dry	--	--	--	--	--	n	
2016-10-12 10:15	ds,bc	7.01	5.51	6439.5	9.7	84	125	y	Muddy water; dtw is without logger in well
2017-07-13 12:17	bt	5.27	3.77	6441.2	--	--	--	n	Well bent at est. 45 degree angle; unable to straighten; could not get logger out or sc meter in
2017-08-10 10:10	bt, gs	--	--	--	--	--	--	n	Attempted well repair; logger still stuck in well; unable to dislodge; will replace well with new logger 8/17/17
2017-08-17 16:57	bt, gs	6.10	4.30	6440.7	13.7	148	191	n	New well installed at 11:30; old well dug up and logger recovered with no lose of data; initial DTW measurement was 6.52--returned at end of day
2017-09-22 12:15	bc	6.07	4.27	6440.7	10.3	106	148	y	Water clear for few bails then muddy
2017-10-25 10:47	bt	5.70	3.90	6441.1	11.0	87	120	y	Grass dry; soil damp; 2 full bails 7(2/3) bails dirty no odor; diagnostic check battery 3.51V
2018-05-22 11:53	bt,ds	2.52	0.72	6444.3	11.4	75	102	y	Stratified at depth: T 8.4°C, C 137, SC 201; soil moist; some ponding in meadow; several seeping channels; 15 bails-last two dirty
2018-07-03 13:15	bc	5.75	3.95	6441.1	12.4	156	205	y	
2018-08-16 15:00	bc	6.57	4.77	6440.2	11.9	126	167	y	
2018-10-19 11:01	bt	6.45	4.65	6440.4	10.9	108	146	y	No stratification; grass dry; soil dry; 5.0 bails slightly dirty water

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions				Water Quality Observations				Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer LP-W2 - uppermost Lower Meadow, on a point bar/slip-off slope south side of Little Truckee River									Galvanized well pipe and cap; bring Monkey wrench in Winter.
Total Depth		<i>ft bgs</i>							
Depth to bottom =		<i>ft btoc</i>							
Total Stickup =		<i>1.50 ft above gs</i>							
Elevation =		<i>6445.0 ft</i>							
2015-04-03 14:30	kb	5.14	3.64	6441.4	-0.4	51	98	n	
2015-05-05 13:34	kb	5.05	3.55	6441.5	7.6	29	44	n	SCT meter needs recalibration--reading only negative temp values.
2015-10-21 12:35	bt	5.98	4.48	6440.5	12.5	38	50	y	Very rusty wire
2016-06-01 15:28	bt	3.82	2.32	6442.7	10.8	58	80	y	Very turbid; got clearer with bailing; dry area willows had no leaves
2016-07-29 17:25	bc	5.82	4.32	6440.7	12.3	56	75	y	Logger in slate mode and stopped 4/2/16; restarted logger in continuous mode at 15:45; no stratification; bailed mostly clean water; ground at well dry
2016-10-12 9:40	ds,bc	5.96	4.46	6440.5	11.7	40	53	y	Muddy water in bailer; need to replace broken wire
2017-07-13 11:57	bt	4.60	3.10	6441.9	14.0	50	63	y	7 bails slightly dirty; ground dry and grass green with lots of wildflowers
2017-09-22 11:45	bc	5.54	4.04	6441.0	11.8	53	70	y	Water was tan
2017-10-25 11:24	bt	5.70	4.20	6440.8	12.7	55	72	y	Stratified at depth: T 10.7°C, C 80.6, SC 110.8@25°C; grass dry; soil damp; 10 bails slightly dirty; diagnostic check battery 3.477V
2018-05-22 12:47	bt,ds	4.02	2.52	6442.5	6.1	70	110	y	No stratification; leaves on willows; soil moist from rain; 10 bails clear
2018-07-03 13:00	bc	5.50	4.00	6441.0	11.5	48	65	y	Water slightly muddy
2018-08-16 14:35	bc	5.92	4.42	6440.6	14.5	72	90	y	Water is muddy
2018-10-19 11:31	bt	5.62	4.12	6440.9	12.0	55	74	y	Stratified at depth: T 10.7°C, C 98.0, SC 134.5; 10 bails dirty water; grass dry; soil damp

Table 11. Groundwater monitoring observations, Water Years 2010 to 2018
Perazzo Meadows Restoration, Sierra County, California

Site Conditions				Water Quality Observations				Remarks	
Date/Time	Observer	Top-of-casing to water (ft)	Depth to water (ft, bgs)	Water Surface Elevation (ft, NGVD/NAVD)	Temperature (°C)	Specific Conductance (at field temp.) (µS/cm)	Specific Conductance (at 25 °C) (at 25 °C)	Bailed?	
Piezometer LP-W4 - uppermost Lower Meadow, on the cut bank of a meander along the north side of the Little Truckee River									
Total Depth		ft bgs							
Depth to bottom =		ft btoc							
Total Stickup =		1.50 ft above gs							
Elevation =		6445.0 ft							
4/3/2015 NR	kb	NR	NR	NR	NR	NR	NR	n	PVC well pipe and cap
2015-05-05 12:53	kb	6.25	4.75	6440.3	6.6	77	122	n	Rusty wire with no Levellogger. PVC cap was very stuck and filled with rusty gunk. Installed brand new Solinst LL; must use software version 4.1.0.
2015-10-21 12:17	bt	8.03	6.53	6438.5	10.2	112	155	y	1/4 bailer of muddy water
2016-06-01 16:51	bt	3.15	1.65	6443.4	8.1	78	115	y	Stratified SC@depth 69.2@ 7.1degC, 105.1 @25degC; Estimated DTW because cap was stuck and the pipe came out at the fitting at ground level; DTW from ground surface 2.10 ft.; logger in slate mode but not stopped-new logger cannot do continuous mode; restarted logger at 17:00; soil moist and soft; lots of wild flowers; bailed light brown dirty water
2016-07-29 17:35	bc	4.00	2.50	6442.5	11.5	70	93	y	Orange and slimy
2016-10-12 10:00	ds,bc	4.72	3.22	6441.8	10.3	63	87	y	Muddy
2017-07-13 11:28	bt	3.25	1.75	6443.3	11.9	79	105	y	Top of well broken at coupling-measured DTW from ground and added upper pipe length; 2.75 bails light brown water
2017-08-10 11:07	bt,gs	3.50	2.00	6443.0	13.9	73	92	n	Grasses still green in meadow and soil is damp (could be from recent thunderstorm activity)
2017-09-22 12:05	bc	--	--	--	--	--	--	n	Top of well off; had to pull out logger to get measurement; sc meter got stuck no measurement
2017-10-25 11:06	bt	3.59	2.09	6442.9	10.3	58	80	n	Grass dry; soil dry; could not get bailer in well-gets stuck
2018-05-22 12:20	bt,ds	2.40	0.90	6444.1	5.3	75	121	y	Only stratified temperature at depth-4.8°C; soil damp from rains; 10 bails slightly dirty; restarted logger at 13:00
2018-07-03 13:05	bc	3.46	1.96	6443.0	9.9	68	95	n	
2018-08-16 14:45	bc	4.02	2.52	6442.5	10.2	67	93	n	Could not get bailer in deep enough
2018-10-19 11:17	bt	3.96	2.46	6442.5	10.6	64	87	n	Well has been damaged and repaired; bailer does not fit in well without getting stuck

Notes:

1) ds is David Shaw (Balance); bc is Beth Christman (Truckee River Watershed Council); rw is Randy Westmoreland (USFS); gs is Guy Smith (USFS); tb is Travis Bagget (Balance); bhk is Brian Hastings (Balance); kb is Kerensa Brooks (Balance); bt is Ben Trustman (Balance)

2) NR is not recorded, -- is not applicable

3) Water surface elevations are based on ground surface elevations indicated on high-resolution digital elevation models (DEM) provided by the USFS Tahoe National Forest Sierraville Ranger District.

4) btoc=below top of casing; bgs=below ground surface

Specific conductance: Measured in micromhos/cm in field using a YSI30 hand-held meter; then adjusted to 25degC by equation $(1.8813774452 - [0.050433063928 * \text{field temp}] + [0.00058561144042 * \text{field temp}^2]) * \text{Field specific conductance}$

LIST OF FIGURES

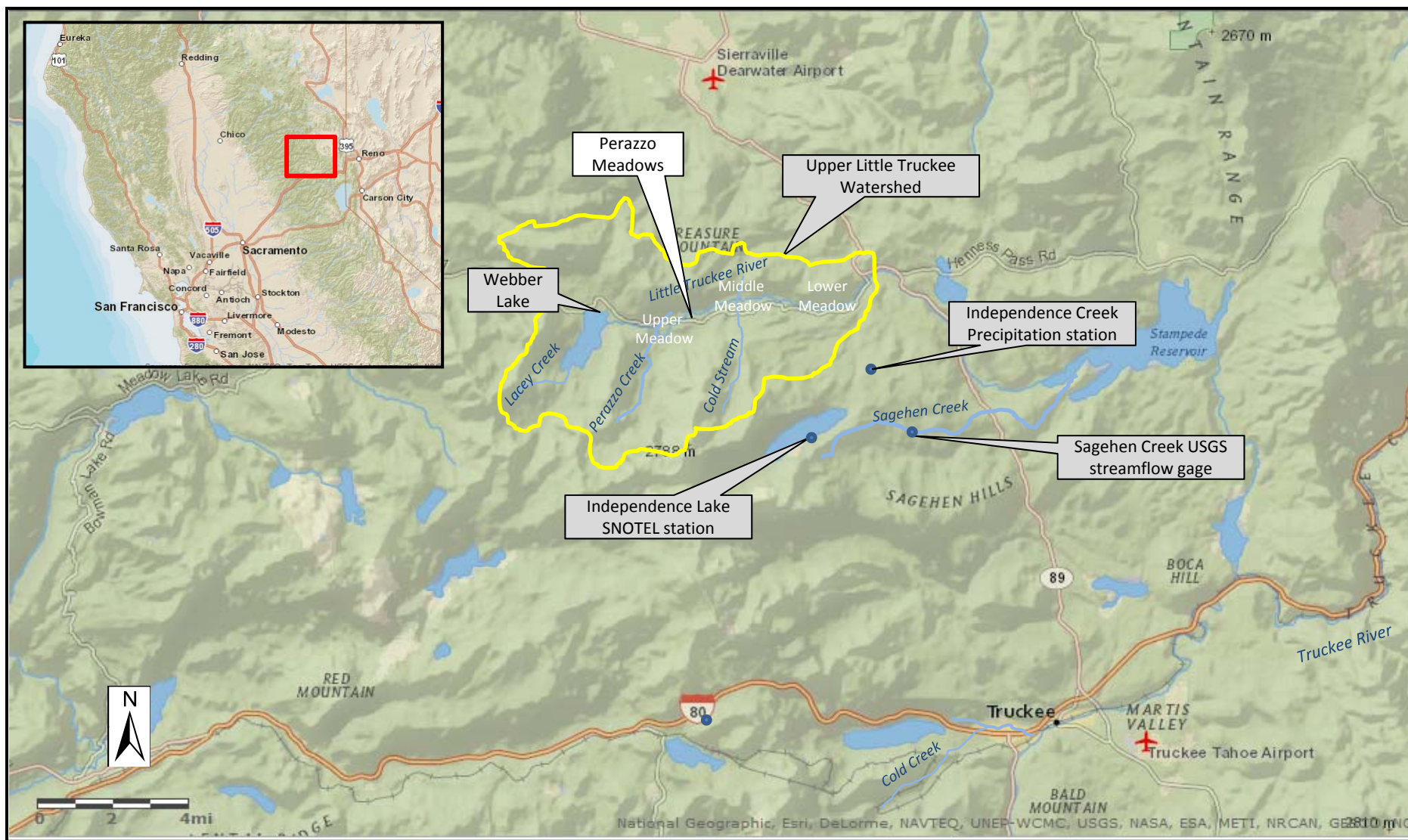
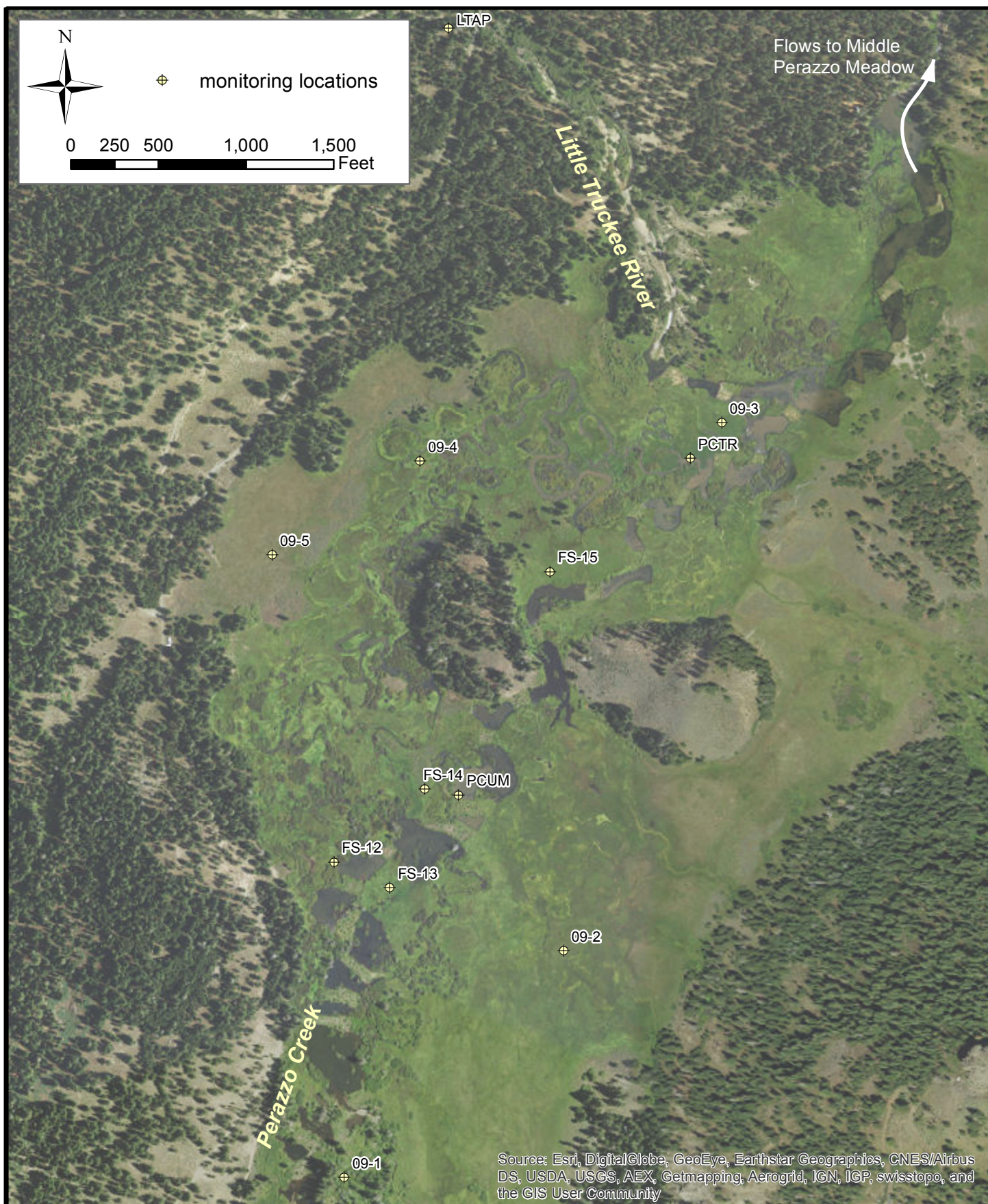


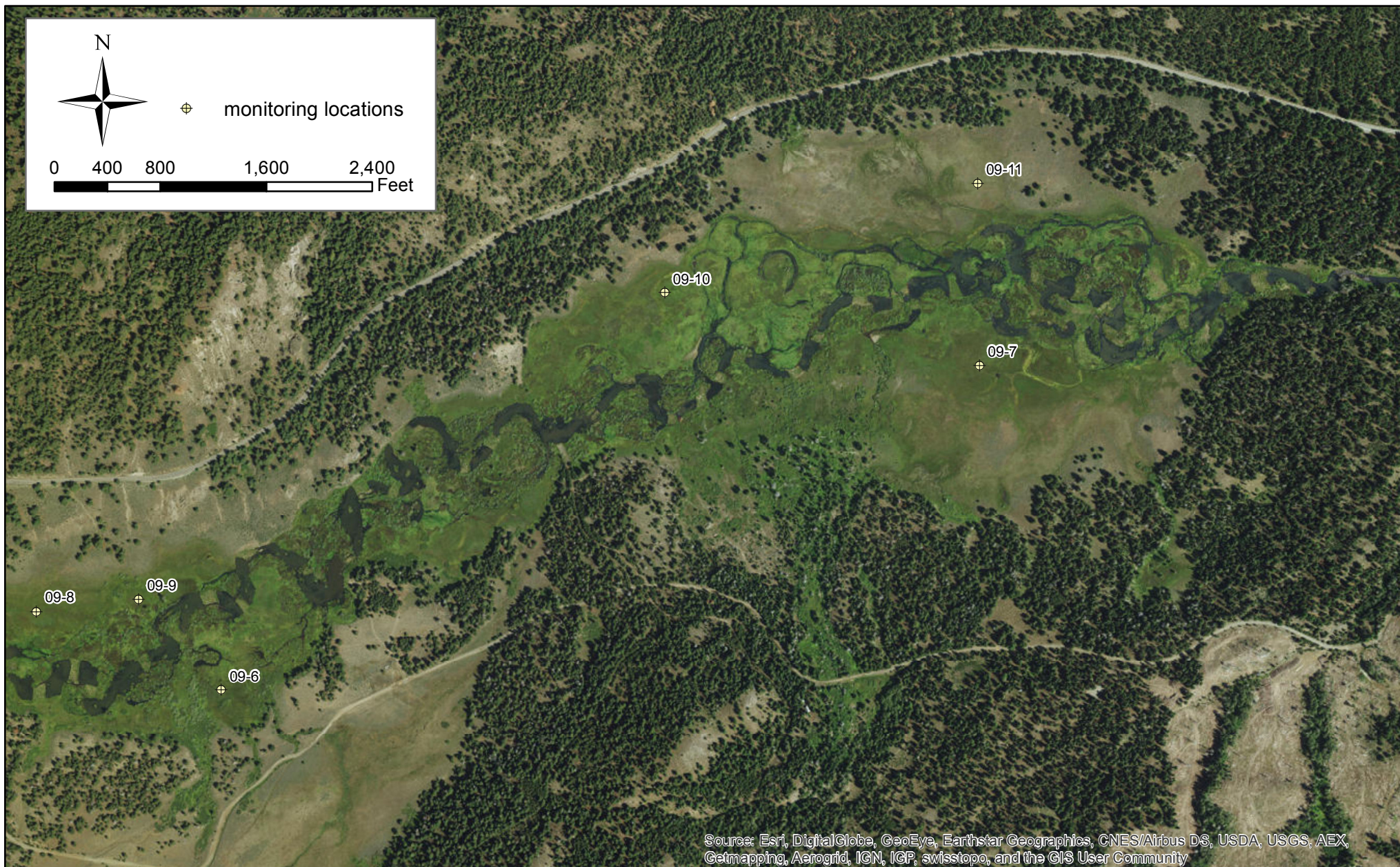
Figure 1. Perazzo Meadows, Sierra County, California

Perazzo Meadows is part of the Upper Little Truckee watershed, in the headwaters of the Truckee River. Other locations discussed in this report are also identified on this map.



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**Figure 2. Location of groundwater and surface water monitoring stations
Upper Perazzo Meadow, Sierra County, California**



**Figure 3. Location of groundwater and surface water monitoring stations
Middle Perazzo Meadow, Sierra County, California**

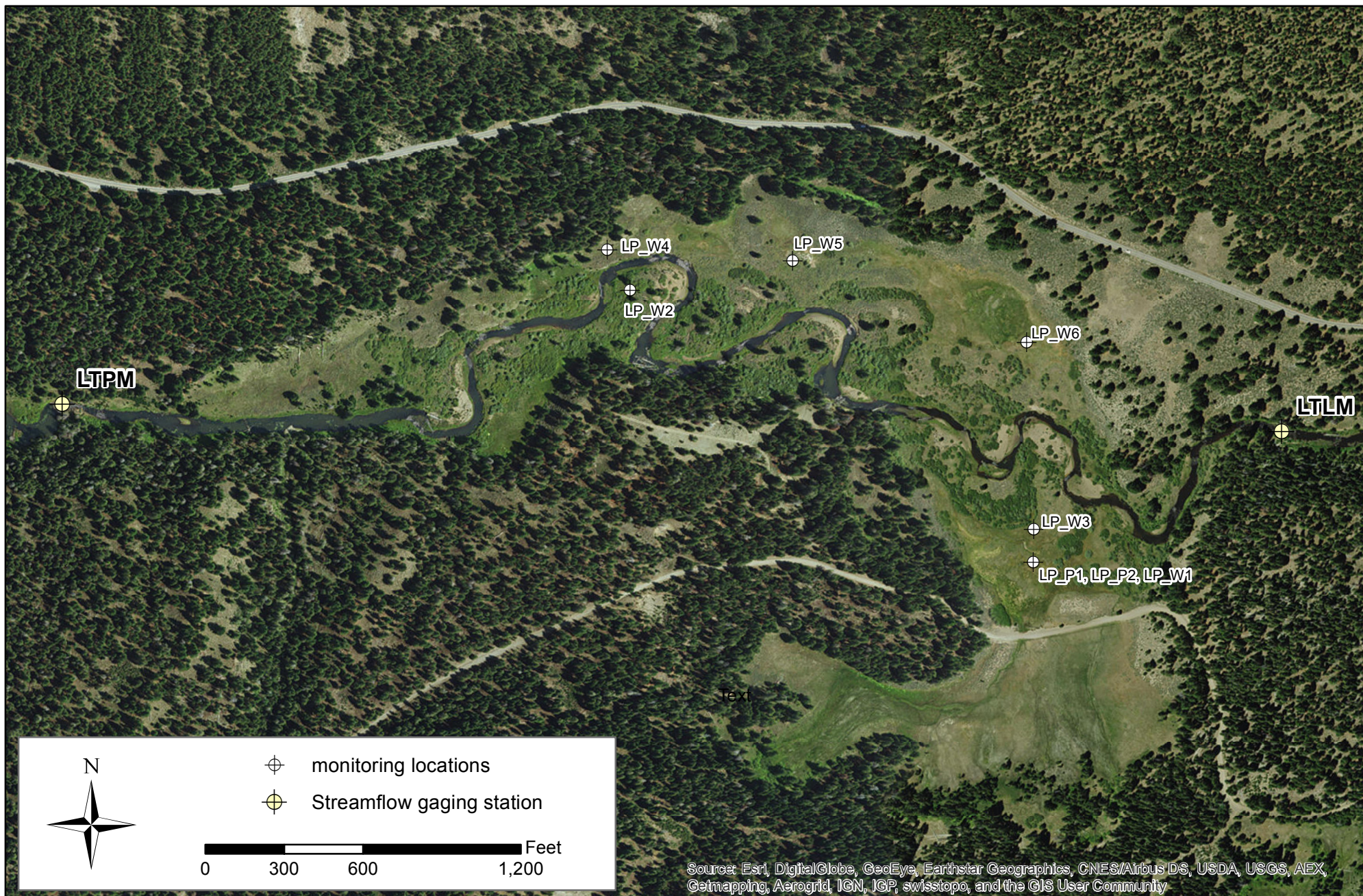


Figure 4. Location of groundwater and surface water monitoring stations, Lower Perazzo Meadow, Sierra County, California
Monitoring stations established in late 2011 and monitored by UC Merced in WY2012 and WY2013, Balance Hydrologics has continued monitoring since WY2014.

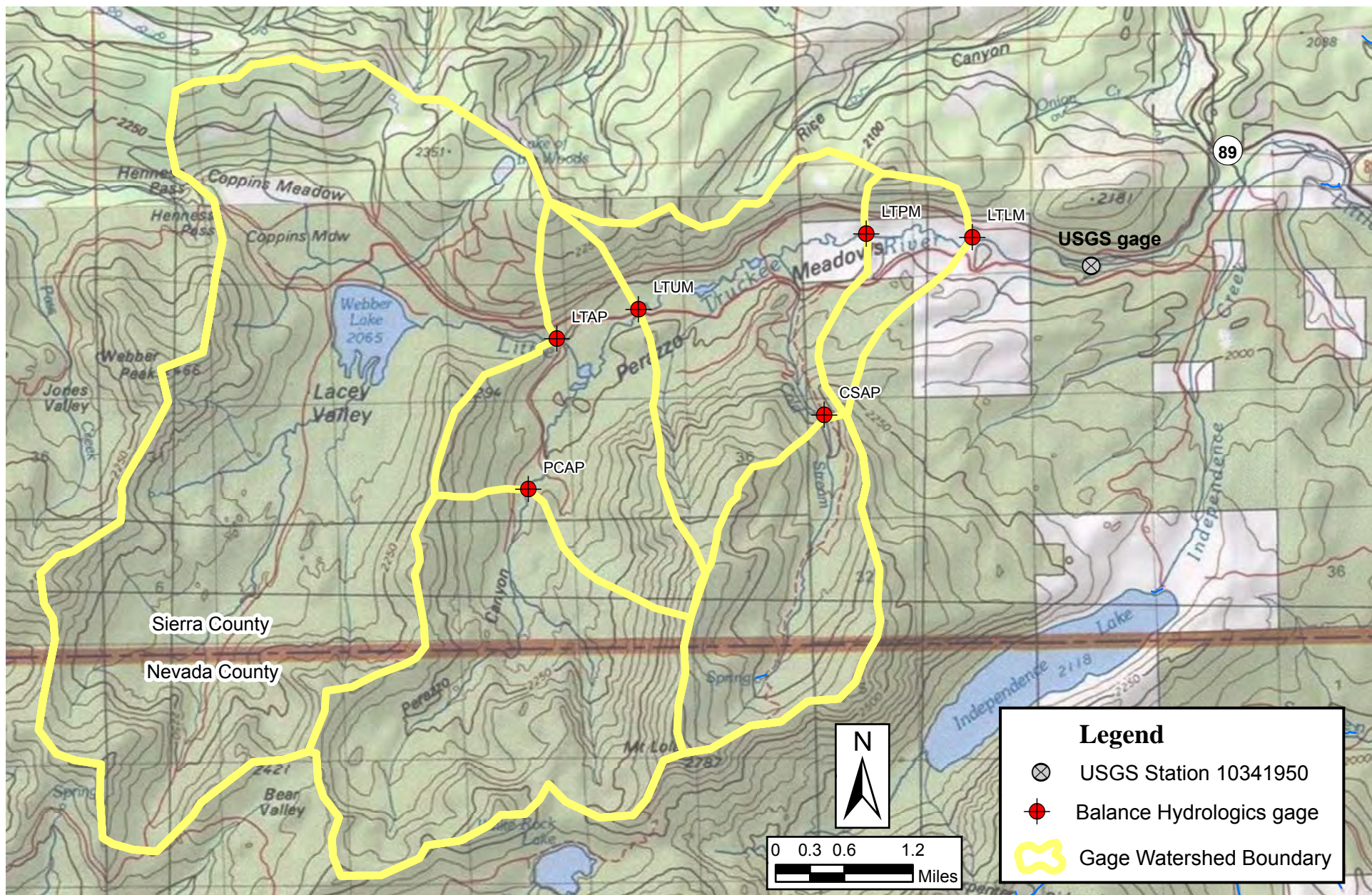
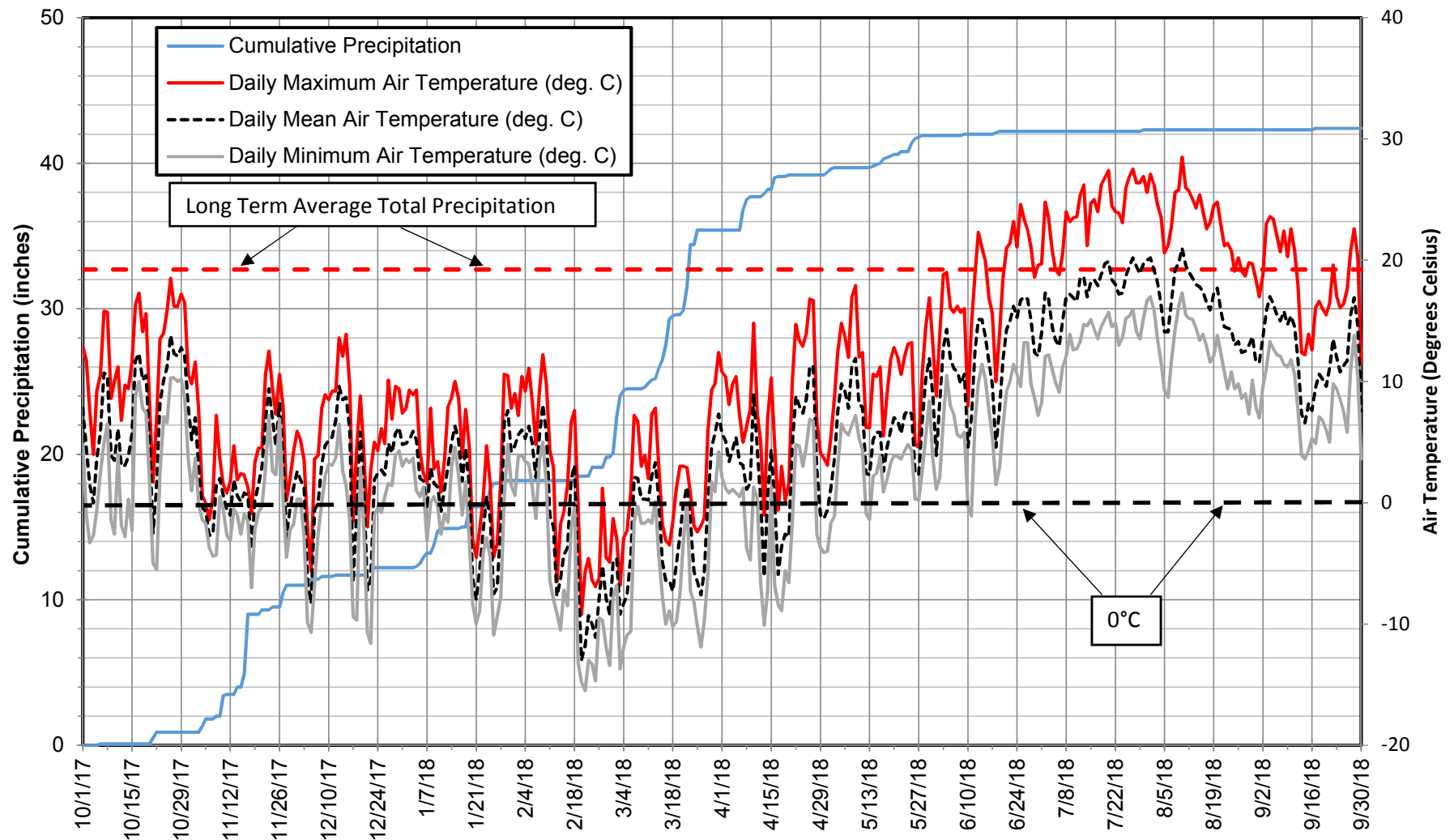


Figure 5. Stream gaging locations and contributing watersheds, Perazzo Meadows, Sierra and Nevada Counties, California



Data Source: NRCS, 2015, SNOTEL Station 540, Independence Creek, CA

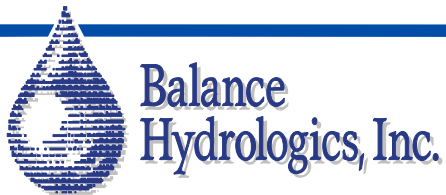
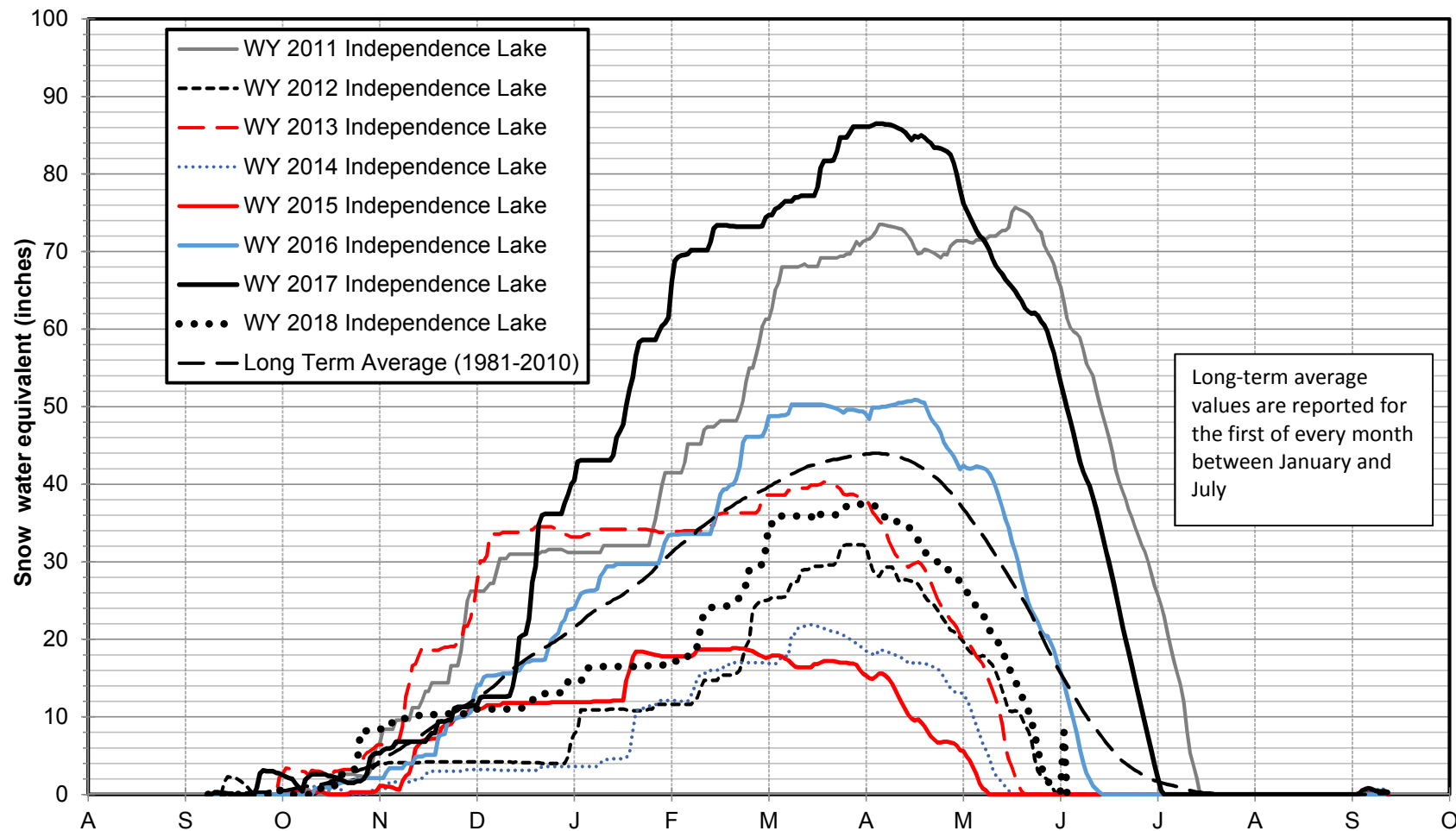


Figure 6. Cumulative precipitation and daily minimum, maximum and mean temperatures, Independence Creek, Sierra County, California, WY2018.
 SNOTEL Station 540: Independence Creek, located approximately 3.5 miles southeast of Perazzo Meadows at elevation 6,455 feet.



Data Source: NRCS, 2015, SNOTEL Station 541 & 540, Independence Lake and Independence Creek, CA

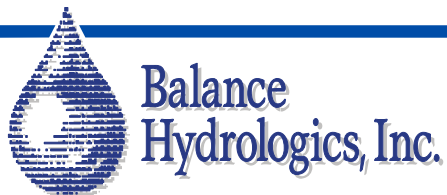


Figure 7. Snow water equivalent (SWE), Independence Lake SNOTEL Station, Nevada County, California, water years 2011-2018 as compared to long-term average. The Independence Lake SNOTEL station 541 is located approximately 3.5 miles southwest of Perazzo Meadows at 8,352 feet elevation. The WY2017 maximum SWE of 86.5 inches was the highest SWE depth ever recorded at this station. In contrast WY2018 maximum SWE was 37.5 inches on April 23, 2018, 6.4 inches below the long term average on the same day.

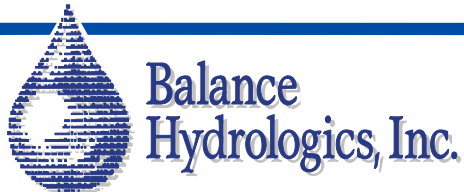
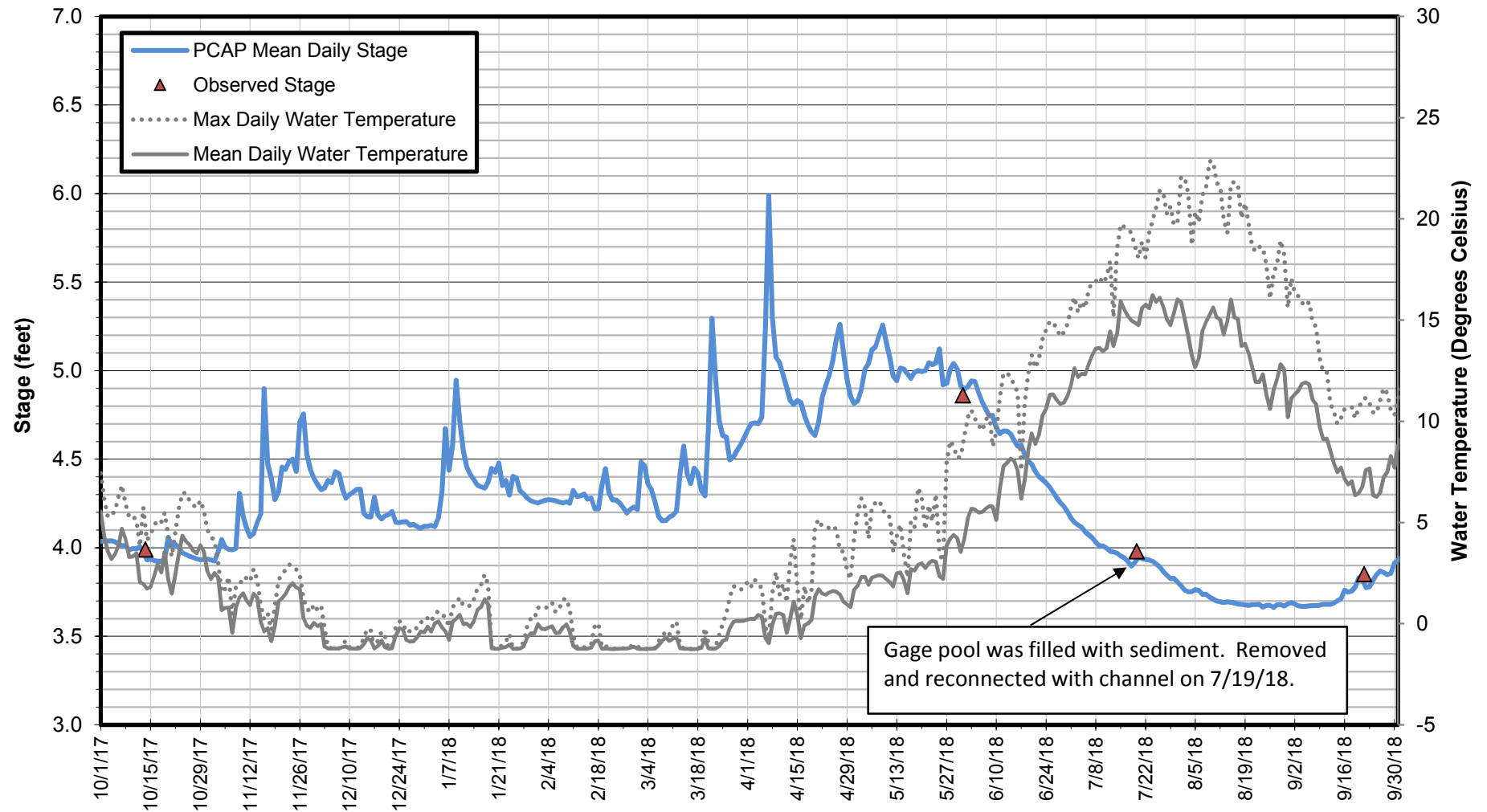


Figure 8. Daily stage and water temperature, Perazzo Creek above Perazzo Meadows (PCAP), Sierra County, California, WY2018.

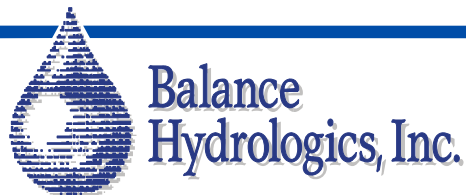
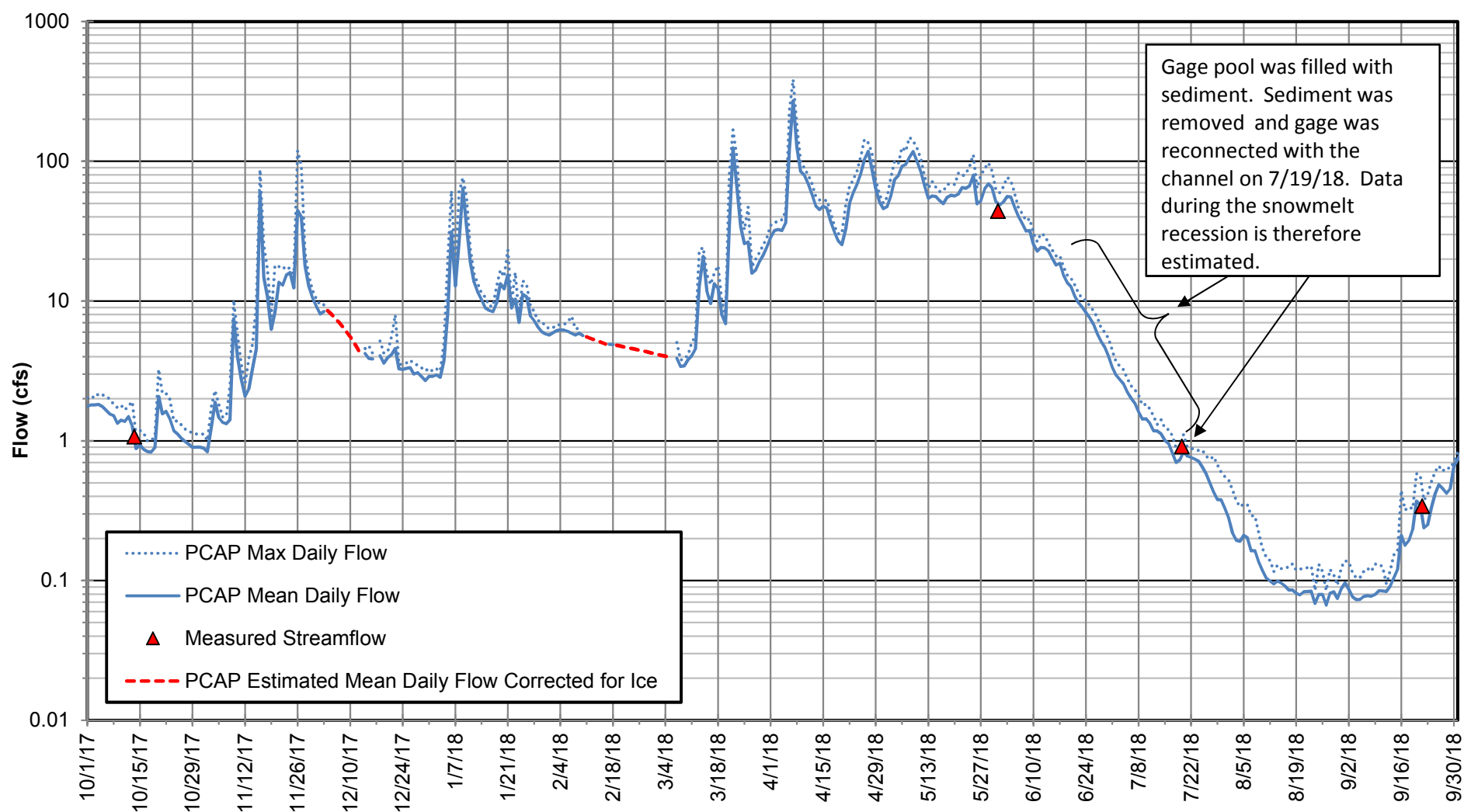


Figure 9. Daily flow hydrograph, Perazzo Creek above Perazzo Meadow (PCAP), Sierra County, California, WY2018. The peak flow of the water year was approximately 385 cfs occurring on April 7, 2018 during a rain on snow event. Peak flow during snowmelt was 144 cfs on April 26, 2018. Interpolation was used for ice corrected flows at times where there was no precipitation input.

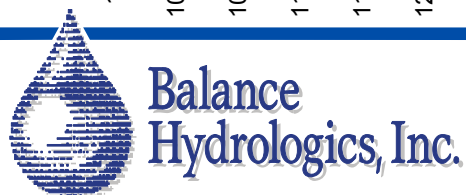
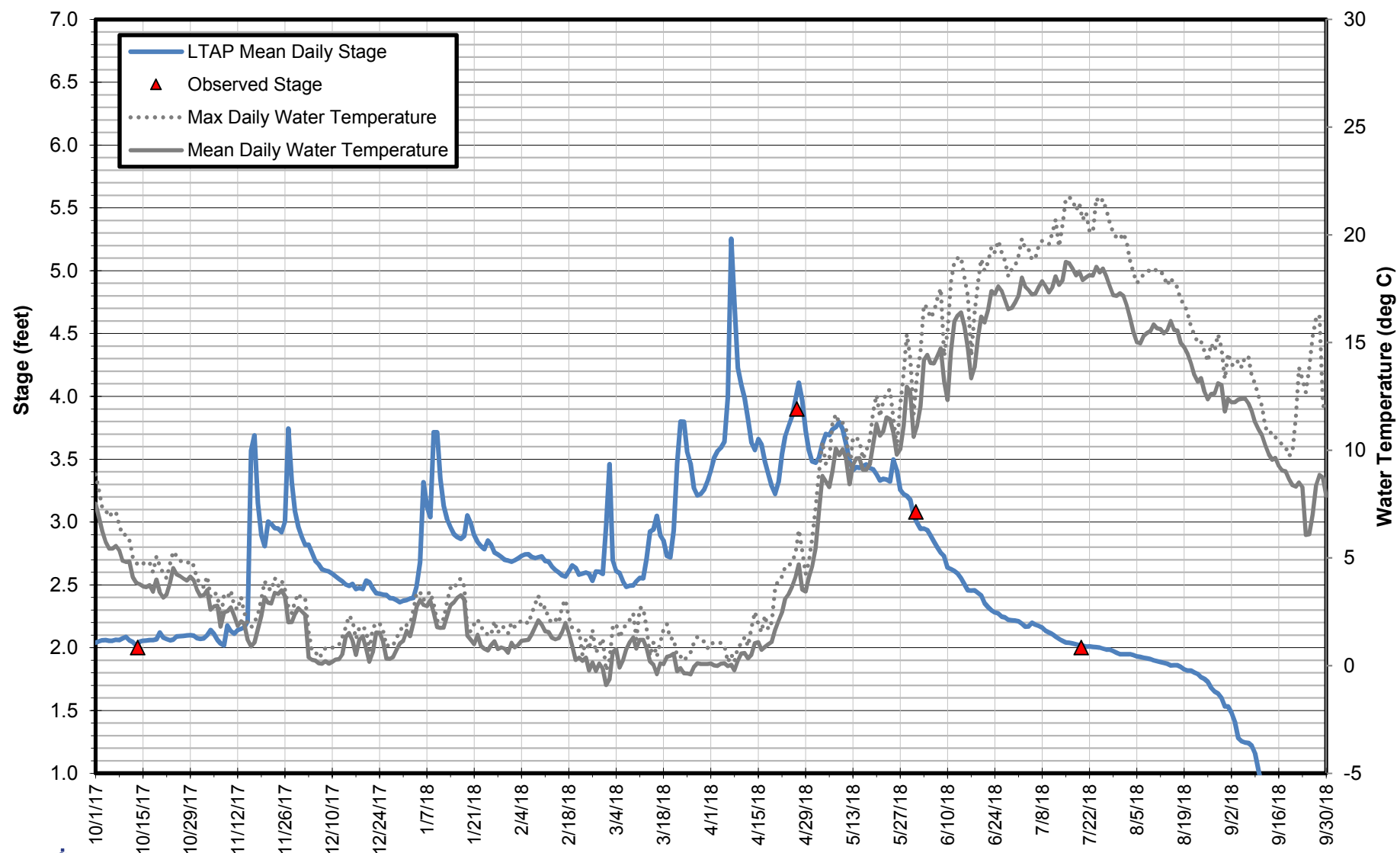


Figure 10. Daily stage and water temperature, Little Truckee above Perazzo Meadows (LTAP), Sierra County, California, WY2018.

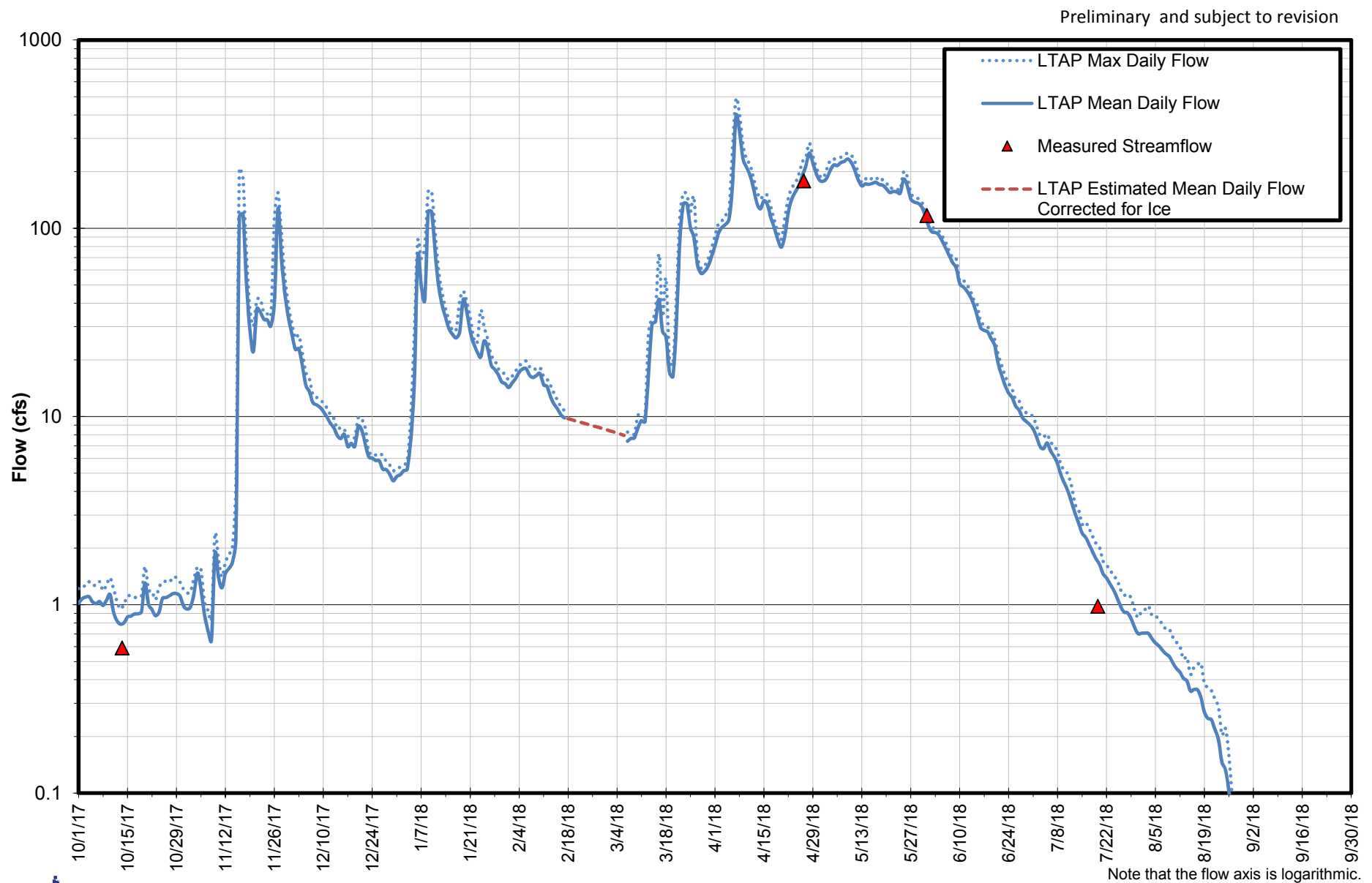
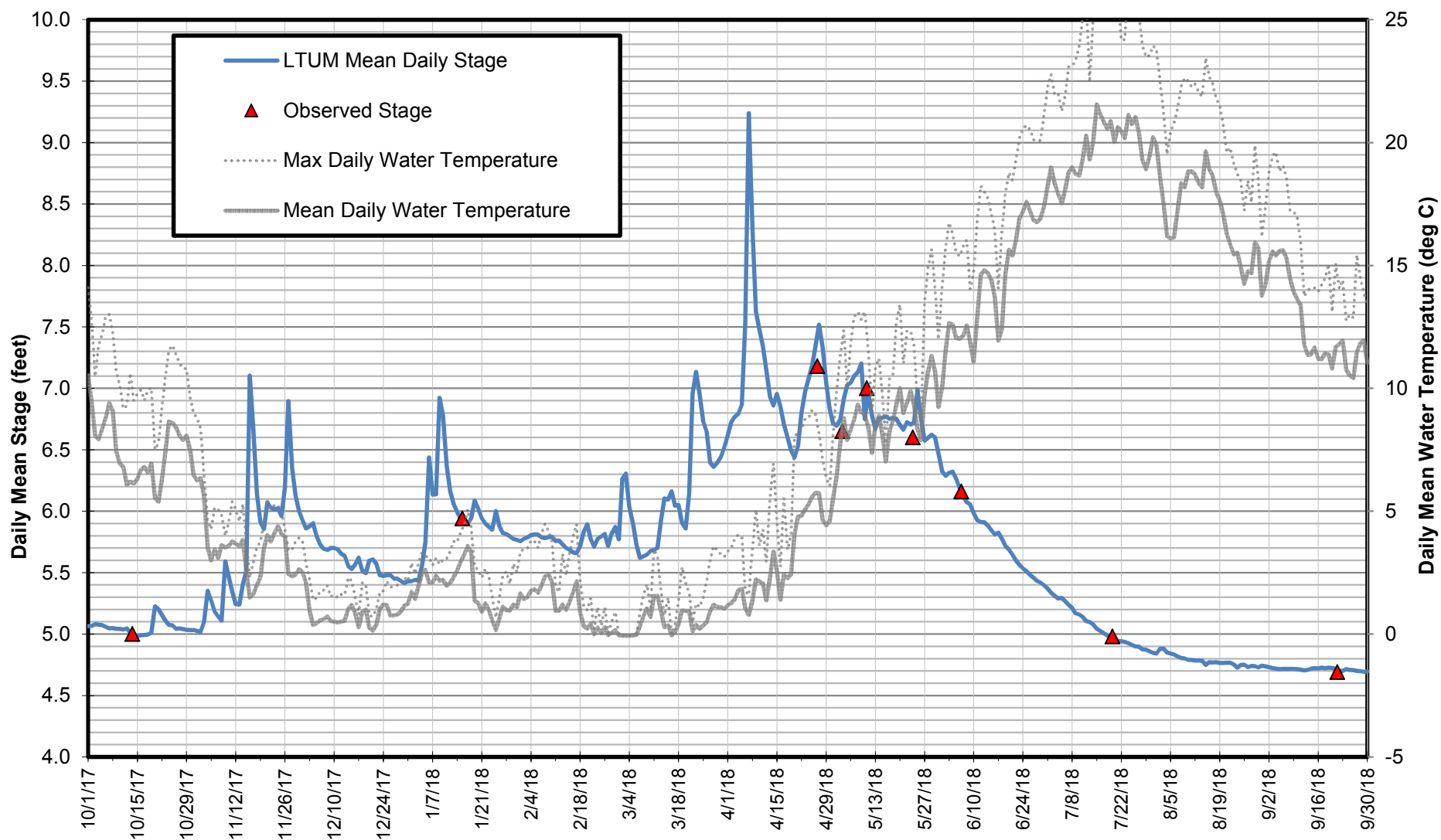
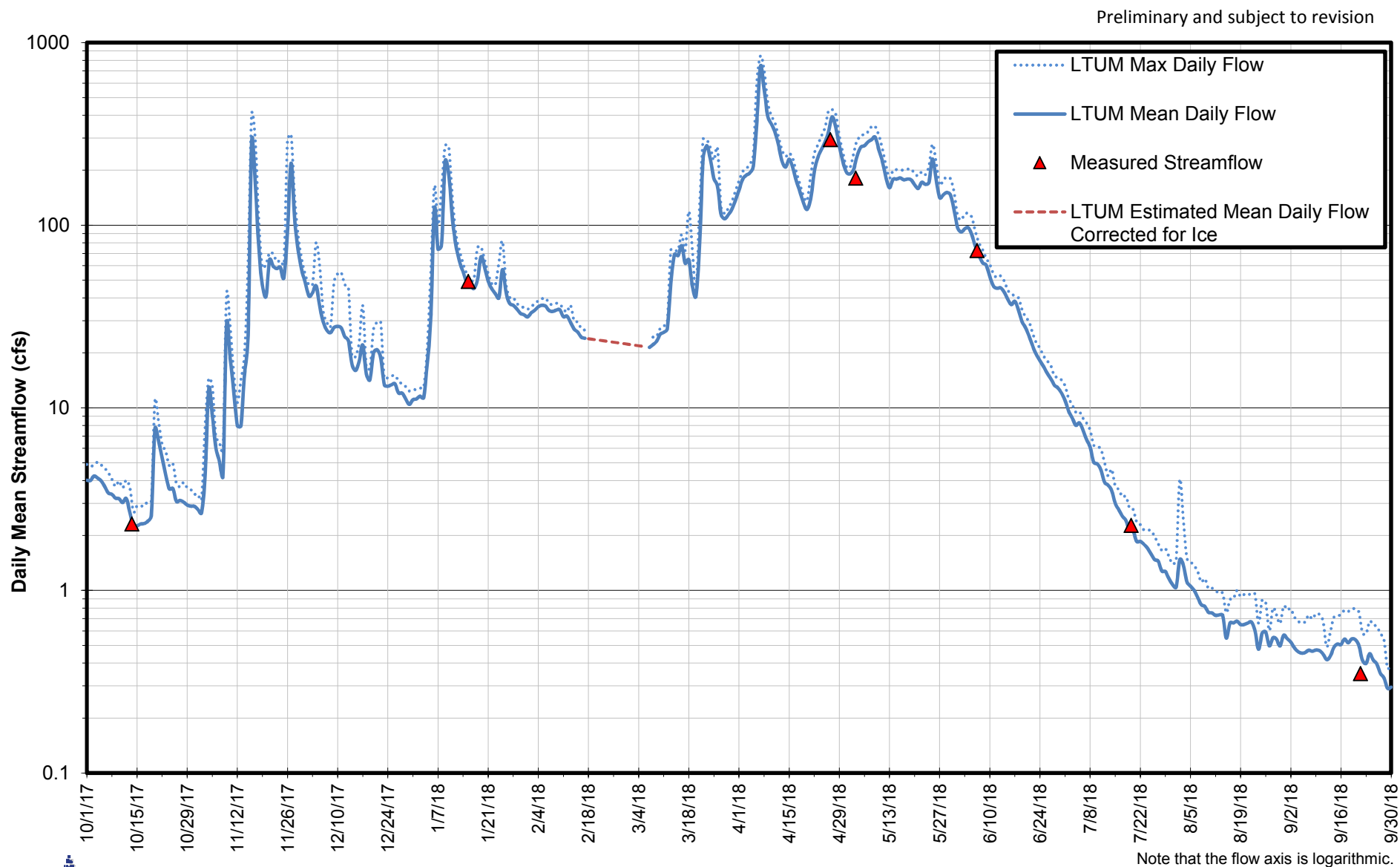


Figure 11. Daily flow hydrograph, Little Truckee River above Perazzo Meadows (LTAP), Sierra County, California, WY2018. The peak flow of the water year was approximately 483 cfs occurring on April 7, 2018. Peak flow during snowmelt was 283 cfs on April 28, 2018.



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Figure 12. Daily stage and water temperature, Little Truckee River below Upper Perazzo Meadow (LTUM), Sierra County, California, WY2018.



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Figure 13.

Daily flow hydrograph, Little Truckee River below Upper Perazzo Meadow (LTUM), Sierra County, California, WY2018. The peak flow of the water year was approximately 846 cfs occurring on April 7, 2018 during a rain on snow event. Peak flow during snow melt was 430 cfs on April 27, 2018.

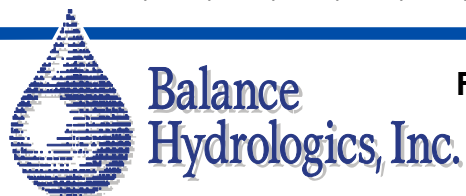
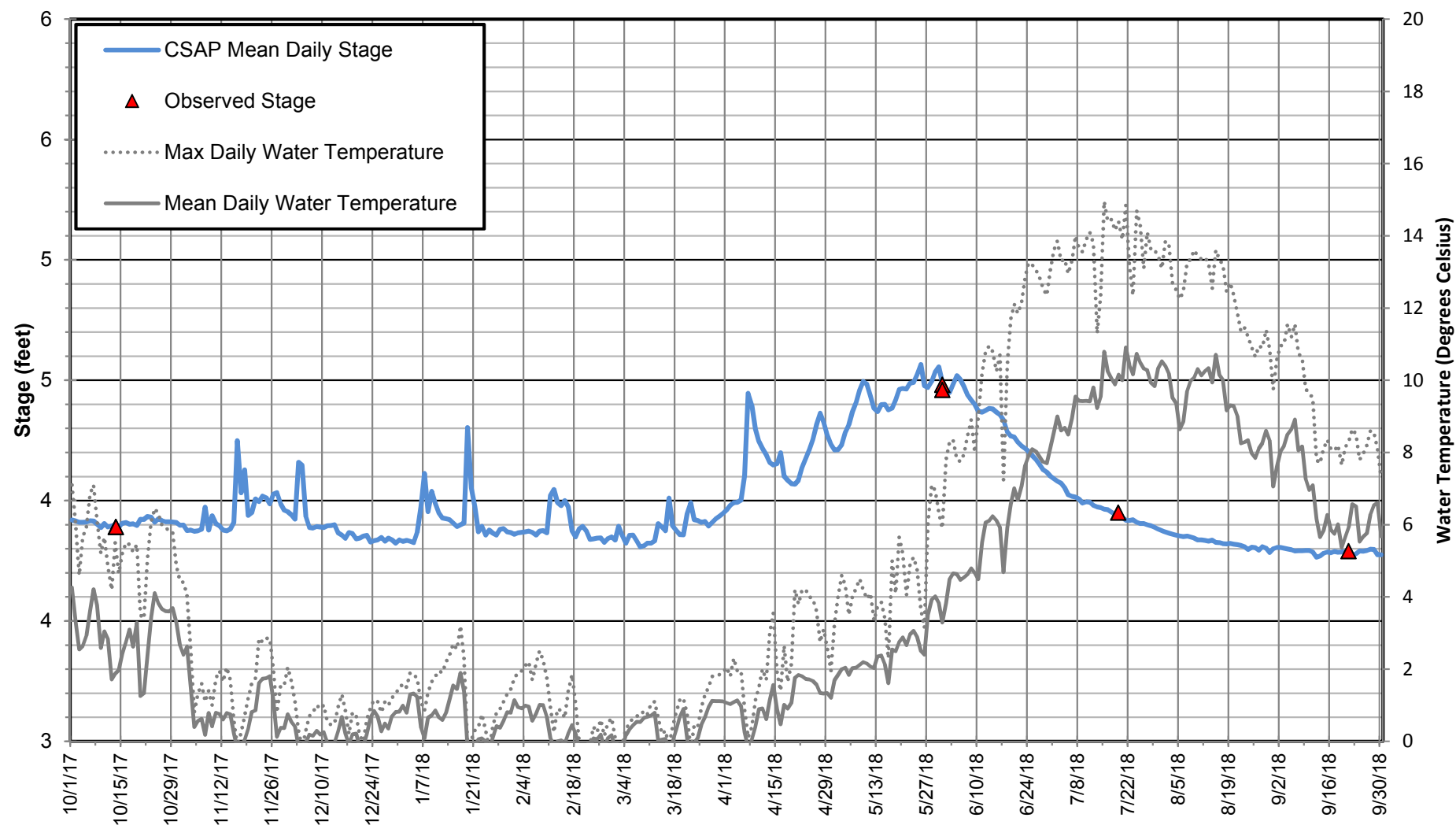


Figure 14. Daily stage and water temperature, Cold Stream above Perazzo Meadows (CSAP), Sierra County, California, WY2018.

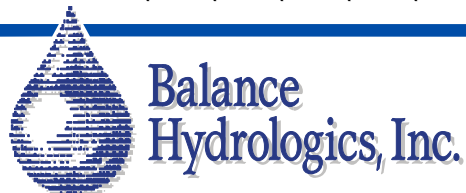
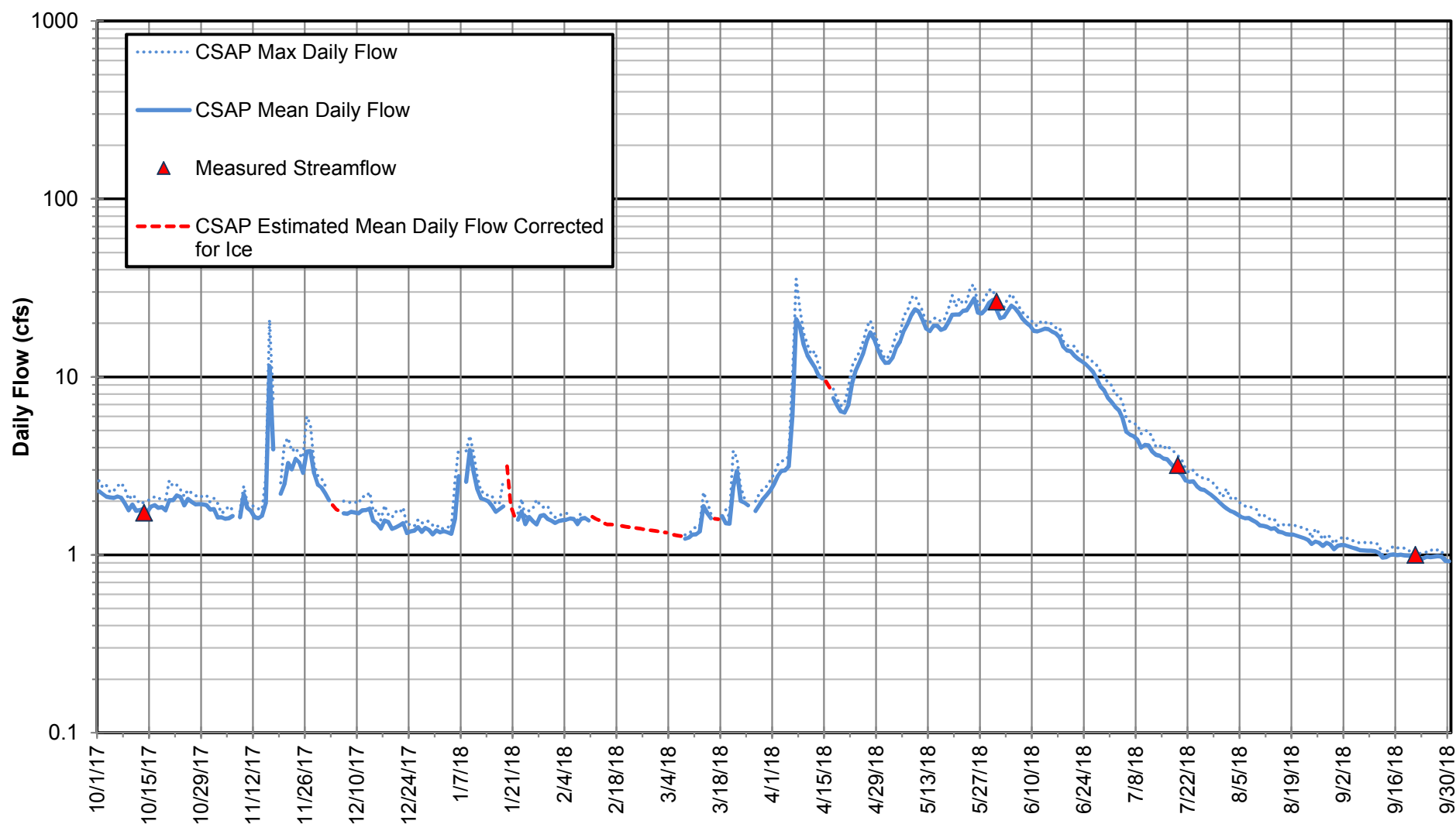
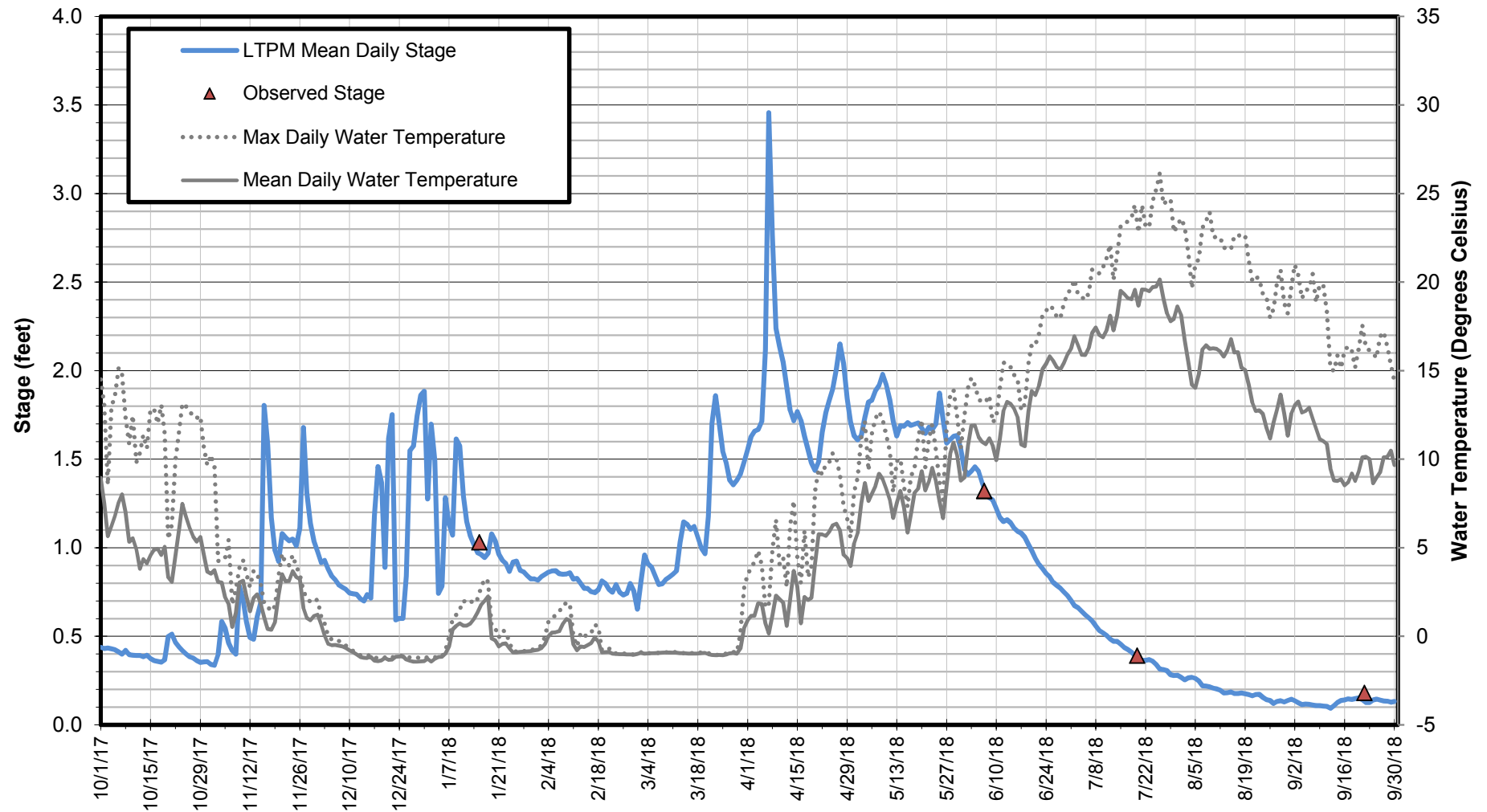


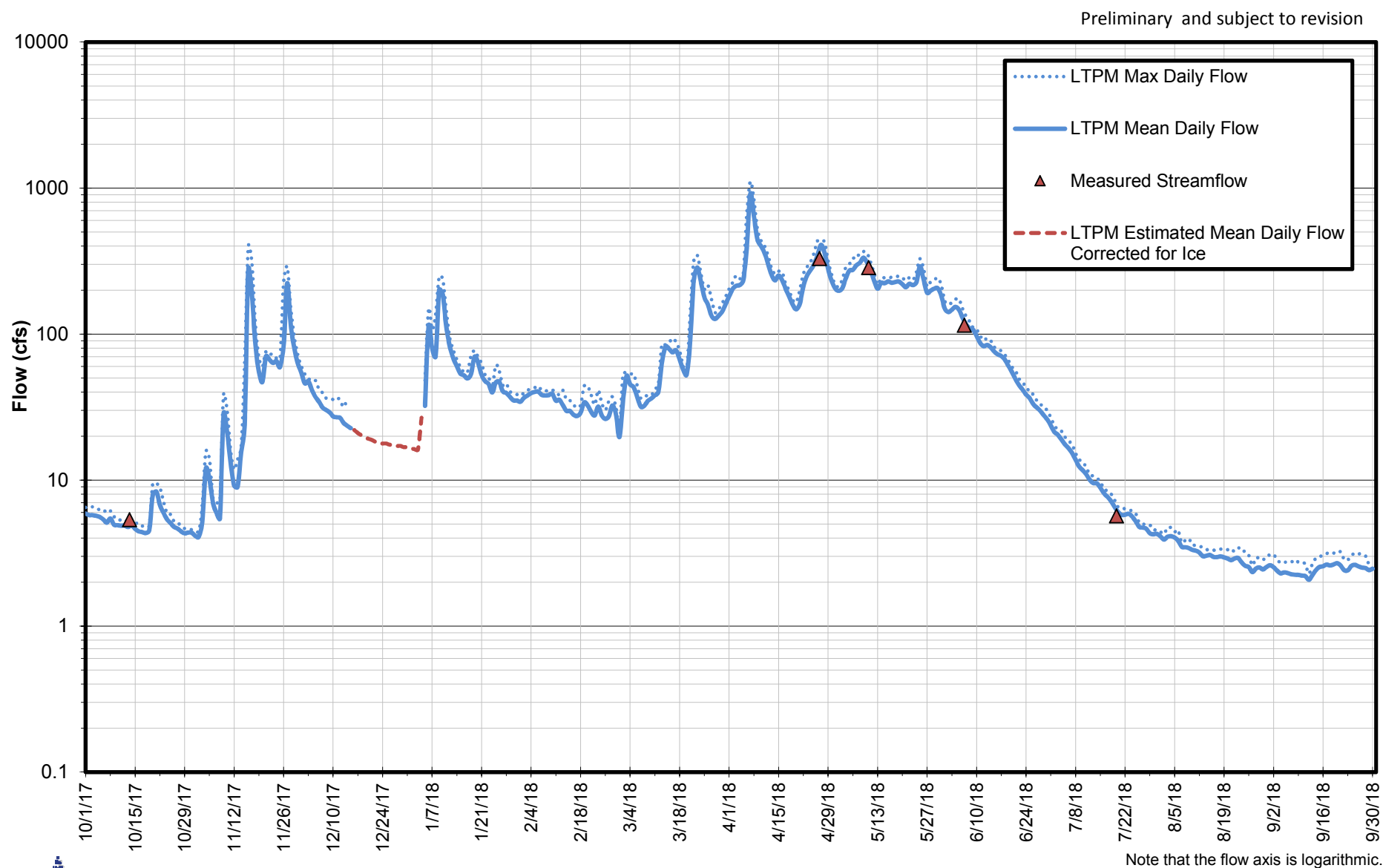
Figure 15. Daily flow hydrograph, Cold Stream above Perazzo Meadows (CSAP), Sierra County, California, WY2018. Annual peak flow of 36 cfs occurred on April 7, 2018, and was similar to the peak snowmelt of 33 cfs on May 25, 2018.



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Figure 16.

Daily stage and water temperature, Perazzo Creek below Middle Perazzo Meadow (LTPM), Sierra County, California, WY2018.



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Figure 17. Daily flow hydrograph, Perazzo Creek below Middle Perazzo Meadow (LTPM), Sierra County, California, WY2018. A peak flow of 1,103 cfs occurred on April 7, 2018 during a rain on snow event. Peak snowmelt runoff of 439 cfs occurred on April 27, 2018.

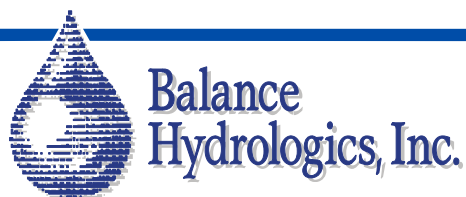
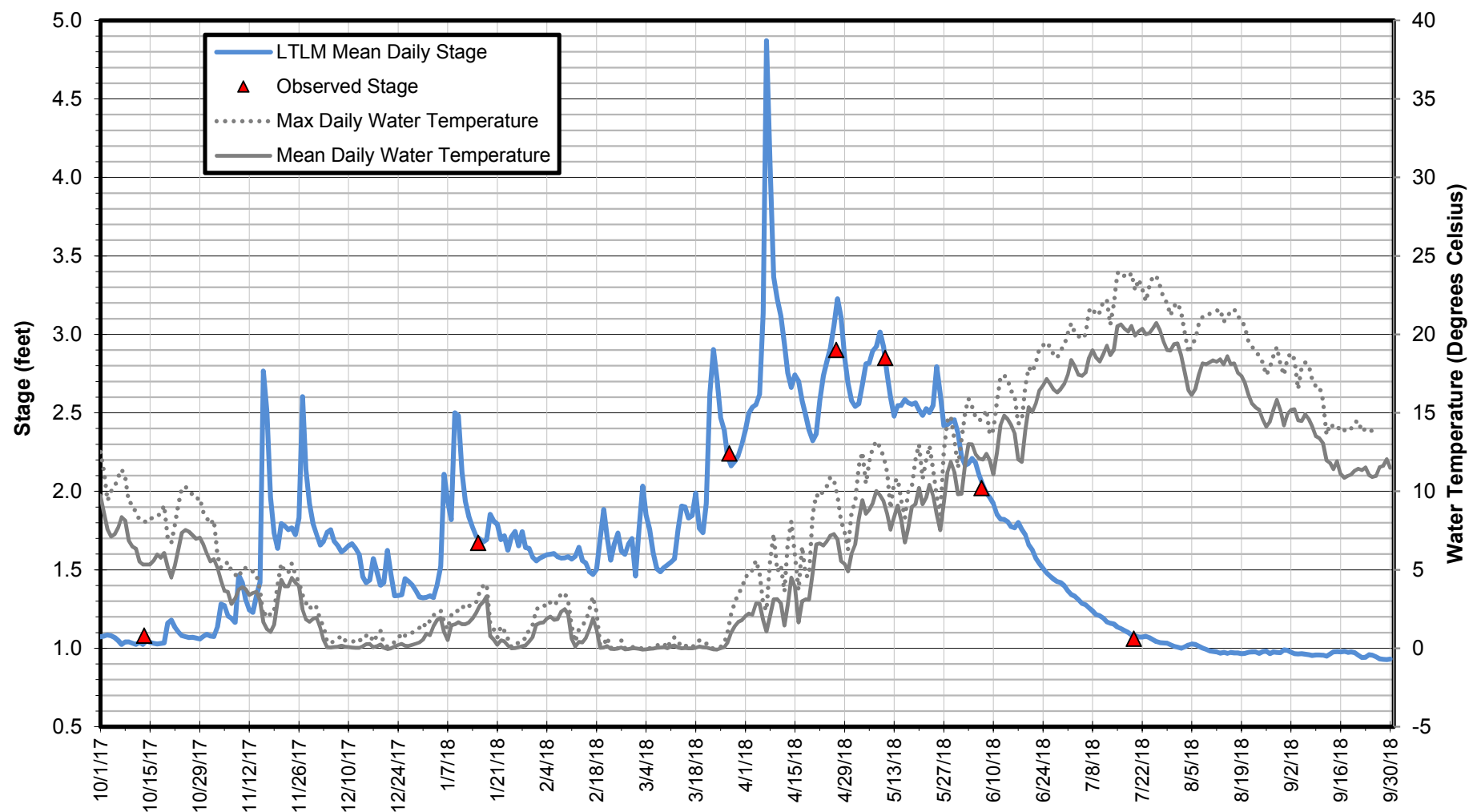
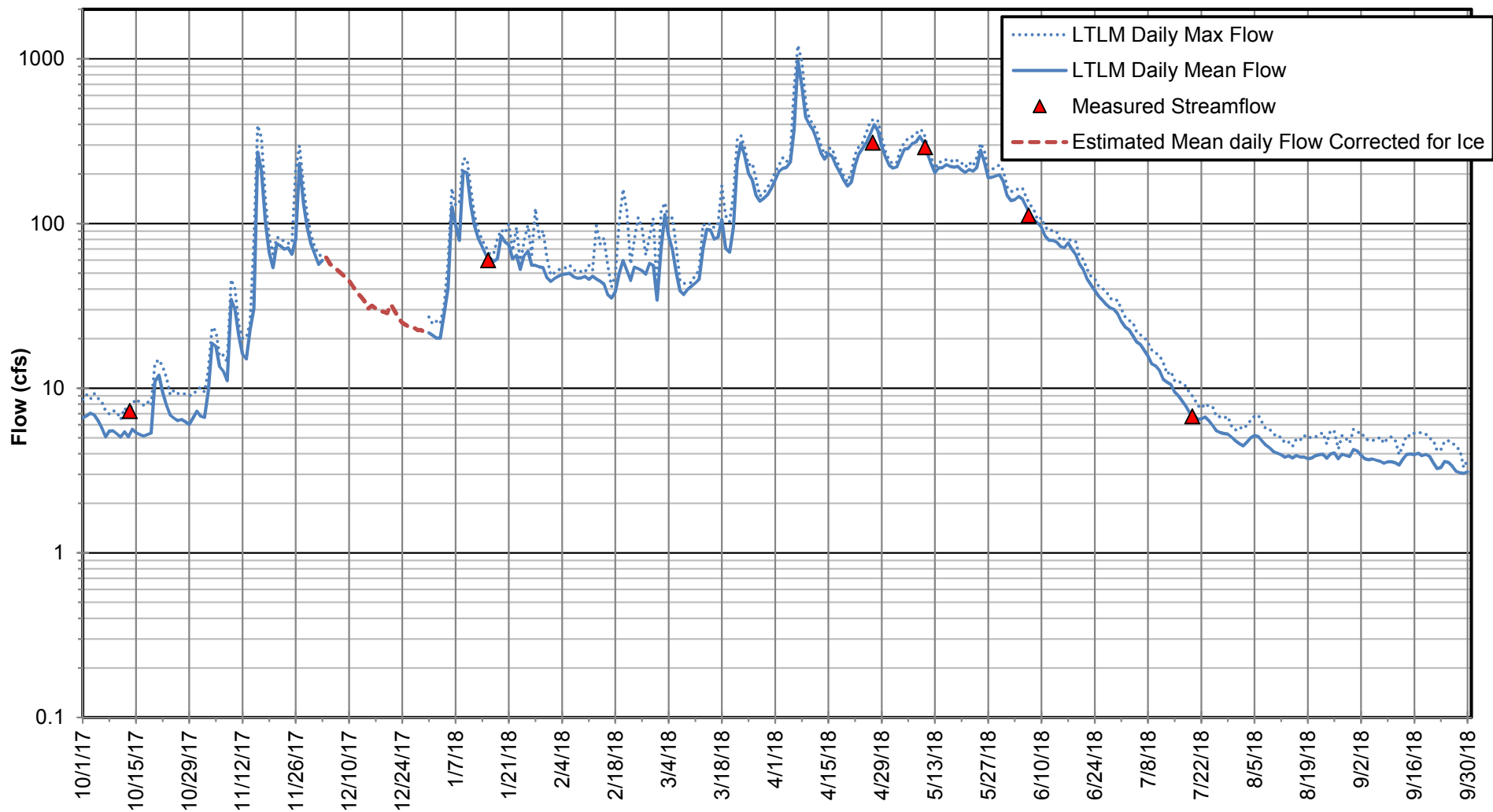


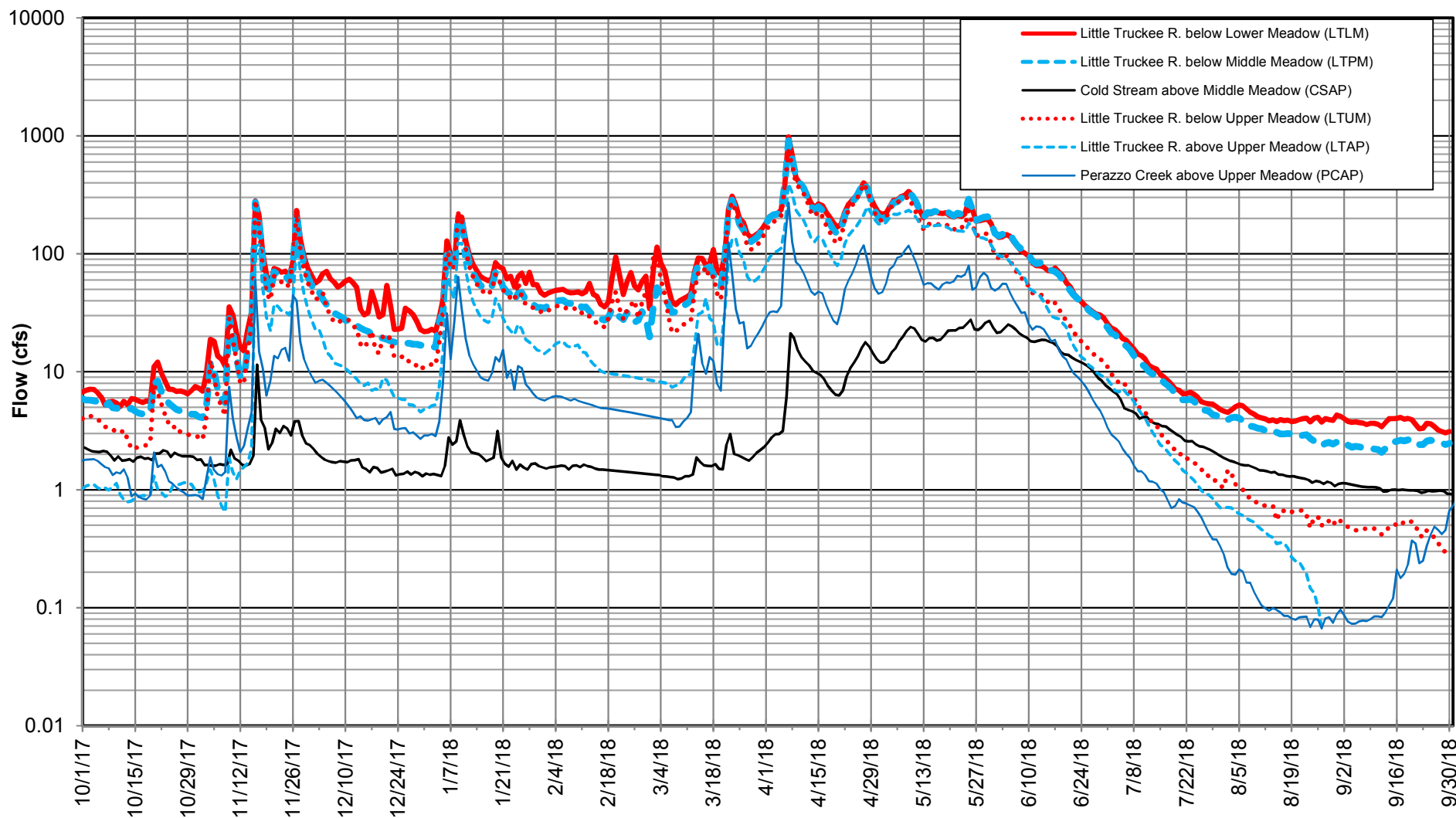
Figure 18. Daily stage and water temperature, Perazzo Creek below Lower Perazzo Meadow (LTLM), Sierra County, California, WY2018.



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Figure 19.

Daily flow hydrograph, Little Truckee River below Lower Perazzo Meadow, (LTLM), Sierra County, California, WY2016. A peak flow of 1207 cfs occurred on April 7, 2018 during a rain on snow event. Peak snowmelt runoff of 432 cfs occurred on April 27, 2018.



Please note that the flow axis is logarithmic



Figure 20.

Flow hydrographs for all stations, Perazzo Meadows, Sierra County, California, WY2018. Peak flows in WY2018 were recorded on April 7, 2018 at all stations (see Forms 1 to 6). Average daily flows shown in the figure above.

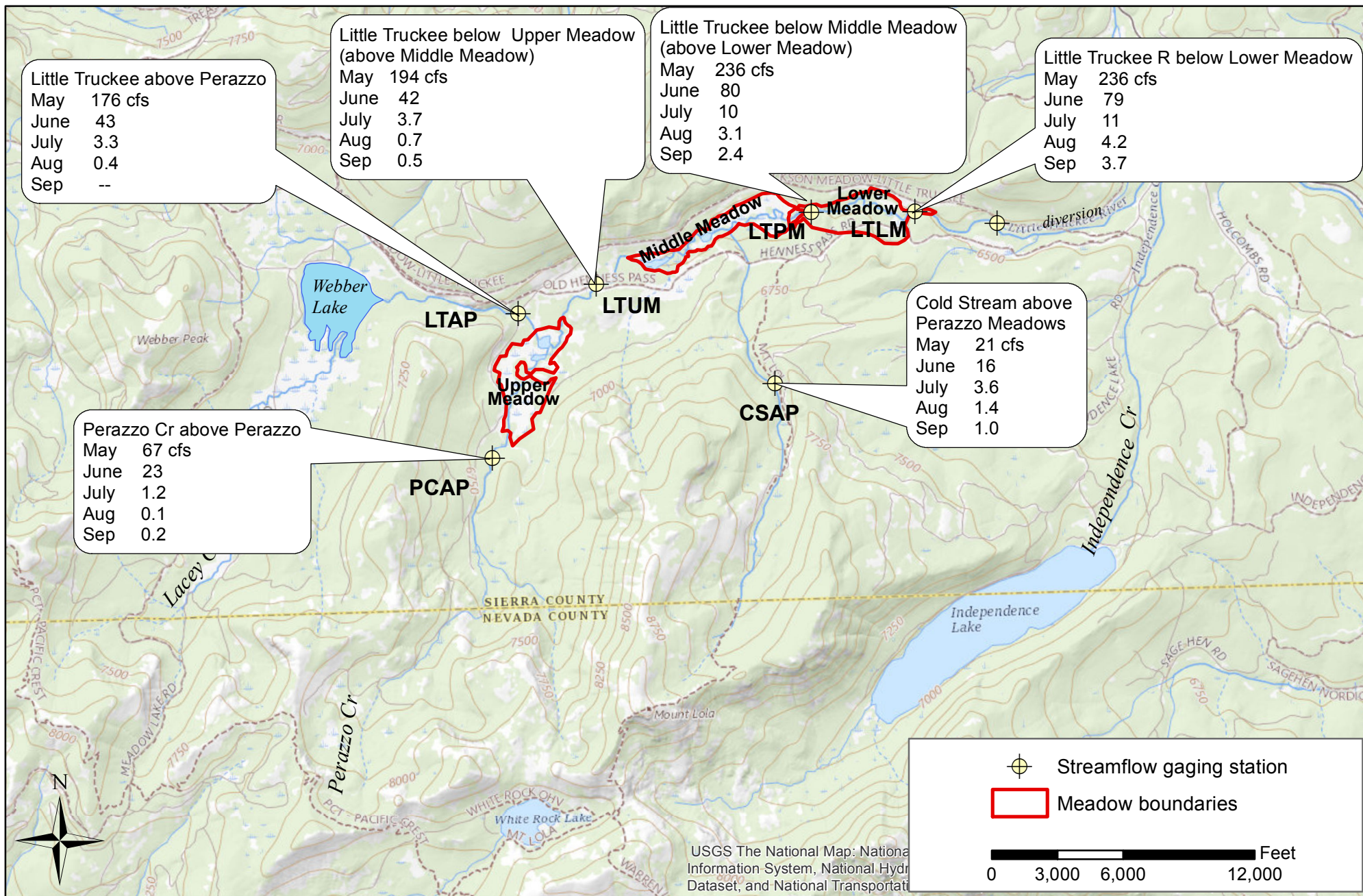
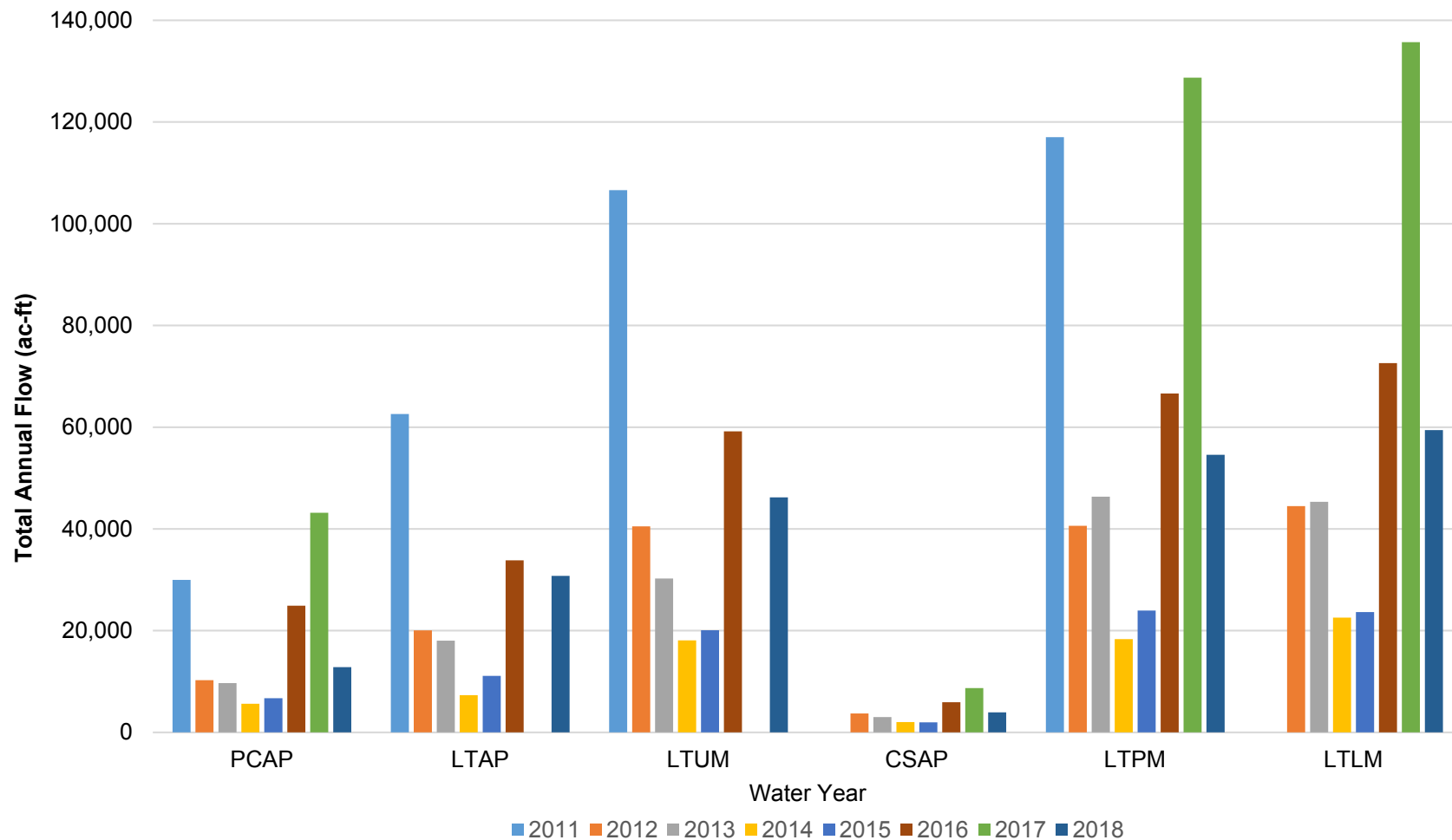


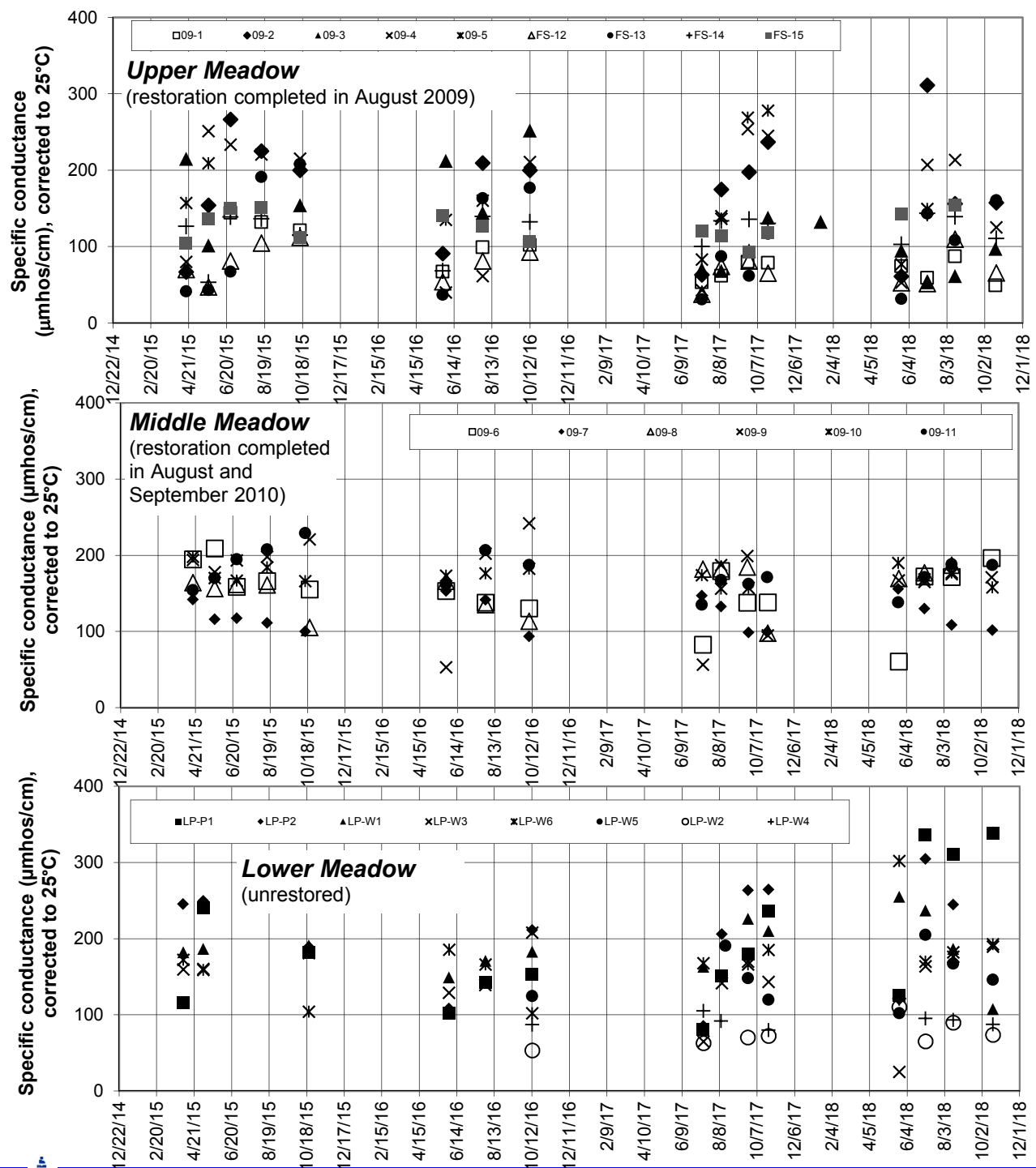
Figure 21. Monthly average streamflow during the snowmelt recession period, WY2018, Perazzo Meadows, Sierra County, California



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Figure 22.

Total Annual Flow for All Stream Gages, Perazzo Meadows, Sierra County, California, WY2011-WY2018. LTAP and LTUM did not have complete data records for WY2017 due to damage during high flows that year.



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Figure 23. Specific conductance of groundwater, Upper, Middle and Lower Perazzo Meadows, Sierra County, California

See Figures 2, 3 and 4 for piezometer locations.

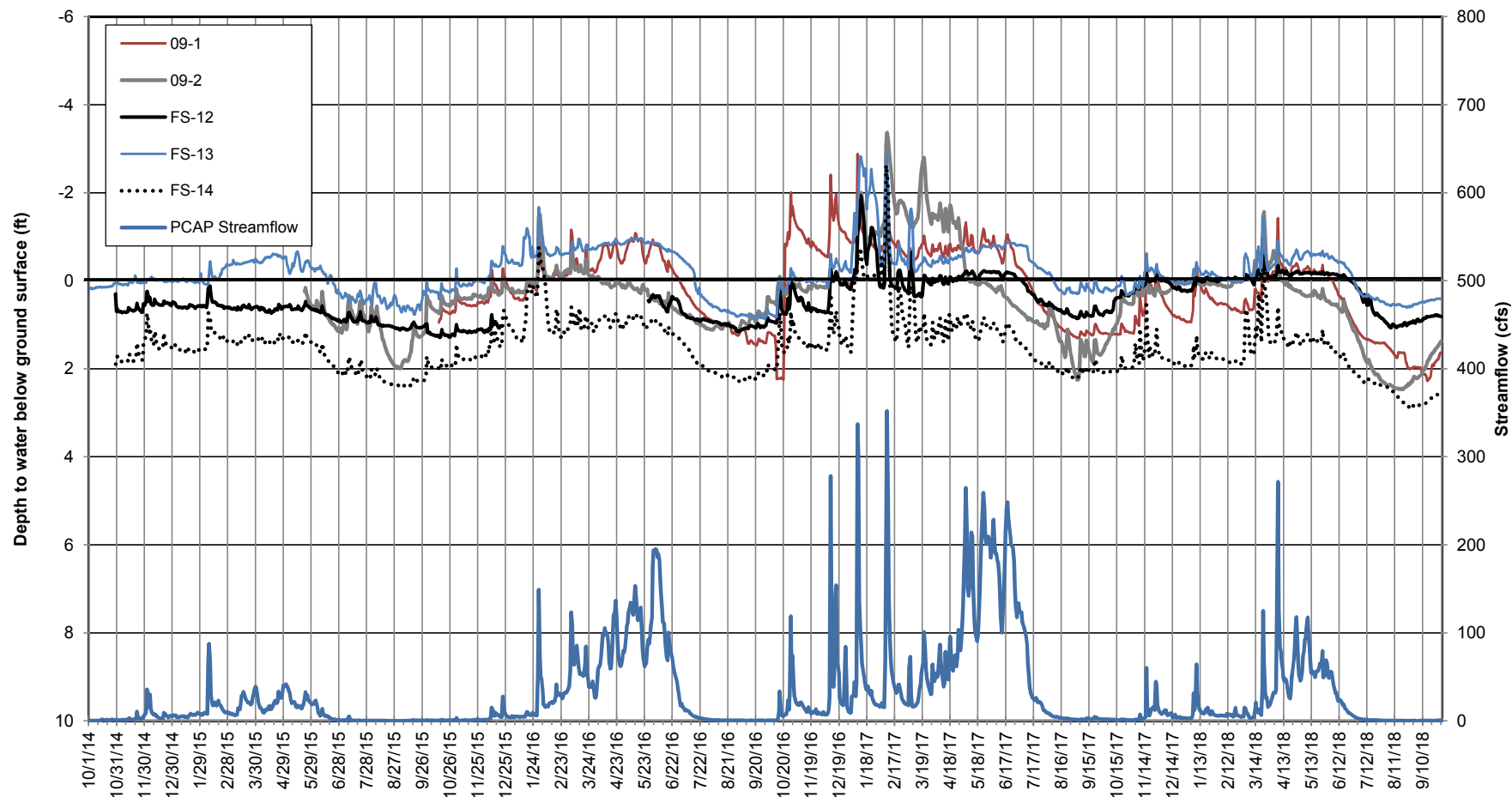
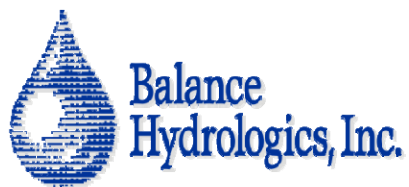


Figure 24. Depth to groundwater WY2015-WY2018, Upper Perazzo Meadow, Sierra County, California.

The beginning half of WY2018 was very dry and most groundwater levels did not go above the ground surface until March and April 2018. Well 09-2 is furthest from the channel in an open meadow area and has the greatest fluctuations in groundwater levels showing a steep decline after snowmelt and lower floor in WY2018 then in previous years.



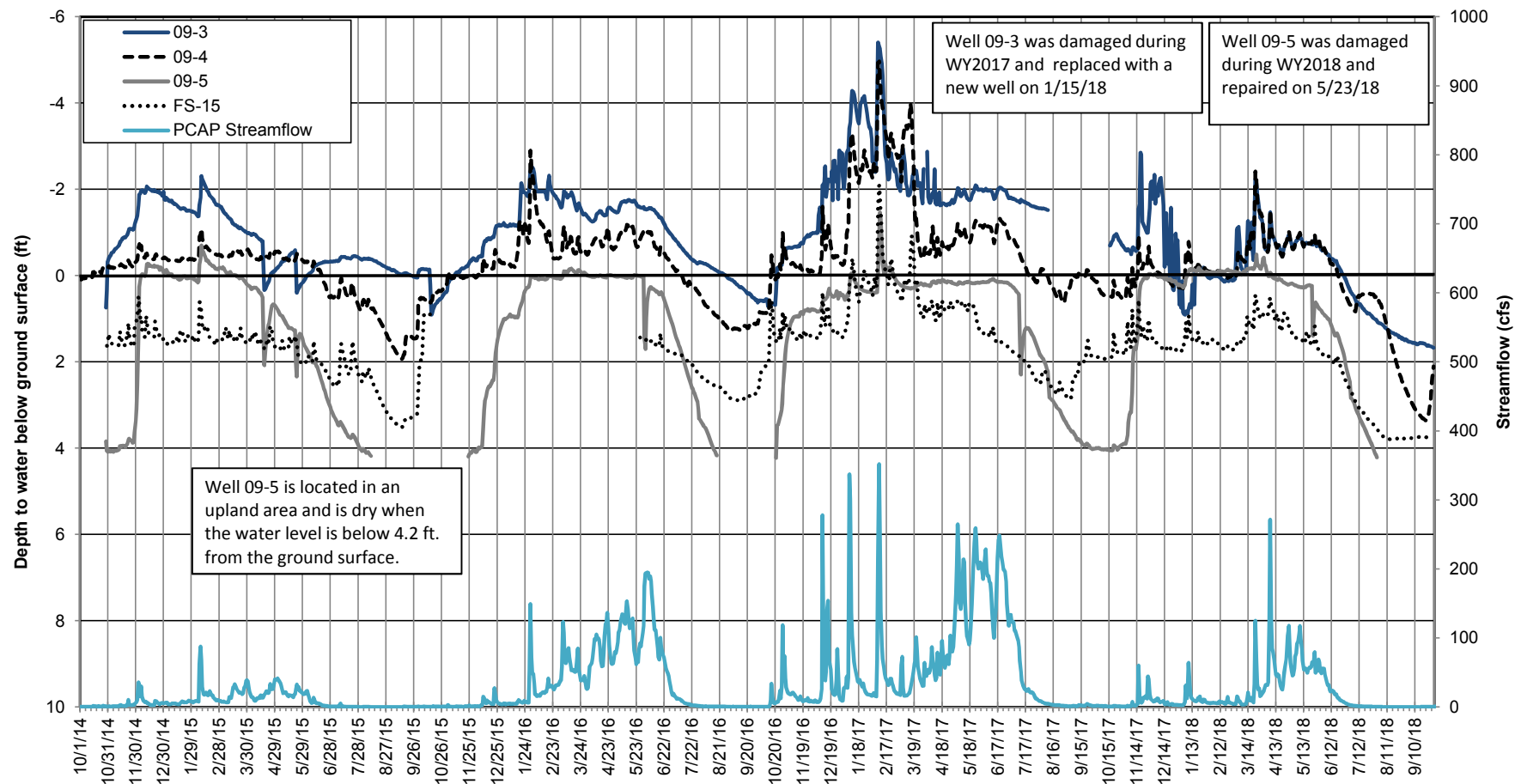


Figure 25. Depth to groundwater WY2015-WY2018, Upper Perazzo Meadow, Sierra County, California. Perazzo Creek (PCAP) is one of the primary sources of water into monitored area of Upper Perazzo Meadow. Well 09-4 is located in an area of relict channels which were re-watered through restoration efforts. Well FS-15 is located in an upland area downstream of ponds. Both wells are affected by increases in streamflow input with well 09-4 having a more defined connection. Well 09-5 is located in an upland area and still sees up to 4 feet of water level variability, concurrent with streamflow. Well 09-3 is located in a wetland area and is typically inundated throughout most of the year. Water levels at 09-3 fell to 1.75 ft below the ground surface in 2018, much more than previous years.



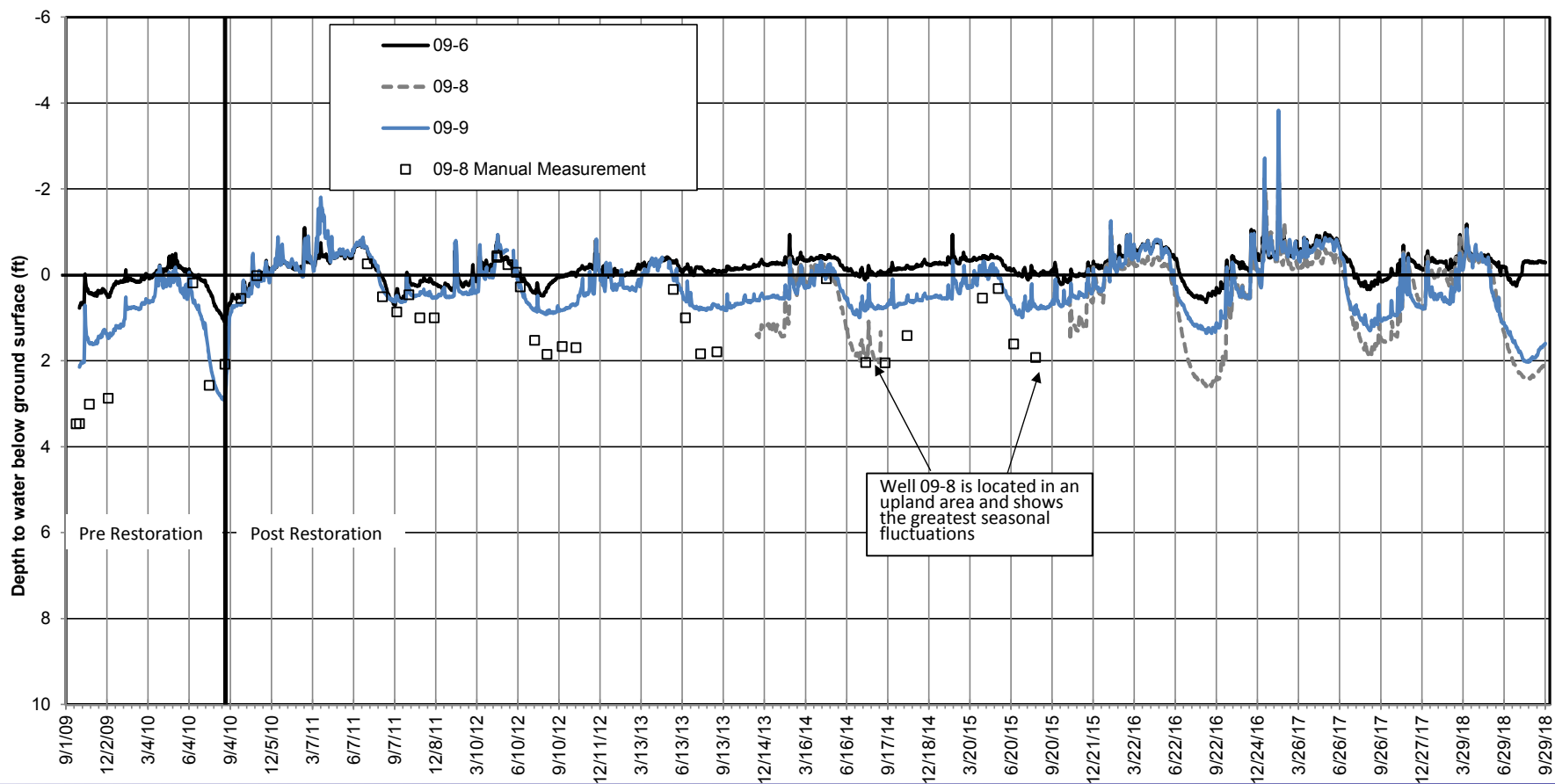


Figure 26. Depth to groundwater WY2010-WY2018, Middle Perazzo Meadows, Sierra County, California. Groundwater levels fall to the hydraulic floor in the summer during the drought, yet the post-restoration hydraulic floor is higher than pre-restoration. Changes in channel flow since 2016 have resulted in changes in groundwater retention in the three upper Middle Perazzo Meadow wells. Well 09-6 continues to maintain inundation during most of the year. Well 09-9 is located closer to the channel and shows significant change in the groundwater floor beginning in WY2016, possibly due to breaches in plugs near this area. Well 09-8 is located in an upland area and has been relatively un-affected from restoration efforts and changes.



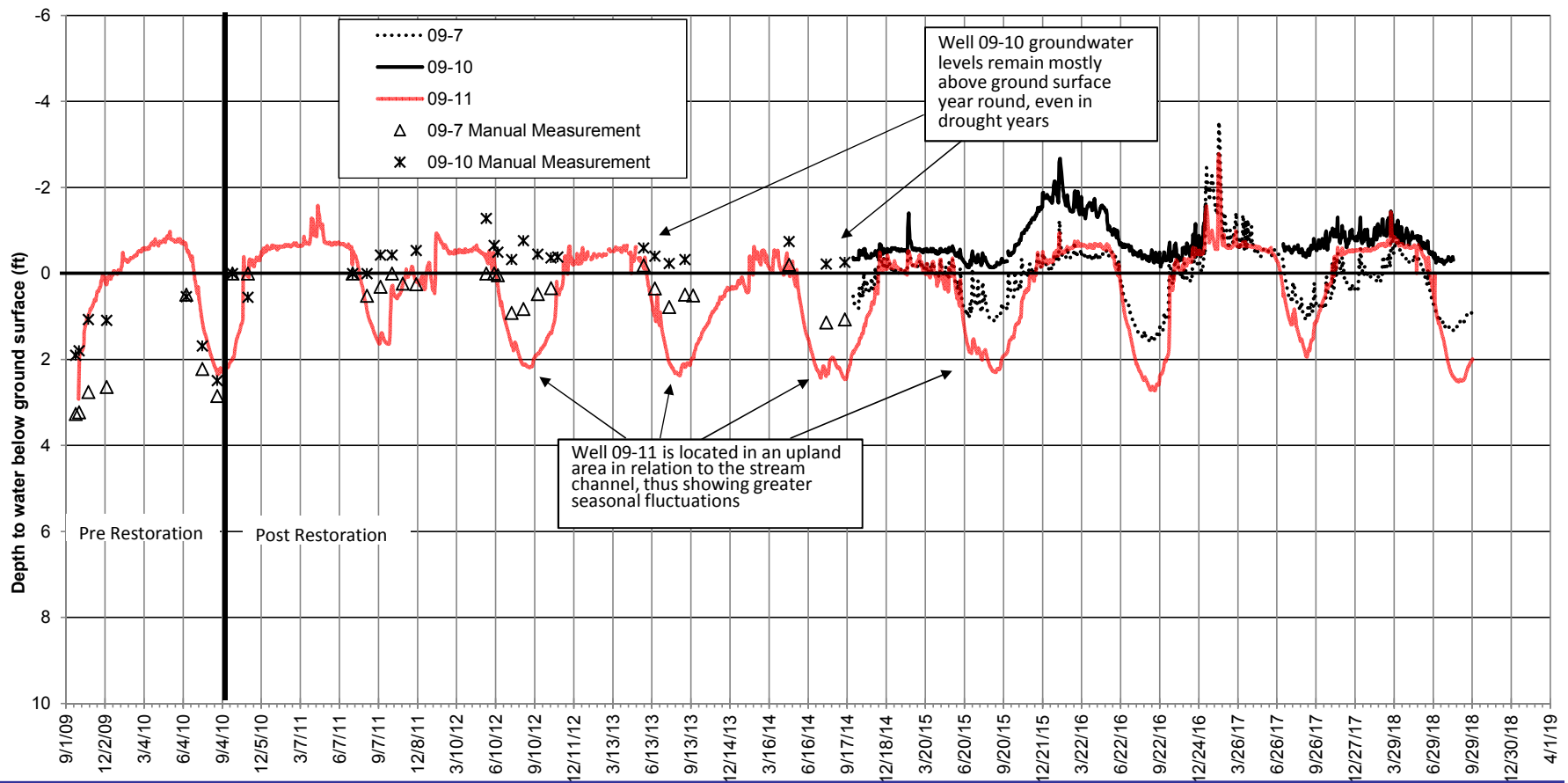
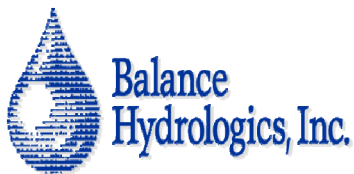


Figure 27. Depth to groundwater WY2010-WY2018, Middle Perazzo Meadows, Sierra County, California. Groundwater levels in wells 09-7 and 09-10 have remained above pre-restoration levels even in drought years though a degree of meadow and channel evolution appears to have led to slightly lower groundwater levels than immediately after restoration. Well 09-11 is located in the upland area and does not show a clear response to changes from restoration activities.



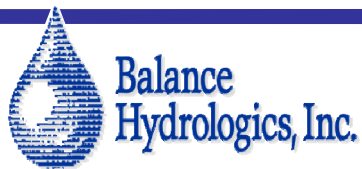
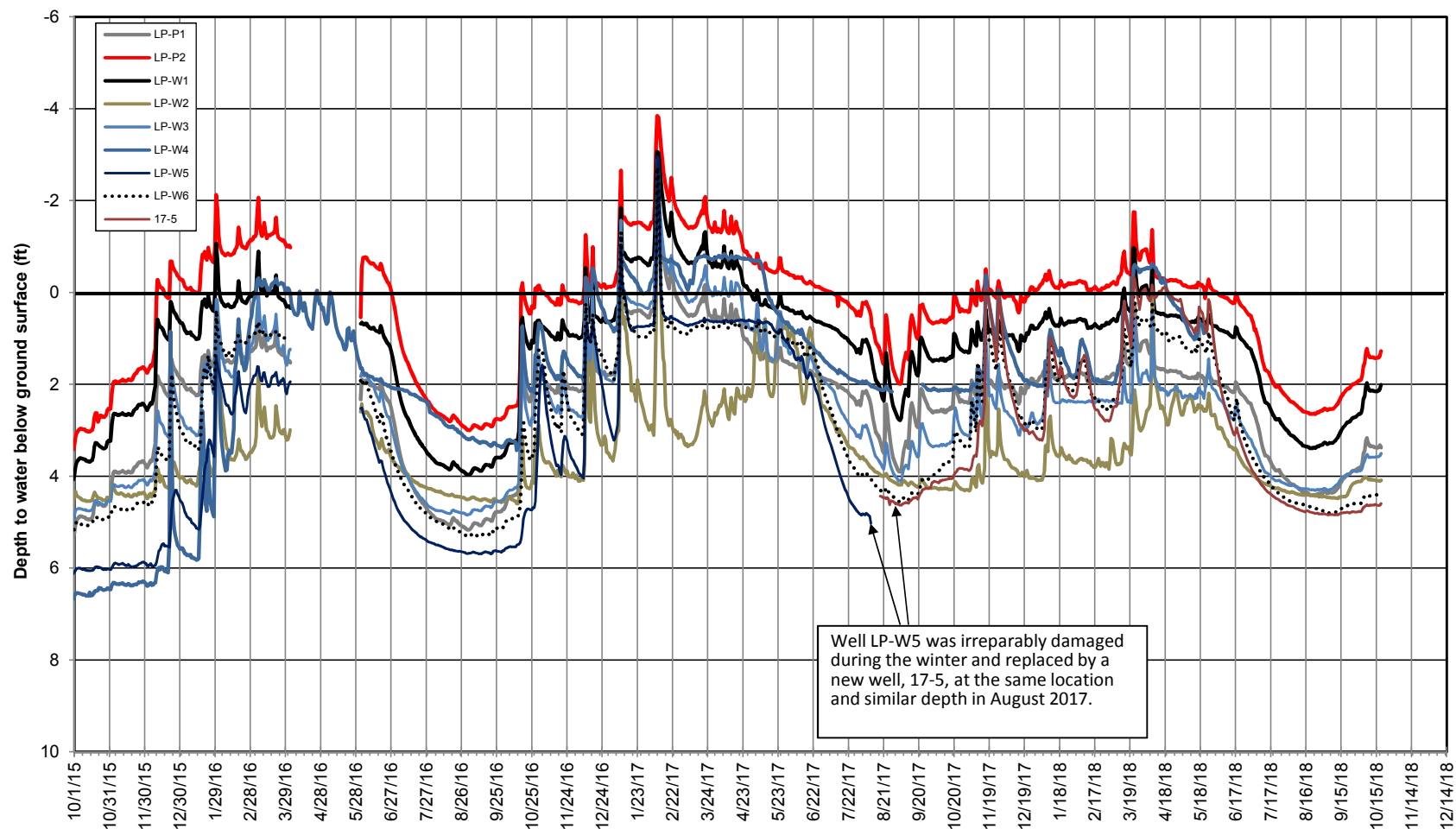


Figure 28. Depth to groundwater WY2016-WY2018, Lower Perazzo Meadow, Sierra County, California
 No restoration has occurred in Lower Perazzo Meadow. Groundwater levels are generally lower compared to the restored Upper and Middle Meadows. Groundwater range is greater in the unrestored meadow.