

Annual summary of recorded water-level, temperature, and specific-conductance data collected by the U.S. Geological Survey in Kaloko-Honokōhau National Historical Park, Island of Hawai‘i, 2017

Summary of recorder data collected January 1–December 6, 2017

Water-level (in terms of water pressure), temperature, and specific-conductance data were recorded at 10-minute intervals by instruments installed in three wells and a monitoring pipe in Kaloko-Honokōhau (KAHO) National Historical Park (fig. 1). Data recorded in the wells and monitoring pipe in 2017 were reviewed, and approved data were made publicly available through the U.S. Geological Survey National Water Information Systems (NWIS) website (U.S. Geological Survey, 2018). Links to access the approved recorder data are provided in this document.



Figure 1. Locations of KAHO wells 1, 2, and 3 and monitoring pipe in 'Aimakapā Fishpond.

Completeness of approved records during January 1–December 6, 2017

None of the records were 100 percent complete in 2017 because the recording instruments were removed briefly every quarter to check for fouling and to check the calibration of the instruments' sensors. In addition, some parts of the records were not approved because of sensor errors or because of erroneous sensor readings during periods when sensors were not equilibrated with groundwater in the wells or water in 'Aimakapā Fishpond.

Approved water-level, temperature, and specific-conductance records were greater than 99 percent complete for KAHO well 1 and 'Aimakapā Fishpond (table 1). Approved water-level, temperature, and specific-conductance records were greater than 96 percent complete at KAHO well 3. The instrument at KAHO well 3 experienced a premature battery failure on 11/27/2017 and no data were recorded for 10 days until the next field visit, when a new instrument was installed in the well.

Due to instrument failures and periods of erroneous readings, the water-level, temperature, and specific-conductance records at KAHO well 2 were 60.4, 60.3, and 46.2 percent complete, respectively (table 1). During the period from 3/29/2017 to 6/13/2017, the instrument in the well stopped operating and failed to record any data for unknown reasons. On 10/11/2017, the instrument in the well experienced a premature battery failure and no data were recorded for 57 days until the next field visit, when a new instrument was installed in the well. The specific-conductance record at KAHO well 2 was less complete than the water-level and temperature records because the specific-conductance record showed anomalous upward trends after instrument deployments on 1/5/2017, 6/13/2017, and 9/7/2017; the anomalies lasted about 12-20 days. The anomalies were determined to be erroneous and were deleted from the record. Similar anomalies have occurred several times in the specific-conductance record of KAHO well 2 between 2015 and 2017, during which four different instruments monitored conditions in the well. Although the erroneous upward trends during 2015–17 always began after instrument deployments, the cause of these trends was not determined, but may have been related to air bubbles being temporarily trapped in the open sensor slot of the instrument.

Table 1. Completeness of water-level, temperature, and specific-conductance records for 4 sites in Kaloko-Honokōhau (KAHO) National Historical Park, Island of Hawai‘i, 2017. Available data period is from January 1–December 6, 2017.

[Values in the Water-level, Temperature, and Specific-conductance columns are percentages; each percentage value equals the number of approved 10-minute values divided by 48,960 possible 10-minute values in 2017 and multiplied by 100. For example, the temperature record for KAHO well 1 was 99.6 percent complete for 2017].

General station name	Station number	Water level	Temperature	Specific conductance
KAHO well 1, near the KAHO Visitor Center	194053156013001	99.7	99.6	99.2
KAHO well 2, the upper well	194120156013501	60.4	60.3	46.2
KAHO well 3, the lower well	194125156013501	96.9	96.8	96.8
Pipe in ‘Aimakapā Fishpond	194037156012901	99.7	99.7	99.4

Range of recorded water level, temperature, and specific conductance during January 1–December 6, 2017

At KAHO well 1, near the KAHO Visitor Center, the water level was between 0.69 and 2.73 feet above mean sea level (fig. 2), temperature was 19.4 degrees Celsius (fig. 3), and specific conductance was between 20,500 and 21,800 microsiemens per centimeter ($\mu\text{S}/\text{cm}$) (fig. 4).

At KAHO well 2, the upper well, the water level was between 0.84 and 2.93 feet above mean sea level (fig. 5), temperature was between 18.9 and 19.0 degrees Celsius (fig. 6), and specific conductance was between 8,970 and 9,650 $\mu\text{S}/\text{cm}$ (fig. 7).

At KAHO well 3, the lower well, the water level was between 0.62 and 2.95 feet above mean sea level (fig. 8), temperature was between 18.8 and 18.9 degrees Celsius (fig. 9), and specific conductance was between 12,200 and 15,100 $\mu\text{S}/\text{cm}$ (fig. 10).

At the pipe in ‘Aimakapā Fishpond, the water level was between 0.96 and 2.60 feet above mean sea level (fig. 11), temperature was between 20.8 and 34.1 degrees Celsius (fig. 12), and specific conductance was between 18,400 and 23,400 $\mu\text{S}/\text{cm}$ (fig. 13).

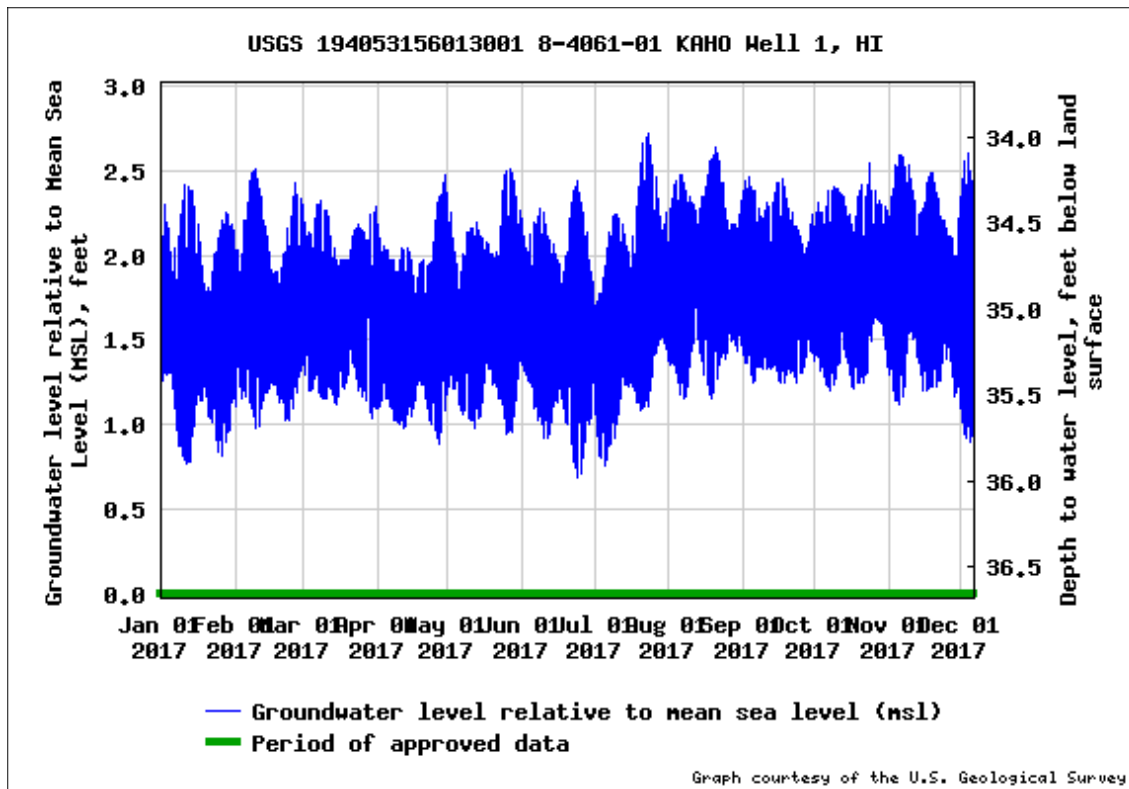


Figure 2. Water-level data for KAH0 Well 1, near the KAH0 Visitor Center, January 1–December 6, 2017.

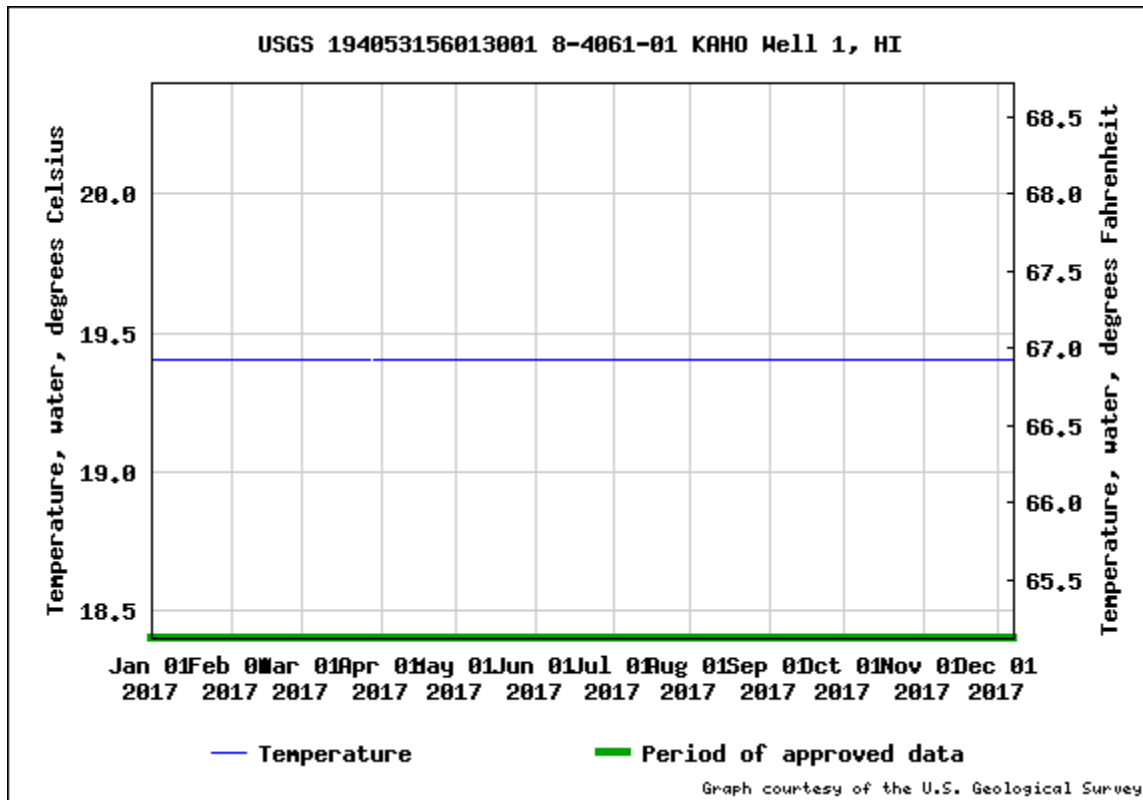


Figure 3. Temperature data for KAH0 Well 1, near the KAH0 Visitor Center, January 1–December 6, 2017.

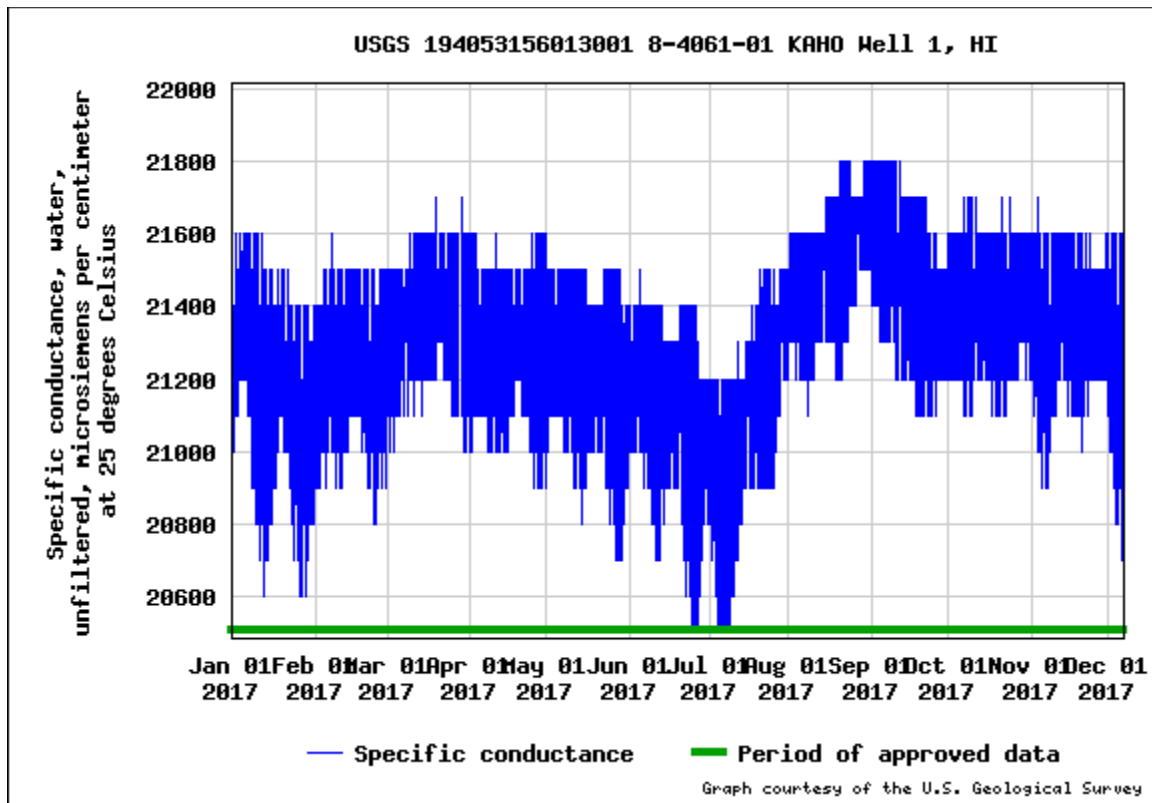


Figure 4. Specific-conductance data for KAHO Well 1, near the KAHO Visitor Center, January 1–December 6, 2017.

Data shown in figures 2–4 for KAHO Well 1, near the KAHO Visitor Center, are available at:

https://nwis.waterdata.usgs.gov/hi/nwis/uv/?cb_00010=on&cb_00095=on&cb_72150=on&format=rdp&site_no=194053156013001&period=&begin_date=2017-01-01&end_date=2017-12-06

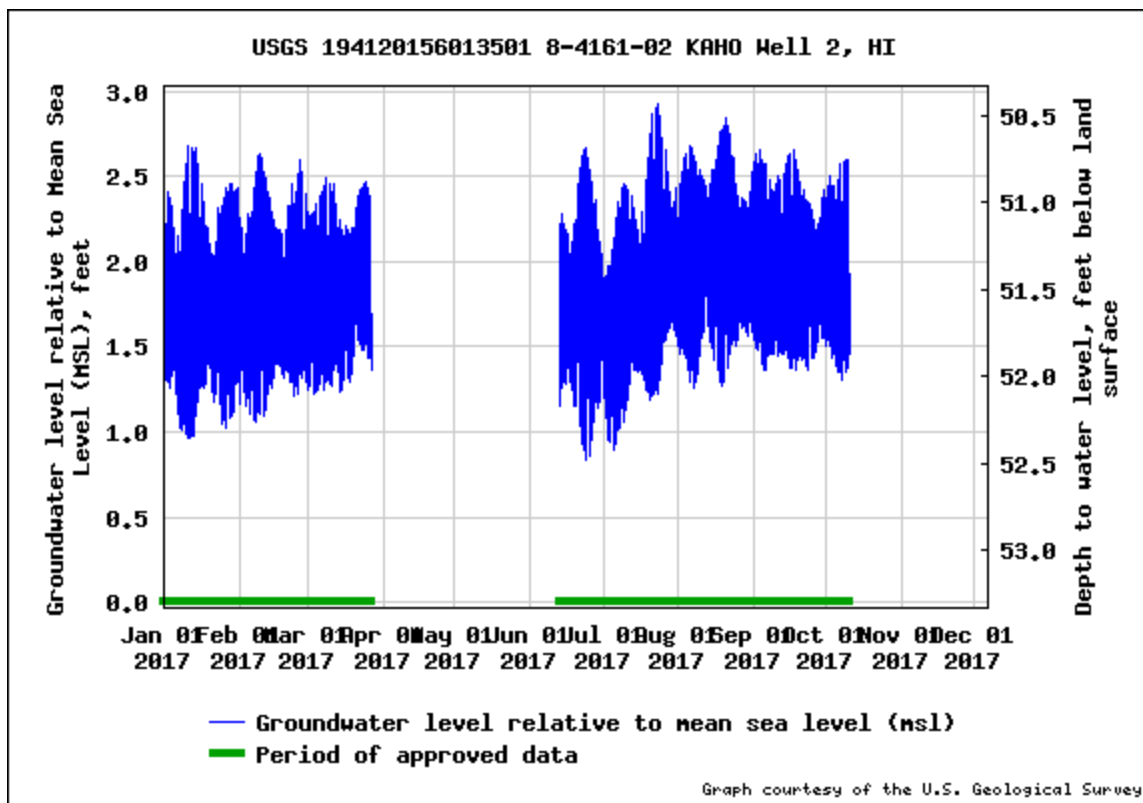


Figure 5. Water-level data for KAH0 Well 2, the upper well, January 1–December 6, 2017.

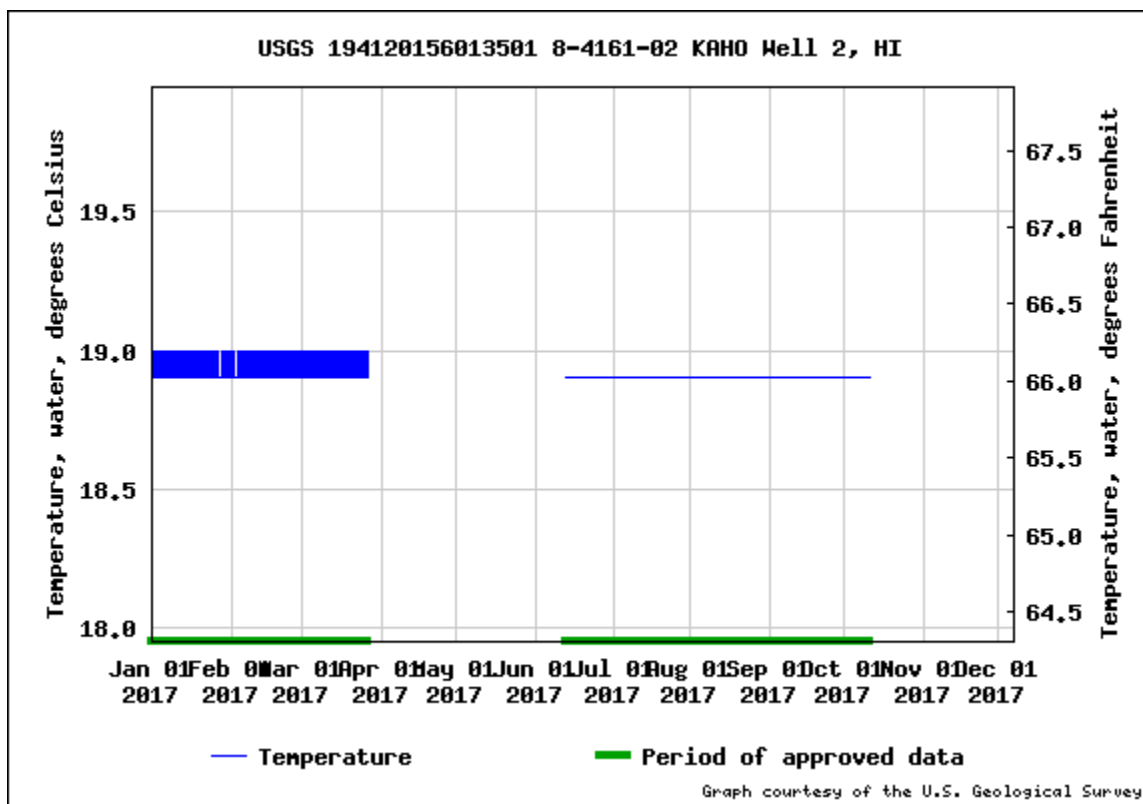


Figure 6. Temperature data for KAH0 Well 2, the upper well, January 1–December 6, 2017.

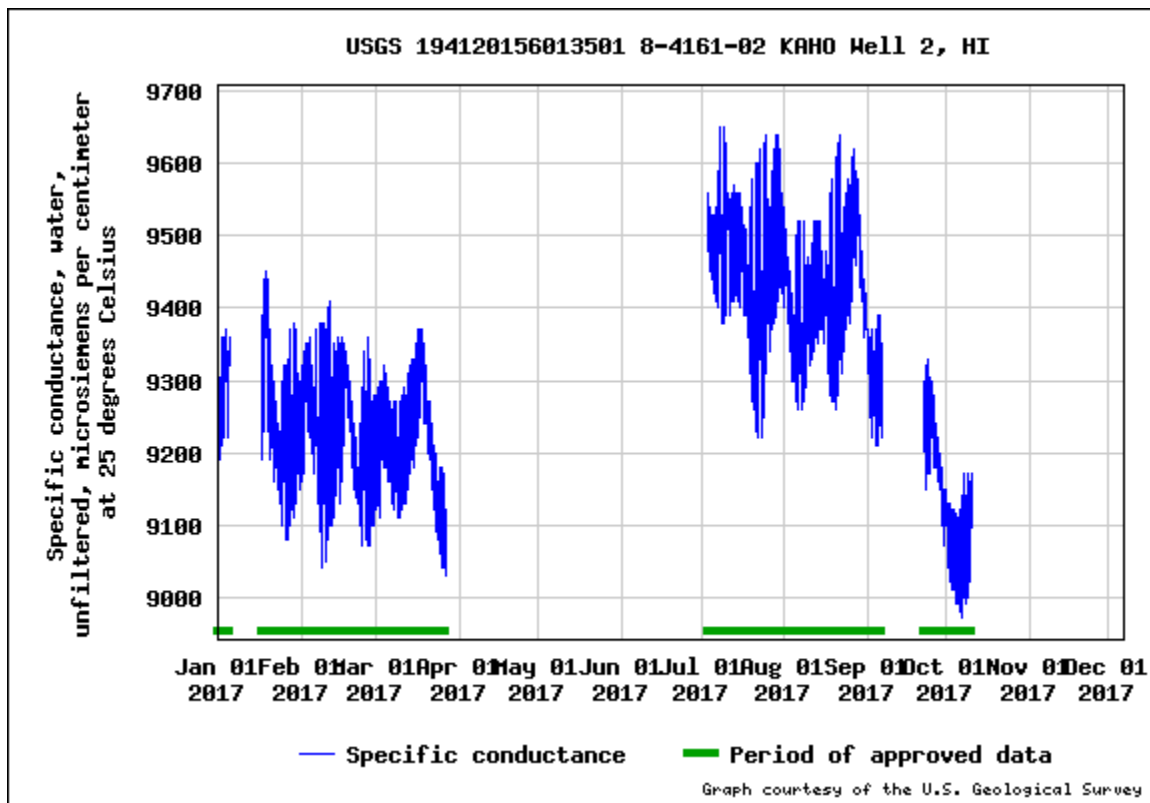


Figure 7. Specific-conductance data for KAH0 Well 2, the upper well, January 1–December 6, 2017.

Data shown in figures 5–7 for KAH0 Well 2, the upper well, are available at:

https://nwis.waterdata.usgs.gov/hi/nwis/uv?cb_all=on&cb_00010=on&cb_00095=on&cb_72150=on&format=rdb&site_no=194120156013501&period=&begin_date=2017-01-01&end_date=2017-12-06

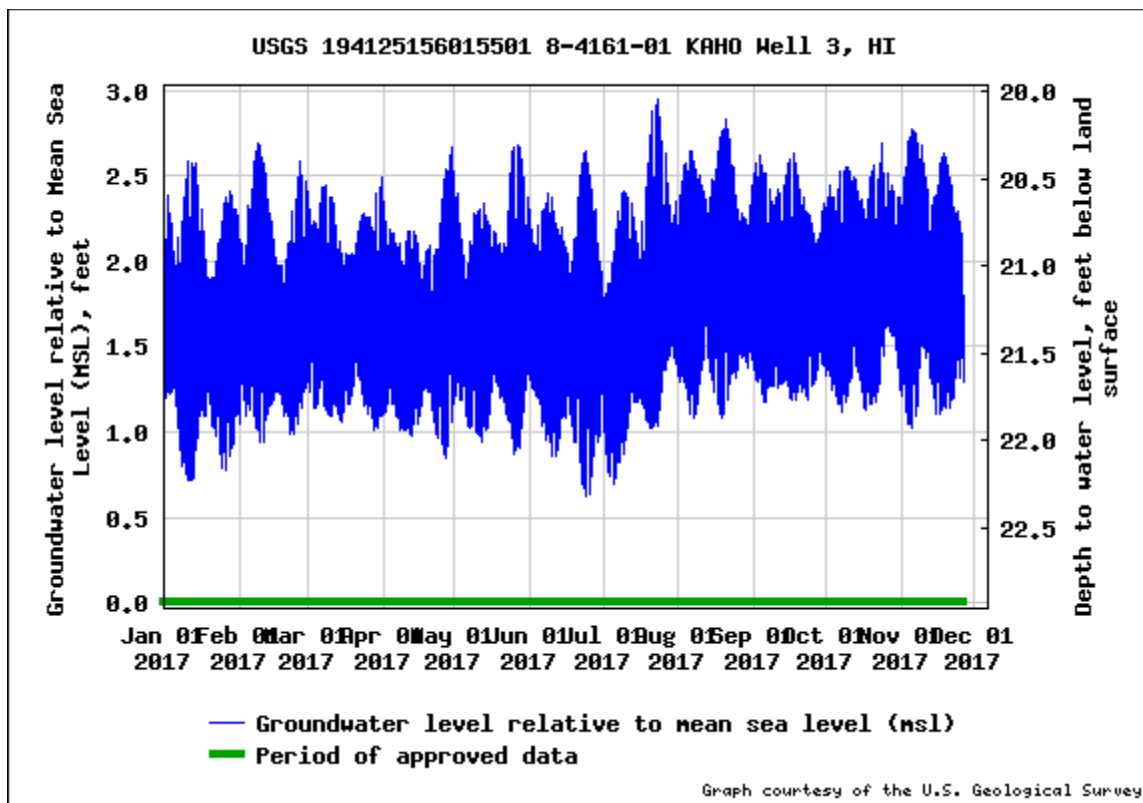


Figure 8. Water-level data for KAH0 Well 3, the lower well, January 1–December 6, 2017.

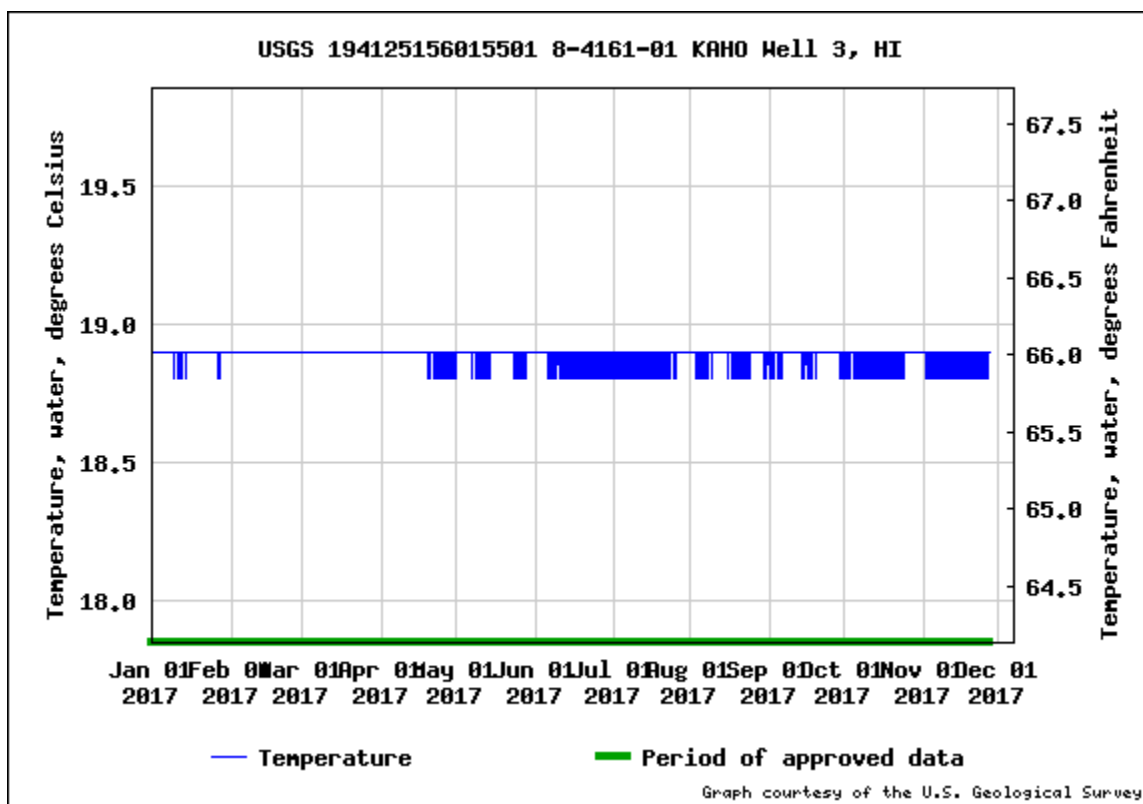


Figure 9. Temperature data for KAH0 Well 3, the lower well, January 1–December 6, 2017.

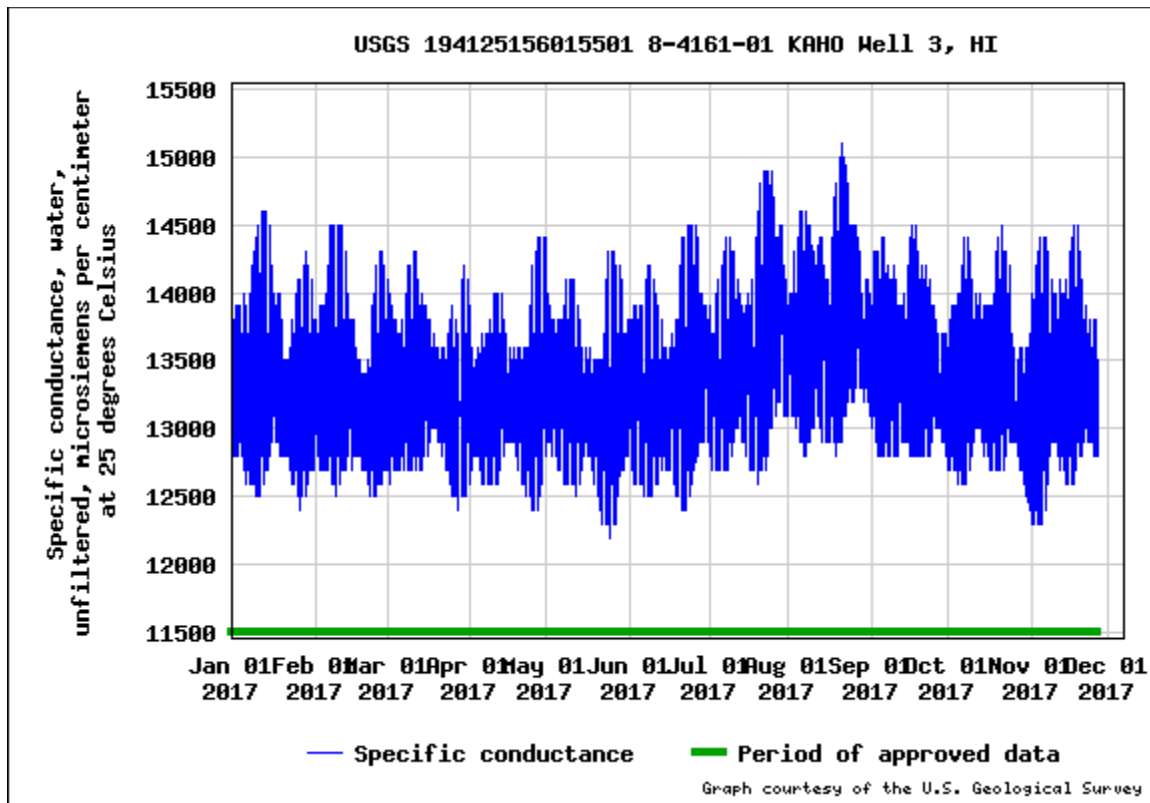


Figure 10. Specific-conductance data for KAH0 Well 3, the lower well, January 1–December 6, 2017.

Data shown in figures 8–10 for KAH0 Well 3, the lower well, are available at:

https://nwis.waterdata.usgs.gov/hi/nwis/uv?cb_00010=on&cb_00095=on&cb_72150=on&format=rdb&sitete_no=194125156015501&period=&begin_date=2017-01-01&end_date=2017-12-06

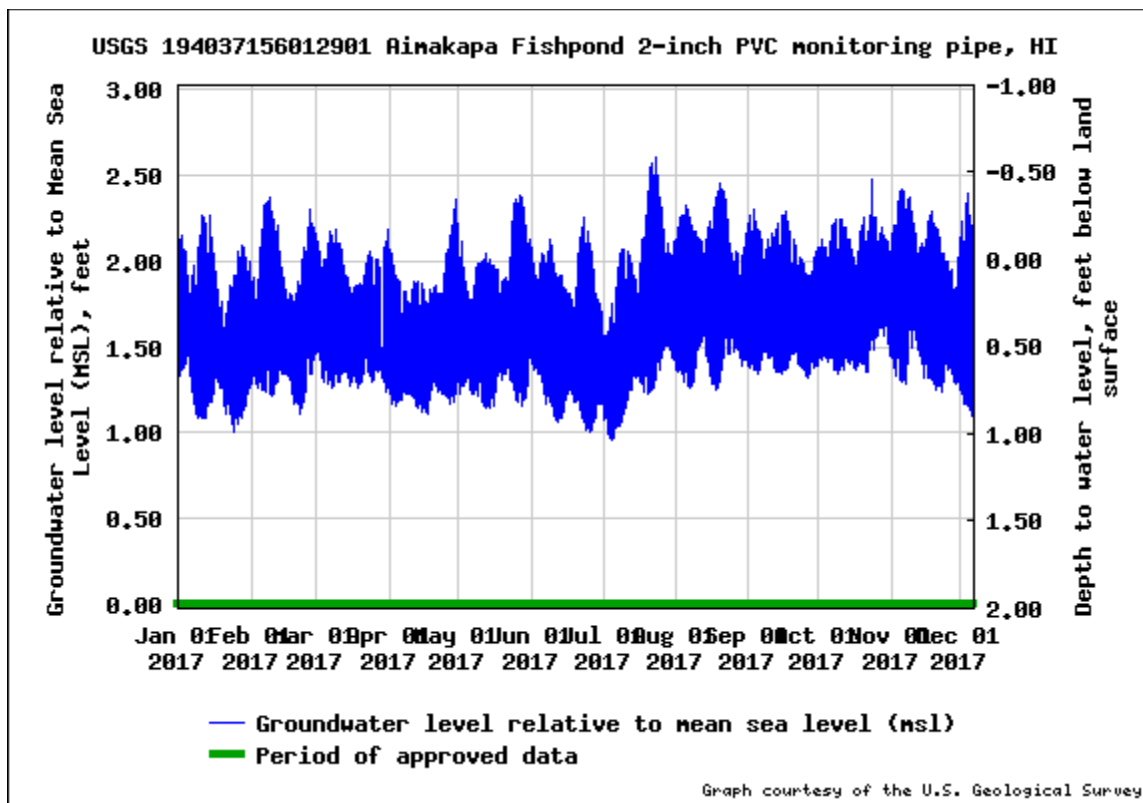


Figure 11. Water-level data for 'Aimakapā Fishpond 2-inch PVC monitoring pipe, January 1–December 6, 2017.

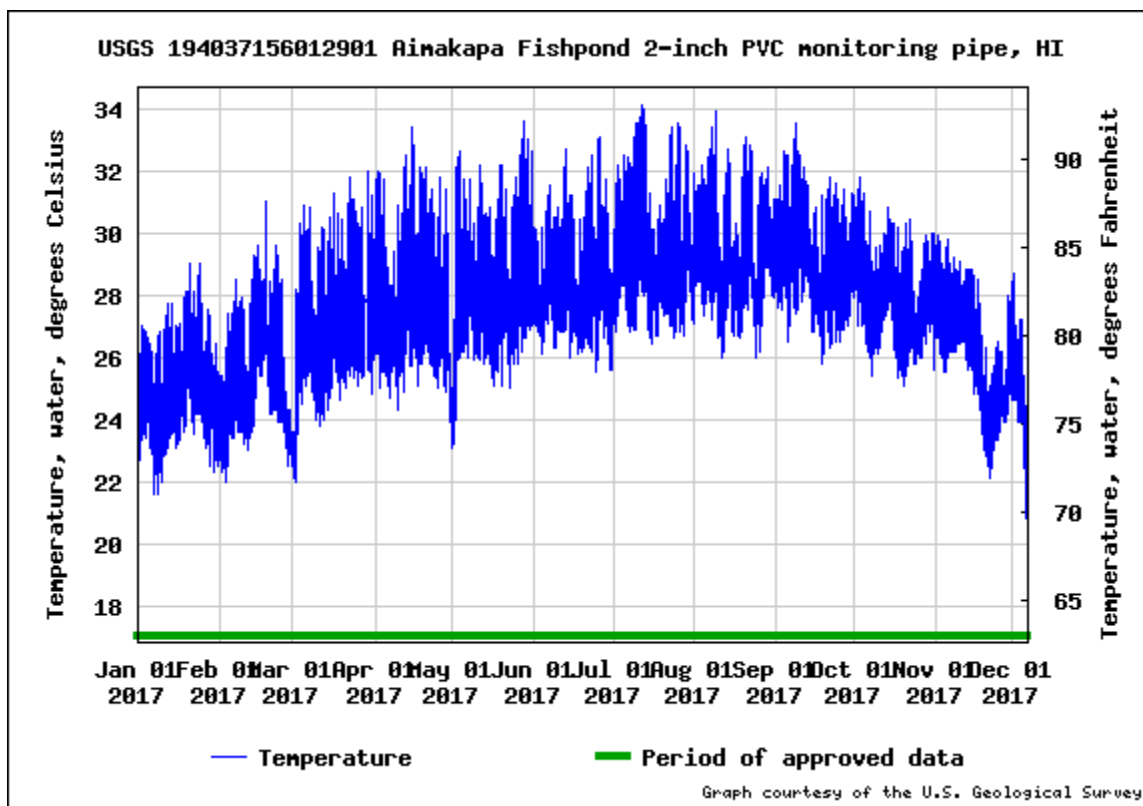


Figure 12. Temperature data for 'Aimakapā Fishpond 2-inch PVC monitoring pipe, January 1–December 6, 2017.

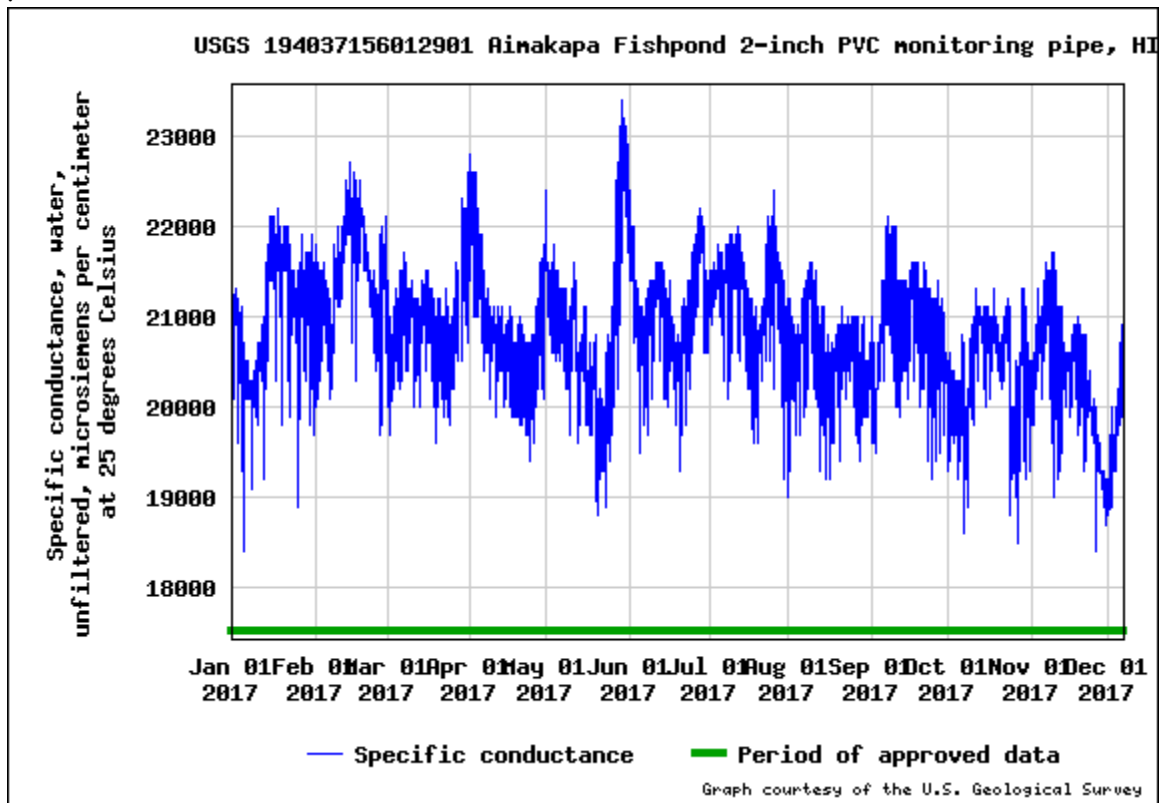


Figure 13. Specific-conductance data for ‘Aimakapā Fishpond 2-inch PVC monitoring pipe, January 1–December 6, 2017.

Data shown in figures 11–13 for the ‘Aimakapā Fishpond 2-inch PVC monitoring pipe are available at:

https://nwis.waterdata.usgs.gov/hi/nwis/uv?cb_all=on&cb_00010=on&cb_00095=on&cb_72150=on&format=rdb&site_no=194037156012901&period=&begin_date=2017-01-01&end_date=2017-12-06

Monthly mean water level, temperature, and specific conductance

Monthly mean water-level, temperature, and specific-conductance values during January–November 2017 are shown in figures 14, 15, and 16, respectively. For comparison, the monthly mean values for 2015 and 2016 are also included in figures 14, 15, and 16.

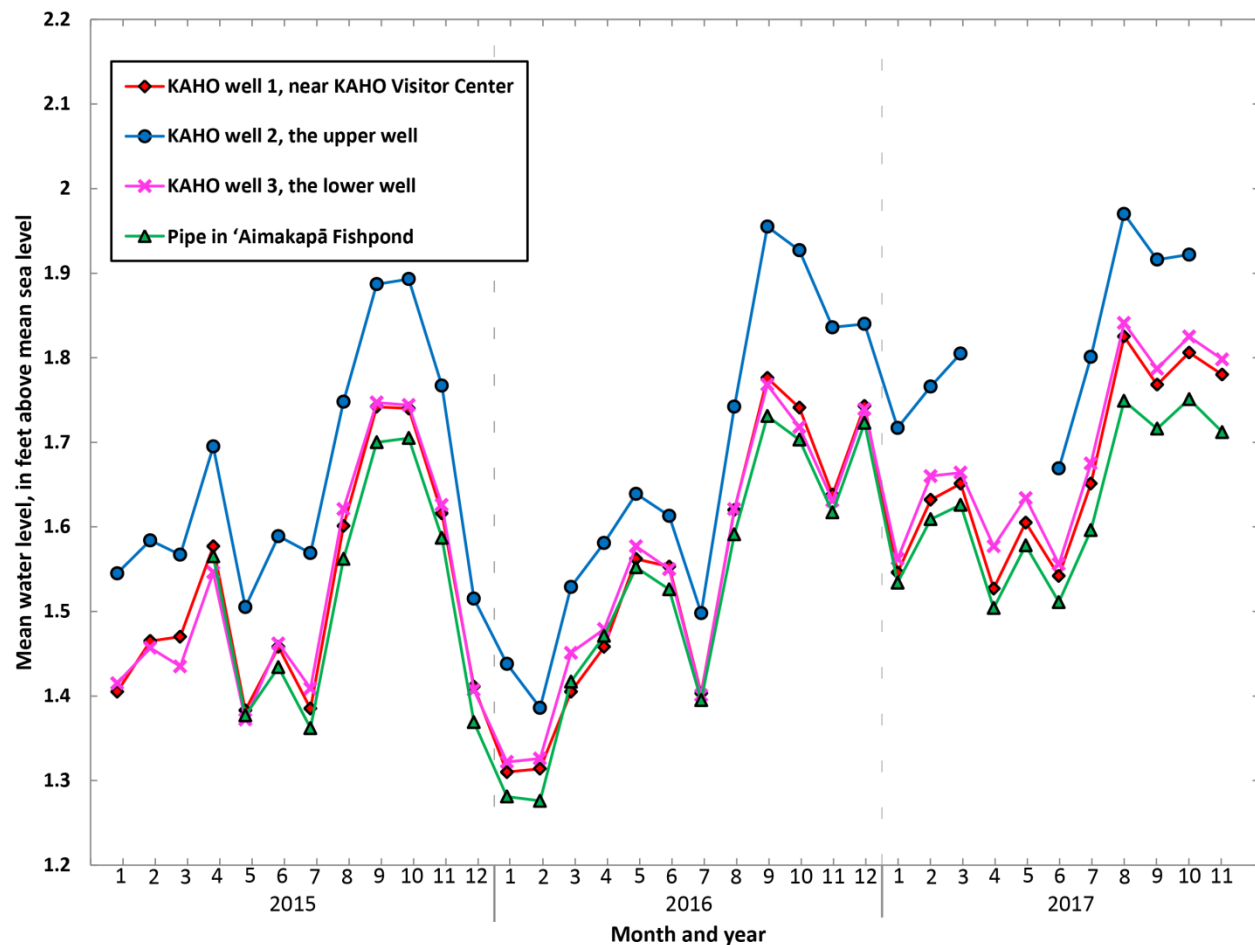


Figure 14. Monthly mean water level, in feet above mean sea level, for four monitoring sites in KAHO National Historical Park, Island of Hawai'i, January 2015–November 2017. Water level was not measured in the pipe in 'Aimakapā Fishpond during January–March 2015.

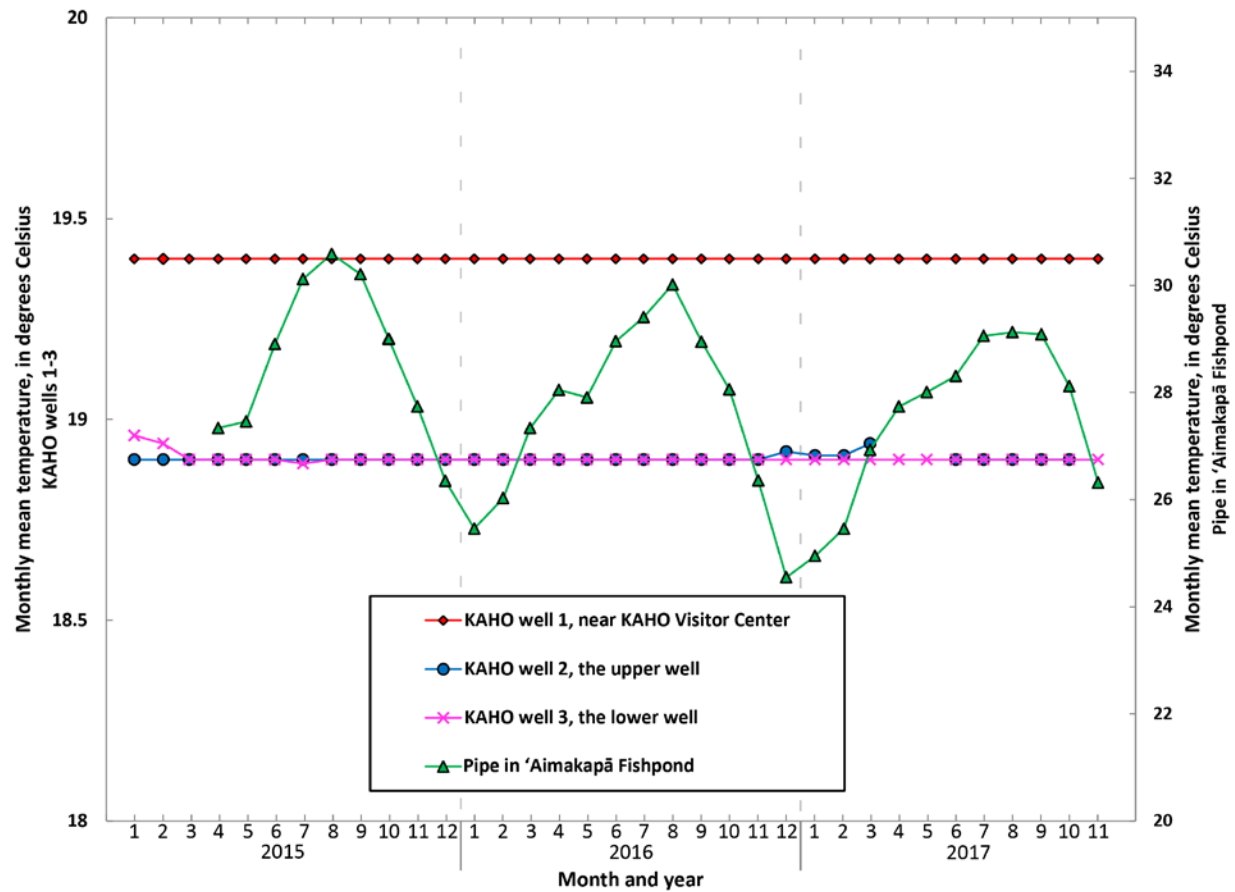


Figure 15. Monthly mean temperature, in degrees Celsius, for four monitoring sites in KAHO National Historical Park, Island of Hawai‘i, January 2015–November 2017. Monthly mean temperature values for KAHO wells 2 and 3 are the same or nearly the same, making their symbols difficult to distinguish in this figure. Temperature was not measured in the pipe in ‘Aimakapā Fishpond during January–March 2015.

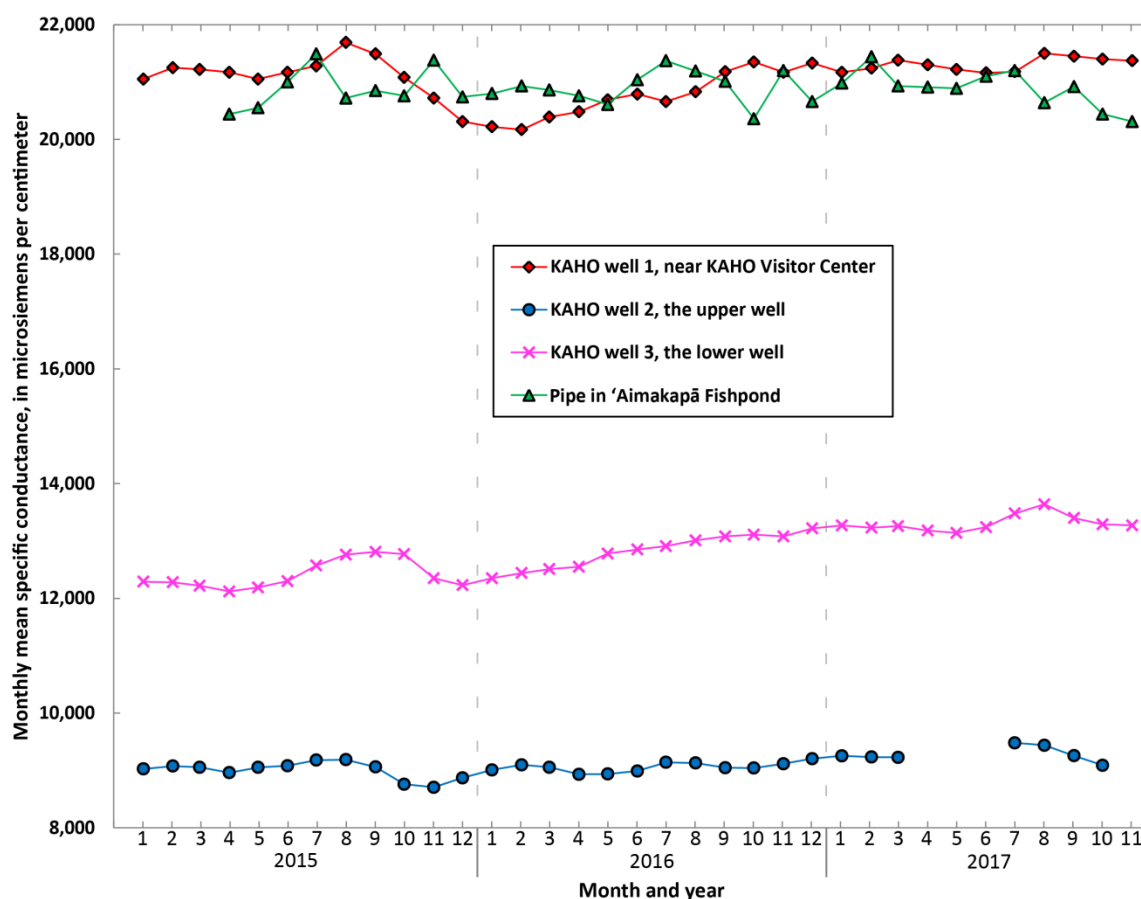


Figure 16. Monthly mean specific conductance, in microsiemens per centimeter at 25 degrees Celsius, for four monitoring sites in KAHO National Historical Park, Island of Hawai‘i, January 2015–November 2017. Specific conductance was not measured in the pipe in ‘Aimakapā Fishpond during January–March 2015.

Monthly mean values in figures 14–16 were obtained from NWIS using the links shown below and by completing the following actions on the NWIS webpages: (1) checking each of the three boxes corresponding to the Parameter Names “Temperature, water, degrees Celsius,” “Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees Celsius,” and “Groundwater level relative to Mean Sea Level (MSL), feet”; (2) entering the desired date range from 2015-01 to 2017-11 for KAHO wells 1 and 3, the date range from 2015-01 to 2017-10 for KAHO well 2, and the date range from 2015-04 to 2017-11 for ‘Aimakapā Fishpond; (3) checking the box labeled “Use incomplete data for statistics calculation”; and (4) pressing the “Submit” button.

Monthly mean values of approved data recorded at KAHO well 1, near the KAHO Visitor Center, are available at:

https://waterdata.usgs.gov/hi/nwis/monthly?referred_module=sw&search_site_no=194053156013001&format=sites_selection_links

Monthly mean values of approved data recorded at KAHO well 2, the upper well, are available at:

https://waterdata.usgs.gov/hi/nwis/monthly?referred_module=sw&search_site_no=194120156013501&format=sites_selection_links

Monthly mean values of approved data recorded at KAHO well 3, the lower well, are available at:

https://waterdata.usgs.gov/hi/nwis/monthly?referred_module=sw&search_site_no=194125156015501&format=sites_selection_links

Monthly mean values of approved data recorded at ‘Aimakapā Fishpond 2-inch PVC monitoring pipe are available at:

https://waterdata.usgs.gov/hi/nwis/monthly?referred_module=sw&search_site_no=194037156012901&format=sites_selection_links

References cited

U.S. Geological Survey, 2018, National Water Information System—Web interface, accessed January 30, <https://doi.org/10.5066/F7P55KJN>.