

April 5, 2021

Manuel Rauhut
Idaho Department of Water Resources
322 East Front Street
Boise, ID 83720
VIA EMAIL (Manuel.Rauhut@idwr.idaho.gov)

Subject: 2020 Annual Water Level Monitoring Report (Permit 61-12090)

Dear Mr. Rauhut:

This report summarizes water level data collected from the Elk Creek Village monitoring well (MW-1) and the Elk Creek Village production well (PW-1) (Figure 1). Monitoring of groundwater production and groundwater levels in these wells is required under Permit 61-12090. Monitoring protocols are outlined in a monitoring plan dated February 15, 2012, which was approved by IDWR on March 26, 2012.

PW-1 is not yet being used for production, but groundwater levels have been measured manually in both PW-1 and MW-1 since October 3, 2011. Transducers and dataloggers have measured and recorded water levels on 6-hour intervals in both wells since that date also (with exceptions – see Table 1). Manual water-level measurements and transducer data downloads occurred every other month through the first year-and-a-half of monitoring (through June 2013), with quarterly measurements and downloads since that time.

Manual Water Level Monitoring

Prior to the January 16, 2018 monitoring event, manual water level measurements were typically made with the same Powers Electric line sounder to maintain consistency (although the sounding tape was replaced in January 2015). Due to concerns about the Powers sounder line stretching and giving inaccurate measurements, an 800-foot non-stretch Waterline electric sounder was obtained for the January 2018 monitoring event. It was found that the 800-foot Waterline sounder better matched the transducer data than the Powers sounder, so the Waterline has been used for all subsequent manual measurements. Manual groundwater level measurements collected from MW-1 and PW-1 are listed in Table 1.

Table 1. Manual depth to water observations at MW-1 and PW-1

Date	MW-1 Depth to Water (ft, BTOC)	PW-1 Depth to Water ¹ (ft, BTOC)
10/3/2011	354.73	343.90
12/9/2011	354.65	342.40
2/17/2012	354.18	342.26
4/6/2012	353.87	342.00
6/28/2012	353.72	342.06
8/30/2012	353.73	343.30
10/18/2012	353.76	342.28
12/27/2012	353.27	341.79
2/13/2013	353.50	341.80
3/8/2013 ²	353.50	---
4/19/2013	353.50	241.46
6/25/2013	353.15	341.61
9/26/2013	353.02	341.76
12/18/2013	353.12	341.58
3/25/2014	352.85	341.18
7/9/2014	351.62	340.40
9/4/2014	351.58	340.35
12/15/2014	351.46	340.19
3/30/2015	355.62	344.26
10/2/2015	356.90	344.50
12/23/2015	355.33	344.47
3/15/2016	354.65	344.53
6/21/2016	355.42	344.50
10/6/2016 ³	355.25	---
10/28/2016 ³	---	344.50
12/19/2016	356.25	343.75
3/1/2017	354.90	343.25
4/6/2017 ³	355.90	---
6/30/2017	354.42	343.13
9/15/2017	353.89	343.28
1/16/2018 ⁴	356.54	345.04
3/28/2018	356.54	344.90
6/18/2018	356.39	344.99
9/25/2018	356.57	345.23
12/27/2018	356.27	344.84
3/19/2019	356.57	344.86
6/24/2019	356.42	344.84
9/16/2019	356.92	344.85
12/12/2019	356.64	344.67
3/27/2020	356.42	344.69
6/29/2020	359.67	345.86
9/15/2020	361.82	349.31
12/21/2020	358.71	347.36
3/26/2021	358.35	346.44

¹PW-1 depth to water measured relative to top of oil²Off-cycle monitoring at MW-1 to repair the water level transducer³Only one well sounded or could not sound due to oil⁴Water levels measured with non-stretch sounder instead of Powers starting January 2018

Continuous Water Level Monitoring

Solinst Levelogger pressure transducers were installed in MW-1 and PW-1 in October 2011. A Solinst Barologger was installed in MW-1 so the Levelogger data could be corrected to compensate for fluctuations in atmospheric pressure. The Leveloggers in MW-1 and PW-1 were each suspended on approximately 400 feet of galvanized steel cable attached to an I-bolt affixed to the top of the well casing. This setting depth submerged the leveloggers between 40 and 60 feet below the typical static water level in each well. As of October 2011, all pressure transducers are set to record data points (water column depth for leveloggers and barometric pressure for the barologger) on 6-hour intervals.

Data is downloaded from the loggers during each monitoring event. Manual water levels are measured with an electric line sounder during each monitoring event and recorded. For the 2020 annual report, monitoring events took place on March 27, June 29, September 15, and December 21, 2020 as well as March 26, 2021. The manual measurements and barometric data were used to create a calibrated time series of the recorded water level data from each well for the 2020 monitoring year (Figure 2). During the December 2019 monitoring event, the Levelogger cable in MW-1 was found to be corroded through and the transducer was lost down the well. A new Solinst Levelogger M20/F65 (S/N 0052112626) was ordered in January 2020 and installed during the March 2020 monitoring event on new stainless-steel cable. The new transducer has consistently recorded data at 6-hour intervals since it was installed with no issues. There are no gaps in the water level data for the 2020 monitoring year.

As mentioned in the 2017 annual report, a correction has been applied to all transducer data prior to January 2018 to remove errors due to compensating with a stretching Powers sounder line. Beginning in the 2018 monitoring year, a non-stretch Waterline sounder was used instead of the Powers which produced much more consistent water level measurements and tracked well with the transducer data so no correction was necessary. The non-stretch sounder will continue to be used for future monitoring. A barometric efficiency (B.E.) correction has also been applied to the transducer data to remove some of the water level fluctuations caused by atmospheric pressure fluctuations. Figures 3 and 4 provide a time series of the B.E.-corrected water level data.

Analysis

Review of the manual water-level measurements and corrected continuous water level recordings from October 2011 to March 2021 suggest:

- (1) pumping from a new irrigation well located approximately 0.8 miles south of PW-1 resulted in water level declines of roughly 4.6 feet in MW-1 and 6.8 feet in PW-1 over the course of the irrigation season;

- (2) water levels had recovered to within 1.7 feet of pre-irrigation levels in MW-1 and within 1.9 feet of pre-irrigation levels in PW-1 by the March 2021 monitoring event, and;
- (3) a very slight upward hydraulic gradient has been present during the monitoring period as evidenced by higher water levels in MW-1 than in PW-1.

Additional monitoring is necessary to determine the long-term effects of the new irrigation well to the south on MW-1 and PW-1.

Please let me know if you have any questions regarding the data collected to date. The next quarterly sampling event is scheduled for June 2021.

Sincerely,



Sean T. Albertson, EIT

Cc: Brian Whitaker, Woods Erickson & Whitaker LLP (bwhitaker@woodserickson.com)
Norm Semanko, Parsons Behle & Latimer (nsemanko@parsonsbehle.com)

Attachment: Electronic data file (spreadsheet)

Report Figures

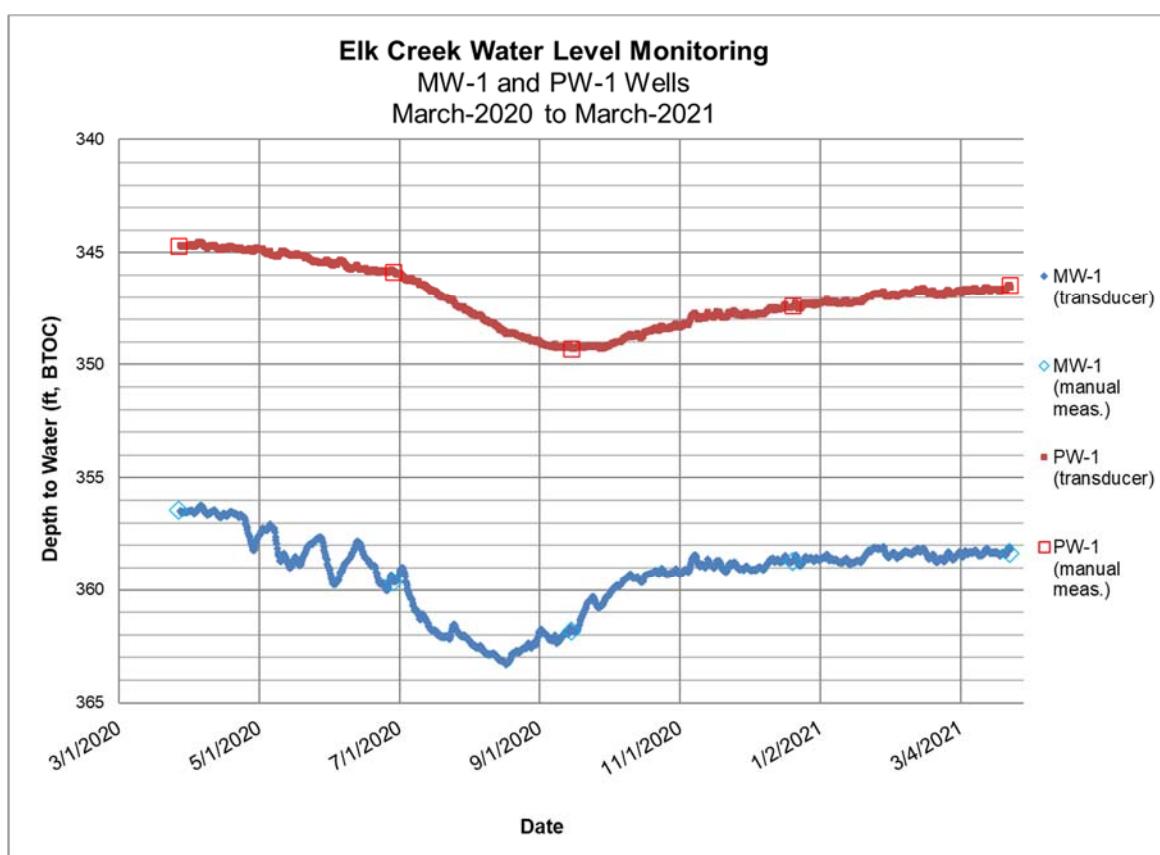
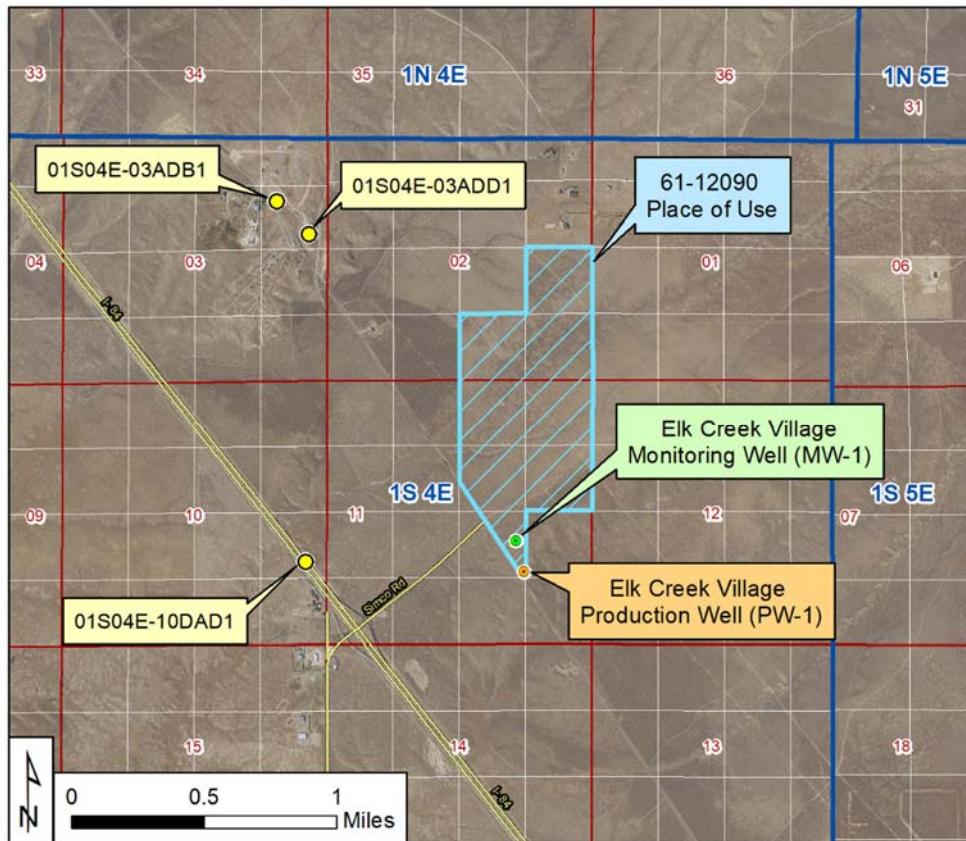


Figure 2. 2020 Annual Water Level Data

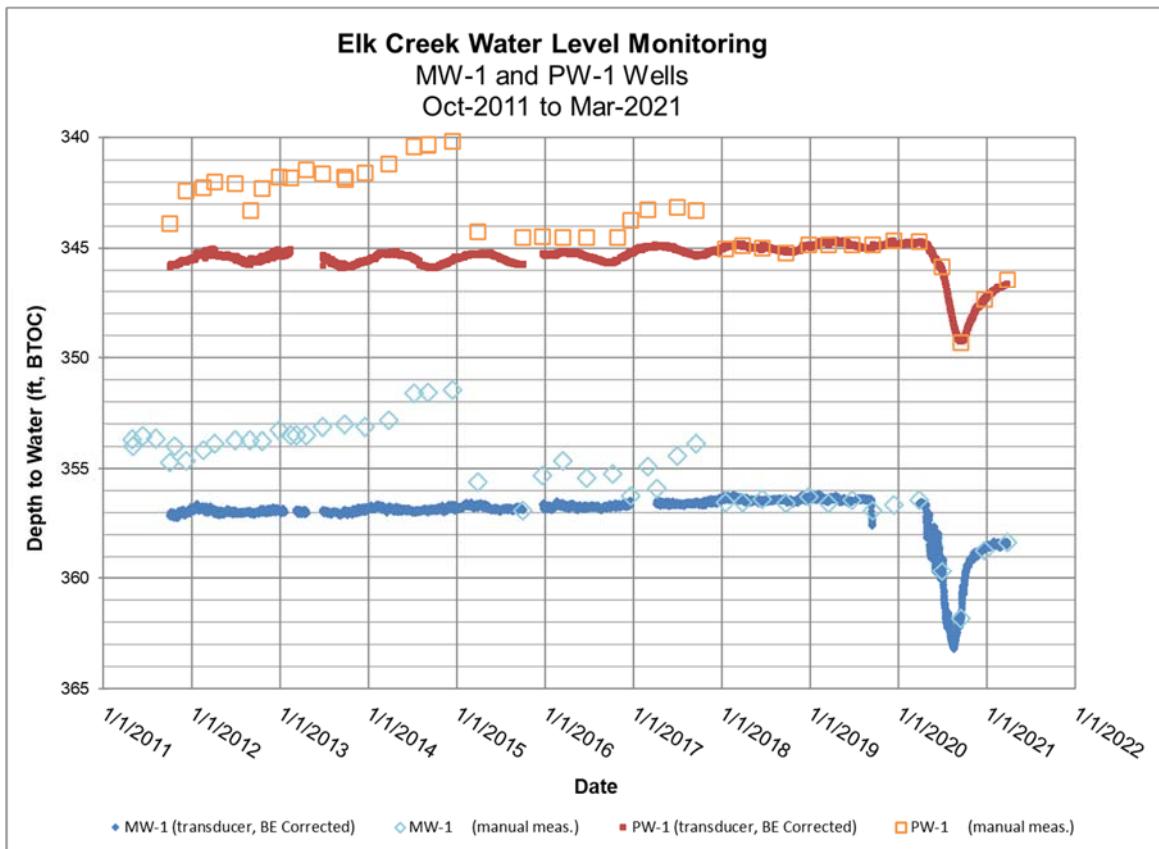


Figure 3. Corrected Water Level Data (Oct 2011 - Mar 2021)

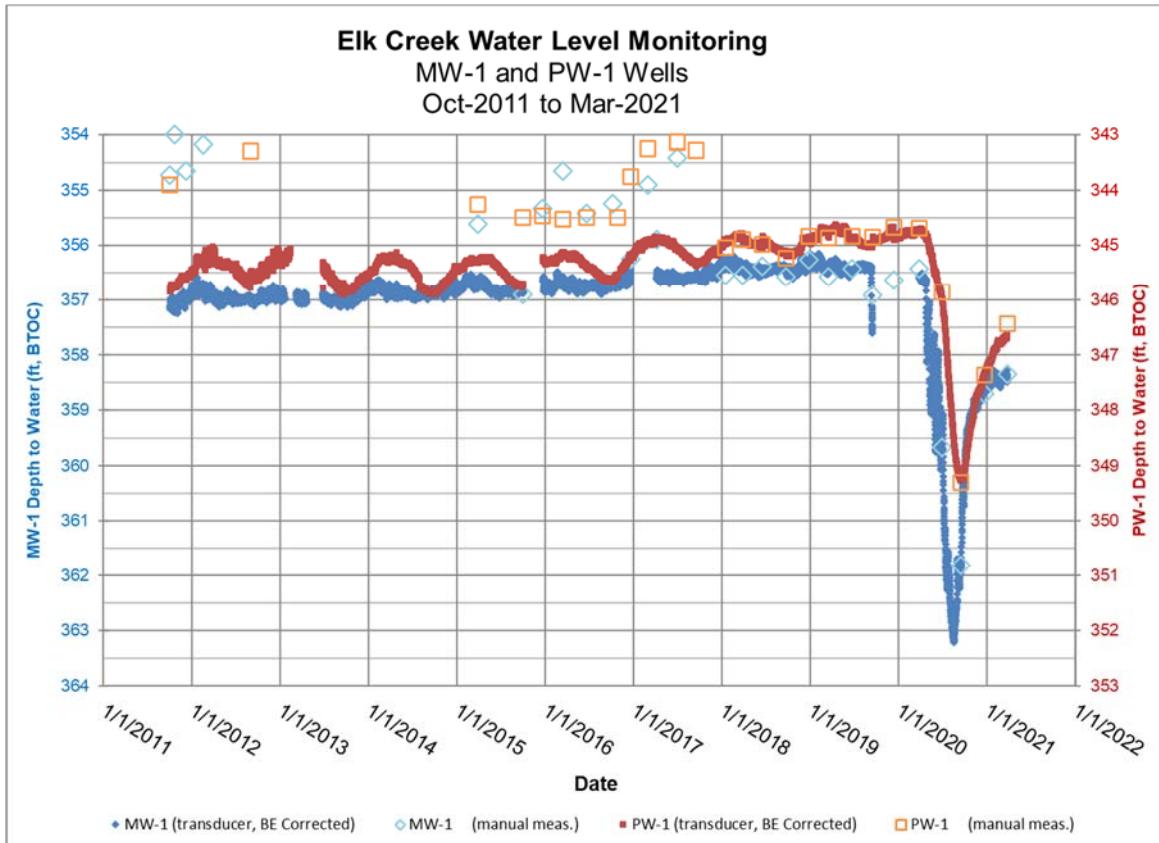


Figure 4. Corrected Water Level Data, Small Scale (Oct 2011 - Mar 2021)