# HAY RANCH PROJECT CONDITIONAL USE PERMIT
# HYDROLOGIC MONITORING AND REPORTING
# THIRD QUARTER 2011
# INYO COUNTY, CALIFORNIA

PREPARED FOR

Coso Operating Company, LLC

PREPARED BY

TEAM
ENGINEERING & MANAGEMENT, INC.
Bishop and Mammoth Lakes, California

OCTOBER 14, 2011

TEAM
ENGINEERING & MANAGEMENT, INC.
P.O. Box 1265, Bishop, California 93515-1265
760-872-1033 fax 760-872-2131

Dr. Bob Harrington
Inyo County Water Department
135 South Jackson Street
Independence, CA 93526

October 14, 2011

**RE: Hay Ranch Project Conditional Use Permit**
**Hydrologic Monitoring and Reporting**
**Third Quarter Report 2011**
**Inyo County, California**

Dear Dr. Harrington:

TEAM Engineering & Management, Inc. (TEAM), is pleased to present the results of hydrologic monitoring activities in Rose Valley relating to the Hay Ranch Project Conditional Use Permit (#2007-003) conducted from July through September 2011.

This *Hay Ranch Project Conditional Use Permit Hydrologic Monitoring and Reporting, Third Quarter Report 2011, Inyo County, California* was produced per the guidelines of the Inyo County Water Department and the Coso Operating Company Hay Ranch Water Extraction and Delivery System Final Environmental Impact Report's Hydrologic Monitoring and Mitigation Plan.

Information provided in this report includes a summary of Rose Valley monitoring activities conducted during Phase 1 of the Hay Ranch Project in 2009. Information provided in this report also includes hydrologic monitoring data collected during Phase 2 and Phase 4 of the Hay Ranch Project from December 2009 through the Third Quarter 2011. This report presents groundwater elevation, surface flow, water quality and Hay Ranch North and South Production Well pumping data in graphical form.

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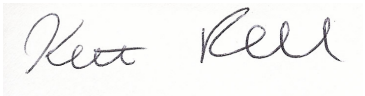
If you have any questions or require additional information, please contact TEAM at your convenience.

Sincerely,

TEAM Engineering & Management, Inc.



Keith Rainville
Staff Geologist

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## 1.0 EXECUTIVE SUMMARY

The following summarizes hydrologic monitoring activities during Third Quarter 2011 related to the Coso Operating Company's Hay Ranch Project Conditional Use Permit (CUP):

- Hay Ranch Project CUP pumping was initiated on December 25, 2009. A total of approximately 1.9 billion gallons of groundwater (5872 acre feet) have been pumped from the Hay Ranch North and South Production wells through September 22, 2011.

- During Third Quarter 2011, monthly groundwater and surface water data were collected from 30 monitoring points throughout Rose Valley as per the schedule set forth in the Hay Ranch Project CUP's Hydrologic Monitoring and Mitigation Plan.

- Quarterly groundwater samples were collected from the Hay Ranch South, Coso Junction Store #2, and Little Lake Ranch North wells. These samples were analyzed for Total Dissolved Solids. None of these samples exceeded "Threshold Requiring Action" levels.

- Quarterly hydrographs, which compare Rose Valley groundwater elevations, surface flow amounts, and Total Dissolved Solid data to Hay Ranch Project CUP pumping amounts over time, are included in this report.

- Phase 3: Model Recalibration and Redefinition of Pumping Rates and Durations occurred from September 2010 to April 2011, and based on results from the recalibrated groundwater model, ICWD set new project pumping rates, pumping duration and groundwater Triggers Levels and Maximum Acceptable Drawdowns for project monitoring points in an addendum dated April 1, 2011.

- Based on third quarter 2011 groundwater monitoring data, the Little Lake Ranch North Well exceeded its Trigger Levels in August by 0.01 feet and in September by 0.05 feet.

- No other wells exceeded their Trigger Levels during the third quarter; and no Maximum Acceptable Drawdowns, as set in ICWD's April 1, 2011 addendum, were exceeded.

- Monthly data transmittal, including groundwater and surface water hydrographs, occurred between TEAM and ICWD. Monthly update letters and groundwater and surface water hydrographs have been posted on the ICWD's public website: www.inyowater.org.

# 2.0 INTRODUCTION

The Coso Operating Company, LLC (COC) operates a geothermal electric generating plant located to the east of Rose Valley in the Coso Mountains in Inyo County, California. COC proposed a project to pump water into the Coso geothermal field from groundwater wells located on the COC Hay Ranch Property in the Rose Valley Basin. Inyo County, as lead agency, approved the Final Environmental Impact Report (FEIR) associated with this project in 2009, issuing a Conditional Use Permit (CUP) for the project: Hay Ranch Water Extraction Project and CUP #2007-03 (Hay Ranch Project). The FEIR includes a Hydrologic Monitoring and Mitigation Plan (HMMP) which stipulates monitoring and mitigation requirements associated with the project. The primary objective of the HMMP is to protect the groundwater and surface water quality and availability in Rose Valley. In May 2009, Inyo County Water Department (ICWD) approved TEAM Engineering & Management, Inc. (TEAM) as the objective, third-party groundwater monitor with respect to the monitoring requirements stipulated in the HMMP.

## 2.1 BACKGROUND

The Rose Valley hydrologic system has been the subject of sporadic research since the early 1900s. Recent, more intensive study includes work by C. M. Bauer in 1996, and numerous studies from 2000 to the present related to the proposed Hay Ranch Project. COC has conducted groundwater monitoring since 2002 at a number of the monitoring wells specified in the HMMP. In addition to being used as an irrigation water supply well in the 1980s, the Hay Ranch South Well, the primary production well for the Hay Ranch Project, underwent two recent pump tests. In 2003, a 24-hour pump test was conducted, and groundwater elevation data was collected during this test. Then, from November to December 2007, a 14-day constant discharge aquifer test was conducted to evaluate potential impacts of the Hay Ranch Project. Groundwater elevation data was collected during this test both by data-logging pressure transducers and manual measurements taken with a depth-to-water (DTW) sounder in various Rose Valley wells.

As part of the California Environmental Quality Act (CEQA) process for the Hay Ranch Project, a Draft Environmental Impact Report (DEIR) and FEIR were produced from 2004 to 2009 with the creation of a numerical groundwater model for Rose Valley and a proposed HMMP for the project. The HMMP specifies which sites are to be included in the monitoring plan for the Hay Ranch Project, how often those sites will be monitored, the types of data to be collected, and the procedures for presenting the monitoring data to Inyo County.

The goal of the HMMP is to prevent potential off-site impacts of the Hay Ranch Project on groundwater and surface water users in Rose Valley. The HMMP is designed to monitor changes in groundwater levels throughout Rose Valley and compare the observed changes to groundwater-model predicted changes in order to predict and prevent potential impacts related to project pumping. The HMMP is broken into four phases: Phase 1 is Monitoring System Setup and Supplemental Data Collection; Phase 2 is Startup Monitoring and Reporting; Phase 3 is Model Recalibration and Redefinition of Pumping Rates and Durations; and Phase 4 is Ongoing Monitoring, Mitigation and Reporting.

In 2009, Phase 1 work was conducted by COC, TEAM and ICWD. On December 25, 2009 Phase 2 began with initiation of project pumping from the Hay Ranch South Well. In April 2010, work on Phase 3: Model Recalibration and Redefinition of Pumping Rates and Duration was initiated with ICWD retaining Daniel B. Stephens & Associates (DBS&A). Phase 3 work

included groundwater model recalibration based on Phase 1 data and also on Phase 2 data collected at project monitoring points from December 2009 through September 2010. In January 2011, DBS&A submitted its "Revised Groundwater Flow Model and Predictive Simulation Results, Coso Operating Company Hay Ranch Water Extraction Delivery System Conditional Use Permit (CUP 2007-003)." Based on results of the groundwater model recalibration, on April 1, 2011 ICWD issued an "Addendum to the HMMP for CUP#2007-003/Coso Operating Company, LLC" (2011 ICWD Addendum). This addendum set revised project pumping rates, durations, Trigger Levels and Maximum Acceptable Drawdowns for the Hay Ranch Project. With the 2011 ICWD Addendum, the project has entered Phase 4: Ongoing Monitoring, Mitigation and Reporting.

# 3.0 PHASE 1 MONITORING AND REPORTING

The purpose of the Phase 1 Monitoring and Reporting period was to install the hydrologic monitoring system in Rose Valley and collect background data to establish prevailing hydrologic conditions prior to any potential impacts caused by Phase 2 and Phase 4 project implementation. From May to December 2009, 30 monitoring points were completed in Rose Valley from the Enchanted Village area in the north to the Little Lake Gap area in the south (Figure 1). These monitoring points include 25 wells and five surface water measuring points. Data logging pressure transducers were installed in 18 wells and five surface water measuring points to record hourly changes in water levels.

During Phase 1, two clusters of monitoring wells were completed on the Hay Ranch Property near the Hay Ranch South Well (the Hay Ranch Cluster 1 and 2 Wells). An additional monitoring well was completed north of the Red Hill Cinder Cone. Surface flow measuring devices (flumes) were installed at Davis Ranch and Little Lake Ranch. The Stilling Well was installed in the north end of Little Lake to measure lake level (stage).

Access agreements were finalized between COC and Rose Valley land owners to collect hydrologic data at numerous points in Rose Valley. Security systems were installed at Rose Valley monitoring points where necessary. Monitoring points were surveyed for northing, easting and elevation data.

Also during Phase 1, monthly field events were conducted to collect DTW and surface flow data from Rose Valley monitoring points. Background hydrologic data was collected from May to December 2009, and a data processing and transfer system was established between TEAM and ICWD. Monthly data packages, update letters and groundwater and surface flow hydrographs were produced. At least six months of groundwater elevation data was collected from wells specified by the HMMP to be used as “trigger wells” in the monitoring system.

## 3.1 ROSE VALLEY MONITORING POINTS

The hydrologic monitoring points throughout Rose Valley vary from active supply wells, to newly constructed monitoring wells, to inactive/former supply wells, to a hand-pumped campground well. Monitoring point locations range from the Enchanted Village area in the north to the Little Lake Hotel Well in the south, and from the Lego Well in the east to the Davis Ranch Wells in the west. Monitoring locations are on private and/or gated property as well as open, remote areas in Rose Valley. Some wells are locked in structures or behind gates, some have locked construction job boxes installed over the casings, and others have security installed on or around the well casing itself. Well owners include private individuals, the U.S. Navy, the Bureau of Land Management (BLM), the Los Angeles Department of Water and Power (LADWP), and Coso Operating Company. A summary table is included in this report (Table 1) which standardizes the names of the Rose Valley monitoring points and provides a reference to the names used in the HMMP for each monitoring point.

Important features of Rose Valley Monitoring Wells are as follows:

The Hay Ranch Cluster Wells feature shallow (1A and 2A), intermediate (1C and 2C) and deep (1B and 2B) screened intervals at each location to provide enhanced groundwater and upper aquifer data. These cluster wells provide data on groundwater drawdown on the Hay Ranch property itself. With their specific screened intervals, each cluster grouping also has the potential

to provide additional information on groundwater drawdown at specific depths. This data can be assessed to deduce upper aquifer parameters such as hydraulic conductivity and specific yield.

The Enchanted Village and Dunmovin Wells are active domestic supply wells. The Coso Junction Store #1 Well is located 20 yards north of an active business supply well: Coso Junction Store #2 Well. The Fossil Falls Well is a hand-operated well that supplies water for campers. At these locations, data collection procedures are in place to recognize and minimize the effects of in-well pumping. However, DTW readings from these wells can potentially be affected by significant, recent pumping of these wells.

The Cal Pumice, Coso Junction Ranch, Lego, G-36, Red Hill, 18-28 and Cinder Road Wells are not actively pumped wells, and are currently used for groundwater elevation monitoring only.

### 3.2 PORTUGUESE BENCH MONITORING POINTS

On Portuguese Bench to the west of US 395, there are three monitoring points located at the Davis Ranch. Two of the monitoring points are supply wells for the property: Davis Ranch North and South Wells, respectively. A third monitoring point, Davis Ranch South Flow, captures outflow from the Davis Ranch South Well.

Davis Ranch North and South Wells are located just below ground surface and are artesian at the top of each well casing. Groundwater from these two wells flows into PVC supply pipes for use at Davis Ranch. At the Davis Ranch North Well, water from the PVC pipe flows downhill into a complicated, gravity-powered water-delivery system. Water from this North Well is used for consumption and irrigation. At the Davis Ranch South Well, water from the PVC pipe flows into a pond.

At the Davis Ranch North and South Wells, pressure transducers have been installed to record well head levels. A small change in head in these wells (e.g. hundredths of a foot) will result in increased or decreased flow.

Outflow from the North Well cannot be directly measured without interrupting the sensitive Davis Ranch water-delivery system. However, due to the simplicity of the water delivery system at the South Well, outflow can be directly measured without disruption. A flow metering system consisting of a trapezoidal flume and stilling well with a data-logging pressure transducer has been installed (Davis Ranch South Flow) in the PVC outflow pipe. Hourly flow measurements are being recorded by the Davis Ranch South Flow flume.

### 3.3 LITTLE LAKE RANCH MONITORING POINTS

The Little Lake Ranch (LLR) area of Rose Valley (Figure 2) extends northwards to the mouth of the Fossil Falls Canyon, east along the volcanic scarp, west to US 395 with some property on the west side of the highway, and south through Little Lake Gap into the lower Little Lake area. As currently understood, Little Lake is fed by groundwater springs; there is no surface water flow into the lake. The surface elevation of Little Lake is controlled by a pair of weirs located in the lake's southwest corner. From these weirs a system of trenches moves surface water from Little Lake south to Pond 1 and Pond 2. Surface water exiting the Little Lake Weirs flows southeast via a trench system toward Pond 1. Coso Springs, located to the northeast of Pond 1, provides surface water to Pond 1. The Siphon Well, located between the Little Lake Weirs and Pond 1, is a siphon well which provides additional surface flow via an outlet pipe to Pond 2. Trenches

connect surface flow between Little Lake Weir, Coso Springs, Pond 1 and Pond 2. These trenches ultimately converge, and all surface water exiting the property flows through the North Culvert, located south of Pond 2, and through the Little Lake Gap area where it can be diverted by LLR staff to various ponds and irrigation trenches in the lower Little Lake area for growth of avian forage.

At the northeast end of the property is the LLR North Well. The LLR North Well is approximately 0.75 miles north of Little Lake and has no pumping infrastructure installed. Located to the southwest of LLR North Well is the LLR 395 Well. This is the primary groundwater supply well for the property. To the southeast is the LLR Ranch House Well. This is a reserve groundwater supply well that is also pumped for irrigation purposes. The LLR Dock Well is located approximately 100 feet northwest of Little Lake itself north of the Boat House, and has a gasoline-engine powered pumping system in place that is rarely pumped. The LLR Stilling Well is located southeast of the Boat House in the north end of Little Lake, and measures the water level (stage) of the lake.

The Little Lake surface level can be manually controlled by two weirs located at the southwest corner of the lake. These concrete weirs have a slat system in place and a pair of three-inch diameter holes which can be plugged to retain water, or opened to release water. Surface water flowing from the Little Lake weir trench system flows through the LLR Lake Outflow flume and then is diverted into the northwest corner of Pond 1. Water from Coso Springs flows through the LLR Coso Springs Flow flume and then enters the northeast corner of Pond 1. Water leaves Pond 1 at a concrete weir in the southwest corner, and the pond's surface level can be controlled by a slat system at this weir. Water from Pond 1 flows by trench to the northwest corner of Pond 2. The LLR Siphon Well draws groundwater to the surface via a siphon pipe that discharges into Pond 2. Pond 2 has a concrete weir in the west corner and the pond's surface level can be controlled by a slat system. Water flows from Pond 2 into a trench system that runs south through the LLR North Culvert Flow flume. LLR North Culvert Flow captures surface flow from Little Lake, Coso Springs, Ponds 1 and 2, and the Siphon Well.

The LLR Hotel Well is located west of US 395 and south of Little Lake. It is a seasonally artesian well, which is not directly connected to the LLR surface water transport system.

The LLR surface water system is managed by LLR staff to place water in parts of the property as needed for wildlife and vegetation management.

A typical water management practice by LLR staff can have the following effects, for example:

In order to supply water to the lower Little Lake area, boards may be removed from the weirs at Little Lake, Pond 1 and Pond 2. Water will flow from Little Lake to the south. The resulting surface water level decline in Little Lake can be measured at the LLR Stilling Well. The LLR Lake Outflow flume will register an increase in flow. Outflow from Little Lake, Pond 1 and Pond 2, will register as increased flow at LLR North Culvert Flow. When the boards are replaced at Little Lake, at Pond 1 and at Pond 2, lake and pond levels will slowly rise. Flows will decrease at LLR Lake Outflow and LLR North Culvert Flow. Throughout this water movement event, flow from Coso Springs and the Siphon Well (if actively producing groundwater) will continue to supply water to the Ponds and, once the water levels in the Ponds have recovered, flow through North Culvert Flow.

In addition to active water management by LLR staff, wind and weather events can cause wave action that produces flow over the Little Lake Weirs. Also, if groundwater flow into Little Lake exceeds losses due to percolation and evapotranspiration, Little Lake surface level will rise, causing overflow at the lake weirs.

A spike in the LLR Lake Outflow hydrograph is typically indicative of water movement (removal of boards at the Little Lake Weirs) by LLR staff. After a time lag, increased outflow from Little Lake will also cause a spike in the LLR North Culvert Flow. A spike in the LLR North Culvert may also be caused by removal of boards at Pond 1 or 2; when only Pond boards are removed, the LLR Lake Outflow flume will not record increased flow, but the LLR North Culvert Flow will record a flow spike. Wind or weather events will cause a less dramatic increase in Lake Outflow and North Culvert Flow readings.

## 3.4 SUPPLEMENTAL DATA COLLECTION

In addition to setting up the monitoring system and conducting monthly DTW and surface flow measurements, supplemental data was collected during the Phase 1 period.

In September 2009, a field event was conducted to evaluate groundwater levels beneath Little Lake. Temporary drive-point piezometers were installed and then removed at four locations around Little Lake to depths of four or more feet beneath the lake bottom. At all four locations, the measurements indicated a downward hydraulic gradient from Little Lake to groundwater beneath Little Lake.

A bathymetric survey was conducted in August 2009 at 21 points across Little Lake. Depth to bottom was measured and location was recorded using a hand held GPS unit. The maximum depth measured was 4.8 feet in the central section of the lake, with average depths between 3.0-4.5 feet throughout most of the lake. The lake level was approximately one foot below the top of the east weir when this bathymetry survey was conducted.

In October and December of 2009, groundwater samples were collected from three wells: Hay Ranch South, Coso Junction Store #2, and LLR North wells. These groundwater samples were lab-analyzed for Total Dissolved Solids (TDS) to establish background water quality conditions. During sample collection, a hand-held field instrument recorded specific conductivity and computed TDS data. In addition to groundwater sample collection, pressure transducers in the Hay Ranch Cluster (1A-1C and 2A-2C), Red Hill, LLR North, LLR Dock and LLR Stilling wells recorded specific conductivity and computed TDS values hourly.

Data gaps regarding various details of monitoring points were closed where possible. In active supply wells which also serve as monitoring wells, total depth and pump depths were collected from owners. Precipitation gauges were identified in Rose Valley and in the Sierra to the north and southwest of Rose Valley to provide additional information for future groundwater modeling.

## 3.5 BASELINE GROUNDWATER LEVELS

At the conclusion of Phase 1, data from 2002 through 2009 was used to establish preliminary baseline groundwater elevations (GWEs). Steve Brooks, Professional Geologist and Principal Hydrogeologist/Senior Project Manager of Schlumberger Water Services, conducted a Rose Valley Baseline Water Level Analysis. ICWD accepted these preliminary baseline levels in January, 2010, and the baseline GWEs are summarized in Table 3.

## 4.0 PHASE 4 ONGOING MONITORING, MITIGATION AND REPORTING

With the Phase 2 initiation of Hay Ranch South Production Well groundwater pumping by COC on December 25, 2009 and with the completion of the Phase 3 Groundwater Model Recalibration in April 2011, the Hay Ranch Project has entered into the Phase 4 Ongoing Monitoring, Mitigation and Reporting period as outlined in the HMMP. The objective of Phase 4 is to document the ongoing response of the Rose Valley aquifer to pumping at the Hay Ranch and to monitor later-stage groundwater and potential Little Lake level changes as pumping continues. Monthly groundwater and surface water data continues to be collected from the 30 monitoring points in Rose Valley.

### 4.1 MONITORING AND REPORTING

During Third Quarter 2011, monthly data collection occurred at the 30 monitoring points in Rose Valley. In addition, quarterly groundwater samples were collected in September from three wells in Rose Valley to gather TDS data.

As part of Phase 3 Groundwater Model Recalibration, GWE drawdown Trigger Levels have been established for certain Rose Valley monitoring wells. Table 2 of the 2011 ICWD Addendum for the Hay Ranch Project establishes the Trigger Level drawdown amounts compared to pre-pumping baseline GWEs for specific monitoring wells. Trigger Levels have been set based on an annual groundwater extraction amount of 4,839 acre-feet per year (APY).

Based on data collected by TEAM during the third quarter 2011 monitoring events, the Trigger Level for the Little Lake Ranch (LLR) North Well (RV180) has been exceeded in August and September. The baseline groundwater elevation (GWE) for LLR North, set by Inyo County Water Department in January 2010, is 3158.88 feet. The Trigger Level for LLR North is 0.00 feet. The GWE at LLR North as measured at 11:30 on August 25 was 3158.87 feet and as measured at 10:52 on September 22 was 3158.83 feet. The LLR North GWE exceeded its Trigger Level by 0.01 in August and 0.05 feet in September compared to its baseline (Table 3). On September 22, the LLR North GWE was 1.25 feet above its Maximum Acceptable Drawdown level. In both instances, ICWD was notified of this Trigger Level exceedance in a timely manner.

No other wells exceeded their Trigger Levels in the third quarter; and no Maximum Acceptable Drawdowns were exceeded at Hay Ranch Project monitoring wells which have baseline and Trigger Levels established. Table 3 of this report compares September 2011 GWEs with pre-pumping baseline GWEs and 2011 ICWD Addendum Trigger Levels and Maximum Acceptable Drawdowns Levels for Hay Ranch Project monitoring points.

Hydrographs from the Third Quarter 2011 monthly field events were submitted to ICWD. These monthly hydrographs featuring the full suite of Rose Valley monitoring points were uploaded to the ICWD website: www.inyowater.org. These hydrographs along with monthly letter reports can be viewed on-line at www.inyowater.org/coso/default.htm. The September 2011 monthly hydrographs are included in this report as Appendix A.

Monthly reads from the Hay Ranch North and South Production Well totalizers documenting groundwater extraction amounts are included in this report as Table 2. The combined groundwater extraction amounts from these two production wells represent the total groundwater extracted by the Hay Ranch Project.

Hydrographs which present various Rose Valley monitoring points comparing GWEs to Hay Ranch Project pumping amounts over time are included in this report as Figures 3 through 10. Groundwater elevations, in feet above mean sea level, are listed on the left axis. Hay Ranch Project average daily pumping amounts, in acre feet per day, are listed on the right axis in inverse order. In these figures, Rose Valley monitoring points have been grouped along similar GWE contours.

A hydrograph which compares groundwater and surface water elevations in the Little Lake area to Hay Ranch Project pumping amounts over time is included in this report as Figure 11. Groundwater and surface water elevations at the LLR Dock, LRR Stilling Well (lake surface level) and LLR Hotel Well are listed, in feet above mean sea level, on the left axis. Hay Ranch Project average daily pumping amounts, in acre feet per day, are listed on the right axis in inverse order.

A hydrograph which compares groundwater and surface water elevations in the immediate vicinity of Little Lake to LLR Lake Outflow amounts over time is included in this report as Figure 12. Groundwater and surface water elevations at the LLR Dock and LLR Stilling Well (Little Lake surface level) are listed, in feet above mean sea level, on the left axis. Surface water outflow from Little Lake, captured by the LLR Lake Outflow flume in cubic feet per second, is listed on the right axis in inverse order.

A hydrograph which compares surface water flows in the Little Lake Ranch area to Hay Ranch Project pumping rates over time is also included in this report as Figure 13. Surface water flows from Lake Outflow, Coso Springs Flow and North Culvert Flow are listed on the left axis, in cubic feet per second. Hay Ranch Project average daily pumping amounts, in acre feet per day, are listed on the right axis in inverse order. As noted in Section 3.3, surface flow captured by the North Culvert Flow flume represents an accumulation of surface flows from Little Lake, Coso Springs and the Siphon Well flow.

Groundwater quality graphs are presented in Figures 14 through 16, comparing TDS levels in Rose Valley monitoring wells with Hay Ranch Project pumping amounts over time. This data is being collected by the in-well, data-logging transducers. The transducers are converting hourly specific conductivity measurements to computed TDS values. TDS values, in parts per million (equivalent to mg/L) are listed on the left axis. Hay Ranch Project average daily pumping rates are listed on the right axis, in average acre feet per day.

A hydrograph which compares the actual amount of groundwater pumped from the Hay Ranch Project in acre feet (AF) with a hypothetical pumping amount is included in this report as Figure 17. The total amount of groundwater extracted from the Hay Ranch property from December 25, 2009 to September 22, 2011 was approximately 5872 AF. The hypothetical pumping amount in Figure 17 assumes a pumping rate of approximately 3,000 AFY for December 25, 2009 through December 31, 2010 and assumes a rate of approximately 4,839 AFY from January 1, 2011 through December 31, 2011. These hypothetical pumping rates represent the maximum allowable pumping amounts for the 2010 and 2011 periods.

Tabular data, in digital format, of groundwater elevations and flow amounts from Rose Valley monitoring points can be obtained by contacting ICWD in writing at PO Box 337, 135 South Jackson St., Independence, CA, 93526 or by phone at (760) 878-0001.

## 4.2 GROUNDWATER QUALITY

On September 22, 2011 groundwater samples were collected from the Hay Ranch South, Coso Junction Store #2, and Little Lake Ranch North Well as part of the quarterly monitoring activities specified in the HMMP. These groundwater samples were analyzed for TDS by TestAmerica, Inc. a California-Certified Analytical Laboratory. Prior to sample collection, groundwater was purged from each well until groundwater physical parameters stabilized, as monitored by a Horiba U52 MPS hand-held unit.

At the Hay Ranch South Well (HRS), approximately 8,000 gallons of groundwater were purged from the well preceding sample collection. The groundwater sample, HRS, was collected from the Hay Ranch South production outflow pipe at 10:20 hours. The laboratory analytical result from HR Production was TDS 750 mg/L. The physical parameters of the groundwater from HRS outflow pipe immediately prior to sampling (10:19 hours) were as follows: temperature 22.6 C; specific conductivity 1,190 µS/cm; TDS 762 mg/L.

At the Coso Junction Store #2 Well (CJS), the groundwater sample, CJS, was collected from the groundwater holding tank located 20 yards north of this active supply well. Water was purged from the holding tank's sample port until groundwater physical parameters stabilized; approximately 20 gallons of water was purged. The CJS groundwater sample was collected from the holding tank's sample port at 13:55 hours. The laboratory analytical result from CJS was TDS 440 mg/L. The physical parameters of the groundwater from CJS holding tank immediately after sampling (13:54 hours) were as follows: temperature 22.6 C; specific conductivity 708 µS/cm; TDS 454 mg/L.

At the Little Lake Ranch North Well (LLR North), approximately 20 gallons of groundwater were purged from the well preceding sample collection. The groundwater sample, LLR North, was collected 11:23 hours. The laboratory analytical result from LLR North was TDS 570 mg/L. The physical parameters of the groundwater from LLR North immediately prior to sampling (11:22 hours) were as follows: temperature 23.0° C; specific conductivity 939 µS/cm; TDS 601 mg/L.

At the three wells, the TDS values from the September 22, 2011 groundwater sampling event were below "Threshold Requiring Action" values as specified in Table 3-2 of the HMMP (1,500 mg/L for Coso Junction Store #2 and Little Lake Ranch North, and 2,000 mg/L for Hay Ranch South Well).

## 4.3 DATA COLLECTION AND PROCESSING

A protocol for measuring and sampling the Rose Valley monitoring sites has been defined and instituted by TEAM with the oversight of ICWD. Transducer hanging points, flow and DTW measuring points have been marked, surveyed and standardized (where feasible). Groundwater levels are measured by lowering a sounding probe into a well and obtaining two successive readings that agree to within 0.01 feet. These measurements are referenced to a mark at the top of the casing. The results of the measurements are then recorded on field sheets.

Field sheets are copied and archived at TEAM. Data from these sheets is input into the project database program "Coso.dbf" and checked against the field sheets. Data from the Coso database is then graphed in flow and groundwater hydrographs. TEAM performs internal quality control and quality assurance checks on this data and then transmits the draft hydrographs to ICWD. After review and/or discussion with ICWD, the draft hydrographs are finalized and uploaded to the ICWD server for public posting on www.inyowater.org.

## 4.4 OPERATIONAL NOTES

During Third Quarter 2011, the following operational issues were noteworthy:

At Davis Ranch South Well, the in-well pressure transducer experienced significant upward pressure drift during the second quarter that was not confirmed by manual measurements. Therefore, the Davis Ranch South Well pressure transducer was replaced with a new unit on August 24, 2011. Also, the Davis Ranch South Flume experienced upward pressure drift due to root growth in the flume during June/July and August/September; the flume was cleaned during all three monthly monitoring events.

At Red Hill Well, the pressure transducer experienced power instability and was removed from the well on June 17, 2011. The unit was replaced in July 20, 2011. At the Hay Ranch Cluster 2B and 2C wells, the pressure transducers experienced power instability and were removed from the two wells on July 20, 2011. These two units were replaced with new units on September 9, 2011.

## 4.5 ADDITIONAL OBSERVATIONS

During the Third Quarter 2011, Little Lake Ranch (LLR) staff conducted seasonal water management on the LLR property which included the summer "lake level holding" pattern where water is generally not released from the lake.

In addition, two other instances of LLR water management were note worthy:

- For parts of the third quarter, the Dock Well was actively pumped. Temporary groundwater level drawdowns were captured by the in-well pressure transducer at the Dock Well.

- At the ponds, LLR staff conducted water management varying flows through the North Culvert during the third quarter.

## 5.0 GENERAL CONDITIONS

Geology, hydrogeology and geochemistry are inexact sciences, and investigative data commonly contain uncertainties. The behavior of groundwater can be complex. Our judgments and conclusions are based upon the analytical data obtained from groundwater measurements collected by TEAM, data supplied to TEAM by COC, Inyo County and other sources, as well as our experience on similar projects. Services performed for this project by TEAM Engineering & Management, Inc. are in accordance with professional standards for groundwater and hydrologic assessment investigations; no guarantees are either expressed or implied.

# TABLES

# TABLE 1
## HAY RANCH PROJECT MONITORING POINT SUMMARY

| Well ID | Well Name | Hay Ranch Project FEIR HMMP reference names from HMMP Tables 3-1 and 3-2 | Monitoring Role | Current Well Use | Transducer Installed | Data Logging Frequency |
|---|---|---|---|---|---|---|
| RV-10 | Enchanted Village | Wells located west of Haiwee Reservoir | Observation | Active Supply | No | NA |
| RV-20 | LADWP V816 | Same | Observation | Inactive | No | NA |
| RV-30 | Cal Pumice | Pumice Mine Well | Observation[1] | Inactive | Yes | Hourly |
| RV-40 | Dunmovin | Same or Dunmovin Area well | Trigger | Active Supply | No | NA |
| RV-50 | Hay Ranch North | Same | Production/GWQ | Production | Flow Meter | NA |
| RV-60 | HR 1A | Six New Hay Ranch Observation wells | Observation | Inactive | Yes | Hourly |
| RV-61 | HR 1B | Six New Hay Ranch Observation wells | Observation | Inactive | Yes | Hourly |
| RV-62 | HR 1C | Six New Hay Ranch Observation wells | Observation | Inactive | Yes | Hourly |
| RV-70 | Hay Ranch South | Same | Production/GWQ | Production | Flow Meter | NA |
| RV-80 | HR 2A | Six New Hay Ranch Observation wells | Trigger[2] | Inactive | Yes | Hourly |
| RV-81 | HR 2B | Six New Hay Ranch Observation wells | Observation | Inactive | Yes | Hourly |
| RV-82 | HR 2C | Six New Hay Ranch Observation wells | Observation | Inactive | Yes | Hourly |
| RV-90 | Coso Jct Ranch | Coso Ranch North | Trigger | Inactive | Yes | Hourly |
| RV-100 | Coso Jct Store #1 | Coso Junction #1 | Trigger/GWQ (#2) | Inactive/Active Supply[3] | Yes | Hourly |
| RV-110 | Davis Ranch North | Not Mentioned | Observation | Artesian | Yes | Hourly |
| RV-111 | Davis Ranch South | Not Mentioned | Observation | Artesian | Yes | Hourly |
| RV-112 | Davis Ranch South Flow | Not Mentioned | Observation | Flume | Yes | Hourly |
| RV-120 | Red Hill (BLM) | New well to be located between Coso Jnc and Cinder Road Red Hill | Trigger[2] | Inactive | Yes | Hourly |
| RV-130 | Well G36 | Well G-36 or Navy G-36 Well | Trigger | Inactive | No | NA |
| RV-140 | Lego | Same or Navy Lego Well | Trigger | Inactive | Yes | Hourly |
| RV-150 | Cinder Road | Cinder Road, Red Hill | Trigger | Inactive | Yes | Hourly |
| RV-160 | Well 18-28 GTH | Well 18-28 or Navy 18-28 Well | Trigger | Inactive | Yes | Hourly |
| RV-170 | Fossil Falls Campground | Same | Observation | Active Supply | No | NA |
| RV-180 | LLR North | Little Lake Ranch North Well | Trigger/GWQ | Inactive | Yes | Hourly |
| RV-190 | LLR 395 | Little Lake Major Operational Changes | Observation | Active Supply | No | NA |
| RV-200 | LLR Ranch | Little Lake Major Operational Changes | Observation | Active Supply | No | NA |
| RV-210 | LLR Dock | Little Lake North Dock Well | Observation | Inactive | Yes | Hourly |
| RV-220 | LLR Lake Stilling | Little Lake | Observation | Actively Managed | Yes | Hourly |
| RV-230 | LLR Lake Outflow | Little Lake Weir | Observation | Actively Managed Flume | Yes | Hourly |
| RV-240 | LLR Coso Springs | Coso Springs | Observation | Flume | Yes | Hourly |
| RV-245 | LLR North Culvert | Little Lake North Culvert Weir | Observation | Actively Managed Flume | Yes | Hourly |
| RV-250 | LLR Siphon | Pond P1 Siphon Well[4] | Observation | Active Siphon | No | NA |
| RV-260 | LLR Hotel | Little Lake Hotel Well | Observation | Inactive | Yes[5] | Hourly |

GWQ- Groundwater Quality monitoring well

1: Due to an anomalous drop in groundwater elevation in December 2009 before Hay Ranch Project pumping started, Cal Pumice Well was removed from project Trigger use by ICWD on April 1, 2011.

2: Trigger Levels for RV-80 and RV-120 were not set in HMMP Table 3-1. However, preliminary baseline levels were set, and Trigger levels were set in ICWD's April 1, 2011 Addendum.

3: RV-100 Coso Jct Store #1 Well is an inactive well located approximately 20 yards north of Coso Jct Store #2 well which is an active supply well where groundwater quality is being recorded.

4: RV-250 LLR Siphon Well supplies water directly to LLR Pond 2, not LLR Pond 1 as erroneously stated in the HMMP.

5: RV-260 LLR Hotel Well is a seasonally artesian well. Hourly pressure transducer reads are occurring during periods of non-artesian groundwater elevations.

# TABLE 2

HAY RANCH PROJECT GROUNDWATER PUMPING TO DATE

September 2011

| Hay Ranch North and South Well Groundwater Extraction Amounts | | | |
|---|---|---|---|
| Time period | Groundwater Production Well | Groundwater Extracted (Gallons) | (Acre Feet) |
| Date: 12/25/09 to 9/22/11 | Hay Ranch South Well Project Totals: | 1,308,309,761 | 4015 |
| Date: 8/25/11 to 9/22/11 | Hay Ranch South Well Recent Period: | 45,791,811 | 141 |
| | | | |
| Date: 12/25/09 to 9/22/11 | Hay Ranch North Well Project Totals: | 604,978,281 | 1857 |
| Date: 8/25/11 to 9/22/11 | Hay Ranch North Well Recent Period: | 41,468,234 | 127 |

**Total Groundwater Extraction Amounts at Hay Ranch Property (Combined Totals of Hay Ranch North and South Wells)**

| Date Numeric | Date Short | Total Days Elapsed | Total Gallons Pumped Since 12/25/2009 | Total Acre Feet Pumped Since 12/25/2009 | Days in Period | Total Gallons Pumped for period | Acre Feet Pumped for period | Average Daily Acre Feet Pumped for period |
|---|---|---|---|---|---|---|---|---|
| 40172 | 12/25/09 | 0 | - | 0.0 | 0.0 | 0 | 0.0 | 0.0 |
| 40175 | 12/28/09 | 3.5 | 2,902,000 | 8.9 | 3.5 | 2,902,000 | 8.9 | 2.5 |
| 40182 | 1/4/10 | 10.5 | 9,469,000 | 29.1 | 7.0 | 6,567,000 | 20.2 | 2.9 |
| 40189 | 1/11/10 | 17.5 | 18,101,000 | 55.5 | 7.0 | 8,632,000 | 26.5 | 3.8 |
| 40196 | 1/18/10 | 24.5 | 24,009,000 | 73.7 | 7.0 | 5,908,000 | 18.1 | 2.6 |
| 40199 | 1/21/10 | 27.5 | 28,463,000 | 87.3 | 3.0 | 4,454,000 | 13.7 | 4.6 |
| 40203 | 1/25/10 | 31.5 | 33,589,000 | 103.1 | 4.0 | 5,126,000 | 15.7 | 3.9 |
| 40210 | 2/1/10 | 38.5 | 40,633,000 | 124.7 | 7.0 | 7,044,000 | 21.6 | 3.1 |
| 40217 | 2/8/10 | 45.5 | 46,049,000 | 141.3 | 7.0 | 5,416,000 | 16.6 | 2.4 |
| 40224 | 2/15/10 | 52.5 | 55,035,000 | 168.9 | 7.0 | 8,986,000 | 27.6 | 3.9 |
| 40227 | 2/18/10 | 55.5 | 59,004,000 | 181.1 | 3.0 | 3,969,000 | 12.2 | 4.1 |
| 40231 | 2/22/10 | 59.5 | 67,248,000 | 206.4 | 4.0 | 8,244,000 | 25.3 | 6.3 |
| 40238 | 3/1/10 | 66.5 | 81,177,000 | 249.1 | 7.0 | 13,929,000 | 42.7 | 6.1 |
| 40245 | 3/8/10 | 73.5 | 96,304,000 | 295.5 | 7.0 | 15,127,000 | 46.4 | 6.6 |
| 40252 | 3/15/10 | 80.5 | 114,238,000 | 350.6 | 7.0 | 17,934,000 | 55.0 | 7.9 |
| 40254 | 3/17/10 | 82.5 | 120,024,000 | 368.3 | 2.0 | 5,786,000 | 17.8 | 8.9 |
| 40259 | 3/22/10 | 87.5 | 132,704,000 | 407.3 | 5.0 | 12,680,000 | 38.9 | 7.8 |
| 40266 | 3/29/10 | 96.5 | 151,531,000 | 465.0 | 7.0 | 18,827,000 | 57.8 | 8.3 |
| 40281 | 4/13/10 | 109.5 | 190,826,000 | 585.6 | 15.0 | 39,295,000 | 120.6 | 8.0 |
| 40312 | 5/14/10 | 140.5 | 248,524,000 | 762.7 | 31.0 | 57,698,000 | 177.1 | 5.7 |
| 40347 | 6/18/10 | 175.5 | 325,519,000 | 999.0 | 35.0 | 76,995,000 | 236.3 | 6.8 |
| 40380 | 7/21/10 | 208.5 | 384,977,000 | 1181.5 | 33.0 | 59,458,000 | 182.5 | 5.5 |
| 40408 | 8/18/10 | 236.5 | 461,484,000 | 1416.2 | 28.0 | 76,507,000 | 234.8 | 8.4 |
| 40436 | 9/15/10 | 264.5 | 569,767,000 | 1748.6 | 28.0 | 108,283,000 | 332.3 | 11.9 |
| 40471 | 10/20/10 | 299.5 | 719,918,000 | 2209.3 | 35.0 | 150,151,000 | 460.8 | 13.2 |
| 40499 | 11/17/10 | 327.5 | 843,610,000 | 2588.9 | 28.0 | 123,692,000 | 379.6 | 13.6 |
| 40527 | 12/15/10 | 355.5 | 942,496,000 | 2892.4 | 28.0 | 98,886,000 | 303.5 | 10.8 |
| 40535 | 12/23/10 | 363.5 | 969,708,000 | 2975.9 | 8.0 | 27,212,000 | 83.5 | 10.4 |
| 40557 | 1/14/11 | 385.5 | 1,051,742,000 | 3227.7 | 22.0 | 82,034,000 | 251.8 | 11.4 |
| 40590 | 2/16/11 | 418.0 | 1,195,277,058 | 3668.2 | 33.0 | 143,535,058 | 440.5 | 13.3 |
| 40618 | 3/16/11 | 446.0 | 1,297,555,396 | 3982.1 | 28.0 | 102,278,338 | 313.9 | 11.2 |
| 40653 | 4/20/11 | 481.0 | 1,411,944,604 | 4333.1 | 35.0 | 114,389,208 | 351.0 | 10.0 |
| 40679 | 5/16/11 | 507.0 | 1,480,298,532 | 4542.9 | 26.0 | 68,353,928 | 209.8 | 8.1 |
| 40711 | 6/17/11 | 539.0 | 1,614,216,071 | 4953.8 | 32.0 | 133,917,539 | 411.0 | 12.8 |
| 40744 | 7/20/11 | 572.0 | 1,718,358,135 | 5273.4 | 33.0 | 104,142,064 | 319.6 | 9.7 |
| 40780 | 8/25/11 | 608.0 | 1,826,027,997 | 5603.9 | 36.0 | 107,669,862 | 330.4 | 9.2 |
| 40808 | 9/22/11 | 636.0 | 1,913,288,042 | 5871.7 | 28.0 | 87,260,045 | 267.8 | 9.6 |

# TABLE 3

HAY RANCH PROJECT GROUNDWATER BASELINES AND TRIGGER LEVELS

September 2011

| Well ID | Monitoring Point | Baseline GWE[1] (feet amsl) | Recent Date of Measurement | Recent GWE (feet amsl) | Recent GWE Compared to Baseline (feet) | Recent GWE Above Max DD[2] (feet) | Trigger Level At Cessation of Pumping[3] (feet) | Recent GWE Compared to Trigger Level (feet) |
|---|---|---|---|---|---|---|---|---|
| RV-40 | Dunmovin | 3252.73 | 09/21/11 | 3246.77 | -5.96 | 17.34 | 23.2 | 17.24 |
| RV-80 | HR 2A | 3240.92 | 09/21/11 | 3232.00 | -8.92 | 18.68 | 27.6 | 18.68 |
| RV-90 | Coso Jct Ranch | 3230.65 | 09/21/11 | 3230.73 | 0.08 | 11.78 | 11.3 | 11.38 |
| RV-100 | Coso Jct Store #1 | 3227.59 | 09/21/11 | 3226.67 | -0.92 | 9.18 | 9.5 | 8.58 |
| RV-120 | Red Hill Well | 3200.66 | 09/21/11 | 3200.93 | 0.27 | 4.17 | 1.8 | 2.07 |
| RV-130 | G-36 | 3198.35 | 09/21/11 | 3199.82 | 1.47 | 4.87 | 1.0 | 2.47 |
| RV-140 | Lego | 3199.21 | 09/21/11 | 3200.65 | 1.44 | 3.74 | 0.0 | 1.44 |
| RV-150 | Cinder Road | 3186.92 | 09/21/11 | 3187.04 | 0.12 | 2.42 | 0.2 | 0.32 |
| RV-160 | 18-28 GTH | 3187.67 | 09/21/11 | 3188.68 | 1.01 | 3.11 | 0.0 | 1.01 |
| RV-180 | LLR North Well | 3158.88 | 09/22/11 | 3158.83 | -0.05 | 1.25 | 0.0 | -0.05 |

1) GWE: Groundwater elevation measured in feet above mean sea level. Baseline GWEs set January 2010 and March 2011 and approved by Inyo County Water Department

2) Max DD: Maximum Acceptable Drawdown from Table 2 of "Addendum to HMMP for CUP#2007-003/Coso Operating Company, LLC"

3) Trigger Level at Cessation of Pumping from Table 2 of "Addendum to HMMP for CUP#2007-003/Coso Operating Company, LLC"

# FIGURES

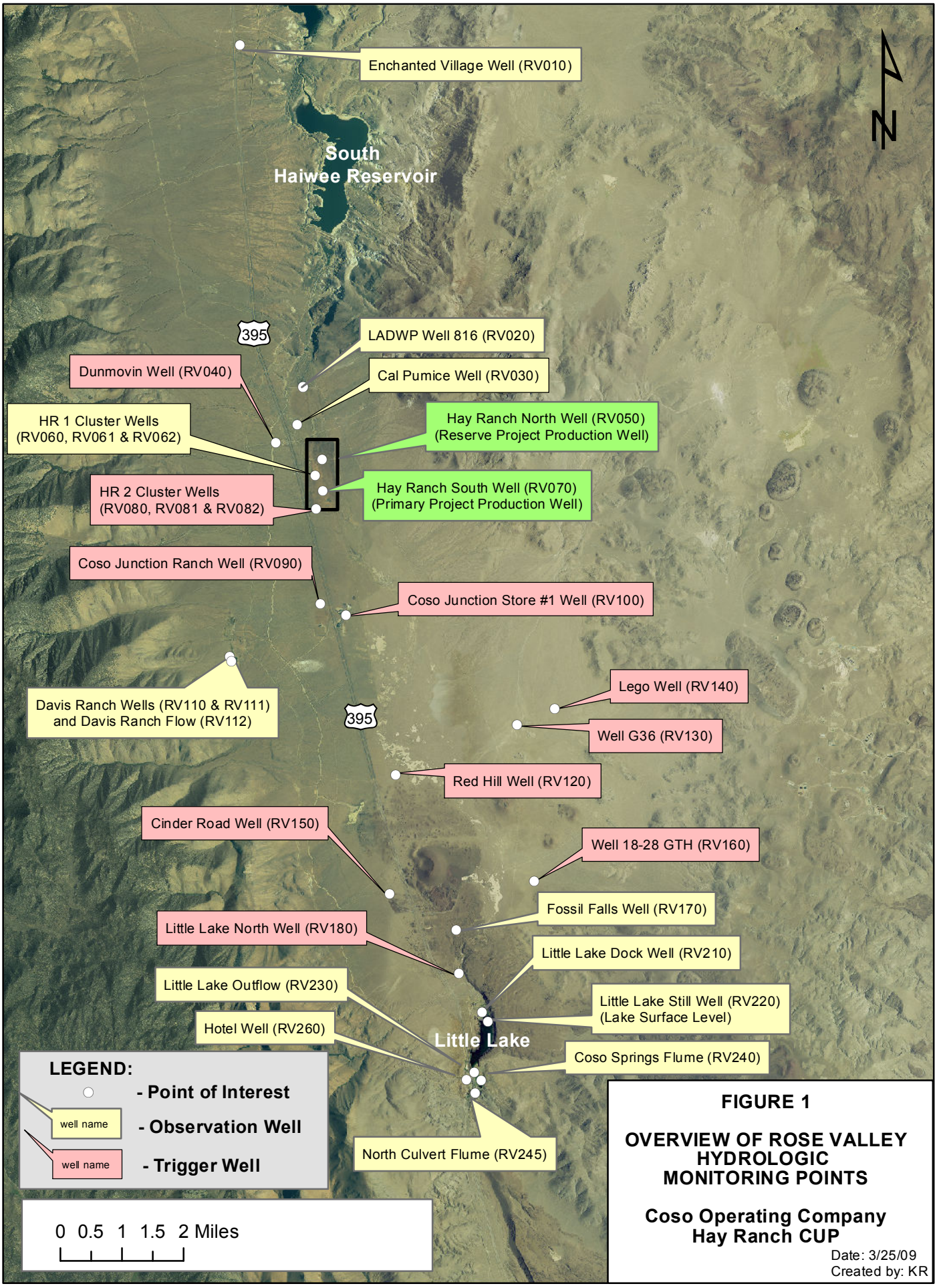


**FIGURE 1**

**OVERVIEW OF ROSE VALLEY HYDROLOGIC MONITORING POINTS**

**Coso Operating Company**
**Hay Ranch CUP**

Date: 3/25/09
Created by: KR

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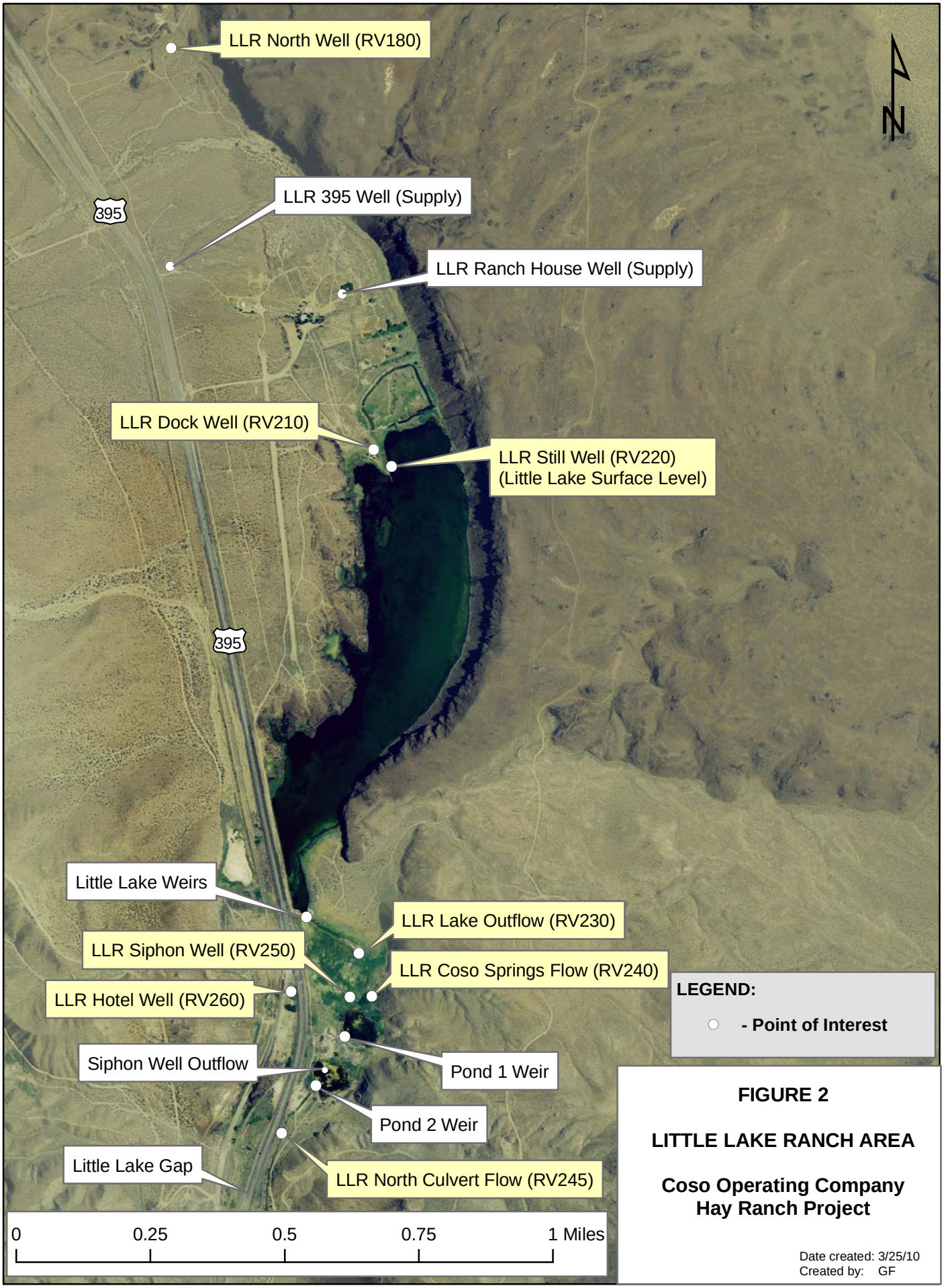


**FIGURE 2**

**LITTLE LAKE RANCH AREA**

**Coso Operating Company**
**Hay Ranch Project**

Date created: 3/25/10
Created by: GF

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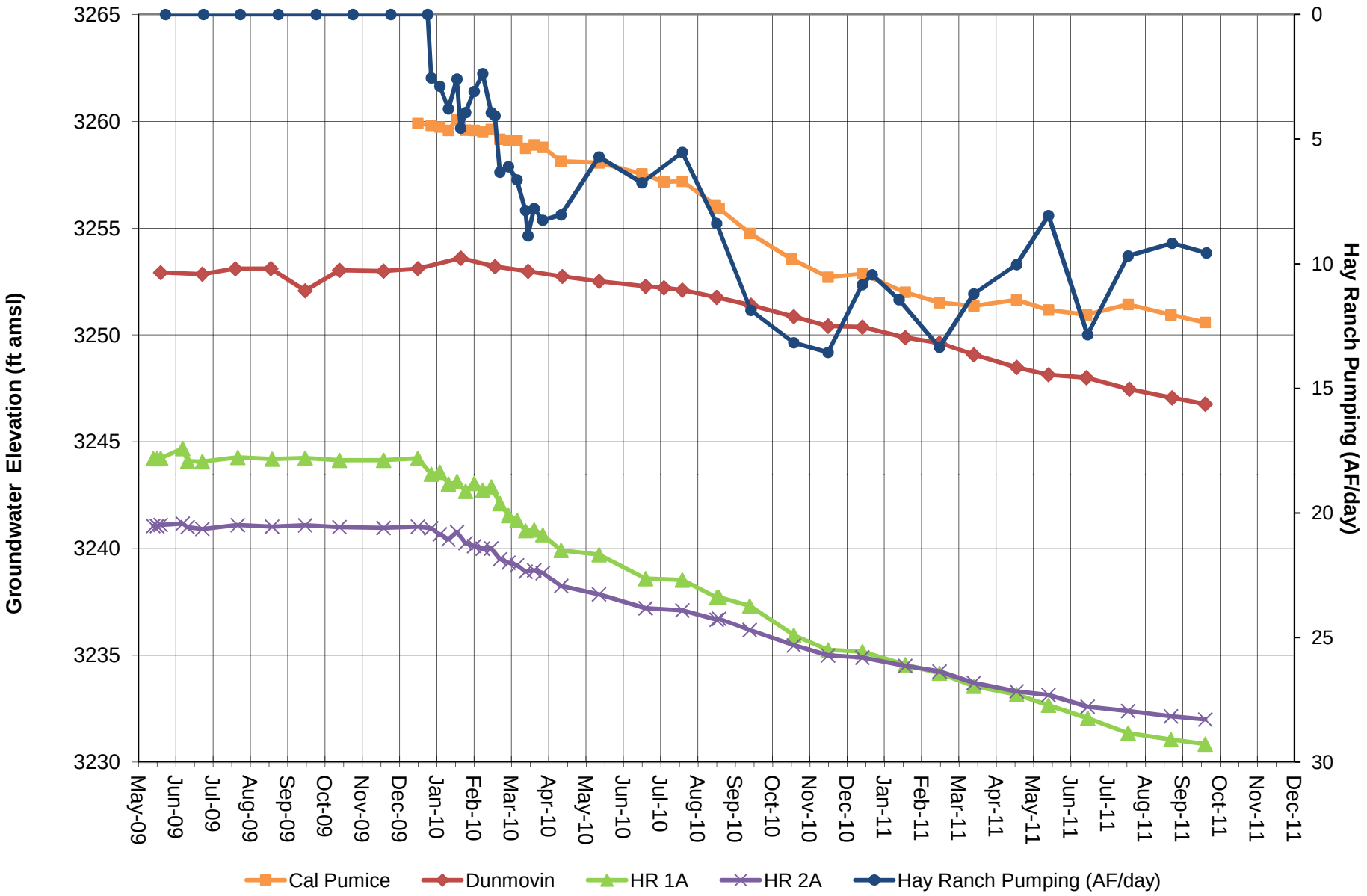
**FIGURE 3**

GROUNDWATER ELEVATION and HAY RANCH PUMPING
Cal Pumice, Dunmovin, HR 1A and HR 2A




Note: Groundwater elevation data based on manual depth-to-water measurements.
Hay Ranch pumping is average acre feet per day.
Coso Operating initiated Hay Ranch Project pumping on 12/25/09.

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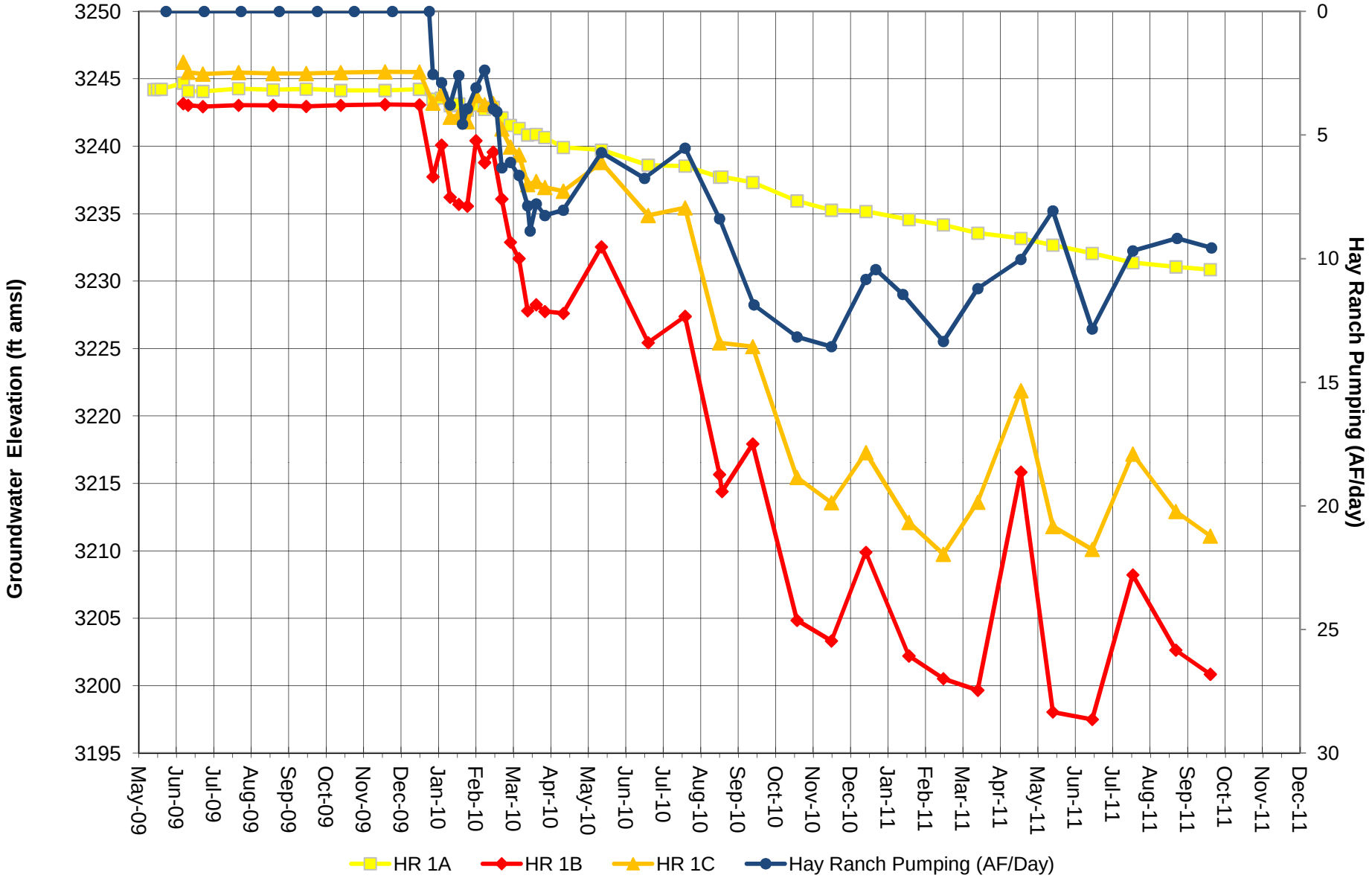
**FIGURE 4**

GROUNDWATER ELEVATION and HAY RANCH PUMPING
HR 1A, HR 1B and HR 1C




Note: GWE data based on manual DTW measurements. Hay Ranch pumping is average acre feet per day.
Screened intervals: HR 1A 170-260 feet; HR 1B 490-540 feet; HR 1C 340-405 feet.
Coso Operating initiated Hay Ranch Project pumping on 12/25/09.

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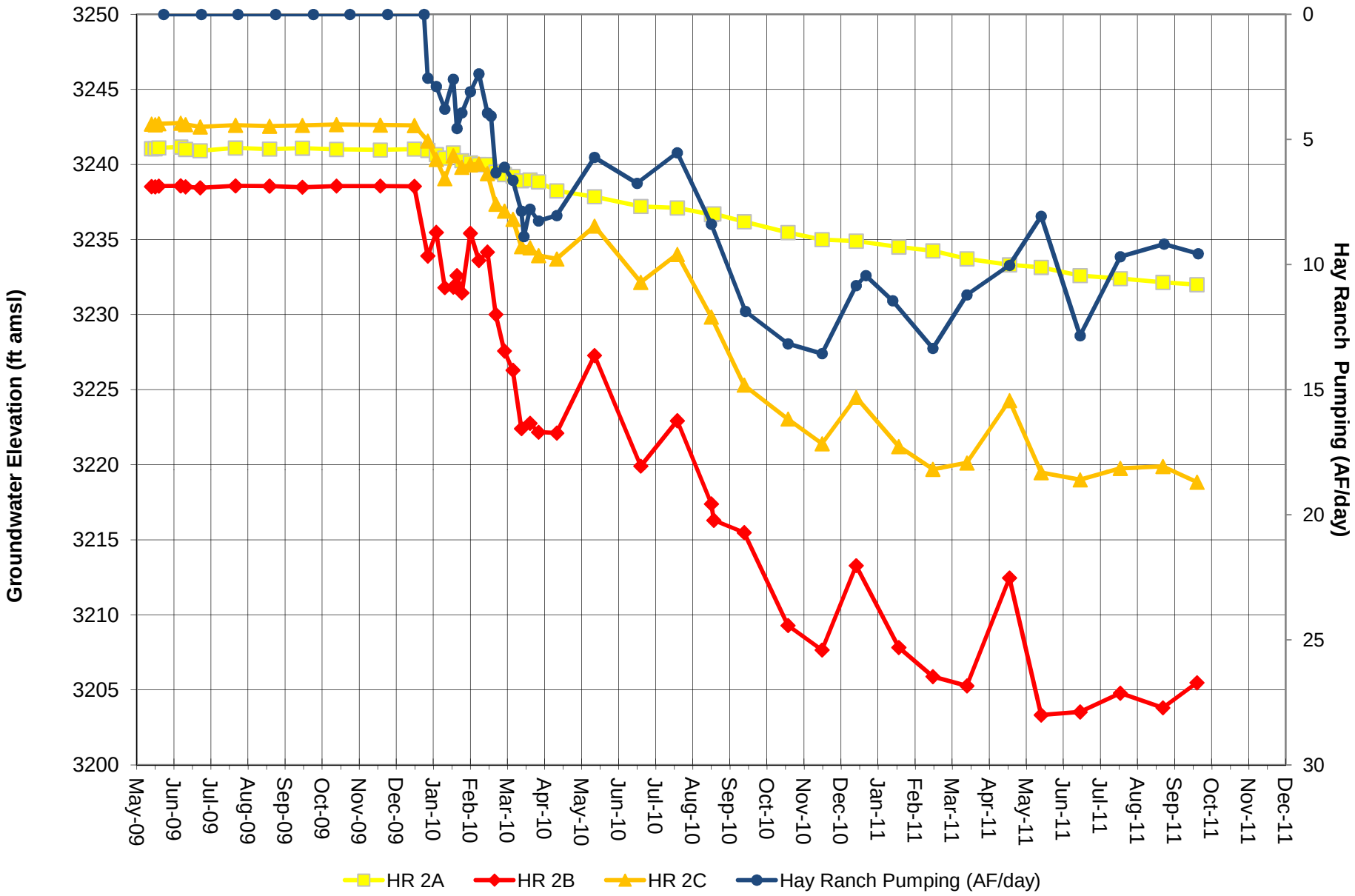
**FIGURE 5**

GROUNDWATER ELEVATION and HAY RANCH PUMPING
HR 2A, HR 2B and HR 2C




Note: GWE data based on manual DTW measurements. Hay Ranch pumping is average acre feet per day.
Screened intervals: HR 2A 180-300 feet; HR 2B 519-584 feet; HR 2C 370-420 feet.
Coso Operating initiated Hay Ranch Project pumping on 12/25/09.

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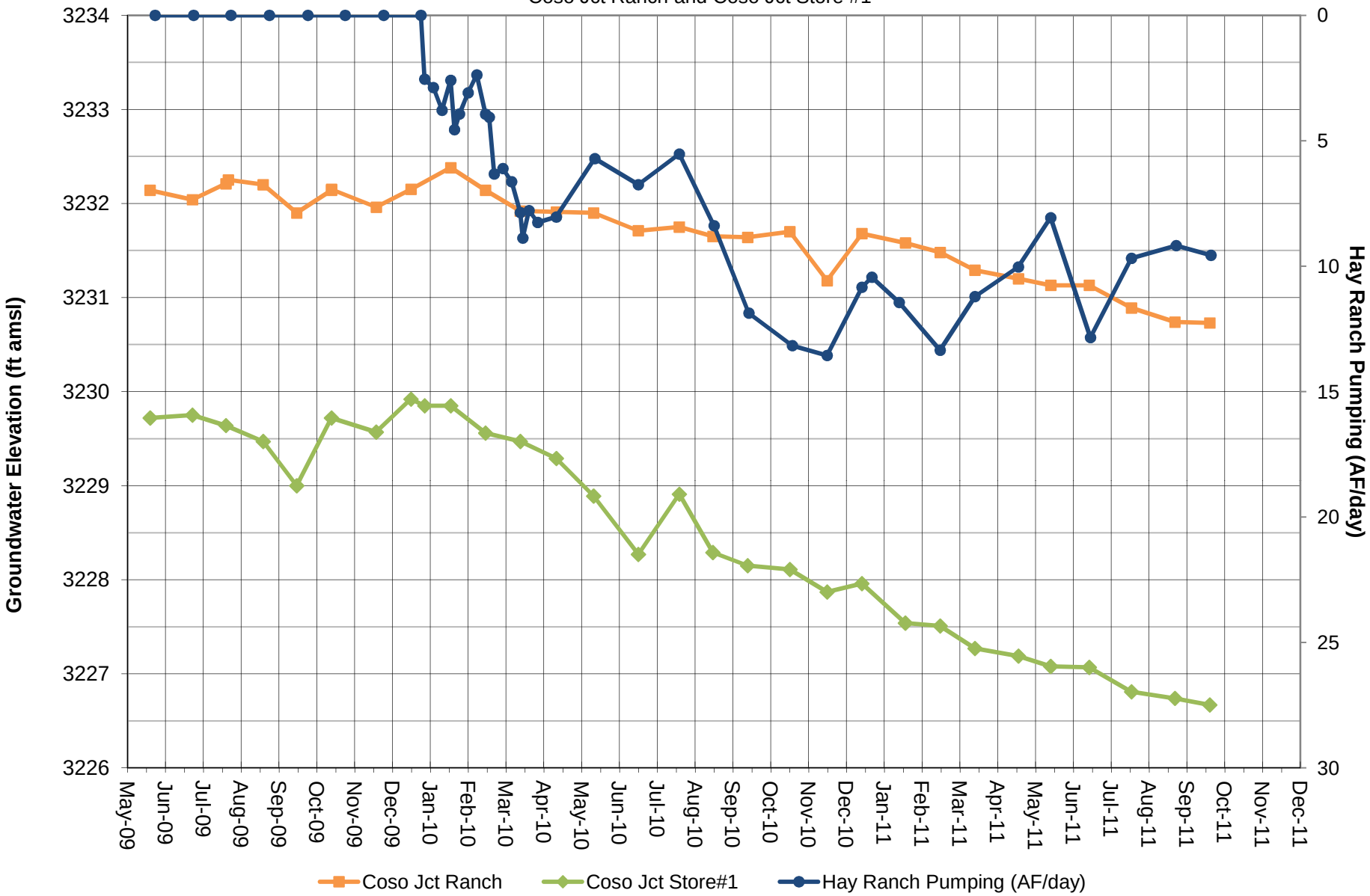
**FIGURE 6A**

GROUNDWATER ELEVATION and HAY RANCH PUMPING

Coso Jct Ranch and Coso Jct Store #1




Note: Groundwater elevation data based on manual depth-to-water measurements.
Hay Ranch pumping is average acre feet per day.
Coso Operating initiated Hay Ranch Project pumping on 12/25/09.

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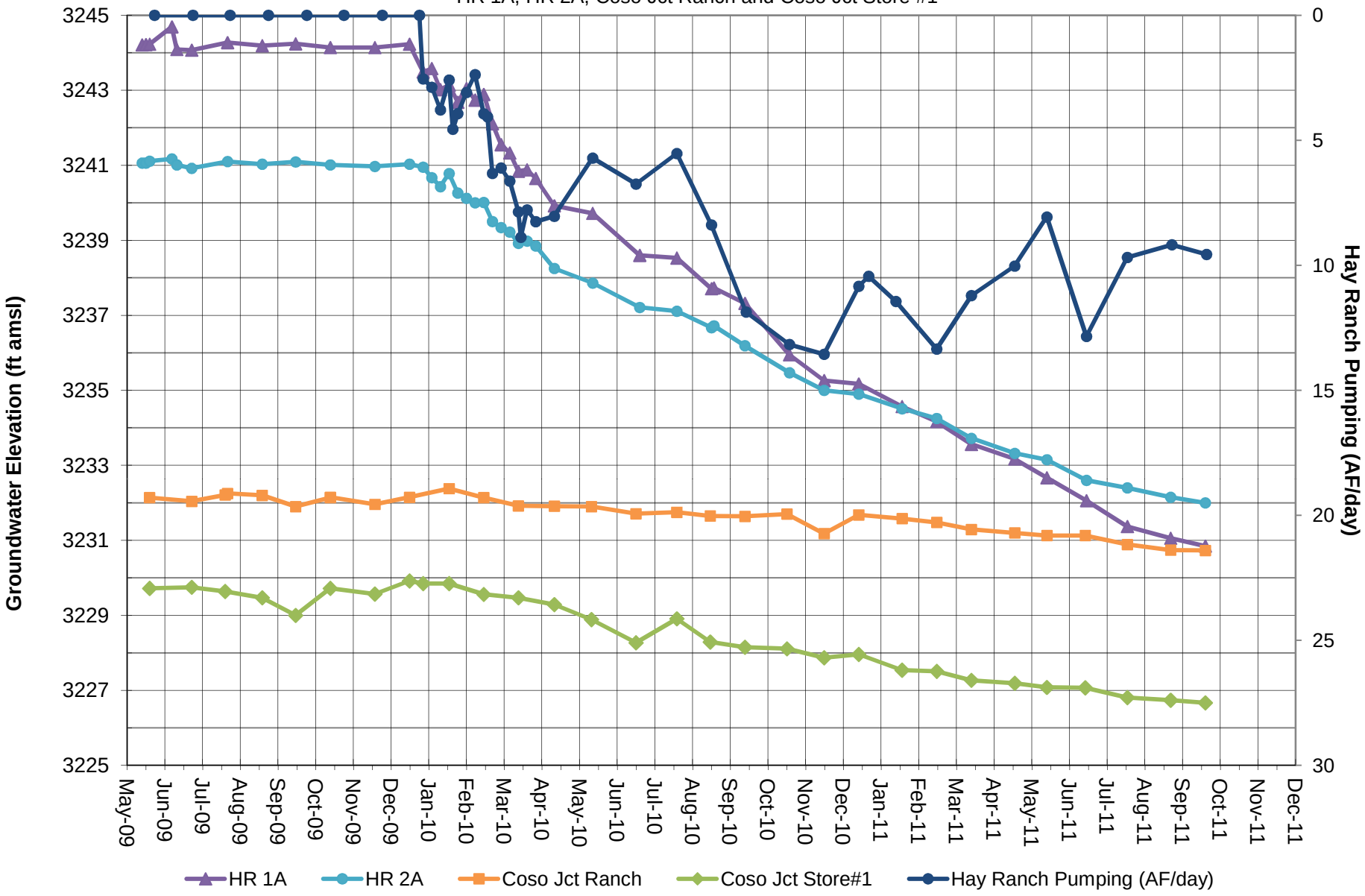
**FIGURE 6B**

GROUNDWATER ELEVATION and HAY RANCH PUMPING
HR 1A, HR 2A, Coso Jct Ranch and Coso Jct Store #1




Note: Groundwater elevation data based on manual depth-to-water measurements.
Hay Ranch pumping is average acre feet per day.
Coso Operating initiated Hay Ranch Project pumping on 12/25/09.

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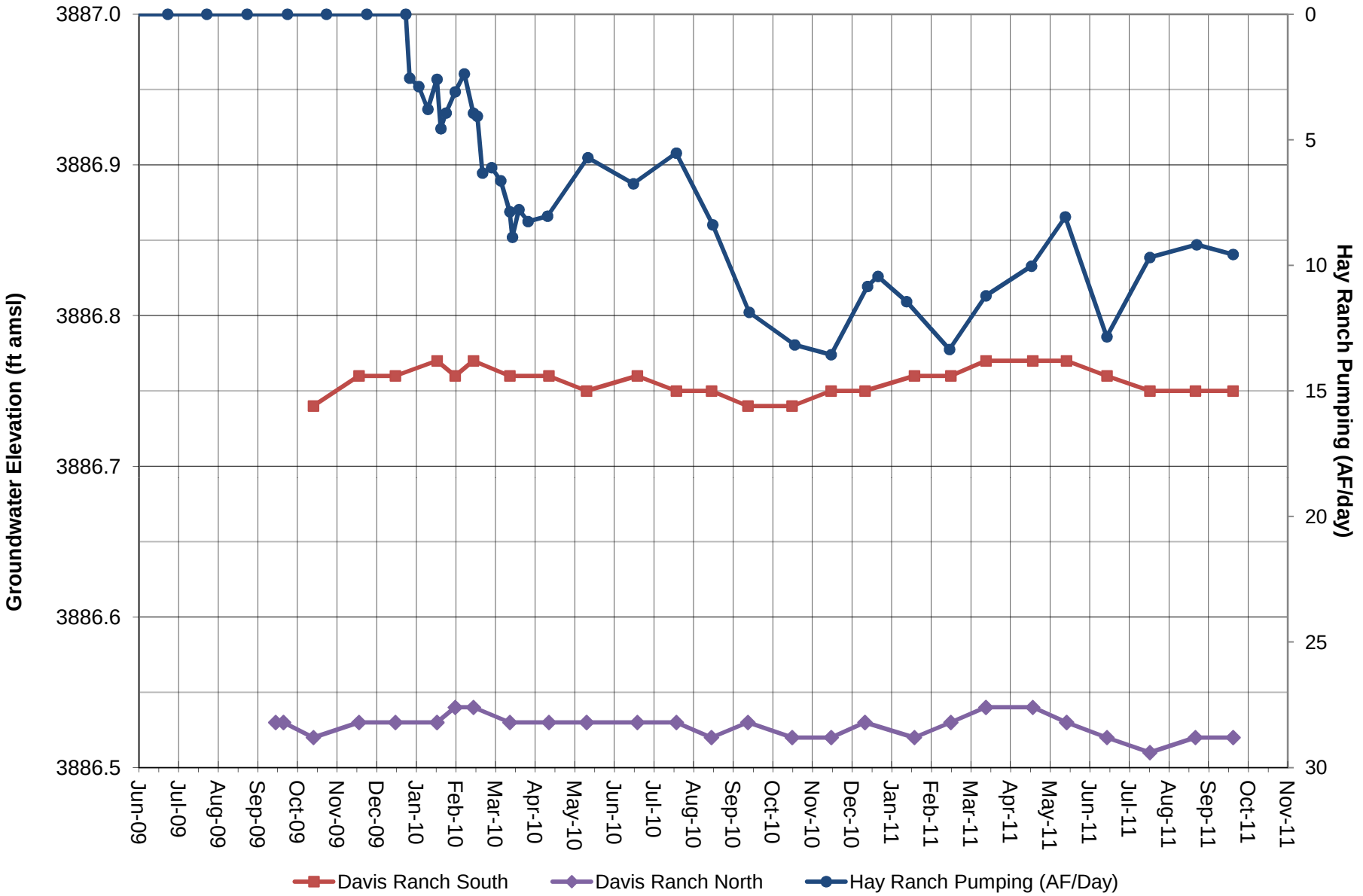
**FIGURE 7**

GROUNDWATER ELEVATION and HAY RANCH PUMPING

Davis Ranch North and South




Note: Groundwater elevation data based on manual depth-to-water measurements.
Hay Ranch pumping is average acre feet per day.
Coso Operating initiated Hay Ranch Project pumping on 12/25/09.

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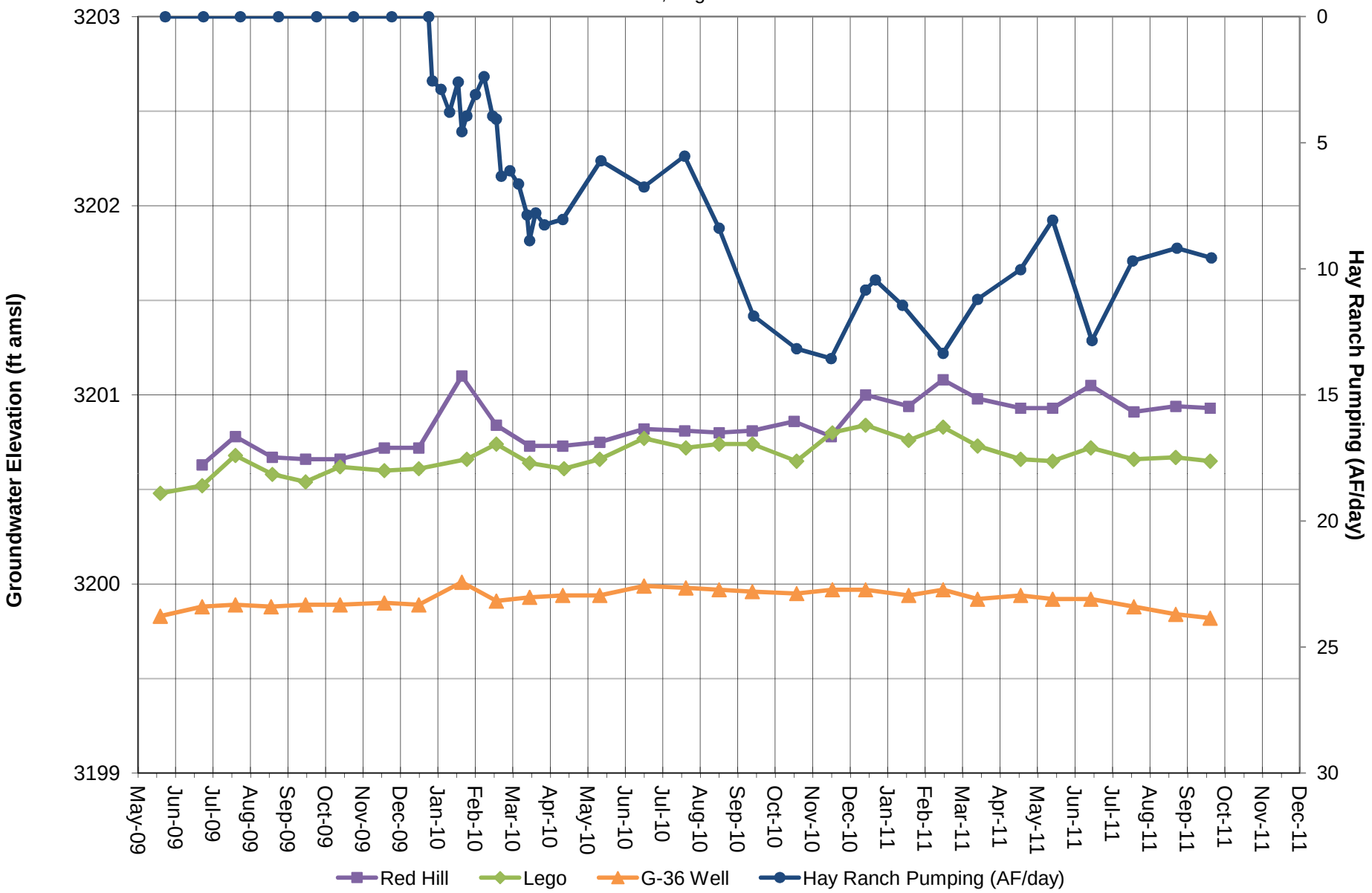
**FIGURE 8**

GROUNDWATER ELEVATION and HAY RANCH PUMPING
Red Hill, Lego and G-36




Note: Groundwater elevation data based on manual depth-to-water measurements.
Hay Ranch pumping is average acre feet per day.
Coso Operating initiated Hay Ranch Project pumping on 12/25/09.

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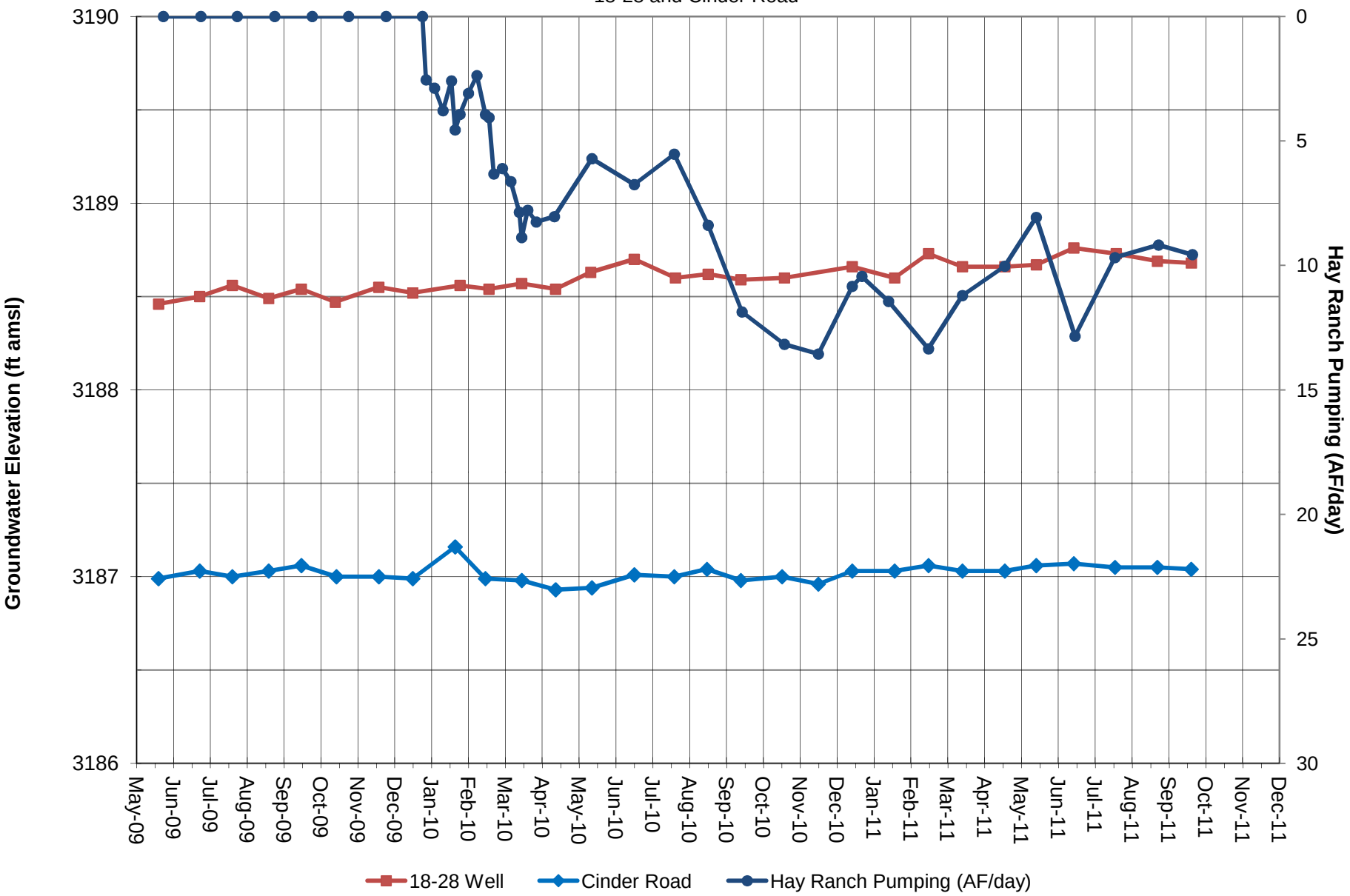
**FIGURE 9**

GROUNDWATER ELEVATION and HAY RANCH PUMPING
18-28 and Cinder Road




Note: Groundwater elevation data based on manual depth-to-water measurements.
Hay Ranch pumping is average acre feet per day.
Coso Operating initiated Hay Ranch Project pumping on 12/25/09.

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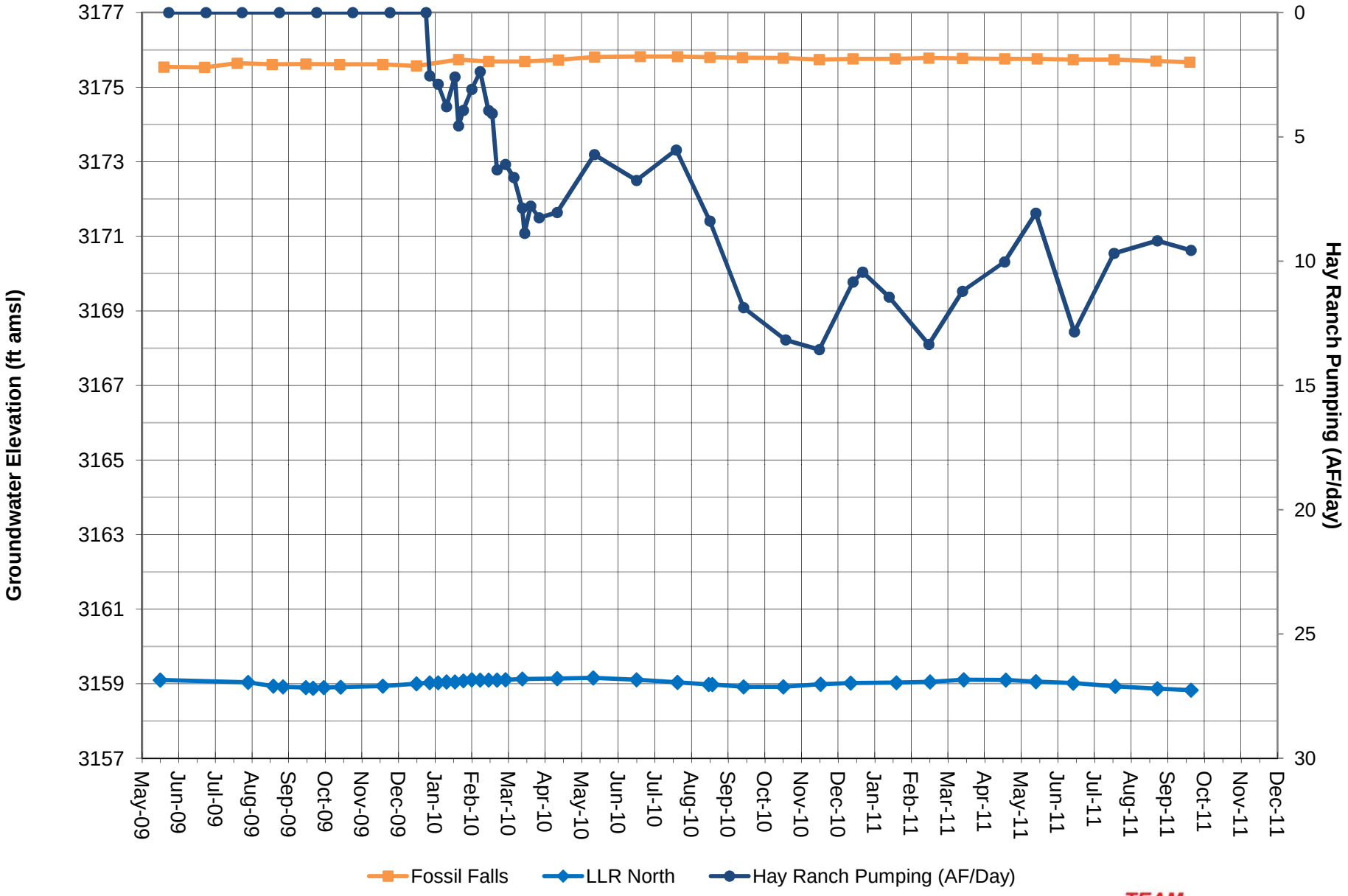
**FIGURE 10**

GROUNDWATER ELEVATION and HAY RANCH PUMPING
Fossil Falls and LLR North




Note: Groundwater elevation data based on manual depth-to-water measurements.
Hay Ranch pumping is average acre feet per day.
Coso Operating initiated Hay Ranch Project pumping on 12/25/09.

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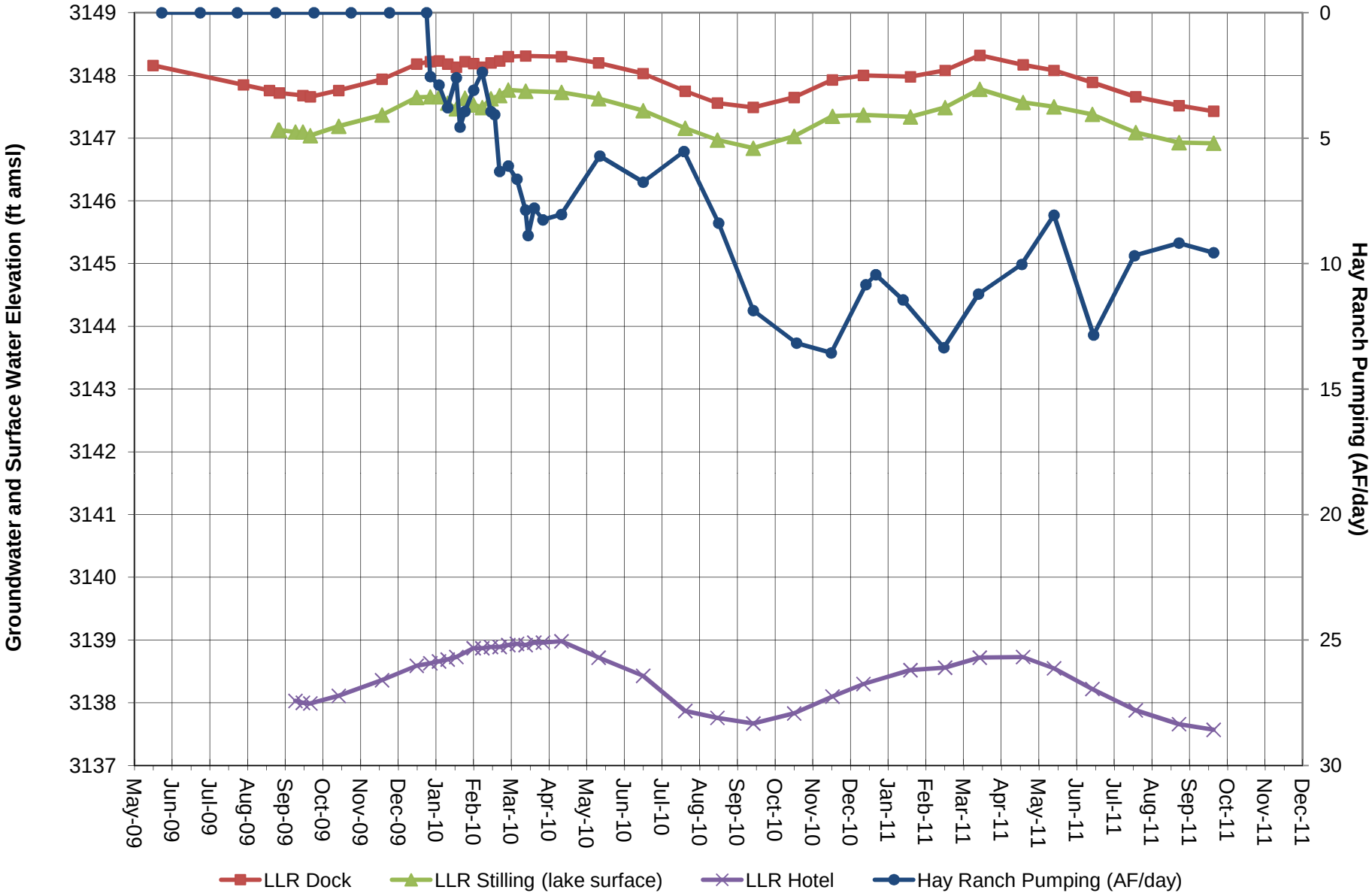
**FIGURE 11**

WATER ELEVATION and HAY RANCH PUMPING
LLR Dock, LLR Stilling and LLR Hotel




Note: Groundwater and surface water elevation data based on manual depth-to-water measurements.
Hay Ranch pumping is average acre feet per day.
Coso Operating initiated Hay Ranch Project pumping on 12/25/09.

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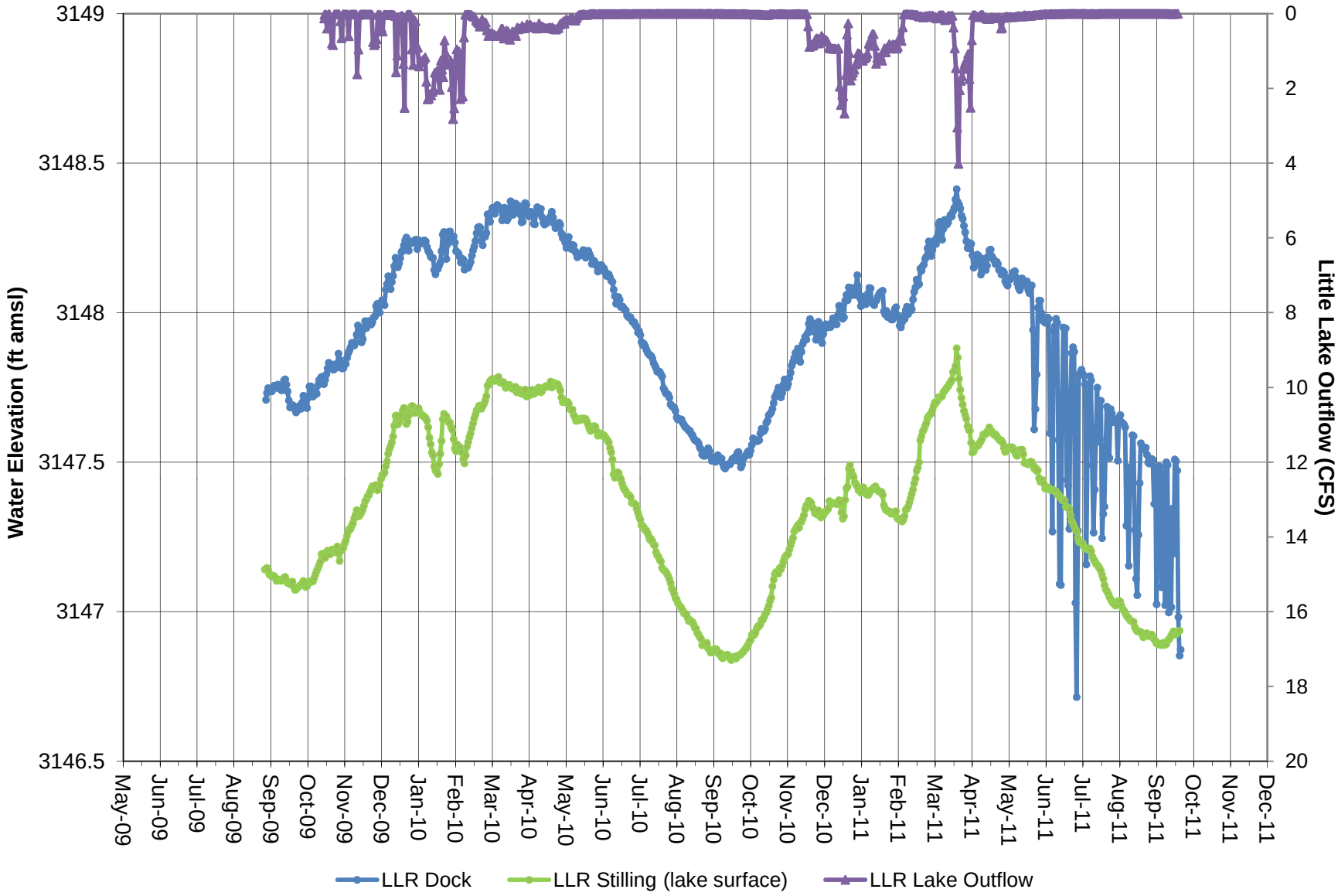
**FIGURE 12**

WATER ELEVATION and LITTLE LAKE OUTFLOW
LLR Dock and LLR Stilling




Note: Little Lake Outflow based on pressure transducer data; flow is cubic feet per second.
LLR staff conducted water management at Dock Well (intermittent pumping) from May-September 2011.

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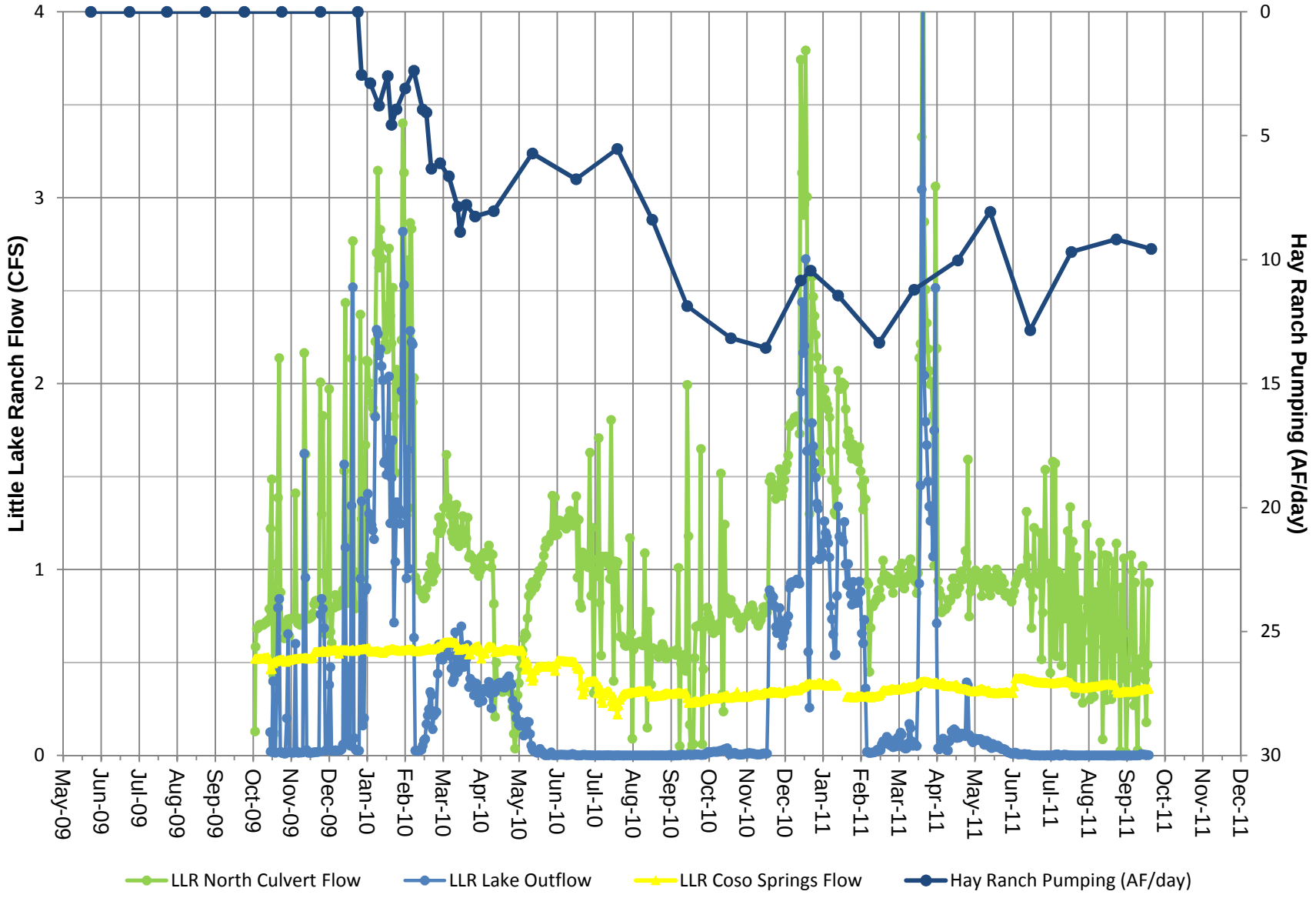
**FIGURE 13**

LLR FLOW and HAY RANCH PUMPING

North Culvert, Coso Springs and Little Lake Outflow




Note: Little Lake Ranch Flows are cubic feet per second.
Hay Ranch pumping is average acre feet per day.
Flows at Little Lake Outflow and North Culvert are influenced both by natural and water management processes at LLR.

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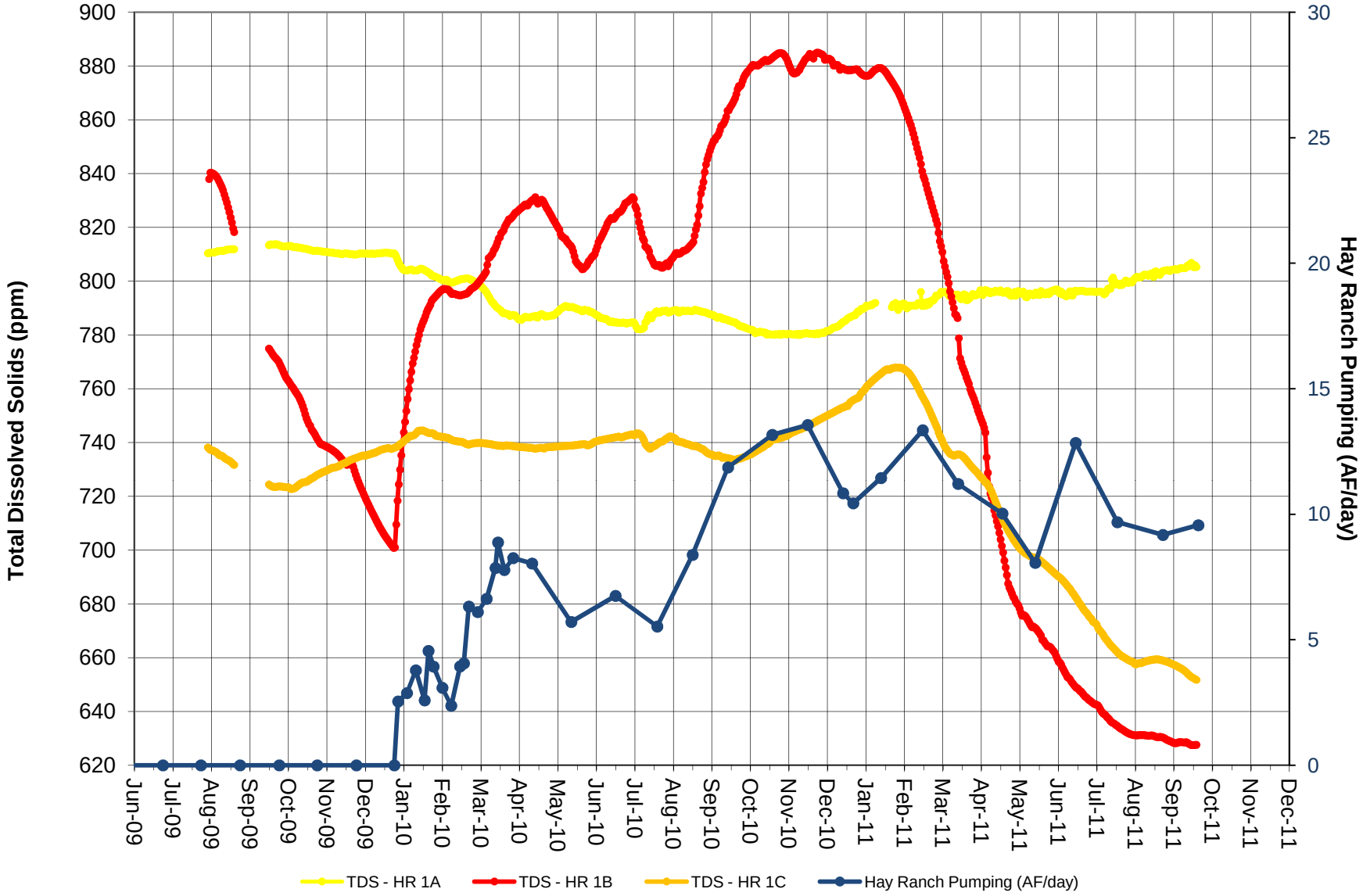
**FIGURE 14**

TOTAL DISSOLVED SOLIDS (TDS) and HAY RANCH PUMPING
HR 1A, HR 1B and HR 1C




Note: TDS data from in-well transducers.
Screened intervals: HR 1A 170-260 feet; HR 1B 490-540 feet; HR 1C 340-405 feet.
HR 1A, 1B and 1C data gaps due to transducer malfunction.
HR 1B transducer lowered in well in March 2011.

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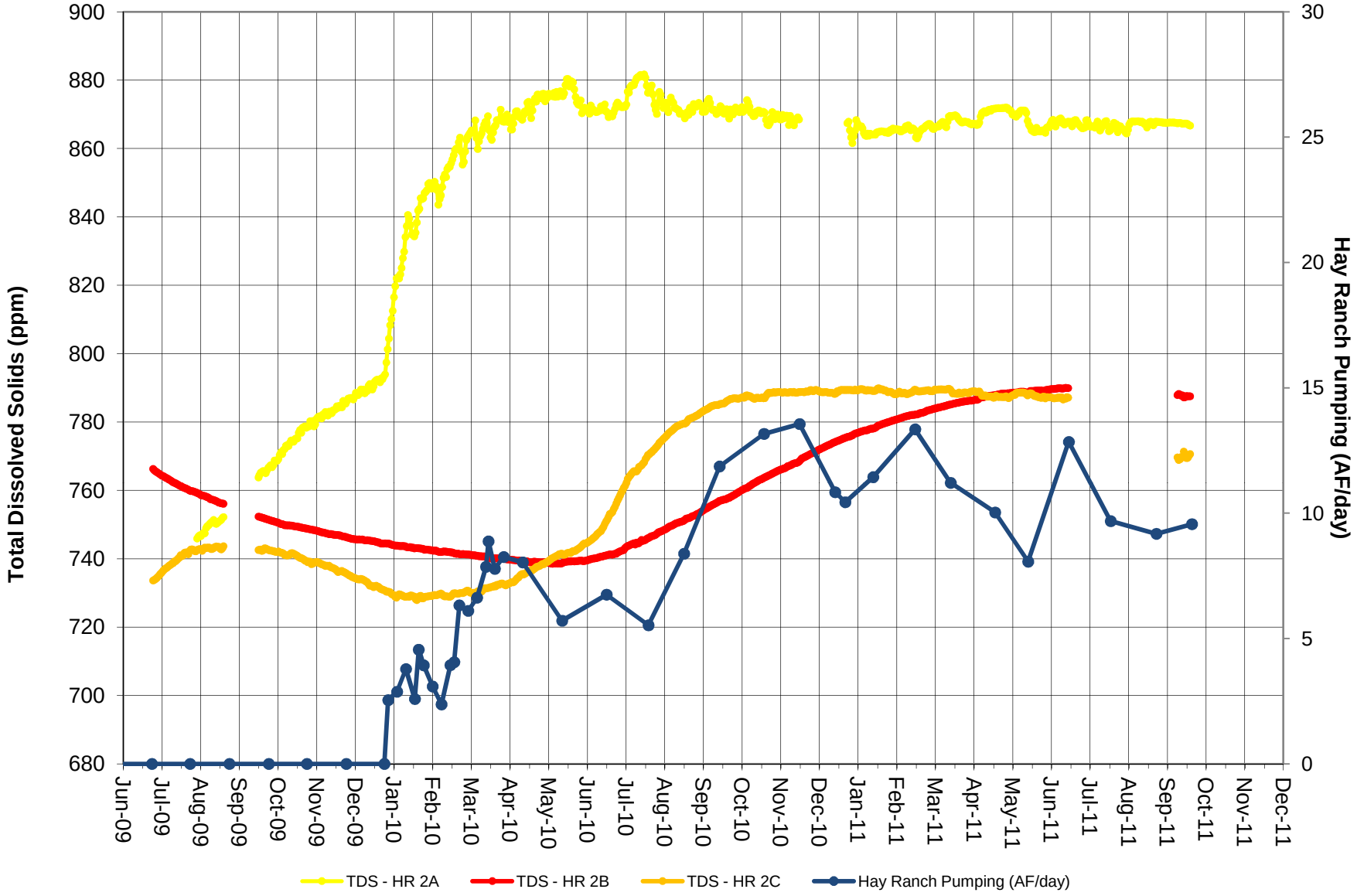
**FIGURE 15**

TOTAL DISSOLVED SOLIDS (TDS) and HAY RANCH PUMPING
HR 2A, HR 2B and HR 2C




Note: Screened intervals: HR 2A 180-300 feet; HR 2B 519-584 feet; HR 2C 370-420 feet.
HR 2A, 2B and 2C data gaps due to transducer malfunction.

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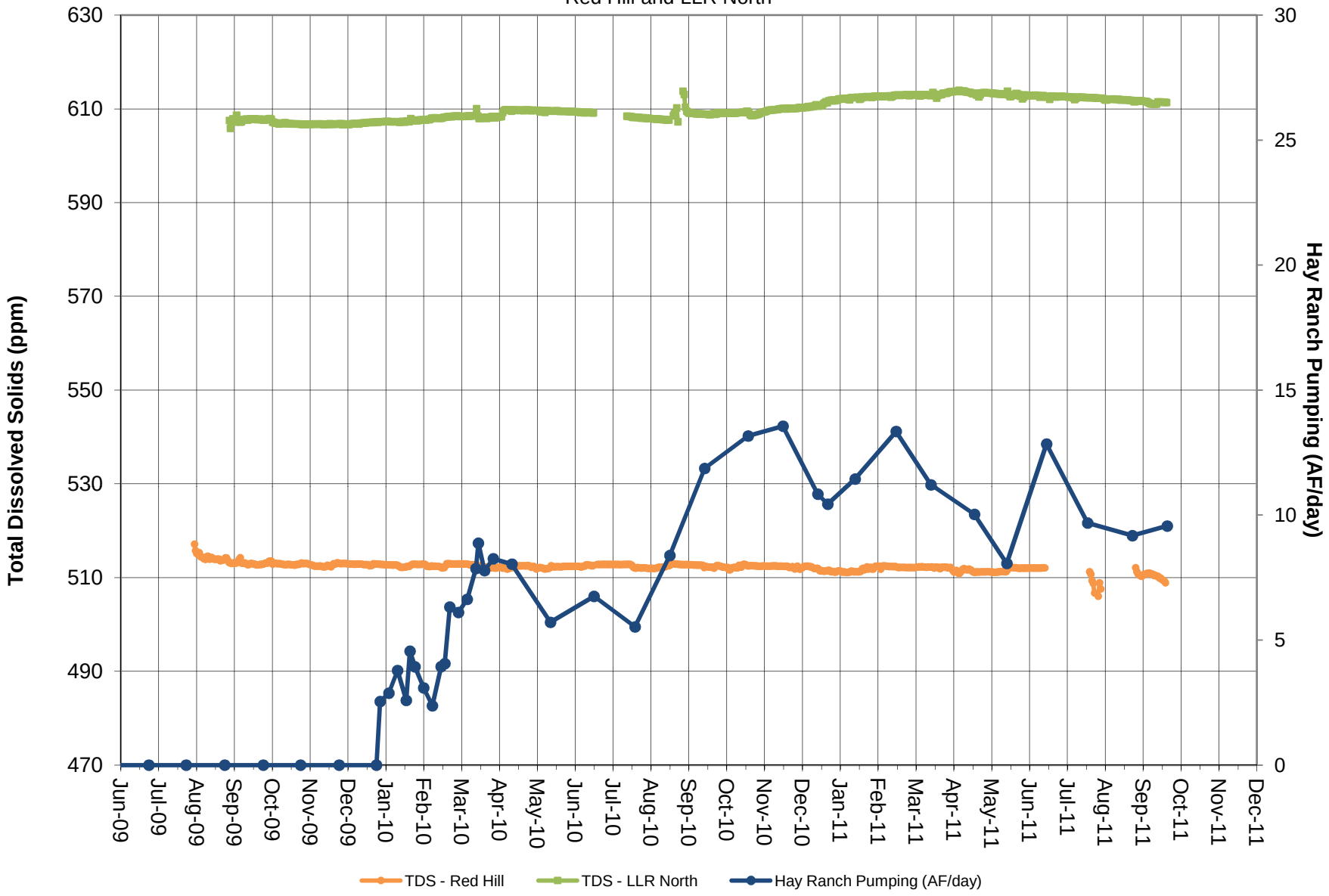
**FIGURE 16**

TOTAL DISSOLVED SOLIDS (TDS) and HAY RANCH PUMPING

Red Hill and LLR North




Note: TDS data from in-well transducers. Hay Ranch pumping is average acre feet per day.
Coso Operating initiated Hay Ranch Project pumping on 12/25/09.
Red Hill and LLR North data gaps due to transducer malfunction.

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10/5/2011

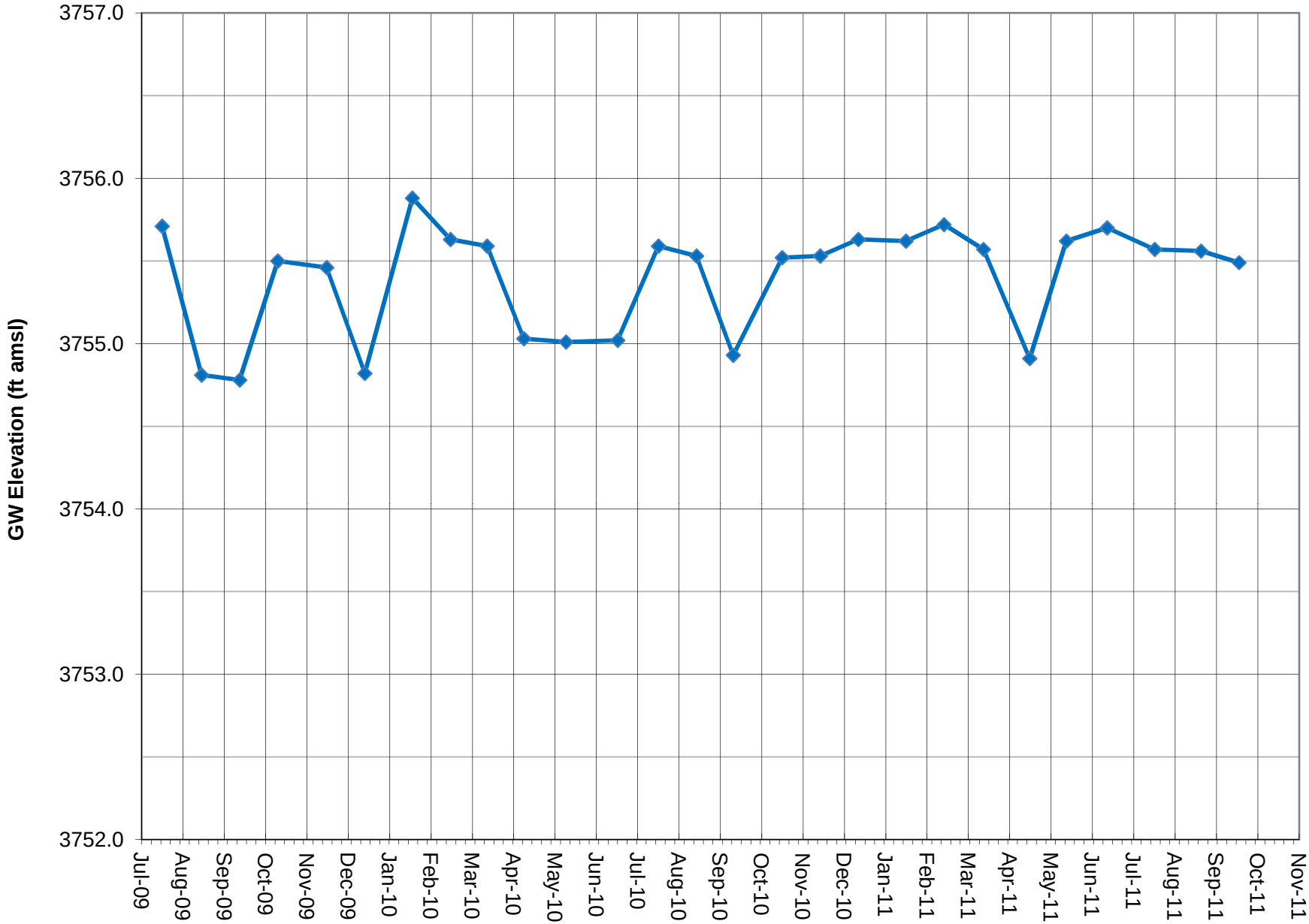
# APPENDICES

# APPENDIX A

**HAY RANCH PROJECT CUP**
**MONTHLY HYDROGRAPHS**
**SEPTEMBER 21-22, 2011**

# GROUNDWATER ELEVATION DATA
# LONG-TERM (MANUAL READS)

## GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV010 - Enchanted Village Well




Note: Groundwater elevation data based on manual depth-to-water measurements.
DTW measured to .01 foot; GWE calculated using approximate surface elevation.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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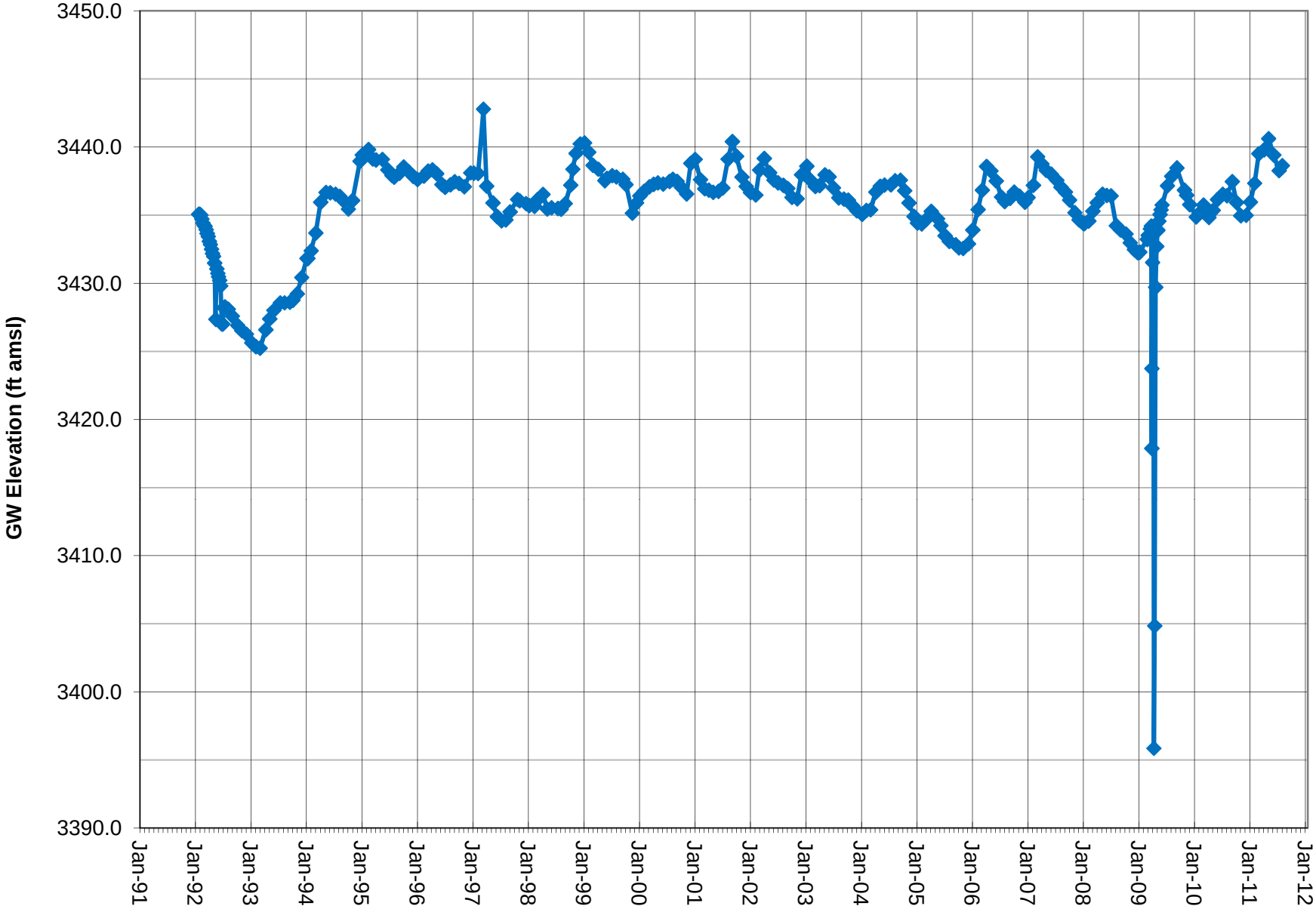
## GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV020 - LADWP 816 Well




Note: Groundwater elevation data based on manual depth-to-water measurements.
LADWP conducted a groundwater pump test on a nearby well in the first quarter 2009.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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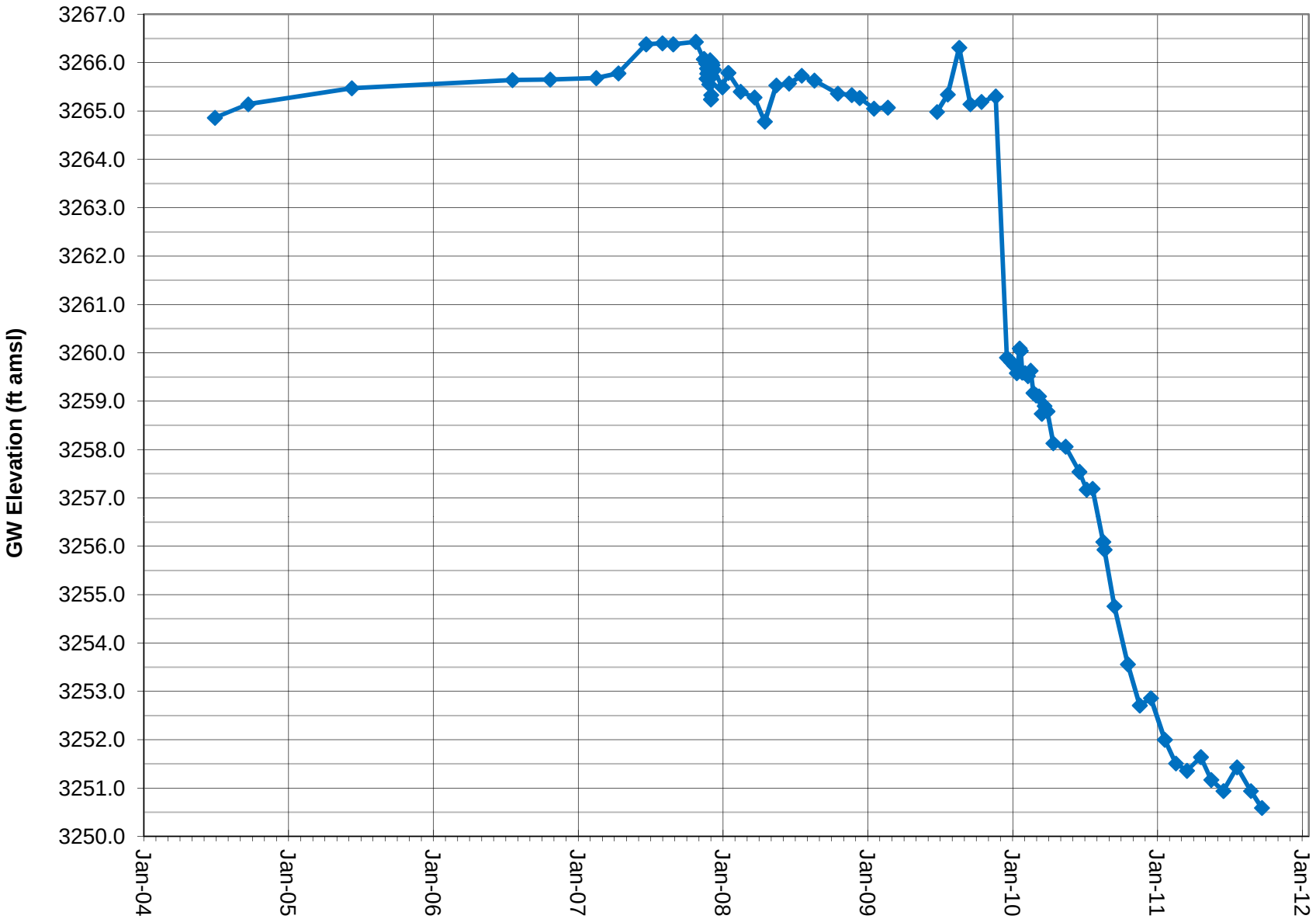
## GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV030 - Cal Pumice Well




Note: A data gap exists in 2009 during a LADWP pump test on a nearby well.
The notable DTW change from 11/19/09 to 12/17/09 was confirmed by in-well PT.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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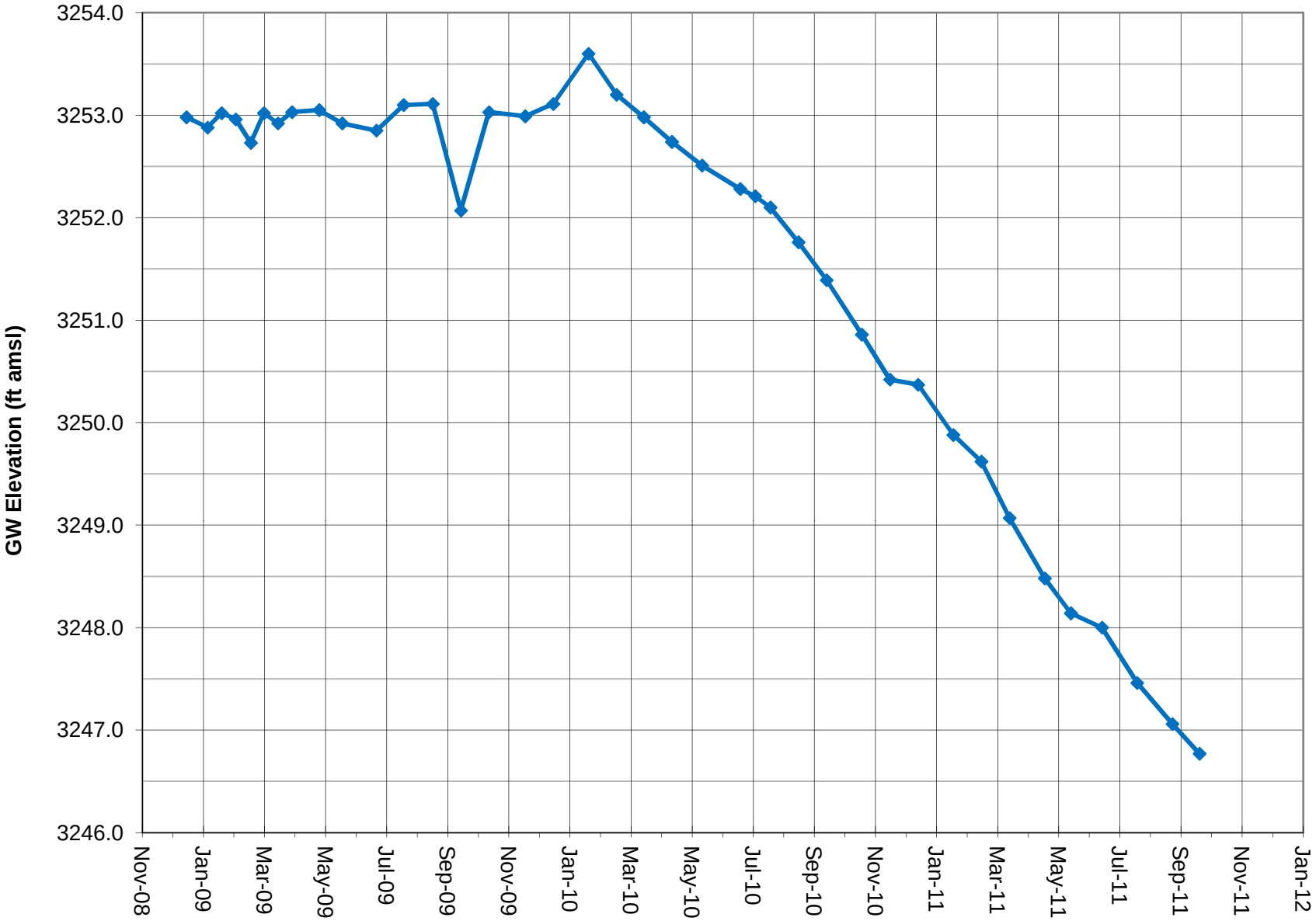
# GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV040 - Dunmovin Well




Note: Groundwater elevation data based on manual depth-to-water measurements. Lines between data points are approximations.
Dunmovin Well is an active domestic supply well.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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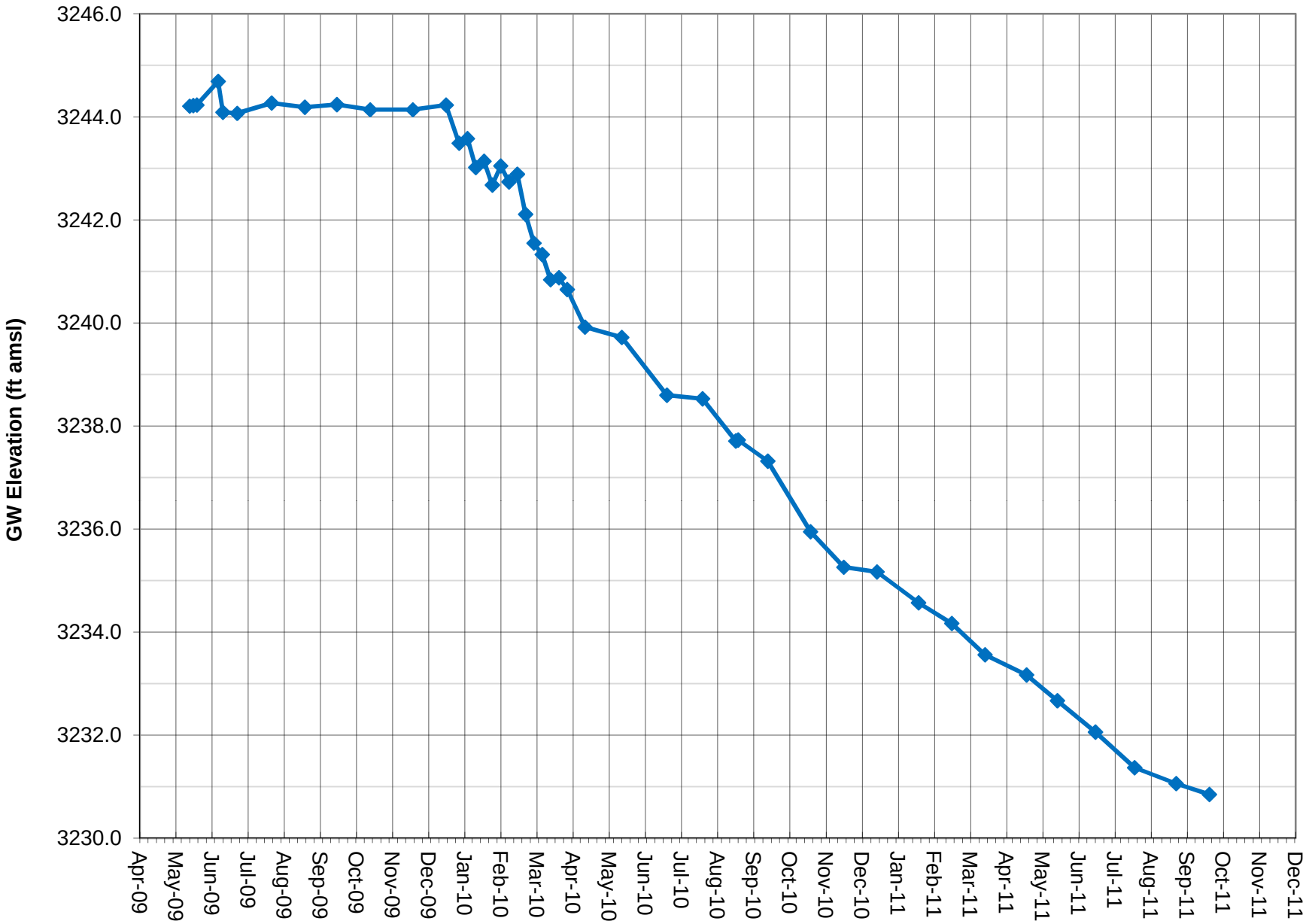
## GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV060 - Hay Ranch 1A Well




Note: Groundwater elevation data based on manual depth-to-water measurements. Lines between data points are approximations.
Screened interval is 170-260 feet.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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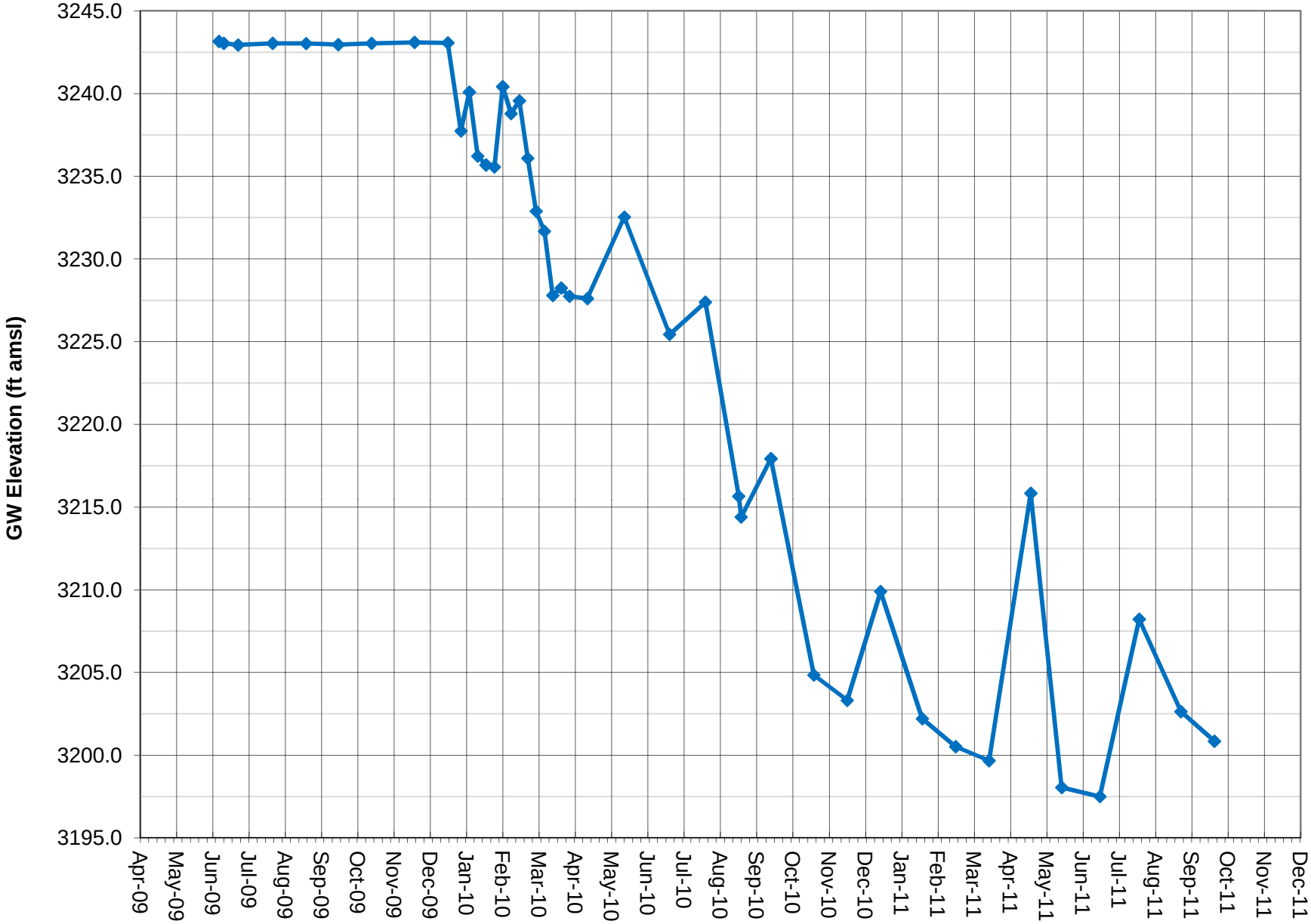
## GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV061 - Hay Ranch 1B Well




Note: Groundwater elevation data based on manual depth-to-water measurements. Lines between data points are approximations.
Screened interval is 490-540 feet.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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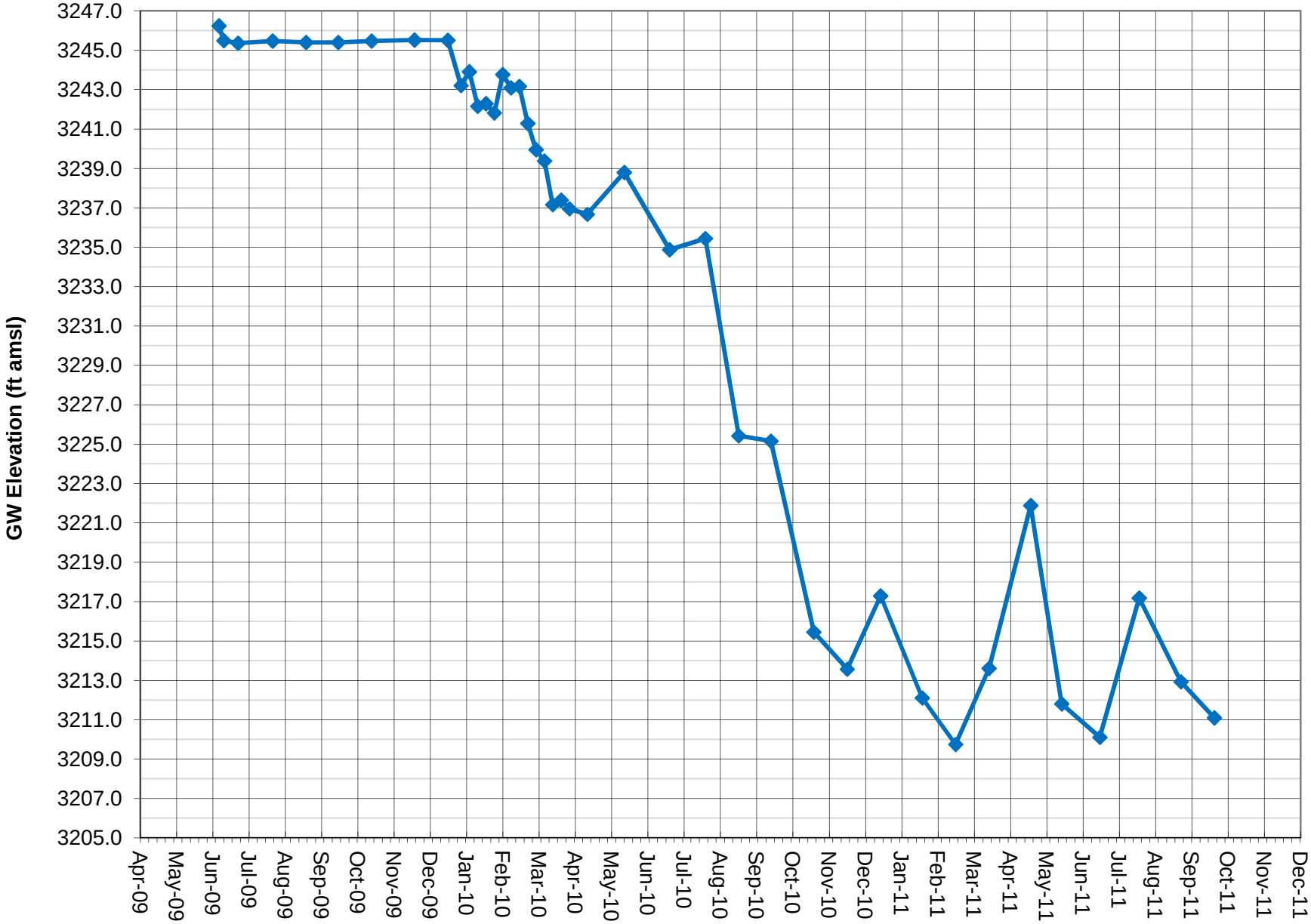
# GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV062 - Hay Ranch 1C Well




Note: Groundwater elevation data based on manual depth-to-water measurements. Lines between data points are approximations.
Screened interval is 340-405 feet.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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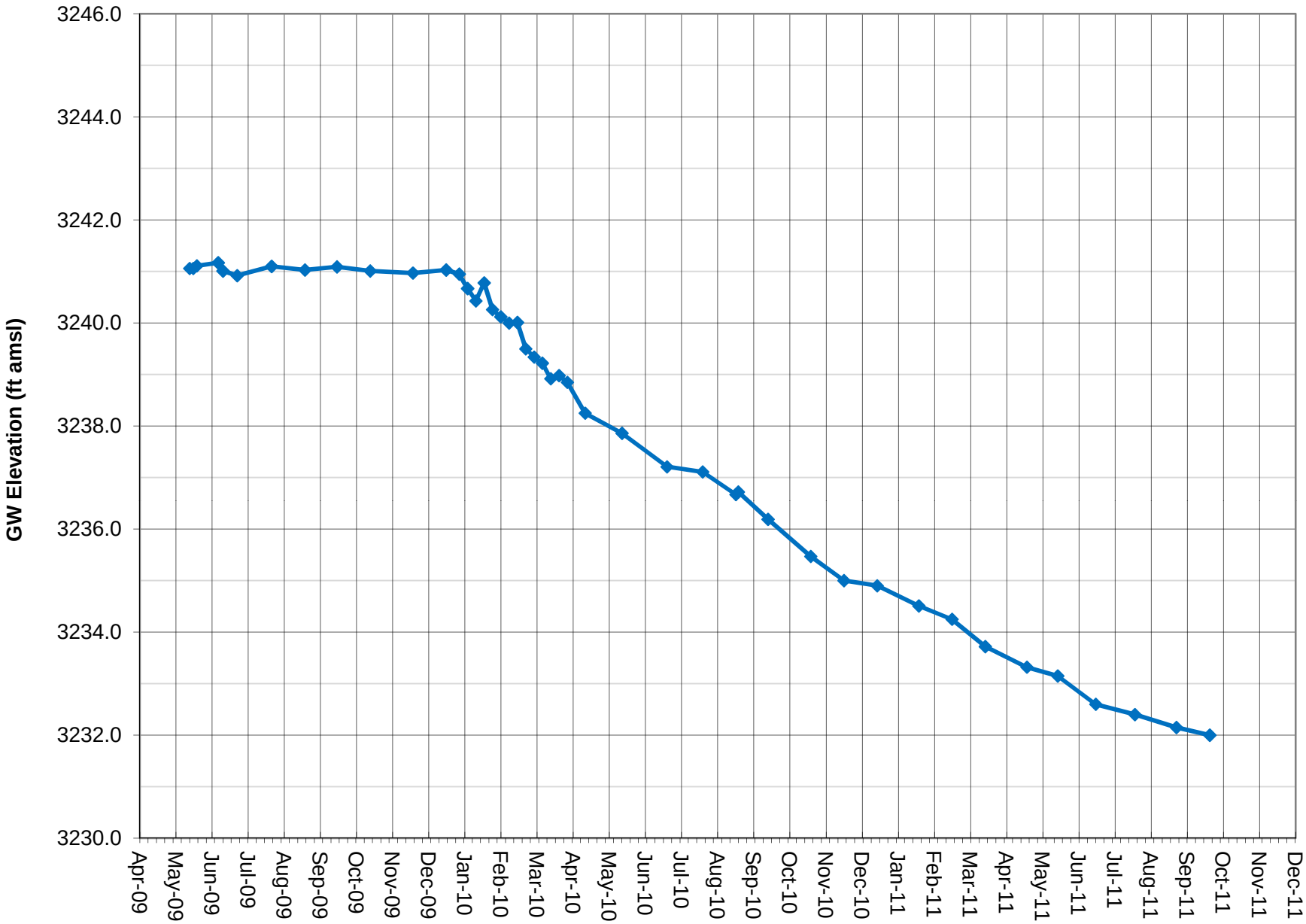
# GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV080- Hay Ranch 2A Well




Note: Groundwater elevation data based on manual depth-to-water measurements. Lines between data points are approximations.
Screened interval is 180-300 feet.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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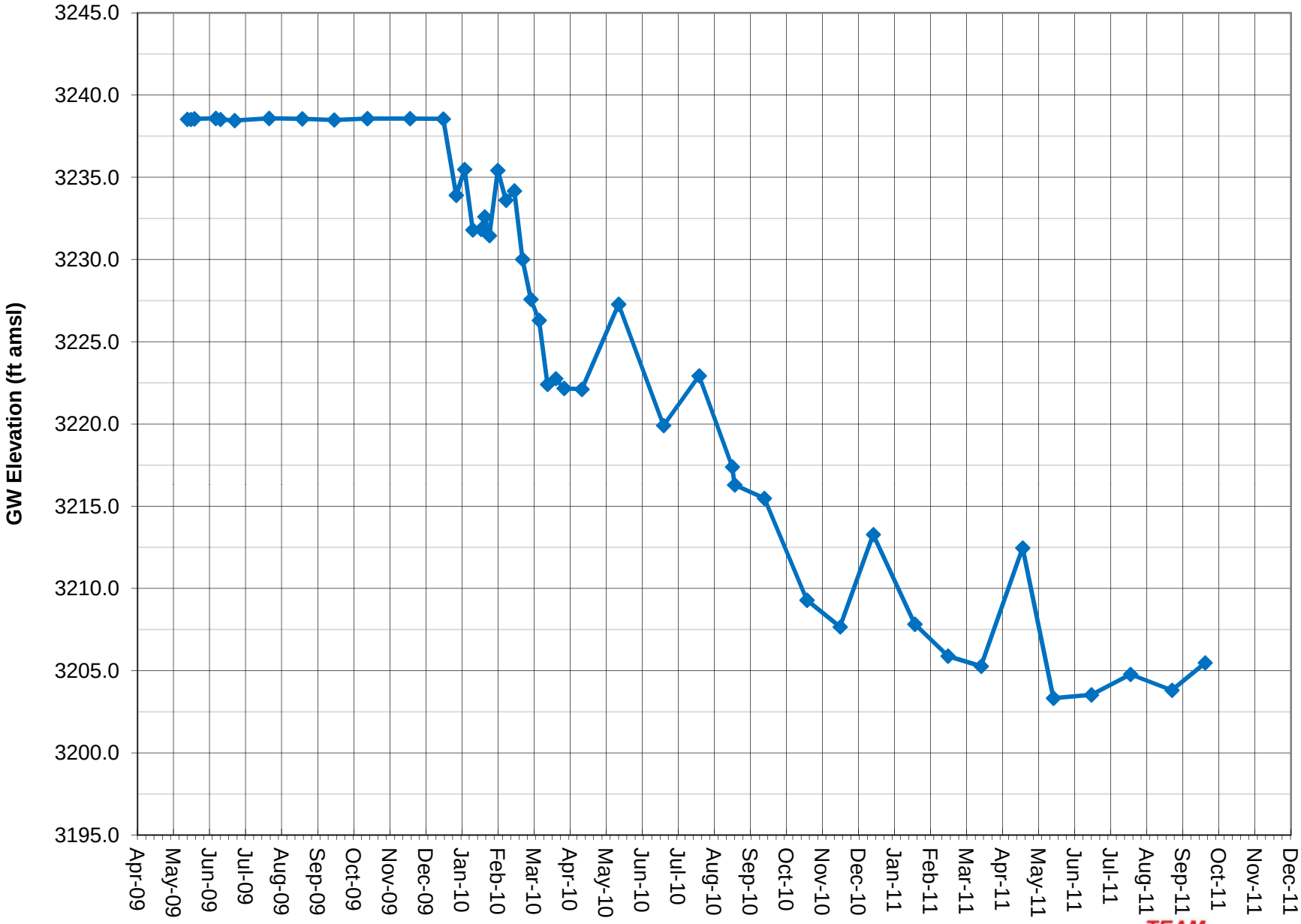
# GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV081 - Hay Ranch 2B Well




Note: Groundwater elevation data based on manual depth-to-water measurements. Lines between data points are approximations.
Screened interval is 519-584 feet.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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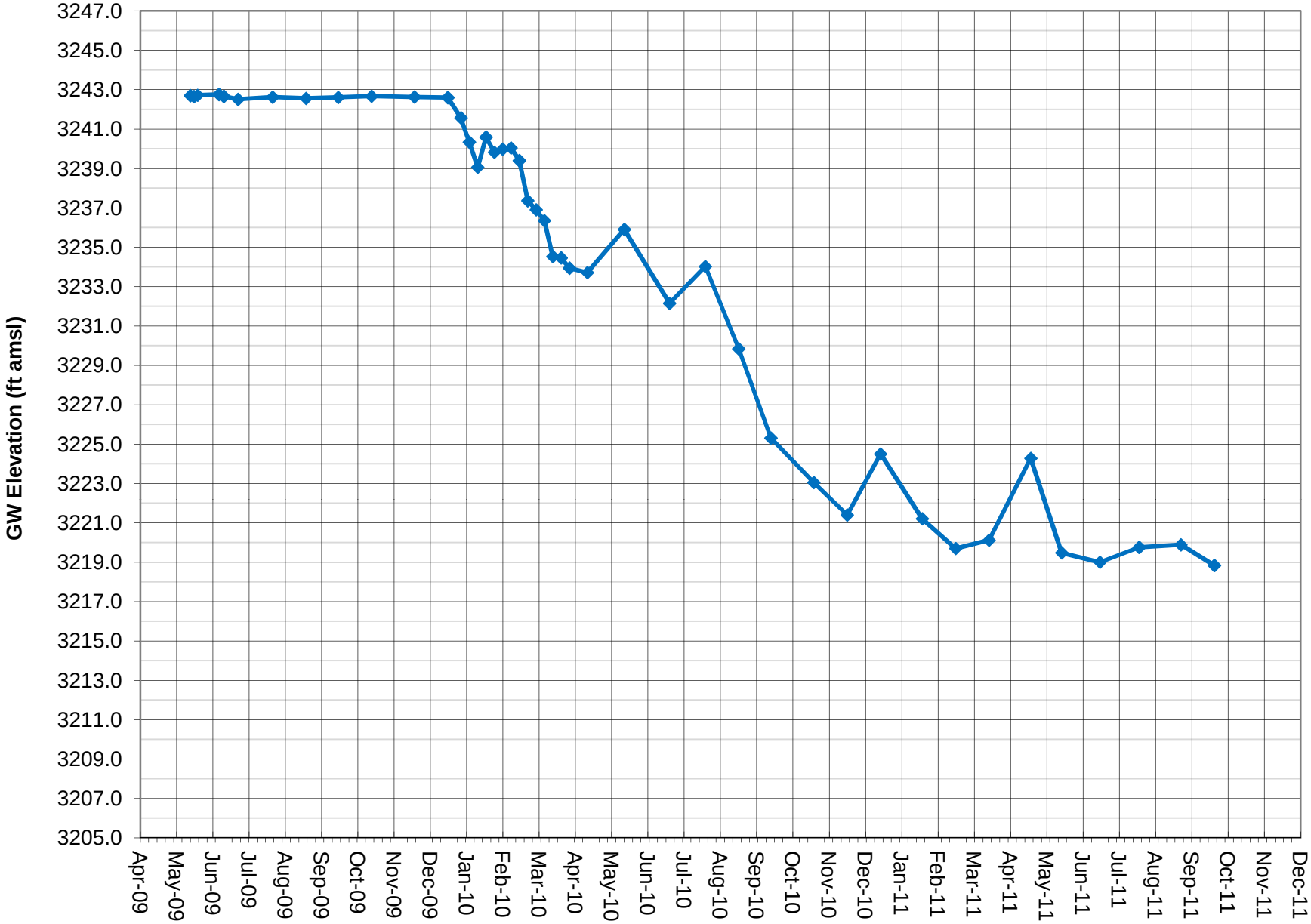
## GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV082 - Hay Ranch 2C Well




Note: Groundwater elevation data based on manual depth-to-water measurements. Lines between data points are approximations.
Screened interval is 370-420 feet.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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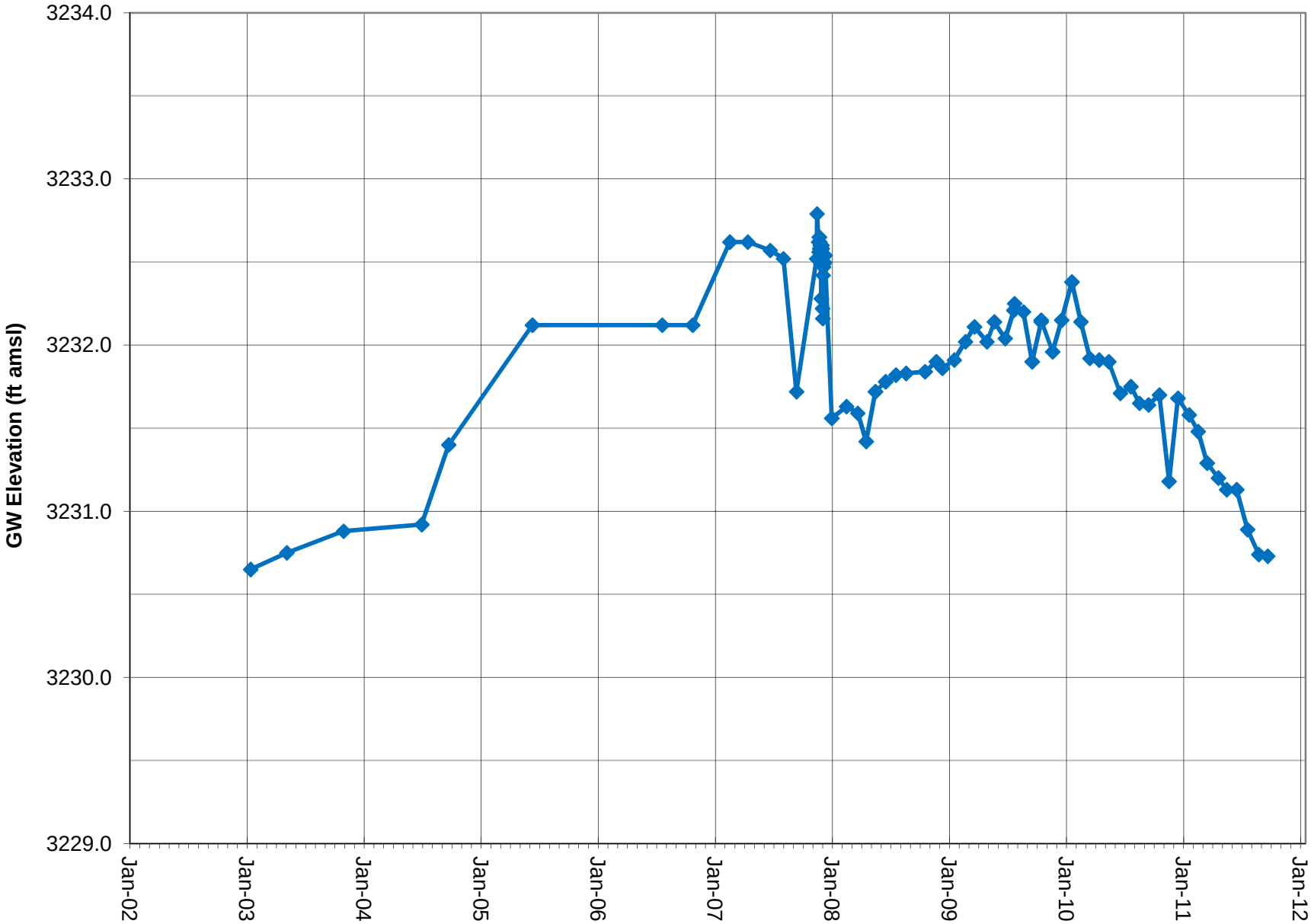
## GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV090 - Coso Junction Ranch Well




Note: Groundwater elevation data based on manual depth-to-water measurements.
Coso Operating Co. conducted a pump test on the Hay Ranch South Well in fourth quarter 2007.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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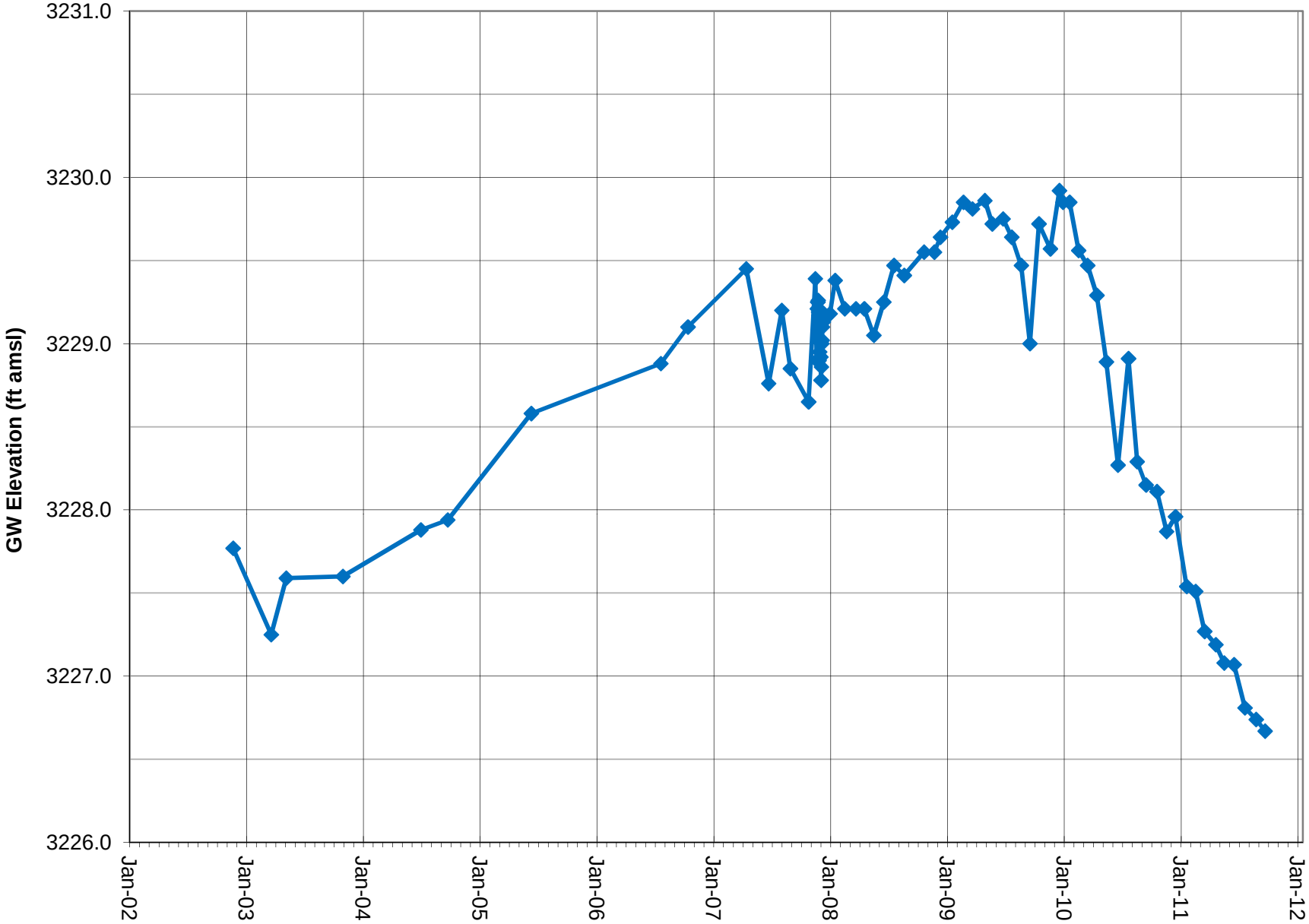
## GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV100 - Coso Junction Store #1 Well




Note: Groundwater elevation data based on manual depth-to-water measurements.
Coso Operating Co. conducted a pump test on the Hay Ranch South Well in fourth quarter 2007.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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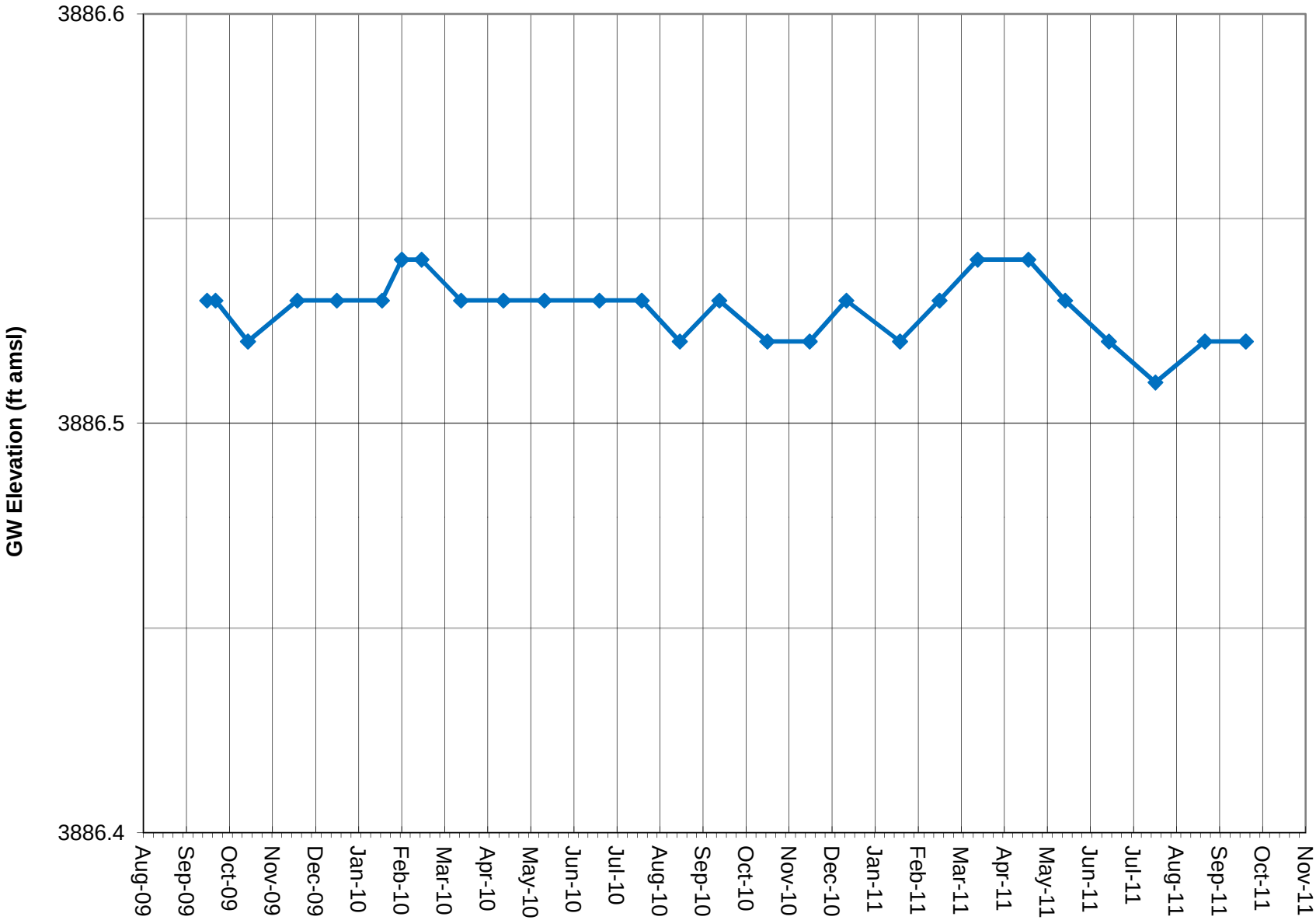
## GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV110 - Davis Ranch North Well




Note: Groundwater elevation data based on manual depth-to-water measurements.
DTW measured to .01 foot; GWE calculated using approximate surface elevation.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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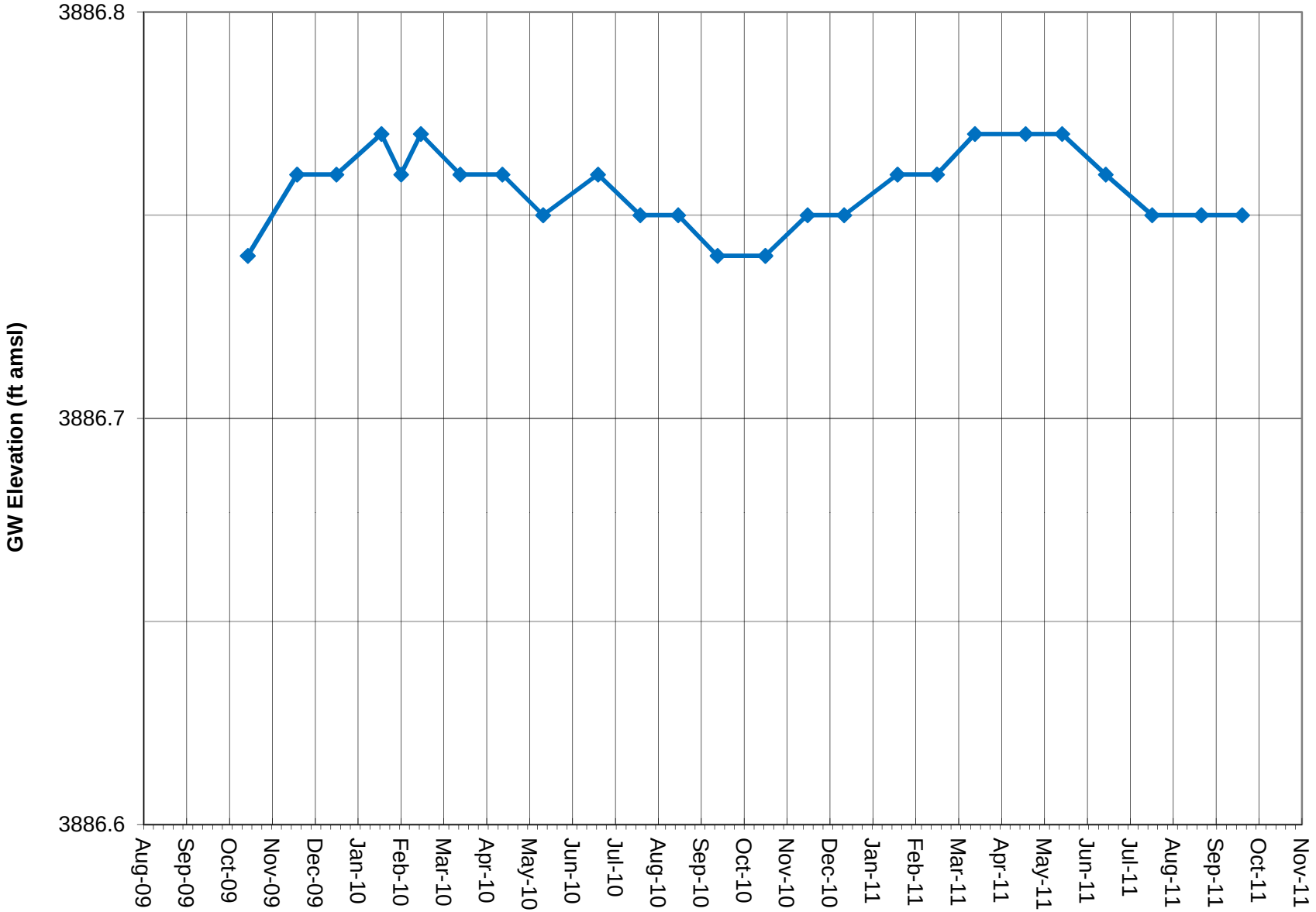
## GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV111 - Davis Ranch South Well




Note: Groundwater elevation data based on manual depth-to-water measurements.
DTW measured to .01 foot; GWE calculated using approximate surface elevation.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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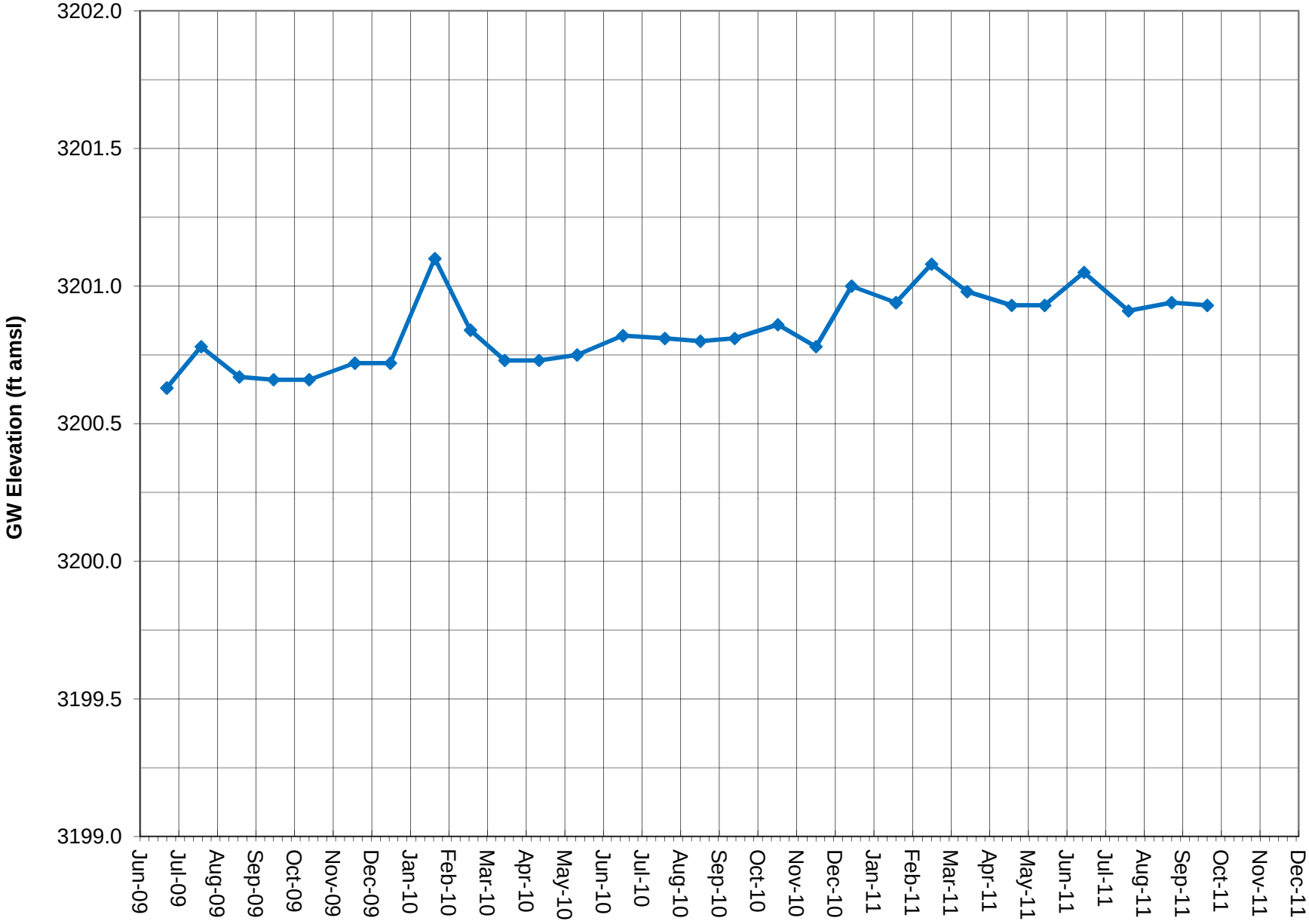
# GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV120 - Red Hill Well




Note: Groundwater elevation data based on manual depth-to-water measurements. Lines between data points are approximations.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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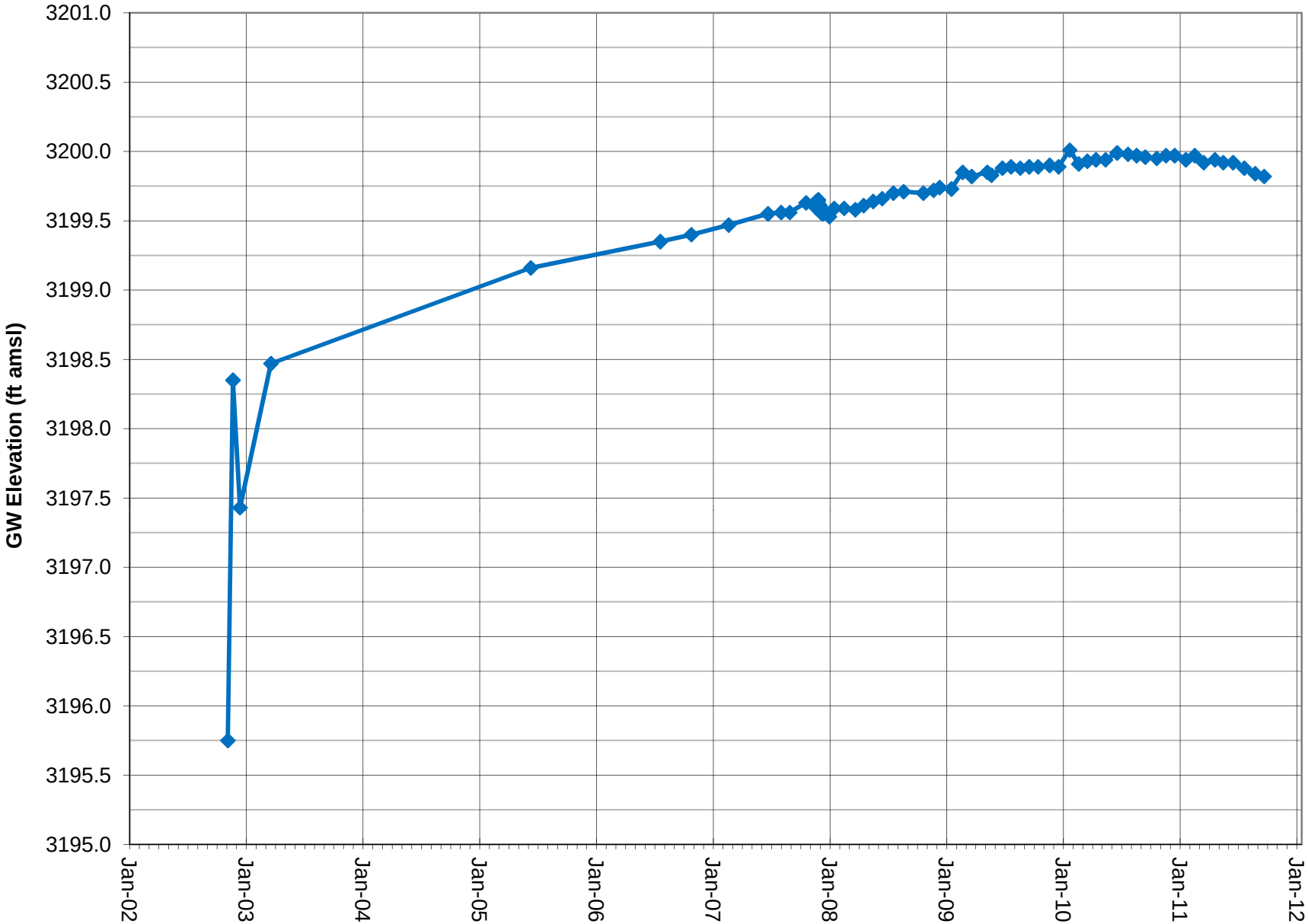
# GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV130 - G-36 Well




Note: Groundwater elevation data based on manual depth-to-water measurements.
Coso Operating Co. conducted a pump test on the Hay Ranch South Well in fourth quarter 2007.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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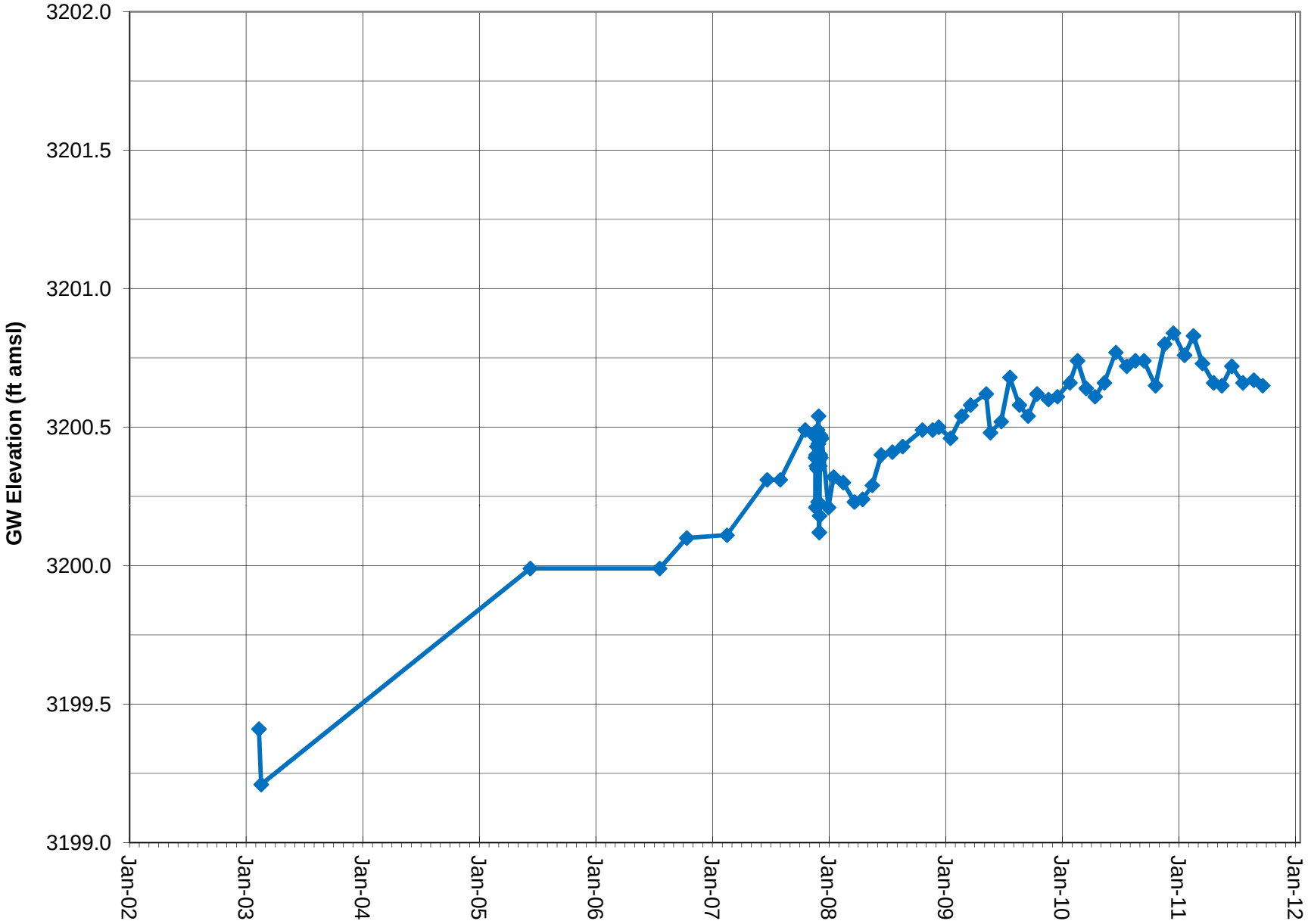
# GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV140 - Lego Well




Note: Groundwater elevation data based on manual depth-to-water measurements.
Coso Operating Co. conducted a pump test on the Hay Ranch South Well in fourth quarter 2007.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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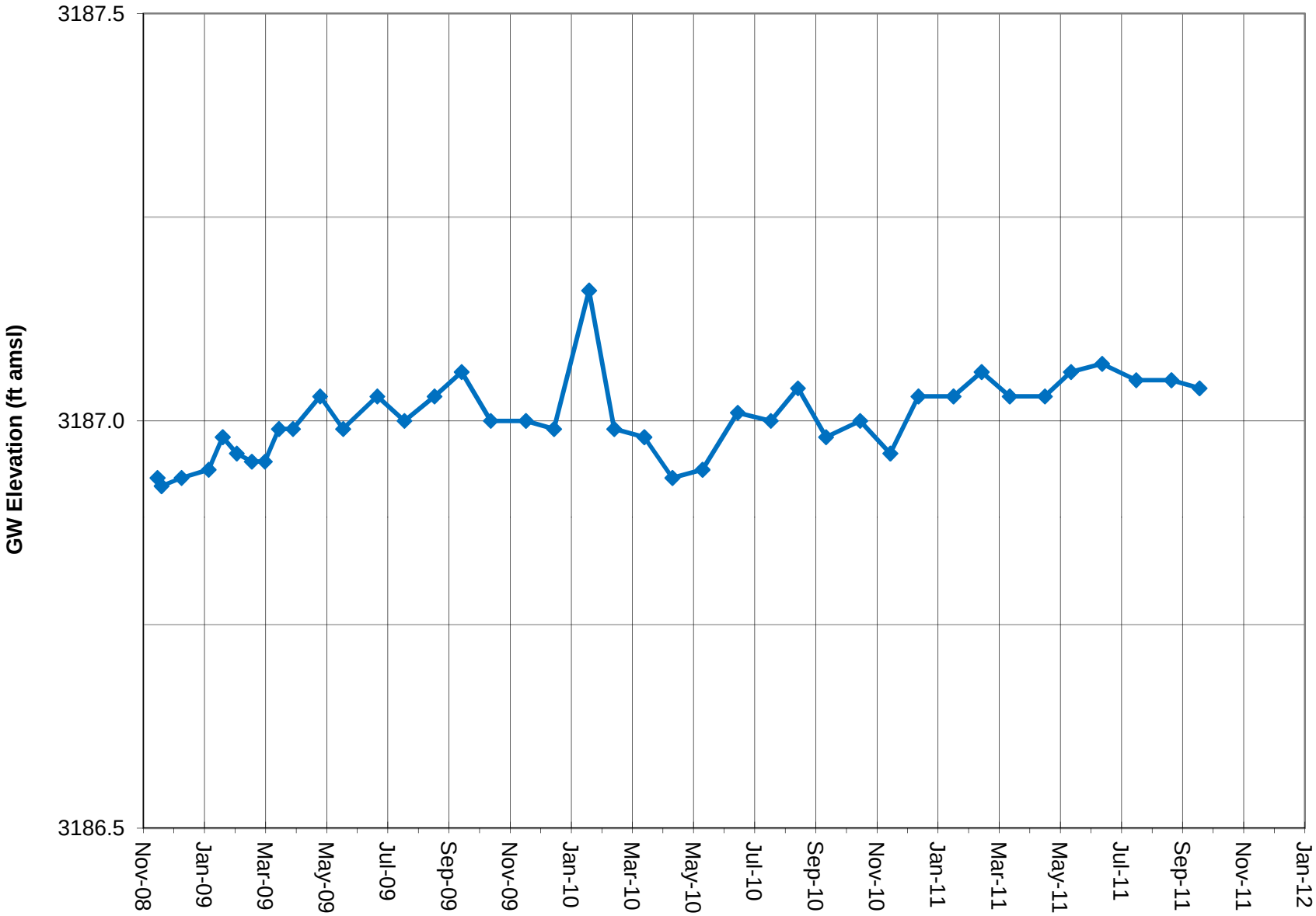
# GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV150 - Cinder Road Well




Note: Groundwater elevation data based on manual depth-to-water measurements. Lines between data points are approximations.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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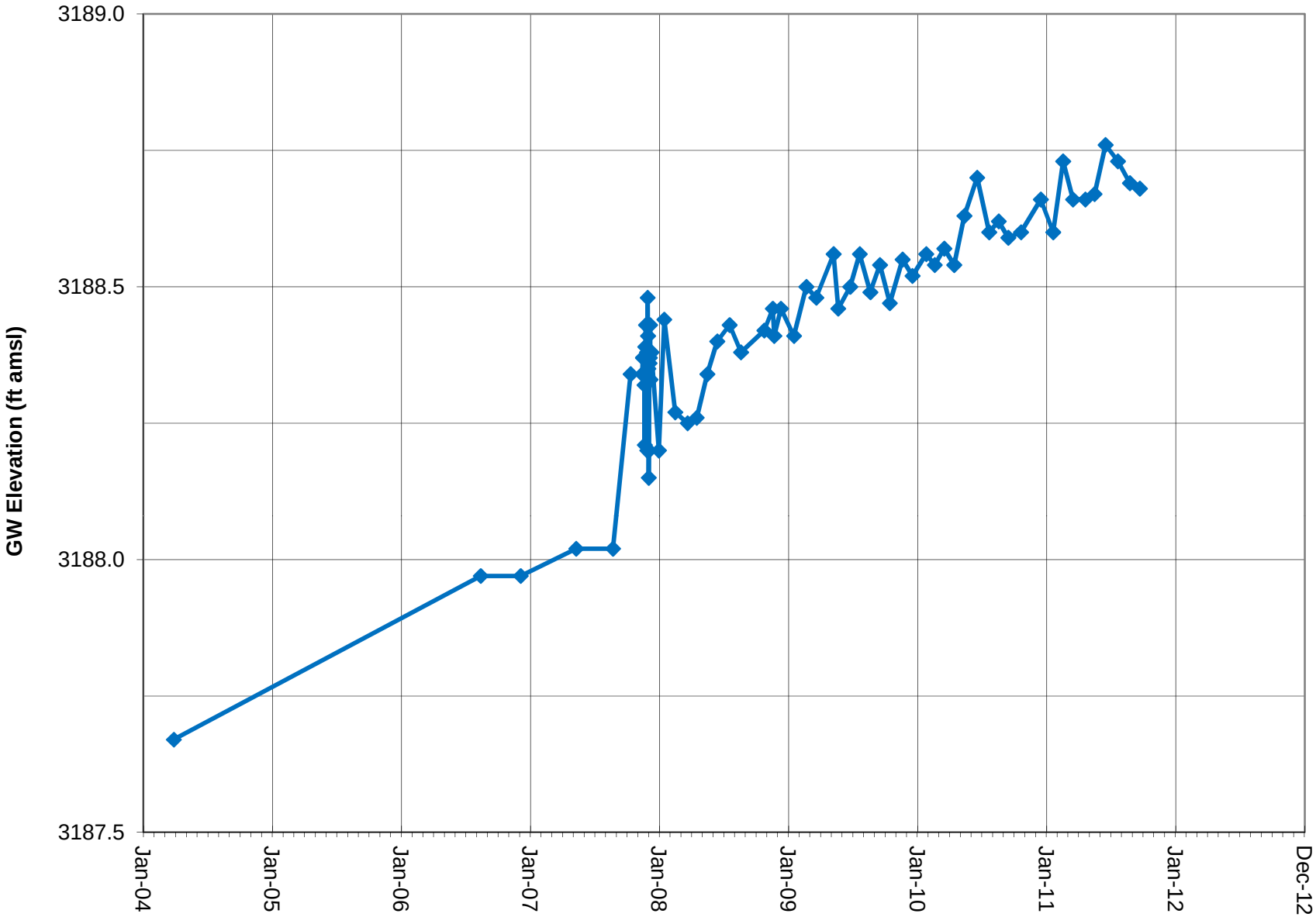
# GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV160 - 18-28 GTH Well




Note: Groundwater elevation data based on manual depth-to-water measurements.
Coso Operating Co. conducted a pump test on the Hay Ranch South Well in fourth quarter 2007.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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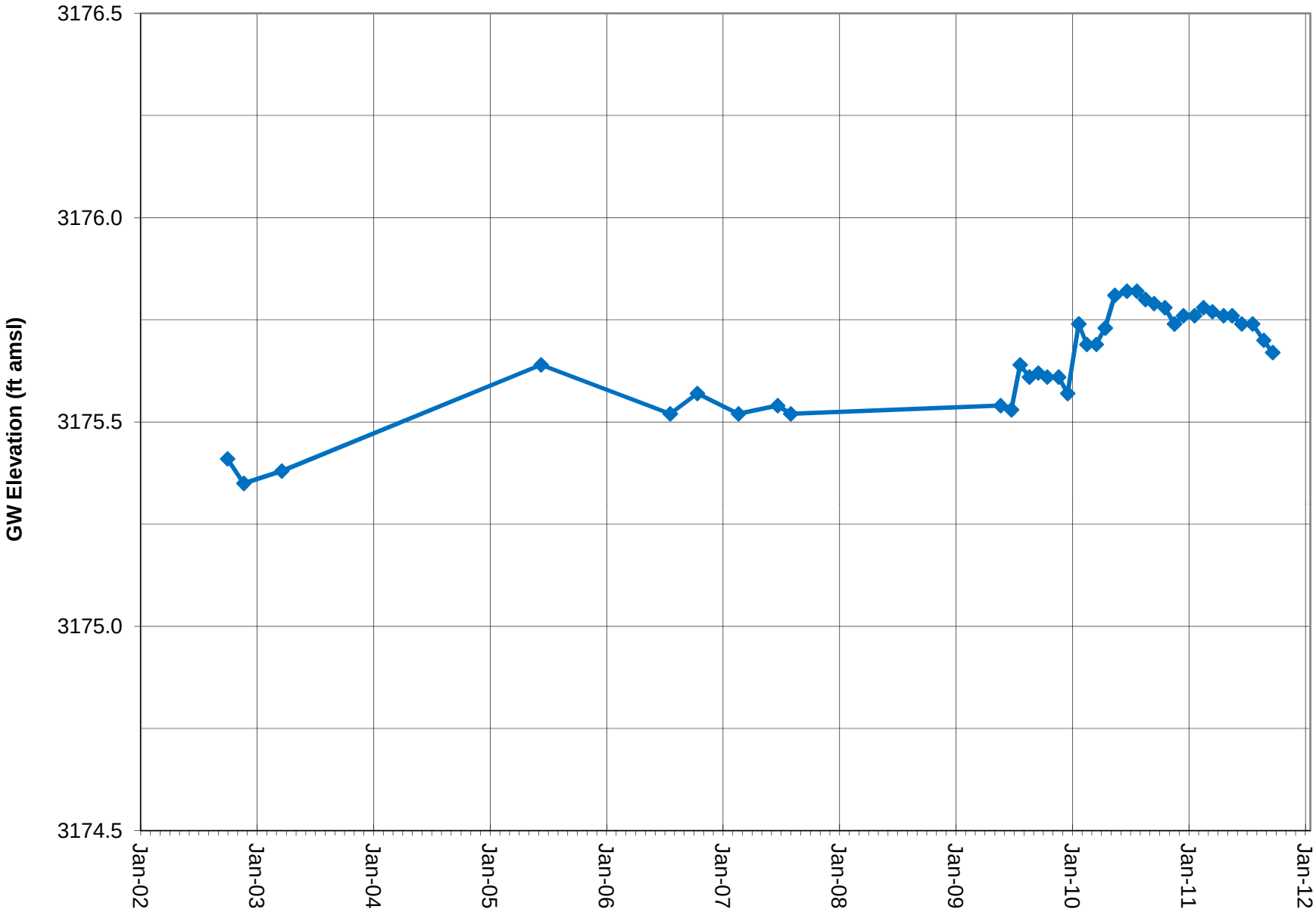
# GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV170 - Fossil Falls Well




Note: Groundwater elevation data based on manual depth-to-water measurements.
Coso Operating Co. conducted a pump test on the Hay Ranch South Well in fourth quarter 2007.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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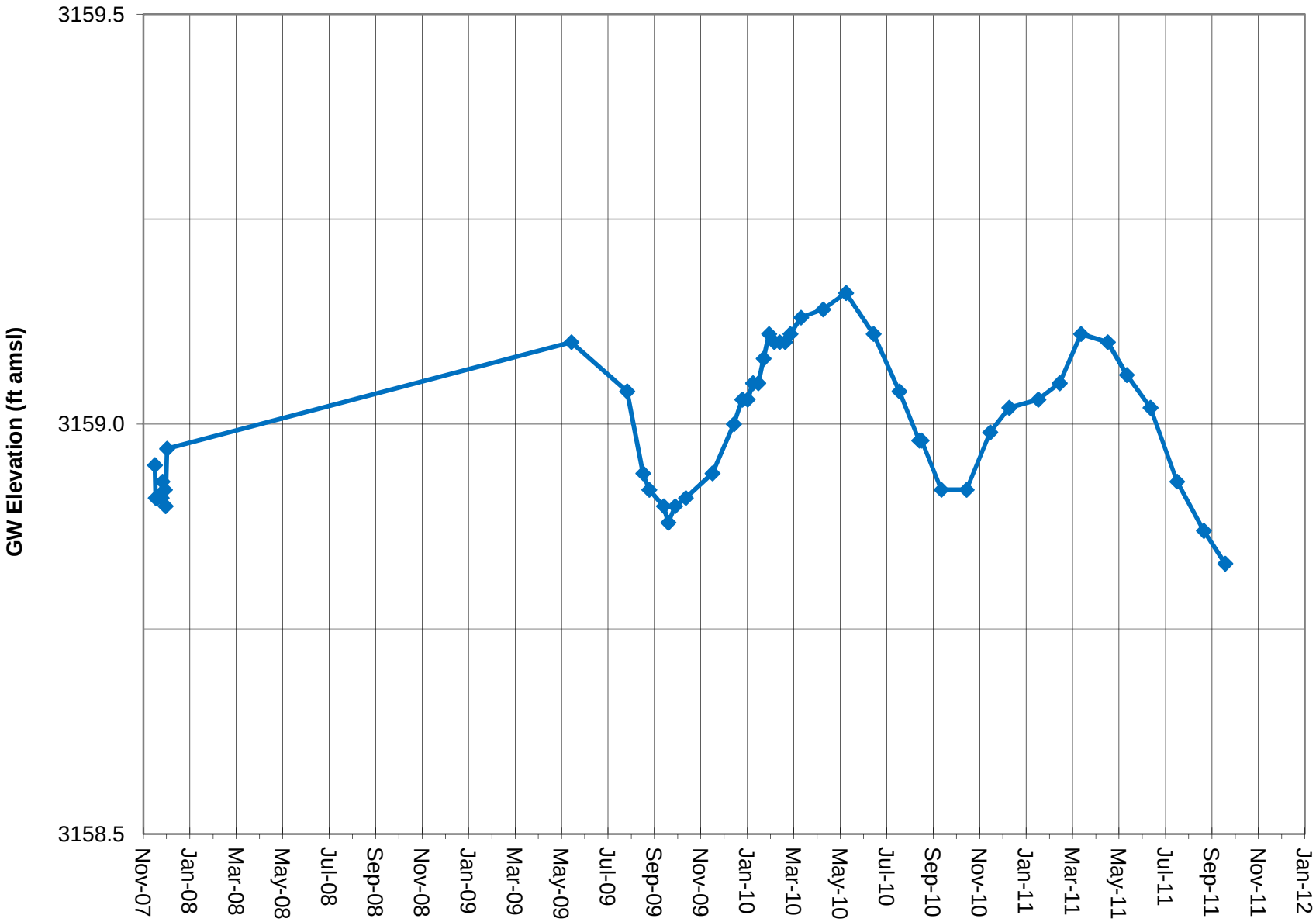
## GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV180 - Little Lake Ranch North Well




Note: Groundwater elevation data based on manual depth-to-water measurements.
Coso Operating Co. conducted a pump test on the Hay Ranch South Well in fourth quarter 2007.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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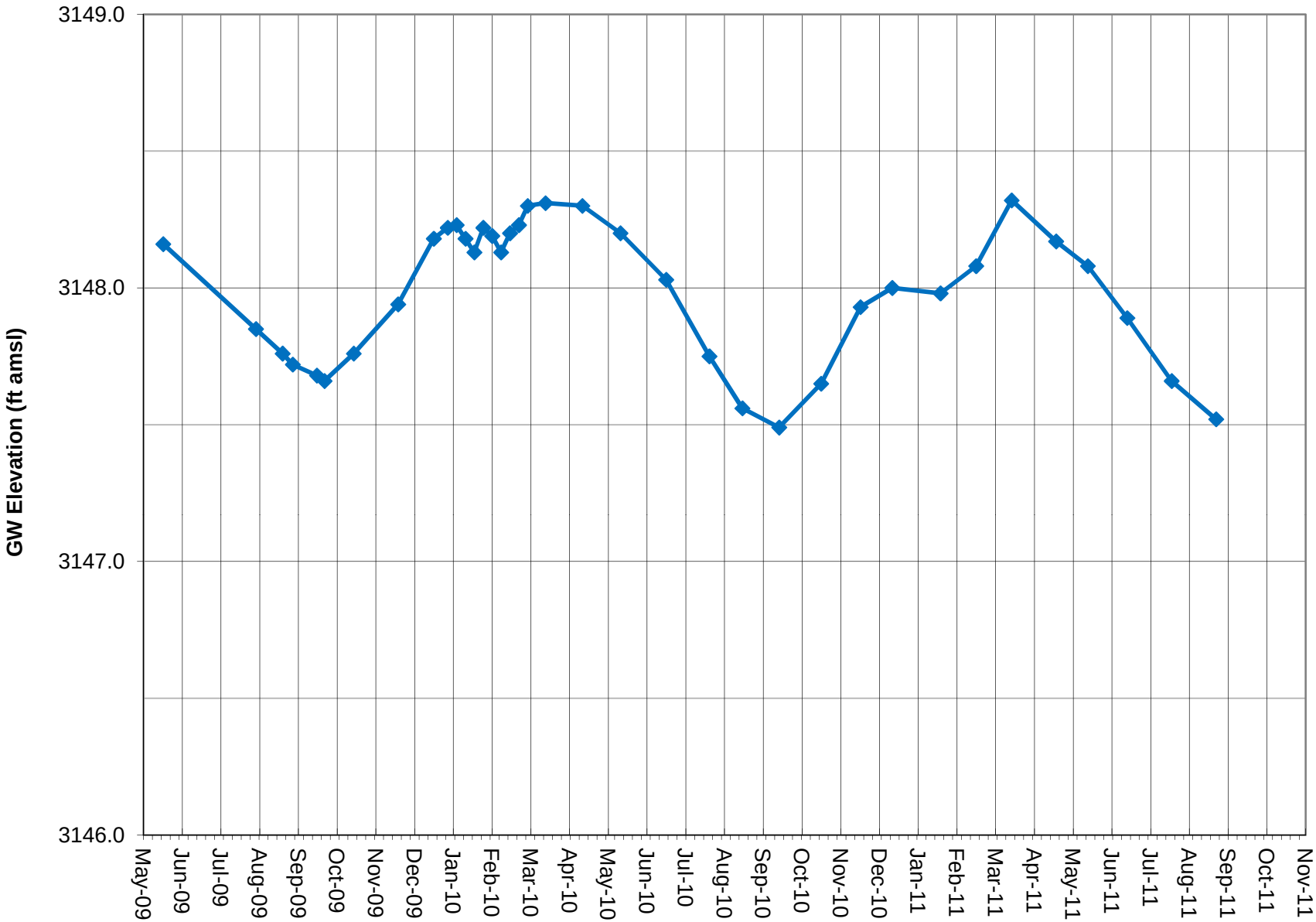
# GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV210 - Little Lake Ranch Dock Well




Note: Groundwater elevation data based on manual depth-to-water measurements. Lines between data points are approximations.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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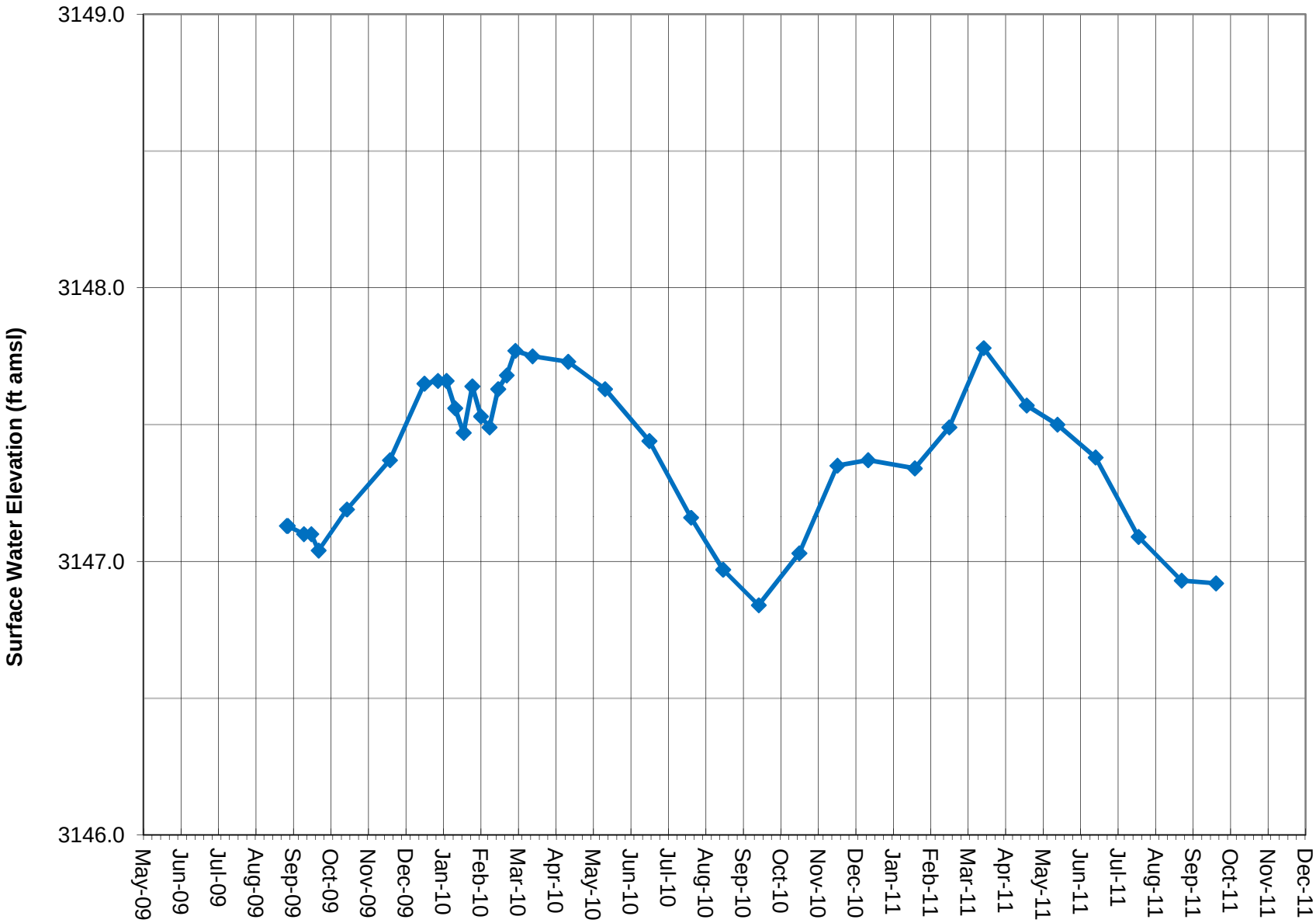
## GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV220 - LLR Stilling Well (lake surface)




Note: Surface water elevation data based on manual depth-to-water measurements. Lines between data points are approximations.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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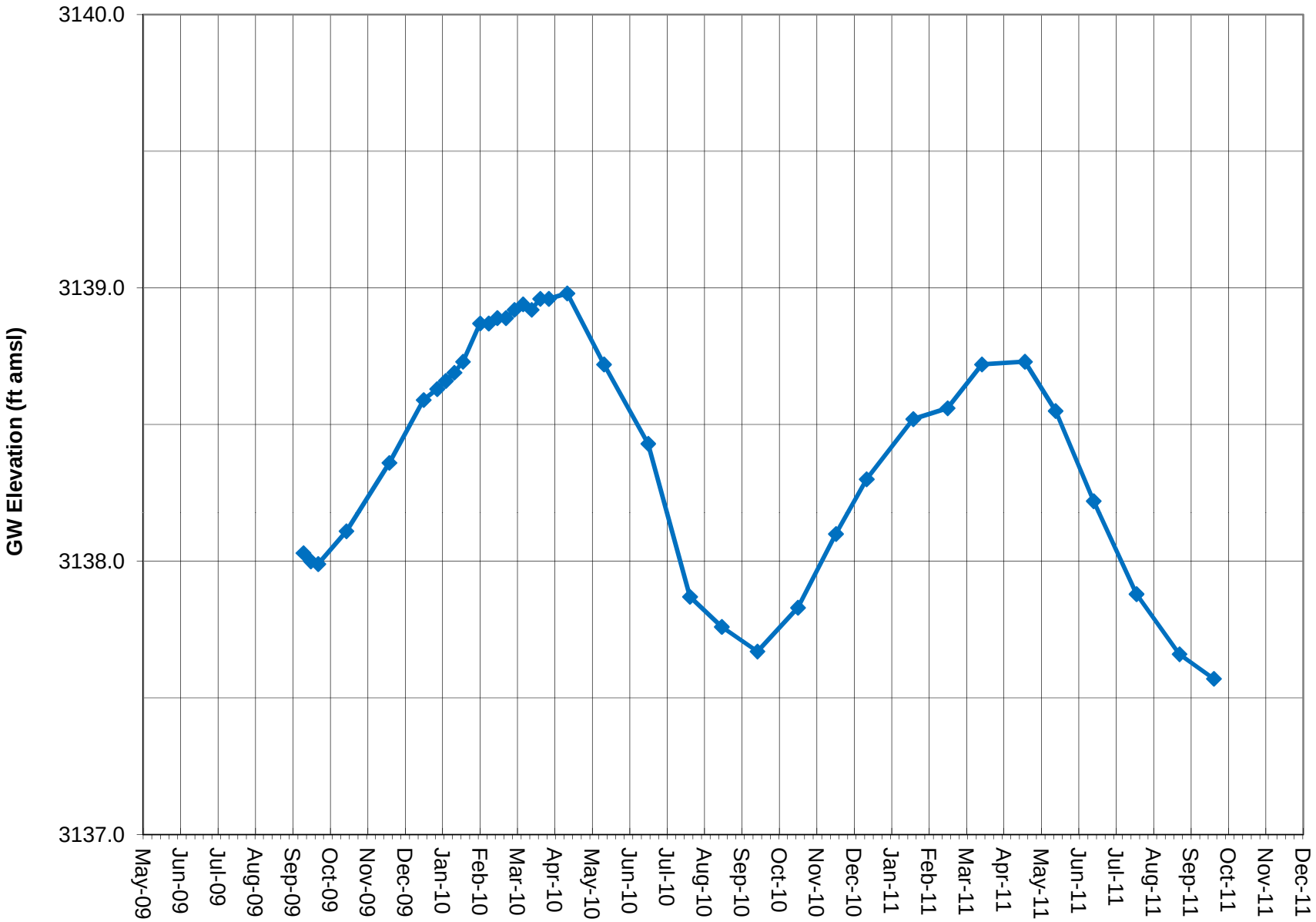
# GROUNDWATER ELEVATION DATA - Long-Term (Manual)
## RV260 - Little Lake Ranch Hotel Well




Note: Groundwater elevation data based on manual depth-to-water measurements. Lines between data points are approximations.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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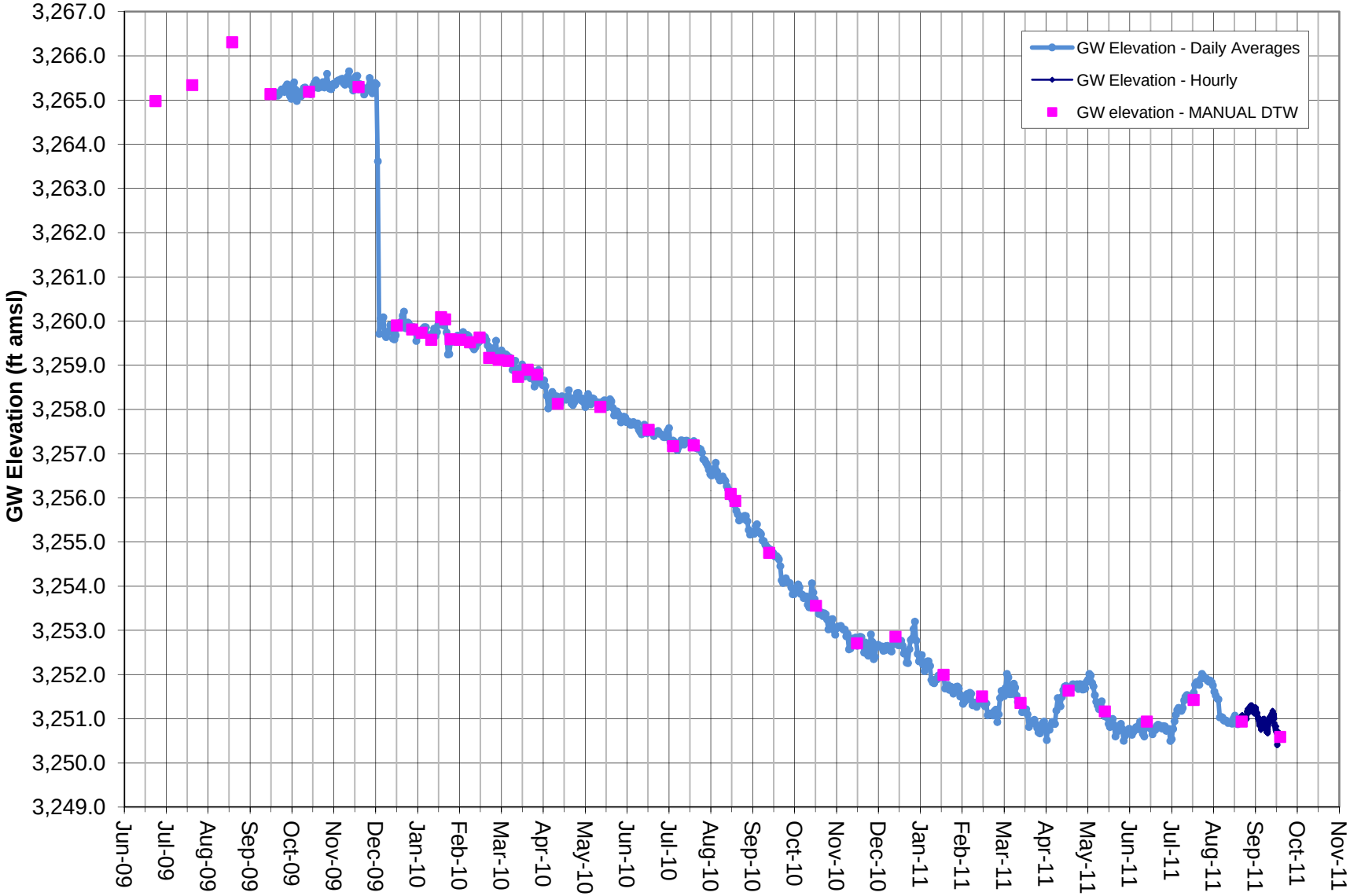
# GROUNDWATER ELEVATION DATA
# TRANSDUCER

# GROUNDWATER ELEVATION DATA - Transducer
## RV030 - Cal Pumice Well




Note: Transducer data adjusted by BaroTroll and correlated to Manual DTW.
The 12/3/09 GWE decrease was confirmed by in-well PT and manual DTW.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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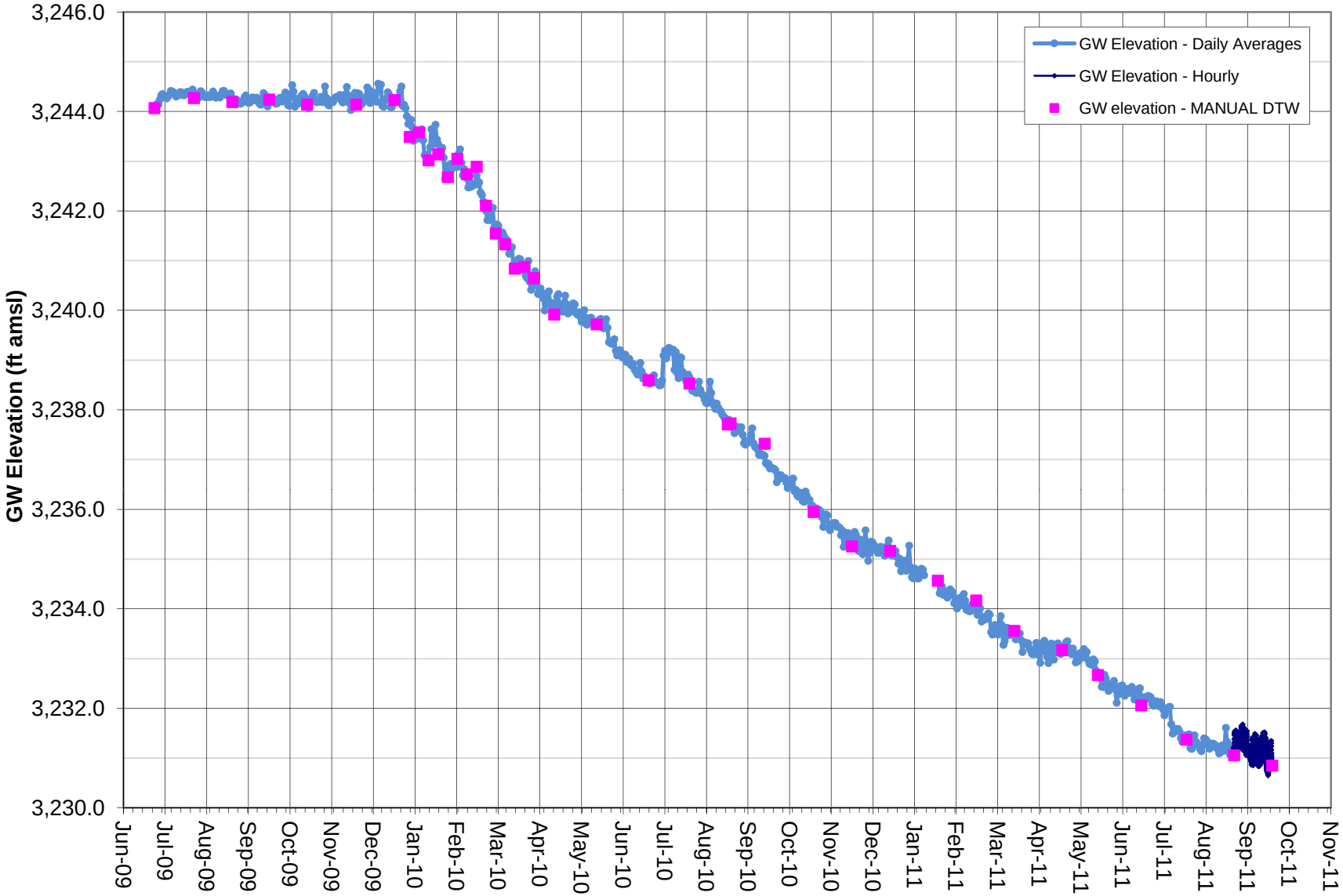
# GROUNDWATER ELEVATION DATA - Transducer
## RV060 - HR 1A Well




Note: Screened interval 170-260 feet.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.
HR 1A data gap from 1/10/11 to 1/20/11 due to transducer malfunction.

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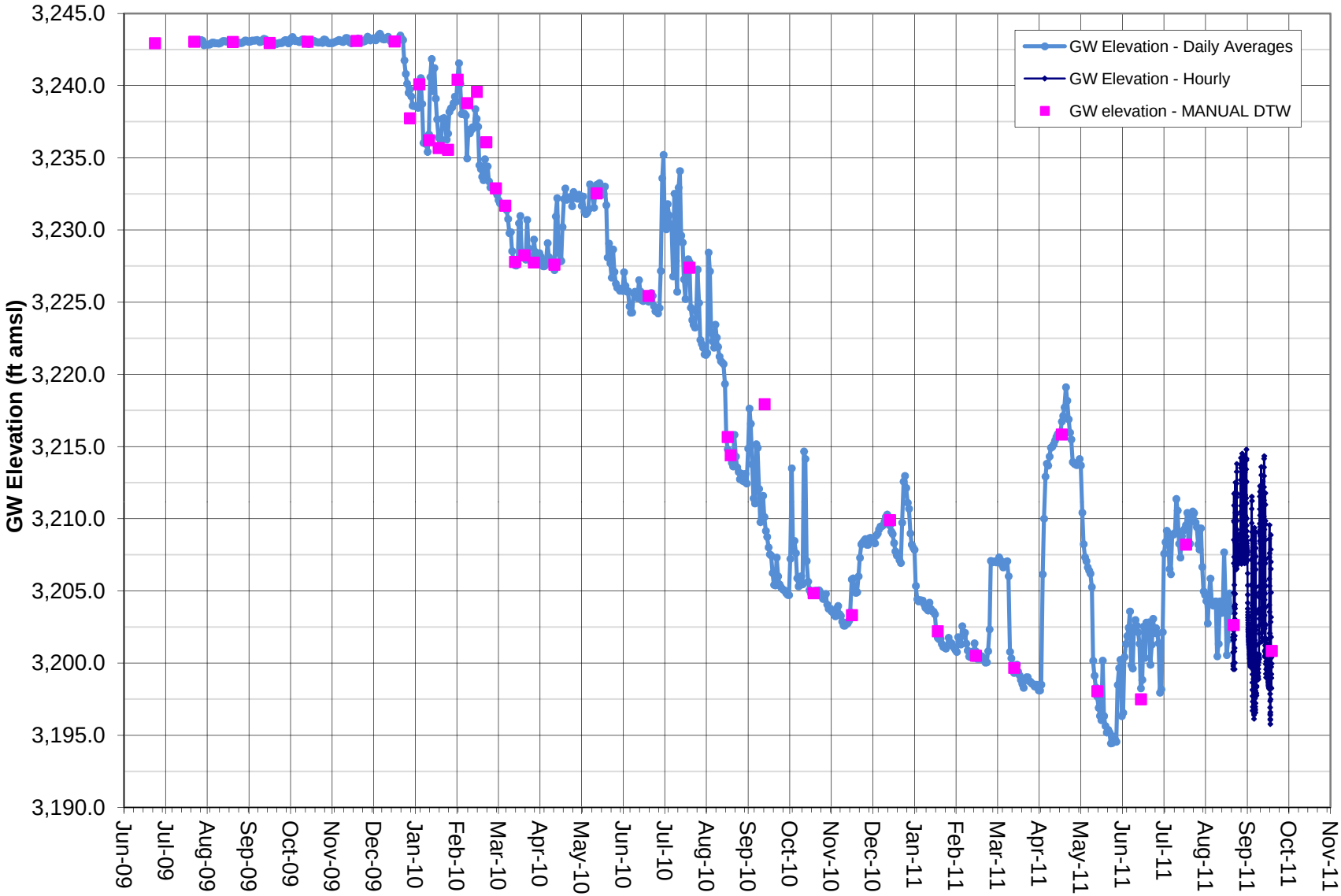
# GROUNDWATER ELEVATION DATA - Transducer
## RV061 - HR 1B Well




Note: Transducer data (absolute pressure) adjusted by data logged from BaroTroll and correlated to Manual DTW measurements.
Screened interval 490-540 feet.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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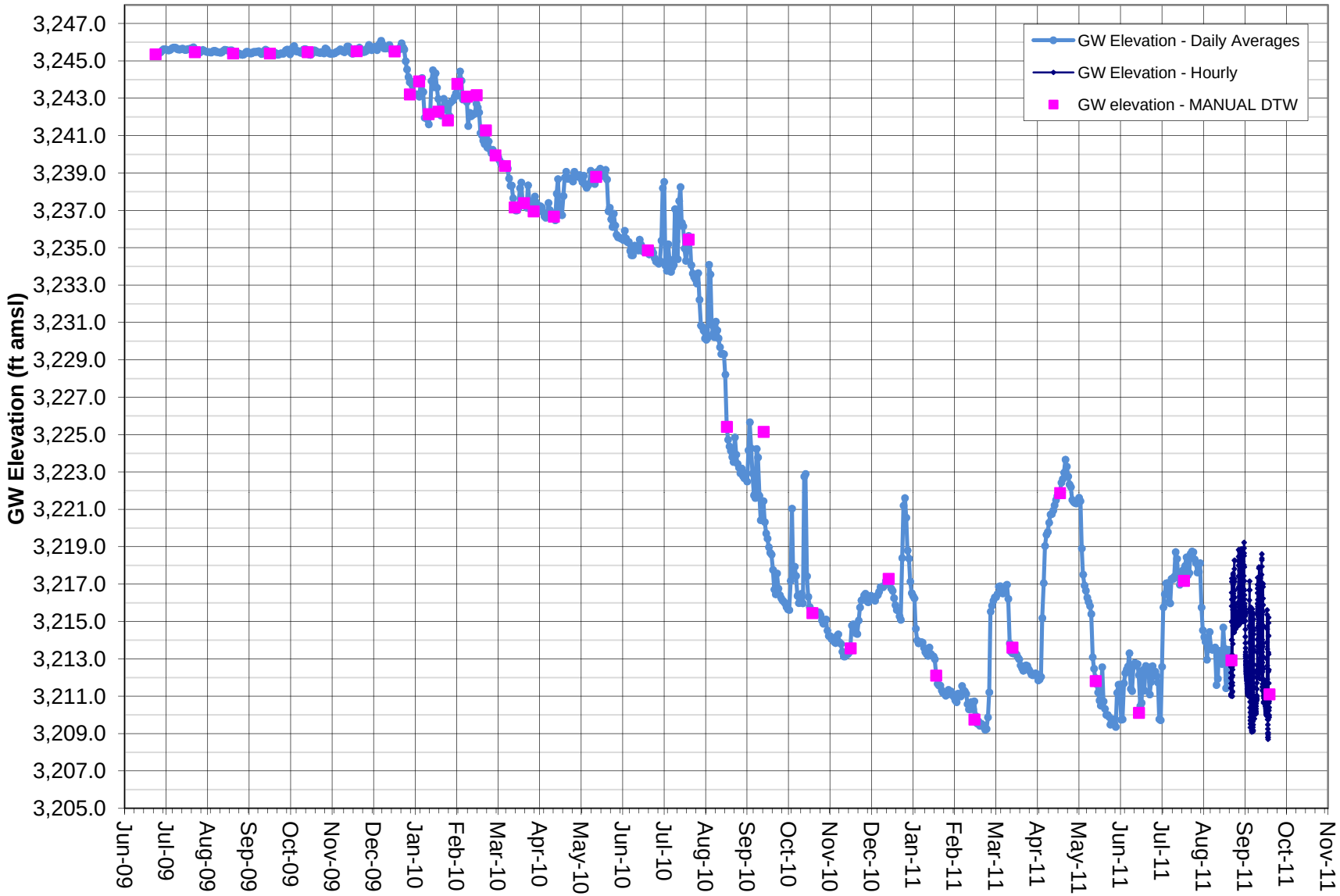
# GROUNDWATER ELEVATION DATA - Transducer
## RV062 - HR 1C Well




Note: Transducer data (absolute pressure) adjusted by data logged from BaroTroll and correlated to Manual DTW measurements.
Screened interval 340-405 feet.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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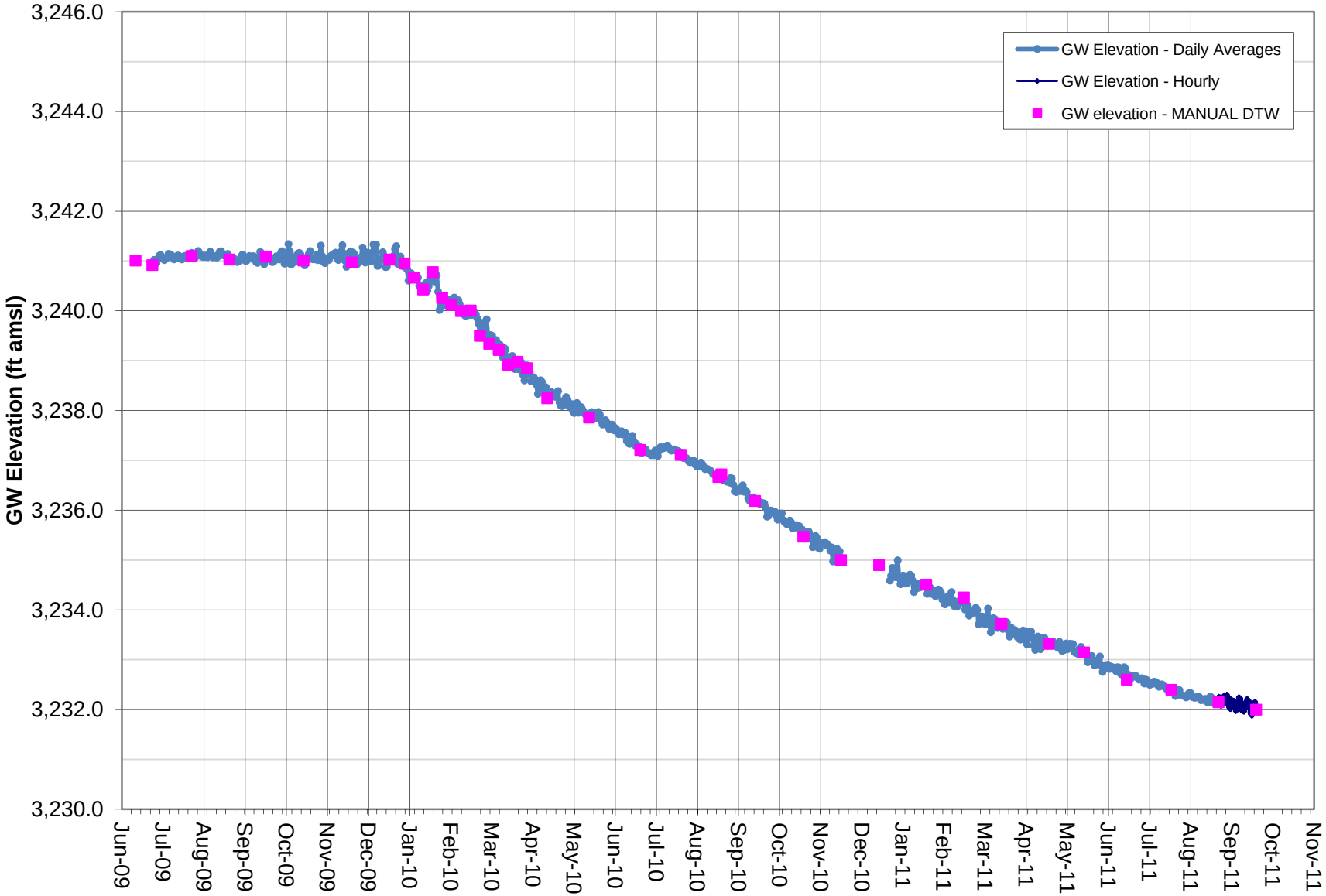
# GROUNDWATER ELEVATION DATA - Transducer
## RV080 - HR 2A Well




Note: Screened interval 180-300 feet.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.
HR 2A data gap from 11/17/10 to 12/23/10 due to transducer malfunction.

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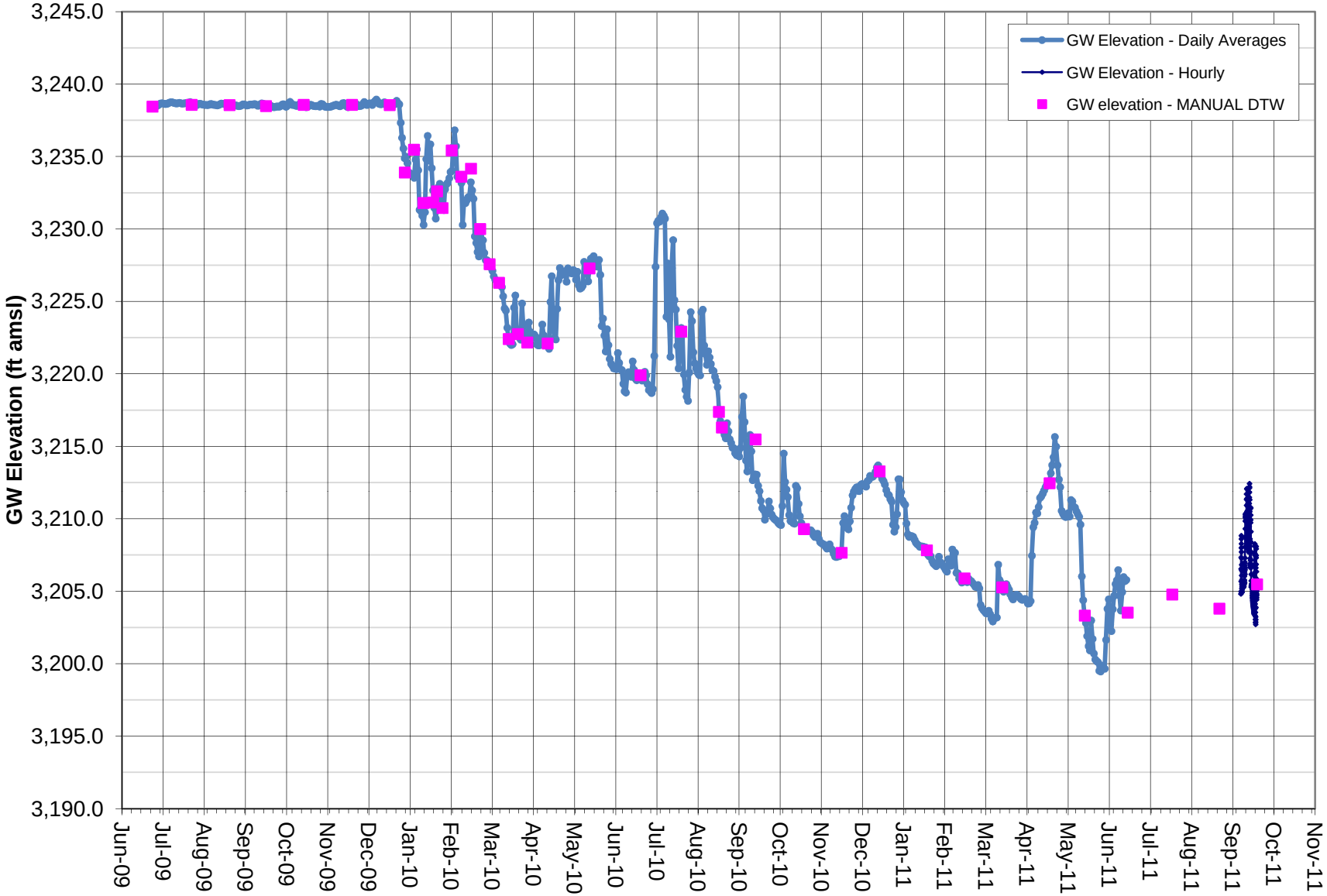
# GROUNDWATER ELEVATION DATA - Transducer
## RV081 - HR 2B Well




Note: HR 2B data gap from 6/17/11 to 9/9/11 due to transducer malfunction.
Screened interval 519-584 feet.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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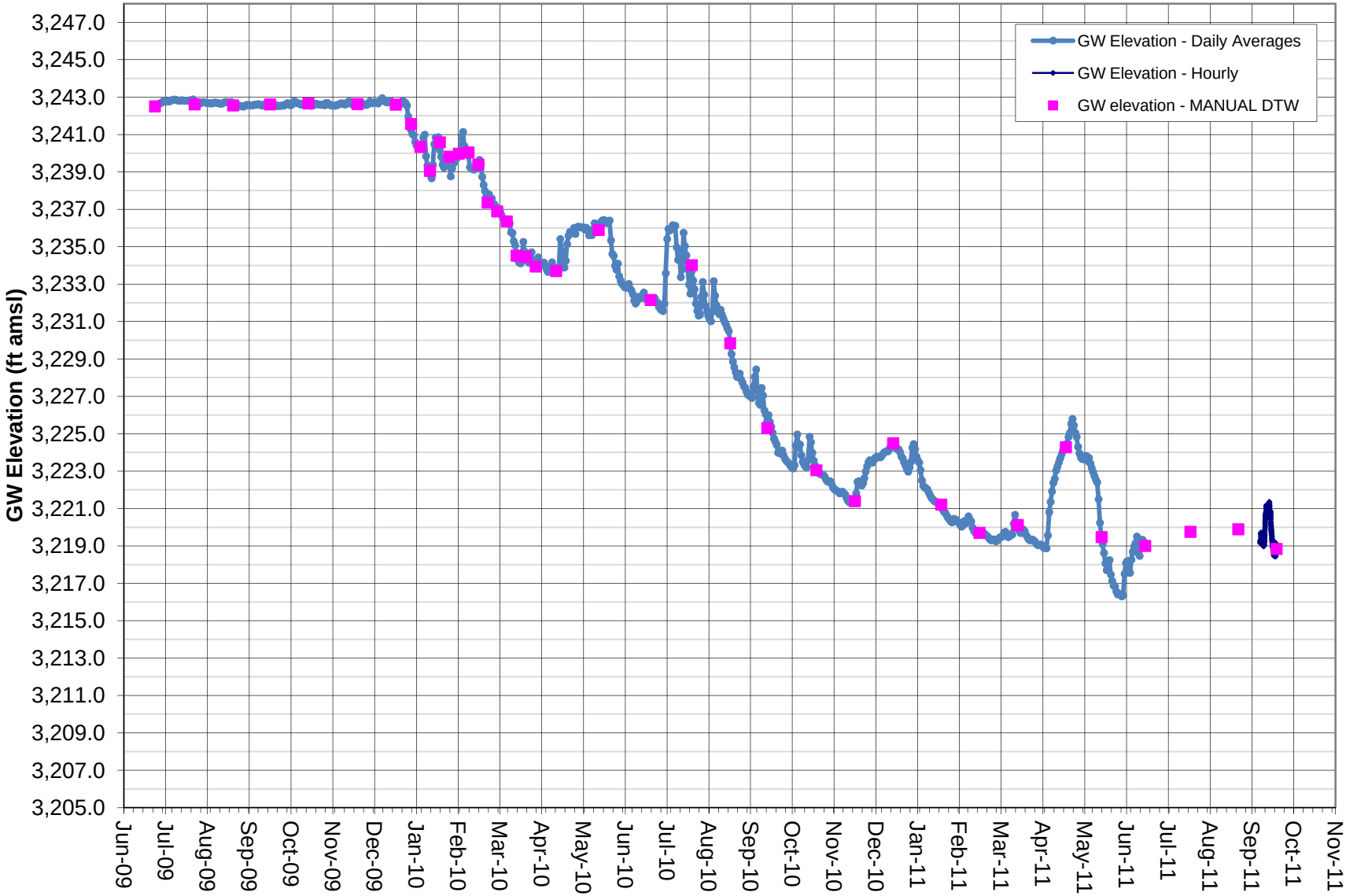
# GROUNDWATER ELEVATION DATA - Transducer
## RV082 - HR 2C Well




Note: HR 2C data gap from 6/17/11 to 9/9/11 due to transducer malfunction.
Screened interval 370-420 feet.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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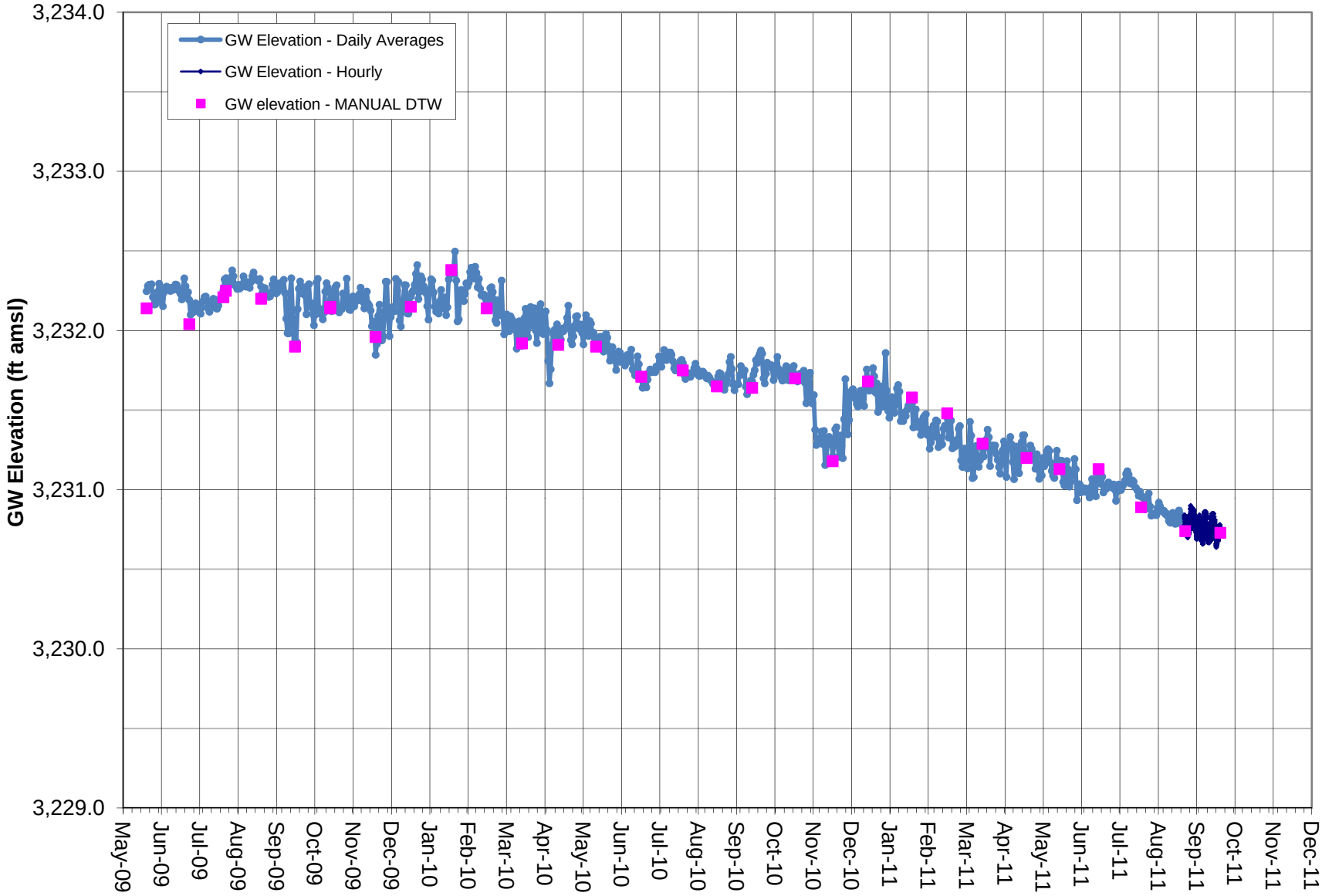
# GROUNDWATER ELEVATION DATA - Transducer
## RV090 - Coso Junction Ranch Well




Note: Transducer data (absolute pressure) adjusted by data logged from BaroTroll and correlated to Manual DTW measurements.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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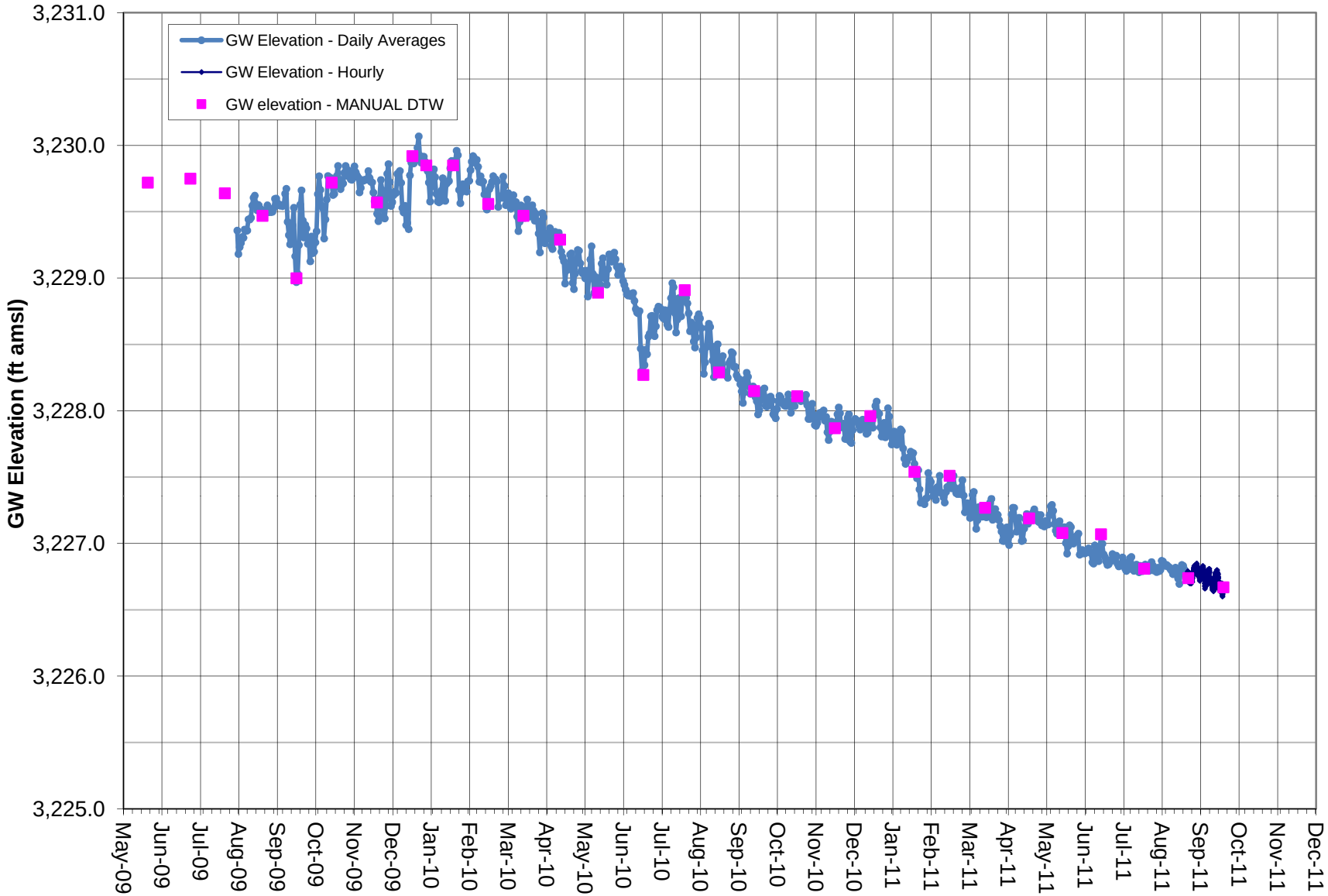
# GROUNDWATER ELEVATION DATA - Transducer
## RV100- Coso Junction Store#1 Well




Note: Transducer data (absolute pressure) adjusted by data logged from BaroTroll and correlated to Manual DTW measurements.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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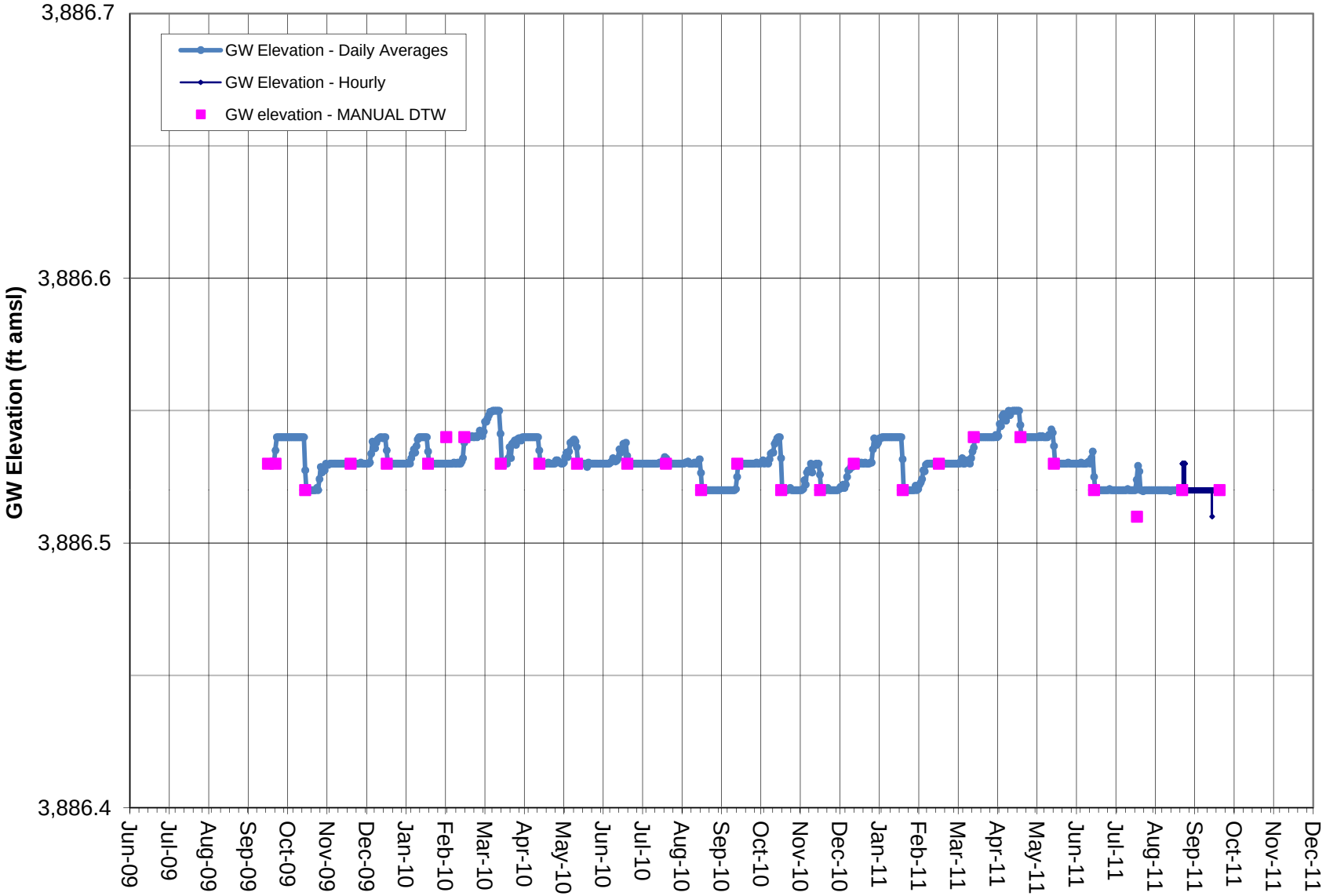
# GROUNDWATER ELEVATION DATA - Transducer
## RV110 - Davis Ranch North Well




Note: Vented transducer data correlated to Manual DTW measurements.
DTW measured to .01 foot; GWE calculated using approximate surface elevation.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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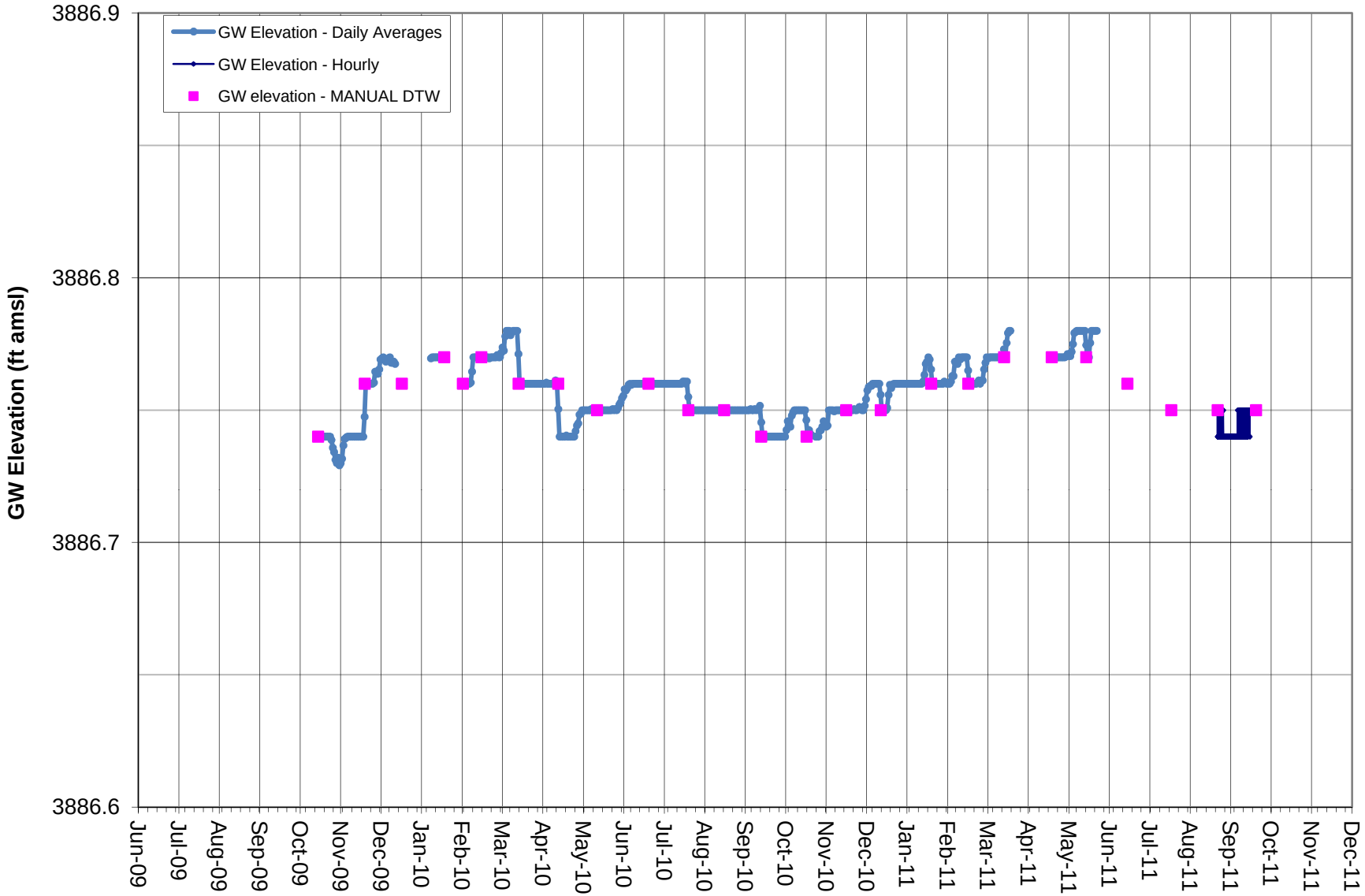
# GROUNDWATER ELEVATION DATA - Transducer
## RV111 - Davis Ranch South Well




Note: Vented transducer data correlated to Manual DTW measurements.
DR South data gaps from 12/12/09 to 2/5/10, and 3/21/11 to 8/25/11 due to transducer malfunction.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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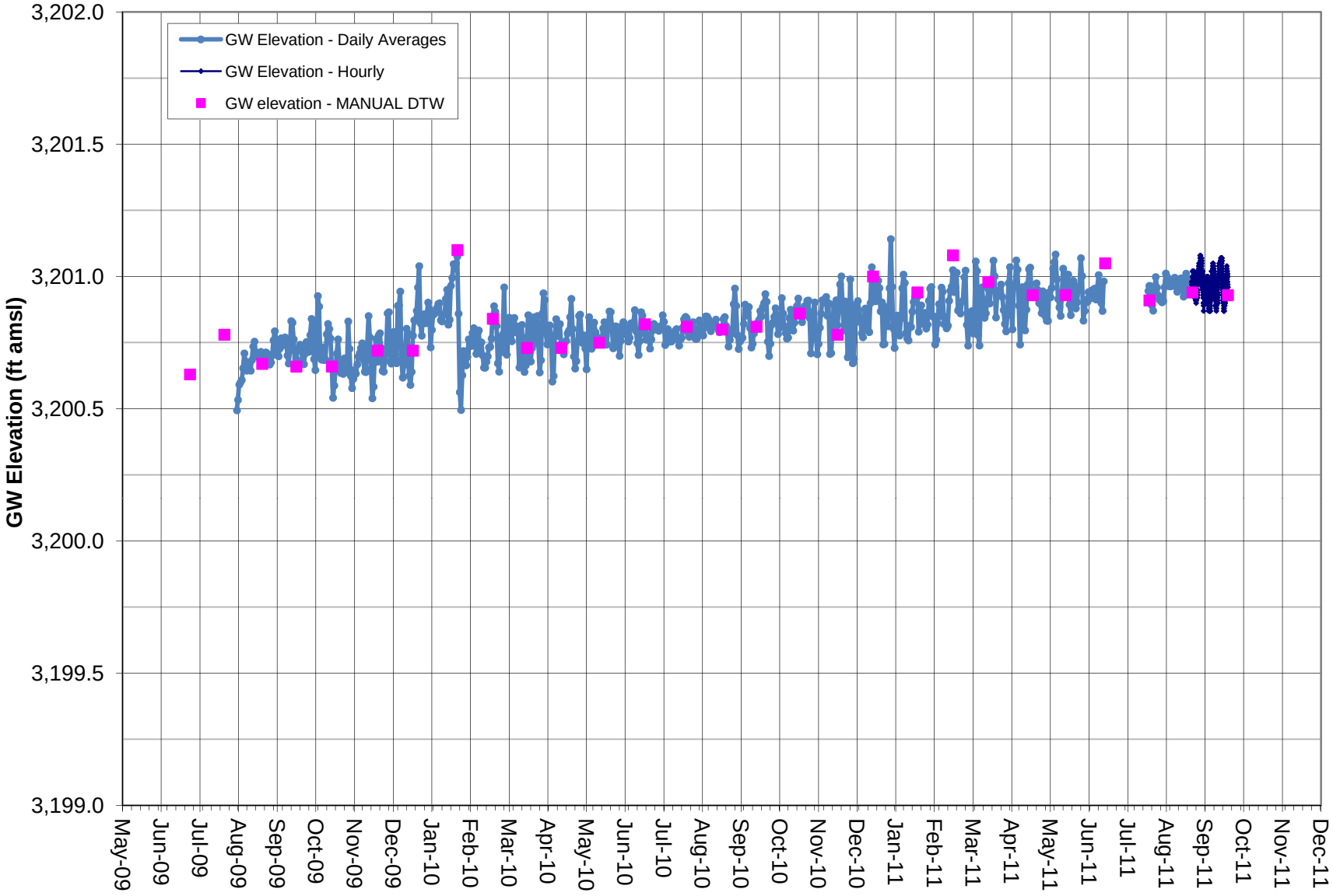
# GROUNDWATER ELEVATION DATA - Transducer
## RV120 - Red Hill Well




Note: Red Hill data gap from 6/17/11 to 7/20/11 due to transducer malfunction.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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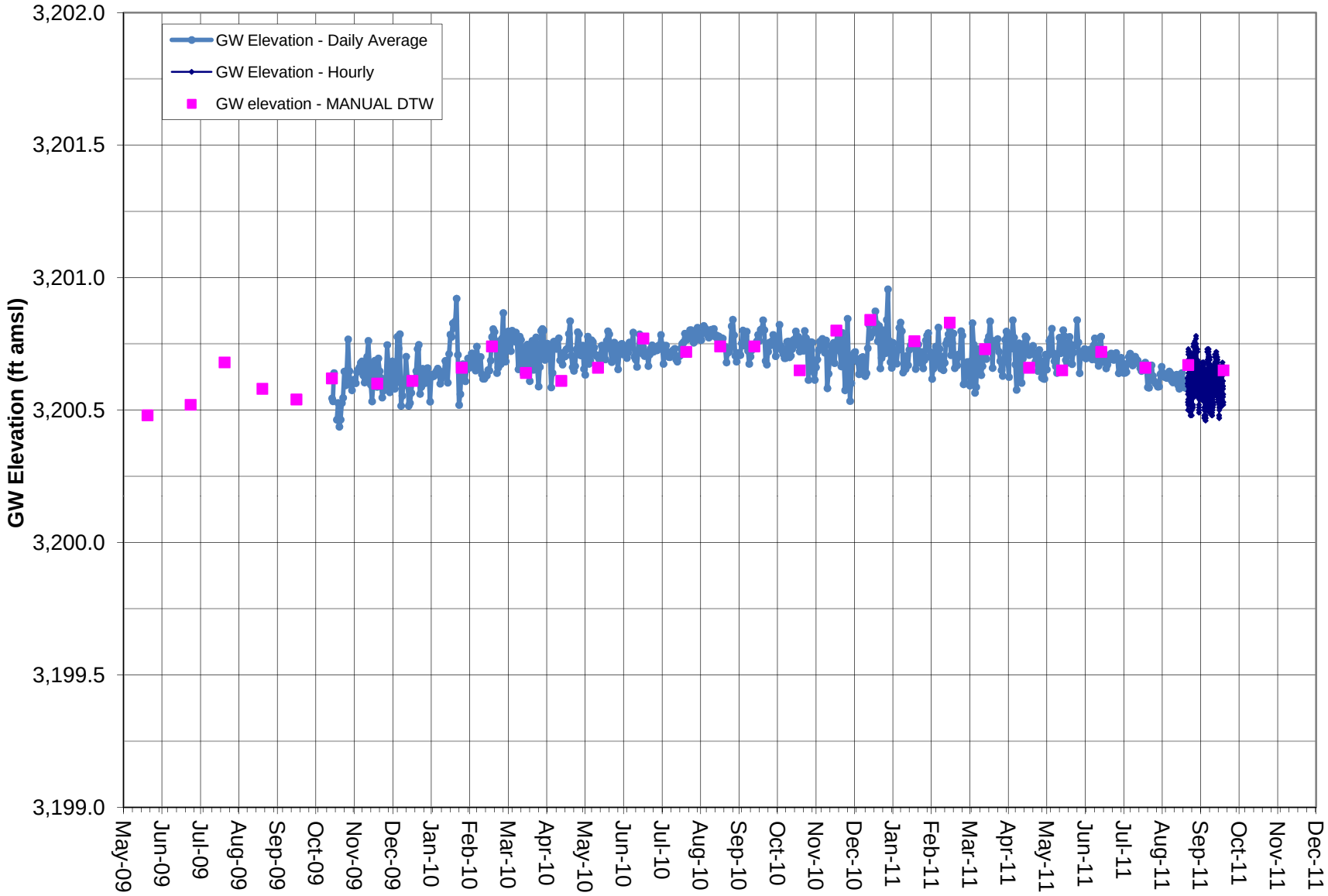
# GROUNDWATER ELEVATION DATA - Transducer
## RV140 - Lego Well




Note: Transducer data adjusted by BaroTroll and correlated to Manual DTW .
Data from 10/17/09 is omtitted as PT slipped less than 1 foot.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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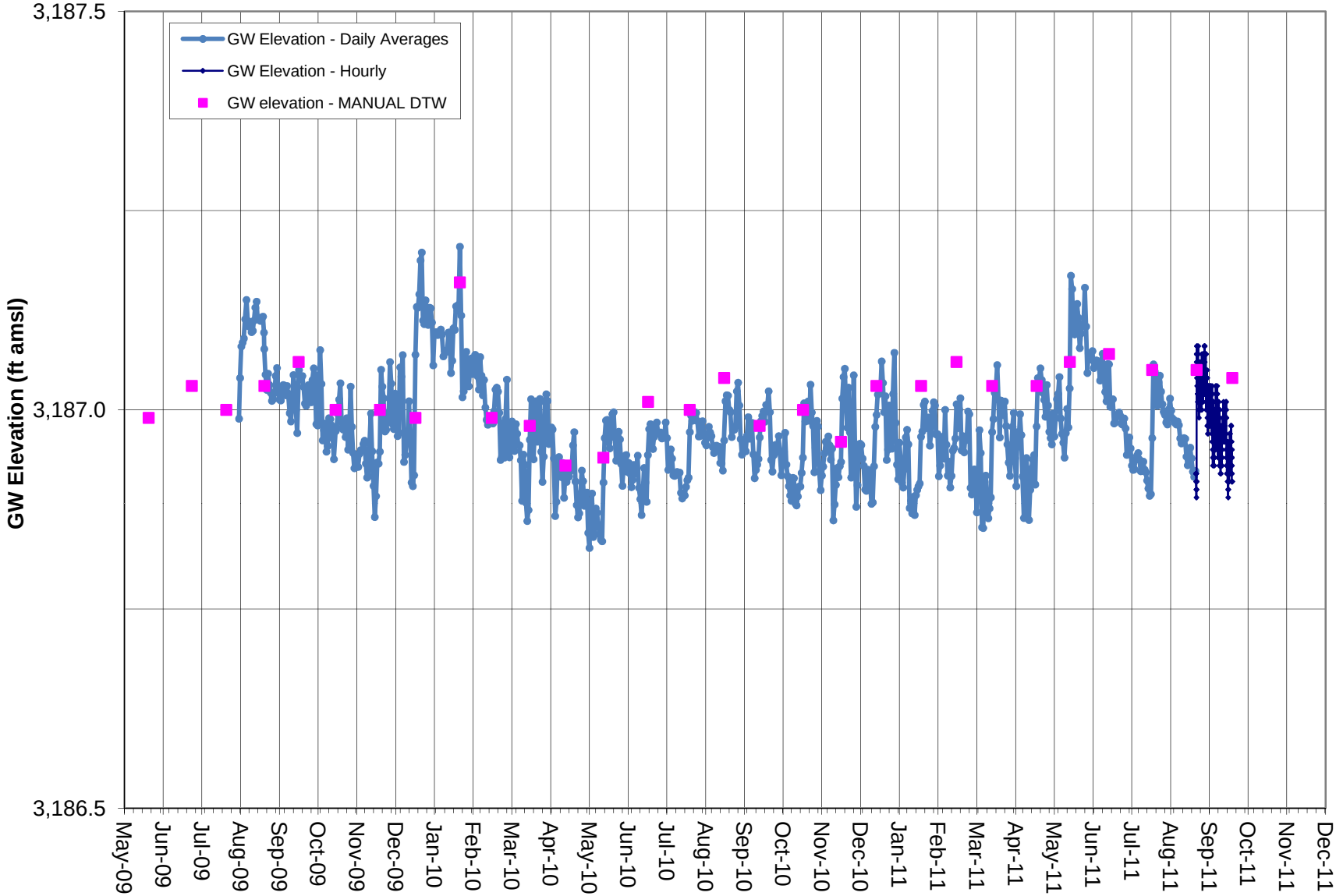
# GROUNDWATER ELEVATION DATA - Transducer
## RV150 - Cinder Road Well




Note: Transducer data (absolute pressure) adjusted by data logged from BaroTroll and correlated to Manual DTW measurements.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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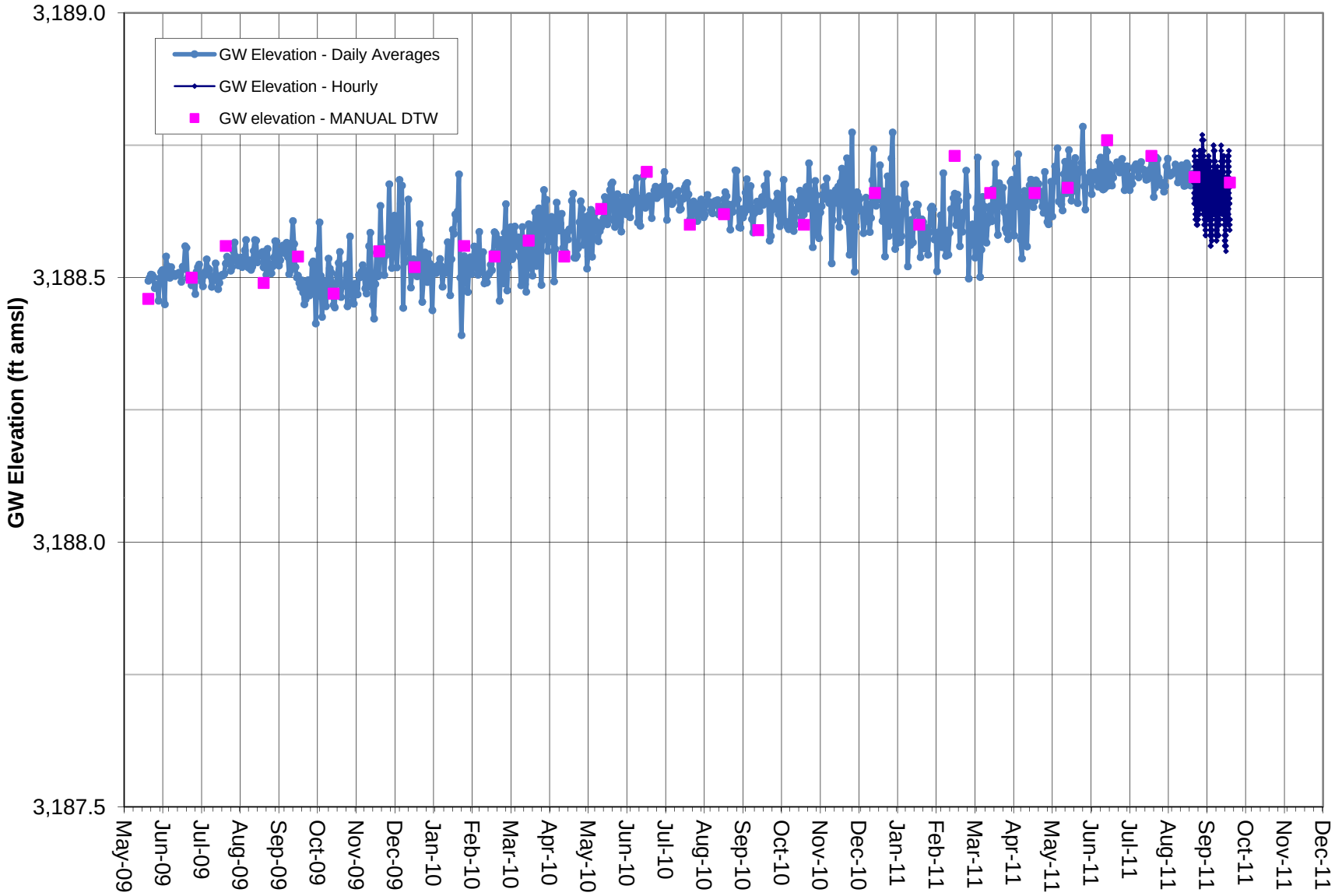
# GROUNDWATER ELEVATION DATA - Transducer
## RV160 - 18-28 GTH Well




Note: Transducer data (absolute pressure) adjusted by data logged from BaroTroll and correlated to Manual DTW measurements.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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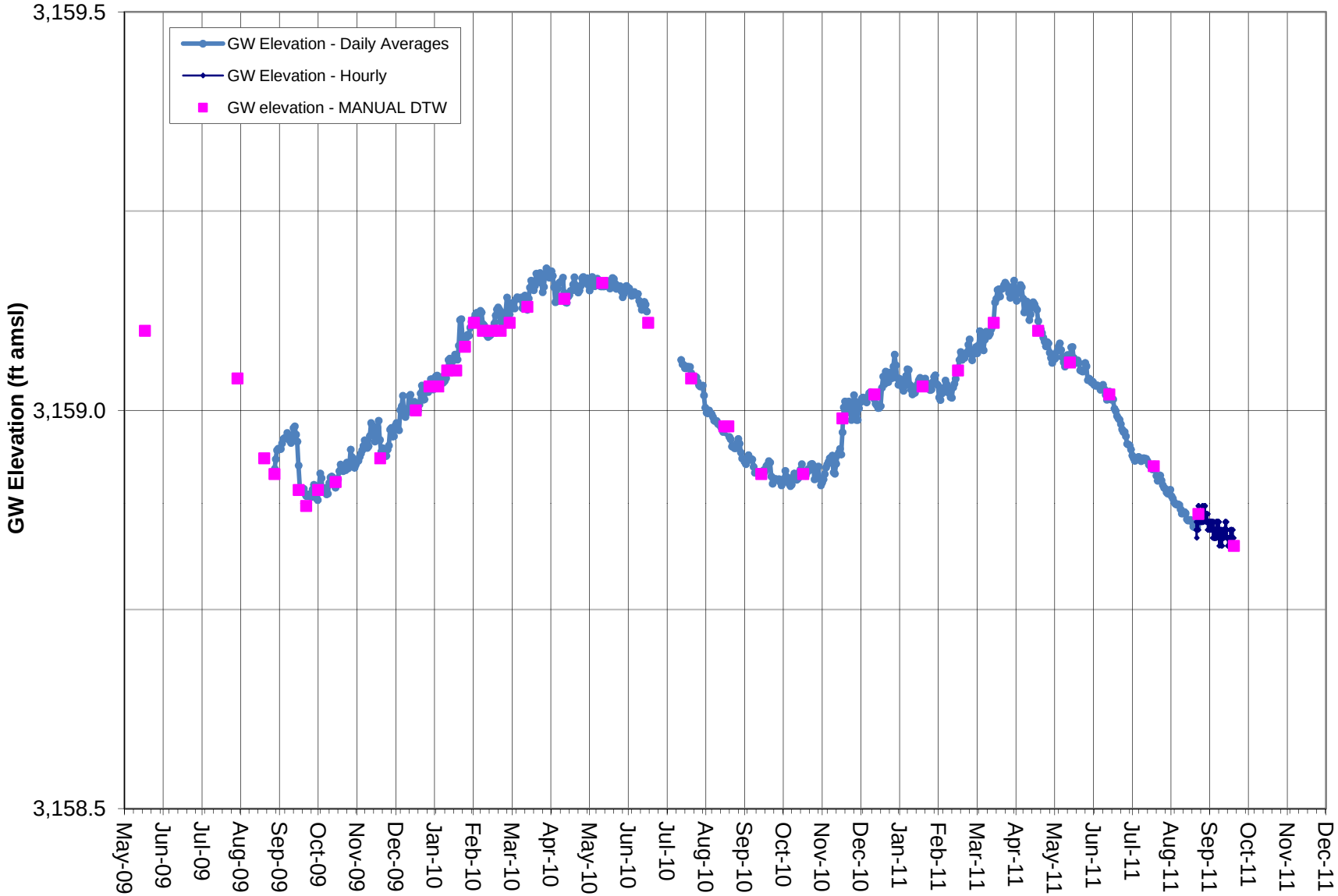
# GROUNDWATER ELEVATION DATA - Transducer
## RV180 - Little Lake Ranch North Well




Note: Vented transducer data correlated to Manual DTW measurements.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.
LLR North data gap from 6/18/10 to 7/13/10 due to transducer malfunction.

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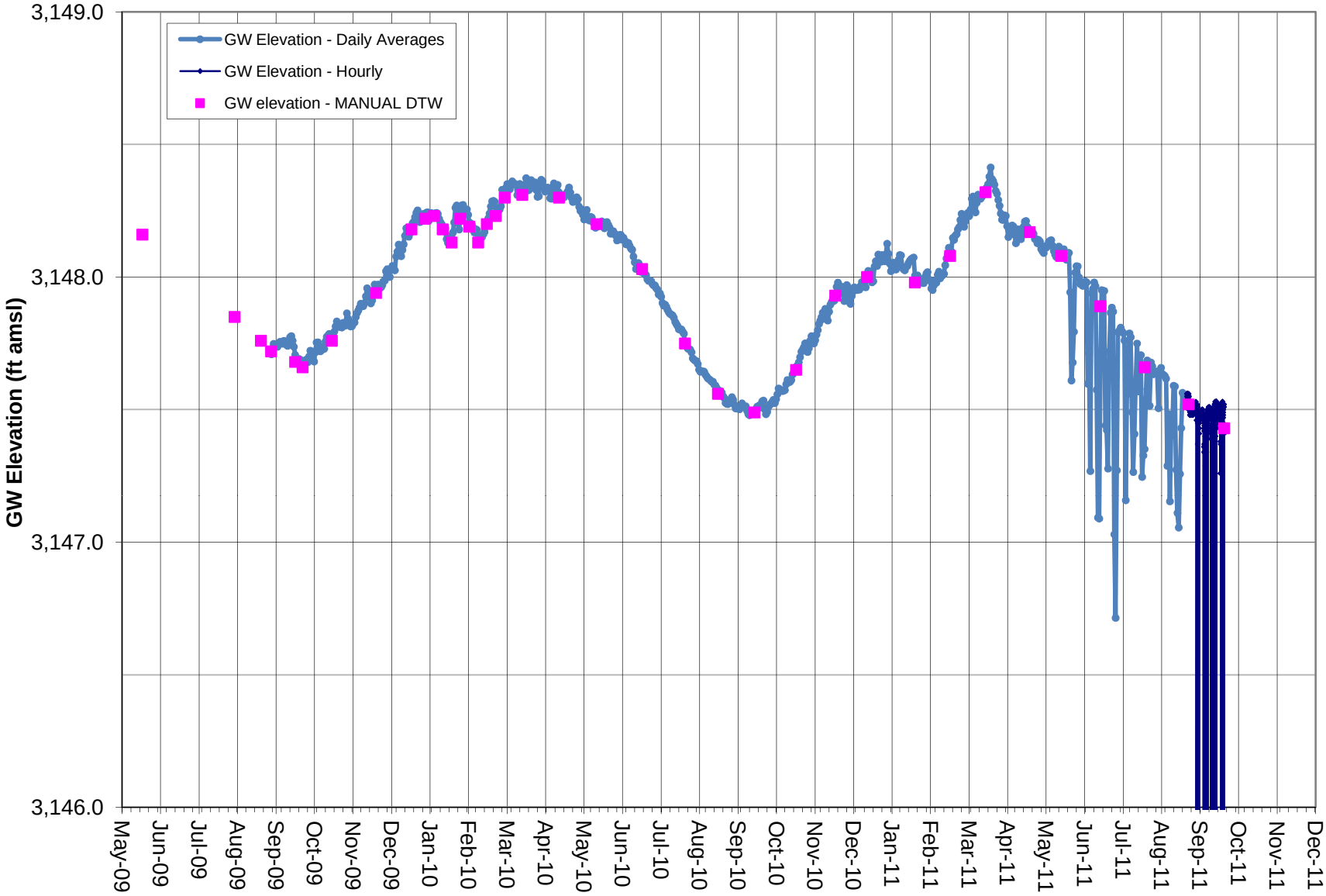
# GROUNDWATER ELEVATION DATA - Transducer
## RV210 - Little Lake Ranch Dock Well




Note: Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.
GWE drops from 5/16/11 to date caused by active water management (pumping) of well by LLR staff.

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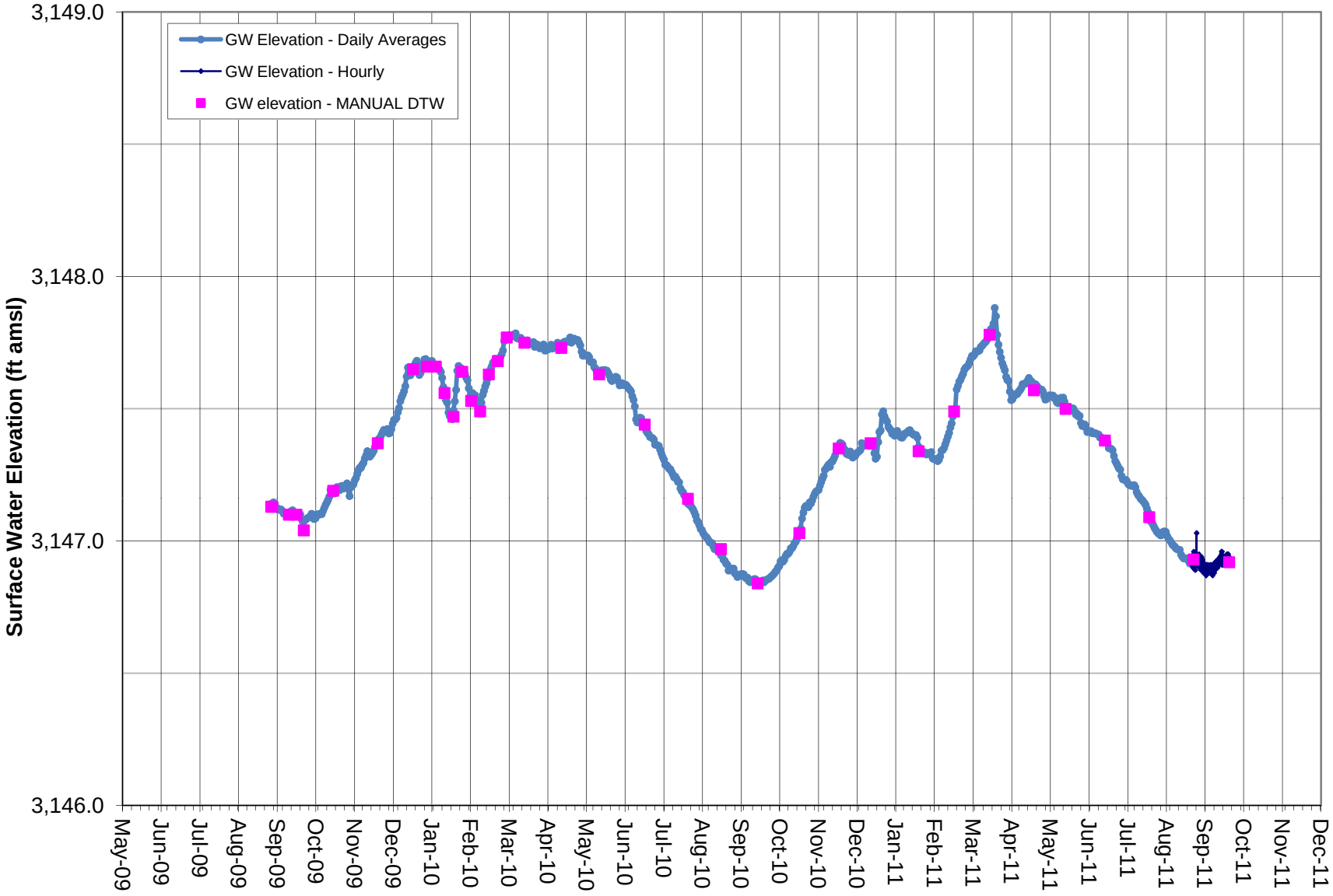
# GROUNDWATER ELEVATION DATA - Transducer
## RV220 - Little Lake Ranch Stilling Well (lake surface)




Note: Vented transducer data correlated to Manual DTW measurements. Represents surface water elevation of Little Lake.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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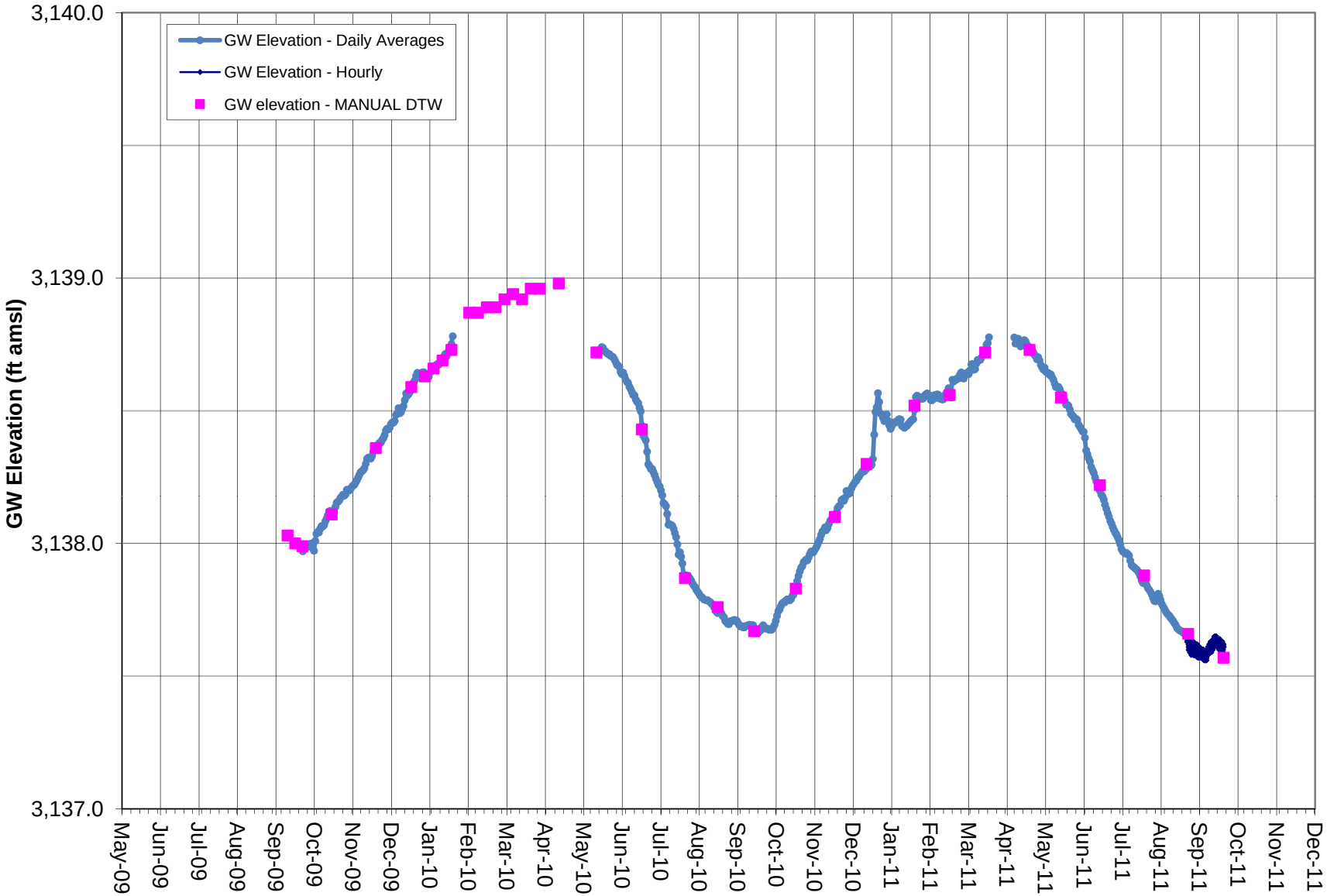
# GROUNDWATER ELEVATION DATA - Transducer
## RV260 - Little Lake Ranch Hotel Well




Note: Vented transducer data correlated to Manual DTW measurements.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.
Transducer reads occuring when groundwater level is below top of well casing.

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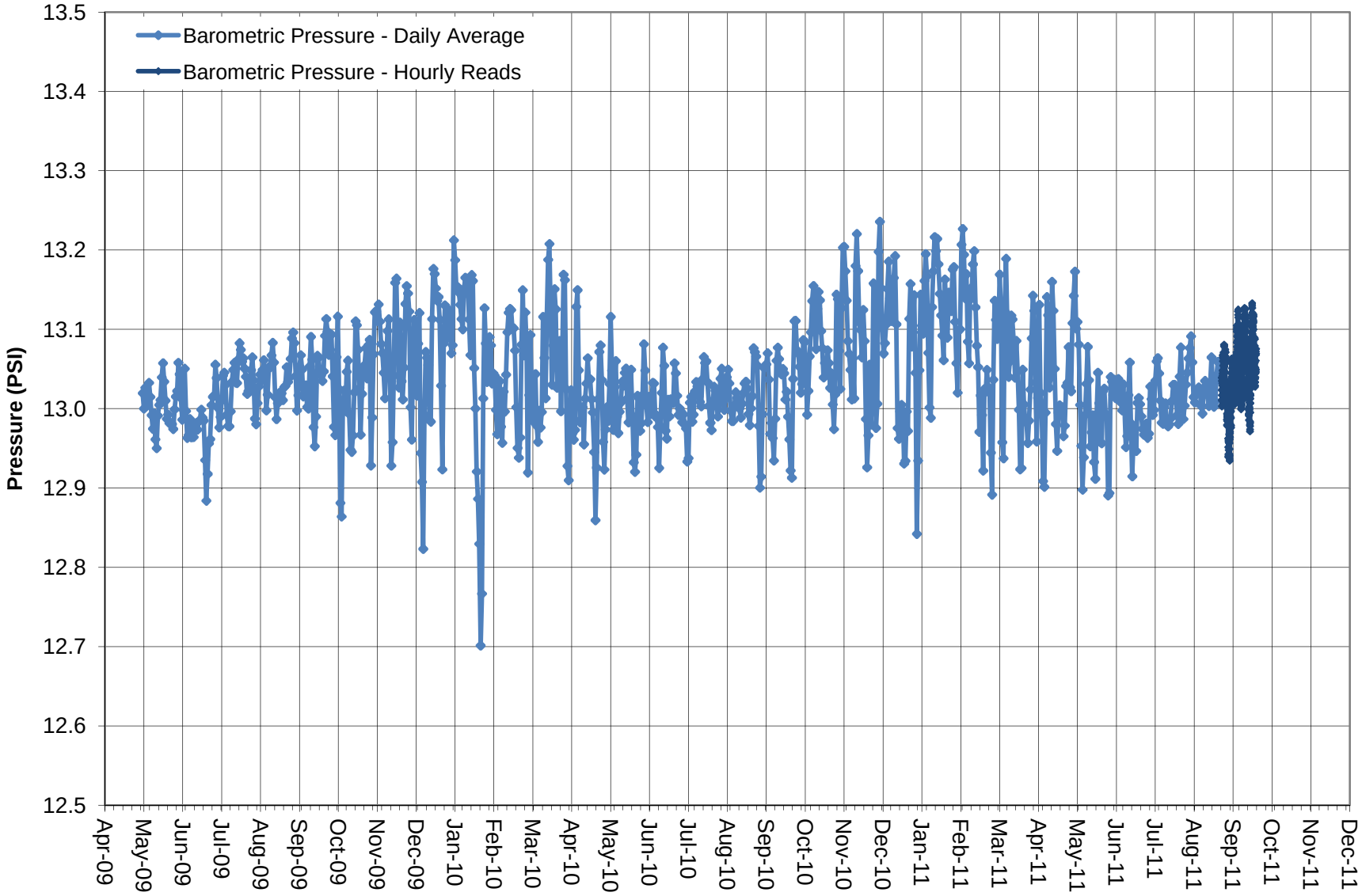
## BAROMETRIC PRESSURE
## as Logged by BaroTroll




Note: BaroTroll located in well casing of well HR-2B. Records atmospheric pressure.
Significant pressure dip in January 2010 caused by large storm.

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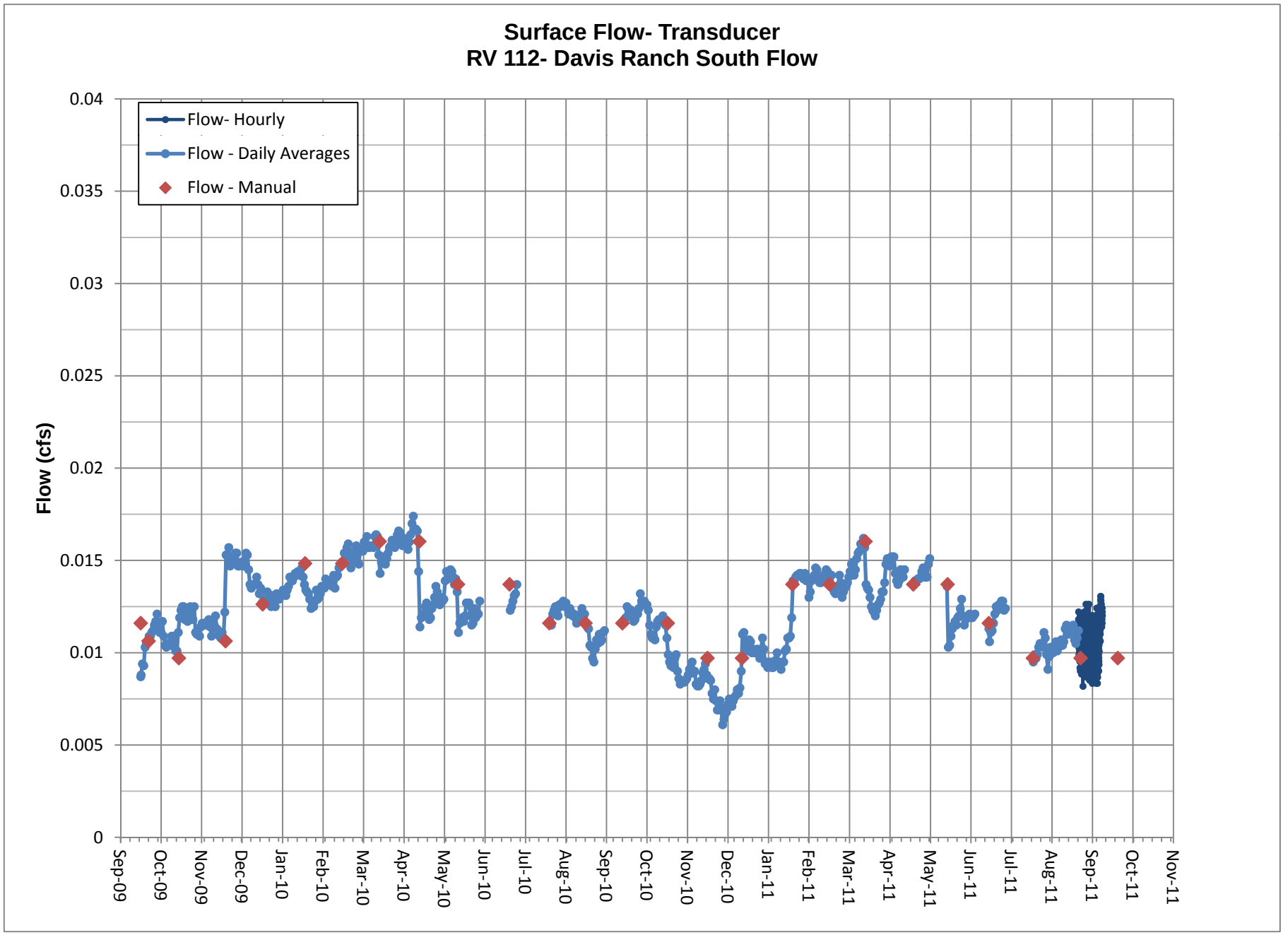
# SURFACE FLOW TRANSDUCER

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Note: Transducer reads drifted upwards from April-July 2010, September 2010, and May-July 2011, September 2011 due to biological activity in flume.

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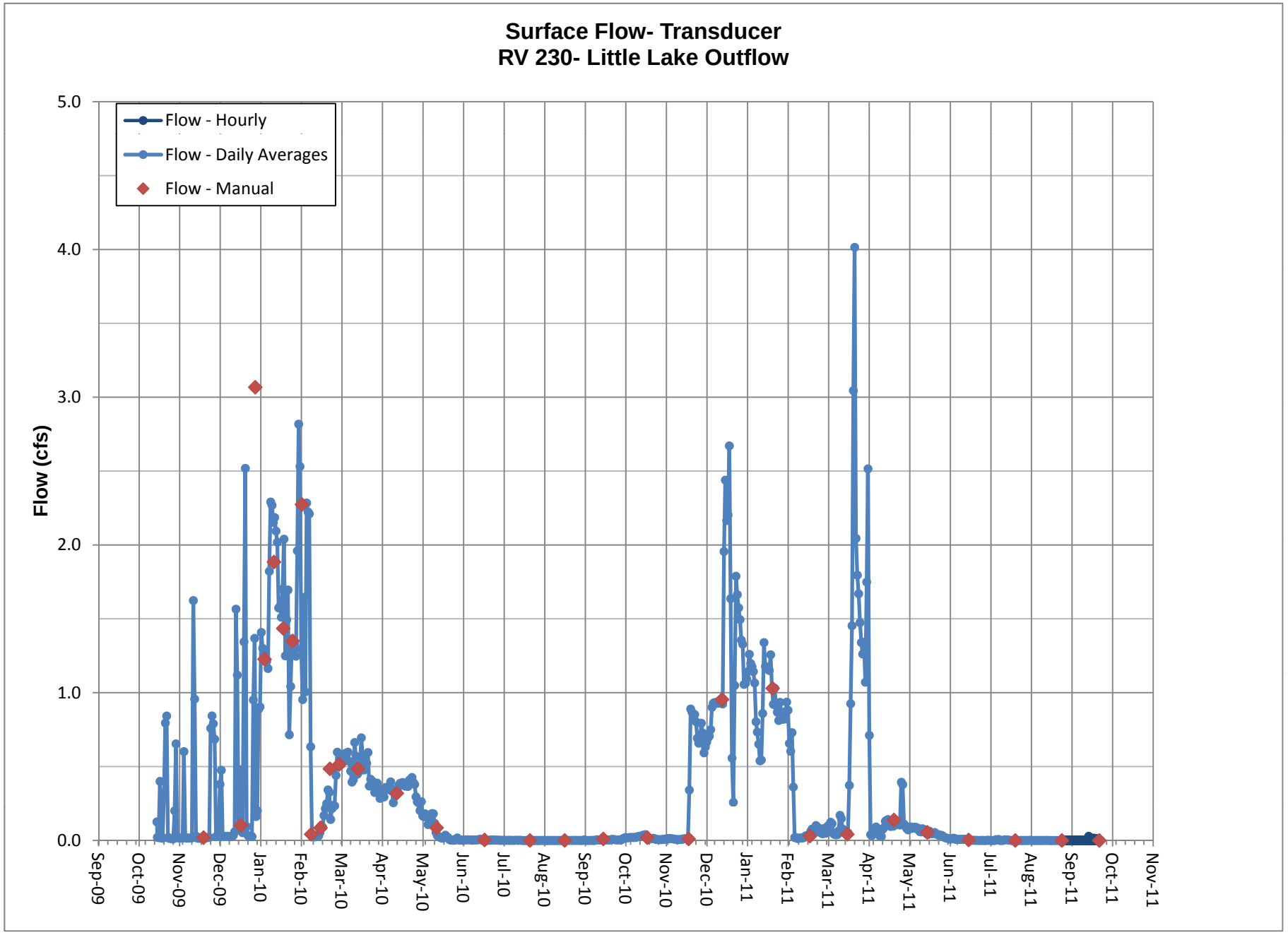


Note: Flows through Little Lake Outflow are influenced by natural and water management processes at Little Lakes Ranch.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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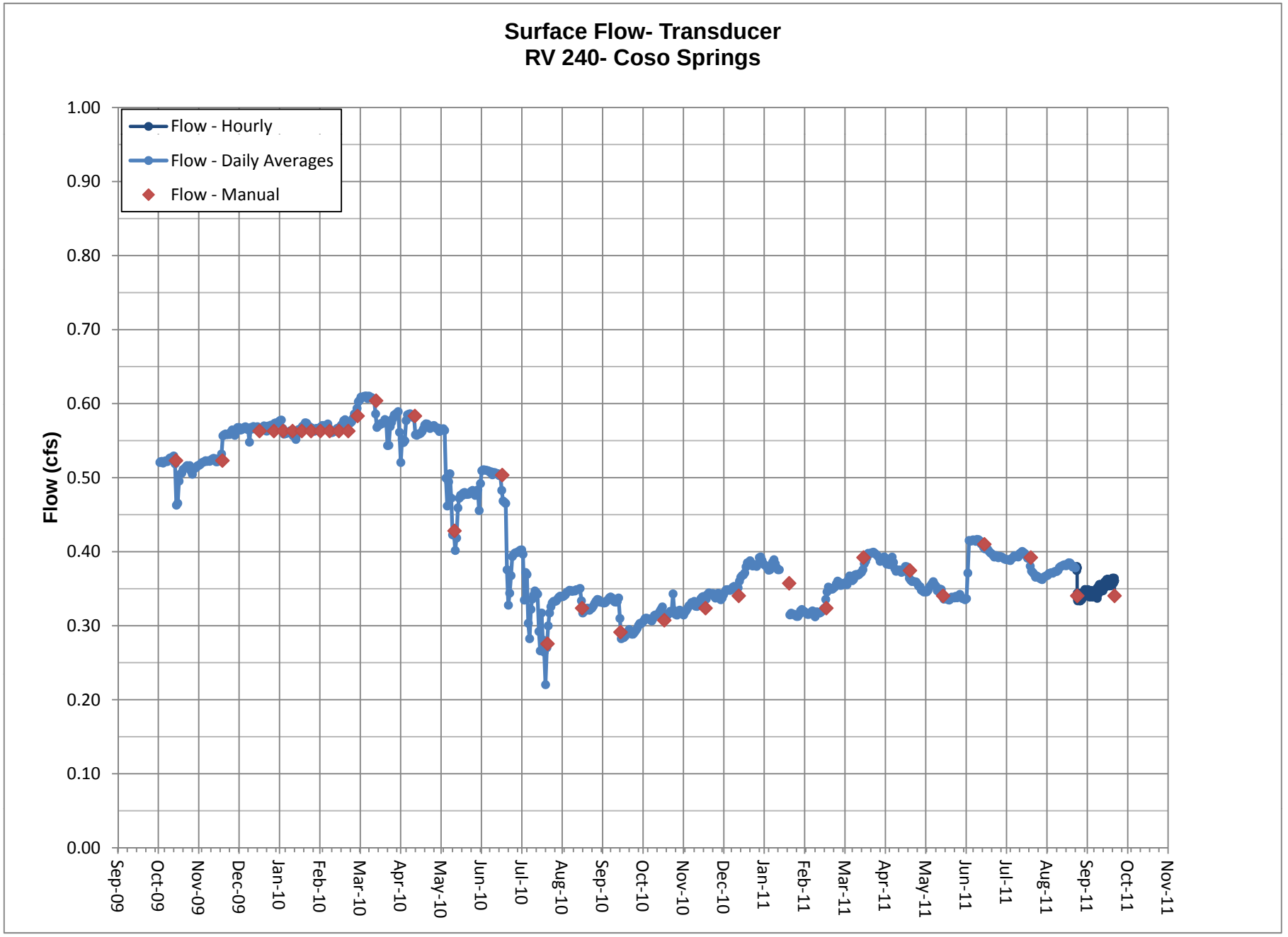


Note: Coso Springs is an artesian spring.
Data gap from 1/13/11 to 1/20/11 due to transducer malfunction.
LLR water management occurred in June 2011.

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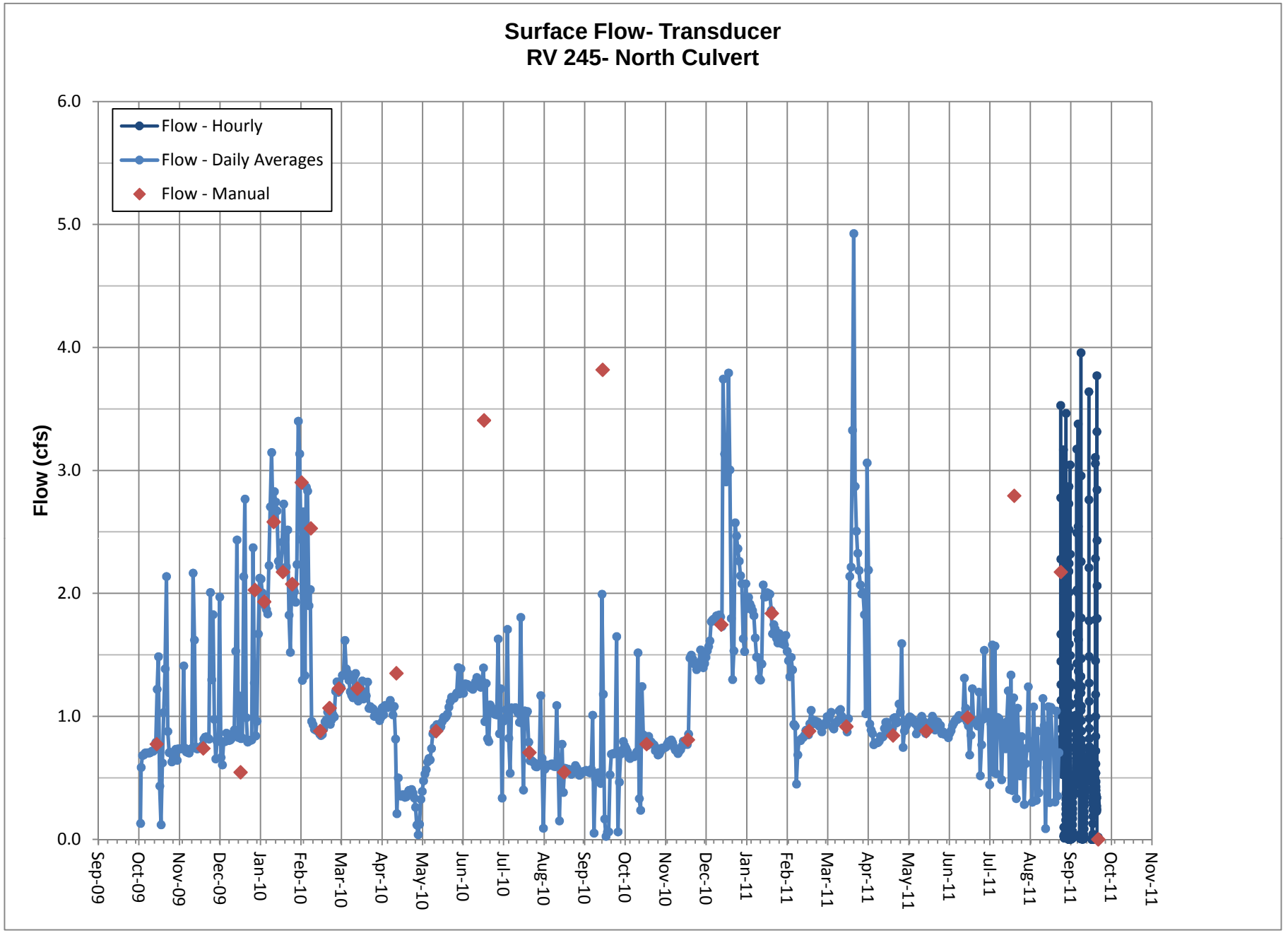


Note: Flows through North Culvert are influenced by natural and water management processes at Little Lakes Ranch.
Coso Operating Co. initiated Hay Ranch Project pumping on 12/25/09.

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